

THE SEARCH FOR THE GOOD IN GARBAGE: A LOOK AT WICHITA'S OWN
PYROLYSIS PILOT PLANT AND THE HISTORY OF THE RESOURCE RECOVERY
MOVEMENT IN THE UNITED STATES FROM THE GILDED AGE TO THE 1990s

A Thesis by

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Bachelor of Arts, Wichita State University, 2002

Submitted to the Department of History
and the faculty of the Graduate School of
Wichita State University
in partial fulfillment of
the requirements for the degree of
Master of Arts

December 2006

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I have examined the final copy of this thesis for form and content, and recommend that it be accepted in partial fulfillment of the requirement for the degree of Master of Arts, with a major in History.

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DEDICATION

To the Fam, for always encouraging me

And if you find her poor, Ithaca has not mocked you.
As wise as you have become, so filled with experience,
you will have understood what these Ithacas signify.
-Constantine Cavafy

ACKNOWLEDGMENTS

I would like to thank Bill Compton, who, whether he knows it or not, is a success and an inspiration. I would like to thank Dr. George Dehner for all of his help, for making me learn and write about things beyond what I already thought I knew, for mailing me my revisions, and for always telling me to "keep writing!" Thanks to Dr. Craig Miner for being on my committee and being a great teacher. Thanks also to Dr. Silvia Carruthers for kindly serving on my committee.

I would also like to thank the ladies at WSU Interlibrary Loan for so speedily getting me all of the millions of books I've asked for throughout my academic career. Thanks to Susan Erlenwein and Melody Miller for their informative and enjoyable interviews. Thanks to Dr. David Eichhorn for helping me with the technical portions of the paper (any inaccuracies are, of course, due to my own lack of understanding). Thanks to Betty Cattrell at the Haysville Community Library for access to her files on Bill. Thanks to the *Haysville Times* and Paul Rhodes, who both led me to Bill.

Thanks to my mom and dad for putting up with "all of the papers!" Thanks to the WSU History faculty, who almost always made history fun. Thanks to my history friends (especially the Society of Leopold, AKA the Society of Guiteau, and the Angie Gumm Distinguished Scholars (let's find out the truth about Blackhawk!)), who always made history fun. And thanks to all of my other friends, as well, for being patient while I got this thesis done!

ABSTRACT

Is there good in garbage? This thesis assumes that while it might not always be economical, safe or immediately worthwhile to get to it, that there is good in garbage. People in the United States have been trying—sometimes without much notice, sometimes with plenty—for over one-hundred years to extract that good, using scientific means. Costs, bureaucracy, failures, safety, perceptions and politics have all been part of American's attitudes towards resource recovery. This paper explores the history of the Waste to Energy movement in the United States from the Gilded Age until resource recovery was eclipsed by the popularity of recycling. It also looks at the unique trash situation in Wichita, Kansas, and the efforts of local inventor Bill Compton to build a pyrolysis pilot plant and to persuade the city to consider pyrolysis as a viable alternative to a new landfill.

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CHAPTER 1

INTRODUCTION

In December 2006, Congress overwhelmingly voted to end a 25-year-old ban on offshore oil drilling in the Gulf of Mexico. The 8.3 million acres of shoreline the bill made available are expected to contain about 1.26 billion barrels of crude oil and 5.8 trillion cubic feet of natural gas. The ban was originally passed because of fear that drilling would deface the nation's shorelines and put beach and recreation areas in jeopardy if a spill occurred. With so many constituents angry over high gas prices, a previously controversial issue like offshore drilling has become increasingly mainstream for politicians. When faced with energy problems in the 1970s, government officials at the time also considered new means of obtaining energy and fuel: solar, water, wind, and nuclear power were all considered as possible sources of energy.¹ Some politicians and businesses, however, noticed that what the country lacked in energy it was more than making up for in garbage. They believed that using an excess of one material to make up for the deficiency of another was an obvious solution to both problems and that technology was the way to achieve that solution.

The Environmental Protection Agency (EPA) estimates that Americans in the new millennium produce about 235 million tons of Municipal Solid Waste (MSW) a year, or 4.5 pounds of waste per person per day. This number is much higher than in preceding decades but still quite a bit lower than what many prognosticators had expected. In the 1960s, the estimated trash generation was 2.7 pounds a day per person or 88 million tons for the country annually. In

¹ Chris Baltimore, "Congress Approves Offshore Drilling Bill," Reuters, 9 December 2006, available from http://today.reuters.com/news/articlenews.aspx?type=businessNews&storyID=2006-12-09T163659Z_01_MOL959333_RTRUKOC_0_US-CONGRESS-OFFSHORE-DRILLING.xml; accessed 9 December 2006; Energy, Research and Development Administration, National Plan for Energy Research, Development and Demonstration, (Washington, D.C.: Government Printing Office, June 1977), 41-42, WSU Coal Gasification Plant Special Collection Box no.1 FF. 12.

the 1970s, the per capita trash generation climbed to an estimated 3.3 pounds a day or 121 million tons for the country in a year. Some "garbologists" maintain that because of the diversity of the United States, the underestimated trade-off of old technology for new (i.e. yes, now we have more waste from cars, but we have less waste from horse carcasses), the variety of disposal methods and the tendency of trash companies to exaggerate their haul for higher profits, that there is no accurate way to know how much waste Americans produce or predict how much they will produce. They do agree, though, that the amount of trash produced has grown with the population. Aware of that growth and possessing a new environmental ethic and an increasingly littered landscape, the media, public and government of the 1960s and 1970s all were interested in fixing the "garbage problem."²

As increasingly affluent Americans toured their country with new cars in the 1960s, the littered highways and eight million junked autos laying in salvage yards along the interstate system became an upsetting blight on what would have been beautiful landscape. The public and the government must have blamed a select group or at least "the other fellow" for that pervasive blight. Although the citizens they represented were the ones who had left their old cars to be junked and who had thrown the litter on the roads, the federal government decided to get involved, as people were not self-regulating their trash disposal. In 1965, Congress passed two pieces of legislation that gave the federal government control over waste: the Highway Beautification Act, which sought to deal with the aesthetic problems of trash, and the Solid Waste Disposal Act, an amendment to the Clean Air Act of 1963, which dealt with the health, safety and planning sides of MSW. Before the Solid Waste Disposal Act, only two state

² See chapter two for higher garbage estimates. Environmental Protection Agency, "2003 Total Waste Generation – 236 Million Tons (Before Recycling)," available from <http://www.epa.gov/msw/facts-text.htm#chart2>; Internet; accessed 5 July 2006; William L. Rathje and Cullen Murphy, Rubbish! The Archaeology of Garbage (New York: Harper Collins Publishers, 1992), 45-48.

governments had solid waste management plans, and over half of urban areas—defined as having a population of 2,500 or more—in the U.S. claimed no MSW disposal program.³

Whether or not it was handled civically, trash, of course, was always addressed in some way. According to Dr. William L. Rathje, founder of the University of Arizona's Garbage Project, and Cullen Murphy "there are no ways of dealing with garbage that haven't been familiar, in essence, for thousands of years...." Rathje says there are basically only four methods of trash disposal: dumping, burning, turning it into something useful, and lessening the volume.⁴ Throughout human history, dumping—in its various forms—has been the favored means of disposal, and for cities with MSW programs, the sanitary landfill was the form of choice by the 1950s. Extraordinary mounds of garbage in some cities, however, as well as the new regulations and environmental ethos of the late 1960s, lessened the esteem of the sanitary landfill, leaving many to believe that the dumping method was no longer acceptable, or at least adequate, for all garbage. All four types of trash disposal were re-investigated in the 1960s and 1970s, but the focus of this paper is the idea of turning trash into something useful.

Except for its lack of contracted hauling, the history of trash in Wichita, Kansas runs pretty much parallel to the trash trends in the rest of the United States. Over sixty dumps existed in Wichita during the 20th century. The city operated a main sanitary landfill, starting with the Chapin Landfill in 1954, but numerous smaller and loosely regulated MSW dumps continued to exist through the mid-1970s. Just like in the rest of the country, people in Wichita started looking at alternatives to local dumps as regulations increased and the population and the amount

³ Carl A. Zimring, Cash for Your Trash: Scrap Recycling in America, (New Brunswick, NJ: Rutgers University Press, 2006), 124; Louis Bloomberg and Robert Gottlieb, War on Waste: Can America Win its Battle with Garbage? (Washington, D.C.: Island Press, 1989), 62.

⁴ Rathje and Murphy, Rubbish!, 33, 47, 48.

of trash grew.⁵ Some Wichitans, like environmentalist Margaret Miller, worked to implement recycling programs in the city and surrounding Sedgwick County.

Another Wichitan, Bill Compton, believed technology not recycling would solve the garbage problem. Compton, a World War II fighter pilot, believed that the solution could be found in chemistry fundamentals he had learned at his Redfield, South Dakota, high school. The physics and engineering education he had gotten while on the G.I. Bill at Emporia State University in Kansas, led him to believe he could build a way to apply that solution himself. The EPA and the Department of Energy (DOE) were also looking into technological ways to get rid of trash in a useful manner. Unbeknownst to Compton, in the same decade, both he and the government agencies became interested in pursuing the same process of resource recovery from trash: pyrolysis.

Like trash disposal itself, the process of pyrolysis is ancient, going back, "at least as far as the Romans who used a form of pyrolysis in their production of iron."⁶ Despite its antiquity, pyrolysis has not been the subject of any histories or much popular discussion. It is barely, and more often, not at all, mentioned in the few books about the history of waste. Studies of waste-to-energy in other fields also treat pyrolysis fleetingly and mainly focus on incineration. If history is written by the winners, or even the survivors, this oversight is understandable: up to the point of this writing at least, pyrolysis in the United States is clearly not the former and barely qualifies as the latter.

Technically speaking, pyrolysis is "heating material in a controlled atmosphere in which there is not enough oxygen to initiate flame combustion." More specifically, it is a "thermal

⁵ Jean Hays, "People Used to Dump Trash Everywhere and Anywhere," *Wichita Eagle* (8 July 1997): 1A, accessed from NewsBank.

⁶ RW Beck and Associates, "Review of Potential for Pyrolysis/Gasification of Municipal Solid Waste: Thurston County, Washington" (Seattle, WA: Beck and Associates, 1993), 2.

degradation of carbonaceous materials at temperatures between 400 and 800 (degrees) C either in the complete absence of oxygen, or with such a limited supply that gasification does not occur to any appreciable extent." ⁷ What happens is similar to what happens in cooking. Materials (in this case, municipal solid waste) are heated until they are broken down into different substances (in this case, fuels). Destructive distillation, which is used in coking coal and which was (and sometimes still is) used to make tar, or pitch, is a kind of pyrolysis. As pure pyrolysis does not really use direct fire, pyrolysis is somewhat of a misnomer. "*Pyros*" is the Greek word for fire, but because pyrolysis uses heat, or "*thermos*" as the Greeks would say, to create change, "*thermolysis*" would have been a better word choice.⁸ Some experts do use the more accurate term, but the more popular "pyrolysis" will be used in this paper.

For MSW to undergo pyrolysis, it must first go through a giant shredder, which has to be able to handle large pieces of debris. After shredding, all of the debris is separated into organic and inorganic groups. Organic materials are mostly made of carbon and hydrogen and are thus able to be broken down into other organic products; inorganic materials are not able to melt down to become organic products. The kind of separator used to sort the materials depends on the system—there are a large variety of pyrolysis plants; as of the year 2000, there were 110 plants in 22 different countries, created by 41 different companies—but generally the separator is magnetic and may involve a kind of flotation system. The inorganic material is sorted to be recycled. The organic material continues through the pyrolysis plant, possibly undergoing more

⁷ This range is about 750-1500 degrees Fahrenheit. C. Heermann, K.J. Whiting, and F.J. Schwager, Pyrolysis and Gasification of Waste: A Worldwide Technology and Business Review (Gloucestershire, England: Juniper Consultancy Services Ltd., 2000), 1:16.

⁸ Ibid.

steps like drying or another shredding, depending upon the system. The organic material is then heated in a reactor, which generates the products.⁹

The products of pyrolysis vary depending on the temperature and the way the heat is employed in the particular process, but unless the intention is to eliminate one of the elements by using excessive heat, the end result will be a liquid, solid and a gas: that is, oil, carbon and combustible gas (i.e. methane, ethylene and acetylene). The fuels produced can be transported to other locations or used right at the plant. Pyrolysis is often viewed by lay people as a type of incineration, but both the method and the products of the process make this a faulty comparison. Incineration, of course, involves the burning rather than the heating of waste. Additionally, ash and steam, which can also be used to create energy, are generally the byproducts of incineration. Refuse Derived Fuel (RDF) incinerators can produce fuels, because they also separate organic from inorganic material, but that material is generally turned into fluff or pellets that are used as fuel. Gasification is a more favorable and accurate comparison to pure pyrolysis, as it also uses heat instead of fire to convert waste, but gasified waste is fed oxygen in order for the waste to produce strictly gas, mainly carbon monoxide and carbon dioxide.¹⁰

The association with incineration has been one hindrance to the public support of pyrolysis. Since the late 1980s there has been a general anti-incineration attitude in the United States because of fear of dioxin emissions; however, interest in incineration techniques did increase by the end of the 1990s. In 2000, there were just three pyrolysis plants in the U.S. There were thirteen gasification plants, however, and 17% percent of solid waste across the country was being converted to energy. The fact that gasification and other waste-to-energy (WTE) methods have bounced back much faster than pyrolysis, can likely be blamed on several

⁹ Ibid., 1:10; Mort LaBreque, "Garbage-Refuse or Resource?," *Popular Science* 210, no. 6 (June 1977): 96.

early failures in the industry, which are at least known to those in the industry. In the early 1970s, after the Clean Air Act had seriously hampered traditional incineration efforts, the EPA gave grants to several resource recovery projects. Pyrolysis received considerable attention, and two pyrolysis projects were funded as demonstration plants. The EPA hoped these projects would become models for other communities considering resource recovery. All WTE plans "achieved a fair degree of popular support" and a good deal of governmental enthusiasm during this time.¹¹ Even the most enthusiastic politicians, who saw the potential of WTE as "enormous" and believed that in the near future, 2 to 3 percent of energy could come from waste, said that too much excitement without success would be detrimental to future projects.¹² Massachusetts Representative Robert Drinan cautioned that:

But as a general comment, it must be stated that there is a potential for what can be referred to as the "White Elephant Syndrome," in which a number of cities build costly resource recovery facilities which do not work in a dependable manner. This has occurred to some extent already, but if it were to become more prevalent, it could set the technology back and hinder the further development of resource recovery in a major way.¹³

A project which was already blundering and to which the Congressman was probably referring was the Baltimore Pyrolysis Plant. The plant, one of the EPA demonstration plants, ended up costing \$26 million and ultimately shutting down without ever coming close to its resource recovery promise. Because of the Baltimore plant and two other fairly large pyrolysis plants, which were also expensive failures, those considering MSW disposal options in the 1980s

¹⁰ "Pyrolysis-A True Alternative for Solid Waste Disposal," *The American City and County* September 1977, 81; Heermann, *Pyrolysis and Gasification of Waste*, 1:16, 1:17.

¹¹ Heermann, *Pyrolysis and Gasification of Waste*, 1:12; Randall Curlee et al., *Waste-to-Energy in the United States: A Social and Economic Assessment* (Westport, CN: Quorum Books, 1994), 38.

¹² House Committee on Science and Technology, Subcommittee on the Environment and the Atmosphere, *Solid Waste Management and Resource Recovery Hearings*, 94th Cong., 2nd Sess., 1976, 3.

¹³ *Ibid.*

and 1990s did not see pyrolysis "as a new technology—indeed industry participants commented that it was an 'old' and 'troublesome' method of disposing of waste."¹⁴

After the federal government had spent millions and lost its money and interest in large scale resource recovery projects, Bill Compton was trying to raise thousands to prove that a large scale resource recovery—namely pyrolysis—project was the only long-term and profitable solution to the growing garbage issue. For nearly 35 years, Compton has worked to solve Sedgwick County's trash problems by promoting pyrolysis. The engineer used the help of his friends and any resources he could find to build his own demonstration pyrolysis plant, which he wanted to use to educate the public about the technique. Those who saw the plant were impressed with the process and were usually surprised that it could produce useful products. Local politicians, however, who were at various times during Compton's crusade looking for a new place to put the county's trash, considered the idea in varying degrees but usually referred Compton to the failure of the Baltimore Plant.

The lack of support that Compton gained should not have been a surprise. The people of the United States have enough land and resources that they have the luxury of dealing with trash only when they have to or when they feel like it, and it is not often that most people feel like dealing with trash. It is true, of course, that faith and progress in technology are American hallmarks. WTE, however, requires a faith in massive machinery. Americans have been more fickle in this faith, adopting it only when it was perceived as progressive, necessary, cheap, or all of the above. The eco-ethos that has been growing in the country since the 1960s argues that personal concern about the environment is progressive. Additionally, WTE is not considered cheap, making it too problematic for Americans, for whom energy appeared to get cheaper and more accessible during every decade of the twentieth century except the war years and the 1970s.

¹⁴ Heermann, Pyrolysis and Gasification of Waste, 1:164.

Usually it is in highly populated areas that resource recovery has been deemed desirable, primarily because it eliminates massive amounts of waste not because of the energy it produces.

Energy has not been as cheap in the early twenty-first century, though, and while the current recycling and composting push has taken the national garbage situation out of most headlines, energy is as big of an issue as ever. Energy conservation from wind, hybrid cars and turkey wastes have all made headlines as oil prices have increased. Now with the lifting of the offshore drilling ban in the Gulf of Mexico, it is possible that environmentalists, who have been fearful of possible emissions, will take another look at scrubber technologies, which have been estimated to eliminate more than 99% of WTE pollutants. This evolving ideology can be seen in Harvey County, Kansas. The county, which has been hailed by Kansas environmentalists for its mandatory recycling program, announced in September of 2006, that it was looking into a WTE facility. Recycling and WTE may seem like natural allies, but in this country they have historically been foes. Another agent of change could come from politicians formerly reluctant to consider the costlier up-front prices of long-term solutions like pyrolysis, coming to view WTE as a lesser political evil locally than having to continuously site new waste disposal sites and nationally than energy solutions like drilling formerly protected areas. Additionally, the term "integrated management" has become a buzzword in many municipalities. In the future it is more likely that, if employed, pyrolysis plants will handle only a certain type of waste instead of the complete array of items included in MSW. The idea is that some kinds of wastes are better suited for certain types of disposal than others. This would be a happy compromise for promoters, who hope that having a more homogenous and steady waste stream will help alleviate

some of the problems that early plants experienced.¹⁵ It is also preferable for environmentalists who oppose the energy used for the destruction of one kind of product to create a new product.

In the 1980s and 1990s, when Bill Compton was promoting his pyrolysis plant, energy prices were not high, and, although it came close to becoming one, Wichita had too many options for its lack of landfill in the mid-1990s to be considered a “true emergency.” Despite his dedication and efforts, Compton had little chance of succeeding in promoting his local pyrolysis plans. The history of trying to make trash into something useful is a long and varied one, undeniably impacted by more than just the nuts and bolts of a method. The political and economic situations are just as important to the success of a waste disposal plan as are the mechanics.

Compton, like many before him, was sure his technique would work if he were given the right opportunity. Others, with equal certitude, did have the opportunity and failed. Their efforts still had worth, though, and not just because engineers and cities can learn from their mistakes. These innovators were trying to prove that there was good in what most people thought was a dreg of society. As Rathje and Murphy write:

Though it is often forgotten amid the well-publicized worries about our present situation, taking the long view generally brings home the fact that ever since governments began facing up to their responsibilities, the story of the garbage problem in the industrial world has been one of steady amelioration, of bad giving way to less bad and eventually to not quite so bad. To be able to complain about the garbage problems that persist-and, indeed to harbor the hope, even the expectation, that they will one day, somehow, be addressed, though that day may not be tomorrow-is yet one more luxury that Americans are unaware they enjoy.¹⁶

¹⁵ Kathryn Hansen et al., "Turning Trash into Energy," *GeoTimes* 51, no. 2, (February 2006): 18-24; Heermann, *Pyrolysis and Gasification of Waste*, 1:164.

¹⁶ Rathje and Murphy, *Rubbish!*, 42

Like other garbage gurus, while Bill Compton was lamenting the mounting heaps of garbage, he was also saying that things did not have to be so bad and that human ingenuity could solve our problems and turn the bad into the good, useful and helpful. Others in Wichita and Sedgwick Country have worked hard on solving the local garbage problem, but Compton was the only one who built the area its own resource recovery plant, a technology that had only been employed in other places with government and/or corporate financing and support, neither of which Compton had. In a way, Bill Compton brought a little glamour to Wichita's garbage.

Finally, American waste needs to be kept in perspective. While the amount of trash in this country has been growing, and there is no question that Americans have historically and currently use and throw away more resources than other countries (although other countries are catching up), that is not solely indicative of wastefulness. Many people, like historian Susan Strasser, believe that America's waste is a type of conspicuous consumption, in which, "discarding things is taken to be a kind of freedom."¹⁷ These people believe that the economy is based on a planned obsolescence: that the producers have planned for people to throw away their products so that they will have to buy replacements. Rathje does not agree that this is the sole reason for our "wastes" and cites the example of the first surgeon to use sterile gloves in 1893, "unwittingly setting in motion a chain of events that would turn American hospitals into vast dispensaries of disposable rubber and plastic objects-the goal of course, was not to create more garbage." He further states, "In the United States, a garbage problem is in some respects the price we pay for having learned to do some important things very well."¹⁸

While few people would probably truly like to give up the material progress that has been achieved in this country, many are not comfortable with the by-products of affluence. If, as

¹⁷ Susan Strasser. Waste and Want: A Social History of Trash (New York: Henry Holt and Company, 2000), 16.

Rathje says, garbage represents the material portion of our spheres of mental and material reality, that garbage "represents physical fact, not mythology," it make sense that well-meaning Americans would be concerned about trash, even if in reality they do not change their behavior.¹⁹ Having people scavenge through the garbage and reclaim what other people have discarded was an effective means of recycling for much of history and is used in developing countries today, but the idea of the poor and children rummaging through unsafe garbage dumps is not really "compatible with other desirable social ends-economic development, modernization, and human dignity, for example."²⁰

Waste-to-energy programs like pyrolysis have plenty of detractors, but the effort to find a way to use what we have thrown away, and in effect reconcile our respective material and mental realities of waste and conservation, is a noble one, which should not be discarded because of trends, technical difficulties or bureaucracy. That does not, of course, mean that faith in the technology or the idea should blind anyone to the realities of the process. Like any other technology, WTE techniques have their good and bad points, and may not be able to be implemented the way their initiators hoped. It is definitely an effort worthy of study and understanding, though. This thesis is a look at Bill Compton's local efforts to bring a WTE process to the Wichita garbage situation and the national historical trends of resource recovery efforts within which his efforts belong.

¹⁸ Rathje and Murphy, Rubbish!, 40.

¹⁹ *Ibid.*, 12.

²⁰ *Ibid.*, 40.

CHAPTER 2

RESOURCE RECOVERY: THE FIRST HUNDRED YEARS

There are few spheres of activity offering such attractions or holding out such tremendous prizes to the persevering and brilliant of thought as that identified with the exploitation of wastes. The field is so vast as to be open to the endeavors of the layman as much as to the master of knowledge. While many of the questions to be answered are of severe technical significance, there are many which are equally capable of solution by the man, or woman, who has had no technical training. There are many "crown cork" problems awaiting solution, while there is equal scope and opportunity for those possessed of the powers of organization.²¹

The issue of waste disposal became a growing concern in America during the Second Industrial Revolution. Not only was the country producing more and consequently had more to throw away, but the country could throw away more, because it was producing more. People, who now worked in factories for wages, no longer had the skill or the need to turn their scraps and broken equipment into useful, valuable products. Under Frederick Winslow Taylor's "Gospel of Efficiency," time was money, and there was no point in individuals mucking around with old, worn out products. Mass-produced, new, clean and often disposable products could be had with less money than the effort of fixing the old product was worth. Waste was indeed in some ways a problem with "crown cork" solutions, where simple answers and business ingenuity combined with the growing field of chemistry to produce clever, informal, and often downright weird solutions to the waste problem. As engineering professionalized, however, and waste became more of a political, health and civic issue, the crown cork solutions also came to an end. Whereas the frugality of Germans became an ideal for waste watchers after World War I and

²¹ Frederick A. Talbot, Millions from Waste (Philadelphia: J.B. Lippincott Company, 1920), 307. The Crown Cork was the first bottle cap, which had a simple yet clever design (shaped like a crown) to keep the cap sealed tight—the same cap that we still use today. A “crown cork solution” is cheap, simple and extremely successful.

citizens salvaged their scrap in World War II, people lost their interest in saving waste in the post-World War II era. Motivated by convenience and affluence, and satisfied with the sanitary landfill, which had proliferated during the war, waste became a non-issue and the affluence it signified a kind of proud characteristic for Americans in the Cold War. In the early 1960s, however, with the emergence of the environmental movement, concern began to grow over the byproduct of America's unprecedented consumerism, and divergent solutions were sought. Fear of exhausting resources and the pending energy crisis of the winter of 1973-1974 caused Americans to once again look at waste as a resource.

Making the Most of It: Trash and the Progressives

Trash collection and disposal became an issue for the public as population growth in cities mandated that something be done with the growing piles of trash in the streets that people believed were causing diseases and sickness. Waste removal, along with clean water, good sewage systems, and properly-ventilated housing, became a major priority in cities in the last quarter of the nineteenth century. Before the rise of big business there just had not been much waste. While some may believe that Americans were wasteful with natural resources like trees and land in the early years, frugality and a conservationist mentality were the basis of American attitudes toward material goods.²²

Just as the table scraps once fed the chickens and Dad's torn trousers provided the material for Junior's new ones, so cities, too, were once systems that incorporated rag pickers and scavengers to process the detritus of others. In this respect they resembled sustainable biological ecosystems, which are in general closed, or cyclical. Waste to one part of the system acts as resources to another; the dead body and excrement of one organism nourishes its neighbors. Industrialization broke the cycle. In an industrial

²² Martin M. Melosi, Garbage in the Cities: Refuse, Reform and the Environment (Pittsburgh, PA: University of Pittsburgh Press, 2005), 22, 73; Donald W. Whisenhunt, The Environment and the American Experience: A Historian Looks at the Ecological Crisis (Port Washington, NY: National University Publications Kennikat Press, 1974), 55.

system, the flow is one-way, materials and energy are extracted from the earth and converted by labor and capital into industrial products and byproducts, which are sold, and [turned] into waste, which is returned to the ecosystem but does not nourish it.²³

Industrialization also changed people's view of trash in another way, according to historian Susan Strasser. Because more people were working in factories, skilled-labor became less common and so did people's ability to use trash. As this happened, people's "expert knowledge of materials became irrelevant; leftovers and scraps that they once might have valued became trash instead."²⁴ The old ways of collecting household waste and selling it to the *bricoler*—someone who made and peddled products from scraps he bought from others—were over. Households were no longer interested in saving waste; they were not interested in seeing it either. In 1880, about 70% of American cities provided street cleaning, and in 1914 that number was about 90%. The amount of waste produced increased as collection increased: In just four years, between 1903-1907, the amount of garbage collected in Milwaukee increased 62% (while the city only had a 12% population increase), Pittsburgh 43%, and both Cincinnati and Newark saw their collected garbage go up about 30%.²⁵ While factors such as increased population, higher consumption and better collection methods all contributed to these booms, "sanitary engineers all agreed that reliable service encouraged households to throw away more."²⁶

The trash that was picked up was initially and for a time dumped in waterways, lots, and poorer neighborhoods. In this burgeoning age of waste, disposal methods were numerous and experimental. Every city was different in the kind of trash they produced and what they were able to do with it; consequently, disposal methods had to vary from city to city, and they often

²³ Susan Strasser, Waste and Want: A Social History of Trash (New York: Henry Holt and Company, 2000), 14-15.

²⁴ *Ibid.*, 14.

²⁵ *Ibid.*, 14, 13, 124; Melosi, Garbage in the Cities, 44, 83.

²⁶ Strasser, Waste and Want, 125.

varied within the same city. Milwaukee, for instance, experimented with feeding garbage to swine, using it as fertilizer, dumping it into Lake Michigan, using it for land fill, as well as reduction (see below) and incineration. The newness of the field and the uncertainty of the methods led most cities to provide for changes in disposal methods every several years, a practice that still exists today. The changing nature of the systems allowed a greater ease for technologies to grow and change, but as cities started contracting out their trash services, contractors were less willing to risk big technological investments on contracts that may or may not be extended.²⁷

Although waste utilization was becoming more and more obsolete in households and cities often had issues with profit-making waste programs, there were still plenty of people promoting waste-to-wealth schemes in the early years of waste collection and disposal. Plans varied greatly, but ultimately the commercialism of the process, wrote Frederick A. Talbot in 1920, "which considers inventive ingenuity merely from the angle of pounds, shillings and pence, or dollars and cents as the case may be, is not impressed by the mere beauty of any process or apparatus." Other factors, he said, were "capital outlay, fuel consumption, simplicity of operation, maintenance charges, depreciation, renewals, and labor."²⁸ Talbot was writing during the twilight years of the "Gospel of Efficiency." The aptly named "Gospel," was a movement, especially among business people, to eliminate waste from every aspect of just about anything. Companies used the Gospel of Efficiency to eliminate wasted motion, materials and employee time and to reward productivity among workers by giving bonuses to those who met

²⁷ Melosi, Garbage in the Cities, 149, 144; Strasser, Waste and Want, 126; Daniel Thoreau Sicular, "Currents in the Waste Stream: A History of Refuse Management and Resource Recovery in America," (Master's thesis University of California at Berkeley, 1984), 73; Melosi, Garbage in the Cities, 143.

²⁸ Talbot, Millions from Waste, 64.

certain production goals—an idea that went naturally with capitalism and the increasing mechanization of industrialization.²⁹

These ideas of efficiency came from a new outlook on the world: never before had so much been accomplished materially in such a short period of time. Once this happened, people began wondering how much more could be accomplished with machine like efficiency. This change in world view has been called "Technique" by some philosophers. Technique "clarifies, arranges, and rationalizes; it does in the domain of the abstract what the machine did in the domain of labor. It is efficient and brings efficiency to everything."³⁰ Technique lent itself well to conservationism, which at its "essence was rational planning to promote efficient development and use of all natural resources."³¹ Utilization of wastes of course did not have to be rational; it just had to make money.

The wealth potential in waste became the new treasure for the fortune seekers who ventured to find ways to cut and/or profit from it. "To relate all the fortunes which have been amassed from the commercialization of what was once rejected and valueless would require a volume," wrote Talbot, "yet it is a story of fascinating romance and one difficult to parallel in the whole realm of human activity."³² While "romance" might not have been the first thing on every waste-utilizer's mind, transforming waste into wealth or something useful at least was a creative and clever endeavor, which resulted in imaginative, often funny and sometimes disturbing ideas. P.L. Simmonds was writing about utilizing waste already in 1873 and suggested making use of everything from human excrement to the surplus dog population in the United States. At the time, he said, six- to eight-thousand of the "miserable mangy-looking

²⁹ Melosi, Garbage in the Cities, 163.

³⁰ Jacques Ellul as quoted in Stanley K. Schultz, Constructing Urban Culture: American Cities and City Planning 1800-1920 (Philadelphia: Temple University Press, 1989), 6.

animals" were turned into glove skins and fertilizers. He advocated increasing that number to about five-hundred-thousand to feed poultry and make fertilizer.³³ Simmonds may indeed have been thinking romantically, as his fellow waste foe Talbot suggested, when he praised dirt, which "makes corn, corn makes cornbread and meat, and that makes a very sweet young lady, that we sometimes kiss. So after all we may kiss dirt..."³⁴ He even applied waste to matrimony when he suggested that one day the English custom of tossing a shoe at newlyweds "will be not only an emblem of good luck, but a substantial present." This was thanks to a chemical heating process, which reduced the shoe back into gelatin, which, Simmonds admitted, "was of the colour of molasses, and tremulous, and looked like incipient glue."³⁵

Simmonds best demonstrated the extremes and advances of waste utilization when talking about the rat, of which he said, "Our grandfathers would have said that the destructive vermin which infest our cellars under the name of rats would be the last thing that could be turned into a useful purpose." The scientist proposed that rats could be used to make gloves, hats, dresses and to clean the bones of horses, whose bodies were also a kind of nuisance. Perhaps his most daring suggestion and the most telling of the dilemma of pragmatism versus the levels of human tolerance, however, was the idea that the rat not be overlooked at meal time.

We do not eat the flesh of rats, but we do of pigs, and yet pigs are amongst the dirtiest-feeding animals of the whole creation. Most people are fond of ham, roast-pork, sausages, etc., the flesh of a well-fed pig. And why should not the flesh of a good, fat, corn-fed rat be palatable and good meat? Who has ever seen a fresh-skinned rat without remarking on the delicate-looking nature of the flesh? I certainly have never tasted it-indeed should require some

³¹ Samuel P. Hays, Explorations in Environmental History, (Pittsburgh, PA: University of Pittsburgh Press, 1998), 2.

³² Talbot, Millions from Waste, 17.

³³ P.L. Simmonds, Waste Products and Undeveloped Substances: A Synopsis of Progress Made in their Economic Utilisation During the Last Quarter of a Century at Home and Abroad, (London: Robert Hardwicke, 1873), 12.

³⁴ *Ibid.*, 66.

³⁵ *Ibid.*, 440.

very strong testimony as to its flavor before doing so; and yet one cannot help thinking that a nice, plump, young rat, fried or roasted, and served up with good gravy and other condiments, would make a very delicious dish.³⁶

Most of Simmonds's plans may not have seemed radical for companies. Firms like Swift and Armour not only used hooves and bones to make glue for their sandpaper, they were able to create "wholly new pharmaceuticals, explosives, lubricating oils, and cosmetics" from waste.³⁷ Of course a politician who suggested his city try too experimental of a method probably would not have stayed in office long enough to try his first *Rat a la King* or wear his first dog glove. Talbot warned of a "large class of waste exploiters," but this notion was probably just his own romanticism again.³⁸ Of course, companies hired and profited from their waste scientists, who could produce a by-product from waste that they would have had to pay to deal with anyway. Companies were already set up to do business and had or knew how to get markets for their products. Most cities, though, were not set up to do business. Some could not even legally sell a product and even if a city could market what it sold, the cost of the conversion facility probably could not have been adequately covered by the sale of byproducts, as "the availability of cheap energy sources-wood, coal, petroleum, and electric power-made the conversion of waste into heat and light seem unnecessary."³⁹ Additionally there was an ensuing debate between "sanitary engineers who wanted to save money, and residents and politicians who wanted to avoid any nuisance."⁴⁰

These obstacles did not stop cities from trying utilization, and reduction plants did see some success in the United States. The reduction method of utilization was a forerunner of the

³⁶ Ibid., 122-124.

³⁷ Strasser, Waste and Want, 134.

³⁸ Talbot, Millions from Waste, 299; Strasser, Waste and Want, 108.

³⁹ Melosi, Garbage in the Cities, 167, 160.

⁴⁰ Sicular, "Currents in the Waste Stream," 71.

pyrolysis method, which Bill Compton would use one hundred years later. It cooked animal and vegetable wastes and pressed them into grease, which could be used to make soap and perfume; tankage, "a dry vegetable, animal, and mineral material, which is fairly stable, mostly fibrous, and has some fertilizing value;"⁴¹ and a mysterious "evil liquid difficult to get rid of."⁴² From 1893 to 1914 forty-five reduction plants had been built, twenty-two of which were still in use in 1914.⁴³ The first American reduction plant, built in Buffalo, New York, in 1893, cost \$55,000 and after a year-and-a half had lost \$18,000. H.A. Fleishman, who had built the plant, said that, "the people who invested their money in the garbage business thought they had better buy some other stock than garbage stock."⁴⁴ As reduction only handled organic waste, and "nauseous odors" required the first plants to be built away from the cities, the prospects of profit were limited.⁴⁵ Still, enough entrepreneurs and scientists were optimistic about the technique that from Boston to Los Angeles nine different types of reduction plants were developed and several others were experimented with. Inspired by contractors who were turning a profit on the city's garbage, in 1905 Cleveland started the first municipally-run reduction plant. Other cities, including Chicago and Detroit, followed suit. Unfortunately for the cities, the contractors had only been able to make a profit because the cities had been paying for the collection and transportation of the garbage.⁴⁶ Ultimately, no matter how ingenious the technology or how much it could be improved upon, the fact that Americans could get raw materials so cheaply made municipal reduction uneconomical, and therefore inefficient.

⁴¹ Rudolph Hering and Samuel Greeley, Collection and Disposal of Municipal Refuse (New York: McGraw Hill Book Company, Inc., 1921), 238, 7, 8.

⁴² Abel Wolman, "Future Trends Which Will Influence Waste Disposal," *Environmental Health Perspectives* 27 (December 1978): 338.

⁴³ Strasser, Waste and Want, 135.

⁴⁴ Fleishman quoted in Sicular, "Currents in the Waste Stream," 20.

⁴⁵ Melosi, Garbage in the Cities, 160, 164; Sicular, "Currents in the Waste Stream," 51.

⁴⁶ Hering and Greeley, Municipal Refuse, 448-455; Melosi, Garbage in the Cities, 160.

Additionally, methods like reduction and hog feeding, an extremely popular method all over the country, could not have lasted far into the twentieth century, as such techniques relied on organic, not increasingly packaged waste. By the turn of the century, packaging was becoming more prolific as companies were producing products on a much greater scale and marketing them throughout the country. It was at this time that working class people started buying at least some packaged food and products—a luxury once reserved for the wealthy; consequently, trash became more prolific and mixed.⁴⁷

The sky-rocketing demand for manufactured goods was linked to ideas of efficiency and to trash. A disdain for and fear of unsanitary living conditions had been a primary reason people became interested in MSW collection. Disposable products solved the sanitation problem in a most efficient manner. Instead of re-using germ-ridden, worn-out products, shoppers preferred the convenience, ease and efficiency of the new throw-away items, a suddenly affordable option in the age of consumerism. The throw-away mentality did lessen people's care about the utilization of trash, as "disposability rested on the ideas that somebody else would carry away the trash and that used materials were worthless."⁴⁸ Americans wanted to buy new and more often, and wanted very little to do with the used goods they had once taken great pride in recovering. Now they were "repelled" by the waste, as they came to associate it with poverty.⁴⁹

For Progressive Era reformists, who were interested in sanitary living conditions and conservation, trash had been an ideal issue. If the movement's goal was to change American society from a "decentralized, nontechnical, loosely organized society, where waste and inefficiency ran rampant, into a highly organized, technical, and centrally planned and directed

⁴⁷ Strasser, *Waste and Want*, 113.

⁴⁸ *Ibid.*, 210.

⁴⁹ *Ibid.*, 113.

social organization,"⁵⁰ reformers might have succeeded too well. Enticed more by the new materialism than the reformers' idealism, Americans were glad to hand over the increasingly technical garbage issue to engineers. The engineers, themselves, had changed as well; instead of polymaths trying to solve various social problems, which culminated in the garbage issue, after the 1920s, engineers became increasingly trained and professionalized,

...but did not hold the view of themselves as holding the answers to a future utopia [as] their predecessors did. They were more concerned with the application of their technical knowledge of the solution of their specific tasks, than with broader environmental and altruistic or sociological issues.⁵¹

Most people, enamored with the convenience of throwing away old items and getting new ones, were also jaded by the previous experiments with trash disposal, and were content to let those with the technical training handle the trash problem with increasingly conservative methods.⁵²

No Waste for War

Nothing brought out strong feelings about waste in America like war. Admiration by efficiency experts of German frugality before and after the First World War caused them to have a kind of nationalistic response to waste. The belief was that "in the great world-struggle of nations, the nation that can organize and use all the resources at its disposal is going to be the winning nation."⁵³ To the lament of the American and British efficiency experts the Germans took their waste seriously, and they advised that "we ourselves might humble our lofty pride and advance a little in the same direction with beneficial results."⁵⁴ Reports of the earnestness, though, were surely exaggerated. One, for instance, said that

⁵⁰ Hays, Conservation and the Gospel of Efficiency, (Cambridge, MA: Harvard University Press, 1959), 265.

⁵¹ Sicular, "Currents in the Waste Stream," 87.

⁵² *Ibid.*, 38; Melosi, Garbage in the Cities, 234-235.

⁵³ Henry J. Spooner, Wealth from Waste: Elimination of Waste, a World Problem (Easton: Hive Publishing Company, 1974), 14.

⁵⁴ *Ibid.*, 15.

It was rendered a penal offence to throw away the kernels of plums, peaches, apricots, prunes, cherries, and other stone fruits or even the pips of apples and pears. One and all had to be carefully husbanded and surrendered to the authorities at special collecting stations, which for the most part, were established in schools and municipal buildings ... The yield of such residues must have been enormous in the aggregate. One city alone reported the production of over 300,000 pounds of oil during a single year from the various nuts collected within its jurisdiction.⁵⁵

Whatever amount of truth the reports had, efficiency experts genuinely felt that Germany "will exert herself far more strenuously in this field in the future than she has ever done before,"⁵⁶ and the lesson seemed to be "digested" by the time of the next World War, when instead of becoming a "nation of chiffonniers" ⁵⁷as Talbot suggested, the American citizens searched their chiffonniers for scrap to "Slap the Japs" with and junk, with which they could "Hit Hitler." ⁵⁸ The federal government held national rubber scrap drives, but cities and counties held scrap drives for other supplies, including "metal, paper and kitchen fats ... By September [1942], every county in the United States had had at least one scrap collection."⁵⁹ President Franklin D. Roosevelt asked people to turn in any rubber they were not using: "We want it in every form-old tires, old rubber raincoats, old garden hose, rubber shoes, bathing caps, gloves...."⁶⁰ Americans were told their contribution would make a difference in the war, that because of their contribution there would be "enough rubber to build the planes to bomb Tokyo and Berlin-enough rubber to build the tanks to crush the enemy wherever we may find him-enough rubber to win this war."⁶¹ The people took the message to heart, and the new patriotic take on the issue

⁵⁵ Talbot, Millions from Waste, 30.

⁵⁶ *Ibid.*, 308.

⁵⁷ *Ibid.*, 296.

⁵⁸ Harold J. Ruttstein, "What the Scrap Campaign Needs," *New Republic*, (5 October 1942), 401.

⁵⁹ Strasser, Waste and Want, 242

⁶⁰ Samuel I Rosenman ed., The Public Papers and Addresses of Franklin D. Roosevelt, "Radio Appeal on the Scrap Rubber Campaign," June 12, 1942, (New York: Harper, 1950), 272.

⁶¹ *Ibid.*, 273; Strasser, Waste and Want, 236.

was that, "any materials, no matter how dirty, had to be reclaimed to wage war. In this context, Americans saw little problem encouraging everyone, even children, to collect germ-infested or rusty discards."⁶²

While encouraging donations from patriotic citizens may have been easy, it was not so with the scrap industry. Critics charged that the scrap collection efforts had "no coordination. No singleness of purpose. No single seat of authority. No final agent of responsibility."⁶³ Unlike in the waste efficiency experts' ideal model, Germany, where the government had been involved in the waste recovery business from the onset, American scrap dealers were used to being left alone. Furthermore, they were happy to finally have a domestic market after the lean years of the Depression. From 1932 until an embargo was instated in 1940, Germany and Japan, along with Great Britain, had been some of the biggest markets for U.S. scrap dealers. As the United States began to help the Allies and eventually geared up for war herself, scrap sales increased and the price of the best quality of scrap steel rose 20% from August to December of 1940.⁶⁴ Trying to manage and utilize scrap, the United States set up a series of administrations and price controls that "tried to find a middle ground between the needs of the war effort and the needs of the [scrap] dealers."⁶⁵ This was not easy considering different sized scrap dealers in different parts of the country relied on different prices to stay in business. Government-imposed price ceilings made it too expensive for scrap dealers to collect and haul all of the junk collected at the community drives. Citizens began to wonder why their contributions sat unmoved. A September 1941 *Time* magazine article said that to "satisfy" the inquiring scrap providers, the Office of Civilian Defense (OCD) publicized that they had "moved" nearly half of the donations

⁶² Carl A. Zimring, Cash for Your Trash: Scrap Recycling in America, (New Brunswick, NJ: Rutgers University Press, 2006), 94.

⁶³ Ruttstein, "What the Scrap Campaign Needs," 402.

⁶⁴ Zimring, Cash for your Trash, 87, 45.

for defense efforts. According to *Time*, “by ‘moved,’ OCD meant allocated to specific smelters. Actually only a fraction of this amount had been taken away.”⁶⁶

For scrap dealers, the collection of household scrap was a wasteful business; they believed that industrial scrap would easily trump the pittance garnered from households, which included things like refrigerators that weighed a lot but had little scrap value. The government, which only expected to get about one-half of one percent of the Lend-Lease scrap need of nearly one and a half billion pounds met by household scrap, must have believed that pittance was valuable. Citizens, perhaps overestimating the value of their personal scrap, were willing to help the war effort, but drew the line at taking their scraps directly to dealers, as they did not want anyone making a profit off of their war contribution, or worse, selling it to the enemy. The dealers had little enthusiasm for paying to move the often heavy and bulky freight, which was not worth all that much. Consequently, a lot of collected junk was left where it had been deposited and never used. Not getting enough scrap from private dealers, the federal government set up its own agency, War Materials, Inc., to buy and sell iron and steel scrap. The government's corporation also collected battlefield scrap; and in 1943, American scrap was being imported from thirty different countries.⁶⁷

The fact that in many cases collected scrap was never really used shows how much the country had changed since the waste efficiency experts had warned to be watchful. The waste-to-energy lessons about the enemy from World War I may have been digested, but they were discharged quickly. American scrap dealers had been trying to get rid of their scrap, not stockpile it like the Germans were. The idea of nut collecting for oil would have been a laughable one for scrap men who had too much un-sellable industrial material already by the

⁶⁵ *Ibid.*, 93.

⁶⁶ “Get the Junk Man,” *Time* (8 September 1941), 62, 63.

onset of the war and were barely interested in the small profits available from household scrap once demand had increased. Regular Americans really did not have the true anti-waste sentiment of the Germans either. Often, the household goods donated to drives were useful items that would be replaced with newer ones, defeating the purpose and illustrating the disposable culture that had developed.⁶⁸

The tremendous efforts required to mobilize Americans to "make it do" and contribute scrap to the war effort contrast sharply with nineteenth century habits of reuse and recycling, which were intrinsic to the work of daily life. Like Depression-induced thrift, World War II scrap campaigns did highlight the value of waste materials. But they do not represent a reversion to an older way of life, nor did they significantly slow the American embrace of consumerist ideals of convenience, fashion, and obsolescence. The scrap drives stand out in public memory because they brought communities together in the service of patriotism, but the memory disguises how much the culture had already changed.⁶⁹

By 1943, the increased imports and the advent of synthetic rubber ended the need for household scrap, and the revived conservation effort would have little sustained impact. In fact, after the war, "Americans abandoned their salvaging ways and embarked upon the most conspicuous period of consumerism the nation had ever seen."⁷⁰ One trash development during World War II would have a far-reaching effect, however. The last of the few remaining reduction plants closed in the 1950s and the still-popular hog feeding garbage disposal method significantly declined between 1953 and 1955, when 400,000 pigs had to be killed because their diet was blamed for spreading a vesicular exanthema epidemic among their species. Eliminating these methods was easy because of a development in Fresno, California. Jean Vincenz introduced his "fill and cover" sanitary landfill in 1934 and during the war, the Army Corps of

⁶⁷ Strasser, *Waste and Want*, 236, 249; "Get the Junk Man," *Time*, 64; Zimring, *Cash for your Trash*, 97.

⁶⁸ Strasser, *Waste and Want*, 12, 259, 262.

⁶⁹ *Ibid.*, 259.

⁷⁰ Zimring, *Cash for your Trash*, 101.

Engineers used the sanitary landfill to dispose of waste at the campsites. When army engineers went home to work for their city's public work office, they recommended the sanitary landfill to be the new method of waste disposal. The result was that while only about 5% of cities surveyed in 1942 had adopted the sanitary landfill, five years later 25% had, and 75% of cities were using one by 1958. Landfills were cheaper than other methods, cleaner than traditional dumps, and because, in their early days, they were intended to be converted into parks complete with trees planted on them, they had a public relations advantage over many other methods.⁷¹

Of course, conservation and waste to energy efficiency were not factors in the popularity of the sanitary landfill. But America was already immersed in another war, a war in which waste itself, not its utilization, would be a weapon: the Cold War. If "discarding things is taken to be a kind of freedom," then Americans were eager to prove their liberty.⁷² Scholar John Kouwenhoven wrote that people in any society do not like to give up what they had already attained, that

since an economic surplus is one of the most recently-achieved of these advantages, and since even now the vast numbers who lack it remind us of the way in which poverty can warp and dwarf the human spirit, we inevitably set a high value on abundance. The materialism of modern civilization, in this light, seems understandable enough.⁷³

Kouwenhoven, perhaps representing the ideology of the masses, whether they knew it or not, said that democracy brings abundance not the contrasting idea held by some, especially those in other countries, that America could afford to be democratic because it had abundance. He wrote that, "...we and others must learn this quickly because our ability to help create a

⁷¹ Strasser, Waste and Want, 259, 16; Sicular, "Currents in the Waste Stream," 122, 118, 104; Melosi, Garbage in the Cities, 184.

⁷² Strasser, Waste and Want, 16.

⁷³ John A. Kouwenhoven, "Waste Not, Have Not: A Clue to American Prosperity," *Harpers*, (March 1959), 78.

peaceful world depends upon our ability to maintain our own abundance while helping others to create it for themselves.⁷⁴ He also said that we could cut back our production to reduce waste, "by giving it away or reducing the efficiency of our productive system."⁷⁵ America had been giving away money and material through programs like the Marshall Plan, but reducing efficiency of production would have been a strange move for a country wanting to prove its economic system was superior to another's. The government was going to continue backing abundance, and waste was just a byproduct of that abundance.

A Different Mindset, a Different Agency

General public support for unlimited production would change temporarily in the 1960s with the onset of the environmental movement. Americans had always believed that bigger and more was better and that size was "synonymous with power, strength, prosperity and self-respect."⁷⁶ Advanced food production methods had been developed during World War II to help feed allied countries and troops. The chemical pesticides DDT and BHC (benzene hexachloride, also known as "666"), as well as intensive, specialized weed killers were all first pushed and applied on a large scale during the Second World War. These improvements were vital to America as the population mushroomed with the Baby Boom, and the use of artificial fertilizer and pesticides enabled fewer American farmers to produce more food than Americans were capable of eating.⁷⁷ The improvements would also launch a reaction that would change the way, temporarily at least, that many Americans felt about growth and abundance.

In 1962 natural scientist Rachel Carson wrote her book Silent Spring about the effects of DDT. For the first time, a significant portion of Americans started questioning if the country had

⁷⁴ Ibid., 75.

⁷⁵ Ibid., 73.

⁷⁶ Whisenhunt, Environment and the American Experience, 98.

gone too far in exploiting the resources of the earth, and the environmental movement was born. Two main groups emerged from the new environmentalists: those interested in making progress cleaner and those interested in redefining progress as environmental quality, whose goal was not exploiting the earth's resources but living with them.⁷⁸ Convincing people to give up material gains already won was too difficult of a task, as Kouwenhoven predicted; suggesting that the fewer people be able to partake in the material gain was perhaps an easier sell, and population control became a fundamental rallying cry for environmentalists. For them it followed that "if there were fewer people, natural resources would not be so threatened and would last longer into the future; fewer people, requiring less food, would lessen the demand for artificial fertilizers or DDT."⁷⁹ However, cutting back American abundance in anything not only did not mesh well with Cold War objectives, it did not mesh at all with American philosophy.

Protecting the environment, though, had become a major national issue, and President John F. Kennedy added the environment to his agenda, a trend that would continue with his successors.⁸⁰ No matter what the trends have been, however, Americans ultimately have not seriously ever gone beyond the cleaner progress notion of environmentalism. William Ruckelshaus, the first Environmental Protection Agency (EPA) Administrator, said that the environmental movement, like the women's rights and civil rights movements tended "to point up imperfections in the society which are almost universally accepted as problems ... highlighting past wrongs that every fair-minded person agrees should be righted."⁸¹ After environmentalists achieved their initial goals like clean air laws and a ban on DDT, they began to

⁷⁷ George Ordish, The Constant Pest, (New York: Charles Scribner's Sons, 1976), 193, 194; Whisenhunt, Environment and the American Experience, 106.

⁷⁸ Hays, Explorations in Environmental History, 7.

⁷⁹ Whisenhunt, Environment and the American Experience, 106.

⁸⁰ Environmental Protection Agency publication, "The Guardian Origins of the EPA," (Spring 1992, accessed June 5, 2006): available from <http://www.epa.gov/history/publications/origins5.htm>.

promote the more controversial environmental quality ideal. Carson and her book may have caused alarm in an unprecedented amount of people but the fact remained that, "traditionally, we (Americans) believed that problems were temporary; any unexpected difficulties would be overcome and progress would continue."⁸² The idea that Americans would limit their material progress was probably never a viable option.

Regulating the environment for "clean progress," however, was a viable success for environmentalists who accepted that goal. In 1965, President Lyndon Johnson sanctioned a major solid waste study, "The National Survey of Community Solid Waste Practices," which was released in 1968. He also asserted a need for increased federal monies to be given to states to research, develop, and plan improved solid waste solutions; within two years of the Solid Waste Disposal Act of 1965, the federal government gave \$9 million dollars to various solid waste projects.⁸³ The Environmental Protection Agency began its tenure as the environment's federal regulatory board in 1970 under the Nixon administration. The agency was formed because of the growing concern over pollution and a recognition that the structure of the federal government had "often defie[d] effective and concerted action" to make an "attack on the pollutants which debase the air we breathe, the water we drink, and the land that grows our food."⁸⁴ The Bureau of Solid Waste Management had been housed at the Department of Health, Education and Welfare (HEW) and with the Bureau of Mines. When the Resource Recovery Act (RRA) was passed in 1970, solid waste became EPA territory. The RRA set guidelines for states to develop conservation, recovery, and disposal systems and gave a limited amount of finances to support

⁸¹ Environmental Protection Agency publication, "William D. Ruckelshaus Oral History Interview," (January 1993, accessed 5 June 2006): available from <http://www.epa.gov/history/publications/ruck/14.htm>.

⁸² Whisenhunt, *Environment and the American Experience*, 19.

⁸³ Larry Luton, *The Politics of Garbage*, (Pittsburgh, PA: University of Pittsburgh Press, 1996), 125-126; Melosi, *Garbage in the Cities*, 201.

⁸⁴ Richard M. Nixon, "Reorganization of Plan No. 3 of 1970," (9 July 1970, accessed June 14, 2006); available from: <http://www.epa.gov/history/org/origins/reorg.htm>.

research and development recovery programs for solid waste, an authority the agency used prudently.⁸⁵

Nonetheless, the federal role in solid waste policy making, as embodied in the EPA, remained ambiguous well into the 1970s. [The] EPA was reluctant to recommend federal intervention, and it generally limited its reports to descriptions of ongoing activities and future options. EPA Administrator William Ruckelshaus emphasized in 1972 that the federal government would not be able to solve the solid waste problem, and suggested that the states, local governments, and industry held the keys.⁸⁶

The EPA's new solid waste plan "was more interested in hazardous waste issues, and proposed to limit its activities to that area."⁸⁷ State and federal legislators objected to this non-intervention in solid waste because they knew it would translate into lack of funding, and local leaders believed that the new environmental regulations "entailed consequences that exceeded both the jurisdiction and the expertise of local governments."⁸⁸

Another, much more prominent act, passed the same year as the RRA, also had a major impact on solid waste. While not the first clean air law, the Clean Air Act of 1970 had more teeth than any environmental regulation ever passed. By implementing deadlines with non-compliance penalties, the act forced previously lackadaisical states to adhere to new standards of air quality. It also became a major contributor to concern over landfill space, because it closed most incinerators and banned open-air burning, which many landfills relied on to reduce their waste volume.⁸⁹ Although it dealt with a different form of pollution, the Clean Air Act both regulated and forced the federal government to become involved with solid waste disposal issues.

⁸⁵ Louis Bloomberg and Robert Gottlieb, *War on Waste: Can America Win its Battle with Garbage?* (Washington, D.C.: Island Press, 1989), 62; Luton, *Politics of Garbage*, 129.

⁸⁶ Luton, *Politics of Garbage*, 129.

⁸⁷ *Ibid.*, 129.

⁸⁸ *Ibid.*, 122.

The Experimental Period: WTE Gets Heavy

While government intervention gave some support to environmentalists' notions of pure living, it also inadvertently increased mounting piles of trash and clearly muddled the motives, sides and interests of politicians, producers and consumers. With solid waste being "recognized as a prime source of air pollutants,"⁹⁰ trash accumulated, and fears began to grow that Americans were "in danger of being engulfed in ... mountains of waste ... building around the cities."⁹¹ Reports circulated that the per capita waste production of Americans would grow from the 1969 estimate of 5.3 pounds to 8 pounds a day in 1980, and this was up from the meager 2.75 pounds in 1920. The large amounts of litter at the time likely worsened people's fear of being engulfed by trash. In 1969 Kansas, a one mile section of a two-lane highway had "770 paper cups, 730 empty cigarette packs, 590 beer cans, 100 whiskey bottles and 90 beer cartons." People began to see that "one person's trash basket is another's living space," and the Director of the Bureau of Solid Waste Management stated that,

The most convenient means for disposal-usually an open-burning dump-was, and unfortunately still is, most frequently employed. However, it is becoming increasingly obvious that such a casual approach to solid-waste management-which may have been acceptable in an earlier day-can no longer be tolerated in a country of over 200 million persons, 70 per cent of whom live in urban areas.⁹²

The growth of urban areas via urban sprawl had put a crunch on where regulated landfills could be sited. As Vice President of American Can Co. Judd Alexander said, "We are not running out of holes in which to put our garbage; we are just running out of cheap, well-located

⁸⁹ Paul Rogers, "The Clean Air Act of 1970," EPA Journal, (January/February 1990, accessed June 14, 2006), available from: <http://www.epa.gov/history/topics/caa70/11.htm>; Luton, *Politics of Garbage*, 127.

⁹⁰ Tom Alexander, "Where Will We Put All That Garbage?" *Fortune* 76, no. 5 (October 1965), 149.

⁹¹ "Why the U.S. is in Danger of Being Engulfed by its Trash," *U.S. News and World Report* 67, no. 10 (Sept. 8, 1969), 64.

⁹² Richard D. Vaughan quoted in *ibid.*, 65.

holes."⁹³ Scientists and even "regular people" tried to find solutions to the trash and landfill problem. In the vein of the century's earlier conservation movement, a slew of creative new methods of trash utilization and disposal popped up in the late 1960s-early 1970s. Edible food wrappers, bottles that dissolved upon contact with water, cans that could be converted into building material, and Glassphalt (an asphalt-type substance made of glass), were methods proposed for dealing with certain types of waste.⁹⁴ B.F. Goodrich proposed sinking tires to the bottom of the ocean to create artificial reefs that would provide a home to barnacles, mussels, sponges, and algae. The prediction was that, "within a year, the new reef is completely covered and the fish accept it as part of the natural environment."⁹⁵ Individuals could cut waste with Ephrem's Olde Time Bottle Cutter Kit, a Junior Achievement project, which turned empty bottles into "glasses, lamps, vases, candles and various other useful products" by using a cutter and heat and ice to create "thermal shock" to smooth the glass edges, so they could be converted.⁹⁶

Scientific schemes for MSW handling similar to the reduction method were also prevalent once again. The Lawden process from Britain could take any kind of waste and turn it into a bag of fertilizer its makers called "Sweetsoil." Scientists at the University of Hartford worked on an incinerator that produced heat (rather than steam) and could take all trash, including automobiles. Despite the concern over pollution that had been popularized by the environmental movement, the idea of dumping municipal trash into the ocean past the Continental Shelf was acceptable to many. Many scientists said trash could not harm the ocean,

⁹³ Michael Thoryn, "Resource Recovery Means Waste Not, Want Not," *Nation's Business* (May 1979), 96.

⁹⁴ Melosi, *Garbage in the Cities*, 202; "Ingenuity and Determination for Our Ailing Environment," *Chemistry* 10, no. 44 (November 1971), 4.

⁹⁵ "Tires-New and Old," *Chemistry* 44, no. 7 (July-August 1971): 4. Dumping MSW into the ocean was outlawed by a Supreme Court decision in 1934. Industrial and commercial ocean dumping are still permitted in the United States today with an EPA permit; although past experience with garbage washing back to shore has caused ocean dumping to become much more regulated. Melosi, *Sanitary City*, 349; Environmental Protection Agency, "Ocean Dumping" <http://www.epa.gov/owow/oceans/regulatory/dumpedredged/oceandumping.html> (accessed July 7, 2006).

as even if "40 million gallons of waste per day were emptied into the ocean for 1,000 years, the waste would be diluted with five million times its volume of sea water."⁹⁷ Some people even considered garbage to be gold, literally. The Bureau of Mines found that burning a ton of garbage would typically yield \$14 worth of silver and gold, causing *Science Digest* to predict that, "with gold and silver in those mounds of trash, it seems to be just a matter of time before someone actually begins to make a profit from garbage."⁹⁸ Even those who took the gold analogy figuratively saw the similarities. "One has to look at this type of analysis in the same fashion as the mining engineer analyzes an assay of a potential ore," wrote S.L. Blum in 1976. Blum went on to write that one should follow the "urban ore" and "its assay from location to location and also for a long time period during which its composition may change." These changes could result from consumer preferences or disposal techniques.⁹⁹

It was the promise of energy, though, and not gold that would excite the federal government about the waste business in the early 1970s. The United States experienced its first energy crisis in the winter of 1973-1974. Just a year earlier, the EPA had announced that it would fund, under Section 208 of the Resource Recovery Act, some demonstration resource recovery plants that could process at least 200 tons of MSW per day. Chemical, mechanical, and mineral disposal processes were all considered based on their ability to recover resources and their economic competitiveness to traditional methods.¹⁰⁰ (The pyrolysis demonstration plants will be discussed further in chapter four.) The EPA had embarked on finding resource recovery solutions primarily to get rid of trash, but in an illustration of the country's unalterable

⁹⁶ "Ingenuity," *Chemistry* (November 1971): 4-5.

⁹⁷ Kenneth A. Kovaly, "What Can You Do with an Avalanche of Garbage?" *Science Digest* 66, no.1 (July 1969): 72-73. See footnote 95 for more on ocean-dumping.

⁹⁸ *Ibid.*, 73.

⁹⁹ S.L. Blum, "Tapping Resources in Municipal Solid Waste," *Science* 191, no. 4228 (Feb. 20, 1976): 671.

¹⁰⁰ James G. Abert, et al., "Economics of Resource Recovery from Municipal Solid Waste," *Science* 183, no. 4129 (15 March 1974), 1052.

commitment to progress, the trash problem became more related to the energy issue and less to the environmental issue. Despite concern over growing landfills, "a consciousness of limits did not arise naturally from the experience of urbanites coping with the mountains of solid waste they produce."¹⁰¹ As Historian Martin Melosi states, "A society that grew powerful because of its mastery of machines, acquisition of vast resources, and massive production of goods was not likely to abandon a faith and a dependence on technology and scientific method to help curb the excesses of those activities."¹⁰² The United States needed energy, and they hoped their trash could help supply it.

From 1950 to 1970, U.S. oil consumption increased from 900,000 to 3.4 million barrels a day. In the same twenty years, America's Gross National Product grew by 102% and the country's energy consumption increased by 98%. The United States, which had less than six percent of the world's population, consumed more than 30% of its energy.¹⁰³ There was a strong belief in the link between American wealth and its energy consumption, and the growing concern that the earth's finite resources could be exhausted by early in the next century worried many government officials, especially as it was the government that had created the demand for energy.

Tax benefits to producers and regulation of prices to consumers have kept the price of energy below its true replacement cost, and thereby promoted consumption and waste. Large-volume consumers of electricity and natural gas have been given discounts. Government policy has subsidized and protected energy-inefficient truck and air transportation. The interstate highway system has encouraged automobile use. Local highways have drawn people, businesses, and industry out of central cities into suburbia. Thus, the American people have been led to believe that the oil and gas they consume will remain cheap, when in fact new additions to oil

¹⁰¹ Hays, *Explorations in Environmental History*, 16.

¹⁰² Melosi, *Garbage in the Cities*, 234.

¹⁰³ Executive Office of the President, Energy Policy and Planning, "National Energy Plan," 2, MS95-01, Box 1, FF 12.

and gas supply already are expensive and inevitably will become more so.¹⁰⁴

The government was willing to consider getting energy from just about anywhere, not least of all from garbage.

The sometimes competing, sometimes cooperative goals of waste disposal, environmental cleanliness and energy extraction led to a great deal of confusion over which federal agency, if any, was responsible for garbage. The EPA, Energy Research and Development Administration (ERDA) and the Federal Energy Administration (FEA) were all perceived to have some role in the issue, but what the roles were was not decided until the end of the decade. The following interaction from a congressional hearing on solid waste and resource recovery demonstrates how bureaucratic garbage had become during the decade of the energy crisis:

Congressmen Leo Ryan (California): Do the three agencies (EPA, ERDA, and FEA) have any kind of common agreement as to what your area of responsibilities are? ... With the substantial disagreement I've heard this morning with who's doing what and where among the three agencies----

Roger Strelow, EPA: I wouldn't call that a disagreement but the only area of overlap which remains to be sorted out--and which is actively underway--is between ourselves and the ERDA. I don't think there is any issue with ourselves and the FEA and so far as I know between ERDA and FEA.

Ryan: That may be your perception but sitting here as a sort of customer and on the outside trying to figure out what you're doing, I'm confused.

...

John K. Freeman, FEA: Perhaps you could clarify so we understand your perceptions of what problems or specific areas of difficulty there are.

Ryan: We're trying to turn garbage into energy. If there is nothing else than a simple page or two that explains what the three of you are doing, I could use it.

¹⁰⁴ Ibid., 3-4.

*And perhaps every member of this Congress could use it. Nobody knows. You may know, but we don't know.*¹⁰⁵

In 1979, the General Accounting Office did a Comptroller's Report of the agencies. It concluded that the

Federal agencies charged with encouraging the use of waste-to-energy systems have not provided:

- adequate dissemination of information and assistance...
- sufficient assistance in financing the evaluation or acquisition of currently available waste conversion systems...
- incentives to encourage investment in MSW energy
- adequate assistance in identifying and developing markets for both recovered materials and non-energy by products...
- an effective testing program aimed at resolving technological questions which inhibit potential investors and users.¹⁰⁶

It would take the EPA and the Department of Energy (DOE), which replaced the FEA and the ERDA in 1977, until 1979—over three years after Congressman Ryan had asked them to explain their jurisdictions—to submit their Memorandum of Understanding. Although the Comptroller's Report recommended that the DOE take the lead in WTE programs, the Memorandum established the

EPA as the lead agency in working with communities in project planning and development, and DOE as the lead agency for demonstrations of new technologies and for financial assistance in facility construction. In this pursuit, DOE will develop a list of candidate technologies for demonstration. Appropriate communities being assisted by EPA will be identified and selected for hosting those demonstrations.¹⁰⁷

¹⁰⁵ House, Subcommittee on Government Operations, *Solid Waste Management and Resource Recovery: Hearings*, 100th Cong., 2nd Sess., 23, 24, 26, 31 March 1976, 330-331.

¹⁰⁶ U.S. General Accounting Office, Conversion of Urban Waste to Energy: Developing and Introducing Alternative Fuels from Municipal Solid Waste, Report to Congress, (Washington, D.C.: General Accounting Office), 4-1.

¹⁰⁷ Committee on Science and Technology, Steffen Plehn statement at *Waste to Energy Joint Hearings*, 96th Cong., 1st Sess., July 17, 18 and September 20, 1979, 38; General Accounting Office, Conversion of Urban Waste to Energy, iv.

Furthermore, the agencies were supposed to submit "a five year action plan" by March of 1980. Although the EPA statement implied a kind of demotion for WTE, as it said that the EPA was going to give equal funding to source separation and WTE projects, resource recovery promoters had a lot to be happy about.¹⁰⁸ If the EPA took the Comptroller's recommendations seriously and gave the DOE the opportunity to offer its technical advisement and financing, the amount of support and financial assistance for WTE projects could increase substantially. Additionally, with the Public Utility Regulatory Policy Act (PURPA) passed in 1978, it looked like WTE operations would have guaranteed markets for their recovered resources. (PURPA will be discussed in the following chapter, as it was not until the 1980s that it became a factor in WTE.) Few WTE promoters were probably expecting the changes that would take place in their field during the rest of the century. In the 1970s, it was only the discussion of packaging that would foreshadow the shift from high tech to personal solutions that would occur in the following decades.

Products Don't Fill Landfills, Packages Fill Landfills

Although resource recovery experienced unprecedented popularity during the 1970s, environmentalists still thought that it reduced waste on the wrong end. Unable to convince mainstream America that consumerism was bad, environmentalists had a much easier time convincing politicians and the public that the packages their products came in were bad and that businesses were responsible for the growing landfills. They said that excessive packaging could be regulated by taxation, extending the life of products, recycling, and making reuse and reclamation more popular.¹⁰⁹ Early in the decade many politicians supported mandates that would make companies tighten their packaging policies. Perhaps surprisingly, it was federal

¹⁰⁸ Plehn., 39.

¹⁰⁹ Baum and Parker, Solid Waste Disposal, 184.

environmental officials who were against these regulations, which they seemed to believe would create more bureaucracy and achieve only nickel and dime results.

If our objective is to conserve natural resources, perhaps the way to go about it is not to look at the refrigerators and packaging but at the larger parameters of our consumption. For instance, considerably more material flows through housing and construction activities than packaging activities. Considerably more energy can be conserved by mandating, for instance, construction codes that increase the insulation in houses and make better use of sunlight for heating and lighting, or measures which limit the square footage of living space that a house, apartment, or office may have per capita.... We could limit demolition of old buildings that are perfectly serviceable but are being torn down to be replaced by buildings that are, at least in my opinion, often much less comfortable. These are some of the types of activities ... that we could undertake that would have much, much greater impact than, for instance, regulating whether or not we should have paper towels.¹¹⁰

Although it would not endorse taxes or regulations on packaging, by the middle of the decade, the EPA did focus energies on redesigning products for "reuse, longer life, improved durability, and less use of materials and energy."¹¹¹ Some politicians and environmentalists, however, could not see what was wrong with taxing excess packaging in order—they hoped—to reduce the amount of waste going to landfills. They argued that if businesses and their packages were filling up landfills, they ought to be helping to pay for new disposal methods. Additionally, they argued that if consumers were taxed for things like grocery bags, they would be more likely to try to extend the life of the taxed product instead of discarding it for a new one. Businesses fired back, however, and said that if they were charged extra for packaging, the price would just be passed on to the consumer anyway. Setting up a bureaucracy to establish and collect the taxes would just be a waste, they said. More importantly, though, they argued that viewing increased

¹¹⁰ Senate, Subcommittee on Environment of the Committee on Commerce, Arsen J. Darnay testimony, *Resource Conservation and Recycling*, 93rd Cong., 1974, 235.

packaging as only a detriment missed a good deal of the situation. In a speech delivered to the American Home Economics Association, American Can Company's Alexander, reflecting the technological bias of business, said that, "If the fruits of automation offer a better life to more people, we are traveling in the right direction, and we must not let garbage stand in our way. We must find the technological solution to that problem."¹¹² He cited examples of Philadelphia Cream Cheese adding a carton to their foil package, which saved a net of 12 percent packaging because the shipping package could be less sturdy, and the individually wrapped cheese slices, which had extended the life of cheese in the refrigerator. "When I was in college," Alexander said, "only the football captain could crush a beer can in his bare hand. Now any sissy can do it. That's because the metal in the average can has been reduced by 30 percent. New technology now being introduced will reduce that another 25 percent."¹¹³

The source reduction debate was yet another venue for those who believed in technological solutions and those who supported a sustainable environment to explore their differences. After a hundred years of growth, progress and relatively unapologetic consumerism, however, only the most optimistic environmentalist could have honestly anticipated the almost complete flip in public opinion that would occur in the last two decades of the 20th century. From the Second Industrial Revolution until the end of the 1970s, WTE had been assumed to be the ideal or at least the most worthwhile solution to the garbage issue when it was convenient and/or profitable. Usually WTE schemes proved too problematic or expensive to work practically, and people resorted to the easy, cheap and reliable method of dumping. But for the most part, the progressive, consumer American society was willing to believe that garbage could

¹¹¹ House, Subcommittee of the Committee on Government Operations, *Solid Waste Management and Resource Recovery*, 94th Cong., 2nd Sess., March 23, 24, 26, 31, 1976, 330-331.

¹¹² Judd H. Alexander, "Packaging, Garbage, and the Quality of Life," *Vital Speeches of the Day* 42, no. 22 (September 1, 1976), 687.

be turned into something good, useful and probably purchasable—as long as businesses or the government were willing to invest the money and effort to make that conversion.

¹¹³ Ibid.

CHAPTER 3

WTE GETS PITCHED, RECYCLING RULES

Attendees of the Engineering Foundation Conference "Municipal Solid Waste as a Resource: The Problem and the Promise," in the summer of 1979 must have been in fine spirits as they talked about the state of resource recovery. Yes, there were problems, but overall the engineers "seemed to feel that the industry was now getting up off its knees and just beginning to walk."¹¹⁴ In fact, while the field had "experienced growing pains"-namely because of "overenthusiasm and inadequate technical and managerial skills"-the resource recovery experts agreed that the fruition of waste recovery schemes "nevertheless seems to be an absolute requisite for an orderly transition through the 1980s and into the 21st century."¹¹⁵ The speakers identified several obstacles facing waste-to-energy operators. It was also agreed that because of the lack of communication between the network of operators and between those in the front end of waste (politicians, manufacturers and waste collectors, for instance) and the operators

many problems and roadblocks are encountered and eliminated time and again with very little being added to a general 'body of knowledge' which can be called upon in the future. With so much effort being devoted to solving and resolving the same problems, little is left over for truly advancing the state-of-the-art.¹¹⁶

The "precious little" amount of "fragmented" technology, was also a problem that needed to be and could be worked out. First and foremost, though, they agreed that the DOE and the EPA "should get their act together. Both agencies have valid and valuable interests in the

¹¹⁴ T. C. Frankiewicz, Design and Management for Resource Recovery, Volume 1: Energy from Waste (Ann Arbor, MI: Ann Arbor Science Publishers, Inc., 1980), x.

¹¹⁵ Ibid., v.

¹¹⁶ Ibid., viii.

development of this technology and an increased degree of interagency communication would be of benefit to all concerned."¹¹⁷

A year and a half later, though, any hopes of the Department of Energy (DOE) and the Environmental Protection Agency (EPA) getting "their act together," would disappear. In fact, neither organization would have much of an act pertaining to solid waste after that time for quite a while. Perhaps not too surprisingly, the DOE lost interest in solid waste as soon as the energy crisis fears had ended. The EPA had never been very enthusiastic about being involved in solid waste management, and the funding priorities of the Reagan Administration allowed them to basically dump the field from their agenda. The solid waste budget was cut from \$29 million in 1979 to \$16 million in 1981. Just one year later the entire solid waste budget was only \$320,000. Those same years, the number of employees in the office went from 128 to 74 to 1. Solid waste certainly was not the only urban issue to be affected by spending cuts: the federal government funded 53 percent of state and local public works capital investments in 1977, but in 1982 that number would decrease to 40 percent. President Ronald Reagan was more interested in spending money on national defense and security than on the increasingly sprawling infrastructures of the cities. Additionally, while solid waste was seen as a nuisance, people were scared about toxic and hazardous wastes, and consequently perhaps more willing to see money invested in taking care of that growing problem.¹¹⁸ This shift meant that there would be no federal funds to lessen

¹¹⁷ Ibid., ix, v. (See chapter 2 for more on the relationship.)

¹¹⁸ Martin Melosi, Sanitary City: Urban Infrastructure in America from Colonial Times to the Present (Baltimore: John Hopkins University Press, 2000), 419, 360, 359, 409; Louis Bloomberg and Robert Gottlieb, War on Waste: Can America Win its battle with Garbage?, (Washington D.C.: Island Press, 1989), 66. Love Canal, a toxic waste chemical dump in New York state, began to leak during a large amount of rainfall in 1978, and charges of birth defects, miscarriages, and high rates of cancer followed shortly after. Incidents like this surely made it easier for Americans to accept the EPA's interest in hazardous over solid wastes. Similar concerns about hazardous wastes occurred in Times Beach, Missouri, and Glen Avon, California, among other places. Ibid., 35.

the "sharp contrast [that] had developed between the promise of waste-to-energy and its unmet expectations."¹¹⁹

Reagan's cuts and his unfortunate choices of James Watts as Secretary for the Department of Interior and Anne Gorsuch as EPA Administrator seemed to encourage grassroots environmentalism. According to Melosi, "As Watt's antienvironmentalism became more outrageous, membership in major environmental organizations increased and continued to do so even after his resignation...."¹²⁰ Watts wanted to increase offshore drilling and extract resources from public lands, while Gorsuch proposed cutting the EPA budget by three-quarters.¹²¹ Local officials who had grown used to money and support from the federal government for their solid waste programs were not ready for the change, as the "increasing difficulties facing landfills assumed an intensity that took public officials ... by surprise."¹²² Environmentalists, who had been irked by the attention lavished on high-technology, profit-based resource recovery schemes throughout the 1970s, saw the chance in the midst of the changing waste atmosphere to promote their baby: recycling. "Once regarded as simply a grassroots method of source reduction and a relatively innocuous protest against overconsumption in the 1960s, recycling in the 1980s became an alternative to--or at least a compliment to--more traditional disposal methods."¹²³

A good indicator of the sudden acceptance of recycling as a mainstream solution is its promotion in the *Reader's Guide to Periodical Literature*. From 1890 to 1980, one looking in the famous index to find information about trash conversion would look under "Refuse" and find the subheading "Utilization of," but in the March 1981-February 1982 volume, there are no listings under "Utilization of." An ideology at least 90 years old—the open-ended idea that

¹¹⁹Bloomberg and Gottlieb, *War on Waste*, 35.

¹²⁰Melosi, *Sanitary City*, 365.

¹²¹Ibid.

¹²²Bloomberg and Gottlieb, *War on Waste*, 35.

waste could be utilized somehow, possibly in a way that would be popular in one year but not in the next or that it would be used in the future in a way that had never been thought of up until that point—had disappeared. By 1982, the acceptable, or at least most talked about, possibilities of how waste could be used could be summed up in two words: "see recycling."¹²⁴

Reader's Guide based their entry on a truly changing behavior. In less than two decades the number of cities with door-to-door recycling collection services went from 140 to 15,000. The EPA set a goal of 25 percent recycling of MSW in its 1988 "Solid Waste Dilemma: An Agenda for Action," and there were 10,000 drop-off and buy-back recycling centers across the nation in 1989.¹²⁵ A 1989 issue of *Environment* magazine stated that the massive success of recycling "caught the national environmental groups off guard. They never imagined that grassroots groups on their own could change federal policy." The author said the environmental groups "would have settled for less," but in the next paragraphs he demonstrated the eagerness of the groups to press their advantage by stating that further recycling plans "replace mass incineration; they are not simply afterthoughts to a mass burn system."¹²⁶

Many people, especially those in the mainstream, were surprised by the antagonism between recyclers and WTE promoters. Paul Casowitz, the deputy manager for solid waste planning and resource recovery in New York City in the mid-1980s, said that when he started out, "I thought I was getting involved in a motherhood-and-apple-pie issue. It seemed to me that

¹²³ Melosi, *Sanitary City*, 411.

¹²⁴ Jean M. Marra ed., *Reader's Guide to Periodical Literature* March 1981-February 1982 (New York: H.W. Wilson Company, 1982): 1352.

¹²⁵ Melosi, *Sanitary City*, 411.

¹²⁶ Neil Seldman, "Mass Burn is Dying," *Environment* 31 no. 7 (September 1989): 43. Mass burn has traditionally been the most popular and reliable method of WTE. Instead of turning trash into different byproducts, the trash is incinerated and the resulting steam is sold to create electricity. The remaining ash still has to be disposed of somewhere. Because of the lack of literature specific to pyrolysis and because of the universal ideal of resource recovery among all WTE techniques, I will assume some basic arguments for and against WTE incinerators to apply to pyrolysis as well. Some technical issues, such as concerns over incinerator ash piles, would not apply to pyrolysis.

turning garbage into energy was something everybody had to support."¹²⁷ The optimistic administrator was wrong, of course. There were several reasons why environmental groups did not latch on to WTE technology, although some had in the beginning. One source of conflict, in the days before integrated waste management, was over materials. "The owners of many incinerators also found themselves locked in a battle with local recyclers over garbage they both wanted, such as newspapers and cardboard, which burn easily and hot."¹²⁸ The need of WTE operators to have a steady stream of materials would not change, but the removal of certain goods from the waste stream, even large quantities of highly burnable material like paper, would eventually come to be viewed as a benefit, because any amount of managing the waste stream adds to its homogeneity. (See introduction.)

Ultimately, the recycling divide was between those who believed in clean progress and those seeking a sustainable relationship with the environment. "In an historical reversal, society has begun focusing on the costs of new technologies rather than only on benefits," writes Historian Joel Tarr. "Public attention is now occupied with the risks and hazards associated with technology rather than its potential for progress."¹²⁹ Rathje and Murphy stated that since the late 1960s the United States has been suffering from a "scrupulous conscience" about risk, whereby our "sensors of sin amplify the most unthinking of technical violations into drumbeats of damnation."¹³⁰

The advantages brought to us by the automobile, we now know, come at a cost of 46,000 lost lives every year, and many times that number of devastating injuries; the price we pay for the automobile in terms of pollution has, of course, been staggering. Had we known in advance that this might be the case, would production of

¹²⁷ J. Tevere MacFadyen, "Where Will all the Garbage Go?" *The Atlantic* 255, no. 3 (March 1985): 33.

¹²⁸ William Rathje and Cullen Murphy, *Rubbish! The Archaeology of Garbage* (New York: Harper Collins Publishers, 1992), 178.

¹²⁹ Joel A. Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron, OH: University of Akron Press, 1996), 30.

¹³⁰ Rathje and Murphy, *Rubbish!*, 244.

this machine ever have been allowed to proceed? Should it have been? We have managed to make peace with countless other less devastating but still harm-doing manifestations of progress, accepting them because the good they accomplish is seen to outweigh by degrees of magnitude the problems they cause.¹³¹

The authors do note that the difference in attitude might lie in the lack of choice involved in high-technology WTE risks.¹³² As many people living near proposed sites may not have the opportunity or inclination to move, they would naturally be more adverse to the risk entailed in a WTE plant. Something about the giant trash-eating plants, though, seemed to upset the psyche of North American environmentalists, who saw the WTE plants as "too costly, too centralized and of a scale incompatible with democratic control."¹³³ Therein lies another fundamental difference between recycling and WTE: recycling is "democratic" in that it depends on people to be successful, whereas WTE uses generally behemoth, in a way, tyrannical technology far out of the power of most of the people who will depend on it to take care of their garbage and, hopefully, provide power.

Supporters of both methods saw the dependence on the main component of the other (people or technology) as detracting from the goal they claimed to want to accomplish. Already in 1976, energy manager S.L. Blum noted that "many environmentalists display an enthusiasm for recycling that borders on religious intensity." The July 1992 issue of *McCall's* magazine had a presumably typical story about a woman named Susan Wood. The story was about how environmental do-gooders were getting burnout from the extra effort of recycling and about disappointment that market forces were not boosting the viability of recovering recycled goods. The story opened talking about the Pennsylvania single mother of two hauling her separated

¹³¹ Ibid., 181-182.

¹³² Ibid., 182.

¹³³ Harold Crooks, Giants of Garbage: The Rise of the Global Waste Industry and the Politics of Pollution Control (Toronto: James Lorimer and Company, 1993), 30.

goods to the curb every trash day, and then "to dispose of foam, cardboard and paper, she makes two separate trips to different recycling facilities."¹³⁴ Nowhere in the story are Wood's multiple weekly trips characterized as wasteful or energy-consuming. Instead, the fact that she "cares about the environment," is as rewarding as any results that may be attained from the action itself. The article addressed many concerns that people who were getting frustrated about recycling may have had, because "if people feel that the efforts of one lonely person (or one family, or one community) can't possibly compensate for the many businesses, communities and individuals that aren't working to improve the environment, they may lose hope." The article advised weary recyclers not to "give up the cause yet" and included a quotation from the deputy director of the Center for Policy Alternatives stating that "Recycling is the single most important environmental education tool we have."¹³⁵ Recycling's success has been based on how many people participate, demonstrating they "care" about the environment and what percentage of garbage is separated, rather than the outcomes from the efforts. This is because constantly participating in this "righteous choice ... enlivens public consciousness and opens new vistas of public participation in the agenda of environmentalism."¹³⁶

Like Susan Wood, most recyclers were inclined to believe that "some invisible hand separates and classifies the different types of recyclables ... and guides them, almost as good as new, back to the manufacturers who filled them before, thus presumably saving civilization great chunks of raw material and fabrication expense."¹³⁷ The resources involved in source separation and the deconstruction and reconstruction of recycled materials, as well as the fickle or absent

¹³⁴ Ellen Alcorn, "Recycling Fatigue: The Uphill Battle to Clean up the Planet," *McCall's* 119, no. 10 (July 1992): 98.

¹³⁵ *Ibid.*, 101.

¹³⁶ Roger Starr, "Recycling: Myths and Realities" *Public Interest* 119 (Spring 1995), available from <http://proxy.lib.iastate.edu:2591/pqdweb?index=19&did=8761908&SrchMode=3&sid=1&Fmt=3&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1164515548&clientId=60760&aid=1>; accessed 26 November 2006.

¹³⁷ *Ibid.*

markets for the products, are generally not considered by the general public and by politicians. If they were, recycling may not have found its place on the top of the "Waste Management Hierarchy."¹³⁸ These factors are not important, however, for the environmentalists, who find the act of recycling virtuous. In his famous editorial against recycling, John Tierney said that

Recycling, which was originally justified as the only solution to a desperate national problem, has become a goal in itself—a goal so important that we must preserve the original problem. It's as if the protagonist of "Pilgrim's Progress," upon being informed that he could drop his sinful burden right there on the road, insisted on clinging to it just so he could continue the pilgrimage to get rid of it.¹³⁹

This desire to be virtuous only went so far, however, and the country's consumerism was not curtailed. Recycling "did not spur customers to reuse old materials within the household but rather to make sure the materials would not enter the waste stream once they were evacuated."¹⁴⁰

WTE, on the other hand, has not been accused of an excess of sentimentality. Rathje and Murphy write that disposing of waste is something "we must learn to accept as a noble enough goal in its own right—worth doing even if one hasn't made a buck or saved the world in the process."¹⁴¹ While the recycling pendulum has been accused of swinging too far to the "save the world" side, opponents of WTE believe that its purveyors are only in it for the almighty dollar.

¹³⁸ The solid waste management hierarchy lists waste reduction and disposal strategies for a community or the country in the most preferable order. Recycling and composting are generally at the top of the disposal methods of all hierarchies, followed by incineration (with Refuse Derived Fuels—this would be the most similar incineration to pyrolysis), incineration (with energy recovery from steam), incineration with no recovery, and finally landfills usually bottom out the list. Bloomberg and Gottlieb, *War on Waste*, 79. There is really no way to make a fair, overall judgment to determine if recycling is better than waste to energy. As Richard C. Porter writes in his book, *The Economics of Waste*, "It would be nice if we could do one definitive benefit-cost analysis of all the recycling in the United States and thereby decide, from an economic viewpoint at least, that it is a good or bad thing. But ... the benefits and costs of recycling vary greatly in different parts of the country and in different kinds of cities." Richard C. Porter, *The Economics of Waste* (Washington, D.C.: Resources for the Future, 2002), 133. That does not even include the issue of fickle markets. Recycling, though, seemed to enjoy (and largely still does) an almost untouchable status in the minds of the public and consumers. It might have been seen as hippy or liberal, but rarely would anyone question whether it was worthwhile. Recycling has costs just like every other waste disposal method, and its economic worth is extremely variable depending on the situation just like every other waste disposal method.

¹³⁹ John Tierney, "Recycling is Garbage" *New York Times Magazine*, June 30, 1996 (accessed July 21, 2006, from: <http://www.williams.edu/HistSci/curriculum/101/garbage.html>).

Lamenting that resource recovery received another \$300 million in federal money in 1979, while recycling would only receive \$1 million through the same year, environmental organizer Neil Seldman wrote, "Don Walter, the head of the DOE commercialization of Waste to Energy Program, glibly stated that he did not care if recycling saved more energy than was generated by incineration [a questionable contention]. 'My job is to create energy from garbage and that is it.'"¹⁴²

As businesses had a financial incentive to utilize waste to its utmost, what was wrong with profit being their motive? After all, the need to make money would naturally require that developers fine tune and possibly scale down their equipment or get out of the business, eliminating many of the arguments that WTE was inefficient and too expensive. More importantly, the 1990 Clean Air Act "placed serious restrictions on existing incinerators" in the hopes heightened emissions standards would improve existing resource recovery plants or lead to the creation of new ones.¹⁴³ In an atmosphere of risk assessment, however, the distrust of technology could not be overcome by meeting minimum, although ever-increasing, air quality requirements. Additionally, concern over air pollution moved WTE into a higher realm of risk on the environmental totem pole. According to Tarr, as the environment became an issue of concern, the "environmental agenda featured action against dirty water and human waste pollution first, dirty air second, and land and groundwater pollution last. Whatever action taken was conditioned by the costs involved, contemporary social values, and existing levels of analytical instrumentation."¹⁴⁴ Landfills may have been able to squeak by with violations

¹⁴⁰ Martin Melosi, Sanitary City, 137.

¹⁴¹ Rathje and Murphy, Rubbish!, 187.

¹⁴² Seldman, "Waste Management," 42.

¹⁴³ Martin M. Melosi, Garbage in the Cities: Refuse, Reform and the Environment (Pittsburgh, PA: University of Pittsburgh Press, 2005), 219.

¹⁴⁴ Tarr, Ultimate Sink, 29.

receiving little notice or priority, but WTE plants, higher up on the environmental agenda, would not get such leeway.

The main concern of WTE air pollution was over dioxin emissions. The plastics industry had boomed after World War II, as plastic began to be used in lieu of other material like paper, rubber and glass, and by 1985, the United States was consuming 39 billion pounds of plastic. Unlike waste that was burned earlier in the century and often deemed a "nuisance," when plastic garbage burned it produced toxic chemicals including dioxins.¹⁴⁵ Although evidence was "inconclusive," problems associated with dioxins included "increases in cancer, birth defects, psychological damage, liver damage, cardiovascular deterioration, and degeneration of the endocrine system ... disturbances in the responses of the peripheral nervous system ... severe weight loss and chloracne, a disfiguring and persistent form of acne growth."¹⁴⁶ The threat of dioxins was debated, as was the threat of the other air pollutants, which many feared that resource recovery plants were releasing, including lead, mercury, beryllium, sulfur dioxide, nitrogen oxides, polycyclic organic compounds, carbon monoxide and hydrogen chloride.¹⁴⁷ Many of those in the waste industry did not agree that the concentrations released carried such risks, however.

In a paper presented at the Solid Waste Association of North America meeting, Dr. Walter Shaub, technical director for the Coalition on Resource Recovery and the Environment, stated that "risk assessments invariably show that the potential risks associated with incinerator air pollution emissions are very small compared to the risks of everyday activities such as smoking, drinking, exposure to sunlight, driving a car, or the burden of naturally occurring [sic]

¹⁴⁵ Carl A. Zimring, Cash for Your Trash: Scrap Recycling in America (New Brunswick, NJ: Rutgers University Press, 2006), 145; Melosi, Sanitary City, 398-399.

¹⁴⁶ Bloomberg and Gottlieb, War on Waste, 98.

toxic compounds that are found in food."¹⁴⁸ Shaub included a quotation from a Harvard University professor who stated, "If some politician says that you are insulting his intelligence by comparing the hazard of an incinerator to one cigarette a year per person, answer back without fear, that you are sorry that the people elected someone who is insulted by the truth."¹⁴⁹ These kind of responses, accurate or not, probably did not help the esteem of WTE in the eyes of environmentalists or the general public. Instead it contributed to the image of WTE operators as being

blithely dismissive of legitimate environmental concerns-too quickly discounting the levels of risk posed by incinerator emissions, offering glib [an apparently popular accusation against WTE proponents] avowals that eating a peanut-butter sandwich everyday, for example, may actually be more harmful (owing to the presence of aflatoxin, a naturally occurring carcinogen) than living next door to a waste-to-energy facility.¹⁵⁰

The standard measure for regulating pollution risks was how many extra deaths there would be over an exposure period of 70 years "at the point of maximum concentration in excess of what would be predicted without the exposure."¹⁵¹ A novice to the field may be surprised to find that what may seem like a conservative system was still not satisfactory to environmentalists and perhaps more understandably to the communities impacted. For the EPA the limit for acceptable cancer rates was "one excess cancer in a population of one million."¹⁵² This was still too much of a risk for concerned citizens who shut down the Los Angeles City Energy Recovery

¹⁴⁷ Ibid., 100; Walter M. Shaub, "Disposing of Waste-to-Energy Facility Ash," from Waste-to-Energy as a Part of Municipal Solid Waste management Volume 2: Selected Papers from the Proceedings of SWANA/GRCDA Meetings 1987-1990 (SWANA Publication no. GR-WTE 0401, February, 1991) 98, 99.

¹⁴⁸ Shaub, "Disposing of Waste-to-Energy," 99, 100.

¹⁴⁹ Ibid., 100.

¹⁵⁰ Rathje and Murphy, Rubbish!, 185.

¹⁵¹ Bloomberg and Gottlieb, War on Waste, 102.

¹⁵² Ibid., 103. This number has become considerably less conservative. The current range of acceptability, depending mainly on the economics of the situation, is from one extra case of cancer in 10,000 to one case in one million. Environmental Protection Agency, "National Oil and Hazardous Substance Pollution Contingency Plan: National Priorities List," Federal Registrar 65, no. 25 (7 February 2000), available from <http://www.epa.gov/fedrgstr/EPA-WASTE/2000/February/Day-07/f2479.htm>; accessed 11 July 2006.

(LANCER) Project, where the increased risk of cancer was projected to be just .118 cases per million, "the lowest cancer risk estimate at that time of any health risk assessment for a mass burn incineration plant" in the United States.¹⁵³ Technology was available to make waste-to-energy plants safe. Swedish emission standards were considered practically impeccable and the Japanese created computer systems that monitored pollutants and the functioning capacity of the equipment and reported that information to the regulatory agency.¹⁵⁴ Such controls were not immediately economical for U.S. markets, where, however unpopular and however much in decline landfills might have been, other waste disposal options still had to be somewhat economically competitive with them.

Besides the pullout of federal funds during the Reagan Administration, two pieces of legislation financially effected waste-to-energy developers in the 1980s. The first was the Public Utilities Regulatory Policies Act (PURPA) of 1978. PURPA tried to remedy what plant operators already knew: resource recovery needed customers to be successful. The law required utilities companies to buy power from non-utility generators (NUGs) like resource recovery operations at the same price they would pay for it from regular electric companies. Furthermore, utilities had to buy from a NUG before buying from regular companies if the energy was of equal quality. It was hard to finance WTE facilities on energy money, though, when energy prices fell substantially during the six years after PURPA. A guaranteed market was not much of a boon to the industry when prices were not guaranteed and when "any decline in the sale price

¹⁵³ Bloomberg and Gottlieb, War on Waste, 175.

¹⁵⁴ *Ibid.*, 108.

of electricity generated at a waste-to-energy plant can significantly boost the per ton service fee."¹⁵⁵

Even when energy prices were high and looked to stay that way, operators knew the reality of the market was different than the hype that had surrounded their facilities. Michael Dingman, the CEO of Wheelabrator-Frye, one of the top WTE plant operators, stated "If all the jobs that were publicized in various papers really were jobs ... the garbage-to-energy business would be a helluva business. But most of it is newspaper puff."¹⁵⁶ Even if government support would have continued, Dingman did not seem to believe that there would have been a great market for waste-to-energy plants, saying, "When the existing garbage dumps get closed, which is easier said than done, and when the people who involve themselves decide to truly solve the problem, then facilities like ours will be a welcome addition to the community."¹⁵⁷

Those who did buy into the "newspaper puff" were likely to become discouraged quickly. "You don't go into the business of resource recovery because you think there's gold in the garbage. It's just not there," said Paul Casowitz. "The point is getting rid of the garbage, and getting rid of garbage is going to be expensive no matter what technology you use."¹⁵⁸ Even when the media did recognize the "puff," they did not seem to be able to get away from it. In a 1985 *Fortune* article about WTE, Colin Leinster waxed that the

hopeful but realistic mood in companies eyeing such [WTE] contracts is a far cry from the naive euphoria of a decade ago. Worries that the industrial world might run out of raw material were rife at the time. Some corporate chiefs saw the nation's flotsam supplanting the end of the rainbow as the place to find a pot of gold-or, more prosaically, pots of metals, glass, paper, and

¹⁵⁵ Ibid., 141. PURPA, of course, pretty much applied only to incinerators, but its impact was felt by the whole WTE industry, and the problem of trying to plan major facilities that have to rely on fluctuating prices is equally applicable to pyrolysis.

¹⁵⁶ Gerald Odening, "That Garbage about Garbage," *Forbes* 127, no. 1 (January 5, 1981): 149.

¹⁵⁷ Ibid.

¹⁵⁸ Ruth Simon, "Garbage in, Garbage out," *Forbes* 146, no. 7 (October 1, 1990) 170, 171. MacFadyen, "Where Will All the Garbage Go?" 32.

especially, precious and untapped sources of energy such as gasses, steam, and solid fuels.¹⁵⁹

The author says things were different and noted the financial "drubbing" that businesses, taxpayers and cities took after so many plants failed at the end of the seventies and the early eighties, but the title of the article, "The Sweet Smell of Profits from Trash," and assertions that WTE plants "are about to take off as a major growth industry in the U.S., and capital investment in them over the next ten years could reach \$20 billion," make one wonder what really had changed in attitude.¹⁶⁰ The only real change was that developers were scaling back their projects and opting for the more conservative mass-burn technology, which only produced steam for electricity, over pyrolysis or refuse-derived fuel RDF (RDF) incineration, both of which produced fuel sources. In a different article, one resource recovery consultant said that the complexity of the equipment and the grand scales of the RDF facilities (and presumably the pyrolysis plants; the quotation starts after the noun, but pyrolysis is included in the article) caused their downfall. According to the consultant, while they "were the 'phenoms' of the waste-disposal industry in the early 1970s ... the plants turned into monsters ... People just got carried away on the engineering side of things." Still, the story said, "RDF is not out of the picture."¹⁶¹

While the developers in both articles were confident in overcoming technical issues, another issue was about to weigh in, and the developers knew it. Tax changes were in the wing that would affect the industry, eliminating investment tax credits on industries and industrial development bonds that cities had used to pay for WTE plants. Usually a private company would own part of the plant and the city would finance their portion through development bonds.

¹⁵⁹ Colin Leinster, "The Sweet Smell of Profits from Trash," *Fortune* 111, no. 7 (April 1, 1985): 151.

¹⁶⁰ *Ibid.*

¹⁶¹ "Refinements Bolster Trash Plants; But Tax Laws Threaten Multibillion-Dollar Market," *Engineering News-Record*, (February 23, 1984), Features, 22. Accessed July 13, 2006, from LexisNexis Academic: http://web.lexis-nexis.com.proxy.wichita.edu/universe/document?_m=02854d94edfb08627b05706ad8d4dc7f&_docnum=1&wchp=dGLbVtb-zSkVA&_md5=0aa7b5d337373881682afa89031e40fc.

The new tax laws would limit the number of bonds available and make cities pay taxes on bonds for investments that were not entirely publicly funded. The *Forbes* article, which was the more optimistic of the two, did hint at the possible changes, and the CEO of Ogden Corp., another major waste-to-energy developer said he was not worried about the tax changes, because "Refuse is a threat to the environment ... These plants must be built, and they will be financed as best they can be."¹⁶² The *Engineering News-Record's* tone was not so optimistic. Its author concluded with a quotation from the National Solid Waste Management Association (NSWMA) saying that, "Construction will be put off until a city gets to the crisis state ... This is really mandating a return to landfilling through tax policy."¹⁶³

When it was passed, the Tax Reform Act of 1986 ultimately had the effect of pushing cities out of the WTE business. Without city support, WTE plans were scrapped by the hundreds. The dramatic impact of the Tax Reform Act can be seen when considering that between 1982 and 1990, 248 WTE plans were scrapped. Eight of those were scrapped between 1982 and 1984, thirty-three were cancelled in 1985, and 207 were cancelled from 1986 to 1990. There were, in the end, a total of 140 WTE plants operating in the U.S. in 1990. This number was clearly not on track to recover the 1.84 quadrillion Btu a year of energy that, in 1976, forecasters predicted would be recovered by the year 2000, the same amount of Btu that the entire country of Uzbekistan consumed in 1998.¹⁶⁴

¹⁶² Leinster, "The Sweet Smell of Profits from Trash," 153.

¹⁶³ "Refinements Bolster Trash Plants."

¹⁶⁴ C. Heerman, *Pyrolysis and Gasification of Waste: A Worldwide Technology and Business Review*, 1:166; Randall Curlee, *Waste-to-Energy in the United States: A Social and Economic Assessment* (Westport, CN: Quorum Books 1994) 4; Melosi, *Garbage in the Cities*, 219; Melosi, *Sanitary City*, 409; "Resource Recovery-A Boom Before 1990?," *The American City and County* 91, no. 5 (May 1976) 54; . The United States consumed 98.96 quadrillion Btu in 2000, so the prediction would have been in line with the 1970s estimates that resource recovery could meet about 2 percent of the United States's fuel needs. Energy Information Administration, "World Primary Energy Consumption by Region, 1994-2003" (May-July, 2005, accessed July 12, 2006): available from <http://www.eia.doe.gov/emeu/aer/txt/ptb1103.html>.

Another setback occurred a few years after PURPA was passed when utility companies began to complain that the alternative energy was damaging their equipment, making many of them reluctant to purchase the WTE power. In perhaps a fairly typical story, Reuters Inc., an RDF plant in Minnesota that did open in 1986, could not find the markets for more than 30% of their fuel pellets and ironically ended up paying to send a good portion of the pellets to the landfill. In four years, the company had lost \$9 million on its \$20 million plant.¹⁶⁵

Not enjoying the popularity of recycling, WTE never got the extra boon from businesses trying to capitalize on a trend that its counterpart did. For awhile at least, recycled products were very much in vogue, and as "finding the use of recycled materials in their products is becoming a marketing necessity, companies are becoming eager customers of the new recycling ventures."¹⁶⁶ In the late 1980s detergent companies were advertising their new, recycled bottles, and major companies like DuPont and Proctor and Gamble were using recycled goods in a huge portion of their products and packaging.¹⁶⁷ Companies had a market incentive to make the effort to switch to recycled products. No such incentive existed for WTE. There were two reasons for a company to switch to WTE power: if it was cheaper and because it was the law. When alternative fuels were perceived to be inferior, though, or when they caused machines to breakdown, those two reasons were not enough for businesses to invest the time and money to make WTE successful.

Without customers or even the threat of an energy crisis to sustain it, the opposition from the public and the lack of financial success wore down the WTE movement. WTE proponents had to convince the public that their plants were safe and convince financial backers the plants would make money even without co-sponsorship or some insurance from the cities.

¹⁶⁵ Ruth Simon, "Garbage in, Garbage out," *Forbes* 146, no. 7 (October 1, 1990): 170, 171.

¹⁶⁶ Vicky Cahan, "Waste Not, Want Not? Not Necessarily," *Business Week*, no. 3115 (July 17, 1989): 117.

Additionally, investors were hesitant to invest in technology that could be regulated or restricted at any time. What was the point of going through so much hassle for a program that no one wanted, no one wanted to pay for and that might become illegal before the project was even operational? Well, there still was the issue of where to put the trash.

If the scarcity of landfills was "not widely discussed in the press" in 1985, things would certainly change a couple of years later, when the interest in garbage would become a "national obsession" until the end of the decade.¹⁶⁸ It was an event in March of 1987 that would get the nation concerned about trash again. The *Mobro 4000* barge left New York on March 22, carrying 3,100 tons of garbage, which it planned to deposit in North Carolina. North Carolina officials became suspicious about the barge because of rumors that it was carrying medical wastes, and they refused to let it unload in the state. The barge went all the way down to Belize, where it was refused there and at multiple ports along the way. It finally returned home, where it still was prevented from docking for a time, and the waste was eventually incinerated in October, seven months after it had began its journey. Two years later, in a famous cover story about trash called "Buried Alive," *Newsweek* would report that,

the saga of Islip's wandering barge may have been to the trash crisis what the sinking of the *Lusitania* was to World War I ... Since then, 18 states and scores of municipalities have embarked on ambitious waste-reduction programs ... With amazing speed, recycling has shed its tie-died image, attracted big-business and political passion.¹⁶⁹

The *New Republic* stated that, "as a dinner-table topic in Washington, garbage is up there with mobile missiles."¹⁷⁰ Reminiscent of the situation in the late 1960s, stories like "How We

¹⁶⁷ Ibid.

¹⁶⁸ MacFadyen, "New York: Where Will All the Garbage Go?" 38; Peter Pringle, "Washington Diarist: Talking Dirty," *New Republic* 201 July-December (October 30, 1989): 42.

¹⁶⁹ Melinda Beck, et. al., "Buried Alive," *Newsweek* 114, no. 22 (November 27, 1989): 68.

¹⁷⁰ Pringle, "Talking Dirty," 42.

Can Win the War against Garbage,"¹⁷¹ "Tons and Tons of Trash and No Place to Put It,"¹⁷² and "Garbage: It Isn't the Other Guy's Problem Anymore,"¹⁷³ inundated magazines. A kind of amnesia seemed to hit the media and WTE developers as they tried to put a new spin on the re-emerged "trash crisis." *Fortune* Magazine did not even bother thinking up a new title for their new story on waste: if "Where Will We Put All That Garbage?" was good enough for readers in 1967, it was good enough for readers in 1988. At least they changed the two-paged picture in the beginning of the story from fires at the Kenilworth Dump, "Washington D.C.'s version of Hades," to seagulls attacking New York's Fresh Kills landfill, "in a nightmarish scene worthy of Hitchcock."¹⁷⁴ Maybe *Forbes's* magazine editors did not read their rival's 1985 "Sweet Smell of Profits from Trash" article. In that *Fortune* story, the one that had talked about the "naive euphoria" disappearing in the new WTE industry and the "pot of gold never [turning] up" in the old industry, Leinster identified David L. Sokol and Alfred B. DelBello, as the "hard-charging" men in charge, respectively, of Ogden and Signal's WTE programs. "Sokol and DelBello exude similar enthusiasm about their burgeoning industry..." the article said. "But unlike the dreamers of the 1970s they know there will be no quick killing. 'We'll make a good return,' says DelBello, 'but there ain't no gold.'"¹⁷⁵ Five years later, *Forbes* had a story with a big picture of Sokol and, above it, the headline "Garbage into Gold." Sokol believed the uncertainty of regulations had been holding the market back but with the passage of the Clean Air Act of 1990,

the waste-to-energy business is on the verge of a new boom in demand ... "With the proposed EPA rules," Sokol says, "the logjam

¹⁷¹ Mariette DiChristina, "How We Can Win the War Against Garbage," *Popular Science* 237, no. 4 (October 1990): 57.

¹⁷² Kenneth R. Sheets and Robert F. Black, "Tons and Tons of Trash and No Place to Put it," *Newsweek* 103, no. 24 (December 14, 1987): 58.

¹⁷³ Terri Thompson and Mimi Bluestone, "Garbage: It Isn't the Other Guy's Problem Anymore," *Business Week*, no. 3000 (May 25, 1987): 150.

¹⁷⁴ Tom Alexander, "Where Will We Put All That Garbage?" *Fortune* 76, no. 5 (October 1967): 148,149; Faye Rice, "Where Will We Put All That Garbage?" *Fortune* 117, no. 8 (April 11, 1988): 96, 97.

¹⁷⁵ Leinster, "The Sweet Smell of Profit," 154, 151.

is breaking. In 1990 there is an enormous number of projects coming up. People say, 'We're willing to spend the money. We're willing to pay to protect the environment.' That's not something you heard ten years ago."¹⁷⁶

It was not something you heard even three years ago from Ogden at least. The company had won the contract to build the LANCER plant in 1987, after an "aggressive and extraordinary lobbying [campaign], wining and dining and making hefty contributions to council members...."¹⁷⁷ The company would invest \$28.3 million in the project and get its profits from the sale of energy. When conflicts arose about the amount of emissions, Ogden was not willing to "pay to protect the environment." In fact, "in an emotional interchange with a City Council member, an Ogden executive declared that his company would not be willing to guarantee meeting the Swedish guideline for dioxin ... Instead, Ogden was only willing to guarantee [the amount in] its initial draft contract with the city, a figure nearly 170 times greater than the Swedish guidelines."¹⁷⁸ As mentioned earlier, LANCER already had the lowest dioxin emissions in the country. The EPA's emissions regulations may have enabled one WTE plant to be environmentally-friendly and remain competitive with another WTE plant, but they would not help WTE be competitive with other, cheaper forms of waste disposal. The markets had not changed nor had the WTE promoters, but now they could use their adherence to EPA regulations as a banner to wave to gain public support.

No matter how it changed its image, in the 1980s and 1990s, WTE would not see anywhere near the success or have anywhere near the support it had in the 1970s. Better or not, the last two decades of the century belonged to the less technical, smaller-scale, and more "democratic" process of recycling. In the early 1990s, twenty-four states had materials recovery

¹⁷⁶ James Cook, "Garbage into Gold," *Forbes* 145, no. 2 (January 22, 1990): 49, 48.

¹⁷⁷ Bloomberg and Gottlieb, War on Waste, 166.

¹⁷⁸ *Ibid.* 178.

facilities (MRF), which pulled recyclable products out of the waste stream (see chapter 4), and half of the citizens in the United States were part of a curbside recycling program. In the last part of the 1990s, the EPA raised their 25% recycling diversion goal, which they had originally thought was a pie-in-the-sky figure, to 35%.¹⁷⁹ The profitability, end success or the necessity of recycling may have been debatable, but its popularity was not. Melosi writes that:

At the very least, implementing recycling programs put municipal policymakers on the side of conservation of resources and gave concerned citizens a way to participate in confronting the solid waste dilemma in specific, and environmental problems in general. The perception of recycling as an answer to the nation's disposal problems gave it strong momentum in the 1980s.¹⁸⁰

With the help of recycling, cities were able and largely have been able to postpone looking for long-term local solutions. Existing, operable landfills have had their lives extended and municipalities without landfills can send their garbage to another site, even if that is in another state. In 1995, all states were either importing or exporting trash, and by 2000, 32 million-tons of trash were going to different states. Where they existed by the 1990s, WTE facilities, for the most part, took their place in cities as part of integrated solid waste management programs. These new plants recovered a certain kind or amount of trash on a much smaller scale than those in the 1970s with a specific market in mind before they were built.¹⁸¹ As it turned out, this restructuring and the surprising heights attained by the recycling movement would eliminate resource recovery as an "absolute requisite for an orderly transition through the 1980s

¹⁷⁹ Melosi, *Garbage in the Cities*, 221, 222.

¹⁸⁰ *Ibid.*, 223.

¹⁸¹ *Ibid.*, 215.

and into the 21st century."¹⁸² The movement would—pardon the expression—basically have to rise from the ashes, if it were to come close to its former prominence.

¹⁸² Frankiewicz, Design and Management for Resource Recovery, v.

CHAPTER 4

BILL COMPTON AND A TALE OF TWO CITIES: A BACKGROUND OF WICHITA TRASH AND PYROLYSIS AND THE STORY OF THE BALTIMORE PYROLYSIS PLANT

With one major exception, the history of garbage in Wichita and Sedgwick County has been similar to that of garbage in the rest of the country. As in other, medium-sized cities, trends may have come slower at times, but they followed the same patterns already seen. In 1914, the *Wichita Eagle* proudly reported that “Wichita will soon be numbered among the cities boasting of a full fledged system of collecting garbage....” The plan called for twenty wagons to pick up trash in business and residential areas three times a week, which it would dispose of in a yet to be built reduction plant. As typical of Progressive attitudes towards waste, the paper referred to the garbage collection as a “privilege”—not for the resident or business whose garbage was to be collected, but for the “man or firm that will make the best offer to the city for the contract.” The bidders were to pay not be paid by the city: “No contract will be awarded,” the article stated, “if it requires any expenditure of the city’s money.” The expected amount of the annual bid was not mentioned, but the city estimated the contractor would have to spend about \$30,000 initially for the reduction plant and the wagons. The city did not mandate what the product of the reduced garbage had to be, but the article noted that other cities, as we have seen, fed the processed refuse to swine or converted it to fertilizer. Stories from promoters (and perhaps some of the “waste exploiters” that Frederick A. Talbot had warned about) and Progressive Era confidence in the value of waste likely led the city to assume there would naturally be a market for any product as worthy as reformed garbage.¹⁸³

¹⁸³ “Calls on Bids for Garbage,” *Wichita Eagle* (30 October 1914): 5.

The city probably did not get the response it was hoping for, as the number of reduction plants in the United States went from twenty-six in 1913 to nineteen in 1915.¹⁸⁴ Wichita did not turn to the next popular trend, the incinerator, either. There would be no reason for anyone to invest in the expensive technology without getting pay from a city contract, as incinerators at this point contained no resource recovery value. The city eventually began to collect all of the refuse itself—something it did “at least until the forties.” Food and other green wastes were collected separately from the non-organic trash; the organic waste went to Chapin’s Hog Farm on South Hydraulic, while the rest was burned—not in an incinerator, but much more cheaply—in open pits. Just like in much of the rest of the country, feeding garbage to hogs ended in Wichita in 1952 after swine were struck with the vesicular exanthema epidemic. The city purchased the farm and turned it into the Chapin Landfill in 1954.¹⁸⁵

It was during a tour of Chapin Landfill almost two decades later—when garbage was no longer fed to pigs and open burning was increasingly regulated—that Bill Compton became interested in trash. Neither Compton, nor the engineering colleagues with him on the tour, and more surprisingly not even the landfill manager, seemed to have known about contemporary national efforts to find alternatives to trash dumping. In that same year (1972) the federal government had decided to invest, for the first time, a significant amount of money into experimental methods of trash disposal options that promised to produce energy. Perhaps the most prominent of those methods was pyrolysis. Wittingly or not, Compton's thoughts were in line with those of engineers all over the country; he wanted to know why something could not be

¹⁸⁴ Martiv V. Melosi, *The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present* (Baltimore: John Hopkins Press, 2000), 201.

¹⁸⁵ John Davis, e-mail to author, 28 November 2006; Jean Hays, “People Used to Dump Trash Everywhere and Anywhere,” July 8, 1997, *Wichita Eagle*, (accessed October 21, 2006): available from <http://docs.newsbank.com.proxy.wichita.edu/>.

done with all the garbage that was being thrown out and piling up. According to Compton, the manager's response was, "Like what?" Compton suggested destructive distillation.¹⁸⁶

The Baltimore Fiasco

The Environmental Protection Agency had been charged with giving demonstration grants in the early part of the decade to find alternative technologies to landfills, which were filling up quickly. New EPA regulations eliminated open dumps, limited burning options and made many existing incinerators out of compliance with the law. The grants demonstrated three different types of disposal methods, all with the goal of getting rid of trash and the benefit of being a novel technique that converted the trash into something useful. Just as these demonstration projects were getting underway, the U.S. faced its first wave of the energy crises. Because of the country's need for energy and the promise these new technologies had of being able to offer it—albeit as a secondary benefit to their main purpose of getting rid of the trash—politicians and developers saw a chance to tout these new methods as sources for a portion of America's sustainable energy. Pyrolysis, which had such a good showing in the demonstration plants, would take a serious blow in the decade because of its failure to live up to the high expectations. Even if the methods were not the "pure pyrolysis" that Compton would propose, the grandiose failure of the Baltimore Pyrolysis Plant would leave a stigma on the method that has not proved easy to overcome.

Two pyrolysis methods were chosen to be demonstration plants: the Flash Pyrolysis system from Garrett Research and Development Company, Inc. in San Diego County, California, and the Langard pyrolysis plant from Monsanto Enviro-Chem Systems, Inc., in Baltimore,

¹⁸⁶ Compton, "Solid Waste Conversion Project," 1, Bill Compton Collection.

Maryland.¹⁸⁷ Of the two pyrolysis plants, the Garrett plant in San Diego was significantly smaller; it was also the older. The San Diego County Utilities Department received a federal grant in June 1965, to study "the feasibility of pyrolysis as an economic method of decreasing the volume of solid and municipal wastes and for producing useful by-products."¹⁸⁸ The department determined pyrolysis to be beneficial for three main reasons: it would contribute a great deal towards extending landfill life; the process could be self-sustaining once it was started (see footnote 192); and the by-products of pyrolysis "might have some commercial value."¹⁸⁹ By mid-1967, the department was sending out for bids for someone to build a pyrolysis pilot plant, what would be the first one used for municipal solid waste in the United States. When describing the process in *American City* magazine, its coordinator emphasized, "We lay no claim to discovering anything new--except the proposed application to municipal wastes."¹⁹⁰ Garrett, a subsidiary of Occidental Petroleum Corporation with its "Flash Pyrolysis" process was chosen for the project, which received a \$2.96 million grant in 1972 and was originally supposed to cost \$4 million with expected revenues of \$200,000 to \$300,000 a year. It took six tries to site the plant due to community opposition. These setbacks delayed the project for three years and raised the price from \$4 million to \$9 million by the time construction was underway in 1975. Of the new costs, the EPA and Garrett were each paying \$3.5 million and the county was responsible for \$2 million.¹⁹¹ Garrett was a "turn-key" contractor for the 200-ton per day facility, meaning

¹⁸⁷ James G. Albert, et. al., "Economics of Resource Recovery from Municipal Solid Waste," *Science* 183, no 4129 (15 March 1974): 1058; John D. Parkhurst, "Resource Recovery: the Vision and the Verities," *Phoenix Quarterly: The Institute of Scrap Iron and Steel* 8, no. 1 (Spring 1976) found in "Summary of Hearings on Research and Development Related to Solid Waste Management and Resource Recovery," by Mark E. Anthony Reisch, (Library of Congress: Congressional Research Service: May 26, 1976): 528-536.

¹⁸⁸ Donald A. Hoffman, "'Burns' Refuse without a Flame," *American City* 82, no. 2 (February 1967): 102.

¹⁸⁹ *Ibid.*

¹⁹⁰ *Ibid.*

¹⁹¹ Hearing before the Subcommittee of Government Operations, 94th Congress, March 23-31, 1976; (no author) "Can Pyrolysis Put Spark into Refuse as Fuel?" *Chemical Week* 115, no. 24 (December 11, 1974): 53; Steven J. Levy, "San Diego County Demonstrates of [sic] Pyrolysis Solid Waste to Recover Liquid Fuel, Metals,

they set up the operation and were responsible for making sure it met the promised design specifications, but, in this case, the county would be responsible for operating the plant.¹⁹²

Although the Garrett system was "one of the more advanced (pyrolysis) processes," it did not succeed. It shut down in 1979 and ended up costing \$15 million. The plant was never able to run continuously.¹⁹³ The plant was supposed to convert the wastes of San Marcos and Escondido, California; its failure was not such a tragedy, though, because it was not the only disposal system in the area, and the county was not reliant upon the plant to dispose of all its garbage.¹⁹⁴ Although not as big, two other fairly famous pyrolysis (non-demonstration) plants operated in the 1970s. South Charleston, West Virginia had a 180-ton per day Union Carbide plant that operated from 1974 to 1978, and the seventy-five-ton per day AndoTorrax Systems'

and Glass," 1975, found in Hearing before the Subcommittee of Government Operations, 94th Congress, March 23-31, 1976: 156.

¹⁹² An explanation of the Process: Whereas the by-products of all pyrolysis methods are solids, liquids and gas, the Garrett Flash Pyrolysis system tried to get the most liquid byproduct (oil) possible, because of the easier markets for selling oil. In the Garrett system, waste was dumped into a shredder, which used a magnet to take out the ferrous materials. After settling in a storage bin, the waste went to an air classifier that had a stream of air entering it from the bottom strong enough just to catch the light materials and push them to the top. The heavy materials, which were mostly inorganic, went through a cylinder with a screen through which particles smaller than one-half on an inch could fall. Those particles went through a chamber where they were crushed; the ones that were crushed enough went to the glass recovery areas, and the ones that were too big went back to the storage bin. The particles that did not fall through the half-inch holes were to go to an aluminum recovery plant or, if that were not available, a landfill. There is no way to separate glass and aluminum from trash except for by hand. Scientists or engineers make calculations about the weight and size of those materials and how much there ought to be by studying the waste stream. The light material, after leaving the air classifier, went through a drier and then another shredder. Once it was finely shredded, the material would be blown into the pyrolysis reactor, a fat stainless steel pipe, which held the hot char. The amount of char in this one-second process was five-to-one over the amount of organic material, and the combination produced a gas-char mixture, which was then separated. The gas part of the mixture was quickly sprayed with oil (from the plant and a supplemental No. 2 oil as well), cooling it down nearly 800 degrees (to 175 F) to produce an oil of high-heat value to be sold as a product called "pyrol." The char and a portion of the gas that was not recovered continued to go through the pyrolysis system, continually providing the char to mix with the organic materials, making the plant self-sustaining. Levy, "San Diego County Demonstrates of [sic] Pyrolysis Solid Waste to Recover Liquid Fuel, Metals, and Glass," 159, 163, 165, 166.

¹⁹³ Bernard Baum and Charles Parker, *Solid Waste Disposal Volume 2: Reuse/Recycle and Pyrolysis* (Ann Arbor, MI: Ann Arbor Science Publishers, Inc.: 1974): 22.

¹⁹⁴ Anthony R. Nollet, testimony at the U.S. Congress, House, "Hearing before the Subcommittee on Transportation and Commerce on Interstate and Foreign Commerce," 96th Congress, Second Session on H.R. 6638: A Bill to Provide for an Accelerated Program for the Recovery of Energy from Municipal Wastes and for Other Purposes," April 22, 1980 Serial 96-166 (Washington, D.C.: U.S. Government Printing Office: 1980) 103. (no author) "Pyrolysis and Salvage Get Demonstration Tests," *American City* 87, no. 11 (November 1972), 44. Howell H. Heck and Marwan E. Jubran, "Civil Engineering Research," Florida Institute of Technology, http://coe.fit.edu/civil/heck_research.html (accessed on July 27, 2006).

plant in Orchard Park, New York, operated from 1971 to 1977. Like the Garrett system, the other plants eventually failed:

Development of the technology can be envisioned as an endless number of technical and mechanical problems and short- and long-term shutdowns. In most cases, redesign or modification of the system solved the problem, but other problems continued to appear. Even during periods when the plants were operating, there were problems in developing markets for the products produced. All of these factors worked together to increase processing costs to the point that other management options were chosen.¹⁹⁵

Fortunately, none of those communities with the pyrolysis plants were investing all of their hopes that their plant could take care of the majority of their solid waste disposal needs. This was not the case for the city that would host what would become the most notorious pyrolysis plant in the country: the Langard Pyrolysis Plant in Baltimore.

In 1970, Baltimore, Maryland, like many other cities across the country, was almost out of landfill space. The city had two incinerators, which were not up to pollution standards and would be expensive to fix.¹⁹⁶ The city looked for a company that was already trying to get EPA demonstration funds. They also asked for assistance from the newly formed Maryland Environmental Services (MES), which had been charged with "being as creative as possible" in dealing with "the shortage of energy and the surplus of junk."¹⁹⁷ Most of the time, cities have "the requirement that the method proposed must have at least three successful, full-scale installations elsewhere. Baltimore decided to abandon this safeguard and to build a plant for the pyrolysis of refuse on an unequalled scale."¹⁹⁸ Baltimore, one of the first communities to adopt a sanitary landfill, had a history of being progressive with their solid waste, and the city,

¹⁹⁵ Heck and Jubran, "Civil Engineering Research."

¹⁹⁶ F. Pierce Linaweaver, "Baltimore Tries Pyrolysis," *American City* 89, no. 5 (May 1974): 50.

¹⁹⁷ Joanne Omang, "Maryland Trying to Squeeze Usable Energy from Waste," *Washington Post*, (25 November 1977), Metro: C1, http://web.lexis-nexis.com.proxy.wichita.edu/universe/document?_m=01ae2eec4d3a97582920f79a266e7660&_docnum=24&wchp=dGLzVzz-zSkVb&_md5=304d9d433828615c4308d325ba643567 (accessed 29 November 2006).

apparently with the support of its citizens, was "totally confident in 1972 that private industry would have the technological know-how to build a successful waste disposal energy production facility for our city...."¹⁹⁹ The city decided to go with the Monsanto's Enviro-Chem subsidiary and their Langard pyrolysis process. The voters of the city had already approved \$6 million to update one of their incinerators in 1971. In October of 1972, Baltimore signed a contract with Monsanto and the next month voters approved a \$4.2 million bond to fund the project. That money with some from another fund equaled a \$6 million contribution from Baltimore. The EPA provided \$6 million, and the MES provided the remaining \$4 million for the \$16 million project. Like the Garrett plant, this was also a turn-key operation, and Monsanto had to agree to pay \$4 million in "performance penalties" if the plant was not up to par.²⁰⁰

While it may be surprising that politicians and the people were willing to back such an experimental method of trash disposal, it might be even more surprising that they would put their faith in a company with no municipal solid waste handling experience whatsoever. Odder still, was that the Monsanto Company wanted to get involved in waste. In his book, The Story of Monsanto, Dan Forrestal writes that "up until the sixties Monsanto was not among the most vocal companies in American industry. Taking a safe and cautious course, Monsanto was often inclined to avoid controversy, or at least to avoid provoking controversy...."²⁰¹ During the sixties, however, the company, like all makers of pesticides, took a public relations beating. The

¹⁹⁸ Linaweaver, "Baltimore Tries Pyrolysis," 51.

¹⁹⁹ Francis Kuchta testimony to "Waste-to-Energy," Joint Hearings Before the Subcommittee on Transportation and Commerce of the Committee on Interstate and Foreign Commerce and the Subcommittee on Energy Development and Application of the Committee on Science and Technology U.S. House of Representatives, 96th Congress, First Session, July 17, 18; and September 20, 1979, Serial No. 96-83 (No. 6--Vol. 8) (U.S. Government Printing Office): 289.

²⁰⁰ F. Pierce Linaweaver Testimony, "The Environmental Protection Agency's Responsibilities in Relation to Its Budget Request," Hearings Before the Subcommittee on Air and Water Pollution on the Committee on Public Works United States Senate, 93rd Congress, First Session, March 28-30, 1973 (Washington, D.C.: U.S. Government Printing Office: 1973) 260; David B. Sussman, "Baltimore Demonstrates Gas Pyrolysis: Resource Recovery from Solid Waste," (U.S. Environmental Protection Agency, 1975) 2, 23.

company did defend itself against blanket environmental attacks, arguing that without pesticides there would not be enough food for the growing populations of the world. There was also a partial acceptance of the growing criticisms against chemicals, and the company decided to respond to the backlash of the 1960s with some environmentally-friendly, pollution-fighting projects for the 1970s. They started a subsidiary in 1969 called Enviro-Chem to spearhead these projects.²⁰²

The EPA's project manager for the plant said the EPA had been "concerned from the beginning with Monsanto Enviro-Chem Div.'s ability to scale up its Langard pyrolysis system from the 35-tpd (ton per day) prototype on which the Baltimore plant is based. 'But they were sure they could do it....'"²⁰³ What Monsanto was sure they could do was process 1,000 tons per day—half of the city's waste—with the "first full-scale pyrolysis solid-waste disposal and resource-recovery system in the world."²⁰⁴ The Monsanto process used the company's Langard pyrolysis method, which it developed in 1969.

²⁰¹ Dan J. Forrestal, The Story of Monsanto: Faith, Hope and \$5,000-the Trials and Triumphs of the First 75 Years (New York: Simon and Schuster: 1977), 193.

²⁰² Ibid., 199.

²⁰³ Joanne B. Winslow, "Baltimore Optimistic Despite Pyrolysis Troubles," *American City and County* 91, no. 4 (April 1976): 12.

²⁰⁴ "Turning Trash into Energy: More Cities are Trying it; the Way One City Plans to Make Use of its wastes," *U.S. News and World Report* (October 20, 1975), 68, accessed from http://web.lexis-nexis.com.proxy.wichita.edu/universe/document?_m=15d66557559bc157e92bd895c50cff02&_docnum=2&wchp=dGLbVlz-zSkVb&_md5=8a26ecba954ee02ce48ea579e2e8eda6.

Generally, the gas extracted from pyrolysis refers to a combustible gas. The main byproduct from the Langard method, however, was steam that could be used for energy. As WTE incinerators generally convert waste into steam, this makes the method unconventional for pyrolysis plants. The Langard method also used a "direct-fire," for heating, which seems unusual for pyrolysis as well. The plant, though, was more than a "glorified incinerator."

Sitting on sixteen acres of land, the Baltimore Pyrolysis Plant was designed to process just about any kind of MSW, including large household appliances like refrigerators. The material went through a shredder and to a storage building. Two underground conveyor belts picked up the shredded waste from the bottom of the pile in the storage building and took it to the pyrolytic reactor, or "the kiln." The kiln was basically a larger version of the kilns on the back of cement trucks. It was nineteen feet in diameter and one-hundred feet long, rotated twice a minute and was slanted at an angle. The shredded material entered the feed end of the kiln, while heated No. 2 oil (only 7.1 gallons per ton of waste) and air (40% of the amount of regular combustion) were forced in through the discharge side of the kiln. The material that was affected and changed composition is the pyrolyzed part. These pyrolysis gases rose up out of the feed end and were combusted in a gas purifier with more air. The temperature of these burning gases was to be 1,400 F, and they were sent to two boilers, generating 200,000 pounds of steam an hour.

Construction of the Baltimore Pyrolysis Plant began in January 1973, and the city even hired a graphic designer to "add pizzazz" to the sprawling structure that looked like "a Rube Goldberg original looming up there with its huge metal tepee, yellow silo, endless conveyors shooting skyward, spaghetti-like pipes, (and) bright orange graphics."²⁰⁵ But the plant was full of problems from the start:

Conveyors broke and clogged. The huge steel barn where garbage entered the plant collected so much carbon monoxide it was dangerous for workmen to stay inside. When trucks dumped trash, it clogged conveyors. A cooling fan didn't work. A trash feeder system jammed. When one part of the plant didn't work, the whole thing would have to shut down.²⁰⁶

A nine-month shakedown period took place in 1975, after which Monsanto said the plant could not live up to the contract. Besides the technical problems, the inability to adhere to Maryland's air quality emission laws complicated plant operations. The universally held conviction about the problems was that a scale-up of thirty times the original size was bound to have problems no matter how well the pilot facility had worked. At the end of 1975, Baltimore and Monsanto signed a supplemental agreement, forcing Monsanto to pay the \$4 million guarantee money. Soon afterwards the project got another one million-dollar grant from the EPA. Meanwhile, municipalities across the country were waiting to see what would happen with

Then the gases would be soaked with water and cooled, so they would not make columns of smoke when released. The solid material from the kiln that exited the discharge side was heated to 2,000 F and sent to a "quench tank" full of water (recycled water from the steam) that cooled the material, which was then sent through a screening process. Pieces that were bigger than four inches were to be stored for possible future recycling, and the smaller material was separated by a float system, which carried off the lighter material to be thickened into a dense carbon material that could be used later. The heavier small material was separated by a ferrous magnet and what remained was to be used to make glassphalt. Sussman, "Baltimore Demonstrates Gas Pyrolysis," 5, 7, 8, 9, 10; E.T. Bielski and A.C.J. Ellenberger, "'Langard' for Solid Wastes" paper presented at 1974 National Incinerator Conference, Resource Recovery Thru Incineration (New York: United Engineering Center: 1974) 331, 335, 336; Baum and Parker, Solid Waste Disposal, 19; Bill Compton Interview with author, Haysville, KS, 30 November, 2004; Baum and Parker, Solid Waste Disposal, 18.

²⁰⁵ Bill Peterson, "Baltimore's Trash Plant is Costly Failure," *Washington Post*, March 20, 1977, accessed from http://web.lexis-nexis.com.proxy.wichita.edu/universe/document?_m=00ebe6ca17f687d384ebc732039218b8&_docnum=49&wchp=dGLbVlz-zSkVb&_md5=3a788f58df37398bb593fc62b7c1c62c. (accessed July 28, 2006).

the plant. A sales manager for Monsanto said, "We get a lot of tire kickers, but most cities want to wait until the Baltimore project checks out."²⁰⁷ Before the new test runs in 1976, Monsanto's project manager said the company still thought they could make the project work. "If we didn't think it would work, we never would have invested the money ... The Baltimore plant hurt our marketing plans and cost us a pile of money, but we think in the long run it will be worth it. There's a huge market out there, and it's not just for burning and burying."²⁰⁸

The manager may have been right about the markets, but he would soon change his mind about the investment being worthwhile for the company. The kiln broke due to excess heat during test runs in May through July 1976. Even after everything was fixed to Monsanto's specifications, the company could not get the kiln to run for more than eighteen days. On February 1, 1977, Monsanto recommended that the plant be abandoned as a pyrolysis plant, and less than a week later the company pulled out of the project. Baltimore Mayor William Donald Schaefer called the company, "a bunch of common bastards [who] sold us a bill of goods."²⁰⁹ The city, which needed the plant to process its wastes, modified the plant into an incinerator, which opened in May 1979. An editorial in *The Sun* after the re-opening gave some amount of praise to the city and showed the resentment still harbored against Monsanto:

City workers have turned a monumental flop into at least a partial success story in getting the previously paralyzed pyrolysis plant back into production after the Monsanto Company had abandoned its defective brainchild ... In turning to practical-minded men in the city's own public-works department to get the plant running, Mayor Schaefer appears to have relied wisely on years of first-hand experience in handling large volumes of rubble.²¹⁰

²⁰⁶ Ibid.

²⁰⁷ "The Dollars Mount up for Resource Recovery," *U.S. News and World Report*, August 18, 1975, http://web.lexis-nexis.com.proxy.wichita.edu/universe/document?_m=7bdf53518bb5d8db55db69c640805ddc&_docnum=1&wchp=dGLbVlz-zSkVb&_md5=10aeffa01d44b2d4cece7ba41a50e0d (accessed on July 28, 2006).

²⁰⁸ Winslow, "Baltimore Optimistic," 12.

²⁰⁹ Peterson, "Baltimore's Trash Plant is Costly Failure."

²¹⁰ "From Paralysis to Pyrolysis," *The Baltimore Sun*--Final Edition (Microfilm Vol. 285, June 16, 1979--June 30, 1979) June 25, 1979: A10.

The plant was able to incinerate 600 tons of waste per day until late in 1980, "when major operational problems necessitated investment of additional capital. The facility was shut down and totally abandoned by the City as an acceptable method of solid waste management."²¹¹ The plant ended up costing \$26 million and would have a detrimental effect on the future of pyrolysis projects.²¹² After the plant's failure, MES Director Thomas Mckewen stated that, "Just the word pyrolysis makes people nervous."²¹³ This stigma would last through the end of the century. Furthermore, the plant was a reminder to cities of how costly failure could be to a budget. After Monsanto pulled out, Baltimore's Public Works Director stated that, "A city can't afford to experiment. Cities need a sure thing. They don't have money to throw away ... Solid waste is a sure thing. It isn't going to go away."²¹⁴

The Local Experience with Destructive Distillation

Bill Compton, who remembered destructive distillation from his high school chemistry class, thought pyrolysis *was* a sure thing. Born on July 31, 1923, Bill Compton grew up in Redfield, South Dakota, and joined the United States military in 1942, becoming a fighter pilot in the 5th Air Force, 58th Fighter Group, 69th Fighter Squadron, the "Werewolves." When he had finished the service, Compton used the GI Bill to finance his education, which he concluded at Emporia State University in Kansas. He studied chemistry, physics, math, and industrial technology, getting his Bachelor of Science degree in 1950. Ironically, in 1952 he went to work as a chemical researcher at Monsanto, which started the Baltimore plant the same year he became interested in trash. Compton and his wife Kathryn moved to Wichita in 1953, and he

²¹¹ Tyler E. Williams, Ed., Energy Efficiency in Buildings and Industry, Michael A. Gagliardo, "Baltimore's Resource Recovery History--Pyrolysis Demonstration to Proven Mass-Burn Technology" (Rockville, Maryland: Government Institutes, Inc: 1984) 513.

²¹² Ibid., 512.

²¹³ Omang, "Maryland Trying to Squeeze Usable Energy."

²¹⁴ Peterson, "Baltimore's Plant is Costly Failure."

went to work at Boeing as an engineer. Throughout his career, he would work at Boeing, Cessna, and his own Kaeton Engineering Co. and Bill's Repair, retiring in 1990.²¹⁵

Because of another proposed solution to the energy crisis, the basic process of destructive distillation, or pyrolysis, should not have been a foreign idea to the majority of Wichitans, either, by the late 1970s. From the beginning of the decade, the City Commission was seriously considering a coal gasification plant for Wichita. Whereas Bill Compton wanted to use destructive distillation to make use of the waste materials going into the landfill, the city wanted to use it, in the form of gasification, to turn abundant supplies of coal into a clean energy source. Just like the rest of the country, Wichita had been interested in the energy crises of the decade and was eager to be pioneers in finding solutions to the problem. In 1977, in response to President Carter's request for "National Energy Policy Recommendations," Grover "Skip" McKee, director of economic development for the City of Wichita, wrote:

The City of Wichita has, for the past six years, undertaken at the local level what the United States has, sadly, failed to do—formulate a rational energy policy. I can warn you that the task which now faces the National Government is not only difficult but is in some cases impossible. It is impossible simply because, for some of the problems inherent in energy shortages, there are no solutions ... At any rate, we have thought about the problem for the past six years, and ... we have started doing something about the energy problem when others have just talked about it, and what we are doing makes sense and works.²¹⁶

The gasification plant was projected to cost \$1.25 billion, which would have mostly been shouldered by the Panhandle Eastern Pipeline Company, the developer and operator of the proposed plant. In December of 1976, the commission announced that it would study the issue

²¹⁵ Ibid., 2.

²¹⁶ The idea of converting solid waste into an energy source was usually grouped with those "other" alternative sources. Grover E. McKee letter to James R. Schlesinger, "Re: National Energy Policy Recommendations," 14 March 1977, Coal Gasification Plant Box no.4 FF. 5, Wichita State University Libraries, Department of Special Collections.

for one year to decide whether the project was worth pursuing.²¹⁷ The people of Wichita handedly voted down the plant in March of 1978, but the public should have been familiar with the destructive distillation process, because they had been inundated with news about it. As one opponent put it, the "excess of zeal [for the gasification plant] ... has so infected the community, its news media and officialdom that critical examination, countervailing opinion and prudent observation have, in effect been overwhelmed."²¹⁸ So from 1972 until the nearly the end of the decade, while the city was undertaking their campaign for coal gasification, Bill Compton had been doing his own campaigning for the pyrolysis of solid wastes by writing candidates in local elections.²¹⁹ Support of one destructive distillation process did not necessarily lend itself to another, however. Whether or not Bill Compton was one of the "scientists and crackpots" Economic Director McKee was referring to, whom he said wished that "the laws of thermodynamics really can be violated," it is clear that the City did not think all forms of destructive distillation were equal, at least in terms of resource recovery.²²⁰ McKee said he did not "hold out much hope for significant break-throughs in the areas of solar, wind, geothermal, etc.," but "[supposed] that continued efforts in this direction are necessary, just to keep up the spirit of optimism" regarding the energy crisis.²²¹

With the public voting down the coal gasification plant, the city commission's "bold moves in the area of energy problems," did not pay off. The amount of confidence in the

²¹⁷ D. Bryan Hufford, The Ayes Have It, Wichita Water Department: A History 1882-1982, (Wichita, KS (?): Frank Wright Jostens, 1982 (?)): 96. available from <http://www.wichita.gov/CityOffices/WaterAndSewer/WWDHistoryBook/Chapter8/8-96.htm>; accessed July 17, 2006.

²¹⁸ Ted Brooks, "Letter to City Commission of Wichita: 60 Days of Cooling Off," 7 December 1976. Coal Gasification Files Box 1, FF 2, Wichita State University Libraries, Department of Special Collections.

²¹⁹ Compton, "The Institute for Resource Recovery," 5, Bill Compton Collection.

²²⁰ Mckee, "Letter to James Schlesinger," 14 March 1977. Coal Gasification Collection Box 4, FF 5, Wichita State University Libraries, Department of Special Collections.

²²¹ McKee, "Letter to Dan Glickman, Requested Comments on Nation's Energy Plan," 25 May 1977. Coal Gasification Collection, Box 4, FF 5, Wichita State University Libraries, Department of Special Collections.

commission to undertake a major public works project and the feeling that "our government's actions [on the energy crisis] have been more right than just about any other government's in the country," would not be seen again after failure of the gasification plant to pass. And the commissioner, who once said that, "we will be happy to reduce our commonsense approach to suggestions [from] federal legislation, if you desire. Otherwise, we will continue to go on our presumptuous, blunt, independent, but workable local energy policy," would have no choice but to carry on without much federal legislation in two years.²²² As the crisis ended, though, the commission would no longer need an energy plan, and, unfortunately for Bill Compton, they would not again be so daring. In her thesis on the politics of the solid waste disposal in Sedgwick County, Debbie Eiler said the local politicians

[reacted] to issues instead of addressing them. In the case of solid waste management, Wichita was able to avoid addressing long-term solutions for disposal, reduction, markets and environmental protection for more than twenty years while the problems (and trash) mounted. When pressed, councilmembers would consider the issues but did little addressing.²²³

Wichita was not unique in this change; with more programs and less federal support, cities all across the country became more gun-shy about spending tax money on possibly risky projects, a trend that has continued to this day, as politicians' careers hang on the line over the trash issue and "everybody wants to be the first to be second" to try a new project.²²⁴ Wichita and Sedgwick County would become even less involved, however, and public opinion over government intervention in the trash business would create a situation where politicians were eventually able to avoid the trash issue almost entirely.

²²² Connie Ames Peters comments at City Hall, 5 February 1977, Coal Gasification Collection, Box 4 FF 2, Wichita State University Libraries, Department of Special Collections.

²²³ Debbie Eiler, "The Social and Political Ecology of Trash: Historical Decisions in Solid Waste Management for Wichita and Sedgwick County" (Masters Thesis in Public Administration, Wichita State University, 1996), 89.

²²⁴ Hansen, "Turning Trash into Energy," 23.

Privatization

The anomaly of the Wichita garbage story is the hands-off approach that local government has taken towards trash collection. The city was picking up trash at about 21,000 households in 1978. The sanitation department at the time had 72 employees, 55 of whom were haulers. Five dollars a month was the city's collection fee, as well as the average fee for the approximately forty somewhat sizeable private haulers in the city at the time. The fee was not enough to cover the cost of hauling the garbage of the city's widely-spread 21,000 customers, however, and the department had amassed a debt of \$50,000, as well as a hefty laundry list of equipment requests and repairs.²²⁵ According to John Davis, who was in charge of solid waste for the Wichita/Sedgwick County Department of Community Health from the 1970s to the 1990s, only three of the trucks were less than ten years old,²²⁶ and most "were so decrepit that they only sold as junk when the city went out of business. Also, when we did our annual inspections, if the truck was on a slope the police would not stand behind it to check out the lights!"²²⁷ The private companies, not surprisingly, did not like competing against the city's fleet of trash haulers, which had more ability to go into debt to keep fees low. In 1978, the same year that the New York garbage haulers went on strike, Wichita garbage men tired of having their old trucks break down. The undesirability of the work has always put a high premium on garbage collecting, and when the city could not offer employees adequate equipment, attitude and efficiency suffered beyond what the city could afford to repair. "Attitude (of the haulers) was more of the 'take this job and shove it' approach," said Davis. "Workers were paid a full eight hours, whilst the routes took only three or four - so incentive to go out of one's way was

²²⁵ Craig Stock, "Campaigns for Trash in Offing," *Wichita Eagle* (28 September 1978): 1C, 3C.

²²⁶ John Davis e-mail to author (21 November 2006).

²²⁷ John Davis e-mail to author (22 November 2006).

limited,”²²⁸ especially when equipment was bound to be more of a problem than work ethic. Workers called in sick when temperatures broke the hundreds, and garbage was not collected in some parts of town for three weeks. Enough local citizens switched to private haulers during this time that the City decided to get out of the waste management business by 1979 instead of updating their equipment. A district plan was proposed to divvy up the city between 38 local haulers, but the city commissioners and especially the smaller haulers fought off the plan in favor of a completely unregulated market. The immediate effect was that more Wichitans began taking their trash cans and carts out to the curbs themselves. Childers Trash Service, which had 14,000 customers—the largest private hauler in the city, was typical of other haulers in 1979, raising the rates for backyard service but lowering their prices for customers willing to do some of the work themselves. Backyard service required about four times more gas and labor time per pickup, so the price difference was significant: the old price for backyard service from Childers was \$15 a quarter; the new rates were \$18 for backyard and \$12 for curbside service.²²⁹ Since the time of privatization, local citizens have remained adamant about keeping trash service privatized, according to Susan Erlenwein of Sedgwick County’s Environmental Resources. Erlenwein speculated that Wichita is perhaps the only major city in the country that does not have a contracted or government-run trash service. The unique clout of private haulers would have significant impacts on future trash decisions and make Compton’s dream of a Wichita pyrolysis plant particularly unlikely.²³⁰

²²⁸ Ibid.

²²⁹ Julie Charlip, “Trash Rates Climb 20% this Year,” *Wichita Eagle* (30 March 1979): 1C. Jean Hays, “Paying More, Getting Less,” *Wichita Eagle* (2 February 1997): 1A.

²³⁰ Author’s interview with Susan Erlenwein, 12 July 2006.

Compton's Batch Plant

Despite the change in political atmosphere, the trash situation, and the end of the energy crises, Bill Compton was still determined to do something about huge quantities of recoverable material heaping up in the local landfill. In November and December of 1980 he created a small pyrolysis batch plant to "experiment, learn and demonstrate."²³¹ The batch plant "produced carbon, industrial gas, methyl alcohol, acetic acid, asphalt cement, and organic ash from trash."²³² The experimental batch plant had a converter or gasifier—made from the saddle gas tank of a truck—that would hold one hundred pounds of organic solid waste. The converter had an outlet on its lower half for carbon (char) to escape and was heated underneath with a wood fire to the optimal temperature of 650 degrees Fahrenheit. What did not turn into carbon, turned into gas, which went up and cooled through a pipe containing water. The gas then went to a condenser, where it separated into one of two areas. The gas that did not convert to liquid after cooling off went to a low-pressure gas recovery area, where it then went through a pump and ended up in a high-pressure gas storage container, which held one hundred pounds of gas per square inch. The gas that did turn into liquid product (oil) after cooling off went through a trap, after which it could be held until processed without re-gasifying.²³³ Compton, to his wife's chagrin, used their bathroom scale to weigh the products the plant produced. "You only put a hundred pounds of trash in the top of it; then, after 18 hours you'd get your gas and your oil, and then you'd have to take the carbon out of the bottom, but it worked!"²³⁴ Anyone who saw the hodgepodge of tanks, barrels, pipes and hoses must have been impressed with the products that came out of it. Compton operated his batch plant until August of 1984. By then, another

²³¹ Compton, "Institute for Resource Recovery" Handout, 5, Bill Compton Collection.

²³² Ibid.

solution, the same one that had gripped the rest of the country, would have captured the hearts of most of those concerned about trash in Wichita.

Recycling Comes to Town

Because he "wanted to learn something about what the hell [was] going on,"²³⁵ Bill Compton paid \$10 and filed for the Wichita City Commission primary race in 1983, campaigning on a trash conversion program. It had been about ten years since Compton founded his local Institute for Resource Recovery, which promoted "scientific investigation and advancement for relieving our Nation's waste disposal problems."²³⁶ Besides its leader, the group consisted of a small bunch of supporters who backed Compton in his thinking, discussing, educating, lobbying, and experimenting with trash disposal. Compton had decided to add politicking to his list of efforts. Soon after he entered the race, though, he was sure he would not win. He stayed in it to learn and befriended his opponent Tony Casado, who was Wichita's Mayor in the late 1970s and the 1980s. Later Compton called on his old political rival to borrow a copy of the \$200 Wichita-Sedgwick County Waste Disposal Study. Compton called the study "2,000 pages of gobblety-gook" but admitted that he did learn things to develop ideas about different processes. It was in that study where Compton became familiar with the Baltimore Pyrolysis Plant, which was the only mentioned pyrolysis process in the book. That encounter would be the first of many for Compton, who continuously argued to nay-sayers that the Baltimore plant "was not a pyrolysis plant in any sense of the word or process."²³⁷ Of course,

²³³ Institute for Resource Recovery, "Resource Recovery Pyrolysis Project Experimental Batch Plant" February 92, Figure 1EX, 10; *ibid.* Figure 1AEX, 11, Bill Compton Collection; Compton, "Solid Waste Conversion Project," 2, Bill Compton Collection.

²³⁴ Compton Interview.

²³⁵ *Ibid.*

²³⁶ "The Institute for Resource Recovery," handout, (ca. 1990), Bill Compton Collection.

²³⁷ Bill Compton letter to Mary Lamberton, 6 June 1998, Bill Compton Collection. Angie Gumm, "Bill Compton and his Pyrolysis Plant: The Story of a Man Ahead of His Time," 10 December 2004, Bill Compton Collection.

the problems with the Baltimore plant were mechanical problems, largely on the front-end of the process and not necessarily with the Langard pyrolysis system, which worked effectively in the pilot plant stage. The Baltimore plant was important as an example of large scale, high-tech waste disposal failure, and one that, rightfully or not, shared the name of Compton's proposed process.²³⁸

After Compton lost the primary, he continued to study the solid waste issue and lobby for the Wichita—by this time—City Council, to switch from a landfill to a pyrolysis plant for its trash. Compton was also making plans to build a bigger model than his batch plant to prove the workability of pyrolysis. Despite the national interest in resource recovery in the 1970s, Compton still encountered many people who were amazed that or did not believe that pyrolysis could work. He wrote in a response letter to Joseph Gilbert, the Vice President of the Society of Automotive Engineers, that he had "determined that folks just didn't understand ... The prospect of making thousands of tons of useable materials from heaps of trash is difficult to comprehend."²³⁹ Furthermore, Compton believed the only thing that kept him from building a plant able to process the thousands of tons of waste was that "I lack financial resources to put

²³⁸ The Baltimore Plant would continue to be a source of consternation for Compton. In a 2000 letter to the *Wall Street Journal*, Compton wrote indignantly of the name, "Why anybody learned in the disciplines of science and technology would so vehemently give a process a false name--is questioned. That person was [an] employee of the United States Department of Energy--a public servant." Bill Compton Letter to Carol Muller (Ed. Office of the *Wall Street Journal*), 9 March 2000, Bill Compton Collection. According to Dr. Robert C. Brown, who operates Iowa State University's pyrolysis plant: "If a little air is added [to the conversion process] it is called gasification and produces mostly flammable gas. If excessive air is added, the process is simply combustion producing hot flue gas. Some facilities gasify but immediately add excess air downstream and it is really just a two-staged combustor. That describes the Baltimore plant." The Baltimore plant was not pure pyrolysis, but it has elements of pyrolysis and was considered to be a pyrolysis plant then and is still (by pyrolysis consultants). Additionally, the main problem of the plant, the scale-up would be just as much on an issue for any plant. The Baltimore Plant's problems were mechanical and not with the process, which was hardly ever practiced. Pure pyrolysis would not be exempt from these problems. Finally, this is one of the times when there are more important things than the engineering. If people perceive no difference between a failed plant and a new one, it will have a difficult time getting implemented. Technical information from Robert C. Brown e-mail to author, 22 March 2006.

²³⁹ Bill Compton, Letter to Joseph Gilbert, 13 July 1983, Bill Compton Collection.

such a plant together."²⁴⁰ In 1987, after reading Frederick Jackson's book Energy from Solid Waste, Compton wrote the author about the Garrett Pyrolysis Process, which had been used in San Diego in the 1970s. He told Jackson that he provided "ample information for the casual reader. However, I need to know more specific [details] of the plant."²⁴¹ This information included the size of the shredder, the air classifier data, the converter, product recovery and product enhancement. And in 1988, Compton wrote a letter to Wichita City Councilman Gregg Ferris, Sedgwick County Commissioner Bud Hentzen, and Donna Hinderliter, of the Plains Keepers Society, who had recently written a letter to the *Wichita Eagle and Beacon* called, "Trash Burning Not Best Disposal Option." In the letter, Compton stated, "I propose to draft a prospectus of how a conversion plant might be built ... I will provide my services at no charge. All I would ask is that funds be provided to underwrite the expenses that would be incurred to put it all together. Some additional basic research may be required."²⁴²

He also wrote a letter to Governor Mike Hayden asking for support. Hayden's secretary Stanley Grant responded that the Kansas Department of Health and Environment (KDHE) was interested in "a number of approaches to the handling and treatment of solid waste," adding that the KDHE—like just about every other state in the nation at the time—was looking into "waste minimization" via "recycling and the use of returnable containers."²⁴³ Compton made a note on the received letter that "None of my recent letters mentioned a word about the pilot plant."²⁴⁴ Perhaps, though, Grant was remembering previous requests Compton had likely made, because the government official wrote that to develop and build a pyrolysis pilot plant, "would require the expenditure of a considerable amount of funds," which the department did not have. "Should

²⁴⁰ Ibid.

²⁴¹ Bill Compton letter to Frederick R. Jackson, 24 August 1987, Bill Compton Collection.

²⁴² Bill Compton letter to Gregg Ferris, Bud Hentzen, and Donna Hinderliter, 15 December 1988, Bill Compton Collection.

the department receive funds,” the letter continued, “for research or development projects of this type in the future, proposals would be [solicited] from all interested parties. However, such funding is not likely in the near future.”²⁴³ Even if it were, like Grant said, the state was interested in recycling. As we have seen, so were the American people, especially as a reaction to high-tech, large-scale solutions. Any research funds for waste projects in Kansas in the 1980s and 1990s, probably would have gone toward a recycling technology like a materials recovery facility (MRF), which the *Wichita Eagle* called the “high-tech” solution to the trash problem offered by the waste consultants the city had hired. A MRF (pronounced “murph”) can either be a center where trash is hauled and recyclables are separated by trained professionals, or where metal and glass are removed and the rest of the waste is turned into something useful like fuel pellets, fertilizer or compost. The consultants thought a MRF could divert 38% of Wichita’s waste, but the idea did not catch on, probably because a facility that big was estimated to cost between \$40 million and \$100 million. Wichita had a small MRF in 1990 that only operated for three months. Another Kansas MRF, located in Galena in the southeast corner of the state, closed within six months of a story the *Wichita Eagle* wrote about it; the story’s title was reminiscent of the old resource recovery articles: “Panning for Gold in the Muck: Processors Try to Make a Buck out of Your Garbage.”²⁴⁶

Still, nothing like the old enthusiasm for resource recovery was going to be seen in the last two decades of the millennium. While one of the two MRF types was fairly technological in nature, it was still rooted in recycling and source separation by humans instead of by a machine.

²⁴³ Stanley C. Grant letter to Bill Compton, 30 January 1989. Bill Compton Collection.

²⁴⁴ Ibid.

²⁴⁵ Ibid.

²⁴⁶ Jean Hays, “Dirtying our own Nest Nest: Wichita Looks for Alternatives to Landfill, but Costs and Politics Complicate Choices,” *Wichita Eagle* (4 October 1992): 3C, accessed from Newsbank; Jean Hays, “Home on the Range Running out of Room to Take out the Trash,” *Wichita Eagle* (25 February 1990): 10M. Jean Hays,

Using his experience after the Baltimore Pyrolysis Plant to write about the national situation, Abel Wolman, of Baltimore's Sanitary Engineering Department, wrote in 1978 that,

never in recent history has the public been so aroused as to press for recycling waste matter, e.g. cans, bottles, newspapers, rags. For a long time, the only recyclers were the city departments and the itinerant collector, now almost extinct. The concerned citizen has the stage at this moment. How long his interest will last is unpredictable. While it does the pressure for recycling may go on.²⁴⁷

Although Wichita had no great flop like Baltimore did to veer it toward recycling in the 1970s, to the disappointment of Bill Compton there was a growing local interest in the issue by the end of the next decade.

The number of recycling centers in Kansas went from 43 in 1983 to 400 in the fall of 1991.²⁴⁸ Wichita did not have a recycling program until the summer of 1990. Despite its late entry into the recycling game, Mayor Bob Knight said he hoped Wichita would be “an eco-city by the turn of the century, a model for other metropolitan areas.” As the *Wichita Eagle* remarked, “Wichita has some catching up to do.”²⁴⁹ By that time, there were already 1,500 cities across the country that had curbside recycling and another 1,000 cities had community composting.²⁵⁰

In 1989, a 27-member recycling task force on solid waste that became the Citizen's Recycling Committee developed a three-part recycling plan for the Wichita. The plan suggested a three-month public awareness campaign, ten drop-off sites that collected plastics, glass,

“Panning for Gold in the Muck: Processors Try to Make a Buck out of Your Garbage,” *Wichita Eagle* (23 February 1992): 1C, accessed from NewsBank.

²⁴⁷ Wolman, “Future Trends,” 340.

²⁴⁸ Jean Hays, “Recycling Faces Two Daunting Hurdles,” *Wichita Eagle* (10 November 1991), 1D, accessed from NewsBank.

²⁴⁹ Jean Hays, “Earth Day isn't over for Wichita Officials,” *Wichita Eagle* (14 May 1990), 1C, accessed from NewsBank.

²⁵⁰ *Ibid.*

aluminum cans and paper, and eventually, a city-sponsored curbside recycling program.²⁵¹

Compton served on the task force and was frustrated that the committee was bent on traditional recycling. "My suggestions and motions to recycle all solid waste were completely [opposed]—rejected," he said.²⁵² In a speech at the local Recreation Vehicle Industry Association meeting, Compton said of the task force "every time they talk about saving the landfill I propose eliminating it ... Recycling to me is just a high class way of spending a lot of money for nothing."²⁵³ The recyclers were proposing to extend the life of the landfill by diverting some of its waste stream. By 1991, Brooks Landfill had 7.8 million tons of trash in it and was growing at a rate of 1,600 tons a day.²⁵⁴ When asked by Wichita State University History Professor Dr. Craig Miner to elaborate on the "high class" comment, Compton said that, "We spend a lot of time talking about how we are going to do things, and what we are to pick out of trash -- i.e. cans can't have labels on them, bottles have to be separated by color, etc. They are so selective that it only diverts about 2/10 of one percent of the actual material."²⁵⁵

Roger Grund, who was director of Homeowners Trust, a local anti-tax group funded by Wichita businessman Willard Garvey, had asked Compton to be on the recycling committee.²⁵⁶ When Grund introduced him at the RVIA meeting he said that the Institute of Resource Recovery had applied for tax exempt non-profit status so Compton could "get a study completed and get funding for a \$50 million resource recovery plant."²⁵⁷ The city's plans at the time to

²⁵¹ Stan Finger, "City Tackles Trash Problems: Task Force Finds Ways to Simplify," *Wichita Eagle* (29 December 1989), 1D, accessed from NewsBank.

²⁵² Bill Compton letter to Gary Gibbs, 22 November 1998, Bill Compton Collection.

²⁵³ Wichita Recreational Vehicle Industry Association, Agenda #117, "Speaker: Bill Compton -Topic: Put an End to Landfill," April 30, 1991: 3. Bill Compton Collection.

²⁵⁴ Jim Lynn, "Landfill Presses for Solution," *Wichita Eagle* (7 February 1991): 1D, accessed from NewsBank.

²⁵⁵ Wichita Recreational Vehicle Industry Association, 4. The records from the Recycling Committee have actually been recycled, so the author was unable to look at minutes or records from the meetings.

²⁵⁶ Bud Norman, "Roger Grund Tried to Keep Politicians' Feet to the Fire," *Wichita Eagle* (17 March 1992): 1D, accessed from NewsBank.

²⁵⁷ Wichita Recreational Vehicle Industry Association, 1.

expand Brooks Landfill were estimated at over \$92 million.²⁵⁸ The curbside collection proposed by the recycling committee was estimated to cost tax-payers an additional \$12 million, besides the cost of the solution to the Brooks Landfill which would need to be addressed by the middle of the decade.²⁵⁹ Compton said that the purpose of the Institute, which had been a vehicle to discuss solid waste and educate the public about pyrolysis, was "to generate funds to underwrite the cost of developing a detailed engineering plan for a resource recovery plant to dispose of all our solid waste (including refrigerators, mowers, wood, etc.) and eliminate the landfill."²⁶⁰ This change in purpose reflected the increasing sentiment in Compton's attitude that if pyrolysis was going to become Sedgwick County's disposal method of choice, he was going to have to be the one to promote it and probably bring it to fruition. He asked the speech attendees for contributions of up to \$200 a piece, so he could raise \$6,000 to develop a detailed draft plan. Miner asked if the plan would be turned over to a city engineer for evaluation, and Compton responded somewhat vaguely, "For this plan to work you have to get the people, government, and private industry interested and involved to avoid special interest groups."²⁶¹ Whatever his intentions were, it did not seem that Compton was considering handing over his plans to any one particular body.

Compton's counterpart in the recycling movement was Margaret Miller, who was four years his senior and had been an activist only slightly longer than Compton. More of an environmentalist rather than a conservationist like Compton, Miller campaigned against nuclear energy, for lower utility rates, and co-founded Citizens for Recycling. "The ideas that I've had

²⁵⁸ Jim Lynn, "Landfill Presses for Solution," *Wichita Eagle* (7 February 1991): 1D, accessed from NewsBank.

²⁵⁹ Jean Hays, "Earth Day Isn't Over for Wichita Officials," *Wichita Eagle* (14 May, 1990): 1C, accessed from NewsBank.

²⁶⁰ *Wichita Recreational Vehicle Industry Association*, 1.

²⁶¹ *Ibid.*, 5.

for maybe 20 years are now coming to the forefront,” she said in 1990.²⁶² The Daughters of the American Revolution Conservation chairman who approved an honor for Miller stated that she “has been a veritable dynamo in recycling, working with legislators and other conservation areas.”²⁶³ Compton could certainly be considered a “dynamo” with his pyrolysis efforts, as well, but he did not work “with” legislators: he wrote to and lobbied them. Compton did not have the luxury of having a popular environmental movement behind him like Miller did. His certitude and independent resolve were probably a mix of his own stubborn personality and years of struggling with little success to show for his efforts. Although he had a great amount of experience and was well-educated, Compton had a rube-like quality, which was endearing to those who knew him—often earning him their fierce loyalties. That characteristic along with his focus and immovability, probably reminded the politicians he continuously pestered of a gadfly that had to be dealt with instead of a serious conservationist they ought to be working with. Of course, the fact that resource recovery was so out of fashion at the time would have made Compton’s agenda nearly impossible for even the most polished lobbyist.

A Plan for the 21st Century

The line between attention to detail and micro-managing can be a fine one, but Compton did seem to approach his pyrolysis plans with an increasingly autocratic attitude. In October of 1991, Compton sent Governor Joan Finney an eight-page "Resource Recovery Project Bill" he had written. Compton wrote of landfills that "there is not material recovery—monetary or other, from this buried waste material. This is a debit to our economy," a debit that with resource recovery could be turned into a "credit."²⁶⁴ The goal of the project was to "receive all waste

²⁶² Brad Stilwell, “DAR Honors Longtime Conservation Activist,” *Wichita Eagle* (8 November 1990): 11N, accessed from NewsBank.

²⁶³ *Ibid.*

²⁶⁴ Bill Compton letter to Joan Finney, October 21, 1991,1, Bill Compton Collection.

generated and convert it to useable industrial materials that have free market value."²⁶⁵ In a letter sent with the bill, Compton identified the people who would likely be dealing with the project as: project engineers, cost engineers, finance managers, bond counselors, trustees, paying agents to redeem bonds and bond interest coupons, and a certified public accountant. He advised the Governor that said people ought to be "well-versed on the matter of resource recovery," and that proximity to highways and railways ought to be taken into consideration. Compton's estimate was that a pyrolysis plant that could process 2,000 tons of waste per day would cost about \$45 million. He estimated, though, that revenue from the carbon, oil and gas that would be produced, along with an \$8 per ton user fee would generate \$20 million annually. Speculating that it would cost upwards of \$13 million a year to operate the plant, that would leave at least \$7 million to pay for the cost and interest.²⁶⁶ The bill allowed for private funding to be used for the project with the endorsement of the state, so that waste disposal would no longer be the responsibility of single city and county governments. It also gave all local governing bodies the power to authorize land use for the operation of the resource recovery project.²⁶⁷

The methods and processes to be employed are not new to us. It is only the concept that might be considered [innovative]. The technology employed is conventional and consistent with current processes employed in our various industries ... Nothing is really new. The equipment is just used in another way for another process and purpose. The applied technology gives it all meaning and substance.²⁶⁸

Soon after he sent the bill, Compton made a map called "Metropolitan Areas Suitable for Resource Recovery Projects" that divided the central and eastern counties of Kansas-the areas that he thought could profit from the bill-into four resource recovery zones. In the bill itself, he

²⁶⁵ Ibid., 2.

²⁶⁶ Ibid., 3.

²⁶⁷ Ibid., 4; "Proposed Enactment for a Resource Recovery Bill," November, 1991, 6, Bill Compton Collection.

took the liberty of including spaces for the legislative bodies and the governor to sign the bill into law.²⁶⁹ He closed his letter by stating that, "It is hoped that this meets with your approval. Such a project, or projects, would go a long way toward bringing Kansas into the 21st Century."²⁷⁰ The bill apparently did not meet with the Governor's approval, and Kansas would eventually enter the 21st century without a pyrolysis project. Thanks to Bill Compton, though, the state would have a pyrolysis plant for a little while before the end of the century.

²⁶⁸ Compton letter to Finney, 21 October 1991, Bill Compton Collection.

²⁶⁹ "Metropolitan Areas Suitable for Resource Recovery Projects," 2 January 1992; "Resource Recovery Project Bill," 8, Bill Compton Collection.

²⁷⁰ Compton letter to Finney, 21 October 1991, 4, Bill Compton Collection.



Bill Compton teaches about pyrolysis and raises money for his future plant at the Wichita Earth Fair. (April 25, 1992)

CHAPTER 5

A PYROLYSIS PROCESS OF OUR OWN: BILL COMPTON BUILDS A PILOT PLANT AND LOCAL TRASH GETS CONFUSING

May 28, 1992, marked an important day for the Institute for Resource Recovery. After researching and studying specific pyrolysis processes, Bill Compton sent out a memorandum to "Contributors and Interested Parties," saying there would be a meeting that day to determine how the Institute could fund a portable pyrolysis pilot plant. "I laid out the plans of what I planned to do and how I was going to do it, and the cost to build it was around \$100,000 or so."²⁷¹ Gary Gibbs, Carl Harris, Carl Compton (Bill's son), John Savute, Brad Hamill, and Ken Flanders, all who had seen Compton's batch pyrolysis plant work and wanted to know more about it or believed that the pyrolysis of MSW was something the public ought to see, came to American Legion Post #401 that night to hear what Compton had to say.²⁷² The men, especially Compton's friend Gary Gibbs, supported the construction of the pyrolysis plant, but knew that \$100,000 was probably not a reasonable financial goal. After a "lengthy (inspirational) give and take discussion," it was decided that the plant could be built out of salvaged materials for \$8,000 to \$10,000.²⁷³

Compton had taken what he had learned from his batch plant and had been working and reworking his ideas since he had stopped operating it in 1984. In March of 1990, he took his project ideas to Wichita State University Design Engineer Russel Pinkerton to evaluate. Pinkerton stated that there were a number of kinds of pyrolysis and that as the process of trash disposal Compton was proposing, "does not require a large amount [of] material to go to the landfill it has a great deal of value when compared to the combustion processes that are being

²⁷¹ Bill Compton interview by author, tape recording, Haysville, KS, 30 November 2004.

²⁷² *Ibid.*, 3.

used ... by having a variety of end products your process will have a more stable source of income as compared to a combustion process that has only one end product."²⁷⁴ He also said, however, that like "all technical processes" Compton's plan had some negative aspects. Unlike the designers of the 1970s, who were caught off guard when their full-scale disposal plants did not work as smoothly as the pilot plants, Pinkerton advised that Compton had to expect difficulties if the plant were to be made big enough to process all local waste. "Even if your pilot plant has been quite successful further scale up difficulties will occur. Anytime a project such as this is built on a large scale problems will occur and the question that I would ask is what size of facility is appropriate for your next unit."²⁷⁵ He also questioned the easy markets Compton had predicted for the sale of materials taken from the front end—the inorganic materials that would be taken out before pyrolysis—and said that the exact pyrolysis process he planned on using was unclear and that it would be best to pick an already investigated process. Pinkerton did say, though, that, "I do not think that the negative aspects should be considered as sufficient reason to not proceed on your pyrolysis project but rather as points that should be investigated and eliminated or accepted."²⁷⁶ Surprisingly—like Compton himself who viewed their impact as minute and inconsequential—the report did not make any speculations about dioxin emissions or other pollutants, which had and have been a major obstacle for WTE plants.

Despite twenty years of work, Compton had not gathered much public support, and the status of pyrolysis in Wichita was, in a way, fully exposed at the American Legion meeting. People who saw the batch plant had been impressed, but that impression seems to have been temporary or at least did not translate into an endorsement of a full-scale pyrolysis plant to be the

²⁷³ Compton interview with Author.

²⁷⁴ Russel Pinkerton letter to Bill Compton, "Analysis of Pyrolysis Proposal," 23 April 1990, Bill Compton Collection.

²⁷⁵ Ibid.

solution for the city's solid waste problems. Compton often blamed the lack of support on a lack of knowledge, but Debbie Eiler said that a large-scale, hard technology solution just would not fit in well with the dynamics of the city. "Both because of the initial up-front cost risk and the cultural preference for small business enterprise, the Wichita community regime ... [resists] schemes of highly technical large capacity combustion operations," she wrote.²⁷⁷ If ignorance had been the only problem, more people who had seen the batch plant operate surely would have come to support the next phase of Compton's plan. Wichitans were not completely adverse to high technology, though. Although they had ultimately voted it down, public enthusiasm had been high for the coal gasification plant for a while; that was certainly a high technology project.

Eiler was certainly right about the preference for small business enterprise, however. The incredible clout that independent trash haulers have had on the "Wichita community regime" has been a force to reckon with for nearly three decades. Even though numerous studies and examples from almost any other city in the nation have shown that citizens could have cheaper pick-up rates and the city or county would be able to implement curbside recycling or other alternative disposal programs if trash were franchised, Wichitans have repeatedly balked at the idea. "I doubt you would allow local government to decide that only one hair salon or one pizza parlor or one landscaper is allowed," said a local lawyer about the idea of franchising trash.²⁷⁸ Joe Williams, of the Solid Waste Association of North America, said that the haulers have "too much control" over the local situation. "I think the question the government needs to be asking itself is what's best for the citizens of Wichita versus what's best for 22 haulers ... How do you

²⁷⁶ Ibid.

²⁷⁷ "The Social and Political Ecology of Trash: Historical Decisions in Solid Waste Management for Wichita and Sedgwick County" (Masters Thesis in Public Administration, Wichita State University, 1996), 85, 86.

²⁷⁸ Steve Painter, "Legislators Hear out Local Trash Haulers," *Wichita Eagle* (15 Mach 2002): 1B, accessed from NewsBank.

protect those 300,000 people?"²⁷⁹ No local leaders have acted at the behest of the community, which has seemed to appreciate the free enterprise and not wanted to run the smaller haulers out of business. Of course, as we will see later, the hands-off approach has made the area particularly vulnerable to the whims of the two national haulers. Nevertheless, if the local government has no say over where waste haulers must deposit their garbage, there is no way to guarantee the amount of garbage to justify a large-scale waste facility plant. Additionally, there was the fundamental obstacle of high-technology solutions just not being popular in the early 1990s, when Compton became determined to make his pilot plant.²⁸⁰

Bill Compton and His Pyrolysis Plant

The local people who believed in pyrolysis were the same people who believed in Bill Compton. When Compton needed help with his batch plant, Gary Gibbs, Compton's friend and part of the core group that would continuously support him said, "Bill, I don't know what the [hell] you are talking about, but I will help you."²⁸¹ Others, like Haysville's head librarian Betty Cattrell, who became a member of the Institute for Resource Recovery (IRR) and helped research existing pyrolysis efforts, supported the process because she had seen it work, but also because of Compton's sincere intentions and dedication:

It's like a lot of people we write off as eccentrics, because their ideas are so different, and because outwardly Billy appears to have no ambition to be famous or to get rich. He just loves the idea of thinking these things up and seeing them materialize and work. That's the engineer in him I guess. That's the only satisfaction he looks for in it. It's kind of refreshing. The only reason he pursued it was to benefit the community-not to put money in his own pockets.²⁸²

²⁷⁹ Amanda O'Toole, "Wichita' Waste-Other Cities Collection Fees are Lower," *Wichita Eagle* (4 June 2006): 1A, accessed from NewsBank.

²⁸⁰ For more about recycling eclipsing WTE as the national preference for solving the garbage problem, see chapter three.

²⁸¹ Bill Compton letter to Gary Gibbs, 22 November 1998, Bill Compton Collection.

²⁸² Betty Cattrell interview with author, Haysville, KS, 3 December 2004.

Salvation Army Major Laurence McPherson, whose contributions of material from the Salvation Army store in his charge were "most notable," also "did not understand the technical principles involved. However, he did recognize the overall [advantageous] implications to our community."²⁸³ McPherson must have believed that Compton would create the "advantageous implications to the community." He probably would not have so willingly helped someone whose process he did not understand if he did not have faith in the person. This faith along with the material support and encouragement of his friends, and his own scrappy determination were enough for Compton to complete his plant.

The plan was for the pilot plant to continually process waste material, and to use it "to conduct research and give public demonstration as to the viability of the process and application for remedy of our massive solid waste disposal problems."²⁸⁴ Like the batch plant, the pilot plant would also be able to process one-hundred pounds of material in a ten-hour period, and it was also made up of a variety of salvaged pieces, barrels and pipes. It was to be much larger and far more complex than the batch plant, though, so it could be subject to a wider range of experiments. Construction started on November 9, 1992.²⁸⁵ Gibbs got his company, Belger Cartage Service of Wichita, to donate a 55" section of flue for the reactor. "So I got a piece and made a design for a reactor and tubed the end and stuff, and damned if they (Belger employees) didn't build the whole thing for me. Then of course, I had to build the rest, but at least we got that

²⁸³ Bill Compton Interim Report to the Consortium, "Pilot Plant-Pyrolysis Demonstration Project," 26 August 1993, 6, Bill Compton Collection.

²⁸⁴ Bill Compton letter to the Consortium, "Pilot Plant Project for Destructive Distillation of Trash (Pyrolysis) and History in the Making," 19 November 1994, 1, Bill Compton Collection.

²⁸⁵ Note on Announcement Memorandum 28 May 1992, Bill Compton Collection.

done. That was a big project."²⁸⁶ The plant was finished and ready for its first run in Compton's backyard on August 12, 1993.²⁸⁷

In the first test run, the plant did not succeed. Compton put wood chips into the feed tube, but he could not get them shoved down into the reactor. After this, the structure was "beefed up." At first it seemed to work, but the plunger jammed in the injector when the wood chips were sent down the feed tube. Compton partially dismantled the machine, and decided to run it without the feed injector, so he could see what else needed to be fixed while he had it disassembled. On August 18 at 7:15 a.m., he tried again, loading the plant with wood chips, whole newspapers, and some assorted plastics. By 10 a.m., some crude oil had started coming out of the plant, and by noon about two gallons of oil had come. Product kept coming out of the plant until 5:30 that evening, when the heat was shut off and the liquid trap was drained. When he opened the reactor the next day, he found that the machine had stood the test run well, and the materials he had put in that had not reached the burner were in a "state of carbonization," which meant they had not completely reduced to carbon but had started the process. Compton concluded that the first run of the plant was "reasonably satisfactory in that the basic principle-Physical-Chemical process, worked. Mechanical problems encountered were not severe as to stop the test."²⁸⁸

The next test run, which apparently happened the following spring, would become the most infamous story in Compton's pyrolysis repertoire; probably because it so nicely encapsulated his views on government bureaucracy. Because of a problem with a valve, a large amount of black smoke poured out of the plant that day. Compton said he stopped the smoke "in

²⁸⁶ Compton interview.

²⁸⁷ "Update on Bill Compton's Pyrolysis Project," *Werewolves Newsletter*, 69th Werewolves Reunion Association. v. 8, n. 3, May 1995: 10, Bill Compton Collection.

²⁸⁸ *Compton Interim Report to the Consortium*, 26 August 1993, 4, Bill Compton Collection.

a couple of minutes," but one of his neighbors thought there was a fire and called the fire department. The firemen drove up into Compton's yard and asked if there had been a fire. Compton said, "I just told him what I was doing and explained to him the process...I showed it to them, so they could see it. I even gave him information-written information-of how it worked and what I was doing, and they didn't cite me or anything."²⁸⁹ Compton says when the men got back to the fire station, they must have decided that he was operating an incinerator, and they notified the Sedgwick County Health Department, who sent out an inspector while Compton was trying to fix the original valve problem.

He says, "I just got a call from the fire department, and they tell me you have an incinerator out here." I says, "What do you mean?" He says, "They say you got an incinerator." And I say, "No, I've got a pyrolysis plant here." Well, I couldn't fire it up to show him how it works, so I explained to him what had happened earlier. I asked him, "Do you know about pyrolysis?" And [he said] "Oh sure! I know all about it." Turned out to be a crock. Anyway, I explained it to him, and he didn't cite me or anything.²⁹⁰

Despite the tutorial, the Health Department Official called the KDHE, who wrote Compton a letter saying he needed to apply for an incinerator permit and send \$25 with the application. Compton wrote them back that he had a pyrolysis plant not an incinerator. According to Compton, the KDHE wrote back that they were going to "fine him and send him to prison" for running an incinerator without a permit. They finally sent J.A. Kater, the Chief Fire Inspector, out to look at the "incinerator," and he saw Compton's third run on June 15, 1994. Compton never heard back from any of the parties. Finally, he called Kater and asked him what

²⁸⁹ Compton interview.

²⁹⁰ Compton Interview

he had told the KDHE, to which he said Kater responded, "I told them I didn't know what you had, but you didn't have no incinerator!"²⁹¹

Compton may not have been deterred by the obstacles he was encountering on the test runs, but he certainly was aware of them. In a letter he sent to over sixty people, including *Wichita Eagle* columnist Bob Getz, local millionaire Charles Koch, and District Attorney Nola Foulston he described runs three through five and concluded the letter by stating that, "There is no doubt; when one is learning, or teaching himself, [an] operation of this kind, there are problems that are to be encountered. This is completely a new method for applying an ancient process for a useful purpose. However, knowledge is being gained and the project is going forward."²⁹²

After the seventh run of the plant in August of 1994, Compton said he was "developing (learning) the [intricacies] of the plant operations. A few more--maybe 3 or 4, more test runs and working out 'the bugs' the plant should be ready to make public demonstrations."²⁹³ By his tenth run, Compton was beginning to sound weary. Although nine people had come out to watch the latest demonstration he said that he hoped more people would come in the future and that, "All this work will come to naught if nobody knows about it."²⁹⁴ He said of the plant, "Too many things require monitoring and adjusting in plant operations to do other things. Running [the] pilot plant is a very busy operation. Nothing is automatic."²⁹⁵ He told the recipients of his report that, "This will be the last progress report to the Consortium until cold weather sets in. It takes

²⁹¹ Ibid; Compton, who is nearly always willing to point out strange bureaucratic behavior, was quick to note the irony of an 11 January 2006, letter he received from KDHE Secretary Roderick Bremby, stating that, "It is KDHE's opinion that research is unneeded because this technology is well-understood." Letter from Roderick Bremby to Bill Compton, 11 January 2006, Bill Compton Collection.

²⁹² Bill Compton progress report to the Consortium, "Test runs #3, #4 & #5 of the Pilot Plant ---- Demonstration and Research Project," 4 July 1994, 3, Bill Compton Collection.

²⁹³ Bill Compton report to the Consortium, "Test Run #7," 2 August 1994, 2, Bill Compton Collection.

²⁹⁴ Bill Compton report to the Consortium, "Test Run #10," 19 September 1994, 3, Bill Compton Collection.

considerable time to make up the reports and type them up. More time must be made available to do pilot plant operations."²⁹⁶

By the time he sent out the next report, though, Compton was sounding much more upbeat. He called the project, "history in the making—the here and now."²⁹⁷ The report contained results for runs eleven through fourteen. Winds hurt the eleventh run, the twelfth was "not a very good run," and the thirteenth was "a very disappointing test run." The fourteenth, though, "was the most productive test run made to date."²⁹⁸ Compton's timing could not have been better, because on October 28, 1994, local channel 12 KWCH sent reporter Andy Abbott out to cover the run.

Mr. Abbott was here approximately one and a half hours. He did a very thorough job of videotaping all of the operations from feeding (injection) of trash to product recovery. I must admit; I was very busy with operating the pilot plant. Nothing in the operation of the plant is automatic. It all requires much attention and continued feeding. The plant was operating very good--the best yet. It was my intent to keep it that way. It is regretted that a more comprehensive personal interview was not achieved.²⁹⁹

Compton also made a list of the thirty people who had come out to see the plant thus far. He did note that up to the present, the cost of the pilot plant had exceeded \$4,000 and donations had amounted to less than \$3,000, but the tone of the letter was much more optimistic than the last.³⁰⁰

²⁹⁵ Ibid., 2.

²⁹⁶ Ibid., 3.

²⁹⁷ Bill Compton report to the Consortium, November 19, 1994: 1, Bill Compton Collection.

²⁹⁸ Ibid., 3.

²⁹⁹ Ibid., 5.

³⁰⁰ Ibid., 4.

The optimism would be short-lived. Both after the seventeenth and the nineteenth test runs, Compton wrote that no further test runs were planned.³⁰¹ On November 10, 1995,

Compton wrote:

This Pyrolysis Project needs more, much more, public interest and involvement ... The Institute for Resource Recovery is extremely short of support funds to sustain operations. This is a sad state of affairs. The work needs to be done. It needs financial support from any public or private source from which help can be obtained.³⁰²

The plant would run two more times before Compton would decide he had gotten all the information from it that he could. During its runs, the plant processed metals, glass, paper (including phone books), cardboard, garbage, wood, all kinds of plastics, tire rubber and car fluff (the portion of cars that cannot be recycled. See footnote). The plant ran for 350 hours and had successfully produced combustible gas, carbon and oil with the best ratio as 13% combustible gas, 34% carbon and 53% oil, all of usable quality (see footnote).³⁰³ In October of 1995, Compton's friend Leland Johnson submitted a description of the pilot plant, with the name, "A System for Salvaging All Refuse Derived Waste (RDW) Material from Municipal, Industrial Suburban, and Agrarian Sources," to the Office of Technology Innovation: Energy-Related

³⁰¹ Bill Compton letter to the Consortium, "Test Run #17," 6 September 1995, 1, Bill Compton Collection; Bill Compton letter to the Consortium, "Test Runs of Pyrolysis Pilot Plant--#18 and #19," 10 November 1995, 2, Bill Compton Collection.

³⁰² Compton letter to Consortium, "Test Run #18 and #19," 2.

³⁰³ Compton interview; Bill Compton, letter to the editor, "Landfill--Needs to be eliminated," *Haysville Times*, March 19, 2004; An explanation of "car fluff": Currently, it is estimated that 75 percent of a vehicle's weight is being recycled, mostly its metal components—the chassis, engine block, and radiator, for example. The other 25 percent, known as auto shredder residue (ASR) or "fluff" contains plastics, rubber, wood, paper, fabrics, and glass. EPA, "Vehicles," available from: <http://www.epa.gov/epr/products/vehicles.htm>; Internet; accessed 23 July 2006; Compton, "Test Run #9," 1,2, Bill Compton Collection. A Btu is a standard energy measurement, that means British Thermal Unit. It is the amount of energy required to raise the temperature of something by one degree Fahrenheit. Btu are used to measure how much energy can be produced by fuels. The oil produced by Compton's pyrolysis pilot plant was 19,000 Btu per lb. A gallon of crude oil weighs 7.21 lbs., and there are 42 gallons in a barrel of oil, so that means the oil generated from Compton's pyrolysis plant has 5,753,580 Btu per barrel, which is 99% of the amount of Btu in regular oil (5,800,000 Btu). The natural gas had 500 Btu per cubic foot, which is about half the Btu of regular natural gas, (1,031 Btu per cubic foot). The standard carbon Btu depends on the application; Compton's carbon was 9,000 Btu per pound.

Inventions Program. The office wrote back a rejection letter saying that the content of the application "lacked a complete engineering analysis, (and) a material and energy balance, comparing the proposed system to competitive systems, was not provided. Also, no economic comparison was made."³⁰⁴ Ultimately, the office wrote that they did not consider the invention promising enough for continued evaluation for three key reasons: the predicted performance would not assure superiority over competitors, the end operating costs might be "excessively high," and energy advantage over competition is "insufficient or questionable."³⁰⁵ On the technical comments, the department wrote, "The inventor's process could probably be made to work. However, we see no new technology in the proposed process that would give either a technical or economic advantage over other processes."³⁰⁶ The department attached a story about the Siemens Company getting ready to operate their first pyrolysis plant in Germany.

Bureaucratic Troubles: The IRRI Meets the IRS

In need of money to continue their plans, Compton and the Institute for Resource Recovery turned their attention in 1996 from the pilot plant toward becoming a non-profit organization. On the "Not for Profit Articles of Incorporation" form, Bill Compton, for the soon-to-be Institute for Resource Recovery, Incorporated (IRRI), wrote that the nature of the corporation was, "engineering to research, experiment, develop methods and projects for solid waste disposal without need for burial (landfills)."³⁰⁷ On March 25, the IRRI was granted an Employer Identification Number, and by April 23, 1996, the organization was filing the Application for Recognition of Exemption (501(c)(3)), to get their tax-exempt status. The goal of the exemption was to be able to apply for more grants, many of which were only open to tax-

³⁰⁴ George P. Lewett letter to Leland Johnson, June 20, 1996, enclosure, "Energy -Related Inventions Program Report of First-Stage Evaluation:" 1, Bill Compton Collection.

³⁰⁵ Ibid.

³⁰⁶ Ibid., 2.

exempt organizations. The amount of trouble the IRRI encountered seems to have been exceptional. Compton went to great lengths to get a fee waiver to avoid paying the \$465 filing fee, as the IRRI had no money. When he accepted that the fee could not be waived, Compton paid the IRS with contributions from the Checker's Manager, Glickman, Inc., Gary Gibbs, Carl Harris, Betty Cattrell, Fred Berry, Carl Compton, Ned Ailes, and Lewis Street Glass Co., Inc., Compton submitted a \$465 money order and a more substantial financial statement, along with a description of the pyrolysis process, to the IRS on August 7.³⁰⁸

On September 19, nearly five months after the IRRI had applied for exempt status, the IRS sent a list of twelve items that they had not mentioned in any previous correspondence but said were lacking from the original 1023 form.³⁰⁹ On October 30, the IRS wrote Compton to say his case had been closed for lack of response. Compton had had trouble getting things certified with Kansas offices and wrote the IRS that "the dialogue with the Secretary of State-Kansas was a victim of misinterpretation. At one point, there was two (2) corporations. This 'foul up' caused [a] 3 week delay. The new corporation was eventually voided."³¹⁰ He also had problems getting things registered at the courthouse. "The thing is," he wrote, "I can promptly respond to your directions and do things. However; in dialogues with other agencies, I can only submit and request. I cannot dictate to them. They would just ignore me."³¹¹ Compton attached the

³⁰⁷ Bill Compton, "Not for Profit Articles of Incorporation," form, 31 January 1996, 1, Bill Compton Collection.

³⁰⁸ Bill Compton letter to Theresa Nelson, IRS, "501 (c) (3) Tax Exemption Status for: The Institute of Resource Recovery Incorporated (IRRI)-a Non-Profit Corporation," 7 August 1996, Bill Compton Collection.

³⁰⁹ Ronald Benjamin, IRS, letter to Institute for Resource Recovery, Inc., 19 September 1996, Bill Compton Collection.

³¹⁰ Bill Compton letter to Bobby Scott, 4 November 1996, Bill Compton Collection.

³¹¹ Ibid.

requested twelve pieces of information with the headline, "By the grace of God--with patience, diligence, [perseverance], and dedication; this transmittal is herein presented."³¹²

Compton would likely need that grace, because on November 12, the IRS wrote him—again not acknowledging the material Compton had sent—stating he needed to send in eleven pieces of information. Despite several letters sent by the IRRRI, on February 2, 1997, the IRS wrote that they had received no response to the request for the eleven items and that if the IRRRI wished to continue pursuing their tax-exempt status, they would need to submit a new 1023 form.³¹³ It is not clear why the IRRRI received this treatment or if it was typical IRS behavior, but Compton wrote back stating:

It would appear that the information provided by the [IRRI] is being ignored by the Internal Revenue Service--your office. The IRS letter of 2/2/97 directs that a new Form 1023 be sent within 90 days and no additional funds would be required. This appears to be a requirement to start all over again.³¹⁴

The next time the IRS wrote, the list of items requested dropped from eleven to two, which they included to be sent back. Furthermore, there was no more mention of a new 1023 form. Finally, on March 5, 1997, the IRRRI got a letter from the IRS granting them tax-exempt status.³¹⁵

That spring, the IRRRI applied for numerous grants. They applied for \$500,000 from Chrysler, \$50,000 from Wichita Greyhound Charities, Inc., \$300,000 from the Hallmark Corporate Foundation, and for \$250,000 from the Victor Murdock Foundation. Compton had

³¹² Bill Compton letter to Bobby Scott and Ronald Benjamin, 3 November 1996, 1, Bill Compton Collection.

³¹³ Ronald Benjamin letter to the Institute for Resource Recovery, 12 November 1996, Bill Compton Collection; Gary Gibbs letter to Ronald Benjamin, 25 November 1996, Bill Compton Collection; Bill Compton letter to Ronald Benjamin, 27 November 1996, Bill Compton Collection; Bobby E. Scott letter to the Institute for Resource Recovery Incorporated, 2 February 1997, Bill Compton Collection.

³¹⁴ Bill Compton letter to the Internal Revenue Service District Director, 9 February 1997, 1, Bill Compton Collection.

³¹⁵ Ronald Benjamin letter to the Institute of Resource Recovery Incorporated, 13 February 1997, Bill Compton Collection; Bobby Scott letter to the Institute for Resource Recovery Incorporated, 5 March 1997, Bill Compton Collection.

letters of support and recommendation from an eclectic group of people including Leland Johnson, of the Technical Applications Group (TAG), local car dealer Rusty Eck, and Compton's fellow WWII United States Air Force Fighter Pilot and friend, Ned Ailis. One supporter, Russ Campbell, of Wichita, compared Compton's pyrolysis developments to Neil Armstrong's walk on the moon!³¹⁶ Compton tried to get funding from the Department of Agriculture and wrote Congressman Dan Glickman, who was Secretary of the Department, that he had received "considerable help from others (including your dad)."³¹⁷

Even with the tax-exempt status, the IRRRI did not get any grants, and its financial situation did not improve. In 1997, it received only \$250 in contributions. Expenditures for the year had been a little over \$1,000; combined with the almost \$1,500 debt from the year before, the IRRRI was \$2,263.15 in the hole at the end of 1997. On New Year's Eve 1997, Compton wrote a letter to the IRRRI and those who had helped him, regretfully stating that the corporation would dissolve at midnight and thanking them for their support.³¹⁸

Whose Problem is it Any Way? Wichita and Sedgwick County Give up on Trash

While the IRRRI's tax debacle with the IRS had been going on in 1996 and 1997, the City of Wichita and Sedgwick County were debating the trash issue. Faced with new federal regulations about the quality of landfills, in 1992 the state handed over all responsibility for solid waste management and planning to Kansas counties. By October of 1996, each county had to submit approved plans to operate under the new guidelines. Local officials moved along unperturbed by the deadlines. As *Eagle* editorialist Randy Brown put it, "The garbage situation

³¹⁶ Copy of Prior Grant Application, 7 April 1997, 1, Bill Compton Collection; Wichita Greyhound Charities, Inc. Grant Application 1997, 7 April 1997, 1, Bill Compton Collection; Bill Compton letter to Lori Wentz, 5 May 1997, 1, Bill Compton Collection; Bill Compton letter to Richard B. Chambers 28 April 1997, 1, Bill Compton Collection; Angie Gumm, "Bill Compton and his Pyrolysis Plant: The Story of a Man ahead of His Time," December 2004, 8: Bill Compton Collection.

³¹⁷ Letter from Bill Compton to Dan Glickman, 18 November 1997, Bill Compton Collection.

is being attacked with all the speed of a sleeping Clydesdale.”³¹⁹ There was a joke going around City Hall that “every family will be issued a new trash cart. When it’s full you can stack it in the backyard next to the others.”³²⁰ Through an inter-local agreement in 1993, the City had been given charge of the trash situation. The City's plan had been for the Brooks landfill to expand; the operators of Brooks had invested \$1 million for extra land around it called the "Kingsbury Tract." Then-Mayor Elma Broadfoot supported the plan, but when Bob Knight came back into office in 1995, he adamantly opposed it, calling it a “loopy idea.”³²¹ The plan, which the City had worked on for three years, was to expand the girth and height of Brooks to make it to 700 acres and 24 stories tall, a monument of garbage as tall as the city’s Epic Center. Some people speculated at the time that he had political support from residents the Moorings, a “tony” development near Brooks.³²²

The Wichita Independent Business Association (WIBA), which had endorsed Knight in the last election, blasted him for creating an “unnecessary crisis.” Roland Smith, the director of WIBA, also speculated about Knight’s motives and made three charges against him: that he was kowtowing to someone, that he was a late-comer who ruined a long standing plan, and that any other plans were going to be far too expensive. Knight said—and his record showed—that he had always been opposed to the expansion of Brooks, which sat near the Equus Beds, the city’s underground water source. There was debate about whether or not landfill leachate could

³¹⁸ Bill Compton letter to (numerous recipients), 31 December 1997, attachment, Bill Compton Collection; *ibid.*, 1.

³¹⁹ Randy Brown, “Wichita Trash Talk Spreads,” *Wichita Eagle* (14 October 1995): 13A, accessed from NewsBank.

³²⁰ Jean Hays, “City Seeks New Ways to Dump Trash,” *Wichita Eagle* (16 July 1995): 1A.

³²¹ Interview with Susan Erlenwein. Bill Compton, as a member of the TAG (Technical Applications Group), signed a "Petition for Reconsideration of the Kingsbury Landfill Site." On the bottom of a taped notice to the petition, Compton wrote, "PS I am still working on Resource Recovery and Pyrolysis Processing for waste disposal," Bill Compton letter to Melody Miller 3 September 1997, attachment, Bill Compton Collection. Jim Cross, “Clash Over Trash,” *Wichita Eagle* (30 November 1995): 1A.

³²² Jim Cross, “Garbage Mountain is Trashed by Knight,” *Wichita Eagle* (28 June 1995): 1A.

contaminate the water supply. Knight said he was not “in a league with some weird, left wing group of crazies,” but also said that he would not keep waste disposal prices down at “the expense of my children and their children and their children.”³²³ Still, the wealth of the Moorings, where homes sold for a very respectable \$200,000 in the Wichita market, led to much eyebrow raising. In a story about a new environmental justice grant for Wichita, the *Eagle* asked, “If the Moorings had been a neighborhood filled with poor, black residents rather than rich white ones, would the city of Wichita still have backed away from building another landfill nearby?”³²⁴

In August of 1996, the city got a reprieve, allowing it to keep Brooks open until an absolute deadline of October 9, 2001. That same month the city bought 1,400 acres called the “Furley land” on the northeast edge of Wichita at 85th St. N. and Greenwich Rd. for \$4.2 million with the intention of siting a landfill on it. The land was bought in secret, adding to the opposition of nearby residents. The site was deemed too close to Jabara and Raytheon airports, and McConnell Air Force Base to be safe, making the plan the only Solid Waste Disposal plan in the state to be rejected by the KDHE. This led to a March 1997 vote from the Sedgwick County Commission against the siting of the Furley Landfill and which gave the county control of the waste disposal issue again.

After the County took over trash again, it set up a study group of about 30 people to look at all aspects of the issue. Sedgwick County Director of Environmental Services Susan Erlenwein said that many people wanted the County to consider incineration, so they had companies come in to pitch ideas about incineration and even pyrolysis. “When the committee

³²³ Jim Cross, “Clash Over Trash,”: 1A.

³²⁴ Jean Hays, “Volunteers to Learn about Environment: Classes to Teach Health Issues to Poor, Minorities,” *Wichita Eagle* (25 September 1995): 1C, accessed from News Bank.

started asking 'where else is this working?' they'd say, 'you can be the first city in the nation.'³²⁵ The chance to go first was not seen as an opportunity, she said, as "the KDHE made it pretty clear they did not want us to be experimental with this amount of trash."³²⁶ There was even a book compiled of "Alternative Waste Disposal Options for the City of Wichita," which listed Compton's Institute for Resource Recovery and Sutton Energy Corporation of Peoria, Illinois, as potential vendors of pyrolysis.³²⁷

Some of Compton supporters came to speak at the waste meetings, like Richard Brown, who stated:

I would like to put in a word for Bill Compton and the Institute for Resource Recovery. I have known Bill since 1959, when we worked together as engineers at Boeing. I consider him to be competent, dedicated, resolute, some people replace the word "resolute" with "hard-headed." He has a passion for solving a pressing community problem. He is not in a position to profit from that solution, and I believe he deserves encouragement, recognition, and whatever support we can find for his project.³²⁸

Ultimately, the county commission decided to have trash hauled out of the county and voted for transfer stations. Some commissioners, like Melody Miller, supported pursuing new technology. As a "progressive county," she said, we should "look at putting aside monies that would possibly track this type of technology."³²⁹ Miller said in an interview that she felt the commissioners had gotten enough information to make a good decision on trash and that the transfer station was a compromise between cost effectiveness and NIMBY-ism (Not in My Back Yard), both of which were major concerns of constituents. Erlenwein said the County went with the transfer station,

³²⁵ Ibid.

³²⁶ Ibid.

³²⁷ The booklets verdict of pyrolysis was that "well-defined costs for commercial facilities are unknown." "Alternative Solid Waste Disposal for the City of Wichita," 22 April 1996, II-3, City of Wichita City Clerk's Office Files 7.8 Waste-Solid 1996-1997.

³²⁸ Sedgwick County Commissioner's Regular Meeting Minutes, March 19, 1997, <http://www.sedgwickcounty.org/countyclerk/1997/regular/reg03-19.pdf>, 23 (accessed July 28, 2006).

so they would not have to landfill the trash in the county, and because it allowed for flexibility for a new program (whereas the County would have been committed to a landfill until it was full).³³⁰

In June of 2001, Joe Kneib of Herzog Environmental, which operated the Brooks Landfill, and Ron Cornejo, of the local construction empire Cornejo and Sons, proposed that they could operate the Furley landfill, with a profit to the city and county. Their plan was appealing because they claimed they would only raise prices by \$1.50 more a ton than the Brooks Landfill—over \$10 less per ton than the fees associated with transferring the trash out of the county.³³¹ One area farmer said, “It was a bad place before, and it still is a bad place ... It is like a bad cold. It keeps coming back.”³³² Two years later, when a new county commission once again said it would look into a Furley landfill, the same farmer called the issue “a complete nightmare ... We have a new group of people who come in and think they can save the world and make some money by putting in a dump.”³³³ It was the private hauling situation that put a crimp in the plan. Local leaders were interested in regaining some of the annual \$6 million dollars in tipping fee money that they lost after the closing of Brooks. When Brooks had closed, however, Waste Management and Waste Connections, the city’s two biggest haulers, which had 70% of the market in Wichita, invested a total of \$20 million in landfills in Topeka and Meno, Oklahoma. With the private hauling situation, the city could not make the companies bring their

³²⁹ Sedgwick County Commissioner's Regular Meeting Minutes, 19 March 1997.

³³⁰ Author interview with Melody Miller, Wichita, KS, 11 July 2006.

³³¹ Jean Hays, “County Enticed Again by Landfill Near Furley—Two Businessmen Propose Putting a Landfill on the Same Spot the Sedgwick County Commission Deemed Unsafe in 1996,” *Wichita Eagle* (21 June 2001): 1A, accessed from NewsBank; Interview with Susan Erlenwein.

³³² Jean Hays, “County Enticed Again by Landfill,”: 1A.

³³³ Jean Hays, “Will Landfill be Built After All?” *Wichita Eagle* (2 February 2003): 1B, accessed from NewsBank.

trash to a Wichita site, and if the city switched to a regulated market, after forcing the companies to look elsewhere for dumping sites, it would likely have faced some hefty lawsuits.³³⁴

Both Miller and Erlenwein said they believed the private hauler situation in Wichita was and will continue to be a major factor in solid waste disposal choices. Now most local waste is taken the Waste Connections new landfill in Harper County, which opened in 2006.³³⁵ At present, the County does not have any legal or regulatory obligation to change the status quo or develop a waste disposal plan, but they also have no contract, and so they could change the plan at any time. Without even a guaranteed gathering place for area waste, it would have been pretty much impossible for Compton's dreams of a 1000-ton-per-day pyrolysis plant to come to fruition locally.

Compton Continues

Although there was no more cooperation and no prospects of Sedgwick County changing its trash policy in the immediate future, Bill Compton continued writing letters to promote and access the pyrolysis situation in the country. In 1998, he wrote William Allen, the editor of *National Geographic Magazine*, in response to a small article in their May issue about extracting soap from cooked tires. He enclosed information about the pilot plant and wrote, "The information presented herein is for whatever use that you can put it to. Conditions—lack of funds and age, prevent me from constructing the plant described. However; that does not prevent me from showing somebody else how to build such a plant to operate it."³³⁶ In 2000, Compton became aware of Conrad Industries, a pyrolysis company in Washington that had been successful in marketing and establishing its process, ART (Advanced Recycling Technology), which is applied only to specific industrial feedstocks, not a heterogeneous waste stream like

³³⁴ Ibid.

³³⁵ Interview with Melody Miller; Interview with Susan Erlenwein.

MSW. Unlike Compton, who wanted to deal with municipal garbage, the company's developer, William Conrad, had been able to form a partnership with KleenAir Products, an already established company. Finally finding a peer, Compton wrote Conrad with a host of questions, and concluded the letter by saying,

It is felt that your method is much the same as ours and has merit. Yours is the first process, of the many that I've been able to study, that gives true Pyrolysis processing and demonstrates economical advantages. I am going to promote it locally and give the 'powers to be' something to think about.³³⁷

Compton did continue to give the powers that be something to think about-locally and nationally. In 2002—with a new name for the former members or the IRRI: Citizens for Gasification Recycling—he even wrote a letter about pyrolysis to President George W. Bush.³³⁸ He wrote letters to the editor and approached businesses that he thought might be interested in pyrolysis, like Wendy's International and TRICON Restaurants Intl., which owns KFC, Pizza Hut and Taco Bell, but no one was interested or willing to adopt the process. Age and arthritis did begin to wear on Compton, however. In September of 2001, he had a heart bypass surgery, and the following year he decided it was time to give up his pyrolysis plant. He donated the pilot plant to the Haysville Community Library, which hosted a raffle for the plant that cost \$5 per entry. There were six entries, five of which were submitted by Paul Rhodes. Rhodes had been participating in area solid waste discussions since 1996 and wanted to carry on Compton's work. In 2002, he co-founded (with Compton) the Compton Conversion Consortium (CCC), with the goal of educating the public about "thermal conversion," also known as pyrolysis.³³⁹ Since its

³³⁶ Bill Compton letter to William L. Allen, 24 April 1998, Bill Compton Collection.

³³⁷ Bill Compton letter to William Conrad, 20 March 2000, Bill Compton Collection.

³³⁸ Letter from Bill Compton to George Bush, Pat Roberts, Sam Brownback, Todd Tiahrt, Church Hagel, Tim Johnson 2 January 2002, Bill Compton Collection.

³³⁹ Bill Compton letter to David C. Novah, 23 July 2001, Bill Compton Collection; *Haysville Times*, 16 August 2002, 2; Paul Rhodes Resume, Bill Compton Collection.

founding, Compton and Rhodes have written letters, lobbied, and presented demonstrations about pyrolysis through the CCC, trying different approaches to carry on Compton's work.

As of this writing, Bill Compton has spent nearly thirty-five years trying to change the way we look at trash. Although he had support from his friends, he was in many ways a kind of one-man band for pyrolysis in Wichita, a city that had no other resource recovery designs for its municipal solid waste. No one else in Sedgwick County was promoting the same ideas that Compton was or anything similar. Compton not only had to build his pyrolysis plant, he had to constantly remind just about everyone why the plant was important. It is a rare character who can play thinker, organizer, promoter, backer and builder, but Bill Compton had to play all of these roles. Some he played better than others, and he surely thought he played them all pretty well. He clearly was not suited to the bureaucracy inherent in government dealings, though, and he was probably not smooth enough to ever be too successful at selling his idea to private enterprise. His best roles were as thinker and builder, the two traits of an engineer. Out of necessity, though, Compton had to spend large chunks of his time and energy selling his ideas to people who did not know about and were not inclined to do anything for the resource recovery of the garbage they had helped produce.

CHAPTER 6

CONCLUSION

As a practitioner of hindsight I know that [he] was trying to do, by personal initiative and with the financial resources of a small and struggling corporation, what only the immense power of the federal government ultimately proved able to do. That does not mean he was foolish or mistaken. He was premature. His clock was set on pioneer time. He met trains that had not yet arrived, he waited on platforms that hadn't yet been built, beside tracks that might not ever be laid. Like many another ... he had heard the clock of history strike, and counted the strokes wrong. Hope was always out ahead of fact, possibility obscured the outlines of reality.³⁴⁰

If Bill Compton would have been promoting his pyrolysis plant twenty years earlier or fifteen years later, would it have gotten the support he had hoped for? That is hard to say. This thesis has looked both at the overall arching trends of resource recovery in the United States and the story of an unlikely individual resource recovery proponent, who happened to be in a place with a very unique trash situation. Of course, looking at a variety of case studies would probably show that just about all trash situations are unique. Resource Recovery—just like most themes in history—has a different story in different parts of the country. The crunch for space on the East Coast has led to an appreciativeness of expensive WTE apparatuses that at least produce a useful product, as opposed to an expensive alternative that produces nothing. Space is much more readily available in the Midwest, and as long as a cheaper, surer landfill is no harder to site than a high-tech alternative, Midwest people will probably go with cheaper and surer. On the West Coast, an environmental ethic has tended to be the lynchpin of their resource recovery story and the measure by which methods are judged. Those stories can all be broken down into thousands of others that are examples of or contradictions of those trends. Still, when put all

³⁴⁰ Wallace Stegner, *Angle of Repose* (New York: Penguin Classics, 2000), 370.

together, the exceptionalism of different places or situations combine to form the overall national story.

The fundamental history of resource recovery in the United States has been a search for trying to find something good in garbage. What has been considered “good” and for what reasons are the qualities of the issue that have fluctuated with locale and period. The basic goal of finding good has not. The Gilded Age and Progressive Era recoverers were efficiency experts and conservationists. For them, the good in garbage came from conquering waste; they were able to use science not just ingenuity or necessity to change trash into an entirely different substance, professionalizing the meanest of fields. Money, discovery and utilization were their objectives, as well as a reformer’s desire to prove that even lowly garbage could be redeemed. The resource recovery of the American people and the scrap dealers during World War II was a mix of what had been and what was to come. Citizens’ contributions were most valuable as an awareness raiser and as a boon to patriotic spirit, resembling the recycling phenomenon that would occur in the 1980s and 1990s. The scrap dealers had little interest in resource recovery for show, linking them more closely to the Progressives, who would have also cut their losses if they were not turning a profit.

In the 1960s, resource recovery schemes were based on landfill reduction not on end product. As people became alarmed at the unprecedented garbage growth, they looked for options that could use some of what they would have dumped for something good. Throwing tires into the ocean to make an artificial reef and turning old wine bottles into glasses really could only help fish or people who drank like one. These ideas had a low-tech scientific element, which did not offend the emerging environmental mentality or the new Clean Air Act regulations.

The pinnacle of resource recovery, of course, was in the 1970s during the energy crisis. People like Bill Compton saw the mounting trash piles and our need for energy and thought, “why not kill two birds with one stone?” Recyclers, who were a small minority at this point, said we should use less, conserving land space and energy in the process. This was the decade for the recoverers, and ideas and processes became corporate and huge. They were not just a call for energy, but politicians could back them as a response to the growing, sprawled-out populations and new environmental regulations that had made siting landfills increasingly difficult. Cities like Baltimore, which built its pyrolysis plant on the site of its old incinerators, were hoping that they would not have to deal with the always unpopular ordeal of putting trash somewhere new, ever again. A machine may need to be updated, but it could be updated on the same spot that the old one was on. Additionally, the EPA had to know that its new regulations, while beneficial to citizens, were a hardship on the cities. Some people feared that going too big, too fast would be the end of resource recovery, and there is no doubt that the failures of the 1970s left a bad taste in the public’s mouth.

The failures were not entirely bad, however. They were a rare opportunity to learn on a grand scale—with a substantial amount of federal funding—what happens when resource recovery plants “go big.” The public’s patience to tolerate such failures may be limited, but so is its memory. Bill Compton never seemed to be willing to admit that the differences in pyrolysis techniques were not as significant as the issue of the waste stream. The Baltimore Pyrolysis Plant did not fail because it was an inferior type of pyrolysis or even because it was not pyrolysis at all. Its process was hardly even tested on a large scale, and its technique was successful on a pilot plant stage. If we assume (or hope) that scale-up problems are obstacles that can be overcome with time and tinkering, then the issue with the failures of the 1970s was the waste

stream. The heterogeneous waste stream of MSW was what caused the Baltimore Plant to break down so often. Conrad Industries may be “pure pyrolysis” and it may be successful, but that is probably because the company knows what will be in its waste stream, and the plant is tailor-made to accept that waste. Even Bill Compton had control of the waste stream he put in his pilot plant. Yes, he used varied materials, but he knew what they were and how much he was putting in. There would be no way to have that kind of control over a MSW pilot plant that processed 2,000 pounds a day.

Compton either could not see this or chose to ignore it. It would have been a detraction to his argument, though, because the labor involved with source separation might make his idea for a plant non-economically self-sustaining. He wanted to prove that garbage did not have to be a “debit.” Still, if garbage could contribute fuels like oil, even if it did not produce them at a profit, it would be valuable. After all, now we pay for oil and we pay to have our garbage taken care of; just because a resource recovery costs money instead of makes it, does not mean it is not useful.

Whether by choice or nature, Compton also remained oblivious to one of the two commandments of resource recovery made after the Baltimore failure: “Thou shalt not assume that untested resource recovery processes will perform as planned,” and “Thou shalt not promote prior to proving.”³⁴¹ Compton was pretty careful about the second commandment, but he did not seem willing to even acknowledge the first. He knew from his own experience that errors and miscalculations caused problems, but maybe because he was able to solve those problems himself, he felt confident he would be able to do the same on any scale of a project. Certain qualities of fighter pilot and engineer must have forged to give Compton that kind of foolhardy

³⁴¹ Abel Wolman, “Future Trends Which Will Influence Waste Disposal,” *Environmental Health Perspectives* 27 (December 1978): 339.

certitude. While industry does have examples of driven people, who have proven their ideas were right and overcome obstacles themselves, government does not work that way. A philanthropist or an optimistic investor might be willing to give Compton money and watch as he used his engineering aptitude to work out all of the problems that arose. A government-run facility would not be set up like that. While there are autocrats in government, they have usually wielded their power over time; Compton seemed to have the idea that he could be placed in charge of an entirely new agency and run it as he saw fit. That kind of position would have been highly unlikely.

The Wichita situation did not help Compton either. There was no land crunch here to necessitate an experimental facility, and of course there was the private hauler issue. If city and county leaders have so little control over the garbage issue that they hand the whole thing over to private industry, there seems little chance they would have the daring to invest in a \$64 million experimental plant. Additionally, they would have to either retake the garbage hauling or mandate that the haulers dump the trash at a certain location, actions that have been too controversial for the area because of public reaction, even with no resource recovery facility involved.

As WTE facilities were out of favor already by the 1980s and 1990s, the resource recovery situation here was probably not much different than it would have been in other Midwestern cities. That fact that recycling, which is popular with voters and politicians, has had such a hard time in Wichita should have been an indicator to Compton that he was barking up the wrong tree with local civic leaders. The city has proposed a ban on grass clippings since 1994, and been desirous of curbside recycling since Bill Compton was on the Citizens Recycling Committee in 1989 yet neither plan has ever been implemented. Recyclers have certainly had

more luck here than Compton; because of the popularity of recycling, they have a legitimacy which he does not. Recycling is an issue that has to be addressed, because it is talked about everywhere and the EPA has even set goals for it. Also, as recycling can involve everyone, it is naturally more consensus-building than a resource recovery plant, especially Compton's with his very singular notions of how things ought to be done. Still, the situation has not been good even for recyclers with local government, and Margaret Miller and company eventually built their own recycling center, which opened in 2006.³⁴²

No matter what, the accomplishments of Bill Compton were great. He undertook on his own what the government and corporations had united to do a decade before. He may have undertaken too much, but if he had not, it is not clear that someone else would have. Even though what he was doing had been tried on the coasts, he was certainly among a select few who had worked on the issue, and his passion for resource recovery was far ahead of its time in Wichita, Kansas. Most importantly, Compton did prove to anyone who would listen that garbage could be turned into oil, carbon and gas. While the public should have heard about these kinds of efforts on the national scale, they do not seem to have remembered. Judging both by the reactions Compton got and the repeated story types in newspapers and magazines, it appears that each new movement in resource recovery encountered an American people who seemed to have amnesia about the value of their trash.

The downfall of resource recovery in the 1980s and 1990s and the bleak local situation, however, do not mean that resource recovery is dead, not even in Wichita! As the Baltimore Public Works director said after his city's fiasco, "The search for conserving materials and

³⁴² Jean Hays, "City Offers Opportunity in Sewage Sludge Recycling," *Wichita Eagle* (21 November 1994): 8D, accessed from NewsBank; Stan Finger, "City Tackles Trash Problems," *Wichita Eagle* (29 December 1989): 1D, accessed from NewsBank.

energy at minimum cost must go on forever.”³⁴³ There will come a time when the landfills will fill despite maximum recycling efforts—even now, it is not uncommon for recycled goods to go to the landfill because there is no one to buy them, and this will be the point when WTE will be able to assert itself as an environmentally and economically beneficial component of solid waste management. This has already happened in a few large U.S. cities, as well as in Japan and some European countries. Although alternative fuels may become more prevalent in the future, it seems unlikely that the need for oil and gas will be completely eliminated in the near future. If pyrolysis becomes part of an integrated waste management program, where certain goods are taken out of the waste stream to be recycled, mechanical problems with facilities might be minimized and the beneficial aspects more worthwhile. Additionally, just as public works employees learned about the sanitary landfill in the military, a new group of engineers, funded by the federal government, spent the 1990s working to dispose of hazardous wastes. Investors have been funding these engineers with the faith that they will come up with “create ideas for novel” waste disposal techniques.³⁴⁴ Perhaps these engineers, who are more acquainted with government bureaucracies will be able to apply their experience to municipalities as well.

New pyrolysis and gasification plant study projects have also been popping up in the United States lately. In Romoland, California, the International Environment Solutions (IES) has an "Advanced Pyrolytic Treatment Thermal Conversion System," that processes thirty tons of waste a day, and Fayetteville, Arkansas and Richland, Virginia both have gasification plants that are processing presorted MSW and hazardous wastes respectively. With fifty such plants in

³⁴³ Abel Wolman, “Future Trends Which Will Influence Waste Disposal,” *Environmental Health Perspectives* 27 (1978), 337.

³⁴⁴ C. Heermann, K.J. Whiting, and F.J. Schwager, Pyrolysis and Gasification of Waste: A Worldwide Technology and Business Review (Gloucestershire, England: Juniper Consultancy Services Ltd., 2000) 1:170.

Japan right now, investors have a reason to have faith in the technology.³⁴⁵ Once methods become more proven, places like Wichita might reconsider large-scale, high-tech solutions. In fact, as there is no solid waste plan for Sedgwick County, the area could implement a resource recovery facility more easily than if it had built a new landfill or made agreements with haulers.

Until there is some excitement or a desperate situation, however, things may not change. As former County Commissioner Melody Miller said, "we are complacent about our garbage."³⁴⁶ Americans as a whole, however, have seemed ready and eager to believe that there is good in garbage. They don't want to live by it, smell it or deal with it, but the idea of turning it into something useful has generally been met with friendly interest and often ardent enthusiasm. Americans have proven that they like to consume and resource recovery turns the byproduct of that consumption into something else they can consume. Probably more important is that resource recovery provides us with a link to good old American ingenuity. If necessity is the mother of invention, then American inventiveness has been missing a parent for quite awhile. There is not much that most Americans "need," as compared to the needs of the impoverished in many places in the world. Finding a way to recover what we have wasted keeps our creativity sharp and probably does something to alleviate the guilt about the "starving kids in China," who have long ruled as a symbol to American youth to appreciate and use what they have.

There is certainly good in garbage and, more importantly, good in the search for it. Recycling has captured the heart of the country, because people can feel like they are personally helping the environment. Resource recovery deserves just as much respect and will one day get it when it becomes the only practical alternative. Ingenuity, resourcefulness and hope for better

³⁴⁵ "Evaluation of Environmental Impacts of Thermochemical Conversion Technologies Using Municipal Solid Waste Feedstocks," *MSW, The Journal for Municipal Solid Waste Professionals* 16, no. 4 (Spring 2006), 15, 16, 18.

³⁴⁶ Melody Miller, interview with author, July 11, 2006.

things are the main components of the history of resource recovery. Recycling may trade equals for equals and promise to offer "sustainability," a fine quality, but the adventure and "romance" of garbage belong to those who have looked at our waste and tried to turn it into something better, trying to prove to the human spirit that there is some good in just about everything, even garbage.

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SPECIAL COLLECTIONS

Bill Compton Collection of letters and papers 1970-present. In transit to Haysville Community Library.

City of Wichita Coal Gasification Archives. Special Collections. Wichita State University.

INTERVIEWS

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