UIC
The University
of Illinois
at Chicago

OSWM-12 January 1993 Published by the Office of Solid Waste Management

Construction and Demolition Waste

Generation, Regulation, Practices, Processing, and Policies

by
Stephen D. Cosper
William H. Hallenbeck
Gary R. Brenniman

Office of Solid Waste Management
Gary R. Brenniman, Director
School of Public Health (M/C 922)
The University of Illinois at Chicago
2121 West Taylor Street
Chicago, Illinois 60612-7260

OSWM-12
January 1993

Construction and Demolition Waste

Generation, Regulation, Practices, Processing, and Policies

by

Stephen D. Cosper
William H. Hallenbeck
Gary R. Brenniman

Office of Solid Waste Management
Gary R. Brenniman, Director
School of Public Health
The University of Illinois at Chicago
2121 West Taylor Street
Chicago, Illinois 60612-7260

Preface and Acknowledgments

This public service report is a result of the concern of the Illinois Governor, State Legislature, and the Public for the magnitude of the solid waste problem in Illinois. This concern led to the passage of the Illinois Solid Waste Management Act of 1986. One result of the Act was the creation of the University of Illinois Office of Solid Waste Management (OSWM). One of OSWM's principal missions is to research and publish public service reports on important topics in solid waste management.

Funding for this public service report was provided by the Illinois Department of Energy and Natural Resources (ENR), Office of Recycling and Waste Reduction The views expressed in this report do not necessarily reflect the policy of the ENR. OSWM would like to acknowledge the review provided by ENR.

Copies of this report are available from the:

Office of Solid Waste Management
School of Public Health
2121 West Taylor Street
Chicago, Illinois 60612-7260

Telephone 312-996-6927

Printed on 100% recycled paper with 15% post-consumer content.

Disclaimer

Mention of company or trade names or commercial products does not sign
endorsement or a recommendation of use by the Office of Solid Waste
Management. Conversely, the exclusion of any organization, company, or proc
does not constitute a negative endorsement.

Summary

This report reviews the following aspects of managing construction and demolition (C/D) waste: generation rates, applicable Illinois regulations, waste management issues and practices, recycling processes and markets, and policy incentives. C/D waste includes materials generated from the construction, renovation, and demolition of residential and commercial buildings. The definition also encompasses debris from road maintenance.

Very little accurate information exists about C/D waste since, in most cases, it is not studied separately from the total municipal solid waste (MSW) stream. Most studies assess C/D waste to be between 15 and 30% of total MSW. The Illinois Department of Energy and Natural Resources (ENR) recently surveyed many C/D firms in the state about waste management practices. The results indicate that the majority of C/D waste is disposed of in MSW landfills.

Illinois counties have recently attempted to quantify C/D waste generation in their solid waste management plans. County data show generation rates ranging from 0.2 to 2.3 pounds per capita per day, with C/D waste comprising 5 to 35% of the total MSW stream. Both county population and per capita income correlate well with C/D waste generation. Waste from residential construction typically consists of about 30% wood, 30% cardboard, 15% drywall, 10% metals, and 15% consisting of plastic, foam, packaging, and masonry. The Toronto Homebuilders' Association reports that the cost of waste disposal is 0.5% of the project cost per new home built.

There is very little in Illinois legislation dealing specifically with C/D waste. However, language in a number of statutes makes it clear that C/D waste should be treated more leniently than MSW in terms of disposal regulation and taxes. The Illinois Pollution Control Board classifies different waste types and gives requirements for proper disposal. C/D waste can fall into several different categories depending on its composition and origin. The most stringent waste regulations deal with hazardous contaminants such as lead paint and asbestos.

In order to implement improved C/D waste management programs, contractors must perceive them to be time and cost efficient and reliable. Source separation on the job site is usually considered impractical. A construction waste hauler in McHenry County patterns its service after residential curbside recycling programs with frequent pick-ups. This effectively achieves source separation since, during a given time period, the waste from a project is relatively homogeneous. The salvaging of building materials from demolition or renovation projects could be more widely practiced to save landfill costs and make money from the sale of recovered items. Three salvage case studies demonstrate these ideas.

Companies who recycle C/D waste materials must be wary of contamination, and structure their tipping fees and material sales to be competitive with local landfills and virgin materials. Since many people prejudge recycled materials to be inferior, waste processors must emphasize quality control for their products. There are now several centralized C/D waste processing facilities in the U.S. These facilities are primarily located on the east and west coasts. They vary greatly in complexity, ranging from the manual sorting of a few materials to large, automated systems incorporating separation machinery and hand picking stations.

Wood wastes, when chipped, have a number of potential uses including landscaping, compost bulking agent, and boiler fuel. There is considerable confusion about how wood wastes should be managed and regulated if they are contaminated with potentially harmful substances (e.g. lead paint, creosote).

Concrete waste (the portion not landfilled) is almost always crushed into sand and gravel and used in pavements and other general construction applications. There are three general processes for recycling scrap asphalt concrete: on-site surface recycling, in-place recycling, and central plant recycling. Basic procedures for these methods have been widely practiced for many years. A new central plant technique utilizes microwave energy to rejuvenate old asphalt pavement.

The materials handling and market infrastructure for metals recycling have been in place for many years. This is due to scrap metal's relatively high value and high density which makes it economical to transport.

Scrap drywall is usually landfilled. However, a few companies have developed methods for recycling this waste into new drywall and other products.

Roofing waste may contain several different materials but the most common are the traditional asphalt based shingles and roofing felts. These two materials have proven effective in making asphalt paving products.

State and local governments can encourage C/D waste recycling through economic incentives for new business ventures. Government can specify the use of reclaimed construction materials and specify waste management practices in government building contracts. Sound C/D waste management practices may be linked to obtaining building permits. County government can promote salvage activity by coordinating a waste exchange program.

In the private sector, building trade organizations can work to identify and eliminate wasteful practices and to promote material-efficient construction methods. Design professionals can specify the use of reclaimed materials and preferred waste management practices. Alternative bids (e.g. one with and one without waste recycling) can be used to encourage contractors to fully consider all the available waste management options.

Table of Contents

Chapter — Page

1. Introduction 1
   1.1 Definition of C/D Waste 1
   1.2 Current C/D Waste Disposal Practices in Illinois 1

2. Waste Generation 4
   2.1 Illinois Counties 4
   2.2 U.S. Army 7
   2.3 Toronto Home Builders' Association 9
   2.4 Kimmins Recycling Corporation 9
   2.5 C.T. Donovan Associates 10

3. Regulation of Construction and Demolition Waste 13
   3.1 Illinois Legislation 13
      3.1.1 Environmental Protection Act of 1970 13
      3.1.2 Solid Waste Management Act of 1986 14
      3.1.3 Solid Waste Planning and Recycling Act of 1989 15
   3.2 Illinois Pollution Control Board Regulations 15
      3.2.1 Types of Waste 15
      3.2.2 Types of Landfills 17
   3.3 Hazardous Contaminants 18
      3.3.1 Lead Paint 18
      3.3.2 Wood Treatments 19
      3.3.3 Asbestos 19
      3.3.4 Other Hazards 20

4. Construction and Demolition Waste Management: Issues and Practices 22
   4.1 Contractor's Perspective 22
   4.2 Source Separation - Cornerstone Material Recovery 24
   4.3 Salvage 26
      4.3.1 Preservation and Conservation Association (PACA) 26
      4.3.2 Wastebusters, Inc 28
      4.3.3 Salvage One 29
   4.4 Debris Processors 30
   4.5 Central Processing Facilities 32
      4.5.1 Low Technology MRF - Dump and Pick 33
      4.5.2 Medium Technology MRF 33
      4.5.3 High Technology MRF 35

5. Recycling Processes and Markets for Specific Materials....38
5.1 Wood....38
5.2 Concrete....39
5.3 Asphalt....40
5.3.1 On-Site Surface Recycling....41
5.3.2 In-Place Recycling....41
5.3.3 Central Plant Recycling....42
5.4 Metals....43
5.5 Drywall....46
5.6 Roofing....49

6. Policies and Incentives to Improve Construction and Demolition Waste Management....50
6.1 Public Sector....50
6.2 Private Sector....51

Glossary of Terms, Abbreviations, and Acronyms....55

Appendix A Legislation and Regulation Applicable to C/D Waste....57

Appendix B Manufacturers of Construction and Demolition Waste Processing Equipment....70

Appendix C Waste Processors In or Near Illinois....75

Appendix D Request for Proposals....91

References....96

Additional Information Sources....100

List of Tables

Table — Page

1.1 Results of ENR construction and demolition business survey.....3
2.1 C/D waste estimates from selected Illinois counties.....5
2.2 Construction waste produced by different housing types.....7
2.3 Composition of demolition waste by type of building.....7
2.4 Composition of C/D debris at a Kimmins Recycling facility.....11
2.5 1989 C/D waste in Vermont.....12
3.1 Maximum concentrations of contaminants for the toxicity characteristic TCLP test.....16
3.2 Possible hazardous contaminants in C/D waste.....21
4.1 Capital investments for a hypothetical wood and concrete processing facility.....35
5.1 U.S. metal consumption and recycling, 1990.....45
5.2 Use of metals in construction.....47

List of Figures

Figure P

2.1 C/D waste as a function of population.....
2.2 C/D waste as a function of per capita income.....
2.3 Prediction of demolition debris volume for several types of structures.....
2.4 Prediction of demolition debris volume from wooden, residential structures.....
2.5 Waste from low-rise residential construction.....1
3.1 Flow chart for determining status of lead paint waste.....1
4.1 Medium technology C/D MRF.....3
4.2 Marin Resource Recovery Center C/D MRF.....3
4.3 Wood Recycling, Inc. C/D MRF.....3
5.1 Wood waste processing plant.....3
5.2 Flow diagram of a concrete crushing plant.....3
5.3 Surface asphalt recycling by heater-scarification.....4
5.4 In-place recycling of asphalt pavement.....4
5.5 Flow diagram of a reclaimed asphalt pavement (RAP) processing plant...4
5.6 Cold mix asphalt plant.....4
5.7 Hot mix asphalt plant.....4
5.8 Microwave asphalt recycling process.....4
5.9 Iron and steel recycling flow diagram.....4
5.10 New West Gypsum processing plant.....4
5.11 RTI gypsum recycling plant.....4

Chapter 1 Introduction

The construction and demolition industry is an integral part of the U.S. economy. The total value of all new construction in 1988 was $403 billion and related industries employed 7.3 million people [Exceltech, 1990]. Most studies assess construction and demolition (C/D) waste to be between 15 and 30% of total municipal solid waste [Fisher, 1992; PE, 1991; Rathje, 1992; REIC, 1990]. This report will review the following aspects of managing C/D waste: material generation rates, applicable regulations, recycling processes, and markets. It will also illustrate these points with a number of case studies.

1.1 Definition of C/D Waste

In this report, C/D waste or debris will include materials generated from residential and commercial buildings, and from road construction. Residential and commercial C/D waste includes materials generated in the construction, renovation, or demolition of houses, apartments, office buildings, or similar structures. This also includes packaging and other incidental materials related to a building construction project. The most common materials in this category are: wood, concrete, corrugated cardboard, drywall, metals, and roofing.

Road construction waste is generated during road repairs by removing top layers or the entire structure of old pavements and bridges. This material consists of asphalt concrete and portland cement concrete (PCC) which often contains steel reinforcing bars (rebar). Asphalt concrete (commonly referred to as asphalt) is a mixture of graded aggregates and bituminous material (asphalt) which is almost always derived from the distillation of crude oil. PCC is a mixture of portland cement (anhydrous tricalcium silicate), water, and fine and coarse aggregates. Rebar improves the tensile strength of PCC.

1.2 Current C/D Waste Disposal Practices in Illinois

The generation of C/D waste is difficult to quantify because it is not recorded as a separate category from MSW in most cases. Only eight counties in the state used local data on C/D waste for their solid waste needs assessments [PE, 1991]. Most of the other counties relied on published generation rates. Illinois county data is presented in Chapter 2.

The recycling of C/D waste is even more difficult to quantify. While the state has several C/D waste processors, it is nearly impossible to determine what fraction of the overall waste stream they handle. One would have to track individual contractors, waste haulers, and processors to get recycling rates for a specific geographic area. This effort would require the cooperation of many public and

private groups.

In December 1991, the Office of Recycling and Waste Reduction of the Illir Department of Energy and Natural Resources (ENR) mailed a survey to C/D companies in the metropolitan areas of Chicago, East St. Louis, and Rockford. These companies represented a wide range of business sizes and types. The purpose of this survey was to help estimate the amount of material discarded by t construction industry in the state and to learn how ENR can best focus its C/D waste reduction efforts. Some of the questions were specific about types of wast generated and recycled, and others were more general. Although 211 companies returned the survey, relatively few answered the questions about specific waste materials. Table 1.1 shows a summary of the responses to questions which were answered by a high percentage of the companies. Over 90% said that their waste sent to a landfill. Very few of the respondents answered the questions about recycling specific materials; of those that did, about half said they did not recycl In response to another question, 58% said that 0 to 25% of their waste is dispose of as cleanfill. Overall, responses to the questionnaire imply that the majority of C/D waste is going to regular MSW landfills. C/D waste is filling landfill capaci needed for municipal refuse. These figures are qualitatively supported by discussions with a number of people in this field.

Other states, especially in the Northeast, are ahead of Illinois in C/D waste recycling efforts. This is mainly due to shrinking landfill capacity, higher tippin fees, and tougher disposal restrictions. These conditions have encouraged innovative waste management practices, and people in the trades are beginning to realize the economic benefits of waste reduction and recycling. Somewhat ironically, some landfills in the Northeast, which will soon be closed for environmental reasons, are *lowering* their tipping fees in order to attract more wa and generate as much revenue as possible before the state shuts them down [Rochwarg, 1992]. However, lack of landfill space and stricter regulation will eventually favor waste reduction and recycling in all regions of the country.

Table 1.1 Results of ENR construction and demolition business survey [ENR, 1992]

Question	Response	Percent	Number of Respondents
Does your company dispose of or pay for the disposal of construction or demolition wastes? Check one.	Yes	80.6	211
	No	19.4	
	Don't know	0.0	
		100.0	
How does your company dispose of its waste? Check all that apply.	pay to landfill	66.8	170
	we landfill	25.6	
	we recycle	6.2	
	dispose on site	3.3	
	pay to recycle	2.8	
	recycler picks up	2.8	
	other	2.4	
	burn on site	1.4	
What percent of your annual waste waste is considered cleanfill or disposed of as cleanfill?	0 to 25%	58.4	149
	26 to 50%	11.4	
	51 to 75%	7.4	
	76 to 100%	22.8	
		100.0	
Check the box next to each type of waste generated by your business.	drywall	65.4	163
	wood	48.8	
	concrete	38.4	
	cardboard	31.3	
	bricks	30.8	
	plaster	29.4	
	ferrous	27.5	
	dirt	22.3	
	asphalt	21.3	
	glass	15.2	
	non-ferrous	14.7	
	tar based	13.3	
	plastic	8.1	
	white goods	3.8	

Chapter 2 Waste Generation Studies

Construction and demolition debris has remained an elusive component of th waste stream for a number of reasons. It is generated to a large extent by the private sector which may not keep nor typically share disposal records. It does n fall neatly into established waste management categories. For example, Franklin Associates did not include C/D waste in their definition of MSW because there is no accurate information at the national level [USEPA, 1992]. This chapter will present some past and current studies which try to quantify C/D waste.

2.1 Illinois Counties

Since recent quantification studies have revealed the surprisingly large magnitude of C/D waste generation and disposal, more government bodies have begun to quantify this waste within their jurisdictions. The solid waste management plans required by the Illinois Solid Waste Management Act have caused counties to examine their waste streams' individual components. Solid waste planners understand that many elements influence the generation rate of C/D waste, e.g. population, income, age of the community, government policies, and certainly economic factors. All these components interact in a complex way. However, one can use general trends and demographic data to make generalizatio and ballpark predictions. The needs assessment from Kankakee County [PE, 199 tabulates demographic and waste generation data for several Illinois counties. Those counties that included C/D data in their assessment are reported in Table 2 High C/D waste generation rates in Champaign, DuPage, Lake, and McLean Counties reflect more rapid housing and commercial development.

Most of the counties not listed in Table 2.1 used a value of 0.72 pounds of C/D waste per capita per day. This is a frequently cited figure found in the literature. Counties using this figure may seriously underestimate their C/D wast generation.

By using statistical methods with this information, predictions can be made concerning how a given variable influences C/D waste generation. Figure 2.1 shows county C/D waste generation plotted against population ($r=0.85$). Figure 2.2 shows C/D waste (in thousands of tons per year) versus per capita income ($r=0.89$). Both of these relationships can be used for rough predictions of C/D waste generation.

McHenry County recently conducted a construction waste audit with the help of Cornerstone Material Recovery [Fisher, 1992]. They found that wood waste a old corrugated cardboard (OCC) each comprised one third of the total volume, drywall waste was 14% of the total volume, metals 10%, with the remainder consisting of plastic, foam, packaging, masonry, and other miscellaneous debris.

Cornerstone also calculated exact weights of waste materials from one single family and one multi-family housing construction project. These data show that while relative percentages of materials are similar for both cases, the multi-family residence produced only about half the waste (in terms of pounds per square foot) as the single family case (Table 2.2).

Table 2.1 C/D waste estimates from selected Illinois counties [PE, 1991]

County	Year	C/D waste (lbs/(cap-day))[a]	C/D waste (tons/yr)	MSW (lbs/(cap-day))	MSW (tons/yr)	% C/D
Champaign[b]	1987	1.8	58,100	5.2	164,000	35
Cook (North)	1988	0.7	107,500	-	-	-
Cook (South)	1989	0.7	75,400	5.2	547,200	14
Cook (West)	1987	0.7	67,400	5.8	553,000	12
DuPage[c]	1990	2.3	93,300	4.5	600,100	16
Iroquois	1989	0.7	4,200	6.0	35,000	12
Kane[d]	1989	1.1	62,020	8.4	490,820	13
Kankakee	1990	1.0	17,680	6.8	120,816	15
Lake[b]	1987	1.7	147,000	6.7	579,000	25
LaSalle	1990	1.0	9,800	5.5	106,400	9
Macon[b]	1989	1.0	24,000[e]	7.1	163,900	15
McLean[b]	1988	1.5	35,900	6.9	163,400	22
McHenry[f]	1989	1.3	39,050	7.7	240,190	16
Peoria	1988	0.7	22,800	6.0	199,300	11
Tazewell	1990	0.7	16,200	6.5	145,000	11
Whiteside[b]	1988	0.2	2,300	4.1	46,500	5
Will	1990	0.7	46,300	5.0	323,000	14
Average		1.0		6.1		15

(a) "lbs/(cap-day)" means pounds of material per person per day
(b) Denotes that these figures were obtained from local data
(c) [DuPage, 1990]
(d) Includes 6,000 tons per year recycled
(e) [KCDD, 1990]
(f) [GASA, 1991]

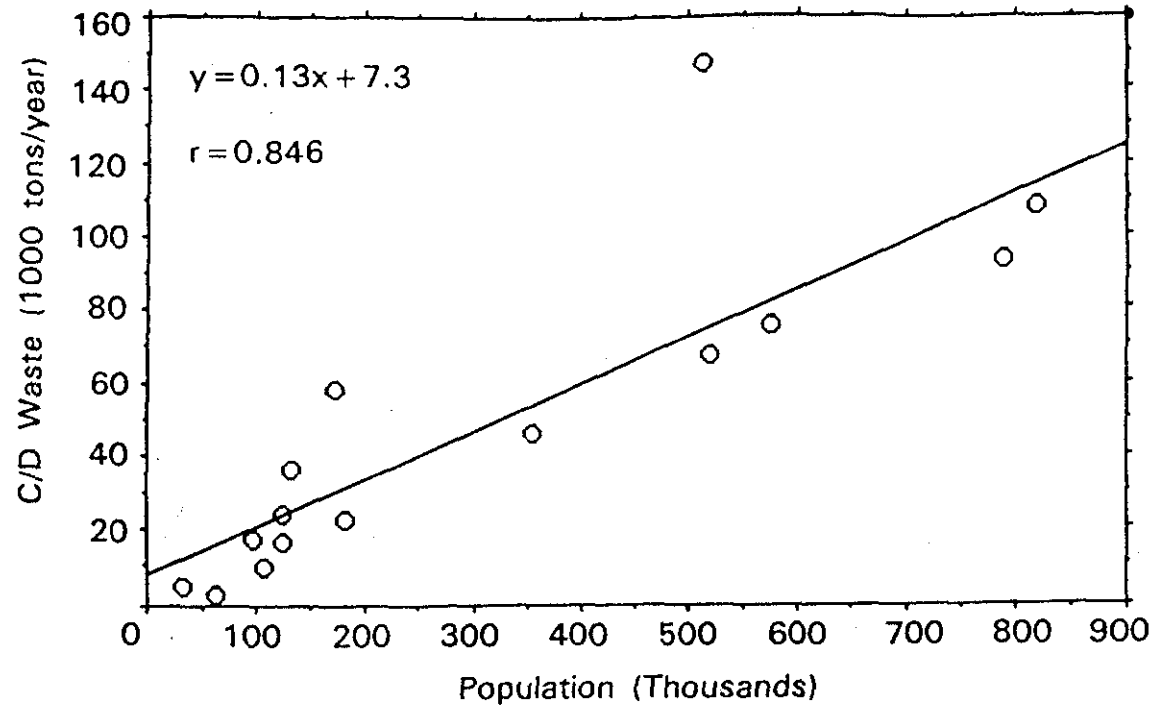

Figure 2.1 C/D waste as a function of population (data taken from [PE, 1991

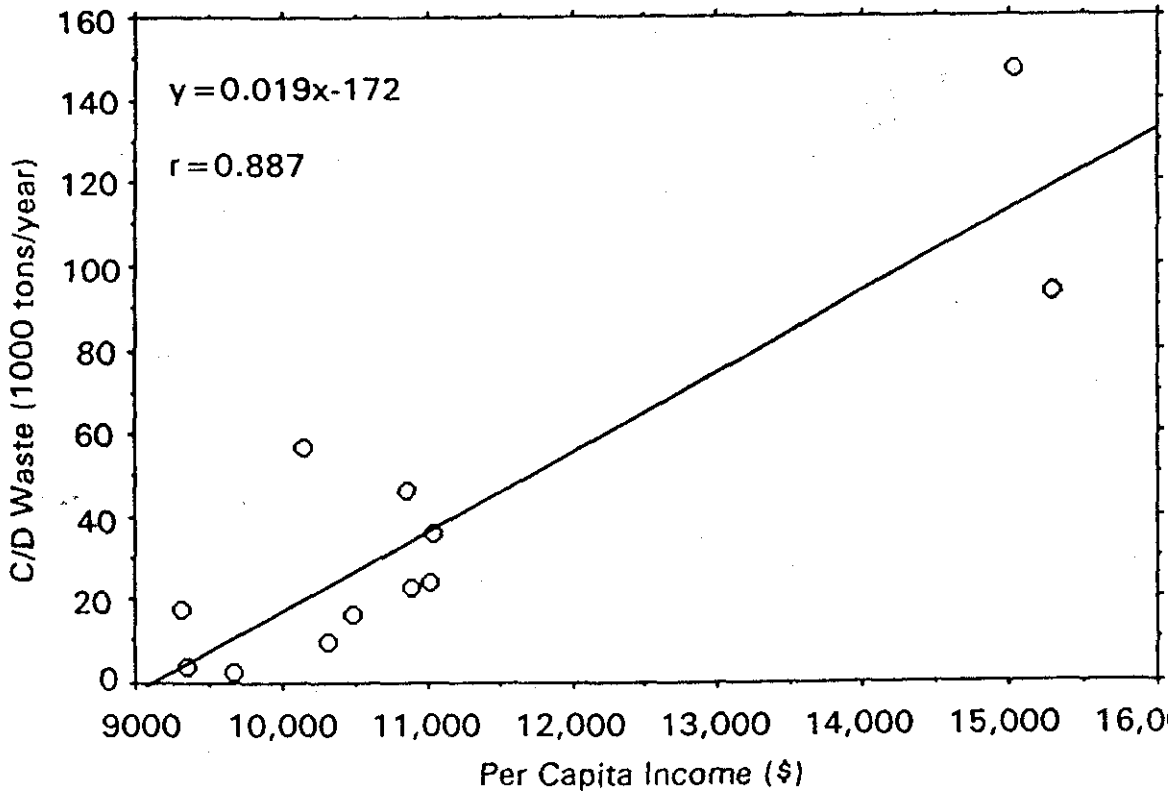

Figure 2.2 C/D waste as a function of per capita income (data taken from [PE, 1991])

Table 2.2 Construction waste produced by different housing types [Fisher, 1992]

	6 unit apartment building (9000 ft^2)		single family house (2,060 ft^2)	
Waste type	tons of waste	% total	tons of waste	% total
wood	7.40	44	3.40	46
gypsum/drywall	4.25	25	1.88	25
mixed debris	3.00	18	1.13	15
cardboard	1.08	6	0.40	5
metals	0.52	3	0.44	6
masonry	0.53	3	0.18	2
Total	16.78		7.43	
Waste generated per floor area	3.7 lbs/ft^2		7.2 lbs/ft^2	

2.2 U.S. Army

In the mid 1970s, the U.S. Army Construction Engineering Research Laboratory performed a study of demolition practices and waste generation at 45, mostly civilian, demolition sites [CERL, 1976]. The purpose was to generate guidelines for safely performing demolition, managing the waste, and to look for salvage opportunities. Table 2.3 summarizes the relative amounts of different waste materials generated by the type of structure demolished. As one would expect, 70 to 80% of the waste generated consists of the primary building material of the structure.

Table 2.3 Composition of demolition waste by type of building [CERL,1976]

Type of Building	Number of Buildings	% Material				
		Concrete	Brick	Wood	Paper Board	Steel
Residential Wood	18	4	13	80	0	3
Residential Brick	4	0	73	23	3	2
Commercial Brick	9	20	71	12	1	3
Commercial Wood	3	7	18	73	0	3
Commercial Concrete	4	51	22	18	5	3

This study collected data on volume of waste generated and floor area of the building in order to try to find a correlation for predicting waste volumes from future demolition projects. Figure 2.3 shows a plot of these data for each of the projects studied, while Figure 2.4 only uses data from the demolition of wooden,

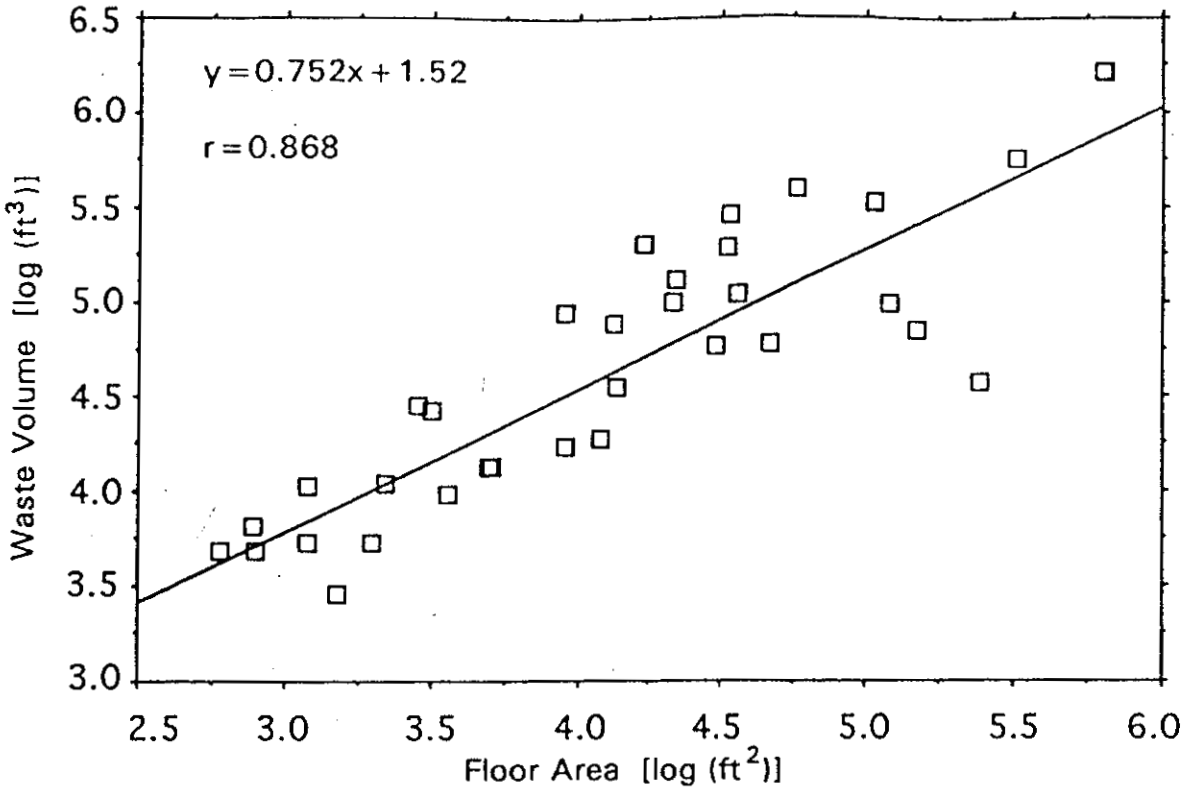

Figure 2.3 Prediction of demolition volume for several types of structures (data taken from [CERL, 1976])

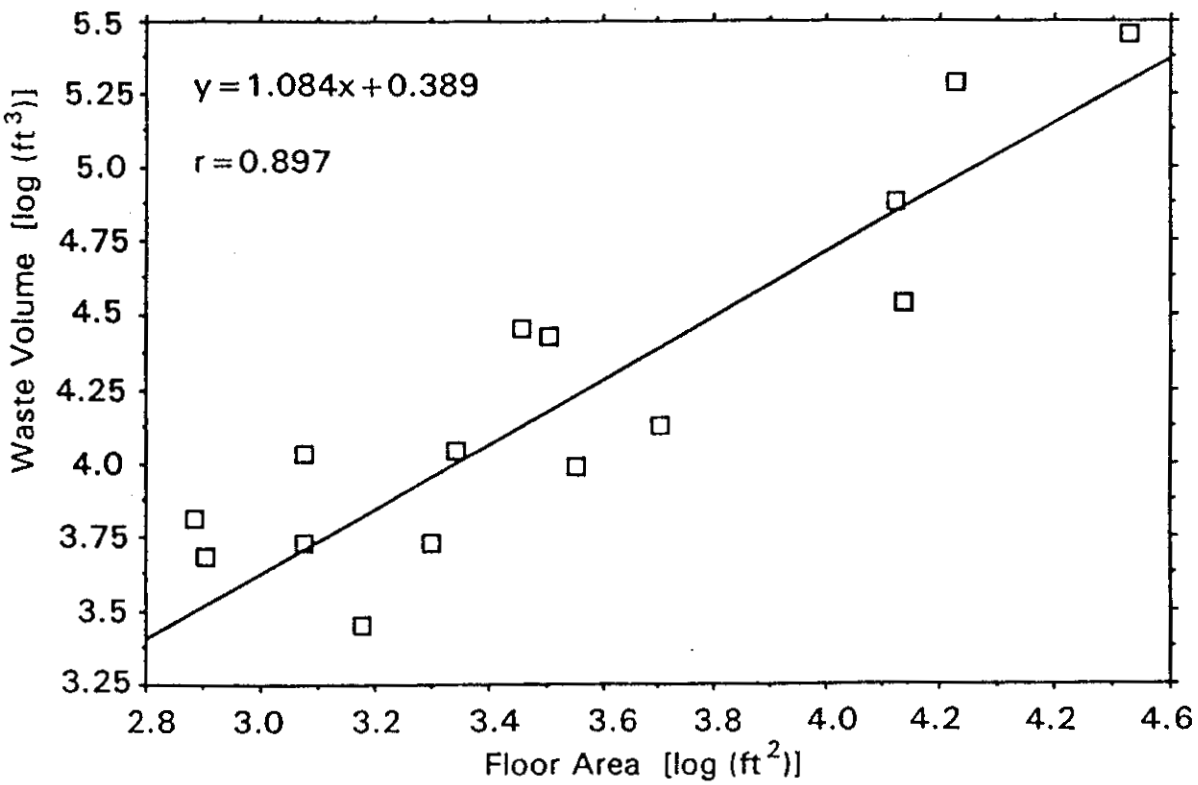

Figure 2.4 Prediction of demolition debris volume from wooden, residential structures (data taken from [CERL, 1976])

residential buildings. Logarithmic conversion of volume and area data were necessary since the projects surveyed vary greatly in size.

2.3 Toronto Home Builders' Association

In response to increasing tipping fees and landfill bans on certain materials, the Toronto Home Builders' Association published a report entitled Making a Molehill Out of a Mountain [REIC, 1990]. The purpose of this report was to assess current waste generation from the home building industry and to give guidance for reducing construction waste in the future. Their study consisted of questionnaires sent to 885 association members as well as several site visits. They found that in the Toronto area, the construction of each new house generates an average of 2.3 tonnes of waste. Waste generation for low-rise residential construction by type of material is presented in Figure 2.5.

The Association also collected data from their members on the cost of waste disposal. While the majority of respondents expressed concern about rising disposal costs, less than half of them could give detailed figures on their own expenditures. The average reported cost of waste disposal was between 0.3 and 0.5% of the total project cost per new house built.

Firms engaged in home renovation reported an average of $40,000 spent annually on waste disposal. Due to the demolition waste generated and economies of scale for these typically smaller firms, waste disposal is a higher percentage of a renovator's total project cost than for a new home builder.

2.4 Kimmins Recycling Corporation

Kimmins Recycling of Tampa, Florida operates C/D material recovery facilities (MRFs) in Miami, Tampa, Jacksonville, Clearwater, and Lantana. They accept the complete C/D waste stream and separate out wood, cardboard, and metals for recycling. Wood waste is chipped and sold as landscaping; cardboard is recycled in Alabama paper mills; concrete is crushed into gravel for use in paving materials; and metals are sold to local scrap dealers [Piano, 1992]. Kimmins diverts about 45% by volume of the incoming material from landfilling or incineration. A one time analysis of debris entering one of their MRFs yielded the composition data in Table 2.4. Kimmins' tipping fees are all competitive with the local landfills or incinerators. They base the fee in part on current markets for their reclaimed products.

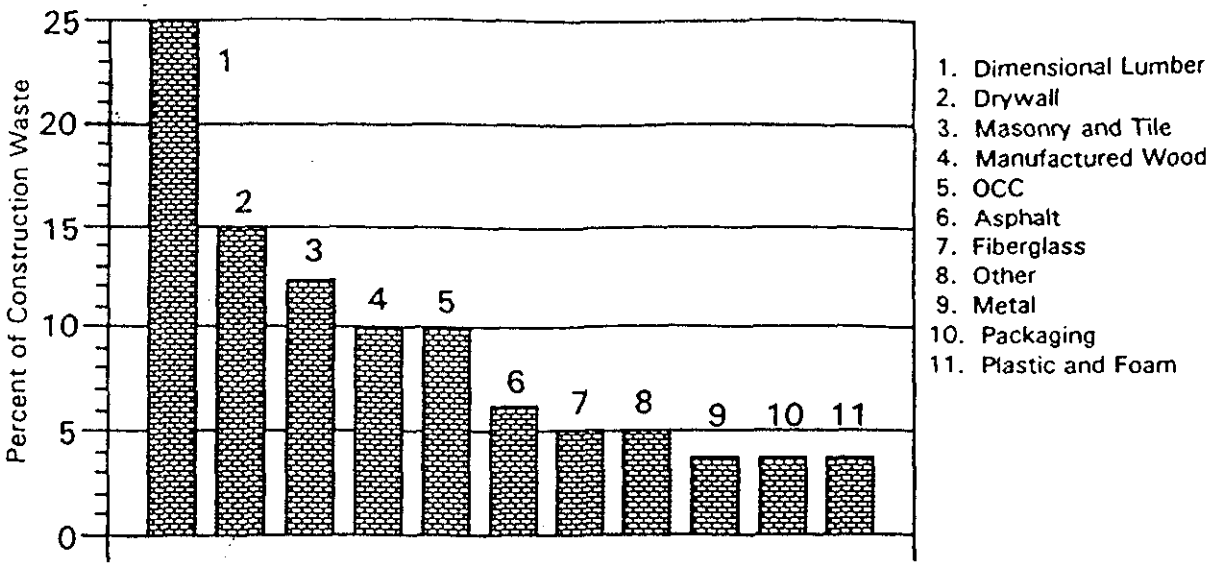

Figure 2.5 Waste from low-rise residential construction [REIC, 1990]

2.5 C.T. Donovan Associates

In 1990, the Vermont Agency of Natural Resources commissioned C.T. Donovan Associates of Burlington to perform a C/D waste generation study and identify opportunities for reuse and recycling of these materials. This has become one of the best known and most comprehensive studies in this field [CT Donovan 1990].

As a first step, they inventoried previous studies and found that the number reported varied widely. In Vermont, the first estimates were made in the State Solid Waste Management Plan in 1989, and they did not take into account waste related to road and bridge construction. The Plan estimated 41,878 tons/year generated in the state, while Donovan's own estimate was 161,000 tons/year including road related waste.

Donovan says that, ideally, factors going into such estimates should include population trends; employment trends in relevant business types; data on the actual type and amount of building, road and bridge construction, renovation and demolition; records of actual C/D disposal at landfills or other facilities; and documentation of past trends in C/D activity and forecasts of future trends. Unfortunately, almost all of this information is either not readily available or nonexistent. Therefore, Donovan developed their own strategy to estimate C/D waste generation in Vermont which they summarize as follows:

- Identify the types of businesses and industries that generate C/D waste in the state by Standard Industrial Classification (SIC) including the number

Table 2.4 Composition of C/D debris at a Kimmins Recycling facility [Woods, 1992]

Material Description		% by Volume	% Recycled
WOOD	construction lumber	25.0	70
	pallets	2.0	95
	trees and stumps	5.0	100
PAPER	cardboard	17.0	75
	rolled paper	0.2	0
	misc.	0.6	0
CONCRETE	concrete block	1.0	0
	poured concrete sections	1.0	50
	plaster	0.3	0
	brick	0.2	0
PLASTICS	plastic pails	1.0	0
	plastic pipe	0.2	0
	polyethylene sheets and styrofoam	0.8	0
METALS	ferrous metals	5.0	95
	non ferrous metals	2.0	95
ROOFING	shingles	3.0	0
	built-up roofing	5.0	0
	roofing insulation	5.0	0
EARTH	dirt	2.0	30
MISC	drywall	15.0	0
	broken glass / windows	0.1	0
	old doors and frames	0.1	0
	building insulation	4.0	0
	paint containers (empty)	0.8	0
	ceiling or floor tile	0.8	0
	carpet remnants	2.0	0
	ceramic tile	0.1	0
	plumbing fixtures	<0.1	0
	electrical fixtures	<0.1	0
UNACCEPTABLE (separated for proper disposal)	batteries	<0.1	100
	white goods	0.1	100
	tires	0.2	0
	furniture	0.2	0
	household garbage	0.2	0

of firms in the state, and the total employment by SIC

- Determine specific materials included in the C/D waste stream
- Interview major generators of C/D debris (i.e. include both building related, and road and bridge-related companies)
- Identify which waste materials are generated in the largest amounts i state and estimate the amount of waste generated by the actual level c activity in a specific commercial or industrial activity
- Develop estimates of the amount of material generated per year for r components of the C/D waste stream.

Following this procedure, the firm estimated the C/D waste generation disposal in Vermont for the year 1989. Table 2.5 gives relative generation r type of material and disposal method. The first column of the table shows e component as a percent of the total generation. The remaining columns indic how much of a material is disposed of in a given manner. For example, 50% waste asphalt generated is either recycled or reused; 202,250 tons per year o waste is either reused or recycled. On-site and illegal disposal includes on-s burying and burning, and off-site dumping.

Table 2.5 1989 C/D waste in Vermont [CT Donovan, 1990]

Material	1989 Gross Generation (%)	Reuse/ Recycling (%)	On-site/ Illegal Disposal (%)	Net Discar (%)
Asphalt	46	50	20	30
Wood	26	50	20	30
Concrete	14	20	20	60
Other Mixed	9	7	47	46
Metal	5	40	20	40
Tons per year	490,000	202,250	110,000	177,750

(a) net discards = (gross generation) - (reuse/recycling) - (on-site/illegal disposal)

Chapter 3 Regulation of Construction and Demolition Waste

This chapter will provide a brief overview of the laws and regulations bearing on the disposal of C/D waste in Illinois. The first section (3.1) discusses regulation of the C/D waste stream as a whole through three broad acts of the Illinois General Assembly. The second section (3.2) looks at the different types of landfills and C/D waste classifications under Illinois Pollution Control Board regulations. Finally, the third section (3.3) examines the regulation of hazardous materials related to C/D waste. Appendix A contains extended passages from the legislation and regulations discussed in this chapter.

3.1 Illinois Legislation

3.1.1 Environmental Protection Act of 1970

In the State of Illinois, the disposal of C/D waste can be governed and influenced from a number of directions. The Environmental Protection Act is the foundation for all environmental regulations. The Illinois General Assembly passed the Act to establish (§ 2(b)):

> "...a unified, state-wide program supplemented by private remedies, to restore, protect, and enhance the quality of the environment, and to assure that adverse effects upon the environment are fully considered and borne by those who caused them"

The Act is the basis for all state environmental programs. It established the Pollution Control Board (PCB) to interpret state laws into working regulations; created the Illinois Environmental Protection Agency (IEPA) to monitor and enforce compliance with these regulations; and it charged the Department of Energy and Natural Resources (ENR) with research and education.

The Act includes C/D debris in its definition of "municipal waste":

> § 3.21 "Municipal waste" means garbage, general household and commercial waste, industrial lunchroom or office waste, landscape waste, and construction and demolition debris.

The Act also gives a working definition of "clean construction or demolition debris":

> § 3.78 "Clean construction or demolition debris" means broken concrete without protruding metal bars, bricks, rock, stone, reclaimed asphalt pavement, or uncontaminated dirt or sand generated from construction or demolition activities.

The Act authorizes local governments to exact fees or taxes on waste disp for the purpose of funding local waste management programs (§ 22.15(j)). However, there are a number of exceptions that apply to C/D waste.

> § 22.15(k)(5) Any landfill which is permitted by the Agency to receive only demolition or construction debris or landscape waste (is exempt).

In addition, waste that exhibits characteristics typical of building rubble is exe

> § 22.16a(b)
> - the waste is non-putrescible and homogeneous and does not contain free liquids
> - combustion of the waste would not provide practical energy recovery or practical reduction in volume

The volume of C/D-type waste accepted at a landfill may be deducted from that site's annual total for the purpose of fee payments to the state Solid Waste Management Fund.

3.1.2 Solid Waste Management Act of 1986

The purpose of this Act is to create a comprehensive solid waste managem program and policy for the State. A key point in the Act is the state agency materials recycling program, (§ 3), which sets waste reduction goals for state agencies, establishes guidelines for purchasing recycled products, and requires waste reduction plans for state universities and colleges (§ 3.1). While the Act does not name C/D waste *per se,* certain paragraphs make it clear that materials exhibiting typical C/D waste characteristics should not be treated as common MSW. Inert, homogeneous, non-putrescible materials should not take up space landfills designed for MSW.

> §2(a)(10) (The General Assembly finds:) that there are over 300 landfills in Illinois which are permitted to accept only demolition or construction debris or landscape waste, the vast majority of which accept less than 10,000 cubic yards per year. By themselves these wastes pose only a minimal hazard to the environment when landfilled in compliance with regulatory requirements in an Agency-permitted site without commingling with other wastes and, as such landfills receiving only such wastes bear a real and substantial difference from landfills receiving wastes which are commingled. Disposal of these wastes uses up increasingly scarce capacity for garbage, general household and commercial waste. It is the policy of the State to encourage disposal of these wastes in separate landfills.

3.1.3 Solid Waste Planning and Recycling Act of 1989

With the passage of this act, local agencies must make a detailed assessment of their waste generation, and write a solid waste management plan for the next 20 years. This has caused the counties to examine their respective C/D waste generation rates. The plan must include a recycling program which is designed to recycle 15% (by weight) of the municipal waste stream after three years, and 25% after five years. Any C/D waste used as clean fill or for erosion control does not count toward these goals.

3.2 Illinois Pollution Control Board Regulations

This section will explain the different solid and hazardous waste classifications, types of landfill permits, and which type of waste may be disposed of in which type of landfill. It is included to summarize and clarify the applicable regulations. All specific citations in this section and in section 3.3 are from Title 35 of the Illinois Administrative Code unless otherwise noted.

3.2.1 Types of Waste

"Hazardous waste" is a substance which is ignitable, corrosive, reactive, or toxic. Ignitable means a liquid with a low flashpoint, a flammable solid or compressed gas, or an oxidizer (§721.121). A liquid is corrosive if it has a pH below 2 or above 12.5 (§721.122). Reactive means unstable or emits toxic gases under normal conditions, or reacts violently with water (§721.123). A waste is toxic (§721.124) if the Toxicity Characteristic Leaching Procedure (TCLP), specified in 40 CFR 261 Appendix III, yields a concentration of a given substance higher than the regulatory level. Table 3.1 gives the regulatory levels for some possible C/D waste contaminants. The purpose of the TCLP test is to simulate conditions in a landfill to determine if a given waste would become mobile in the leaching process. Title 35 also lists specific industrial byproducts, pesticides, and chemicals considered hazardous by the USEPA (§721, Subpart D).

"Solid waste" is a rather broad category with three subclassifications under PCB regulations (§810.103):

- "Chemical waste" means a non-putrescible solid whose characteristics are such that any contaminated leachate is expected to be formed through chemical or physical processes, and no gas is expected to be formed as a result.

- "Inert waste" means any solid waste that will not decompose biologically, burn, serve as food for vectors, form a gas, cause an odor, or form a contaminated leachate, as determined in accordance with Section 811.202(b). Such inert waste shall include only non-biodegradable and non-putrescible solid wastes. Inert wastes may include, but are not limited to, bricks, masonry, and concrete (cured for 60 days or more).

Table 3.1 Maximum concentrations of contaminants for the toxicity characteris TCLP test (35 Ill. Adm. Code 721.124) [PCB , 1992]

Contaminant	Regulatory Level (mg/l)
Arsenic	5.0
Chromium	5.0
Creosol	200.0
Lead	5.0
Mercury	0.2
Pentachlorophenol	100.0

•"Putrescible waste" means a solid waste that contains organic matter capable of being decomposed by microorganisms so as to cause a malodor, gases, or other offensive conditio or which is capable of providing food for birds or vectors. Putrescible wastes may form a contaminated leachate from microbiological degradation, chemical processes, and physical processes. Putrescible waste includes, but is not limited to, garbage, offal, dead animals, ger household waste, and commercial waste. All solid wastes which do not meet the definitions inert or chemical wastes shall be considered putrescible wastes.

The majority of C/D waste falls into the latter two categories. Material consist of concrete, asphalt, general rubble, metals, and masonry is inert, while wood waste is biodegradable, and considered putrescible. General MSW is putrescibl

"Special waste" is the third general category of waste, and can be consider hybrid of hazardous and solid wastes. A special waste is material that is not classified as hazardous waste, yet poses some health or environmental risk due physical or toxicological properties. Section 808 gives definitions, administrati details, and technical procedures for classifying special wastes. However, PCB regulations do not currently contain examples or lists of special wastes by sourc general category as in the hazardous waste regulations. The PCB evaluates eac request for waste type determination on a case by case basis.

A subcategory of special waste is "special handling waste". From the definition in §808.110:

"Special handling waste" includes any such waste which would pose a danger if handled in a manner similar to household waste. "Dangers" include, but are not limited to, the following fire, explosion, and emission of toxic or carcinogenic gas or dust.

A fourth waste category germane to this report is "clean construction or demolition debris", as previously defined in § 3.78 of the Illinois Environmenta Protection Act (section 3.1.1). The regulation of this material depends on its

If it is used as fill, as in construction, it is not regulated [Stewart, 1992]. However, if it is stored, it becomes a "waste pile" as defined in § 810.103:

"Waste pile" means an area on which non-containerized masses of solid, non-flowing wastes are placed for disposal. For the purposes of this Part and 35 Ill. Adm. Code 811 through 815, a waste pile is a landfill, unless the operator can demonstrate that the wastes are not accumulated over time for disposal. At a minimum, such demonstration shall include photographs, records or other observable or discernible information, maintained on a yearly basis, that show that within the preceding year the waste has been removed for utilization or disposed elsewhere.

This means that the waste pile is only allowed to remain at a given site for one year. If the material remains for more than one year, the owner must categorize it as into one of the four previously mentioned waste types, and dispose of it accordingly.

3.2.2 Types of Landfills

There are three major landfill types allowed by the PCB: hazardous, putrescible/chemical, and inert, in order of decreasing regulatory rigor. Waste is usually disposed in the lowest landfill "class" possible, since this will be the least costly landfill option.

Hazardous waste landfills are regulated by §724.400 which details construction, leachate treatment, monitoring, emergency procedure, administrative, and closure requirements. Waste meeting the hazardous waste criteria in section 3.2.1 may only be landfilled in this type facility.

There is a common set of requirements for landfills accepting putrescible or chemical solid wastes (§811.301) which specify foundations, liners, leachate treatment, landfill gas, and groundwater monitoring. Special wastes are also disposed of in putrescible/chemical landfills. There is no separate landfill classification for special wastes.

Inert waste landfills may only accept materials meeting the inert waste definition. Since the definition states that no contaminated leachate should be produced, an inert waste landfill is not required to have a special liner (§811.201).

While these broad categories provide the necessary regulatory framework, the IEPA has considerable latitude in permitting a given landfill. For example, a putrescible/chemical waste landfill may legally accept special wastes, but the IEPA can write additional restrictions on daily cover or site security into the facility's permit.

3.3 Hazardous Contaminants

One problem with using reclaimed materials is the threat of contamination which may limit potential end uses. For example, wood chips contaminated with chemical preservatives could not be marketed as residential landscaping material. This section will focus on regulation concerning the removal and disposal of lead based paint and asbestos. These are two of the most prevalent hazardous contaminants in demolition waste.

3.3.1 Lead Paint

This section will focus on the regulation of lead paint as a demolition waste. While other hazardous substances were formerly used in paint, such as mercury a fungicide, lead is the most serious problem due to its widespread use. The classification and final disposal of lead based paint (LBP) waste depends on its form and source (see Figure 3.1). The following discussion is equally applicable wood treatments containing other hazardous materials.

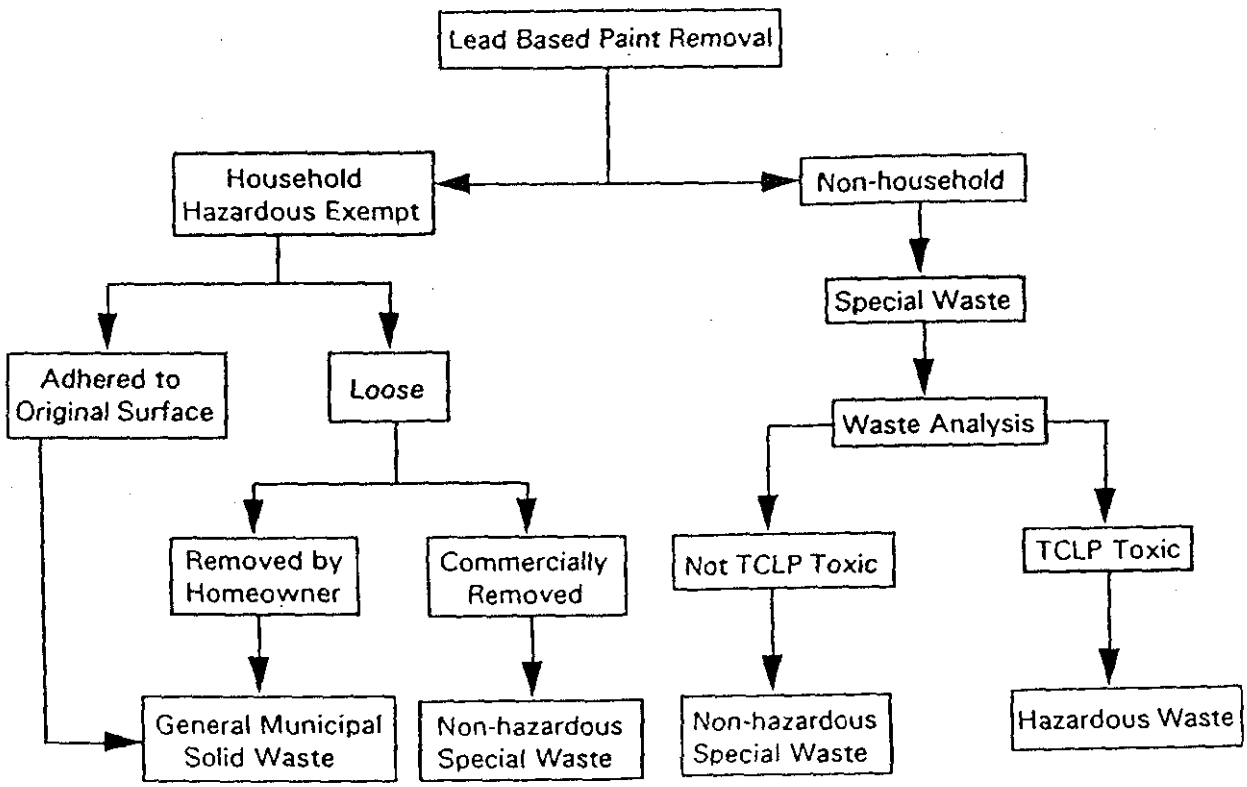

Figure 3.1 Flow chart for determining status of lead paint waste [IEPA, 1991]

If an individual homeowner removes LBP from their own residence, the resulting waste is considered general MSW and not regulated any further. However, if the homeowner were to hire a contractor to remove the LBP from the same residence, the waste would be considered a special waste, and subject to regulation under §808 and 809. If the LBP removed from a household is still adhered to its original surface, as in demolition waste, then it is classified as general MSW regardless of who removes it. Any solid waste generated in a household cannot be classified as hazardous (§721.104(b)).

LBP generated from industrial or commercial activity cannot be disposed of as MSW. It is classified as either a special waste or hazardous waste depending on its physical properties. If the TCLP test returns a value of less than 5.0 mg/l for lead, the waste is considered special; otherwise it is considered hazardous (Table 3.1). Anyone producing this waste must obtain a USEPA identification number (§722.122).

Wood waste processing centers should be cautious when accepting loads of painted wood if unsure of the origin. One method of separating the wood fraction of C/D waste from stone and metal is to use a flotation system. After prolonged operation of the flotation system, sediments or sludge may accumulate [Ellinger, 1992]. If lead paint has been part of the waste stream, this sludge may qualify as a hazardous waste.

3.3.2 Wood Treatments

In addition to lead based paint, wood has in the past been treated with several other potentially hazardous materials (e.g. creosote, chromium and arsenic containing paints and preservatives, glues, pentachlorophenol, urea-formaldehyde or phenol-formaldehyde resins, and varnishes or stains [Donovan, 1991]). Table 3.1 lists the regulatory limits for some of these materials based on the TCLP test. However, the PCB (§721.104(b)(9)) exempts arsenic treated wood, even if it fails the above toxicity test:

> Solid waste which consists of discarded wood or wood products which fails the test for the toxicity characteristic solely for arsenic and which is not a hazardous waste for any other reason or reasons (shall not be considered hazardous) if the waste is generated by persons who utilize the arsenical-treated wood and wood products for these materials' intended end use.

3.3.3 Asbestos

Asbestos is a generic name for a family of naturally occurring mineral substances. It was, until recently, widely used as insulation wrapped around pipes, and as a fire retardant, sprayed under roofs, on structural members, and over false ceilings. Because of its crystalline structure, it tends to break up into very small,

sharp fibers that are easily inhaled. The body cannot expel them due to their siz and shape, and asbestos has been linked to several lung disorders.

Section 112 of the Clean Air Act has a section titled National Emission Standards for Hazardous Air Pollutants (NESHAPS). It called for uniform nati standards to limit the release of hazardous substances into the air. The USEPA beginning in 1971, issued standards for asbestos and several other specific substances. Beginning at 40 CFR 61.140, the USEPA has promulgated regulati on the use and disposal of asbestos and removal standards for buildings under renovation or demolition. The following is a brief summary with respect to the construction industry for handling asbestos.

The owner of a building scheduled for renovation/demolition or the contra must notify the Illinois EPA Division of Air Pollution Control (or the USEPA A Compliance Branch, asbestos section) and provide the following:

- a description of the facility; an estimate of the amount of friable asbestos present ("friable" means crumbles under hand pressure)
- the demolition schedule
- asbestos removal procedure
- the location for final disposal.

Any friable asbestos which would be disturbed during the demolition/remo must be removed prior to the start unless it is encased in concrete or it is kept w during the project to prevent dust emissions. Removed asbestos must be handle with due care to keep it contained until its final disposal. A final disposal site n meet several criteria (40 CFR 61.156) including warning signs and daily dust control cover.

If asbestos demolition waste is wetted during removal, properly containeri and labeled, it can be disposed of in any landfill. However, the generator, haul and landfill all must follow a specific manifest procedure and the landfill must k the records for 30 years. Loose, friable asbestos is considered a special waste i Illinois [Klein, 1992].

3.3.4 Other Hazards

Many hazardous products are routinely used on construction sites. It is lik that some will find their way into the C/D waste stream. Table 3.2 was taken f a study commissioned by the California Department of Health Services [Excelte 1990]. Its purpose was to quantify and give suggestions for minimizing hazard material use in construction. Many of the materials are associated with painting solvents, or maintenance products for heavy equipment. C/D waste managers

should be aware that these potential hazards may be mingled with materials they are trying to recover.

Table 3.2 Possible hazardous contaminants in C/D waste [Exceltech, 1990]

Acetone	Acetylene gas
Adhesives	Ammonia
Anti-freeze	Asphalt
Benzene	Bleaching agents
Carbon black	Carbon dioxide (in cylinders)
Caulking, sealant agents	Caustic soda (sodium hydroxide)
Chromate salts	Chromium
Cleaning agents	Coal tar pitch
Coatings	Cobalt
Concrete curing compounds	Creosote
Cutting oil	De-emulisifier for oil
Diesel fuel	Diesel lube oil
Etching agents	Ethyl alcohol
Fiberglass, mineral wool	Foam insulation
Freon	Gasoline
Glues	Greases
Helium (in cylinders)	Hydraulic brake fluid
Hydrochloric acid	Insulation
Kerosene	Lime
Lubricating oils	Lye
Methyl ethyl ketone	Motor oil additives
Paint/lacquers	Paint remover
Paint stripper	Particle board
Pentachlorophenol	Polishes for metal floors
Putty	Resins, epoxies
Sealers	Shellac
Solder flux	Solder, lead
Solder, other	Solvents
Sulfuric acid	Transite pipe
Varnishes	Waterproofing agents
Wood preservatives	

Chapter 4 Construction and Demolition Waste Management: Issues and Pra

This chapter will discuss the issues surrounding C/D waste generation, salvaging, recycling, and disposal by looking at the groups of people engaged managing C/D waste, methods used, and facilities for processing the material Four case studies are provided to illustrate C/D waste management practices.

4.1 Contractor's Perspective

The general contractor is a person or a firm that is responsible for physi building or demolishing a structure. They are also usually responsible for su management tasks as making work schedules, coordinating project phases, sit safety, and waste management. Subcontractors may be responsible for dispo their own wastes. Waste management is generally seen as overhead, or a cos doing business. Depending on the size of the project, contractors will subcon with a large, licensed waste hauler to ensure reliability of service and legal di practices. Beyond that, a contractor would not consider waste management o reduction relevant.

If the contract has been awarded to a firm through a competitive bidding process, the general contractor has signed an agreement to complete the proje their lowest possible cost. Since they will receive a fixed amount of money f project, it is to their advantage to minimize their costs. Anything that increas cost of operation will erode their margin of profit. It is important to accurate predict timing and costs for each phase of a project, even for relatively small such as waste management, in order to submit a realistic bid. Therefore, contractors would be inclined not to try a new waste management practice, ev might save money, if it does not have a well established track record. The ne universal practice is to put a large roll-off box on site, dump all debris in it, t have the waste hauler remove it when full. This procedure is very simple, an to plan, but it may not be the most cost effective alternative.

A waste management practice that ensures high quality recovered mate recycling is extensive source separation (e.g. wood in one container, cardboa another). Unfortunately, this may take more time than simply throwing ever into the same dumpster, and time equals money, especially when labor costs exceed $30 per hour [Shehan, 1992]. There are other time related constraints as material delivery schedules, delays due to the weather, and, ultimately, the promised project completion date.

Therefore, from a contractor's point of view, any scheme to reduce was generation or to recycle should not:

- incur any more direct costs (e.g. haul cost, container rental, tipping fees) than customary methods
- take up any more of their workers' time than customary methods.

A construction project which incorporated recycling while adhering to the above principles was the renovation of Memorial Stadium on the campus of the University of Illinois at Urbana-Champaign. After nearly seventy years of hosting Fighting Illini football, Memorial Stadium required some updating and repairs. The University hired Turner Construction Company to manage the project. Founded in 1902, Turner is the largest commercial construction company in the country. Their projects include hospitals, offices, apartments, sports facilities, and airports [Davidson, 1992].

The main goal of this project was to remove the concrete risers from the balcony and upper third of the main stands, down to the structural steel, and replace it with new precast concrete. They also replaced the roofs of the four corner "towers", installed new restroom facilities, and upgraded building safety systems.

The contractor removed a total of 3200 yd^3 of concrete from the stadium. About 95% of it was removed in long slabs corresponding to the length between the original expansion joints. These slabs were removed by crane on to flatbed trucks owned by an independent trucking company, then driven to the Champaign Asphalt Company where they were crushed for use as aggregate in new pavements. No tipping fee was charged due to a good market for aggregate and the quality of concrete which contained very little rebar.

The project produced nearly the same volume of inert waste including masonry and concrete rubble. This was hauled to an inert waste permitted landfill north of Champaign in 20 yd^3 drop boxes. The manager of this landfill was careful not to accept loads contaminated with wood waste. The project also produced about 3000 yd^3 of trash such as wood scraps, cardboard, and other packaging material, which was hauled to a municipal solid waste landfill in Danville, Illinois.

The other interior modifications generated scrap metal, copper, steel, and lead, much in the form of pipes. The plumbing contractor wished to keep the copper flashings from the roof due to its high market value. The contractors segregated the other metal on-site and allowed independent scrap dealers to remove it. Bill Davidson of Turner noted that these salvagers had to be monitored to assure that they removed only the designated materials.

There were some hazardous contaminants in the building which had to be removed. Trained University staff removed vinyl asbestos floor tile (VAT) and asbestos pipe insulation and sent it to a specially permitted landfill. Lead was found in very high levels in the paint on steel structural members and handrails. This may

have been a lead oxide primer. Due to time constraints, the decision was made to only remove the lead paint from the hand railings. An alkaline stripper on a paper backing was used, then the railings were rinsed. The scrap paint, stripper, and rinse water were all placed in eleven drums which were then collected by the campus hazardous waste personnel, for disposal in a hazardous waste landfill.

4.2 Source Separation - Cornerstone Material Recovery

As stated in section 4.1, source separation can be a time consuming process, adding to the labor cost of a project, and cluttering the work area. Through creativity and an innovative approach, Cornerstone Material Recovery of McHenr Illinois, has effectively achieved source separation of C/D waste while actually making the construction workers' job a little easier [Clements, 1992].

The company was started in the late 1980s by Richard and Steve Clements, and Tom Riley. The brothers are knowledgeable about the industry having grown up with their family's construction business. They realized that waste disposal would be an ever increasing concern, so they combined this interest with their construction background to fill a niche. According to Vice President Steve Clements, in retrospect, they were fortunate to not have much capital to invest in the business early on. If they had, they probably would have bought several truck and roll-off boxes, and become a typical waste hauler. Instead, they invested in a open-top truck with a crane, and another equipped with a baler. They also have a small shredder which allows them to grind wood waste for their customers.

Using a development of single family housing as an example, a typical waste hauler would place a large roll off box in a centralized location where crews working on a number of houses would take their building waste. The hauler would then pull the box when it is full and charge the contractor on a volume basis. With this system, all types of material from different phases of the construction process and from different houses will be commingled in the same container. Therefore, recovering certain types of waste requires a fairly intensive sorting process, such the central processing facilities discussed below. If a waste hauler owns the landfill, there may not be an economic incentive to try to reduce waste quantities.

In contrast to this usual system, Cornerstone is a small waste hauler whose primary concern is material recovery. Under their system, they place a small, temporary bin made of plywood or plastic fencing in front of each house, so the workers do not have to transport the waste as far. More importantly, Cornerstone services each site at least once a week or more often as needed, keeping the area clean looking. They charge the contractor on a per unit basis, such as a certain fee per house built. This system also limits unauthorized "fly dumping" since there is no familiar roll-off box to act as a target.

With this combination of individual containers and frequent service, source separation is done almost automatically, *over time*. Different stages of the construction process generate different types of waste, therefore, at a given time the waste produced will be relatively homogeneous. For example, mostly lumber is generated in the initial framing stage; drywall from interior finishing; and cardboard boxes containing exterior and interior trim in the latter stages. Therefore, when Cornerstone makes a pick-up during the week when the drywall contractors are working, most of the waste will be drywall scrap. The crane then lifts the material into the truck, keeping the majority item separate from the "garbage" which they haul to the landfill. Cardboard can be loaded into the baler truck manually or with the crane. This arrangement allows them the flexibility to be at two sites at once. Since they handle the waste in small quantities, either manually or with the aid of the crane, they can see almost every item. This form of quality control is very important when segregating materials for recycling to ensure low contamination.

Currently, Cornerstone actively markets only two main materials: wood and cardboard. Wood is sold to composting yards for use as a bulking agent, and to landfills which use it for road bedding. Cardboard is sold to area paper mills. In addition, they save the small amount of metals generated and store them at their facility until they have accumulated enough to truck it to a scrap dealer. They also save incidental items such as aluminum cans and some types of plastic. Drywall is 14% of the total construction waste volume, so they would like to find or develop a market for it, such as a soil amendment in agriculture. Although their yard is relatively small, they would have enough room to park a large semi-trailer to load it with recyclable materials which are not generated in large quantities, e.g. metals or drywall. This could make the recycling of these materials economically feasible if they could find a buyer who is only interested in large quantities.

As another advantage, Cornerstone is a small company with only six full-time employees. This allows them to be quite flexible and to tailor their services to their customers needs and schedules. For example, some general contractors will hold periodic trade meetings where all of the subcontractors gather to discuss progress or problems. This is an excellent opportunity for two-way communication which is not always possible during working hours. Cornerstone takes advantage of this situation to bring up waste management issues and get feedback from the others about how to better serve them. For instance, they may ask that the workers place drywall scrap inside the curbside container, while piling scrap metal next to it.

Cornerstone has previously operated entirely in an entrepreneurial fashion, striving to keep solvent during slow construction periods. However, they have recently received a grant from the Illinois Department of Energy and Natural Resources, Technology and Practices Demonstration Program. This grant has

enabled them to design and build a new baler truck with compartments to separa different materials. In addition to corrugated cardboard, they will collect and ba polyethylene sheeting (LDPE) used to keep rain off the site and as packaging.

4.3 Salvage

Salvaging would correspond to "reuse" in the solid waste management hierarchy of Reduce - Reuse - Recycle. In this context, it means removing reus items from buildings before they are demolished or remodeled. This section lo at a three salvagers with different methods and objectives.

4.3.1 Preservation and Conservation Association (PACA)

PACA was founded in 1981 in Champaign, Illinois. This group's purpose to preserve and protect architecturally significant buildings. As alternatives to demolition, they encourage reusing the building for a modified purpose or even moving the entire structure off-site in the case of houses. When demolition is unavoidable, they try to salvage as much as they can of the building's unique or useful features and then sell the pieces to individuals remodeling their own hom Proceeds from these sales support their efforts to preserve other buildings in th community [Kummer, 1992].

As a first step, the group has to find out when a building is scheduled for demolition. This can be through the media if it is a well known building, or through word of mouth. One of the best ways is through cooperation with local governments. PACA has a good relationship with the City of Urbana which wi notify them when the city issues a demolition permit. This allows PACA to co the demolition contractor or owner to schedule a time for salvaging. Even after permit has been issued, it still takes some time to disconnect utilities before the actual demolition. Therefore, there is always at least a small window of time fo salvaging. Since PACA has a large list of volunteers, many with construction experience, they can begin work at any given time.

PACA follows some basic guidelines in selecting items to salvage. First, must be in reasonably good condition; it must have value, either as a functional item (a door), decoration (marble trim), or have historic value; and it should no something readily available elsewhere (e.g. two by fours or standard hardware) Selected pieces are then loaded into volunteers' personal pick-up trucks and tak the PACA warehouse in downtown Champaign where the items are inventoried sorted by type.

The warehouse is open to the public one day a week or other times by spec arrangement. PACA normally does not advertise because they get customers through word of mouth and their widely distributed newsletter. Also, they have

"want list" six or seven pages long of standing orders for specific items from members. In addition, they hold a semi-annual salvage sale which gets more publicity. Most of the customers are individuals remodeling their homes, but PACA does deal with several architects and antique dealers.

There are several special considerations needed for this type of operation to be successful:

- a large, dedicated group of people, some with experience, willing to devote spare time to salvaging
- official status as a not-for-profit organization (necessary to receive donations of state property; also, demolition contractors can count salvaged material as a tax deduction)
- some means of transporting salvaged materials (such as volunteers' trucks)
- an understanding of and good rapport with local government in charge of building permits
- a secure storage area which can serve as a showroom
- insurance.

The group carries a one million dollar liability insurance policy to protect themselves in case a volunteer is injured on site.

A good example of PACA's projects is the renovation of Harker Hall, the oldest building at the University of Illinois at Urbana-Champaign, which is on the National Register of Historic Places. The relatively small, four story building has served many functions and housed many departments. It was nearly torn down in 1940 to make way for the new Illini Student Union. In recent years the building has been slowly deteriorating and not utilized to its fullest extent. The University decided to completely strip the interior, leaving nothing but the four walls, and create a new space for the University of Illinois Foundation. The original mansard style roof of Harker Hall was lost in a fire early this century and replaced with one of a much simpler design. In the current renovation, the new roof matches the original.

The University hired P.K. Demars as the general contractor who has been involved in several University projects. The demolition subcontractor, O'Neil Brothers, completely "gutted" the building in the Fall of 1991, generating 75 semi-trailer loads of debris, each with a capacity of 20 yd^3, or 1500 yd^3 total. With a disposal and hauling fee of $265 per trailer, waste disposal in the demolition phase cost nearly $20,000 [Shehan, 1992]. All of this waste was sent to a municipal solid waste landfill in Danville,Illinois due, in part, to the fact that O'Neil is a partial owner of that facility. O'Neil did, however, salvage the huge wooden structural trusses for their own use.

One interesting feature of this building was its cast iron columns incorporated

as structural members. They each weighed 900 pounds with fluted shafts and ornate capitals. The University's operations and maintenance division salvaged over a dozen of these.

Other than the wooden trusses and cast iron columns, the contractors did no source separation or recycling of building materials in this project. One reason f this is that there would have been no space on site for separate containers.

PACA was instrumental in saving useful items from the landfill. They negotiated with the University to give them access to the building before the demolition contractor. They were allowed about three and a half weeks of limite access due to asbestos removal in progress. In that time, they removed 48 pick-u truck loads of items or an estimated 150-200 yd^3 volume otherwise destined for t landfill. This translates to a disposal cost savings of up to $2,650. The followi is a partial list of items removed from Harker Hall by PACA volunteers:

decorative marble on entrance	wood fire extinguisher case
bulletin board	chalkboard and wood surround
cast iron air return grates	coat hangers
transoms with hardware	chair rail
cast iron register grill	blackboard with surrounding wood
oak cabinet	oak shelving
thermostat	interior doors
baseboard	lighting fixtures

Currently, PACA is working on ways to facilitate the moving of houses instead of demolishing them. One impediment to this is the large lead time requi to plan a move (e.g. six months in the case of one Champaign area contractor). This may suffice if the owner is an institution, but it would not be fast enough in normal commercial real estate transactions.

For more information, write to PACA at Box 2555, Station A, Champaign, Illinois 61820, or call 217-328-PACA.

4.3.2 Wastebusters, Inc.

Wastebusters is a firm in Staten Island, New York, dedicated to salvaging a reselling building components taken from commercial buildings, offices, hotels, and apartments during demolition or remodeling. Bob Langeland, founder of Wastebusters, was a general contractor and had always been amazed at the amoun of high quality items thrown away on construction and demolition sites. Wastebusters differs from PACA in a number of ways. They are a for-profit company which deals only with materials from commercial buildings. Their

customers are contractors, building maintenance people, or landlords looking for a low cost alternative to buying new materials. All of their prices are 50% to 75% less than wholesale. They have a warehouse and a showroom, and publish the *Wastebusters News,* a monthly list of new items with prices and relevant articles. They too have a "wish list" of items their customers are looking for.

As an example, Wastebusters salvaged many solid white oak doors from the offices of *Rolling Stone* magazine. They stripped and primed the doors, leaving the brass hinges and handles intact, and sold them for $225. Buying the same thing new, including the labor, could cost more than $1,000.

According to a Wastebusters staff member, getting the cooperation of contractors is not a problem. This is no doubt due in part to Mr. Langeland's familiarity with the industry. Also in their favor is the higher waste disposal cost in the Northeast. Through this type of salvage operation, Wastebusters saves money for the owner in terms of labor, dumpster rental which can be as high as $1,000 for 40 yd^3 [*The Wastebusters News,* 1992], hauling charges, and tipping fees. On a large project, this could be a substantial savings.

For more information, write to Wastebusters at 1390 Richmond Terrace, Staten Island, NY, or phone (718) 351-1936.

4.3.3 Salvage One

Salvage One was founded in 1980 to salvage Chicago bricks. It was purchased in 1986 by Leslie Hindman Auctioneers who transformed it into a high end salvage operation, acquiring items from all over North America and Europe. Their goal is to recover pieces from a certain time period or of high value (referred to as "architectural artifacts") from buildings under renovation or demolition. Today, the salvaged items occupy 100,000 square feet and five floors of an old warehouse located just southwest of Chicago's Loop. Here, the public can browse through the huge collection, which currently contains 6,000 doors, 1,200 fireplace mantles, hundreds of lighting and bathroom fixtures, and many other types of items, some rather unusual. Two of the most interesting, and expensive, recent items are a pair of iron gates from the Paris apartment of Gustave Eiffel, selling for $30,000, and a 30 foot long wooden bar circa 1890, selling for $40,000 [McLagan, 1992].

By moving in the proper circles, Salvage One staff hear by word of mouth about many of their salvage opportunities. Also, they subscribe to newspapers from around the world, looking for auctions or estate sales. Much of their information comes directly from owners and demolition contractors, with whom they have good rapport, who want to make money by selling parts of the building before it's torn down. Salvage One targets large, older houses, apartments, commercial institutions (e.g. banks and law firms), and churches.

On a larger project, Salvage One staff will survey the building, then give owner a room by room list of the items they wish to buy. After that is agreed upon, staff with construction experience will proceed to remove the selected it and take them to the warehouse. This removal should take place prior to any necessary asbestos abatement, since much of the interior may have to be rippe to access asbestos coated elements.

Most of Salvage One's customers are individual homeowners in the proc remodeling or looking to give their homes a high quality, historical touch. Th also visited by architects, history museums, and their artifacts are frequently u on movie sets.

For more information, write to Salvage One at 1524 South Sangamon Str Chicago, IL 60608, or phone (312) 733-0098.

4.4 Debris Processors

Processors of C/D debris face several challenges:

- they accept waste material which may be contaminated or come from unknov sources
- they must keep tipping fees competitive with local landfills or other process
- they must use processing labor and equipment efficiently
- they must produce a product of a similar quality and at a competitive price t virgin products
- they must try to overcome the perception from contractors and government agencies that recycled products are always inherently inferior to virgin produ

One way to help encourage the use of recycled products is to offer two services to the customer at one location which will lower hauling costs. For example, the Wheaton Asphalt Company recycles scrap asphalt pavement and concrete into new pavement and aggregates [Vollmer, 1992]. A hauler could b in a load of asphalt concrete, and leave with a load of course aggregate suitable the base of a new road. Alternatively, the driver would have to make at least t trips to complete the same tasks: to the landfill, to a quarry, and return.

The key to producing a good product from reclaimed materials is quality control. This begins with an inspection of incoming loads, requiring only a qu glance if the source is well known, or dump and sort if the source is suspect. Quality assurance continues through the sorting process, either manual or automated, to yield a homogeneous, uncontaminated product. Finally, one mu closely match the customer's product specifications to show that recycled mate can compete with virgin materials.

Suitable deposits of naturally occurring materials are being exhausted or a

located too far from building activity. Rising waste generation and closing landfills are causing tipping fees to increase. These factors will combine to provide waste processors with healthy markets in the future.

A unique and innovative example of the processing and reuse of building materials stems from the removal of the marble exterior of the Amoco Building at 200 East Randolph Drive in Chicago, an 82 story city landmark. Unfortunately for the company, the 43,000 slabs of Italian Carrera marble adorning the outside of the building proved not to be suitable for long term outdoor exposure. Due to its porous, brittle nature, it began to exhibit signs of bowing and cracking. The company used steel strapping as a temporary measure to hold it together. Ultimately, it was decided that the marble must be removed.

After carefully weighing economic, safety, and environmental considerations, Amoco decided that crushing the marble for landscape use was the best disposal option [Stow, 1992]. Two-thirds of the recovered material was used by Amoco for landscaping at their Whiting, Indiana refinery. One-sixth of the marble went to Governor's State University in University Park, Illinois, at the request of the local state representative, for similar landscape uses.

The final sixth of the marble was donated to Regalo, a division of Lashcon, Inc. based in Barry, Illinois. Dorothy Lashmett, President and CEO of Lashcon, had long been interested in reusing materials, such as scrap wood from her company's furniture making business. When she read about the Amoco project in the Chicago Tribune, she saw a perfect opportunity to use the marble for specialty items such as corporate gifts. Amoco agreed to donate the marble and became Regalo's first major customer [Capo, 1992].

The marble was loaded onto Lashcon's flatbed trucks as it was removed from the building, and hauled to Regalo's facility in Barry, Illinois. The Illinois Department of Rehabilitative Services gave them a grant to lease and modify this facility to accommodate Regalo's 25 handicapped workers to provide job training, which has been one of Dorothy Lashmett's long-term goals.

Using virtually the same tools as the wood furniture business, workers carve a wide variety of gift items from the marble (e.g. desk clocks, paper weights, pen holders) as well as custom orders and some larger pieces. The labor cost associated with using reclaimed marble is higher than that for virgin marble because much cleaning and polishing is necessary. However, the low raw material cost for reclaimed marble can help make up the difference.

John Lashmett of Regalo estimates that even though they will be working with the marble from the Amoco Building for a number of years, they would welcome inquiries from people wishing to dispose of a high quality stone waste.

Another Chicago project features a contractor and several processors working

in sequence to reclaim a large amount of demolition material. Comisky Park o
Chicago's south side was the home to baseball's White Sox for many years. It
the oldest major league park standing until April 1991 when Speedway Wreckin
Chicago began demolition. Park owners and the city determined it would cost
to demolish the old park, and nearly one hundred other nearby structures, and b
a new facility, than to refurbish old Comisky. This demolition project took abo
seven months.

Speedway removed 15,000 tons (2200 truck loads) of concrete floors, foundations, columns, and beams, some containing rebar, and sent it to Sacram Crushing of Chicago. Sacramento accepts uncontaminated concrete (i.e. no oth material mixed in) and processes it into graded aggregates for many application Steel rebar is also removed and sold as scrap. They use a primary jaw crusher, secondary impact crusher, and a screening plant to produce four separate aggreg grades which adhere to city and state specifications. One of their largest marke materials for road base. They recently supplied aggregate for repairs on Chicag Kennedy Expressway.

In addition, Speedway removed 6,500 tons of structural steel [Kolko, 199 which was sent to Cozzi Iron and Metal of Chicago, who in turn sheared it into foot lengths and sold it to a steel mill in Arkansas [Brennan, 1992]. Some of th brick from the old park was sold through a retail store as mementos. The majo was sent to the southern states (e.g. Florida, Alabama, Texas) where the specia red-colored Chicago brick is in demand.

Larry Kolko, estimator for Speedway, indicated that waste disposal costs would have been about three times higher if the majority of the demolition debri has not been recycled.

4.5 Central Processing Facilities

Despite the advantages of source separation discussed in section 4.2, it wil impractical at times due to increased labor, space restrictions, or lack of pick up services. In these cases, commingled C/D waste could be taken to a central material recovery facility (MRF) where it is separated into its constituents, then recycled if there is a sufficient market. This section will give an overview of processing facilities that handle a mixed C/D waste stream. Appendix B lists companies who manufacture the type of equipment used in these facilities. Cha 5 will discuss the processing of specific materials.

In general, C/D MRFs may be separated into three categories: low, mediu and high technology facilities in order of increasing separation and recovery. Medium and high technology facilities are better suited to process residential or other light C/D waste which does not consist primarily of heavy materials (e.g.

concrete and asphalt concrete). These categories are artificial and for presentation purposes only. Construction costs, capacity, and removal efficiency will all vary with the type of incoming waste material.

4.5.1 Low technology MRF - Dump and pick

As the name indicates, a low technology facility does not use any type of automatic sorting equipment. The only sorting is done by hand with a bobcat type tractor to help move materials. Or the MRF may have a conveyor belt with the person at each picking station assigned to remove a specific material. A baler may be used to compact cardboard, but in general, all further processing is done somewhere else. Materials segregated in this type of facility are usually limited to cardboard, wood, and metals. Dense, bulky materials are too heavy to be sorted manually. The remainder is shipped directly to a landfill.

The goal is to quickly remove only a few relatively high volume or high value items from the commingled debris. Alternatively, the objective may be to remove putrescible materials so that that the waste may be dumped at an inert waste landfill, usually at a lower tipping fee.

Based on estimates for an actual proposed low tech MRF in Vermont, the total capital costs would be about $1 million [C.T. Donovan, 1990], including: permits, engineering, land, the building, 2 "Bobcat" loaders, 4-5 roll-off containers, truck scales, and a grinder.

4.5.2 Medium Technology MRF

This type of facility will utilize some mechanical sorting devices, separate more materials from the commingled waste, and may have some processing equipment for the separated materials.

A well known example of this type of facility is the Jet-A-Way Waste Technologies system in Boston, built by Lindemann Recycling Equipment of New York. This facility uses a combination of manual and mechanical sorting techniques to recover most of the materials from the C/D waste stream. Figure 4.1 gives a flow diagram of this facility based on J. Curro's description in *BioCycle*. An incoming load is first given an initial inspection. Sufficiently homogeneous loads of a recyclable material are then moved directly to a transfer area without sorting. Mixed loads are taken to a dumping area where they are inspected further and a hydraulic grapple removes oversize items such as appliances, doors, furniture, and large pieces of rock or metal. The remainder is fed onto a conveyor with a front end loader. The conveyor runs to a two section trommel screen to remove first fines and small stones, and then larger aggregate. The fine material can be used as landfill daily cover. The stream from the second section of the

trommel passes a magnet to remove ferrous metals.

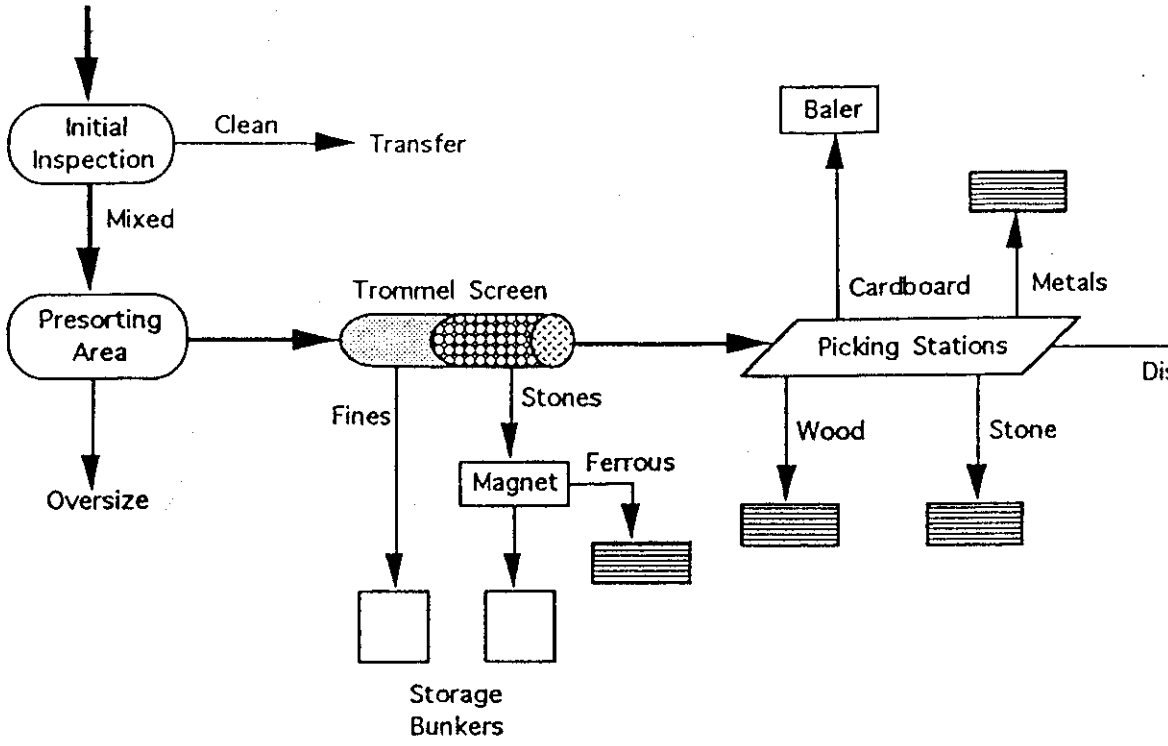

Figure 4.1 Medium technology C/D MRF [Curro, 1991]

Another conveyor directs material passing through the trommel past se picking stations where employees manually separate wood, stone, and meta roll-off containers. Corrugated cardboard is also removed and conveyed di another area for baling. Anything left on the main conveyor after the picki stations is directed to large shipping trailers for final disposal.

This facility was originally designed to process 250 tons/day when it c September of 1990. It quickly became quite successful, and for a time was operating at 500 tons/day, charging $40-60/ton tipping fee. Due to the rece economic slowdown, they only receive 200 tons/day and must charge a tipp of $120 [Curro, 1992].

In 1979, the M.I.T. Mechanical Engineering Department performed a study of demolition wastes, including the design of a hypothetical large vol C/D waste processing plant [Wilson, 1979]. This hypothetical facility pro segregated wood and concrete and recovers ferrous metal. It is typical of t processing necessary to reduce and grade materials after they have been seg from commingled waste. Table 4.1 lists all the capital investments for thi hypothetical facility. While all of the items listed may not be necessary for existing or planned MRF, this list provides a good example of the types of equipment one must consider.

Table 4.1 Capital investments for a hypothetical wood and concrete processing facility [Wilson, 1979]

System	Equipment
Wood	receiving pit conveyor 5 ft x 30 ft (2) wash pit and agitator conveyor 24 in x 60 ft shredder recirculating conveyors 30 in x 60 ft magnetic separator 8 ft x 12 ft single deck vibrating screen radial stacker, 30 in x 80 ft
Concrete	42 in x 16 ft feeder and hopper 30 in x 42 in jaw crusher conveyor 42 in x 50 ft magnetic separator 44 in x 20 ft double screw washer - dewaterer conveyor 24 in x 60 ft 5 ft x 16 ft triple deck vibrating screen 5.5 in cone crusher recirculating conveyors 24 in x 60 ft radial stackers 24 in x 50 ft (3)
General	5.5 yd^3 front-end loaders (3) 2 yd^3 backhoe 500 kW electric power unit (2) 120 gallon per minute pump hose (2) building (10,000 ft^2) road land (15 acres)

4.5.3 High Technology MRF

A high technology C/D MRF will utilize many more mechanical devices to intensively sort incoming mixed waste based on the materials size, density or other physical properties. It may also process sorted materials on site into marketable item.

The Marin Resource Recovery Center (MRRC) in San Rafael, California uses several different types of sorting devices to recover 60% of the incoming mixed waste. A disk screen is the first device used with the oversized material directed to a series of picking stations. The undersized material from the disk screen is directed to a trommel screen for further size classification. The oversize from the trommel is sent to an air classifier to separate wood type waste from rock type

waste. All recovered wood waste is directed to tub grinder for size reduction. Figure 4.2 gives a flow diagram of a high technology C/D MRF.

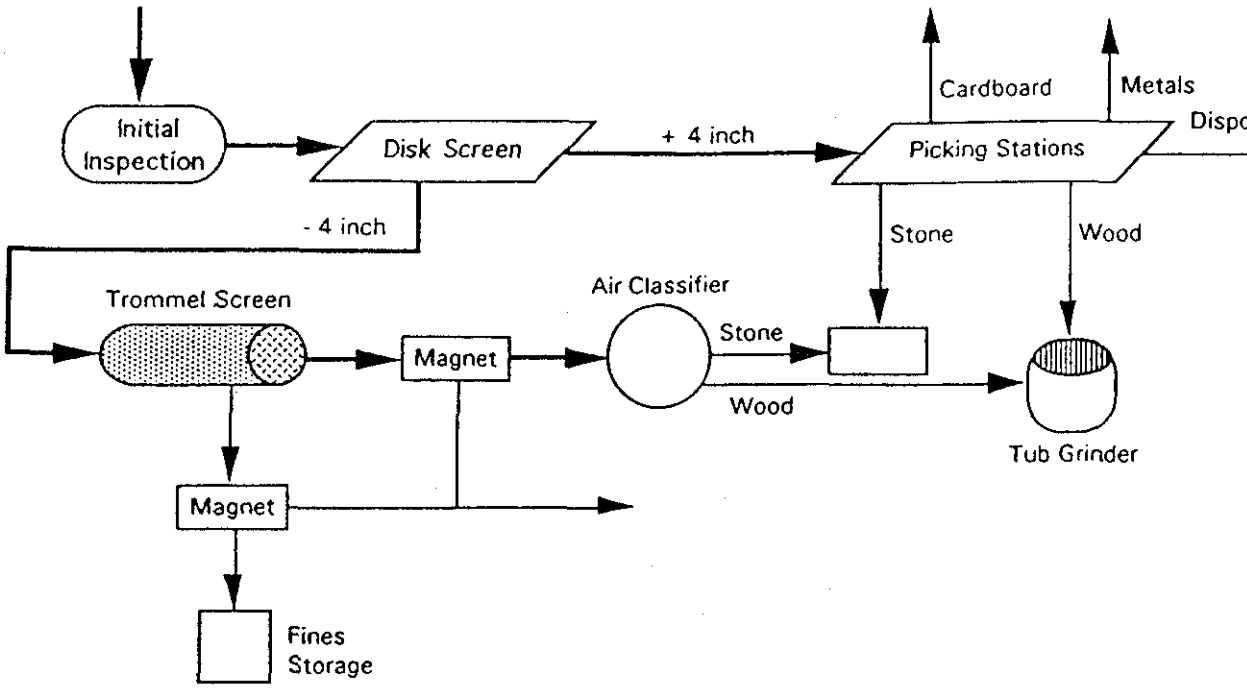

Figure 4.2 Marin Resource Recovery Center C/D MRF [Apotheker, 1992]

The capital cost of MRRC's mixed waste recovery system was $1.2 millic including conveyors, dust control, and storage bunkers.

Another example of a high technology C/D MRF is the Wood Recycling, I facility near Boston. It utilizes specialized sorting equipment manufactured by General Kinematics Corporation of Barrington, Illinois. The facility mainly acc residential type construction waste, and processes it into four salable products: clean wood chips; slightly dirty wood chips for cogeneration plants; ferrous and nonferrous metals; and fines for landfill cover [Rochwarg, 1992].

After an initial inspection, all material passes through an impact crusher fc size reduction. Then it is conveyed past picking stations on a vibrating finger screen conveyor which removes particles below 3/4 inch in diameter. Material passing the picking stations moves past an overhead magnet to remove ferrous metals. Next, remaining debris enters a "De-Stoner" air classification system which divides it into three fractions based on material density. Light materials (paper, light plastic) are discharged through a cyclone and dust control system. Medium weight materials (chiefly wood) pass through the end of the device for further processing or storage. The heavy fraction (metal, concrete, brick) are sic

discharged past another magnet (residual ferrous removal) and picking stations (nonferrous and other recyclables) with the remaining residue directed to containers for landfill disposal.

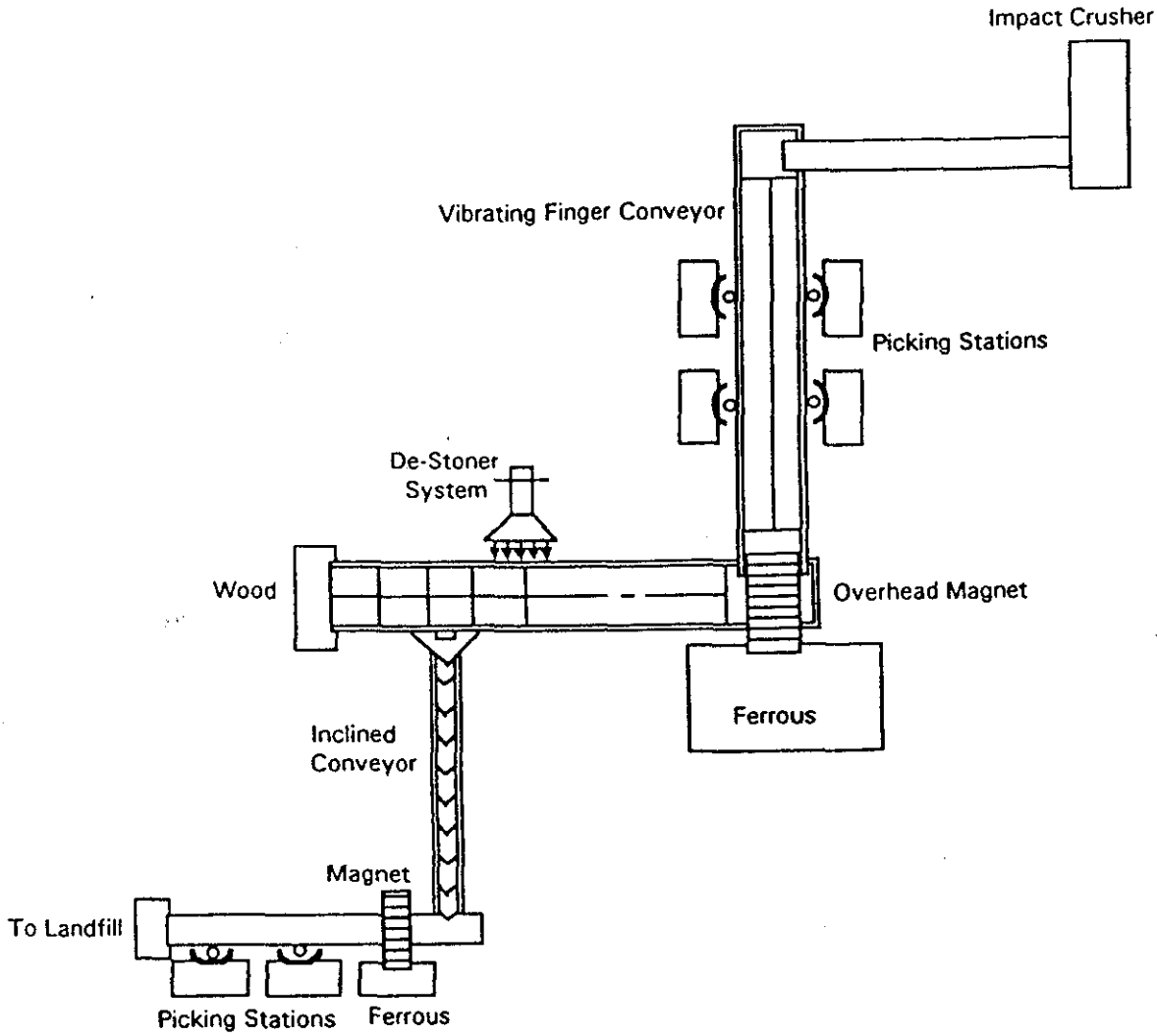

Figure 4.3 Wood Recycling, Inc. C/D MRF [General Kinematics, 1991]

This chapter will discuss processing technology, products, and markets f specific C/D waste materials. Information specific to Illinois is given where possible. Appendix C lists processors of C/D related wastes.

5.1 Wood

As seen in Chapter 2, wood waste comprises the single largest componen C/D waste. Sources include lumber end cuts, wooden concrete forms, landclearing, and demolition of wooden structures. Figure 5.1 shows a flow diagram of a hypothetical wood waste processing plant. The key to this syste the flotation tank which separates materials based on density. Wood, being le dense than water, will float to the top where it can be skimmed off by manual mechanical means. Metals, concrete, and other debris will sink to the bottom either be recovered or discarded.

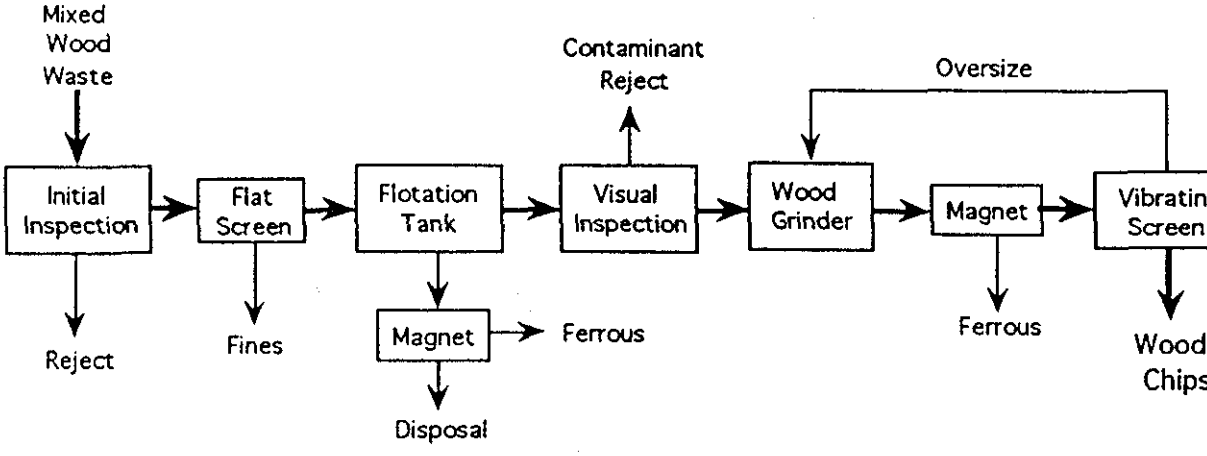

Figure 5.1 Wood waste processing plant [Donovan, 1991; Gitlin, 1991]

There are other ways to separate wood waste from other debris, such as the ai classification system shown in Figure 4.3.

Markets for wood chips include landscaping, compost bulking agents, an bedding, and boiler fuel. CT Donovan Associates has found that, at least in t Northeast, one of the largest potential markets for wood chips is fuel [Donova 1991]. Clean wood as from pallets, framing lumber, and landclearing, is esp in demand. However, the burning and ash disposal from painted or treated w has received much scrutiny from state regulatory agencies.

The Microterra Company of Boca Raton, Florida has developed a biolo process to remove creosote and pentachlorophenol (the most commonly used preservatives) from treated wood such as telephone poles and railroad ties. M

than 99.9% of these chemicals are removed [Jesitus, 1992].

In Illinois, there are several wood fired boilers in operation, located primarily in plants that produce wood scrap as a byproduct (e.g. a sawmill or furniture factory) [Moore, 1992]. However, it appears that the Illinois EPA does not encourage wood waste burning due to concern over contamination. It would be difficult to permit and convert an existing coal fired boiler to wood.

To increase the amount of wood waste composted, ENR recommended in a 1991 report that "The language defining materials that can be accepted in landscape waste sites be modified to permit these sites to accept appropriate wood waste..." [ENR, 1991]. They further recommend that "the Illinois Pollution Control Board review the permit requirements for co-firing wood and coal in existing coal-fired facilities."

5.2 Concrete

Regardless of the source of waste concrete, the goal of recycling is to separate it back into its component parts: sand, aggregate, and rebar. There are also applications for larger pieces of crushed concrete. Figure 5.2 presents a generic flow diagram of a concrete crushing plant. In practice, crushing is usually done in two steps: a primary crusher to reduce the large incoming debris, and a secondary crusher to bring the material nearer to the desired particle size. Magnetic ferrous metal recovery can occur after both crushing stages.

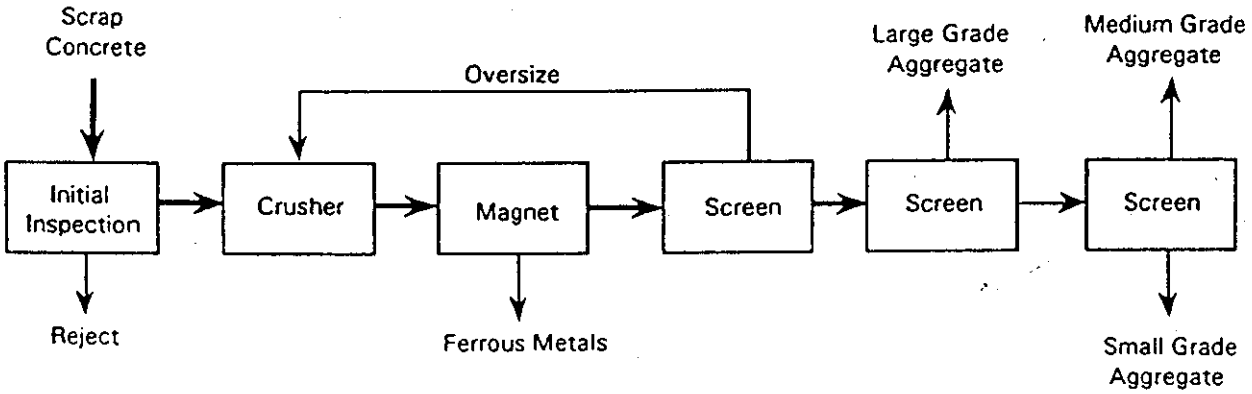

Figure 5.2 Flow diagram of a concrete crushing plant. [Donovan, 1991]

The three main types of crushers are jaw, impact, and rolling. Jaw crushers are best suited for quickly reducing large or odd shaped debris from.C/D projects to a manageable size, typically less than 15 cm in diameter. High speed rotary impact crushers use a lot of energy and may pose a safety hazard from flying debris. However, an impact crusher would outperform a jaw crusher in freeing rebar

encased in the rubble [Vollmer, 1992]. A roller crusher is composed of two l cylindrical rollers separated by the desired particle diameter. It is used for secondary crushing.

Dust control at a concrete crushing plant is critical, especially if the plant located near residential or other sensitive areas. At Wheaton Asphalt (Wheato IL), the crusher operator uses a hose to spray water directly on the rubble as i passes through a jaw crusher.

The main markets for processed concrete are asphalt and concrete pavem road base, and as a fill material. All the concrete removed during the current reconstruction of Chicago's Kennedy Expressway is being recycled into the ba course on the same project. From 1989-1991, the Illinois Department of Transportation (IDOT) used 594,000 tons of recycled concrete for aggregate drainage layers and aggregate subbases [Brown, 1992]. IDOT allows the use reclaimed aggregates in new concrete pavement as long as it meets the same specifications as virgin material. Unfortunately, most of the concrete roadwa the state are made from aggregates which tend to break down under freeze-tha cycles. Therefore, they are not suitable for new concrete highways. The discu of the different methods of pavement recycling in section 5.3 is equally applic to concrete pavements.

There are several other current and potential uses for scrap concrete [Kre 1980]. Concrete has long been used as fill for low areas and quarries since th usually represents the cheapest disposal method. It can also be used to fill underground caverns which might otherwise collapse. Concrete in large slabs used as rip rap to prevent shoreline erosion. Finely crushed limestone contain concrete can be utilized as a neutralizing agent for power plant scrubber syste industrial wastewater, acidic mine drainage, or acidic agricultural soils. Othe potential uses include ballast or subballast for railroad tracks and trickling filt media for wastewater treatment plants. The use of relatively clean C/D waste, as concrete scrap, for daily and final cover at landfills should be investigated. would reduce the purchase and hauling costs of earthen cover material [Millsp 1992].

5.3 Asphalt

Asphalt concrete pavements are subject to many different forms of distre from traffic loading and weather conditions. In the late 1970s, government transportation agencies looked seriously at recycling asphalt pavements due to of funding and a low supply of virgin materials. Local supplies of suitable aggregates were diminishing, and high energy costs made long distance haulin impractical. Recycling existing pavements provides a solution to each of these

problems. Three distinct types of pavement recycling are commonly practiced and are discussed in the following subsections.

5.3.1 On-Site Surface Recycling

Surface recycling involves removing and replacing the top layers of a pavement structure for the purpose of repairing a wide range of pavement distress. The first step is to break up the top layer to a depth of about one inch using one of three types of machines: planing, milling, or scarifying. Each of these may be used in conjunction with a heater to soften the asphalt. Then the loose material is recompacted, and sprayed with a liquid modifier recycling agent. A modifier (or rejuvenator) is a hydrocarbon product with physical characteristics selected to restore aged asphalt to current asphalt specifications [Epps, 1980]. The modifier may be a soft asphalt cement or a specialty chemical. Next, a new surface is placed, ranging from a layer of new aggregate to a thick layer of asphalt concrete. Finally, the pavement is again compacted (Figure 5.3). Surface recycling can correct many pavement surface defects at a reasonable initial cost and with limited traffic disruption. However, any serious structural problems in the pavement base will remain.

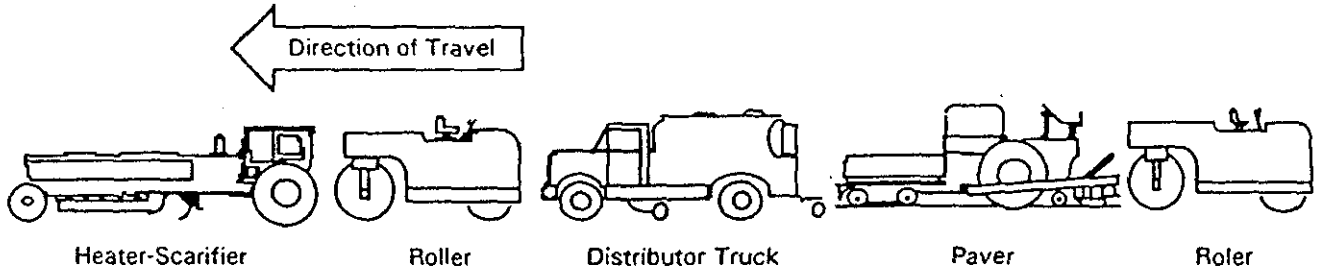

Figure 5.3 Surface asphalt recycling by heater-scarification [Epps, 1980]

5.3.2 In-Place Recycling

In-Place recycling means turning the existing pavement into a base for a new pavement. First, the entire existing pavement structure is pulverized. Then the asphalt concrete surface and the aggregate base are separated and windrowed. A modifier may be applied to the asphalt bound materials. Next the old surface and base are mixed together. A binder may be added to strengthen this loose material. Common binders are, asphalt, lime, cement, and fly-ash. Finally, the mixture is smoothed, compacted, and a new surface course is applied (Figure 5.4).

Because of the additional binders, this new base may be stronger than the previous one, and the overall thickness of the pavement may be reduced. In this case, some of the new base mixture can be stockpiled for future use. Since in-place recycling processes both the pavement surface and base courses, any underlying

structural problems can be repaired. However, the procedure tends to disrupt traffi and quality control is difficult to maintain.

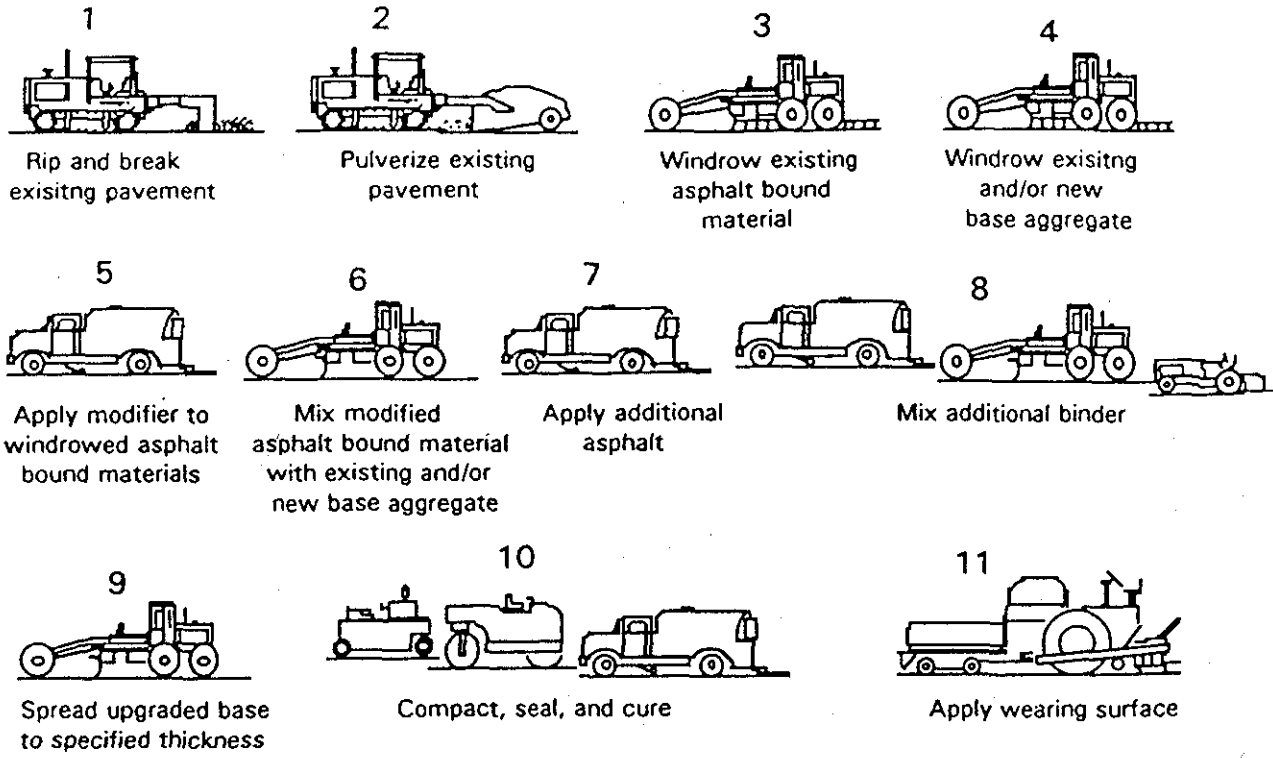

Figure 5.4 In-Place recycling of asphalt pavement [Epps, 1980]

5.3.3 Central Plant Recycling

Central plant recycling of asphalt pavements became widespread in the early 1970s, when asphalt cement prices rose as a result of the energy crisis. As with in place recycling, the entire depth of pavement is broken up. It may be crushed and sized on-site using milling, planing, or scarifying machines, or larger pieces may be taken to the central facility. There, the reclaimed asphalt pavement (RAP) is crushed and sized, and any tramp metal is removed (Figure 5.5). Material processing at a central plant tends to improve quality control over on-site methods. With the whole pavement structure removed, it is easier to change highway geometry.

The RAP is then mixed with virgin asphalt and aggregate to achieve desired specifications. Other materials can be added such as bricks or ceramics, glass, tire rubber, or asphalt shingles. The end product is known as "cold mix", commonly used as a pavement base course, patching potholes, or as surface course for road shoulders and other non-critical applications. Figure 5.6 shows a typical cold mix plant layout. Cold mix can contain nearly 100% RAP.

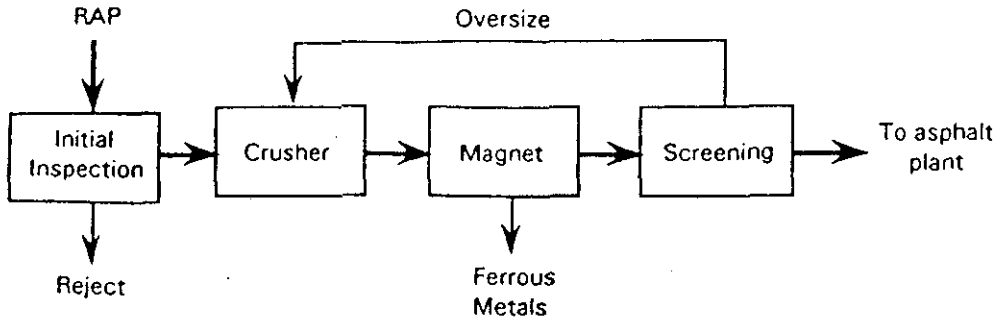

Figure 5.5 Flow diagram of a reclaimed asphalt pavement (RAP) processing plant [Donovan, 1991].

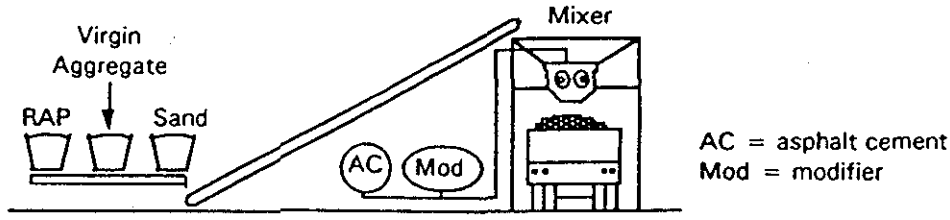

Figure 5.6 Cold mix asphalt plant [Epps, 1980]

"Hot mix" is the surface or intermediate asphalt concrete course which is applied hot with special paving machines. It is usually produced by a drum mixing technique with an open flame in the center to heat and mix the materials. It is important that the RAP be added at the end of the heating process because the residual asphalt on the RAP can smoke and burn and cause air pollution. This procedure can produce new asphalt pavement with a maximum RAP content of 50%, but the usual range is between 20 and 30% (Figure 5.7).

Highway engineers have been hesitant to use RAP extensively in surface hot mix due to quality concerns. Asphalt cement tends to oxidize and become brittle with exposure to the elements. The aggregate may become damaged due to freezing and thawing, or may be "polished", losing important frictional properties. North Carolina and Florida have been using hot mix containing up to 50% RAP for over ten years. According to a Florida Department of Transportation employee, the state saves 35 to 45% in asphalt cost per project by using RAP [Naber, 1989].

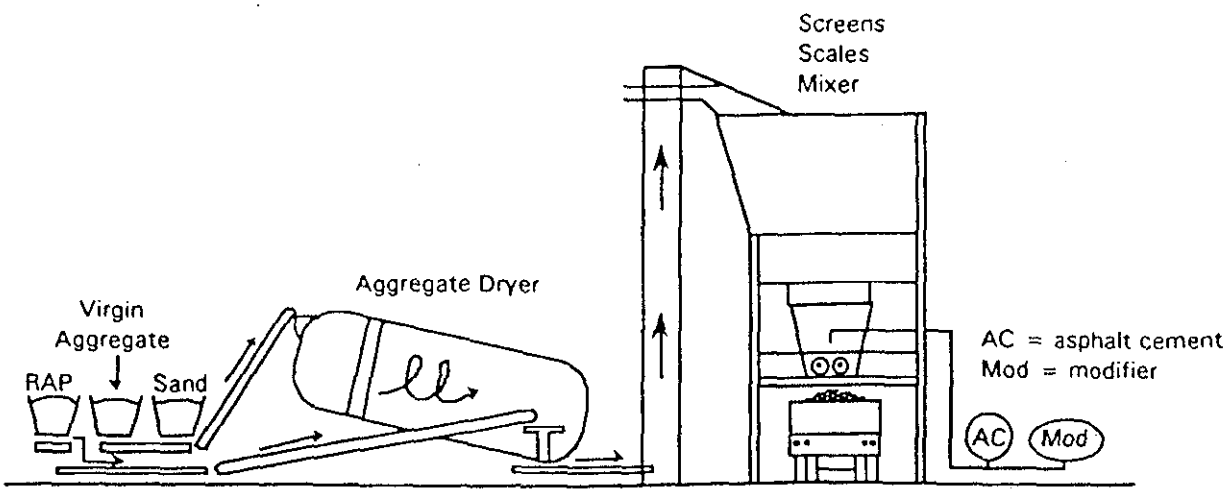

Figure 5.7 Hot mix asphalt plant [Epps, 1980]

Another central plant recycling method was developed by Cyclean, Inc. of Round Rock, Texas to produce hot mix containing up to 100% RAP. They use microwave energy to heat water trapped in the RAP and new aggregate. This process heats the surrounding asphalt and promotes a reportedly better bond (Figure 5.8). Since the system uses microwave energy instead of an open flame, no smoking or burning occurs. This process was used by the Texas Department of Transportation to resurface over 18 miles of an interstate highway [*Cyclean Times*, 1992]. The final surface course consisted of 90% RAP and 10% new aggregates. The agency acknowledged a cost savings of 25 to 30 percent (i.e. 75,000 tons of new aggregate and 18,000 barrels of petroleum were saved compared to a virgin hot mix production). The Pennsylvania Department of Transportation has recently used the Cyclean process to resurface seven miles of the Pennsylvania Turnpike with good results [Branca, 1992]. It is also used by the Los Angeles Bureau of Street Maintenance.

In 1991, IDOT used 477,000 tons of RAP out of a total of 8.3 million tons of asphalt concrete. IDOT's policy is to give contractors the option of using RAP in limited circumstances in order to keep project bids as low as possible. RAP may be used in state projects in the following cases [Brown, 1992]:

- Surface mixtures for roads with 2000 average daily traffic or less - 15% maximum
- Base and binder mixture for primary and local roads - 25% maximum
- Shoulders and subbases for all roads - 50% maximum

In Illinois, the supply of available RAP typically meets the demand.

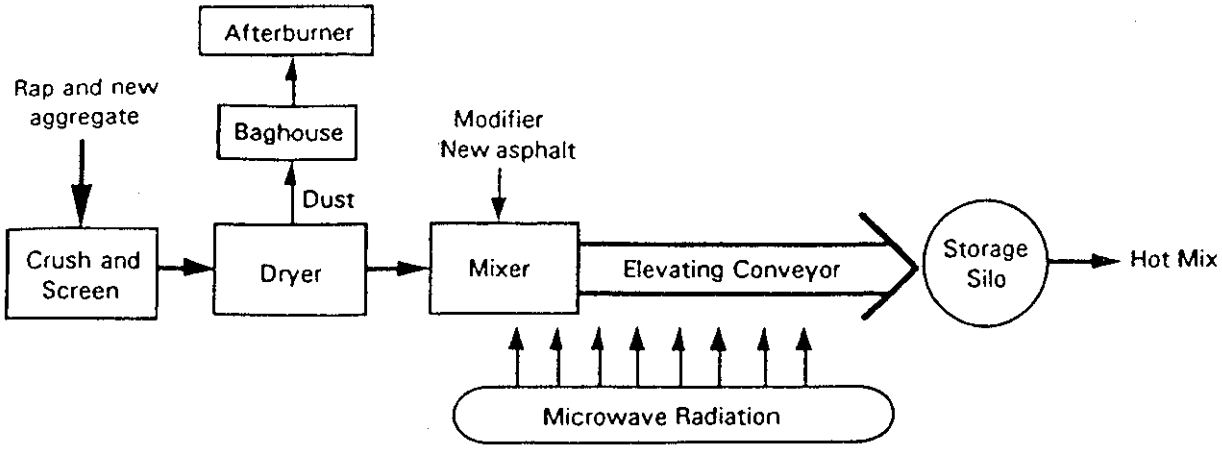

Figure 5.8 Microwave asphalt recycling process [Naber, 1989]

5.4 Metals

There has always been a strong market for ferrous and nonferrous scrap metal. This is due to scrap metal's relatively high value and high density which makes it economical to transport. Each of the C/D waste processors examined in Chapters 2 and 4 recover metals. The magnetic property of ferrous metals allow them to be separated from mixed debris with relative ease. Table 5.1 shows the U.S. metal recovery rates which are significantly higher than other parts of the MSW stream. Appendix C contains several pages of companies in or near Illinois whose primary business is metal recycling. Figure 5.9 is a flow chart of the well developed scrap metal infrastructure for iron and steel. Table 5.2 lists the types and functions of metals commonly used in construction. The majority of these could be recovered and recycled in a careful demolition process.

Table 5.1 U.S. Metal consumption and recycling, 1990 [Rogich, 1992]

Metal	Consumption (thousand tons)	Percent of Consumption Provided by Recycling
Lead	1,297	73
Copper	2,168	60
Iron and Steel[a]	99,900	56
Aluminum	5,263	45

(a) 1989 figures

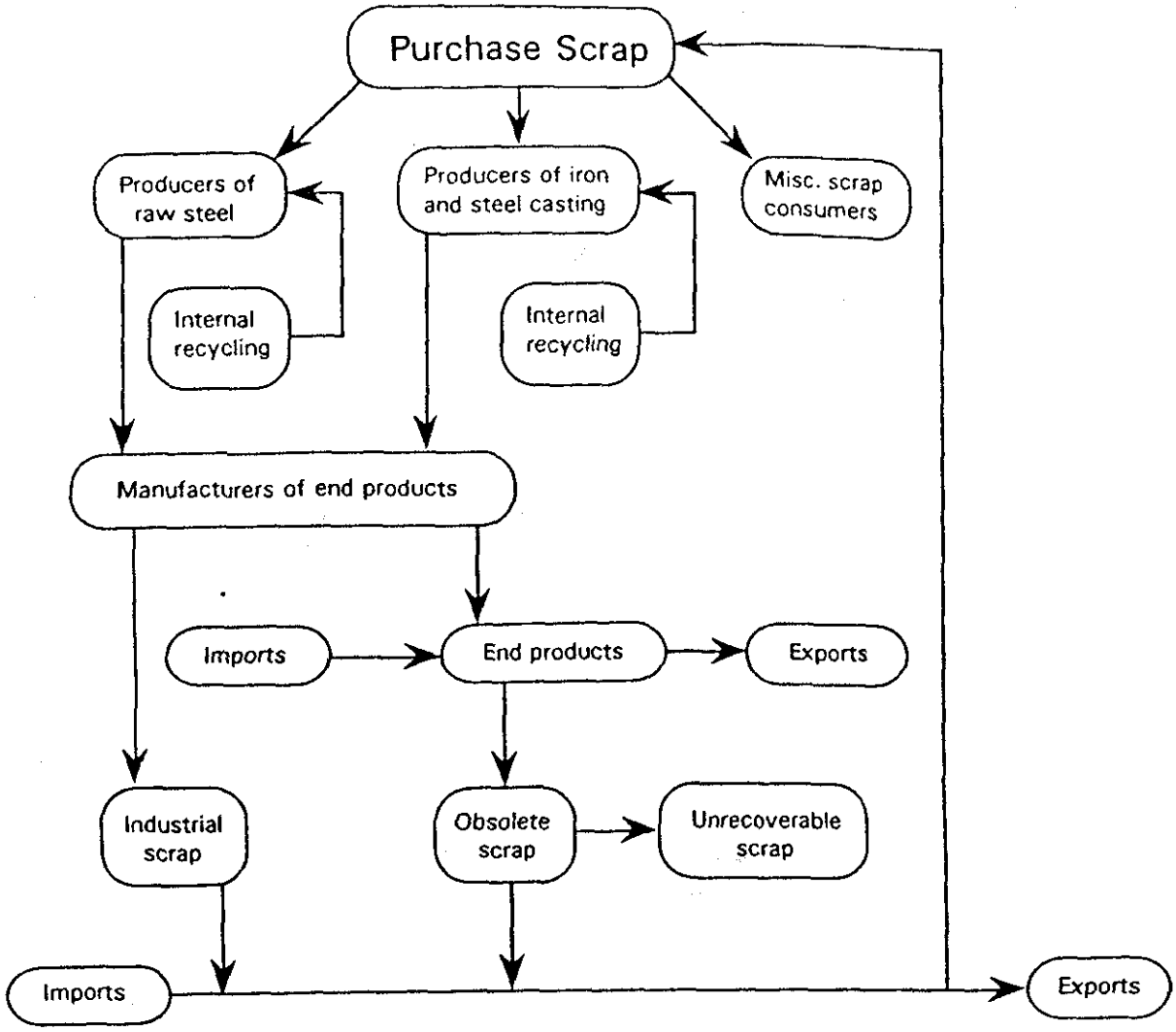

Figure 5.9 Iron and steel recycling flow diagram [Wilson, 1979]

5.5 Drywall

Drywall, also known as wallboard, Sheetrock, or gypsum board, is a special mixture of gypsum ($CaSO_4 \cdot 2H_2O$) rolled between paper backing and cured to form a stiff sheet, used as interior walls. In the drywall manufacturing process, 3 to 5% of the production is waste. Of the finished product sold to builders, 10 to 12% is wasted on the job, or about one pound per square foot of floor area [Musick,1992].

There are only a handful of firms in North America known to be actively processing waste drywall. New West Gypsum, based near Vancouver, British Columbia, built a plant to recycle gypsum wallboard in 1986 as a result of a landfill ban on the material. The ban was enacted because, under specific landfill conditions, drywall can decompose to form hydrogen sulfide gas (H_2S). New West currently has plants in Vancouver, Toronto, Tacoma, and one planned for Burlington, New Jersey. Their plants take in relatively homogeneous drywall waste and process it into fine gypsum powder (Figure 5.10). The company accepts

Table 5.2 Use of metals in construction [Wilson, 1979]

Metal	Construction Uses
Aluminum	door and window jambs, curtain wall, panel frames, thresholds, threads, handrails, door and window stiles, rails, muntins, bars, mullions, flashing, roofing roof drains, weather stripping, backing for built-up spandrel panels, chimney caps, air ducts, louver blades
Copper	wiring, ornaments, door fittings
Cast Iron	piping
Wrought Iron	roofing sheets, wires, ornaments
Antimony Lead	gutters, casting
Lead	roofing, flashing, spandrel wall panels
Chromium Steel	exterior wall panels, frames and doors, expansion joints, flashings, copings, fascia, gravel stops
Nickel Steel	structural elements

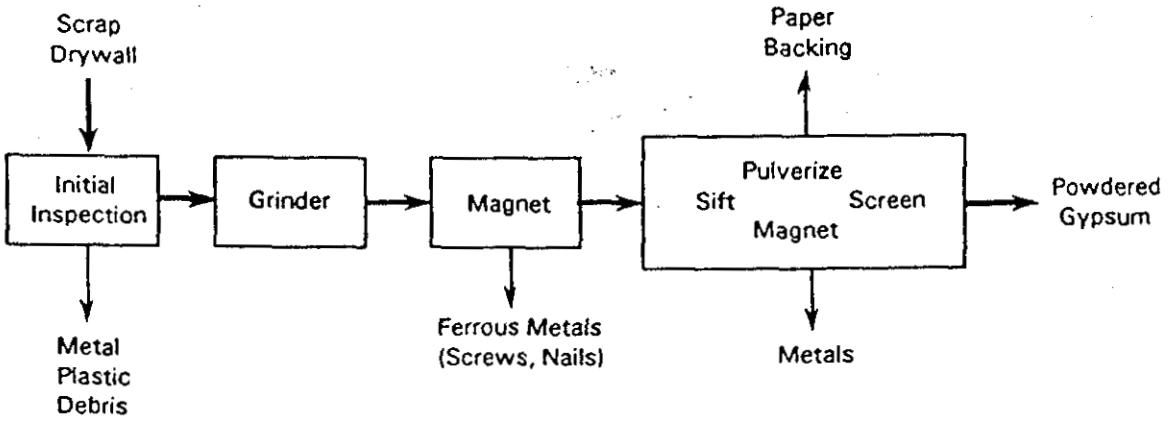

Figure 5.10 New West gypsum processing plant [Musick, 1992]

manufacturing waste from two major drywall plants and from building contractors. It then sells the processed gypsum back to the manufacturers.

In British Columbia, the landfill ban and high tipping fees make gypsum recycling economically attractive. However, in Tacoma, Washington, tipping fees at the local landfill and at New West's plant are about equal. In order to increase their supply, the company has a network of transfer stations located in areas with higher landfill fees. New West is currently constructing a plant to process the scrap wallboard backing paper. The plant will separate and clean the paper, then the company will sell the product to a paper mill. There, it will be reprocessed into backing paper, and the recycling loop is completed by selling this paper to drywall manufacturers.

Canagro Agricultural Products of Elmira, Ontario manufactures organic fertilizers using some recycled gypsum they reclaim from scrap wallboard [Kalin, 1991]. In 1989, the company began marketing some of the gypsum as cat litter since the material absorbs both liquids and odors. They also market the scrap backing paper with residual gypsum as bedding for livestock.

Reclamation Technologies, Inc. (RTI) of North Plainfield, New Jersey manufactures drywall recycling equipment (Figure 5.11) and they plan to open two

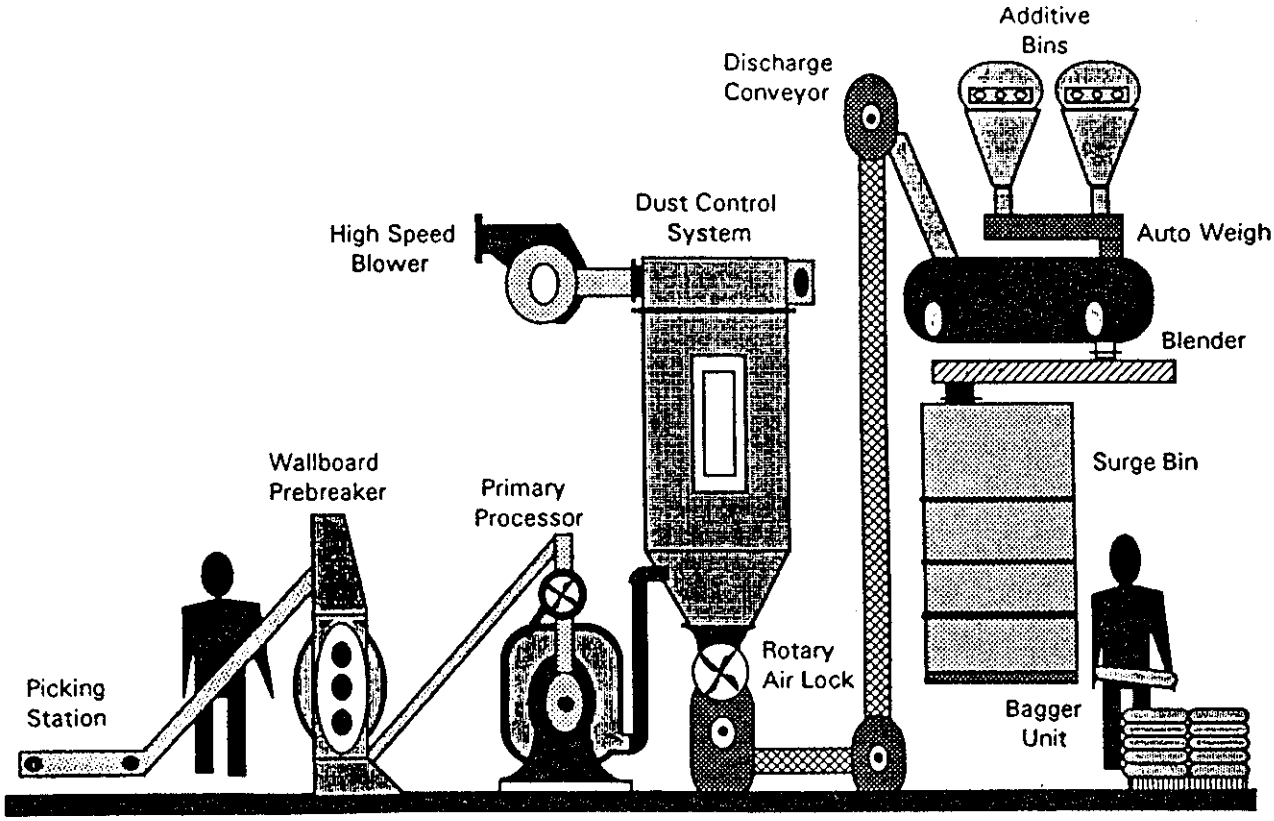

Figure 5.11 RTI Gypsum Recycling Plant [RTI, 1992]

of their own recycling facilities in New Jersey [White, 1992]. The plants will accept waste paper, wood, plastic, and glass, in addition to gypsum. RTI has developed several applications for processed gypsum including a sludge composting amendment, an agricultural amendment, an oil absorbent, structural building blocks, and coatings for interior and exterior building materials.

In addition to gypsum, drywall contains several additives including soaps, boric acid, silicone glue, starches, potassium sulfate, fiberglass, chelating agents, water dispersants, and asphalt wax emulsions [Musick, 1992]. There are also trace amounts of dioxins and furans in the backing paper. Due to these contaminants, the use of recycled drywall, other than for new drywall, will be limited.

5.6 Roofing

Roofing contractors are increasingly concerned about landfill fees as disposal costs take a larger portion of their projects' budget [Steiner, 1991]. In 1989, the tearing-off and replacement of old roofing comprised about 50% of all roofing projects, while recovering or repair was 30%, and new construction 20% [Ginter, 1991].

There is wide variety of different roofing materials used today in commercial and residential applications. Asphalt shingles are the traditional roofing material for slanted, residential roofs. Built up roofing (BUR) is the traditional material for flat, commercial roofs. BUR consists of layers of roofing felt with interply moppings of bituminous coal tar (i.e. coats of tar between layers of felt). Roofing waste from replacement or repair jobs will most likely consist of asphalt shingles or BUR. A few other materials have come into common use in recent years. Ethylene propylene diene monomer (EPDM) is a single ply rubber membrane. Expanded polystyrene (EPS) and poly-isocyanurate foam are used as insulation under roofing membranes [Ginter, 1991]. There are also many different types of sealants and glues used.

Roofing material manufacturers and trade organizations are working on recycling the newer materials (e.g. EPS and poly-isocyanurate). However, only asphalt shingles and BUR are actively recycled. ReClaim, Inc. of Tampa, Florida accepts asphalt shingles, BUR (including insulation) from roofing contractors, and rejects from roofing material manufacturers. They do not accept any asbestos containing materials. ReClaim then mixes the roofing materials with RAP to make a number of products including pot-hole patch, hot mix, and parking lot pavement. All contain high percentages of reclaimed materials. The company currently has two plants in New Jersey and has plans to open six more in other cities. ReClaim hopes to build a plant in Chicago in 1993 with a processing capacity of 2000 tons per day [Hagen, 1992].

Chapter 6 Policies and Incentives to Improve Construction and Demolition Waste Management

This chapter will give examples of government polices and private sector guidelines for reducing, reusing, or recycling C/D waste.

6.1 Public Sector

State government can foster the development of C/D waste recycling through grants or loans to encourage new businesses ventures. The Technologies and Practices Demonstration Program of the Illinois Department of Energy and Natural Resources (ENR) is designed to financially encourage innovative waste management practices. In the Fall of 1992, ENR released a Request for Proposals (RFP) to "qualified contractors to host and conduct demonstrations of relevant technologies, alternative uses, and/or economic methods to divert (C/D waste) from landfills." The entire text of this RFP appears in Appendix D and may serve as a guide for other state or local agencies. On state funded building projects, state government may incorporate waste management specifications or alternative bids as discussed in section 6.2.

One of the reasons for the lack of attention on reducing C/D waste in the Midwest is the relative availability and low cost of landfilling. Solid waste officials should examine tipping fee structure when trying to promote recycling. Several states have adopted tax incentive strategies to attract recycling businesses [Donovan, 1991]. In Virginia, companies receive an income tax credit of 10% of the purchase price of machinery used to process recyclables. Florida gives a sales tax exemption on recycling equipment and tax incentives to encourage affordable transportation of collected recyclables. Kentucky grants a property tax exemption to companies that process recyclables.

The Illinois General Assembly may wish to consider banning some elements of C/D waste from MSW landfills. It is clearly their intent that C/D waste not take up needed space in MSW landfills, as stated in §2(a)(10) of the Solid Waste Management Act of 1986 (see section 3.1.2). The development of gypsum recycling near Vancouver was a direct result of a 1984 landfill ban (see section 5.5). In the Toronto area, landfill bans on cardboard, wood products, and drywall have caused the Toronto Home Builders' Association to adopt a proactive waste reduction policy [REIC, 1990].

County government policies can directly affect construction waste management. Henry Fisher, solid waste manager for fast growing McHenry County, has proposed using the building permit system to track and control C/D

waste generation [Fisher, 1992]. In order to obtain a building permit, a developer would have to submit a material recycling plan for wood, metals, masonry, and corrugated cardboard. The plan would include estimated waste generation, material separation procedure, recycling method, and location of material processor. The second phase of this C/D waste recovery strategy would require developers to furnish receipts from material processors before the county will issue an occupancy permit.

A county government could set up a material exchange facility for reusable items such as bricks, lumber, plumbing and lighting fixtures, white goods, cabinets, and wood trim [St. John, 1992]. Individual home renovators or contractors could drop off appropriate items free of charge. The facility would then be open to the public to purchase these items for a nominal fee to help cover operating costs. Demolition salvagers or contractors may be allowed to sell on a consignment basis. The county would supply the physical space for this market, and hire someone to manage the facility to ensure that only clean, reusable materials are accepted. Before trying to develop this type of facility, one should ascertain if there are any local private organizations involved in this type of work. If so, a liaison may be formed to increase recovery rates. Local solid waste agencies can also help publicize existing construction waste management companies.

The role of the federal government in C/D waste management will be limited. State and local governments will be more intimately involved in the details of encouraging new business, siting MRFs, and working with contractors. Perhaps the most important part the federal government can play is to use its purchasing power to stimulate the markets for reclaimed construction materials. Federal agencies heavily involved in construction (e.g. Army Corps of Engineers, Department of Transportation) can specify the use of reclaimed materials and the recycling of wastes created in their projects and utilize the alternative bidding process discussed in the next section.

6.2 Private Sector

The construction industry, through individual trade organizations, can adopt guidelines to ensure that waste management practices always receive due consideration. The Construction Industry Affairs Committee of Chicago (an umbrella organization for several construction related groups) proposed the following recommendations in November 1990. These recommendations show that contractors, architects, and owners all have a part to play in C/D waste reduction.

- Design professionals should urge owners to explore the benefits of recycling and make a commitment to the process for their projects.

- Design professionals should specify the following recycling requirements for waste materials generated on a project:
  - -Prequalified recycling firms should be named in the specification.
  - -Reusable demolition materials should be salvaged and incorporated into new construction, stored for future use, or moved into the salvage market.
  - -Non-reusable demolition materials should be recycled.

- Alternate bids should be used to determine the added cost or savings of the recycling requirements.

- Contractors and subcontractors should voluntarily initiate recycling programs. The costs or savings of the recycling programs should be included in bids.

- To stimulate the markets for waste materials, design professionals should select and specify used materials or new products made of recycled materials whenever possible.

Of these recommendations, the second and third are perhaps the most important. If owners desire to reduce waste generation, a waste management practice (e.g. recycling specific materials or salvaging) should be part of the specifications for a given project. This will create a baseline for all contractors bidding on the job, and encourage innovative practices. In lieu of such a specification, contractors will seek the cheapest waste disposal option in order to submit the lowest bid. Design professionals (i.e. architects and engineers) should try to be familiar with local C/D waste disposal options so they can specify appropriate, cost effective waste management alternatives. Owners must realize that waste reduction practices may cost more than landfilling, at least until the recycling infrastructure has developed. Alternative bids (one with and one without waste management specification) may be required to compare differential costs of waste management strategies. Since contractors may be more familiar with different waste management possibilities, they could take the initiative to suggest alternative disposal options.

The Toronto Home Builders' Association (THBA) proposed a code of practice to improve waste management by its members [REIC, 1990]. The code encourages members to be proactive in looking for ways to reduce waste and not simply follow the letter of the law. The code gives suggestions in three categories: waste reduction, reuse, and recycling.

Reduction

- incorporate waste management considerations into project planning
- investigate building techniques which produce less waste
- target systemic factors which contribute to the waste problem (e.g. the overpackaging of construction materials)
- eliminate unnecessary over-purchasing of construction materials

Reuse

- separate waste materials on site for reuse purposes
- strip reusable materials out of buildings before demolition
- ensure that all waste materials being used as on-site fill are environmentally benign

Recycling

- investigate and implement methods of recycling waste products
- separate waste materials on site for recycling purposes
- encourage use of recyclable materials
- work in cooperation with local officials to eliminate recyclables from landfills

More emphasis needs to be placed on source reduction of the type stated in the above code. Since packaging can make up a significant portion of C/D waste, contractors should discuss packaging reduction with their suppliers [Fisher, 1992]. The THBA report also found that the construction of higher priced homes, custom work, and renovations tend to produce less waste than other home construction. Contractors should attempt to identify and practice material-efficient building techniques.

The THBA suggests that periodic seminars on waste related issues would catalyze the discussion of problems and solutions. Building trade organizations could sponsor workshops for members to voice concerns and suggest solutions to C/D waste problems. Guest speakers could include local or state regulatory authorities and operators of C/D material recycling facilities.

Construction companies could work together to combine their segregated waste streams, especially for low volume materials such as plastics. Large quantities of accumulated materials are more attractive to recyclers and can better justify transportation costs than small loads.

Demolition and renovation companies could develop a market for stripped out, reusable items. Urban Ore of Berkeley, California is a successful example of this type of operation [Gitlin, 1991]. Alternatively, these items could be donated to charitable organizations.

Glossary of Terms, Abbreviations, and Acronyms

Afterburner - air pollution control device utilizing an open flame to burn off hydrocarbon gasses in exhaust

Aggregate - mineral materials such as sand or stone; used in making concrete

Asphalt cement - black tar-like substance derived from crude oil

Asphalt concrete - road paving material consisting mainly of aggregate and asphalt cement

Baghouse - enclosure containing large fabric bags used as an air pollution control device to remove particulate matter from exhaust gasses

Bulking agent - material, such as wood chips, added to compost to improve body or texture

BUR - built up roofing; consists of layers of felt with coats of tar in between

C/D - construction and demolition

Cold mix - asphalt concrete, mixed and applied cold; used for non-critical applications, such as filling potholes and roadbases

Creosote - oily liquid containing phenols and creosols (aromatic, $C_8H_{10}O_2$); obtained from coal tar and used as a wood preservative

Dimensional lumber - wood cut into standard sizes, e.g. 2 x 4 inches

Disk screen - an array of disks used to separate bulk material into distinct size classes

Drywall - interior wall board made of a powdery, gypsum-based material between sheets of paper

ENR - Illinois Department of Energy and Natural Resources

EPDM - ethylene propylene diene monomer; a single ply rubber membrane used in roofing

EPS - expanded polystyrene; used as insulation under roofing membranes

Ferrous - metals containing iron

Fly dumping - unauthorized dumping into a commercial waste container

Friable - substance crumbles under hand pressure; used to describe asbestos

Hot mix - asphalt concrete mixed and applied hot; used as a pavement surface

IEPA - Illinois Environmental Protection Agency; state agency charged with the enforcement of environmental regulations

LBP - lead based paint

LDPE - low density polyethylene

Modifier - hydrocarbon product with physical characteristics selected to restore aged asphalt to current asphalt specifications

MRF - materials recovery facility

MSW - municipal solid waste

OCC - old corrugated cardboard

PCB - Illinois Pollution Control Board; state government body charged with writing environmental regulations and adjudicating environmental cases

PCC - portland cement concrete

Picking station - platform next to a conveyor on which a MRF employee stands and manually remove specific item(s) from commingled waste

Poly-isocyanurate - a foam used as roofing insulation; sometimes referred to as "iso"

RAP - reclaimed asphalt pavement

Rebar - steel reinforcing bars placed inside concrete to improve tensile strength

Roll-off box - large metal container used to collect and haul solid wastes, usually 20-30 cubic yards in volume

RFP - request for proposals

Scarification - removal of the top layer of asphalt concrete pavement with a series of parallel shallow cuts

Source separation - segregating waste materials in the same location they are generated in preparation for collection and recycling

TCLP - Toxicity Characteristic Leaching Procedure; a test to determine how a chemical may become mobile in the environment

Trommel screen - rotating perforated cylinder used to remove fines from bulk material

VAT - vinyl asbestos tile

White goods - large household appliances, such as stoves and refrigerators

Appendix A Legislation and Regulation Applicable to C/D Waste

Chapter 3 discussed the laws and regulations which influence the management of C/D and gave brief excerpts. This appendix will give extended text of applicable laws to give the reader a better understanding of the context and intent of these laws. The complete texts are available from the Illinois Environmental Protection Agency.

Illinois Statutes

Environmental Protection Act

Title I: General Provisions

Legislative Declaration

§ 2(b) It is the purpose of this Act, as more specifically described in later sections, to establish a unified, state-wide program supplemented by private remedies, to restore, protect, and enhance the quality of the environment, and to assure that adverse effects upon the environment are fully considered and borne by those who caused them.

Definitions

§ 3.08 "Disposal" means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any waste of hazardous waste into or on any land or water or into any well so that such waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

§ 3.11 "Garbage" is waste resulting from the handling, processing, preparation, cooking, and consumption of food, and wastes from the handling, processing, storage, and sale of produce.

§ 3.15 "Hazardous waste" means a waste or combination of wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible, illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed, and which has been identified, by characteristics or listing, as hazardous pursuant to Section 3001 of the Resource Conservation and Recovery Act of 1976, P.L.94-580, or pursuant to Board regulations.

§ 3.21 "Municipal waste" means garbage, general household and commercial waste, industrial lunchroom or office waste, landscape waste, and construction or demolition debris.

§ 3.30 "Recycling, reclamation, or reuse" means a method, techniques, or process designed to remove any contaminant from waste so as to render such waste reusable, or any process by which materials that would otherwise be disposed of or discarded are collected, separated, or processed and returned to the economic mainstream in the form of raw materials or products.

§ 3.32 "Regional pollution control facility" is any waste storage site, sanitary landfill, waste

disposal site, waste transfer station, waste treatment facility or waste incinerator that accepts waste from or that serves an area that exceeds or extends over the boundaries of any local general purpose unit of government...

§ 3.78 "Clean construction or demolition debris" means broken concrete without protruding metal bars, bricks, rock, stone, reclaimed asphalt pavement, or uncontaminated dirt or sand generated from construction or demolition activities.

§ 3.81 "Recycling center" means a site or facility that accepts only segregated, nonhazardous, nonspecial, homogeneous, nonputrescible materials, such as dry paper, glass, cans, or plastics, for subsequent use in the secondary materials market.

§ 3.83 "Transfer station" means a site of facility that accepts waste for temporary storage or consolidation and further transfer to a waste disposal, treatment, or storage facility...

Environmental Protection Agency
§4(a) There is established in the Executive Branch of the State Government an agency to be known as the Environmental Protection Agency. This agency shall be under the supervision and direction of a Director who shall be appointed by the Governor with the advice and consent of the Senate...

Pollution Control Board
§ 5(a) There is hereby created an independent board to be known as the Pollution Control Board, consisting of 7 technically qualified members, no more than 4 of whom may be on the same political party, to be appointed by the Governor with the advice and consent of the Senate...

(b) The Board shall determine, define, and implement the environmental control standards applicable in the State of Illinois and may adopt rules and regulations in accordance with Title VII of the Act.

Title V: Land Pollution and Refuse Disposal

Act Prohibited
§ 21 No person shall:

(a) Cause or allow the open dumping of waste

(d) Conduct and waste-storage, waste-treatment, or waste-disposal operation:

(1) Without a permit granted by the Agency or in violation of any conditions imposed by such permit, including periodic report and full access to adequate records and the inspection of facilities, as may be necessary to insure compliance...

(2) In violation of any regulations or standards adopted by the Board under this Act

(e) Dispose, treat, store, or abandon any waste, or transport any waste into this State for disposal, treatment, storage, or abandonment, except at a site or facility which meets the requirements of the Act and of regulations and standards thereunder.

Solid Waste Management Fund - Fees - Rules - Financial Assistance
§22.15 (a) There is hereby created within the State Treasury a special fund to be known as the "Solid Waste Management Fund" constituted from fees collected by the State pursuant to this Section...

(b) On and after January 1, 1987, the Agency shall assess and collect a fee in the amount set

forth herein from the owner or operator of each landfill...

(j) A unit of local government, as defined in the Local Solid Waste Disposal Act, in which a solid waste disposal facility is located may establish a fee, tax, or surcharge with regard to the permanent disposal of solid waste, to be utilized for solid waste management purposes...

(k) In accordance with the findings and purposes of the Illinois Solid Waste Management Act, beginning January 1, 1989 the fee under subsection (b) and the fee, tax, or surcharge under subsection (j) shall not apply to:

(3) Waste from recycling, reclamation, or reuse processes which have been approved by the Agency as being designed to remove any contaminant from wastes so as to render such wastes reusable, provided that the process renders at least 50% of the waste reusable

(5) Any landfill which is permitted by the Agency to receive only demolition or construction debris or landscape waste.

Fee exemptions

§22.16a(a) In accordance with the findings and purposes of the Illinois Solid Waste Management Act, the Agency shall grant exemptions from the fee requirements of Section 22.15 of this Act for solid waste meeting all of the following criteria:

(1) the waste is non-putrescible and homogeneous and does not contain free liquids;

(2) combustion of the waste would not provide practical energy recovery or practical reduction in volume; and

(3) the applicant for exemptions demonstrates that it is not technically and economically reasonable to recycle or reuse the waste.

(b) Exemptions granted under this Section shall cause the solid waste exempted under subsection (a) which is permanently disposed of by an owner or operator of a sanitary landfill to be disregarded in calculating the volume or weight of solid waste permanently disposed of during a calendar year under Section 22.15 of this Act.

Solid Waste Management Act

Public policy

§ 2(a) The General Assembly finds:

(7) that there are wastes for which combustion would not provide practical energy recovery or practical volume reduction, which cannot be reasonably recycled or reused and which have reduced environmental threat because they are non-putrescible, homogeneous, and do not contain free liquids...

(10) that there are over 300 landfills in Illinois which are permitted to accept only demolition or construction debris or landscape waste, the vast majority of which accept less than 10,000 cubic yards per year. By themselves these wastes pose only a minimal hazard to the environment when landfilled in compliance with regulatory requirements in an Agency-permitted site without commingling with other wastes and, as such landfills receiving only such wastes bear a real and substantial difference from landfills receiving wastes which are commingled. Disposal of these wastes uses up increasingly scarce capacity for garbage, general household and commercial waste. It is the policy of the State to encourage disposal of these wastes in separate landfills.

(b) It is the purpose of this Act to reduce reliance on land disposal of solid waste, to encourage and promote alternative means of managing solid waste, and to assist local governments with solid waste planning and management. In furtherance of those aims, while

recognizing that landfills will continue to be necessary, this Act establishes the following waste management hierarchy, in descending order of preference, as State policy:

(1) volume reduction at the source;
(2) recycling and reuse;
(3) combustion with energy recovery;
(4) combustion for volume reduction;
(5) disposal in landfill facilities.

Information clearinghouse

§ 5 The Department of Energy and Natural Resources, in cooperation with the Environmental Protection Agency, shall maintain a central clearinghouse of information regarding the implementation of this Act. In particular, this clearinghouse shall include data regarding solid waste research and planning, solid waste management practices, markets for recyclable materials, and intergovernmental cooperation.

(Note: the ENR Clearinghouse may be telephoned at 800-252-8955)

Lead agency - Powers

§ 6 The Department of Energy and Natural Resources shall be the lead agency for implementation of this Act and shall have the following powers:

(c) to provide loans or recycling and composting grants to businesses and not-for-profit and governmental organizations for the purposes of increasing the quantity of materials recycling or composted in Illinois...

(d) to establish guidelines and funding criteria for the solicitation of projects under this Act, and to receive and evaluate applications for loans or grants for solid waste management projects...

(f) to provide loans or grants for research, development, and demonstration of innovative technologies and practices, including but not limited to pilot programs for collection and disposal of household wastes.

Waste paint

§ 7.1(a) The Department of Energy and Natural Resources shall conduct a study to develop cost effective, environmentally sound, and technically feasible waste paint disposal options for small businesses, including at least painting contractors, auto body shops, and households. The study shall include on site investigations of manufacturing processes, including demonstration projects on reprocessing, and on pigment and solvent extraction.

(c) By November 1, 1991, the Department shall report to the Governor and the General Assembly on its activities pursuant to this Section...

Solid Waste Planning and Recycling Act

Legislative findings - Purpose

§ 2(a) The General Assembly finds:

(2) that counties should have the primary responsibility to plan for the management of municipal waste within their boundaries to insure the timely development of needed waste management facilities and programs;

(b) It is the purpose of this Act to provide incentives for decreased generation of municipal waste, to require certain counties to develop comprehensive waste management plans that place

substantial emphasis on recycling and other alternatives to landfills, to encourage municipal recycling and source reduction, and to promote composting of yard waste.

Waste management plans

§ 4(a) By March 1, 1991, each county with a population of 100,000 or more and each municipality with a population of 1,000,000 of more, and by March 1, 1995, each county with a population of less than 100,000, shall submit to the Agency an officially adopted plan for the management of municipal waste generated within its boundaries. Such plan shall conform with the waste management hierarchy established as State policy in subsection (b) of Section 2 of the Illinois Solid Waste Management Act.

Recycling Program

§ 6 Each county waste management plan adopted under Section 4 shall include a recycling program. Such recycling program:

(3) shall be designed to recycle, by the end of the third and fifth years of the program, respectively 15% and 25% of the municipal waste generated in the county, subject to the existence of a viable market for the recycled material, based on measurements of recycling and waste generated in terms of weight. The determination of recycling rate shall not include: discarded motor vehicles, wastes used for clean fill or erosion control, or commercial, institutional or industrial machinery or equipment.

Illinois Pollution Control Board Regulations

Illinois Administrative Code
Title 35: Environmental Protection Subtitle G: Waste Disposal
Chapter I: Pollution Control Board

Part 721 Identification and Listing of Hazardous Waste
Subpart A: General Provisions

§ 721.104 Exclusions

a) Materials which are not solid wastes. The following materials are not solid wastes for the purpose of this Part:

9) Wood preserving wastes

A) Spent wood preserving solutions that have been used and are reclaimed and reused for their original purpose; and

B) Wastewaters from the wood preserving process that have been reclaimed and are reused to treat wood.

b) Solid wastes which are not hazardous wastes. The following solid wastes are not hazardous wastes:

1) Household waste, including household waste that has been collected, transported, stored, treated, disposed, recovered (e.g., refuse-derived fuel) or reused. "Household waste" means any waste material (including garbage, trash, and sanitary wastes in septic tanks) derived from households (including single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas)...

9) Solid waste which consists of discarded wood or wood products which fails the test for the toxicity characteristic solely for arsenic and which is not a hazardous waste for any other reason or reasons if the waste is generated by persons who utilize the arsenical-treated wood and wood products for these materials' intended end use.

Subpart C: Characteristics of Hazardous Waste

§ 721.120 General

a) A solid waste, as defined in Section 721.102, which is not excluded from regulation as a hazardous waste under Section 721.104(b), is a hazardous waste if it exhibits any of the characteristics identified in this Subpart.

b) A hazardous waste which is identified by a characteristic in this Subpart is assigned every USEPA Hazardous Waste Number which is applicable as set forth in this Subpart. The number must be used in complying with the notification requirements of Section 3010 of the Resource Recovery and Conservation Act and all applicable recordkeeping and reporting requirements under 35 Ill. Adm. Code

§ 721.121 Characteristic of Ignitability

a) A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

1) It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and had a flash point less than 60°C...

2) It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

3) It is an ignitable compressed gas...

4) It is an oxidizer...

b) A solid waste that exhibits the characteristic of ignitability has the EPA Hazardous Waste Number of D001

§ 721.122 Characteristic of Corrosivity

a) A solid waste exhibits the characteristic of corrosivity of a representative sample of the waste has either of the following properties:

1) It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5...

2) It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35mm per year at a test temperature of 55°C...

b) A solid waste that exhibits the characteristic of corrosivity has the EPA Hazardous Waste Number of D002.

§ 721.123 Characteristic of Reactivity

a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

1) It is normally unstable and readily undergoes violent change without detonating.

2) It reacts violently with water.

3) It forms potentially explosive mixtures with water.

4) When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

5) It is a cyanide of sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

6) It is capable of detonation of explosive reaction if it is subjected to a strong initiating source of if heated under confinement.

7) It is readily capable of detonation of explosive decompression or reaction at standard temperature and pressure.

8) It is a forbidden explosive as defined in 49 CFR 173...

b) A solid waste that exhibits the characteristic of reactivity has the EPA Hazardous Waste Number of D003.

§ 721.124 Toxicity Characteristic

a) A solid waste exhibits the characteristic of toxicity if, using the test method described in (40 CFR 261 Appendix III)...the extract from a representative sample of the waste contains any of the contaminants listed in the table in subsection (b) at a concentration equal to or greater than the respective value given in that Table. Where the waste contains less than 0.5 percent filterable solids...the waste itself...is considered to be the extract for the purposes of this section.

b) A solid waste that exhibits the characteristic of toxicity has the USEPA Hazardous Waste Number specified in the following table which corresponds to the toxic contaminant causing it to be hazardous.

Maximum concentrations of contaminants for the toxicity characteristic

USEPA Hazardous Waste Number	Contaminant	CAS Number	Regulatory Level (mg/l)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D018	Benzene	71-43-2	0.5
D0006	Cadmium	7440-43-9	1.0
D019	Carbon tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D007	Chromium	7440-47-3	5.0
D023	o-Cresol	95-48-7	200.0 (4)
D024	m-Cresol	108-39-4	200.0 (4)
D025	p-Cresol	106-44-5	200.0 (4)
D026	Cresol		200.0 (4)
D016	2,4-D	94-75-7	10.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	75-35-4	0.5
D029	1,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	0.13 (3)
D012	Endrin	72-20-8	0.02
D031	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	0.13 (3)
D033	Hexachlorobutadiene	87-68-3	0.5
D034	Hexachloroethane	67-72-1	3.0
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	74-39-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D035	Methyl ethyl ketone	78-93-3	200.0
D036	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	5.0 (3)
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D015	Toxaphene	8001-35-2	0.5

D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D017	2,4,5-TP (Silvex)	93-72-1	1.0
D043	Vinyl chloride	75-01-4	0.2

Notes: (3) Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.
(4) If o-, m-, p-cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200.0mg/l.

Subpart D: Lists of Hazardous Waste

Part 724 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

Subpart N: Landfills

§ 724.400 Applicability

The regulations in this Subpart apply to owners and operators of facilities that dispose of hazardous waste in landfills, except as Section 724.101 provides otherwise.

Part 808 Special Waste Classifications

Subpart A: General Provisions

§ 808.110 Definitions

"Special handling waste" is a declassified waste which, due to its form or mode of containment in transport or storage, presents a danger to a person handling the waste such that the person needs information about the waste to safely transport or store the waste. "Special handling waste" includes any such waste which would pose a danger if handled in a manner similar to household waste. "Dangers" include, but are not limited to, the following: fire, explosion, and emission of toxic or carcinogenic gas or dust. "Special handling waste" also includes any special waste which, because of appearance or packaging, resembles waste which would be a special handling waste. Such waste includes, but is not limited to, any special waste contained in a sealed drum...

"Special (non-RCRA) waste" is any special waste that is not a hazardous waste, as defined in this Section.

"Special waste" means any hazardous waste (note: using the definition of hazardous waste from the Environmental Protection Act) and any industrial process waste or pollution control waste which has not been declassified pursuant to Section 808.245.

Part 810 Solid Waste Disposal: General Provisions

§ 810.103 Definitions

"Chemical waste" means a non-putrescible solid whose characteristics are such that any contaminated leachate is expected to be formed through chemical or physical processes, and no gas is expected to be formed as a result.

"Inert waste" means any solid waste that will not decompose biologically, burn, serve as food for

vectors, form a gas, cause an odor, or form a contaminated leachate, as determined in accordance with Section 811.202(b). Such inert waste shall include only non-biodegradable and non-putrescible solid wastes. Inert wastes may include, but are not limited to, bricks, masonry, and concrete (cured for 60 days or more).

"Leachate" means liquid that has been or is in contact with a solid waste.

"Putrescible waste" means a solid waste that contains organic matter capable of being decomposed by microorganisms so as to cause a malodor, gases, or other offensive conditions, or which is capable of providing food for birds or vectors. Putrescible wastes may form a contaminated leachate from microbiological degradation, chemical processes, and physical processes. Putrescible waste includes, but is not limited to, garbage, offal, dead animals, general household waste, and commercial waste. All solid wastes which do not meet the definitions of inert or chemical wastes shall be considered putrescible wastes.

"Salvaging" means the return of waste materials to use, under the supervision of the landfill operator, so long as the activity is confined to an area remote from the operating face of the landfill, it does not interfere with or otherwise delay the operations of the landfill, and it results in the removal of all materials for salvaging from the landfill site daily or separates them by type and stores them in a manner that does not create a nuisance, harbor vectors or cause a unsightly appearance.

"Scavenging" means the removal of materials from a solid waste management facility or unit which is not salvaging.

"Shredding" means the mechanical reduction in particle sizes of solid waste. Putrescible waste is considered shredded if 90 percent of the waste by dry weight passes a 3 inch sieve.

"Solid waste" means a waste that is defined in this Section as an inert waste, as a putrescible waste, as a chemical waste, or as a special waste, and which is not also defined as a hazardous waste pursuant to 35 Ill. Adm. Code 721.

"Waste pile" means an area on which non-containerized masses of solid, non-flowing wastes are placed for disposal. For the purposes of this Part and 35 Ill. Adm. Code 811 through 815, a waste pile is a landfill, unless the operator can demonstrate that the wastes are not accumulated over time for disposal. At a minimum, such demonstration shall include photographs, records or other observable or discernible information, maintained on a yearly basis, that show that within the preceding year the waste has been removed for utilization or disposed elsewhere.

Part 811 Standards for New Solid Waste Landfills
Subpart A: General Standards for All Landfills
Subpart B: Inert Waste Landfills
Subpart C: Putrescible and Chemical Waste Landfills

Federal Regulations
National Emission Standards for Hazardous Air Pollutants (NESHAPS)
Code of Federal Regulations Title 40

§61.141 Definitions

Adequately wetted means sufficiently mixed or coated with water or an aqueous solution to prevent dust emissions.

Asbestos means the asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite.

Asbestos-containing waste materials ... as applied to demolition and renovation operations... includes only friable asbestos waste and asbestos waste from control devices.

Asbestos material means asbestos or any material containing asbestos.

Facility means any institutional, commercial, or industrial structure, installation, or building (excluding apartment buildings having no more than four dwelling units).

Facility component means any pipe, duct, boiler, tank, reactor, turbine, or furnace at or in a facility; or any structural member of a facility.

Friable asbestos material means any material containing more than 1 percent asbestos by weight that hand pressure can crumble, pulverize, or reduce to powder when dry.

Visible emissions means any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

§ 61.145 Standard for demolition and renovation: Applicability.

The requirements of §§ 61.146 and 61.147 apply to each owner or operator of a demolition or renovation operation as follows:

(a) If the amount of friable asbestos materials in a facility being demolished is at least 80 linear meters on pipes or at least 15 square meters on other facility components, all the requirements of §§ 61.146 and 61.147 apply, except as provided in paragraph (c) of this section.

(b) If the amount of friable asbestos materials in a facility being demolished is less than 80 linear meters on pipes and less than 15 square meters on other facility components, only the requirements of paragraphs (a), (b), and (c) (1), (2), (3), (4), and (5) of § 61.146 apply.

(c) If the facility is being demolished under an order of a State or local governmental agency, issued because the facility is structurally unsound and in danger of imminent collapse, only the requirements in § 61.146 and in paragraphs (d), (e), (f), and (g) of § 61.147 apply.

(d) If at least 80 linear meters of friable asbestos materials on pipes or at least 15 square meters of friable asbestos materials on other facility components are stripped or removed, all the requirements of §§ 61.146 and 61.147 apply.

(1) To determine whether paragraph (d) of this section applies to planned renovation operations involving individual nonscheduled operations, predict the additive amount of friable asbestos materials to be removed or stripped over the maximum period of time a prediction can be made, not to exceed one year.

(2) To determine whether paragraph (d) of this section applies to emergency renovation operations, estimate the amount of friable asbestos materials to be removed or stripped as a result of the sudden, unexpected event that necessitated the renovation.

(e) Owners or operators of demolition and renovation operations are exempt from the requirements of §§ 61.05(a), 61.07, and 61.09.

§ 61.146 Standard for demolition and renovation: Notification requirements
Each owner or operator to which this section applies shall:

(a) Provide the Administrator with written notice of intention to demolish or renovate.

(b) Postmark or deliver the notice as follows:

(1) At least 10 days before demolition begins if the operation is described in § 61.145(a);

(2) At least 20 days before demolition begins if the operation is described in § 61.145(b);

(3) As early as possible before demolition begins if the operations is described in § 61.145(c);

(4) As early as possible before renovation begins.

(c) Include the following information in the notice:

(1) Name and address of owner or operator.

(2) Description of the facility being demolished or renovated, including the size, age, and prior use of the facility.

(3) Estimate of the approximate amount of friable asbestos material present in the facility in terms of linear feet of pipe, and surface area on other facility components. For facilities described in § 61.145(b), explain techniques of estimation.

(4) Location of the facility being demolished or renovated.

(5) Scheduled starting and completion dates of demolition or renovation.

(6) Nature of planned demolition or renovation and method(s) to be used.

(7) Procedures to be used to comply with the requirements of this Subpart.

(8) Name and location of the waste disposal site where the friable asbestos waste material will be deposited.

(9) For facilities described in § 61.145(c), the name, title, and authority of the State of local government representative who has ordered the demolition.

§ 61.147 Standard for demolition and renovation: Procedures for asbestos emission control.
Each owner or operator to whom this section applies shall comply with the following procedures to prevent emissions of particulate asbestos material to the outside air:

(a) Remove friable asbestos materials from a facility being demolished or renovated before any wrecking or dismantling that would break up the materials or preclude access to the materials for subsequent removal. However, friable asbestos materials need not be removed before demolition if:

(1) They are on a facility component that is encased in concrete or other similar material; and

(2) These materials are adequately wetted whenever exposed during demolition.

(b) When a facility component covered or coated with friable asbestos materials is being taken out of the facility as units or sections:

(1) Adequately wet any friable asbestos materials exposed during cutting or disjoint operations; and

(2) Carefully lower the units or sections to ground level, not dropping them or throwing them.

(c) Adequately wet friable asbestos materials when they are being stripped from facility components before the members are removed from the facility. In renovation operations, wetting that would unavoidably damage equipment is not required if the owner or operator:

(1) Asks the Administrator to determine whether wetting to comply with this paragraph would unavoidably damage equipment, and, before beginning to strip, supplies the Administrator with adequate information to make this determination; and

(2) When the Administrator does determine that equipment damage would be unavoidable,

uses a local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material produced by the stripping and removal of the friable asbestos materials. The system must exhibit no visible emissions to the outside air or be designed and operated in accordance with the requirements in § 61.145.

(d) After a facility component has been taken out of the facility as units or in sections, either:

(1) Adequately wet friable asbestos materials during stripping; or

(2) Use a local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material produced by the stripping. The system must exhibit no visible emissions to the outside air or be designed and operated in accordance with the requirements in § 61.154.

(e) For friable asbestos materials that have been removed or stripped:

(1) Adequately wet the materials to ensure that they remain wet until they are collected for disposal in accordance with § 61.152; and

(2) Carefully lower the materials to the ground or a lower floor, not dropping or throwing them; and

(3) Transport the materials to the ground via dust-tight chutes or containers if they have been removed or stripped more than 50 feet above ground level and were not removed as units or in sections.

(f) When the temperature at the point of wetting is below 0°C:

(1) Comply with the requirements of paragraphs (d) and (e) of this section. The owner or operator need not comply with the other wetting requirements in this section; and

(2) Remove facility components coated or covered with friable asbestos materials as units or in sections to the maximum extent possible.

(g) For facilities described in § 61.145(c), adequately wet the portion of the facility that contains friable asbestos materials during the wrecking operation.

§ 61.152 Standard for waste disposal for manufacturing, demolition, renovation, spraying, and fabricating operations.

Each owner or operator of any source covered under any of the provisions of §§ 61.144, 61.147, 61.148, and 61.149 shall:

(a) Deposit all asbestos-containing waste material at waste disposal sites operated in accordance with the provisions of § 61.156; and

(b) Discharge no visible emissions to the outside air during the collection, processing (including incineration), packaging, transportation, or deposition of any asbestos-containing waste material generated by the source, or use one of the disposal methods specified in paragraphs (b)(1), (2), or (3) of this section, as follows:

(1) Treat asbestos-containing waste material with water:

(i) Mix asbestos waste from control devices with water to form a slurry; adequately wet other asbestos-containing waste; and

(ii) Discharge no visible emissions to the outside air from collection, mixing, and wetting operations, or use the methods specified by § 61.154 to clean emissions containing particulate asbestos material before they escape to, or are vented to, the outside air; and

(iii) After wetting, seal all asbestos containing waste material in leak-tight containers while wet; and

(iv) Label the containers specified in paragraph (b)(1)(iii) as follows:

CAUTION
Contains Asbestos
Avoid Opening or Breaking Container
Breathing Asbestos is Hazardous to Your Health

Alternatively, use warning labels specified by Occupational Safety and Health Standards of the Department of Labor, Occupational Safety and Health Administration (OSHA) under 29 CFR 1910.1001(g)(2)(ii).

(2) Process asbestos-containing waste material into nonfriable forms:

(i) Form all asbestos-containing waste material into nonfriable pellets or other shapes; and

(ii) Discharge no visible emissions to the outside air from collection and processing operations, or use the methods specified by § 61.154 to clean emissions containing particulate asbestos material before they escape to, or are vented to, the outside air.

(3) Use an alternative disposal method that has received prior approval by the Administrator.

Appendix B Manufacturers of Construction and Demolition Waste Processing Equipment

Balers

American Baler Company, 200 Hickory Street, Bellevue, OH 44811 (419)483-5790
horizontal balers

Baler Equipment, PO Box 1458, Greer, SC 29652 (800)845-2382
new and used balers

Balemart International, PO Box 75267, Tampa, FL 33675 (800)221-2559 x300

Balemaster, 980 Crown Court, Crown Point, IN 46307 (219)663-4525
horizontal balers

Enterprise Baler, PO Box 15546, Santa Ana, CA 92705 (714)835-0551
horizontal two ram balers

Epco Manufacturing, 860 Seneca St., Buffalo, NY 14210 (800)836-BALE
vertical balers

Etzler Recycling Equipment, 239 Woodhill Drive, Glen Burnie, MD 21060 (410)761-5544
used balers

Excel Manufacturing, 6463 50th Street SE, Rochester, MN 55904 (507)280-8812
horizontal baler

Global, East 10310 Montgomery, Spokane, WA 99206 (800)735-1336

GPI Division, Harmony Enterprises, 706 Main Ave. North, Harmony, MN 55939 (507)886-6666
vertical balers and compactors

International Baler, 5400 Rio Grande Ave., Jacksonville, FL 32205 (800)231-9286

J.V. Manufacturing, 701 Highway 265-S, PO Box 229, Springdale, AR 72765 (501)751-7320
horizontal and vertical balers

Logemann Brothers, 3150 West Burleigh Street, Milwaukee, WI 53210-1999 (414)445-3005
horizontal and vertical balers

Maren Engineering, PO Box 278, 111 West Taft Drive, South Holland, IL 60473 (708) 333-6250
horizontal and vertical balers, automatic systems

Mid-States Recycling Systems, Tom Ellis, Operations Manager, 9710 Industrial Drive, Bridgeview, IL 60455 (708)430-3888

Mosely Machinery, PO Box 1552, Waco, TX 76703 (800)422-BALE
horizontal balers

Ross, PO Box 2577, 460 North Danebo, Eugene, OR 97402 (503)689-5031
horizontal two ram balers

Sealed Air Corporation, Engineered Products Division, Hodgkins, IL (708)352-8700
baler for cardboard, sheet plastic, foam, packaging; produces small, cylindrical bales which can be handled manually; automatic tying

Van Dyk Baler, 1033 Route 46, Clifton, NJ 07013 (201)773-4844
horizontal balers

Ver-tech, 2892 Vicksburg Lane, Minneapolis, MN 55447 (800)328-3398
vertical, automatic balers

Waste Processing Equipment, 160 Dilbeck Road, PO Box 1047, Rainsville, AL 35986 (800)225-6458
horizontal and vertical balers, trailers

Waste Recycler Manufacturing, PO Box 410364, Charlotte, NC 28241 (704)598-0889
cardboard baler

Dealers

Alan Ross Machinery, 3240 Commercial Ave., Northbrook, IL 60062 (708)480-8900
new and used: conveyors, balers, shredders, magnetic separation equipment, shears, and steel containers

Counselor Engineering, PO Box 428, Hudson, OH 44236 (800)783-6567
new and used: balers, shears, shredders, cranes

Ely Enterprises, Indianapolis, IN (800)633-0660
new and used balers, shredders, conveyors, magnets

Mi-Jack Products, 3111 West 167th Street, Hazelcrest, IL 60429 (708)596-5200
balers, compactors, shredders, conveyors, material recovery facilities

Recycling Equipment Connection, PO Box 490, Garner, NC 27529 (800)752-6124
magnets, grapples, balers, associated equipment

Roberts & Schaefer, 120 South Riverside Plaza, Chicago, IL 60606 (312)236-7292

Seyco Textile Machinery, PO Box 7580, Chicago, IL 60680 (312)829-2419
used balers, shredders, hammermills

Grinders and Shredders

American Pulverizer, 5540 West Park Avenue, Saint Louis, MO 63110-1897 (314)781-6100
crushers, grinders, and shredders for wood, light metals, asphalt, and concrete blocks

Blower Application, N114 W19125 Clinton Drive, PO Box 279, Germantown, WI 53022 (414)255-5580
shredders for wood, metals, mixed waste

CW Manufacturing, 14 Commerce Drive, Sabetha, KS 66534 (800)743-3491
wood waste tub grinder

Crane & Machinery, 9655 Industrial Drive, Bridgeview, IL 60455 (708)403-5300
Pioneer jaw crushers for concrete and asphalt; screening

Diamond Z, 1102 Franklin Blvd., Nampa, ID 83687 (208)467-6229
wood grinders

Excell Recycling & Manufacturing, PO Box 31118, Amarillo, TX 79120 (800)858-4002
asphalt, concrete, and building rubble crushing systems

Gensco, America, 2372 South Stone Mountain-Lithonia Road, Lithonia, GA 30058 (800)268-6797
shredder for most all materials

Haybuster Manufacturing, Dealer: Chip-er-Split Equipment, PO Box 89, 1650 East North Street, Crown Point, IN 46307 (219)663-5462
grinder for wood waste

Innovator Manufacturing, 120 Weston Street, London, Ontario, Canada N6C 1R4 (800)465-4747
wood waste tub grinder

Jones Manufacturing, PO Box 38, Beemer, NE 68716 (402)528-3861
wood grinder

LaBounty Manufacturing, State Road 2, Two Harbors, MN 55616 (218)834-2123
tractor mounted size reducing equipment for concrete

MAC Corp / Saturn Shredders, 201 East Shady Grove Road, Grand Prairie, TX 75050 (214)790-7800
shredders for wood, metal, plastic, general debris

Magnatech Engineering, PO Box 52, St. Charles, MO 63302 (314)949-0096
crushers, hammermills, shredders for wood, mixed debris, light metals, gypsum, white goods

Maren Engineering, PO Box 278, 111 West Taft Drive, South Holland, IL 60473 (708) 333-6250

Mid-States Recycling Systems, Tom Ellis, Operations Manager, 9710 Industrial Drive, Bridgeview, IL 60455 (708)430-3888
Pioneer jaw crushers for concrete and asphalt

Morbark, Recycling Systems, 8507 South Winn Road, PO Box 1000, Winn, Michigan 48896 (517)866-2280
wood grinders and debris shredder

Nordberg, PO Box 383, Milwaukee, WI 53201 (800)558-6818 (7)
impact crushing plant for concrete with ferrous recovery, and asphalt concrete

Norkot Manufacturing, 1405 Sinclair Street, Bottineau, ND 58318 (800)292-MAXI
grinders for asphalt, wood waste, demolition debris, can crush white goods, barrels, etc.

O&E Machine, 826 Vanderbraak Street, PO Box 1836, Green Bay, WI 54305 (414)437-6587
shredders

Riverside Products, PO Box 884, Moline, IL 61265 (309)764-2020

Rome Waste Management Systems, PO Box 48, Cedartown, GA 30125 (404)748-4450
shredders for wood, demolition debris, white goods, carpet

Shred-Tech, 201 Beverly Street, PO Box 1508, Cambridge, Ontario, Canada, N1R 7G8 (519)621-3560
shredders for metal, plastic, wood, mixed debris

SSI Shredding Systems, 9760 SW Freeman Drive, Wilsonville, OR 97070-9286 (503)682-3633

Sundance, PO Box 2437, Greeley, CO 80632 (303)353-8700
wood grinders

Tryco International, 1160 South Monroe Street, PO Box 1277, Decatur, IL 62525 (217)428-0901
shredder for metal, plastic, and wood

Universal Refiner, PO Box 151, Montesano, WA 98563 (206)249-4773
wood grinder

West Salem Machinery, PO Box 5288, 665 Murlark Ave. NW, Salem, OR 97304 (503)364-1398
wood grinders

Wood Waste Conversion Systems, Bloomfield Hills, MI (313)642-8891
wood waste shredder

Material Recovery Facilities

General Kinematics, 777 Lake Zurich Road, Barrington, IL 60010 (708)381-1376
C/D waste MRFs and separation equipment

Hazemag, Mt. Braddock Road, PO Box 1064, Uniontown, PA 15401 (800)441-9144
complete plants for processing and recycling demolition materials, asphalt and concrete, and wood

Krause Manufacturing, 6059 Guide Meridian Road, Bellingham, WA 98226 (206)398-7533
general MRFs, conveyors, picking stations

Lindemann Recycling Equipment, 42 West 38th Street, 11th Floor, New York, NY 11018 (212)382-0630
C/D waste MRF

Logemann Brothers, 3150 West Burleigh Street, Milwaukee, WI 53210-1999 (414)445-3005
general MRF

Magnatech Engineering, PO Box 52, St. Charles, MO 63302 (314)949-0096
portable and stationary MRFs

Mid-States Recycling Systems, Tom Ellis, Operations Manager, 9710 Industrial Drive, Bridgeview, IL 60455 (708)430-3888

Ptarmigan Machinery, 217 San Anselmo Ave., Suite B, San Anselmo, CA 94960 (415)454-6283
mobile and skid mounted sorting systems (hopper, conveyor, picking stations), demolition debris, concrete, and asphalt recycling plants

Recovery Systems Technology (RSTI), 13802 35th Avenue Southeast, Bothell, WA 98012 (206)486-0247
C/D waste MRF

Torbeck Industries, 355 Industrial Drive, Harrison, OH 45030 (800)333-0080
MRF platforms and picking stations

Van Dyk Baler, 1033 Route 46, Clifton, NJ 07013 (201)773-4844
general MRFs

Other

Kenetech Resource Recovery, (800)741-4439
wood waste handling, grinding, and marketing service

Reclamation Technologies (RTI), 283 Harold St., North Plainfield, NJ 07060 (908)769-0600
gypsum wallboard recycling plants

Universal Wood Recycling, (800)327-6893
wood grinding and disposal service

Separation Equipment

A and A Magnetics, 1033 Wanda Lane, Woodstock, IL 60098 (815)338-6054
overhead belt magnets, pulleys

Amadas Industries, 1100 Holland Road, Suffolk, VA 23434 (804)539-0231
disk and trommel screens

Buffalo Wire Works, PO Box 129, Buffalo, NY 14240 (800)828-7028
wire screens

Bulk Handling Systems, 1040 Arrowsmith, Eugene, OR 97402 (503)485-0999
disk screens

Dings Magnetic Group, 4740 West Electric Avenue, Milwaukee, WI 53219 (414)672-7830
wide variety of permanent and electro magnets for ferrous metal separation, head pulleys, suspended magnets

Eriez Magnetics, Chicago District Office, 1107 South Manheim Road, #319, Westchester, IL 60154-2560 (708)681-0800
permanent and electromagnets for ferrous metal separation

Fuel Harvesters Equipment, 2501 Commerce Drive, Midland, TX 79703 (915)694-9988
trommel screens

Hustler Conveyor, 4985 Fyler Ave., St. Louis, MO 63139 (314)352-6000
conveyors, conveyor head pulleys with permanent magnets, ferrous - nonferrous separation equipment

Magnatech Engineering, PO Box 52, St. Charles, MO 63302 (314)949-0096
trommel screens, vibrating screens, magnetic separation, conveyors

Ptarmigan Machinery, 217 San Anselmo Ave., Suite B, San Anselmo, CA 94960 (415)454-6283
screens, vibrating conveyors

Read Corp, 25 Wareham Street, Middleboro, MA 02346 (508)947-5208
vibrating finger screens

Recovery Systems Technology (RSTI), 13802 35th Avenue Southeast, Bothell, WA 98012 (206)486-0247
trommel screens

Recycling Systems, 8507 South Winn Road, PO Box 1000, Winn, Michigan 48896 (517)866-2280
portable trommel screen

Re-Tech, PO Box 106, 222 South Market Street, Elizabethtown, PA 17022 (717)367-3535
trommel screens
Royer Industries, PO Box 1232, Kingston, PA 18704 (717)287-9624

Walker Magnetics, PO Box 18155, Columbus, OH 43218 (614)481-0007
permanent and electromagnets for ferrous metal separation, head pulleys, suspended magnets

West Salem Machinery, PO Box 5288, 665 Murlark Ave. NW, Salem, OR 97304 (503)364-2213
screens, disk screens, conveyors, trommel screens

Appendix C Waste Processors In or Near Illinois

This appendix lists companies or organizations which accept (i.e. buy, collect, process, or charge a tipping fee for) materials related to construction or demolition activities. Contact an individual company for specific information on materials, quantities, preprocessing, and pricing.

Asphalt /Brick/Concrete

Champaign County

Champaign Asphalt Company, 1414 West Anthony Drive, Urbana, IL 61801 (217)356-728 (asphalt and concrete)

Cook County

Allied Asphalt, 31W504 Stearns Road, Bartlett, IL 60103 (708)289-6080
Adams Brick Company, 2627 East 100th Street, Chicago, IL 60617 (312)221-4223
Colonial Brick Company, 2222 South Halsted, Chicago, IL 60608 (800)621-0385 or (312)733-2600
Lindahl Brothers, 3301 South California, Chicago, IL 60632 (312)523-3737
Sacramental Crushing, 445 North Sacramento Ave., Chicago, IL 60612 (312)722-1000
Terra Excavating Company, 11001 South Doty Ave., Chicago, IL 60628 (312)660-9230
Allied Asphalt, 254 West Old Higgins Road, DesPlaines, IL 60018 (708)824-2848
R.I. Busse, 1520 Midway Court, Elk Grove Village, IL 60007 (708)640-0105
Alpha Construction, 1340 West 171st Street, Hazelcrest, IL 60423 (708)335-2323
Allied Asphalt, 4105 West Harrison, Hillside, IL 60162 (708)544-4947
Palumbo Brothers, 321 Center St., Hillside, IL 60162 (708)544-9440
S.G. Hayes & Company, 162nd & Western, Markham, IL 60426
D & P Construction, 2035 Indian Boundary Drive, Melrose Park, IL 60635, (708)625-5017
Doetsch Brothers Excavating, 35 East Palatine Road, Prospect Heights, IL 60070 (708)537-2280
Monarch Asphalt, 3219 Oakton, Skokie, IL 60076 (708)677-7780

DuPage County

Harry Kuhn Company, 28W651 North Ave., West Chicago, IL 60185 (708)668-4425
Wheaton Asphalt Company, 1N550 Pleasant Hill Road, Wheaton, IL 60188 (708)668-8833
(asphalt, concrete, and other rocky materials)

Lake County

Extrin Design Group, 27282 West Cuba Road, Barrington, IL 60010 (708)382-8989 (brick)

McLean County

McLean County Asphalt and Concrete, PO Box 3547, Bloomington, IL 61702 (309)827-4811

Peoria County

Peoria Blacktop, PO Box 1019, Peoria, IL 61653 (309)674-5133 (asphalt and concrete)

Corrugated Cardboard

Adams County

Celotex Corp., Building Products, 901 South Front St., Quincy, IL 62301 (217)224-3800 (manufactures gypsum board liner, backing liner, and chipboard)
Quincy Recycled Paper, 526 South 6th Street, Quincy, IL 62301 (217)224-2754

Boone County

Harris Silver & Sons, PO Box 13, 800 East Pleasant, Belvidere, IL 61008 (815)544-9221

Bureau County

Gateway Center, 406 South Gosse Blvd, Princeton, IL 61356 (815)875-4548

Champaign County

Community Recycling Center, 720 North Market St., Champaign, IL 61820 (217)351-4495

Christian County

Midstate Recycling, 1402 West South Street, Taylorville, IL 62568 (217)824-6047

Coles County

Armstrong Center, 1400 Piatt Avenue, Mattoon, IL 61938 (217)235-0959

Cook County

Metro Recycling Center, 13546 South Western Ave, Blue Island, IL 60406 (708)388-1551
Atlas Recycling, 2432 West Barry, Chicago, IL 60618, (312)935-3747
Bethel Recycling, 4746 West Rice, Chicago, IL 60651 (312)261-8340
Bethel Trading Post, 831 North Cicero, Chicago, IL 60624 (312)261-8340
Carroll Paper Recovery, 1220 West Carroll Ave., Chicago, IL 60607 (312)829-5741
Channeled Resources, 935 West Chestnut, Suite 405, Chicago, IL 60622 (312)733-4200
Chicago Paperboard, 900 North Ogden Ave, Chicago, IL 60622 (312)997-3131
Chicago Recycling Works, 9204 Commercial Ave., Room 211, Chicago, IL 60617 (312)731-8211
Columbia Paper Corp, 311 West Superior St., Chicago, IL 60610 (312)943 1433
Continental Paper Grading, 1623 South Lumber Street, Chicago, IL 60616 (312)226-2010
D & D Disposal, 2401 South Laflin, Chicago, IL 60608 (312)942-0029
Donco Paper Supply Co., 737 North Michigan Ave., Chicago, IL 60611 (312)337-7822
Father & Son Salvage, 626 East 111th, Chicago, IL 60628 (312)264-3516
Flood Brothers Disposal System, 4825 West Harrison, Chicago, IL 60644 (312)626-5800
Huron Paper Stock Co., 2545 West Fulton, Chicago, IL 60612 (312)829-7456
Illinois Recycling Service, 2401 Laflin, Chicago, IL 60608 (312)732-9253
J.B. Scrap Metals, 2910 West Carroll, Chicago, IL (312)533-4200
Lakewood Recycling Center, 1305 West Belmont, Chicago, IL 60657 (312)472-4800
Loop Recycling, 1700 South Damen, Chicago, IL 60608 (312)942-0042
Loop Recycling, 2401 South Laflin, Chicago, IL 60608 (312)942-0042
Mid-America Paper Recycling, 1144 South Fairfield Ave., Chicago, IL 60612 (312)826-5046
National Fiber Supply Co., 55 East Monroe St., Chicago, IL 60603 (312)346-4800
Northwest Salvage, 4519 West Patterson St., Chicago, IL 60641 (312)545-7560
Paper Chase Exchange, 3730 South St. Louis, Chicago, IL 60641 (312)890-9000
Paper Salvage Corp., 655 West Irving Park Road, Suite 111, Chicago, IL 60613 (312)248-2070
Profile Document Processing, 6600 West Armitage, Chicago, IL 60635 (312)237-7200
Recycling Services, 3301 West 48th Place, Chicago, IL 60632 (312)247-2070
Resource Center, 4 East Ohio #34, Chicago, IL 60611 (312)787-7078
Skokie Valley Shipping, PO Box 12439, 2142 West Carroll, Chicago, IL 60612 (312)666-2888
Unique Salvage, 1039 North LaSalle, Chicago, IL (312)951-5300
Wolf Mill Supply Co., 6901 South Bell Ave., Chicago, IL 60636 (312)436-4546
RG Salvage & Recycling, 134 East Touhy Ct., DesPlaines, IL 60018 (708)803-6885
Valley Scrap Corp, 1155 Hartrey Ave, Evanston, IL 60202 (708)328-9200
Best Recycling Services, 1912 Lehigh, Glenview, IL 60025 (708)724-2378
Office Paper Recycling., 4152 May St., Hillside, IL 60162 (708)941-0020
LaGrange Park, 937 Barnsdale Road, LaGrange, IL 60525 (708)352-2922
DuPage Paper Stock., 1301 South Greenwood Ave., Maywood, IL 60153 (708)343-0124
R & L Recycling, 4719 West Lake St., Melrose Park, IL 60160 (708)681-3626
United Fibers, 4719 West Lake St., Melrose Park, IL 60160 (800)727-3750
American Paper Recycling, 301 West Lake St., Northlake, IL 60164 (708)344-6789

RSVIP-Ltd., 2725 North Thatcher, Suite 501, River Grove, IL 60171 (708)452-1158
Western Pacific Pulp & Paper, 1701 East Woodfield Road, Suite 521, Schaumburg, IL 60173 (708)240-1485
James Flett Organization, 1000 Capitol Drive, Wheeling, IL 60090 (708)537-3008

Crawford County

Crawford County Solid Waste Disposal Agency, Outer East Emmons St., Robinson, IL 62454

DuPage County

Smurfit Recycling, Container Corp., 450 East North Ave., Carol Stream, IL 60188 (708)260-3600
Naperville Area Recycling Center, PO Box 894, Naperville, IL 60566 (708)369-0801
All Warrenville Area Recycling Effort, Mignin Drive City Yard, north of Warrenville Road, Warrenville, IL 60555 (708)393-9427
Woodridge Recycling Center, 1 Plaza Drive (between library and fire station), Woodridge, IL 60517 (708)964-3859

Henry County

Abilities Plus Recycling Center, 1116 North Main, Kewanee, IL 61443 (309)853-1561

Jackson County

Southern Recycling Center, 220 South Washington, Carbondale, IL 62901 (618)549-2880

Jefferson County

Kendrick Paper Stock Company, 603 South 12th Street, Mt. Vernon, IL 62864 (618)242-4527

Kane County

The Davey Company, Aurora Paperboard Division, 750 North Farnsworth, Aurora, IL 60507 (708)898-4231
Intensive Processing Services, 515 Stevenson Drive, South Elgin, IL 60177

Lake County

Alan Josephson Company, 901 East Orchard Ave., Mundelein, IL 60060 (708)949-0770
C & M Recycling, 1600 Morrow Ave, North Chicago, IL 60064 (708)578-2922
Roundout Iron & Metal, 1501 Rockland Road, Lake Bluff, IL 60044 (708)362-2750
CH Oscarson, 2701 Daiquiri Drive, Riverwoods, IL 60015 (708)945-2246
Wheel-In Recycling, 1211 North Garland Road, Wauconda, IL 60084 (708)526-2978
Cleveland Corp., 42810 North Green Bay Road, Zion, IL 60099 (708)872-7200
Zion Recycling Center, City Landfill, 17th & Hareb Ave., Zion, IL 60099 (708)872-4269

LaSalle County

G&W Recycling, 1112 6th Avenue, Mendota, IL 61342 (815)539-9089
Newteon Iron & Metal, 901 West Marquette Street, PO Box 296, Ottawa, IL 61350 (815)433-1658
Second Wind Recycling, 1127 North Fulton Street, Ottawa, IL 61350 (815)433-0031
Kwikash, 807 North Vermilion, Streator, IL 61364 (815)672-5900

Lee County

S & W, 78 Monroe Avenue, Dixon, IL 61021 (815)288-4407

Livingston County

City of Fairburg, Jackson & Walnut Streets, City Hall - 100 East Locust, Fairburg, IL 61739
Pontiac Recycling, 1703 North Aurora, Pontiac, IL 61764 (815)844-6419

Macon County

W.E.C.A.R.E. Recycling, 112 North West, Carlinville, IL 62626 (217)854-9510

Decatur Recycling, 2500 North Martin Luther King Jr. Drive., Decatur, IL 62526 (217)875-2425
Recycling Unlimited, 108 South Wall Street, Macon, IL 62544 (217)764-3371

Madison County

Jefferson Smurfit Corp., 401 Alton St., Alton, IL 62002 (618)463-6093
Triangle Metallugical, 2684 Missouri, Granite City, IL 62040 (618)452-5410
Wright Recycling, 4378 Highway 162, Granite City, IL 62040 (618)797-6168
Eddie's Scrap Iron Truck, 200 Roosevelt Road, Box 227, Madison, IL 62060 (618)451-7221
Eddie's Scrap Iron Truck, Eagle Park Fire Station, 91 Harrison Street, Madison, IL 62060 (618)451-6971

McHenry County

Village of Lake in the Hills, 600 East Oak St., Village Garage, Lake in the Hills, IL 60102 (708)658-4213
Metropolitan Fiber, 1216 North Appaloosa Trail, McHenry, IL 60050 (815)344-7800
Union American Legion, Legion Lot, Union, IL 60180 (815)923-2400
Wonderview Community Center, Walnut Ave., Wonder View, IL 60097 (815)653-9525
McHenry County Defenders Recycling Center, 239 Throop St., Woodstock, IL 60098 (815)338-0393
Shamrock Fibers, 665 Jackson St., Woodstock, IL 60098 (815)338-8513

McLean County

Midwest Paperstock, 1712 South Bunn St., Bloomington, IL 61701 (309)829-6631
Operation Recycle, 923 East Grove, Bloomington, IL 61701 (309)829-0691

Ogle County

Insul-Mor Mfg., PO Box 259, White Pines Road, Oregon, IL 61061 (815)732-7973 (manufactures insulation)
Full Circle Recycling, PO Box 391, Oregon, IL 61061 (815)652-4817 (also appliances)

Peoria County

I. Erlichman Company, 3213 South Washington St., Peoria, IL 61602 (309)637-4491

Pike County

Pike County Recycling Center, West Route 36, Piitsfield, IL 61602 (217)285-2194

Rock Island County

Midland Paper & Products, 3301 4th Avenue, Moline, IL 62450 (309)786-4278
Durbin Paper Stock, 430 1st Street, Rock Island, IL 61201 (309)786-6633

Saint Clair County

Belleville Recycling, 501 Hecker, Belleville, IL 62221 (618)233-2425
Davis Recycling, 236 North 5th Street, East St. Louis, IL 62201 (618)271-6610
Solid Waste Recovery, 1200 North 1st Street., East St. Louis, IL 62702 (618)274-8157

Sangamon County

Hughs Recycling, RR 1, New Berlin, IL 62670
Bearcat Recycling, Ash Street at Dirksen Parkway, Springfield, IL 62703 (217)523-5357
HIS Recycling, 2130 Clear Lake Ave., Springfield, IL 62703 (217)788-9455
Mervis Iron & Supply, 1023 East Madison, Springfield, IL 62702 (217)522-1541
Mervis Iron & Supply, PO Box 4285, 1100 South 9th Street, Springfield, IL 62703
Waste Paper Inc., PO Box 3332, Springfield, IL 62708 (217)544-7731

Stephenson County

Freeport Recycling Center, 657 North Van Buren, Freeport, IL 61032 (815)232-2906

Tazewell County

Quaker Oats Co., P.O. Box 520, Pekin, IL 61554 (309)346-4118

Vermilion County

Mervis Iron & Metal, 2313 Cannon Street, PO Box 827, Danville, IL 61832 (217)442-5300

Warren County

Warren County Recycling Center, 620 South Main (BTC Building), Monmouth, IL 61462 (309)734-6939

Whiteside County

1205 West 5th, Sterling, IL 61081

Will County

Illiana Scrap Processing, 1722 State St., Crete, IL 60417 (708)672-5590
Berlinsky Scrap Corp., PO Box 733, 212 Page St., Joliet, IL 60432 (815)726-4334
Illinois Recycling, 808 South Joliet St., Joliet, IL 60436 (815)723-3700
Ivex Corp., Mill Division, 292 Logan Ave, PO Box 386 Joliet, IL 60434 (815)740-3838
Grell Recycling, Route 4, Wilmington, IL 60481 (815)476-9387

Williamson County

George Cullum, West Boyton Street, Marion, IL 62959 (618)997-9448

Winnebago County

Rockford Maintenance & Recyling, PO Box 2311, Loves Park, IL 61131 (815)654-0206
Joseph Behr & Sons, 1100 Seminary, PO Box 740, Rockford, IL 61105 (815)987-2600
Robbins Recycling, 1311 Harrison Avenue, Rockford, IL 61104 (815)398-2267
Rockford Recycling, 2131 Harlem Road, Rockford, IL 61111 (815)654-0206
Sonoco Products Company, Paper Div, 200 Harwick, P.O. Box 327, Rockton, IL 61072 (815)624-8801

Woodford County

Woodford County Training Center, PO Box 241, Eureka, IL 61530 (309)467-3015

Indiana

Smurfit Recycling, 1520 North 5th Ave., Evansville, IN 47710 (812)425-6279
Georgia-Pacific Corp., Industrial Tissue Div., 2nd and Waite St., Gary, IN 46404
Keyes Fibre Co., 6629 Indianapolis Blvd., Hammond, IN 46320
Jefferson Smurfit Corp., Industrial Packaging Div., 40 Chestnut St., P.O. Box 5149, Lafayette, IN 47903
Inland Container, P.O. Box 428, Newport, IN 47966 (317)492-3341
Central States Fiber, 837 Webster Street, PO Box 239, Shelbyville, IN 46176 (317)389-3108
The Weston Paper & Mfg. Co., 2001 North 19th St., P.O. Box 238, Terre Haute, IN 47808 (812)234-6688
Globe Building Materials, 2330 Indianapolis Blvd., Whiting, IN 46394 (312)374-5011 (manufactures roofing felt)

Missouri

Brown's Recycling Center, 1408 East Gordon St., Hannibal, MO 63401 (314)248-1599
Federal International, 3948 Lindall Blvd, St. Louis, MO 63108 (314)531-0335
Smurfit Recycling, 600 Biddle Street, St. Louis, MO 63101 (314)231-1567

Iowa

Consolidated Packaging Corp, P.O. Box 250, Fort Madison, IA 52627

Wisconsin

Beloit Boxboard Company, 801 2nd Street, P.O. Box 386, Beloit, WI 53511 (608)365-6671
Fiberform Containers Inc., North 115 W 19255 Edison Drive., Germantown, WI 53022
Fort Howard Corp., 1919 South Broadway, P.O. Box 19130, Green Bay, WI 54307 (800)283-3678 x 3290
Milwaukee Waste Paper Company, 2342 North Newhall Street, Milwaukee, WI 53211 (414)271-5320
Newark Boxboard, 1514 East Thomas Ave., Milwaukee, WI 53211-4397
The Peltz Corp., PO Box 09462, Milwaukee, WI 53209 (414)445-6279

Ferrous Metals

Adams County

Chanen Scrap & Steel, 2400 Gardner Expressway, PO Box 766, Quincy, IL 62306 (217)223-0156

Boone County

Harris Silver & Sons, 800 East Pleasant, PO Box 13, Belvidere, IL 61008 (815)544-9221

Champaign County

Marco Steel, 302 South Market, Champaign, IL 61820 (217)352-4707
Area Recycling, 824 West Champaign, Rantoul, IL 61866 (217)893-3675

Christian County

Midstate Salvage, 1402 South Street, PO Box 129, Taylorville, IL 62568 (217)824-6047

Coles County

General Steel & Metals, Logan & Dewitt, PO Box 8, Mattoon, IL 61938 (217)235-5575 (including appliances)

Cook County

T&J Metal Co., 4602 West 120th St., Alsip, IL 60658 (708)388-6191
Metro Recycling Center, 13546 South Western Ave, Blue Island, IL 60406 (708)388-1551
AAA Alloys Scrap Iron & Metal, 4630 West Armitage Ave, Chicago, IL 60639 (312)237-8585
AAA Mid-City Recycling Company, 820 West Cermak, Chicago, IL 60608 (312)226-3825
Alco Salvage & Recycling, 1012 South Fairfield, Chicago, IL 60612 (312)638-5070
American Metals, 2420 West Cermak, Chicago, IL 60608 (312)927-0060
Azcon Corp., Chicago, IL 60633 (312)646-2300
Chicago Industrial Iron & Metal, 4555 West Grand, Chicago, IL 60639 (312)252-8048
Curbside Collection & Recycling Co., 3120 West 37th Place, Chicago, IL 60632 (312)376-6363
Doppiet's Scrap Iron & Metal, 1000 West Cermak, Chicago, IL 60608 (312)226-5355
Empire Iron and Steel, 1515 West 122nd St., Chicago, IL 60643 (312)928-0400
Illinois Scrap, 2048 West Hubbard, Chicago, IL 60612 (312)421-0549
J.B. Scrap Metals, 2910 West Carroll, Chicago, IL (312)533-4200
Loop Recycling, 1700 South Damen, Chicago, IL 60608 (312)942-0042
Otis-Oakley Iron & Supply Co., 3000 South Kedzie, Chicago, IL 60623 (312)523-7722
Price Watson/General Iron Industries, 1909 North Clifton Ave, Chicago, IL 60642 (312) 327-9600
S&C Salvage Co., 1968 North Racine, Chicago, IL 60614 (312)252-1868
Scrap Corp. of America, 12901 South Stony Island Ave, Chicago, IL 60633 (312)646-2222
Uptown Recycling Station, 4716 North Sheridan Road, Chicago, IL 60640 (312)769-4488
West Pullman Iron & Metal Co., 11954 South Peoria St., Chicago, IL 60643 (312)785-0534
Wolf Mill Supply Co., 6901 South Bell, Chicago, IL 60630 (312)436-4546
Superior Recycling Center, 3601 Glenwood-Dyer Road, Chicago Heights, IL 60411 (708)758-0597
United Scrap, 1545 South Cicero Ave, Cicero, IL 60650
Franklin Park Iron & Metal Co, 10062 Franklin Ave, Franklin Park, IL 60131 (708)678-7410
R.P.S. Industrial Metals, 9200 West King Ave., Franklin Park, IL (708)678-5050
Dudek Inc, 129 West New Ave, Lemont, IL 60439 (708)257-6532

Public Iron and Metal Co, 7735 West 47th St., Lyons, IL 60534 (708)447-4710
Metal Reclaiming Company, P.O. Box 448, Prospect Heights, IL 60070 (708)392-5662

DeKalb County

DeKalb Iron & Metal, 900 Oak Street, DeKalb, IL 60115 (815)758-2458

DuPage

Naperville Area Recycling Center, PO Box 894, Naperville, IL 60566 (708)369-0801
St. Charles Scrap, 3N780 Powis Road (1/2 mile north of North Ave.), West Chicago, IL 60185 (708)377-0008
Region Metals, 108 East Chicago, Westmont, IL 60559 (708)964-0979

Franklin County

Heartland Metal, Route 14 West, Benton, IL 62812 (618)439-4128
T.A. Pollack, 200 South Taft, West Frankfort, IL 62896 (618)932-2111

Fulton County

Bork Scrap Metal, 352 South 2nd Street, Canton, IL 61520 (309)647-2438

Henry County

Kewanee Metal, 616 East 6th Street, PO Box 347, Kewanee, IL 61443 (309)852-2105

Jackson County

KARCO Scrap Recycling, PO Drawer 3250 North New Era Drive, Carbondale, IL 62901 (618)457-5514

Jefferson County

Bodine Scrap Metal, 1407 South 10th Street, Mount Vernon, IL 62864 (618)242-5410
Shapiro Brothers of Illinois, 510 South 6th Street, Mount Vernon, IL 62864 (618)244-3168

Kane County

Aurora Iron & Metal, 500 North Broadway, Aurora, IL 60505 (708)897-7172
Fox Valley Iron & Metal, 637 North Broadway, Aurora, IL 60505 (708)897-5907
S & S Metal Recycling, 336 East Sullivan Road, Aurora, IL 60506 (708)844-3344 (accepts appliances)
Eagle Recycling, 700 South Route 25, Batavia, IL 60510 (708)406-1066
Elgin Salvage and Supply Company, 464 McBride St., Elgin, IL 60120 (708)742-9500
(accepts appliances)

Kankakee County

Belson Scrap & Steel, Route 50 North, Bourbonnais, IL 60914 (Mail: PO Box 147, Kankakee, IL 60914
(815)939-7517
Kankakee Scrap Corp, 1000 North Washington, Kankakee, IL 60901
Louis Pearlman & Sons, 564 North Entrance Ave, Kankakee, IL 60901

Knox County

Galesburg Salvage & Iron, PO Box 1312, Galesburg, IL 61401 (309)343-6176
McCabe Scrap Iron & Material, 215 West Ferris, Galesburg, IL 61401 (309)343-4131

Lake County

C & M Recycling, 1600 Morrow Ave, North Chicago, IL 60064 (708)578-2922
Wheel-In Recycling, 1211 North Garland Road, Wauconda, IL 60084 (708)526-2978
Cleveland Corp., 42810 North Green Bay Road, Zion, IL 60099 (708)872-7200

LaSalle County

Buckman Iron & Metal, 153 Canal Street, LaSalle, IL 61301 (815)223-0322
Newteon Iron & Metal, 901 West Marquette Street, PO Box 296, Ottawa, IL 61350 (815)433-1658
R.T. Recycling, Gage Street, Somonauk, IL 60552 (815)498-3749

Lawrence County

Fox Iron & Metal Works, 799 Corporation Street, Bridgeport, IL 62417 (618)945-4521

Lee County

Johnson Wrecking, 2118 Sink Hollow Road, Dixon, IL 61021 (815)652-4608
S & W, 78 Monroe Avenue, Dixon, IL 61021 (815)288-4407

Livingston County

Fairburg Scrap Metal, 105 South Webster, Box 44, Fairburg, IL 61739 (815)692-2631
Pontiac Recycling, 1703 North Aurora, Pontiac, IL 61764 (815)844-6419

Macon County

U.S. Scrap & Metal, 2712 North Woodford Street, Decatur, IL 62521 (217)422-0046
U.S. Scrap & Metal, 1551 McBride, Decatur, IL 62521 (217)422-0046

Madison County

G.M. Scrap Processors, 36 MacArthur Drive, Cottage Hills, IL 62018 (618)259-8570
Sidney B. Arst, 100 Haynes Avenue, East Alton, IL 62024 (618)259-8331
Odell's Iron & Metal, 116 State Street, Madison, IL 62060 (618)876-6680

Massac County

Holt Recyclers, 910 East 2nd Street, Metropolis, IL 62960 (618)524-2109

Peoria County

Scrap Products, 7000 SW Adams, Bartonville, IL 61607 (309)697-6161
A. Miller and Company, 1612 SW Adams, Peoria, IL (309)674-1101
IBS Inc., 2424 West Clark, Peoria, IL 61607 (309)637-4422 (also appliances)
I. Erlichman Company, 3213 South Washington St., Peoria, IL 61602 (309)637-4491

Pulaski County

B & B Salvage and Rigging, Junction Routes 3 & 51, Cairo, IL 62363 (618)734-2082
Southern IL Scrap, 1700 Cedar Street, Cairo, IL 62363 (618)734-0634

Randolph County

Harold Tillock Salvage & Supply, Highway 154, Baldwin, IL 62914 (618)785-2545
Kelley's Salvage, RR 2, Sparta, IL 62278 (618)443-4807

Rock Island County

E & J Metal, PO Box 3665, 300 24th Avenue, Rock Island, IL 61201 (also appliances)

Saint Clair County

Lefton Iron & Metal, East St. Louis, IL 62207 (618)274-4900

Saline County

Eldorado Iron & Metal, Route 45, Eldorado, IL 62930 (618)273-9612
Harrisburg Recycling, Route 4, Harrisburg, IL 62946 (618)253-3113

Sangamon County

Mervis Iron & Supply, 1023 East Madison, Springfield, IL 62702 (217)522-1541
Mervis Iron & Supply, PO Box 4285, 1100 South 9th Street, Springfield, IL 62703
Springfield Iron & Metal, 930 Wolfe, Springfield, IL 62702 (217)544-7131

Shelby County

Shelbyville Salvage Yard, RR 3, Box 13, Shelbyville, IL 62565 (217)774-3108 (also appliances)

Stephenson County

Freeport Recycling Center, 657 North Van Buren, Freeport, IL 61032 (815)232-2906

Vermilion County

Coultas Recycling, 123 North 2nd, Danville, IL 61832 (217)443-6539
Mervis Iron & Metal, 2313 Cannon Street, PO Box 827, Danville, IL 61832 (217)442-5300

Williamson County

Gary's Metals, 25 County Aire Drive, Carterville, IL 62918 (618)996-2041 (also appliances)
B & J Salvage, Route 2, Creal Springs, IL 62922 (618)942-7626
American Iron & Metal, 603 North Monroe, Marion, IL 62959 (618)997-5341

Winnebago County

Rockford Maintenance & Recyling, PO Box 2311, Loves Park, IL 61131 (815)654-0206
Joseph Behr & Sons, 1100 Seminary, PO Box 740, Rockford, IL 61105 (815)987-2600

Multiple Materials

R2 Reuse Centers, Inc., 9690 West 55th Street, Countryside, IL 60525 (708)482-0154

Through municipal collection and private business contracts, R2 accepts, sells, and brokers a wide variety of reusable materials. They deal with building materials such as lumber, drywall, bricks, hardware, light fixtures, plumbing fixtures, and appliances. Their warehouse at the above address is open to the public from 8:30 to 5 Monday through Friday, and from 9 to 4 on Saturday.

VIM Corporation, PO Box 491, Glen Ellyn, IL 60138 (708)858-5180

This company acts as a broker and/or processor of many materials generated in construction , including: aluminum, cardboard, concrete, gypsum wallboard, roofing tarpaper, vinyl siding, window glass, and wood.

CMI Corporation, 330 SW Washington, Suite 205, Peoria, IL 61602

A division of VIM above

Nonferrous Metals

All of the businesses listed below accept at least one type of nonferrous metal scrap (e.g. aluminum, brass, copper, or lead) and most accept all types.

Adams County

Chanen Scrap & Steel, 2400 Gardner Expressway, PO Box 766, Quincy, IL 62306 (217)223-0156
Quincy Recycle Paper, 526 South 6th Street, Quincy, IL 62301 (217)224-2754

Boone County

Harris Silver & Sons, 800 East Pleasant, PO Box 13, Belvidere, IL 61008 (815)544-9221

Champaign County

Community Recycling Center, 720 North Market St., Champaign, IL 61820 (217)351-4495
Marco Steel, 302 South Market, Champaign, IL 61820 (217)352-4707
Area Recycling, 824 West Champaign, Rantoul, IL 61866 (217)893-3675

Christian County

U-Dump-It, 500 North Hickory, Pana, IL 62557 (217)562-5212
Midstate Salvage, 1402 South Street, PO Box 129, Taylorville, IL 62568 (217)824-6047 (including appliances)

Coles County

Charleston Recycling, 203 North 10th Street, Charleston, IL 61920 (217)345-1194
General Steel & Metals, Logan & Dewitt, PO Box 8, Mattoon, IL 61938 (217)235-5575 (including appliances)
Patterson Scrap, 1112 Hayes, Mattoon, IL 61938 (217)234-4158

Cook County

Reliable Recycler, Inc., Alsip, IL 60658 (708)597-2930
T&J Metal Co., 4602 West 120th St., Alsip, IL 60658 (708)388-6191
Metro Recycling Center, 13546 South Western Ave, Blue Island, IL 60406 (708)388-1551
A.M. Cozzi Metals, 1540 West 33rd St., Chicago, IL 60608 (312)254-1490 (also appliances)
AAA Alloys Scrap Iron & Metal, 4630 West Armitage Ave, Chicago, IL 60639 (312)237-8585
AAA Mid-City Recycling Company, 820 West Cermak, Chicago, IL 60608 (312)226-3825
Alco Salvage & Recycling, 1012 South Fairfield, Chicago, IL 60612 (312)638-5070
American Metals, 2420 West Cermak, Chicago, IL 60608 (312)927-0060
American Metals, 3315 West Augusta, Chicago, IL 60651 (312)927-0060
Azcon Corp., Chicago, IL 60633 (312)646-2300
B.L. Nicholson Iron & Metal, 8501 South Baltimore, Chicago, IL 60617 (312)375-0874
Bethel Recycling, 4746 West Rice, Chicago, IL 60651 (312)261-8340
Bethel Trading Post, 831 North Cicero, Chicago, IL 60624 (312)261-8340
Biltmore Recycling, 813 West Cermak, Chicago, IL 60608 (312)829-2066
Brick and Metals Company, 6449 West Grand, Chicago, IL 60635 (312)804-1333
Chicago Detinning, 1500 West Webster Ave., Chicago, IL 60614 (312)549-3151
Chicago Industrial Iron & Metal, 4555 West Grand, Chicago, IL 60639 (312)252-8048
Chicago Metal Works, 3200 South St. Louis, Chicago, IL 60603 (312)927-2600
Courtesy Metal, 3711 South California, Chicago, IL 60632 (312)847-3330
Curbside Collection & Recycling Co., 3120 West 37th Place, Chicago, IL 60632 (312)376-6363
Edco Recycling Co., 8224 South Vincennes Ave., Chicago, IL 60620 (312)278-7060
Elston Metal & Salvage Co., 2320 North Elston, Chicago, IL 60614 (312)278-7060
Empire Iron and Steel, 1515 West 122nd St., Chicago, IL 60643 (312)928-0400
Filmore Junk, 4536 West Grenshaw, Chicago, IL 60624 (312)826-4223
Frank Eiserman & Co., 5332 South Long Ave, P.O. Box 388232, Chicago, IL 60638 (312)735-8200
Global Recycling, 1800 North St. Louis, Chicago, IL 60647 (312)276-0730
Gordon Bros. Iron & Metal Co., 1640 West Kinzie, Chicago, IL 60622 (312)421-5940
Illinois Scrap, 2048 West Hubbard, Chicago, IL 60612 (312)421-0549
J.B. Scrap Metals, 2910 West Carroll, Chicago, IL (312)533-4200
Loop Recycling, 1700 South Damen, Chicago, IL 60608 (312)942-0042
Mahzel Metals, 325 North Elizabeth, Chicago, IL 60607 (312)733-5500
Midwest Industrial Metals, 111 North Cherry, Chicago, IL 60622 (312)337-1900
North Avenue Iron and Metal, 1917 West North Ave, Chicago, IL 60622 (312)278-4370
On State Recycling, 6040 State, Chicago, IL 60621 (312)667-8283

Reserve Iron and Metal, 12701 South Doty Ave, Chicago, IL 60633 (312)646-2121
Resource Center of Chicago Donation Site, 6100 South Blackstone, Chicago, IL 60637 (312)821-1351
Resource Center of Chicago - Riverfront, 222 East 135th Place, Chicago, IL 60627 (312)821-1587
Reynolds Aluminum Recycling Center, A&D Home Center, 8320 South Pulaski Ave, Chicago, IL 60652 (708)344-1548
Reynolds Aluminum Recycling Center, K-Mart store lot, 51st and Kedzie, Chicago, IL 60632 (708)344-1548
Reynolds Aluminum Recycling Center, 4124 West Ogden, Chicago, IL 60623 (708)344-1548
Reynolds Aluminum Recycling Center, Ames store lot, 6211 North Lincoln, Chicago, IL 60659 (708)344-1548
Reynolds Aluminum Recycling Center, K-Mart store lot, 3443 West Addison, Chicago, IL 60618 (708)344-8215
Reynolds Aluminum Recycling Center, 21st and Loomis Ave, Chicago, IL 60608 (708)344-8215
Rockwell Scrap Co., 3046 North Elston, Chicago, IL 60618, (312)478-3108
S&C Salvage Co., 1968 North Racine, Chicago, IL 60614 (312)252-1868
Scrap Corp. of America, 12901 South Stony Island Ave, Chicago, IL 60633 (312)646-2222
Uptown Recycling Station, 4716 North Sheridan Road, Chicago, IL 60640 (312)769-4488
West Pullman Iron & Metal Co., 11954 South Peoria St., Chicago, IL 60643 (312)785-0534
Wolf Mill Supply Co., 6901 South Bell, Chicago, IL 60630 (312)436-4546
Superior Recycling Center, 3601 Glenwood-Dyer Road, Chicago Heights, IL 60411 (708)758-0597
United Scrap, 1545 South Cicero Ave, Cicero, IL 60650
Maine Scrap Metal, 1274 Rand Road, DesPlaines, IL 60016 (708)824-3175
Reynolds Aluminum Recycling Center, K-Mart store lot, Lee and Oakton, DesPlaines, IL 60018 (708)344-1548
Reynolds Aluminum Recycling Center, Beisterfield & Arlington Heights Road, Elk Grove Village, IL 60007 (708)344-1548
Valley Scrap Corp, 1155 Hartrey Ave, Evanston, IL 60202 (708)328-9200
Franklin Park Iron & Metal Co, 10062 Franklin Ave, Franklin Park, IL 60131 (708)678-7410
Reynolds Aluminum Recycling Center, Hickory Hills Plaza, 87th Street & Cork Ave, Hickory Hills, IL 60457 (708)344-1548
Dudek Inc, 129 West New Ave, Lemont, IL 60439 (708)257-6532
Public Iron and Metal Co, 7735 West 47th St., Lyons, IL 60534 (708)447-4710
Reynolds Aluminum Recycling Center, 2925 West 19th St., Ames store lot, Markham, IL 60426 (708)344-1548
Reynolds Aluminum Recycling Co, 1310 South 4th Ave, Maywood, IL 60153 (708) 344-8215
R & L Recycling, 4719 West Lake St., Melrose Park, IL 60160 (708)681-3626
Reynolds Aluminum Recycling Center, Lawrencewood Plaza, Oakton & Waukegan Roads, Niles, IL 60648 (708)344-1548
Reynolds Aluminum Recycling Center, K-Mart store lot, 111th St. and Cicero, Oak Lawn, IL 60453 (708)344-1548
Metal Reclaiming Company, P.O. Box 448, Prospect Heights, IL 60070 (708)392-5662
Reynolds Aluminum Recycling Center, Zayre store lot, Sauk Trail & Governor's Highway, Richton Park, IL 60471 (708)344-1548
West Side Recycling, 3108 North Avenue, Stone Park, IL 60165 (708)343-8885
Reliable Recyclers, 7307 Duvan Dr., Tinley Park, IL 60477, (708)532-8130

Cumberland County

Coleman-Embry Recycling, 631 Locust, Neoga, IL 62447 (217)895-2270

DeKalb County

DeKalb Iron & Metal, 900 Oak Street, DeKalb, IL 60115 (815)758-2458

DuPage County

American Industrial Metals, 607 Winthrop, Unit 2, Addison, IL 60101 (708)279-4517 or (708)543-9868
Wastewater Plant, Glen Ellyn Road and Edgewater Drive, Bloomingdale, IL 60108 (708)529-5911
Reynolds Aluminum (DuPage Township Recycling Center), 151 Royce Road (1 block west of IL Route 53), Bolingbrook, IL 60439, (708)344-1548
Reynolds Aluminum, Schmale Road and Geneva Road, Northland Mall, Carol Stream, IL 60188 (708)344-1548
Reynolds Aluminum, 1220 Plainfield Road, Darien, IL 60559 (708)344-1548

Reynolds Aluminum Recycling Center, Beisterfield and Arlington Heights Roads, Elk Grove Village, IL 60007 (708)344-1548
Christ United Methodist Church, 920 Swain, Elmhurst, IL 60126 (708)833-7723
Reynolds Aluminum, IL Route 83 at St. Charles Road, Elmhurst, IL 60126 (708)344-1548
Reynolds Aluminum, K-Mart lot, 900 West Irving Park Road, Hanover Park, IL 60103 (708)344-1548
Hinsdale Recycling Center, Public Works Garage, Symonds Drive, PO Box 61, Hinsdale, IL 60522 (708)323-5505
Reliable Recycler, 905 North Ridge Ave, Lombard, IL 60148, (708)629-8760 (nonferrous and appliances)
Village of Lombard, 2020 South Highland, Lombard, IL 60148 (708)620-5700
Naperville Area Recycling Center, PO Box 894, Naperville, IL 60566 (708)369-0801
Public Works Garage, 720 Rush Street, Roselle, IL 60172 (708)980-2000
Villa Park Recycling Center, Public Works Garage, 100 West Home, Villa Park, IL 60181 (708)834-8500
Wayne Community Association, Wayne Village Hall, Army Trail Road & Railroad St., north parking lot, Wayne, IL 60184 (708)584-8659
St. Charles Scrap, 3N780 Powis Road (1/2 mile north of North Ave.), West Chicago, IL 60185 (708)377-0008
West Chicago Auto Wrecker, Recyclers of America, 641 West Washington, West Chicago, IL 60185
Region Metals, 108 East Chicago, Westmont, IL 60559 (708)964-0979
Wheaton Sanitary District, 1S649 Shaffner Road, Wheaton, IL 60187 (scrap aluminum and appliances)

Franklin County

Davis Collection Center, Route 37 South, Benton, IL 62812 (618)435-5305
Heartland Metal, Route 14 West, Benton, IL 62812 (618)439-4128
Metal Market Recycling, Route 1, Mulkeytown, IL 62865 (618)724-9369
T.A. Pollack, 200 South Taft, West Frankfort, IL 62896 (618)932-2111

Fulton County

Bork Scrap Metal, 352 South 2nd Street, Canton, IL 61520 (309)647-2438

Henry County

Kewanee Metal, 616 East 6th Street, PO Box 347, Kewanee, IL 61443 (309)852-2105

Iroquois County

D&J Recycling, 114 West Front Street, Gilman, IL 60938 (815)265-7215

Jackson County

KARCO Scrap Recycling, PO Drawer 3250 North New Era Drive, Carbondale, IL 62901 (618)457-5514
Southern Recycling Center, 220 South Washington, Carbondale, IL 62901 (618)549-2880
F.T.M. Enterprises, Illinois Highway 51, Dowel, IL 62927 (618)568-1112
Murphysboro Recycling Center, 1321 Rover Street, Murphysboro, IL 62966 (618)687-4600

Jefferson County

Bodine Scrap Metal, 1407 South 10th Street, Mount Vernon, IL 62864 (618)242-5410
Recycling Associated Services, RR 3, Mount Vernon, IL 62864 (618)244-2336
Shapiro Brothers of Illinois, 510 South 6th Street, Mount Vernon, IL 62864 (618)244-3168

Jo Daviess

Behr Recycling, 18525 Route 20 West, East Dubuque, IL 61025

Kane County

Aurora Iron & Metal, 500 North Broadway, Aurora, IL 60505 (708)897-7172
Can-Venient, 300 Parker, Aurora, IL 60505 (708)859-1074
Fox Valley Iron & Metal, 637 North Broadway, Aurora, IL 60505 (708)897-5907

S & S Metal Recycling, 336 East Sullivan Road, Aurora, IL 60506 (708)844-3344 (accepts appliances)
Eagle Recycling, 700 South Route 25, Batavia, IL 60510 (708)406-1066
Elgin Salvage and Supply Company, 464 McBride St., Elgin, IL 60120 (708)742-9500 (accepts appliances)

Kankakee County

Belson Scrap & Steel, Route 50 North, Bourbonnais, IL 60914 (Mail: PO Box 147, Kankakee, IL 60914) (815)932-741
Kankakee Scrap Corp, 1000 North Washington, Kankakee, IL 60901
Louis Pearlman & Sons, 564 North Entrance Ave, Kankakee, IL 60901

Lake County

C & M Recycling, 1600 Morrow Ave, North Chicago, IL 60064 (708)578-2922
Wheel-In Recycling, 1211 North Garland Road, Wauconda, IL 60084 (708)526-2978
Cleveland Corp., 42810 North Green Bay Road, Zion, IL 60099 (708)872-7200

LaSalle County

Buckman Iron & Metal, 153 Canal Street, LaSalle, IL 61301 (815)223-0322
G&W Recycling, 1112 6th Avenue, Mendota, IL 61342 (815)539-9089
Newteon Iron & Metal, 901 West Marquette Street, PO Box 296, Ottawa, IL 61350 (815)433-1658
Second Wind Recycling, 1127 North Fulton Street, Ottawa, IL 61350 (815)433-0031
R.T. Recycling, Gage Street, Somonauk, IL 60552 (815)498-3749
Kwikash, 807 North Vermilion, Streator, IL 61364 (815)672-5900

Lawrence County

Fox Iron & Metal Works, 799 Corporation Street, Bridgeport, IL 62417 (618)945-4521

Lee County

Johnson Wrecking, 2118 Sink Hollow Road, Dixon, IL 61021 (815)652-4608
S & W, 78 Monroe Avenue, Dixon, IL 61021 (815)288-4407

Livingston County

City of Fairburg, Jackson & Walnut Streets, City Hall - 100 East Locust, Fairburg, IL 61739
Fairburg Scrap Metal, 105 South Webster, Box 44, Fairburg, IL 61739 (815)692-2631
Jim's Recycling, 410 East Wabash, Pontiac, IL 61764 (815)842-6720
Pontiac Recycling, 1703 North Aurora, Pontiac, IL 61764 (815)844-6419

Macon County

W.E.C.A.R.E. Recycling, 112 North West, Carlinville, IL 62626 (217)854-9510
Decatur Recycling, 2500 North Martin Luther King Jr. Drive., Decatur, IL 62526 (217)875-2425
U.S. Scrap & Metal, 2712 North Woodford Street, Decatur, IL 62521 (217)422-0046
U.S. Scrap & Metal, 1551 McBride, Decatur, IL 62521 (217)422-0046

Madison County

Azcon, Broadway & Chessan Lanes, Alton, IL 62002 (618)463-3770
Pride Recycling, 122 East Broadway, Alton, IL 62002 (618)465-1042
G.M. Scrap Processors, 36 MacArthur Drive, Cottage Hills, IL 62018 (618)259-8570
Odell's Iron & Metal, 116 State Street, Madison, IL 62060 (618)876-6680

Marion County

A & K Recycling, Route 1, Box 175, Salem, IL 62881 (618)548-4666

Massac County

Holt Recyclers, 910 East 2nd Street, Metropolis, IL 62960 (618)524-2109

McHenry County

Hebron Disposal Service/Alden, East of Fire House on Route 173, Alden, IL 60001
Days & Crawford Scrap Metal, 304 Briarwood Road, Crystal Lake, IL 60014, (815)459-7751
T & C Metal Company, P.O. Box 531, 378 Prairie St., Crystal Lake, IL 60014 (815)338-0393
Hebron Disposal Service, B&W Liquor Store parking lot, Hebron, IL 60034
McHenry County Defenders, Main St., west of train station, McHenry, IL 60050 (815)338-0393
McHenry County Defenders Recycling Center, 239 Throop St., Woodstock, IL 60098 (815)338-0393

McLean County

Morris Tick, PO Box 3095, 501 East Stewart, Bloomington, IL 61702 (309)828-6084

Peoria County

Scrap Products, 7000 SW Adams, Bartonville, IL 61607 (309)697-6161
IBS Inc., 2424 West Clark, Peoria, IL 61607 (309)637-4422 (also appliances)
I. Erlichman Company, 3213 South Washington St., Peoria, IL 61602 (309)637-4491
A. Miller and Company, 1612 SW Adams, Peoria, IL (309)674-1101
Commonwealth Aluminum Recycling, 407 NE Rock Island, Peoria, IL 61603

Pulaski County

B & B Salvage and Rigging, Junction Routes 3 & 51, Cairo, IL 62363 (618)734-2082
Southern IL Scrap, 1700 Cedar Street, Cairo, IL 62363 (618)734-0634

Randolph County

Harold Tillock Salvage & Supply, Highway 154, Baldwin, IL 62914 (618)785-2545
Kelley's Salvage, RR 2, Sparta, IL 62278 (618)443-4807

Rock Island County

Del's Metal, 1605 1st Street, PO Box 3586, Rock Island, IL 61201 (309)788-1993
E & J Metal, PO Box 3665, 300 24th Avenue, Rock Island, IL 61201 (also appliances)

Saint Clair County

Belleville Recycling, 501 Hecker, Belleville, IL 62221 (618)233-2425
Cerro Copper Products, East St. Louis, IL 62202 (618)337-6000 (copper only)
Lefton Iron & Metal, East St. Louis, IL 62207 (618)274-4900

Saline County

Ande Scrap Yard, Route 1, Eldorado, IL 62930 (618)273-5195
Eldorado Iron & Metal, Route 45, Eldorado, IL 62930 (618)273-9612
Eldorado Enterprises, Route 45, Eldorado, IL 62930 (618)273-9543
Harrisburg Recycling, Route 4, Harrisburg, IL 62946 (618)253-3113

Sangamon County

Bearcat Recycling, Ash Street at Dirksen Parkway, Springfield, IL 62703 (217)523-5357
Mervis Iron & Supply, 1023 East Madison, Springfield, IL 62702 (217)522-1541
Mervis Iron & Supply, PO Box 4285, 1100 South 9th Street, Springfield, IL 62703
Springfield Recycling, 1900 East Moffat, Springfield, IL 62703 (217)753-1620
Springfield Iron & Metal, 930 Wolfe, Springfield, IL 62702 (217)544-7131

Shelby County

Shelbyville Salvage Yard, RR 3, Box 13, Shelbyville, IL 62565 (217)774-3108 (also appliances)

Stephenson County

Freeport Recycling Center, 657 North Van Buren, Freeport, IL 61032 (815)232-2906

Vermilion County

Coultas Recycling, 123 North 2nd, Danville, IL 61832 (217)443-6539

Mervis Iron & Metal, 2313 Cannon Street, PO Box 827, Danville, IL 61832 (217)442-5300

Wayne County

Fairfield Recycling, Route 15 East, Fairfield, IL 62837 (618)842-9079
M & M Salvage, RR 3, Fairfield, IL 62837 (618)382-7955

White County

Carmi Recycling, Main Cross Street, Carmi, IL 62821

Whiteside County

1205 West 5th, Sterling, IL 61081

Will County

Illiana Scrap Processing, 1722 State St., Crete, IL 60417 (708)672-5590
Grell Recycling, Route 4, Wilmington, IL 60481 (815)476-9387

Williamson County

Gary's Metals, 25 County Aire Drive, Carterville, IL 62918 (618)996-2041 (also appliances)
B & J Salvage, Route 2, Creal Springs, IL 62922 (618)942-7626
A & D Recycling, 302 East Union, Marion, IL 62959 (618)993-5761
American Iron & Metal, 603 North Monroe, Marion, IL 62959 (618)997-5341

Winnebago County

Rockford Maintenance & Recyling, PO Box 2311, Loves Park, IL 61131 (815)654-0206
Joseph Behr & Sons, 1100 Seminary, PO Box 740, Rockford, IL 61105 (815)987-2600
Robbins Recycling, 1311 Harrison Avenue, Rockford, IL 61104 (815)398-2267

Iowa

Rich Metal Company, 510 Schmidt Road, Davenport, IA 52802 (319)322-0975

Missouri

Ace Scrap Metal Processor, 5900 Manchester, St. Louis, MO 63110 (314)781-6860
Cash's Metal & Iron Processors, 3144 North Broad St., St. Louis, MO 63147 (314)231-1938
Gateway Recycling Company, 12308 Missouri Bottom Road, Hazelwood, MO 63042 (314)731-2364
National Metal Broker, 5939 St. Louis Ave., St. Louis, MO 63120 (314)389-4710
Southern Metal Processing, 6400 South Broadway, P.O. Box 2857, St. Louis, MO, 63111
(314)481-2800

Vinyl Siding

Cook County

Dobb's Recycling Service, 901 West 115th Street, Chicago, IL 60643 (312)568-0700
Lifetime Aluminum Supply, 5320 West Roscoe St., Chicago, IL 60641 (312)736-0015

DuPage County

VIM Corporation, PO Box 491, Glen Ellyn, IL 60138 (708)858-5180

Lake County

Maine Plastics, P.O. Box 939, North Chicago, IL 60064 (708)473-3553

Wood

Cook County

Reliable Recycler, Inc., Alsip, IL 60658 (708)597-2930 (pallets)
Skid Recycling, Inc., 2855 West Washington, Bellwood, IL 60104 (708)544-6730 (skids)
Great Lakes Disposal Service, 13546 Western Avenue, Blue Island, IL 60406 (708)388-9999
Calumet Lumber & Sawmill Company, 13651 South Buffalo, Chicago, IL 60633 (312)646-1444
Jones Pallet Recycling, 348 West 47th Street, Chicago, IL 60609 (312)536-6776
McCarthy Inc., 1737 North Paulina, Chicago, IL 60602 (312)278-4878
Acme Scavenger Service, 13631 Kostner Ave, Crestwood, IL 60445 (708)238-1188

Iroquois County

Pallet Recyclers, Box 472, Watseka, IL 60970 (815)432-3857

Kane County

Interstate Pallet Company, 1400 Mitchell Road, Aurora, IL 60507 (708)892-7900
Soderstrom Pallets, 115 West Indian Trail, Aurora, IL 60506 (708)897-5545

Lake County

Extrin Design Group, 27282 West Cuba Road, Barrington, IL 60010 (708)382-8989

article will concentrate on educating children on what happens to recyclables after they have been collected in the home or at school. Information on collection techniques and end use markets for various recyclables were discussed.

o Implementation

- Tim Jones provided OSWER and OPPE documents concerning the financing of solid waste programs to EPA's State Capacity Task Force's Team on Alternative Financing Mechanisms. The Team, staffed out of the Office of Administration and Resources Management's Public Private Partnership Program, will use the information to develop a paper on States' use of fees to finance environmental protection programs. The paper is scheduled to be completed in June.

o Source Reduction

- On April 30, source reduction staff went to Baltimore to visit The Loading Dock, a non-profit building supply resource exchange that promotes low-cost housing while diverting materials from the waste stream. Retailers of building materials, businesses with excess inventory stock and hard-to sell merchandise, and others can take tax deductions for donations of building material, which The Loading Dock distributes at low cost to low-income families and non-profit organizations. In 1991, The Loading Dock diverted 7,000 tons of building materials from the waste stream. To demonstrate the effectiveness of the resource exchange as a source reduction tool for municipalities, MISWD is entering into a cooperative agreement with a resource exchange in the Washington, D.C. area to develop a "how-to" manual to assist municipalities and non-profit organizations in setting-up resource exchanges. The Loading Dock will serve as a model and a consultant during the research and writing of the manual.

- On May 4, Lynda Wynn, Jan Canterbury, and OPPE economics staff met with Bob Repetto, Vice President of the World Resource Institute (WRI). WRI has studied unit pricing programs in 14 communities and has attempted to develop price elasticities for disposal rates and amount of waste discarded. Staff will evaluate WRI's report and, if appropriate, use some of the information

o Budget and Administrative Services Branch

Contracts Management

- Cheryl Barton, representing OSW, attended the OSWER Contracts Management Steering Committee meeting last week. Matt Robins briefed the group on the activities of the staff of OARM Standing Committee. The staff is in the process of completing a comprehensive problem identification and needs assessment on contracts management. This information will be used to map out a course of action for working on improvements in contracts management.

- Wendell Miser, Carolyn Loomis, Mike Shannon, Norma Hughes, and Kent Anderson participated, along with representative Project Officers, Delivery Order Project Officers and Work Assignment Managers from other OSWER offices, in a needs identification session sponsored by the staff of the Standing Committee last week.

- Norma Hughes and Cheryl Barton met with an Office of Water Project Officer and Work Assignment Manager workgroup to brief them on how NUTs and BOLTS was developed and how OSW contracts management is organized. Office of Water is working on adapting NUTS and BOLTS to their specific Office needs.

MUNICIPAL AND INDUSTRIAL SOLID WASTE DIVISION

o Recycling

- On April 30-May 1, Ellen Pratt and Kim Carr attended a construction and demolition debris recycling conference in Philadelphia, PA. The conference, sponsored by Gershman, Brickner and Brattan, Inc., covered an overview of construction and demolition debris, the costs of running a recycling facility, and the markets for the recycled materials. Ellen Pratt presented an overview of EPA's role in construction and demolition debris recycling. On the second day of the conference, the attendees toured two recycling facilities in the Philadelphia area.

- On May 11, Terry Grist and Bill MacLeod met with Thea McManus of CABD and Jean West, Asst. Editor of "The Mini Page" newspaper for children to discuss an upcoming issue on recycling. The

Appendix D Request for Proposals

"DEMONSTRATION OF ALTERNATIVES TO LANDFILLING OF CONSTRUCTION AND/OR DEMOLITION DEBRIS"

I. Description of Program

The Illinois Department of Energy and Natural Resources' ("Department") Technologies and Practices Demonstration Program (TPDP) is initiating a funding program that will consider alternatives leading to the diversion from landfilling of debris resulting from construction and/or demolition operations. This Request for Proposals (RFP) is meant to serve as a notice of the Departments's intent to contract with qualified contractors to host and conduct demonstrations of relevant technologies, alternative uses and/or economic methods to divert this material from landfills. Qualified contractors are invited to submit proposals for the completion of the tasks as outlined in this RFP.

The Department's primary interest in issuing this RFP are:

- Demonstration of production of marketable by-products from construction and demolition debris.
- Demonstration of alternative uses for constructional and demolition debris, as opposed to landfilling or incineration.
- Minimization of volume, toxicity, and leachability of debris reaching the landfill.

II. Authorization for RFP:

Authorization for this solicitation is contained in the Solid Waste Management Act (Illinois Revised Statutes, Chapter 111 1/2, paragraph 7051 *et seq.* as amended) which authorizes the department:

a) to provide technical and educational assistance for applications of technologies and practices which will minimize the land disposal of non-hazardous solid waste;

b) to establish guidelines and funding criteria for the solicitation of projects under this Act, and to receive and evaluate applications for grants and loans for solid waste management projects based upon such guidelines and criteria; and

c) to provide financial assistance for research, development, and demonstration of innovative technologies and practices.

III. Eligibility

A. Applicant:

- Qualified applicants will be or work in close association with the host facility that is a permitted Regional Pollution Control Facility or other organization possessing all necessary permits and meeting all necessary state and local zoning and regulations for operation. Copies of operational or experimental permit applications must accompany the proposal. Revocation of any of the foregoing permits at any time of the project's operation will automatically revoke the department's contractual obligation to the contractor.

B. Project:

- The project must be physically located in the state of Illinois.
- For project purposes, the applicant must certify that at least 80% of the construction/demolition debris received will be from Illinois and/or destined for Illinois landfills.
- The applicant must identify markets and supply letters of intent or commitment for marketing products.
- The applicant must certify that the project is currently in compliance with applicable environmental

and safety laws, and is eligible to acquire all necessary environmental, zoning, etc. permits related to the project.

- The applicant must certify it is offering a security interest on equipment and materials for which ENR funding is requested.

- INELIGIBLE PROJECTS AND EXPENDITURES: road demolition debris, buildings and grounds (i.e.: construction of a new building to house equipment for the project, construction of a road or parking facility, etc.), site improvements and modifications, labor costs, personal services, operating capital, travel, utilities, and material collection costs.

IV. Evaluation Criteria:

A pre-proposal letter will be required to determine which projects best meet the objectives of the Department. Based on our pre-selections, prospective applicants will be notified and a detailed proposal, including a TPDP application, must be submitted.

All proposals received by the deadline in this RFP will be evaluated by a panel of Illinois Department of Energy and Natural Resources personnel. An interview and/or a presentation may be required to further differentiate among qualified applicants. In addition to the requirements discussed in Section III, above, the proposals will be evaluated by the following criteria:

1. Project Scope of Work Plan (which should include, but not be limited to, the elements described in Section V.A.) [30 points]

2. Suitability of Facility (i.e. support of host community, necessary permits, size of facility, long-term ability and interest in processing construction/demolition debris over an extensive period of time) [25 points]

3. Project Cost Detail [20 points] - (See application for more information)

4. Qualifications of Company and Personnel Assigned to Project [15 points]

5. Time Schedule [10 points]

The total number of demonstration facilities has not been predetermined. The Department reserves the right to select only those facilities that exhibit high potential for successful operation and technology transfer.

V. Basic Requirements, Qualifications and Time Deadlines

A. Scope of Work:

A proposal submitted under this RFP must include, but should not necessarily be limited to the following tasks:

- Task 1: Operate a facility or program to demonstrate one or more of the areas of interest outlined in Section I (DESCRIPTION OF PROGRAM) for a minimum of contract life.

- Task 2: Conduct a sort and weight composition analysis of the construction and/or demolition debris stream at least four times throughout the project's duration.

- Task 3: Record all materials transferred to the processing facility for the duration of the project, including the tonnage of debris and its constitution (masonry, wood, metal, drywall, plastics, etc.). The tonnages and destination of all processed and marketed materials, as well as the market prices for these materials, and the average costs of operation will be quantified.
- Task 4: Provide project reports detailing the economics, technical and operational aspects of the project, and summarizing operational data of the project to date, due at quarterly intervals

throughout the project's duration.

- Task 5: Provide a final report in a format acceptable to the project manager.

Any individual scope of work and deliverables will be developed for any approved project.

B. Conditions and Additional Requirements:

- The contractor is required to work closely with the Department project manager in finalizing the work plan at various stages of the project. Pursuant to this condition, the contractor shall travel to meet with the Department project manager after initiating the contract. Such meetings will take place at a location selected by the Department.

- The proposed project shall be organized so that continued operation will take place following successful completion of the project.

- The project will not be considered complete until the Department receives a completed final report in a form acceptable to the Department project manager.

- The anticipated project contract period should not exceed two years.

C. Necessary Qualifications and Contractor Responsibilities:

- The contractor should have project staff that a) are thoroughly familiar with the necessary operational parameters for the various aspects of the project's operation; b) shall have the capability to conduct tests described in the scope of work, either in-house or in conjunction with a testing service; c) shall be able to analyze data to derive meaningful insight and provide accurate reports for the project. The applicant must document the level of prior experience with the type of system, technology, or process to be demonstrated.

- The proposal must indicate the responsibilities and specific tasks to be assigned to each staff person and where each staff person will be physically located when performing his or her assigned tasks. Personnel assigned to this project will not be reassigned by the contractor with the express consent of the Department.

- In the event a contractor proposes to subcontract certain project tasks, the primary contractor will be required to have a significant involvement in the project and to assume responsibility for all work specified in its proposal, whether performed directly by its own personnel or those of a subcontractor.

D. Time Schedule:

- The applicant should include in the proposal a time schedule showing expected completion dates of the various tasks, submission of progress reports, and date of final report. A maximum of two years will be allowed for the total project time schedule (in an effort to cover two construction seasons). Potential contractors are encouraged to submit a proposal which can address the objectives of this RFP within the projected two year time frame, or less.

VI. Budget

The Department has appropriated a maximum of $750,000 for this RFP. For those facilities meeting the criteria outlined in this RFP, the Department will fund those selected projects in the form of grants or low-interest loans to not-for-profit and for-profit enterprises. However, under no circumstances will an applicant receive both a grant and a loan. In other words, an applicant may apply for a grant and a loan (on the same or separate project), but will not be awarded both. Also, the Department will not provide more than fifty percent of the total project costs. It is the Department's intent that the grant monies be used for the purchase of equipment, or for additional testing and/or monitoring required beyond normal operations to insure environmental compliance and end-market requirements. Loans shall be used specifically for equipment purchases. All costs must be documented by invoice or other

verifiable billing. In-kind services are note eligible for funding, but may be used as the matching requirement or not more than twenty percent of the total project cost. The proposal must contain a detailed budget that estimates the cost of the project by task and by expenditure category (personal services, equipment, indirect costs, etc.).

Grant and loan funds will be disbursed on the following schedules:

- Grants:
  1. Seventy percent of the grant funds will be dispensed upon the Department's receipt of purchase invoices.

  2. Twenty percent of the grant monies will be issued upon certification by the project manager that installation of equipment is completed and equipment is operational.

  3. Ten percent of the grant funds will be retained until all invoices have been verified and the final report is received and accepted by the project manager.

- Loans:
  1. Up to ninety percent of the loan amount will be issued upon the contractor providing the Department with appropriate invoices for the expenditures.

  2. The remaining ten percent of the loan funds will be dispensed upon certification by the project manager of the installation and operational status of equipment purchased and all invoices have been verified.

VII. Pre-Proposal Submission:

Applicants must first submit a pre-proposal letter, providing an overview of what the project will entail. The pre-proposal letter will allow initial screening of projects and increase the opportunity for applicants to submit a proposal that best meets the goals of the Department. The information contained in the pre-proposal letter should include:

- purpose and description of project,
- indicate whether request is a grant or loan,
- itemized statement of total project cost,
- estimated amount of funding requested from the Department, applicants contribution towards the project, and other sources of funding,
- time frame for proposed project,
- current financial statements *and* a pro forma statement of income for the project,
- include waste quantities affected, waste source, geographic area served, current disposal practice, and
- pertinent experience of applicant.

All pre-proposal letters must be submitted no later than 5:00 p.m. on October 30, 1992. From examination of the pre-proposal letters, the Department will select the prospective projects that best exhibit the potential for meeting the program objectives. Once notified, a detailed proposal must be submitted.

VIII. Department's Notification of Pre-Propsal Selections:

The Department will notify applicants of the pre-proposal selections by December 15, 1992. The potential applicant will then need to submit a detailed proposal, as outlined below.

IX. Proposal Submission:

Applicants selected to submit proposals are encouraged to develop a workplan that addresses the generalized tasks outlined previously. In addition to an explanation of the proposed project, the proposal should include:

- a cost breakdown/budget and time frame for each task,
- a list of individuals or subcontractors who will perform work on each task,
- personnel qualifications, and
- a statement that no conflict of interest will result the Department funding the project.

Guidelines for a standardized application format are provided in APPENDIX I and the required budget forms are included in APPENDIX II. This should be followed as closely as possible by the applicant. The application and budget must be accompanied with the proposal. The application should include the following:

- must be accompanied by documentation of host community support,
- must be accompanied by written agreements ensuring steady supplies of construction/demolition debris for at least the duration of the project.

All reviews of any proposal submitted under this RFP will be contingent upon receipt of all materials requested in the "Application for Technologies and Practices Demonstration Program Funding". Final acceptance of proposals and disbursement of funds for any proposed project under this RFP is strictly contingent upon the applicant producing all necessary permits and regulatory and governmental approvals. All proposals must be postmarked no later than January 29, 1993.

All prospective applicants will be notified of project acceptance or rejection by March 15, 1993. At that time, it will take approximately sixty (60) days for a contract agreement to be completed prior to project start-up. ANY EXPENSES INCURRED PRIOR TO CONTRACT EXECUTION ARE INELIGIBLE FOR DEPARTMENT FUNDING.

X. Submission of Pre-Proposals and Proposals

Please provide one original proposal and three copies. Price and terms of the proposal as stated must be valid for the length of the project. Those proposals without the required project work plan, budget, time schedule, certifications, and qualifications will be immediately disqualified.

Please submit written proposals to:

Director
Office of Recycling and Waste Reduction
Illinois Dept of Energy and Natural Resources
325 West Adams Room 300
Springfield, IL 62704-1892

Inquiries about the RFP may be addressed to:

Ms. Angela D. Adkins
Project Manager
Office of Recycling and Waste Reduction
Illinois Dept of Energy and Natural Resources
325 West Adams Room 300
Springfield, IL 62704-1892
Telephone: (217) 524-5460

References

Apotheker, S. Managing Construction and Demolition Materials, *Resource Recycling* XI(8):50, August 1992.

Branca, S. Pennsylvania Turnpike Commision, Harrisburg, personal communication, October 1992.

Brennan, D. Cozzi Iron and Metal, Chicago, Illinois, personal communication, October 1992.

Brown, K. House Bill 2020 Report (letter to Illinois General Assembly), Illinois Department of Transportation - Materials and Physical Research, Springfield, August 4, 1992.

CERL (U.S. Army Construction Engineering and Research Laboratory), Development of Predictive Criteria For Demolition and Construction Solid Waste Management, Champaign, Illinois, Technical Report N-15, October 1976.

CT Donovan and Associates, Inc. Recycling Construction and Demolition Waste in Vermont, Vermont Agency of Natural Resources, Montpelier, December 1990.

Capo, J. and J. Lashmett Regalo Company, Chicago, Illinois, personal interview, July 1992.

Clements, S. Cornerstone Material Recovery, McHenry, Illinois, personal interview, September 1992.

Curro, JP An Inside View of C&D Recycling, *BioCycle* 32(3):31, March 1991.

Curro, JP Camp Dresser & McKee, Inc., Boston, Massachusetts, personal communication, September 1992.

Cyclean Times, TxDOT interstate reconstruction uses 90% RAP for surface course, Cyclean, Inc., Round Rock, Texas, Spring 1992.

Davidson, B. Turner Construction Company, Chicago, Illinois, personal interview, August 1992.

Donovan, CT Construction and Demolition Waste Processing: New Solutions to an Old Problem, *Resource Recycling* X(8):146, August 1991.

DuPage County, DuPage County Solid Waste Management Plan, Volume 2, Wheaton, Illinois 1990.

Ellinger, MC Ptarmigan Machinery Co., San Anselmo, California, personal communication, October 1992.

ENR (Illinois Department of Energy and Natural Resources- Evaluation Unit), Results of the Construction/Demolition Business Survey, Springfield, Illinois, 6 March 1992.

ENR (Illinois Department of Energy and Natural Resources, Office of Recycling and Waste Reduction) Wood Waste Disposal in Illinois, Springfield, ILENR/RR-91/04, March 1991.

Epps, JA, DN Little, RJ Holmgreen, and RL Terrel, Guidelines for Recycling Pavement Materials, Transportation Research Board, National Cooperative Highway Reasearch Program, Washington, DC, Report 224, September 1980.

Exceltech, Inc. Waste Audit Study - Building Construction Industry, California Department of Health Services-Alternative Technology Division, Sacramento, May 1990.

Fisher, HF McHenry County Department of Solid Waste Management, Woodstock, Illinois, personal interview, October 1992.

GASA (Graef, Anhalt, Schloemer, and Associates, Inc.) McHenry County Solid Waste Management Plan 1990-2010, Woodstock, Illinois, May 1991.

General Kinematics Corporation, Barrington, Illinois, Bulletin 291, 1991.

Ginter, C. Roofing Debris Initiatives, Indiana Roofing Contractors Association, Fort Wayne, November 20, 1991.

Gitlin, L. Integrating Wood into the Recycling Loop, *Recycling Today* 2(6):58, June 1991.

Hagen, J. ReClaim, Inc., Tampa, Florida, personal communication, November 1992.

IEPA (Illinois Environmental Protectional Agency), Information Statement on the Removal of Lead-Based Paint from Exterior Surfaces of Structures, Springfield, August 1991.

Jesitus, J. Construction & Demolition Recycling Efforts Building, *MSW Management* 2(7):36, November/December 1992.

KCDD (Kane County Development Department) Kane County Solid Waste Management Plan Volume II Geneva, Illinois, October 1990.

Kalin, Z. Canada Targets C&D Debris, *BioCycle* 32(1):35, January 1991.

Klein, O. Illinois EPA Division of Air Pollution, Springfield, personal communication, December 1992.

Kolko, L. Speedway Wrecking Company, Chicago, Illinois. personal communication, October 1992.

Kreijger, PC NATO Advanced Research Institute on Adhesion Problems in the Recycling of Concrete. conference proceedings. p 325. Saint-Rémy-les-Chevreuse. France, 25-28 November 1980.

Kummer, K, B Swisher, and H Kaczmarski, Preservation and Conservation Association (PACA), Champaign, Illinois, personal interview, August 1992.

McLagan, A. Salvage One, Chicago, Illinois, personal interview, September 1992.

Millspaugh, MP Utilizing Construction/Demolition Debris and other Waste Materials for Landfill Closure Purposes, Dunn Geoscience Engineering Company, Albany, New York, September, 1992.

Moore, B. Illinois EPA Air Division, Springfield, personal communication, November 1992.

Musick, M. Recycling Gypsum From C&D Debris, *BioCycle* 33(3):34, March 1992.

Naber T. Asphalt Recycling Goes High-Tech, *Waste Alternatives* 2(3):72, September 1989.

PCB (Illinois Pollution Control Board), Illinois Administrative Code, Title 35, Subtitle G, Chapter I; Illinois Environmental Protection Agency, Springfield, April 1992.

PE (Patrick Engineering) Kankakee County Solid Waste Needs Assessment Kankakee County Regional Planning Commission, Kankakee, Illinois November 1991.

Piano, D. Kimmins Recycling, Clearwater, Florida, personal communication, December 1992.

REIC (REIC Consulting, Renova Consultants, RIS), Making a Molehill Out of a Mountain, Toronto Home Builders' Association, North York, Ontario, 1990.

RTI (Reclamation Technologies NJ, Inc.) Gypsum Recycling Plants (company brochure), North Plainfield, New Jersey, 1992.

Rathje, WL Name It and Claim It, *Garbage* IV(4):20, July/August 1992.

Rochwarg, J. Wood Recycling, Inc., Boston, Massachusetts, personal communication, October 1992.

Rogich, DG Trends in Material Use: Implications for Sustainable Development unpublished paper, U.S. Bureau of Mines, Division of Mineral commodities, April 1992.

St. John, J. Monroe County Solid Waste Management District, Bloomington, Indiana, personal communication, November 1992.

Shehan, E. P.K. Demars Construction Company, Champaign, Illinois, personal interview, August 1992.

Steiner, VM Roofing Recycling: What Lies Ahead for the Industry?, *Professional Roofing* p 28, October 1991.

Stewart, R. Illinois Environmental Protection Agency - Land Pollution Control, Springfield, personal communication, November 1992.

Stow, R. Amoco-Public Relations, Chicago, Illinois, personal communication, September 1992.

USEPA (United State Environmental Protection Agency - Municipal and Industrial Solid Waste Division) Characterization of Municipal Solid Waste in the United States: 1992 Update EPA/530-R-92-019, NTIS#PB92-207 166, July 1992.

Vollmer, R. Wheaton Asphalt Company, Wheaton, Illinois, personal interview, October 1992.

The Wastebusters News, Staten Island, New York, June/July 1992.

White, K. Two Gypsum Wallboard Recycling Plants to Open in New Jersey *Recycling Times* 4(14):12, July 14, 1992.

Wilson, DG Demolition Wastes: Data Collection and Separation Studies, Massachusetts Institute of Technology, NTIS #PB80-179294, December 1979.

Woods, R. C&D Debris: A Crisis is Building, *Waste Age* 23(1):26, January 1992.

Additional Information Sources

API (American Paper Institute) PaperMatcher, 2nd Edition, Washington, D.C., July 1992.

Ahmed, I. Use of Waste Materials in Highway Construction Purdue University, West Lafayette, Indiana, FHWA/IN/JHRP-91/3, May 1991.

Austin, T. Building Green, *Civil Engineering* p 52, August 1991

BioCycle, Recycling Debris From Construction Projects, 33(8):62, August 1992.

BioCycle, Tearing Down For Reuse, 33(5):53, May 1992.

Burke, TT, MD Cohen, and CF Scholer Synthesis Study of the Use of Concrete Recycled from Pavements and Building Rubble in the Indiana Highway System, Purdue University, West Lafayette, Indiana, FHWA/IN/JHRP-92/15, May 1992.

ENR (Illinois Department of Energy and Natural Resources, Office of Recycling and Waste Reduction), Directory of Illinois Recycling Centers - Chicago Edition, Springfield, ILENR/RR-87/03, May 1991.

ENR (Illinois Department of Energy and Natural Resources, Office of Recycling and Waste Reduction), Directory of Illinois Recycling Centers - Downstate Edition, Springfield ILENR/RR-87/03, May 1991.

ENR (Illinois Department of Energy and Natural Resources, Office of Recycling and Waste Reduction) Illinois Recycled Materials Market Directory, Springfield, ILENR/RR-87/01, October 1991.

ENR (Engineering News Record), Illinois Recycles Pavement, July 22, 1991.

Goddard, J. and D. Palermini Managing a Resourceful Renovation, *Resource Recycling* XI(8):86, August 1992.

Goldstein, N. Demolition Contractor Becomes Recycler *BioCycle* 33(1):76, January 1992.

Greenlaw, B. Cutting Job-Site Waste, *Fine Homebuilding* p 104 September 1992.

Kasai, Y. Demolition and Reuse of Concrete and Masonry, Volume Two: Reuse of Demolition Waste, RILEM symposium proceedings, Tokyo, Japan, November 7-11, 1988.

Kibert, CJ Guidelines for Contractors in Dealing with Environmental Issues, University of Florida, Gainesville, April 1, 1992.

McManus, F. Contractor a Special Waste Recycler, *Resource Recovery Report* May 1990.

Montanari, R, "This Old-New House", *Recycling Today* 2(11):58, November 1991.

Naber, T. From Rubble to Reuse, *Waste Alternatives* 2(3):64, September 1989.

Piasecki, BW, J. Ray, and P. Golden, American Hazard Control Group Managing Construction & Demolition Debris: Trends, Problems, and Answers General Building Contractors of New York State, Albany, New York, March 1990.

Salimando, J. Recycler Risks Diversity and Succeeds, *Waste Age* 21(5):79, May 1990.

Setzer, SW, T Cosgrove, and DK Rubin Dumping Debris Gets Difficult, *ENR (Engineering News Record)* p 14, January 25, 1990.

Spencer, R. Recycling Opportunities for Demolition Debris, *BioCycle* 30(11):42, November 1989.

Spencer, R. Taking Control of C&D Debris, *BioCycle* 32(7):65, July 1991.