GEORGIA’S SCRAP TIRE MANAGEMENT PROGRAM:
An Assessment Of Economic And Environmental Viability

Prepared for
Pollution Prevention Assistance Division
Environmental Protection Division, Land Protection Branch
Georgia Department of Natural Resources

By
Ronald G. Cummings, Principal Investigator
Kelly M. Brown
Peter Terrebonne
*Environmental Policy Center*
*School Of Policy Studies*
*Georgia State University*
*Atlanta, GA 30303*
*404-651-1888*

Janusz R. Mrozek
*School Of Economics*
*Georgia Institute Of Technology*
*Atlanta, GA 30332*
*404-894-0353*

October 19, 1998
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Executive Summary

Following their survey of present conditions in Georgia’s scrap tire industry and the State’s Scrap Tire Management Program (the Program), the authors of this report identified the following three policy questions which constitute the primary focus of this report:

(1) what is a reasonable prognosis for the long-run viability of the Program’s ability to achieve the goals of the State Legislature for ensuring that scrap tires generated in the State are “…reused or recycled rather than being disposed”? (Georgia Code §12-8-21(f) O.C.G.A., 1991)

(2) are existing state policies adequate?

A corollary to this second policy question is: should the existing scrap tire fee be allowed to ‘sunset’ as provided in the Code?

(3) are new state policies and/or programs needed?

Referring to (1), all else equal there is a basis for considerable optimism concerning expectations that the seven million scrap tires generated each year in the State will be “recycled rather than disposed.” Presently, Georgia firms process more than twelve million tires (more accurately, 12 million “passenger tire equivalents”) -- Georgia is an importer of scrap tires. Scrap tire processors in Georgia presently import tires primarily from Florida, Tennessee, South Carolina, and Kentucky. End-users will most likely absorb an additional two million scrap tires and scrap tire products within the very near future. Thus, in a state that generates some seven million scrap tires each year, processors or direct tdf use of scrap tires by cement kilns can be expected to require more than fourteen million tires. Over a longer period of time -- the next five to ten years -- growth in crumb rubber production spurred by ongoing changes in technology and excess production capacities that presently exist in states like Florida could result in conditions wherein competition for scrap tires among processors result in falling tipping fees and a restructuring of the regional scrap tire industry (less efficient processors in the region being forced out of business).

It is critically important that one recognize, in terms of the optimism expressed above, that all else may not be equal. The scrap tire processing industry in Georgia (and other states) is a relatively infant industry. There is a great amount of variability in the quality of chips being produced, and there is little in the way of standards for quality. There is also confusion across local governments in terms of standards related to the use of scrap tire products, particularly in terms of their use for septic drainage fields. It has been and will likely continue to be characterized by instability and change as it struggles to establish and maintain its ability to
compete in a market that appears to be persistently expanding in scope. The industry may be described as “fragile” for a number of reasons set out in the body of this report.

Given the uncertainties and vulnerabilities described above as they are relevant for the scrap tire industry, we conclude that the Program’s ability to adequately respond to its legislative mandates will be enhanced by responses to the following recommendations. The reader should note that implementation of the recommendations given below will require funds that would logically come from the Solid Waste Trust Fund. Thus, in offering these recommendations we are tacitly assuming that the scrap tire fee is renewed, an issue that is taken up below.

**Recommendations:**

* Establish a continuing process for monitoring the scrap tire industry in Georgia and in the Southeast region.

* Charge Georgia’s Program with the responsibility of preparing an annual report which describes the state of the system, describes relevant changes that have the potential for affecting the economic and environmental viability of the system, and identifies actions and/or studies required to ameliorate or eliminate effects from these changes.

* Maintain and strengthen local government education and enforcement programs.

* Consider the possibility of establishing state-wide standards for the approved use of tire chips for septic drainage systems.

Moving to policy question (2), with few exceptions we find existing state policies adequate for achieving the legislature’s goals related to scrap tire management. The exceptions concern possible new policies discussed in (3) and two changes in the Georgia Code as it is now written. The two changes at issue involve the present ban on landfill disposal of whole tires and the existing sunset provision for the scrap tire fee. We have examined arguments for and against the maintenance of the present ban on landfill disposal of whole tires. We find that authority given to the Director of the EPD under present law provides the Program with a great deal of flexibility in responding to short term conditions which might otherwise benefit from removal of the ban on landfill disposal of scrap tires. We find no compelling case for removing the ban.

We find what we regard as a strong case for the renewal of the scrap tire fee. Basically, this case rests on our findings that the purposes found by the legislature to warrant the establishment of the fee in 1991 will not “sunset” by July 1, 2000. Thus, if it “made sense” to establish the fee in 1991 it makes sense to renew the fee for another five years. This conclusion is based on the following findings.

(i) While the Program has made great progress in cleaning up scrap tire piles that
were known to exist in 1991, new scrap tire piles continue to be discovered. Since 1993 newly discovered scrap tires in piles have increased at an annual rate of 24%; only recently the EPD discovered two previously unknown piles that may contain more than one million tires. Most other states have had similar experiences: the “new discovery” process can extend over many years.

(ii) We emphasized above the uncertainties and vulnerabilities of the industry that affects the collection and disposition of scrap tires in Georgia. To ensure accomplishment of the legislature’s long run goals for the Program it will be necessary for the Program to expand its planning and enforcement activities (see recommendations given above). The Program’s focus must move beyond its present emphasis on clean-up of scrap tire piles to improving its capacity to anticipate emerging problems which could threaten the continued viability of the system for collecting/disposing scrap tires. Funding for these critical activities derive from the scrap tire fee.

(iii) The need for education and enforcement programs at the level of local governments perceived by the legislature in 1991 will also not “sunset” in the year 2000. Indeed, drawing on experiences in other states, they may be expected to increase in importance in future years.

Georgia is well advised to consider experiences -- a recurrence of accumulating scrap tire piles -- in other states that have allowed their scrap tire fee to sunset prematurely, e.g., the States of Washington, Oregon, and Texas. The authors add the following recommendations.

**Recommendations:**

* Maintain the existing ban on landfill disposal of scrap tires as codified in State Code 12-8-40.1.

* Extend the scrap tire fee for five years.

Referring to policy question (3), while we found no strong, compelling case for new state laws, regulations, or programs, we did identify two sets of actions that the State may wish to consider for possible implementation. The first of these relates to bonding requirements. Under present law bonding is required for scrap tire carriers, but not for processors of scrap tires. The extension of bonding requirements to processors may be justified by the state’s experiences with processors who have gone out of business leaving abandoned piles of scrap tires or scrap tire materials the disposition of which ultimately became the responsibility of the State. On the other hand, bonding costs could have adverse effects on potential new entrants to the industry and therefore on the competitive structure of the processing industry -- a reasonable consideration given that there are now only two large firms in Georgia’s scrap tire processing industry. Resolving the question as to whether or not bonding requirements “should” be extended then
requires a weighting of benefits and costs, a task which can only be accomplished by the legislature. We can do no more than recommend that the not-so-obvious costs associated with the extension of bonding requirements (those associated with effects on competition) be carefully considered along side of the more obvious benefits associated with imposing financial responsibility for scrap tire piles on processors (and, perhaps, end-users that maintain large stocks of scrap tire materials).

Second, there are at least two ways in which joint-venture projects between the Program and private industry could benefit the state; other such opportunities will surely arise over time. Funds for the Program’s participation in such projects would be made available from the Solid Waste Trust Fund. The first of these would involve demonstration projects designed to enhance our understanding of potential environmental benefits associated with the various uses of scrap tire products; such demonstration projects would most logically begin with paper mills. A second joint-venture project with considerable potential for yielding pay-offs for the state would focus on technologies for removing wire from tire chips in cost-effective ways. Success with such projects could improve the overall quality of chips produced in the State of Georgia.

We conclude with the addition of one additional recommendation.

**Recommendation:**

*Carefully consider the possibility of establishing bonding requirements for scrap tire processors and, possibly, for end-users that maintain unusually large stocks of scrap tire materials.*
GEORGIA’S SCRAP TIRE MANAGEMENT PROGRAM:  
An Assessment Of Economic And Environmental Viability

Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Executive Summary</td>
<td>i</td>
</tr>
<tr>
<td></td>
<td>Contents</td>
<td>v</td>
</tr>
<tr>
<td>I</td>
<td>Purpose Of The Study</td>
<td>1</td>
</tr>
<tr>
<td>II</td>
<td>Georgia’s Scrap Tire Industry: An Overview</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A. Processors of scrap tires -- the present</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>B. Processors of scrap tires -- the future</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>C. End-users of scrap tire products -- the present</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>D. End-users of scrap tire products -- the future</td>
<td>10</td>
</tr>
<tr>
<td>III</td>
<td>Policy Issue #1: The Continued Viability Of Georgia’s Scrap Tire Network</td>
<td>14</td>
</tr>
<tr>
<td>IV</td>
<td>Policy Issue #2: Are Existing State Policies Adequate?</td>
<td>16</td>
</tr>
<tr>
<td>V</td>
<td>Policy Issue #3: Are New State Policies And/or Programs Needed?</td>
<td>21</td>
</tr>
<tr>
<td>VI</td>
<td>Conclusions And Recommendations</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Bibliography</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Appendix A: Scrap Tire Capacity In The Southeast</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Appendix B: Issues Pertaining To The Pollution Arising From Industrial Combustion Of Scrap Tires</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Appendix C: Individuals And Organizations Contacted As A Part Of This Study</td>
<td>35</td>
</tr>
</tbody>
</table>
I. Purpose Of The Study

The State of Georgia’s commitment to the development of an effective program for the management of scrap tires is made manifest in 1991 legislation that provides that:

“It is...the intent of the General Assembly that every effort be undertaken to ensure the proper management of scrap tires from the point of generation to the ultimate point of reuse, recycling, or disposal and that every effort be made to ensure that, where possible, they be reused or recycled rather than being disposed.”

As a part of this commitment, the Environmental Protection Division (EPD) and the Pollution Prevention Assistance Division (P2AD) commissioned researchers at Georgia State University and the Georgia Institute of Technology to develop a study that would assess the network for the collection, processing, and end-use of scrap tires in Georgia. Based on likely future trends in the scrap tire industry identified in this work, the primary purpose of the study is to develop and justify responses to the following related questions that represent policy issues of central importance to the State:

**Policy Issue #1:** What is a reasonable prognosis concerning the long run economic and environmental viability of the existing system for collecting scrap tires generated in the State and, via recycling and/or reuse, the transformation of scrap tires into useful products?

**Policy Issue #2:** Are existing state policies adequate? Does the long run economic and environmental viability of the State’s scrap tire network depend in any substantial way on the continuation of the scrap tire fee and/or the existing ban on landfill disposal of scrap tires?

**Policy Issue #3:** Are new state policies and/or programs needed?

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1 The authors gratefully acknowledge the support and assistance given by Ms. Deanna Ruffer to their efforts in preparing this report. They also wish to thank professionals with the Pollution Prevention Assistance Division and the Environmental Protection Division, as well as many knowledgeable individuals in the scrap tire processing and end-use industries, for their time in sharing with us their knowledge and insights concerning technical issues relevant for assessing the State’s scrap tire management program. Responsibility for errors of omission and/or commission in the preparation and interpretation of materials presented in the report reside, of course, with the authors.

The research team has reviewed substantial literature relevant to the scrap tire management issue (see bibliography), spoken with some forty in-state and out-of-state individuals and organizations that are knowledgeable about the scrap tire processing and end-use industries, and interviewed representatives from Georgia firms involved with processing scrap tires and the end-use of scrap tire products (Appendix C provides a list of individuals and organizations contacted as a part of the study). Guidance and oversight for the research team’s efforts were provided by a P2AD-EPD working group consisting of Bob Donaghue and Amy McMillen with P2AD, and Denny Jackson, Mark Smith, Kristi Campbell and Rick Cothran with the EPD. Ms. Deanna Ruffer, a consultant for the P2AD, has been an invaluable source of information and technical guidance throughout the research project.

The results of these research efforts as they apply to the policy issues given above are set out in the following sections. Section II provides a sketch of the evolution of scrap tire processing in the State and the likely future of this industry; present and likely future conditions for end-users of scrap tire products are also described in this section. Section III focuses on a response to policy issue #1: what is a reasonable prognosis concerning the long run economic and environmental viability of the network for collecting scrap tires generated in the State. Policy issues #2 and #3 are taken up in Sections IV and V, respectively. Conclusions and recommendations are offered in section VI.
II. Georgia’s Scrap Tire Industry: An Overview

Georgia’s system for disposal of tires after use, and possibly recapping and reuse, consists of several components. Processors collect tires from retailers or fleets, or accept tires from haulers. They transform the tires into products which are then sold to end-users. End-users consist of two categories. Some end-users accept whole tires. In Georgia the only significant end-user of this type are cement kilns that burn whole tires. Other end-users purchase the products created by processors. Table 1 shows how many tires are being handled by processors by their eventual end-use, and how many tires go directly to end-use without being processed.

In what follows we provide an overview of present and future conditions that affect, or will likely affect, each of these components of Georgia’s system for scrap tire disposal.

A. Processors of scrap tires -- the present. While the actors have changed, the general characteristics of Georgia’s scrap tire processing industry has changed little since 1991. In 1991 there were four processing firms that processed seven to eight million tires per year. In 1998 there were three major processing firms (Green Man, United Rubber Recycling (recently acquired by Green Man), and Waste Recovery, Inc.) that process 10.6 million tires per year (Table 1).

<table>
<thead>
<tr>
<th>Product/use</th>
<th>Approximate volume (passenger tire equivalents)</th>
<th>Per cent of total</th>
</tr>
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<tbody>
<tr>
<td>A. Processors:</td>
<td></td>
<td></td>
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<tr>
<td>Chips - tdf</td>
<td>5.7 million</td>
<td>47%</td>
</tr>
<tr>
<td>Chips - sewage drain field</td>
<td>2.3 million</td>
<td>19%</td>
</tr>
<tr>
<td>Chips - crumb stock</td>
<td>1.2 million</td>
<td>10%</td>
</tr>
<tr>
<td>Waste to land fills</td>
<td>1.4 million</td>
<td>12%</td>
</tr>
<tr>
<td>Sub-total</td>
<td>10.6 million</td>
<td></td>
</tr>
<tr>
<td>B. Direct to end-use:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDF - whole tires</td>
<td>1.5 million</td>
<td>12%</td>
</tr>
<tr>
<td>Total</td>
<td>12.1 million</td>
<td></td>
</tr>
</tbody>
</table>
There are a few other smaller operators in the State with tire shredding equipment that may have considerable potential for growth; see related comments below in sub-section B. In addition, one end-user is a cement kiln that uses a substantial number of whole tires and thus may be considered a kind of processor. Cement kilns will be discussed separately below.

The basic product produced by Georgia’s three scrap tire processors are tire chips.62% of these chips are sold as tire-derived-fuel (tdf) to paper mills, 25% are sold to building contractors for use in sewage system drainage fields, and 13% are sold as feed-stock to out-of-state producers of crumb rubber. A portion of the scrap tires used by processors (12%) cannot be turned into usable chips; such wastes are disposed of in landfills. Of the 12.1 million scrap tires used by Georgia processors each year, approximately 9.2 million are obtained from sources in Georgia (scrap tire piles and generators of scrap tires); the remaining tires are obtained from out-of-state sources, primarily from Florida, Kentucky, Tennessee, and South Carolina.

There are three characteristics of scrap tire processors in Georgia that are of particular relevance for considerations related to the viability of the State’s network for scrap tire management. First, about 85% of the chip-producing processor’s annual revenue derives from the tipping fee -- some $0.50-$0.60/tire freight-on-board (fob) the processor’s facility. Prices received for scrap tire products currently average some $10/ton fob the processor’s facility -- $0.10 per passenger tire equivalent (pte). An important conclusion is suggested by these observations. The economic viability of the chip producer is strongly tied to tipping fees. Therefore, the processor can withstand substantially more variation in product price than in tipping fees. A 10% change in tipping fees has the same impact on revenue as a 50-60% change in product price.

Second, processors appear to be operating within reasonable proximity to existing production capacity. The primary problem that processors may face in the near future relates to the supply of scrap tires, as opposed to the demand for scrap tire products. Over the past several years a significant part of that supply has been scrap tire piles, a source that is rapidly diminishing in Georgia. With processors and direct-to-end-use current demands for 12.1 million scrap tires, the supply of scrap tires may soon become a limiting factor.

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3 Small amount of other products come out of processors’ activities. Examples (that apply in large part to scrap tires obtained from scrap piles) include tires resold as used tires, inner tubes sold as scrap rubber, scrap metal (in the main, tire rims), and waste wire.

4 In 1994 Rubber Technology, a firm located in Crawford County, opened as a crumb producing enterprise. Unfortunately, the enterprise was unsuccessful. There is some possibility that Rubber Technology will be reopened under new ownership in the near future. In addition, both Greenman and United Rubber Recycling collect “purer” forms of used tire rubber, such as buffings and inner tubes, which they send out-of-state to crumb rubber operations. The volumes involved are quite small, however.

5 We are told that product price for tdf is tied to the price of coal -- some 50% of coal prices. Coal prices have persistently declined over the last decade as have tdf prices.

6 Tires in Georgia’s scrap tire piles have declined from more than 7 million in 1993 to present levels of about 2 million, including recent discoveries of new scrap tire piles. There exist more than 40 million tires in known scrap tire piles in this region, however.
tires/year and Georgia’s annual generation of scrap tires at some 7 million tires/year, continued operations at present levels may require still greater imports of scrap tires from neighboring states. This is particularly the case given plans by two large cement kilns in the Atlanta area to initiate and/or expand their use of whole tires as a source of tdf (discussed in more detail below), uses which may constitute additional demands for scrap tires on the order of 1.5 million tires/year. Increased competition for scrap tires may have the effect of bidding down tipping fees. Possible implications of falling tipping fees are discussed in section III.

The third characteristic of Georgia’s scrap tire processing industry that warrants mention here may be described as change. There have been a number of changes in ownership of processing capacity in the State since 1991 (involving local and national companies) -- some facilities have had multiple changes in ownership. Georgia’s scrap tire processing industry is relatively young and, in our view, one sees here the free enterprise system at its best. Georgia entrepreneurs are deeply involved in efforts to develop new products, new processes and new technologies that may produce a better product at a lower cost. These changes (along with changes described in the following sub-section) make exceedingly difficult any effort to predict the future of this industry.

B. Processors of scrap tires -- the future. Over the next two to four years the most likely substantive changes in Georgia’s scrap tire processing industry are the possible entry of two crumb rubber producers, and expansions in processing activities by a handful of firms that are presently just beginning operations.

Of course, Georgia’s scrap tire processing industry can be affected by developments in neighboring states. Most important among these developments may be the establishment of new processing firms in the Southeast, especially new firms that produce crumb rubber. Industry experts point to substantial advances in technologies for producing high quality crumb rubber -- a consistent, fine-grain product with no contaminants. The present market for such high-end products appears to be substantial with enormous potential for expansion. Existing excess crumb rubber production capacity appears to characterize the “low end” of the market -- markets for coarse, low quality crumb.

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7 A common rule of thumb for estimating the generation of scrap tires is one tire generated annually per capita.

8 We are aware of at least two firms seeking investor support for the expansion and modernization of crumb rubber producing facilities in Florida and North Carolina.

9 Unlike chip processors, the crumb producer is typically not dependent on tipping fees as a major source of revenue because product prices are higher -- much higher -- than prices received by chip producers. For example, depending on quality, 40-100 mesh crumb commands prices in the range $0.49-$0.58 per pound ($980-$1,160/ton), compared with $10.00 per ton received for chips. (see prices quoted on the Internet by Recycler’s World, http://www.net/recycle/Rubber/granule/ xv132000.html, August 13, 1998. Lower grade 40 mesh is priced much lower: $0.08/lb. Rough crumb as feed stock for more refined crumb commands $55/ton)
The potential for expansion of the crumb rubber industry in the Southeast, along with the likely increase in demand for chips as feed stock for crumb rubber in the State, raises questions that are of fundamental importance for the purposes of this study: how will such developments affect the long-run prognosis for the State’s scrap tire management network? Under *existing* conditions (ignoring the increase in demand for tires that would attend the potential entry of crumb rubber producers in Georgia), the volume of scrap tires used by Georgia processors and cement kilns exceed the annual generation of scrap tires in the State by some 73%. This means, of course, that aside from tires coming from scrap tire piles, users of scrap tires in Georgia are already obtaining a substantial part of their raw materials (scrap tires) from out-of-state sources -- Georgia is importing scrap tires. Three related questions then arise:

(i) with the depletion of scrap tire piles in Georgia, are *current* levels of scrap tire use (some 12 million/year) sustainable?

(ii) with modest growth in Georgia’s processing industry and direct-to-end-use users of scrap tires, which might increase annual demands for tires to something on the order of 15 million tires/year, would this level of scrap tire use be sustainable?

(iii) what might be the effects on Georgia’s processing industry of regional growth in crumb production, with the attendant increase in the regional demand for scrap tires?

In an effort to explore possible responses to these questions, we consider the regional market for scrap tires by surveying selected Southeastern States to determine their processing capacities. Table 2 summarizes results from this survey; detailed results appear in Appendix A.

Table 2 includes three measures that are of primary interest for our purposes: processing capacity; current volume (the number of tires actually being processed); and scrap tires generated. We will focus on the following aspects of scrap tire processing in these states:

* **excess supply of scrap tires:** a state with excess supply can export scrap tires to other states; it is a source of supply for states with excess demand for scrap tires. Excess supply in any state is implied under conditions where current volume (number of tires processed) is *less than* the number of scrap tires generated.

* **excess demand for scrap tires:** a state with excess demand is importing tires from other states. Excess demand in any state is implied under conditions where current volume *exceeds* the number of tires generated.
Table 2

Characteristics Of Scrap Tire Processing In Southeastern States

<table>
<thead>
<tr>
<th>State</th>
<th>Capacity*</th>
<th>Volume**</th>
<th>Tires Generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. States with excess supplies of scrap tires:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Florida</td>
<td>15,152,400</td>
<td>10,602,400</td>
<td>14,654,000</td>
</tr>
<tr>
<td>Kentucky</td>
<td>2,122,000</td>
<td>1,466,000</td>
<td>3,908,000</td>
</tr>
<tr>
<td>South Carolina</td>
<td>4,754,000</td>
<td>3,314,000</td>
<td>3,760,000</td>
</tr>
<tr>
<td>Tennessee</td>
<td>2,200,000</td>
<td>2,200,000</td>
<td>5,368,000</td>
</tr>
<tr>
<td>sub-total</td>
<td>24,228,400</td>
<td>17,582,400</td>
<td>27,690,000</td>
</tr>
<tr>
<td>excess supplies:</td>
<td>27,690,000 - 17,582,400 = 10,108,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| B. State with excess demands for scrap tires: |           |          |                 |
| Alabama          | 6,990,000  | 6,990,000 | 4,319,000       |
| Georgia          | 12,100,000 | 12,100,000| 7,486,000       |
| Mississippi      | 3,316,000  | 2,908,600 | 2,731,000       |
| North Carolina   | 9,350,000  | 8,350,000 | 7,425,000       |
| sub-total        | 31,756,000 | 30,348,600| 21,961,000      |
| excess demand:   | 30,348,600 - 21,961,000 = 8,387,600 |

* Capacity for Georgia is estimated and likely underestimated.

** Volume includes direct-to-end-use uses of scrap tires.

Source: Appendix A, Table A.1.
The definition of excess capacity as total capacity minus production (volume) introduces the possibility of biases that the reader should recognize. Differences in individual reports of “capacity” may be based on differences in respondents’ perception of operating hours “relevant” for defining capacity. Thus, one processor may report as capacity the volume of tires that could be processed in “normal,” 12-hour shifts of operation while another processor may report capacity as the volume that could be produced with a 24-hour operation. We do not have access to data that would allow us to ensure consistent measures of capacity across all processors in our survey.

Large numbers of scrap tires are presently shredded and disposed of in landfills in North Carolina and Kentucky. These tires may be viewed as a potential source of supply for the region’s scrap tire processing industry.

Telephone interview with Mr. Bill Parker with Florida’s Environmental Protection Division, Division of Waste Management, September 28, 1998. There is presently one cement kiln in Florida that uses tdf and a new kiln that will use tdf when it comes on line. Two other kilns in the State used tdf at one time but no longer do so.


There exists, of course, other supplies of scrap tires in these eight states: more than 40 million scrap tires in scrap tire piles (including some 2 million remaining in Georgia’s scrap
Scrap tires in known scrap tire piles total: 4.8 million, Florida; 2 million, Georgia; 8.5 million, Kentucky; less than 1 million, North Carolina; 9 million, Alabama; 16 million, Tennessee; and .2 million, Mississippi. Data are not reported for South Carolina. Scrap Tire Research Institute [1998; pp. 57-64].

In some ways, at $37-$38/ton yielding 13,500-14,000 btu/lb, coke is a more economical fuel. However, coke tends to be higher in sulfur content than coal, thereby restricting the attractiveness of its use for companies that are relatively constrained by their emissions permits. This may be particularly relevant for cement kilns.

C. End-users of scrap tire products -- the present. As noted above, there are presently three primary markets for chips produced by Georgia processors: tdf; engineering applications (in Georgia, the use of chips in the construction of sewage drainage fields); and feed-stock to out-of-state crumb processors (not discussed further). A fourth market for end-uses of scrap tires -- cement kilns -- will also be discussed.

Paper mills are the exclusive users of tdf chips in Georgia (tdf uses of whole tires are discussed below). Georgia’s scrap tire management program has benefitted greatly over the last decade from the relative stability of this market. Major advantages enjoyed by tdf include: fuel efficiency (e.g., tdf provides 15,500 btu/lb {if wire-free} compared to 12,000 btu/lb for coal); a
competitive price *vis-a-vis* coal (but not bark); and in some cases reduced emissions of NO\textsubscript{x} relative to coal (however, tdf emissions of zinc are higher than most alternative fuels; see Appendix B for a discussion of environmental issues).

Major disadvantages associated with the use of tdf include: price disadvantages *vis-a-vis* bark (an important consideration when supplies of bark are plentiful) and environmental considerations (wet scrubbers commonly used catch the bulk of SO\textsubscript{x} emissions but allow zinc particles to pass into the environment; contaminants in ashes).

Engineering applications of scrap tire chips in Georgia are effectively limited to their use in septic system fields at the present time. The major advantages of tire chips (relative to gravel) for these uses include their lighter weight, and therefore reduced hauling costs, the relative ease with which the material can be handled by construction workers and equipment, and the reduction in the extent of compaction over time relative to gravel. At current delivered prices for chips -- some $20-$26.00/ton -- their use can reduce contractor’s costs by 5-6%. This is a relatively narrow margin, in which case substantive increases in chip prices could threaten the sustainability of this particular market.

Finally, there is significant use of whole tires for tdf purposes by cement kilns in the Atlanta metro area. The primary advantages of tdf for cement kilns are: savings in fuel costs,\textsuperscript{16} some reduction in costs for iron (replaced by wire in the whole tires), and reductions in NO\textsubscript{x} emissions -- reductions on the order of 15% (see Appendix B). Major *potential* disadvantages of tdf for cement kilns are product losses due to the nonuniformity of tires and the seemingly strong reliance of “cost savings” on tipping fees received by the kiln -- tipping fees on the order of $0.25-$0.30/tire.

D. End-users of scrap tire products -- the future. Absent substantive changes in tipping fees, product prices, etc., there are a number of possible sources for expansions in the end-use market for rubber chips over the next five to ten years. The most near-term expansion is the large-scaled expansion in the use of whole tires by cement kilns in Georgia.\textsuperscript{17} Over the next year or so the volume of whole tires used by cement kilns is expected to increase from current levels of 1.5 million tires/year to as many as 3 million tires/year.

Two key issues affect the future of the tdf market. The first is the relationship between product prices and the resulting demand for the product. The price for tdf chips (currently some $10.00/ton fob processor) is closely linked to the price of the least cost alternative fuel, generally coal. It appears that processors will have little latitude to raise chip prices, should revenues from tipping fees fall, as they can expect substantial reductions in tdf sales. Furthermore, processors can do little to increase sales by lowering prices, given a variety of limits on tdf use. These limits...
include those due to boiler technology (such as ash disposal), those due to emissions restrictions (including air and solid waste), and those due to the need by paper mills to consume other fuels (such as bark and sludge). In most cases the limiting factor on increase use of tdf as fuel is not price. Thus, processors have little latitude in terms of an ability to increase demand by lowering product price.18

The second issue is the extent to which the regulatory environment will change. The use of tdf as fuel affects a facility’s air emissions and its solid wastes (by changing the toxic components in the ash). Tdf users in Georgia are highly concerned about potential increases in regulatory restrictions. For example, Georgia’s EPD is in the process of promulgating new “cluster rules” which combine air and water regulations that will be specific to the paper industry. It is not clear that such concerns are warranted, however. Our information is that regulations related to air quality are expected to focus on non-combustion sources of air emissions (dryers and the like) and will therefore not affect boilers that burn chips.19

There are several Georgia paper mills that are not presently using chips at levels for which their use is permitted. While we are unaware of current plans for large-scaled expansions in such use, subject to the caveats expressed in the preceding paragraph these plants do represent a potential source for increases in end-use. Several plants have indicated a desire to expand use under certain conditions. Also, while we know of no present plans for increases in the number of paper mills that use chips as a part of their fuel mix, the relatively low cost of tdf combined with its advantages over coal in terms of emissions of NOx could well lead additional mills to move to the use of tdf -- this may be particularly true as the State faces the necessity to respond to new national air quality standards for ozone and suspended particulates. The outlook for expanded use of tire chips by paper mills in the region would be significantly enhanced with changes in the quality of tire chips produced in Georgia -- in this regard reference is made primarily to the production of chips with less (or no) wire content.20

Georgia’s Department of Transportation has received a grant from the U.S. Environmental Protection Agency for the purpose of exploring the viability of using chips as mulch and fill (limited to 2-3” layers in intervening layers in response to the experience in the State of Washington at which the rubber fill caught fire). We are unable to speculate at this point in time as to the potential demand for these uses of chips that might attend satisfactory tests by the DOT. In other parts of the country fill uses for chips constitute an important market. For example, in Minnesota 25% of scrap tires end up in similar civil engineering applications

18 Arguably, lower prices might to some extent induce new paper plants to adopt the use of tdf.
19 This information was derived from an interview with Mr. Jimmy Johnson, Program Manager for the EPD’s Stationary Source Program. Mr. Johnson was unfamiliar with a related source of concern to the paper industry associated with the Toxic Release Inventory: “waste disposal unit” designations for boilers used by the paper industry. Mr. Johnson indicated the EPD view as one in which tdf is viewed as a fuel, not as a waste. Precedents exist in which the EPD has determined, in an instance where a paper plant was burning combinations of bark and sludge, that the sludge was not regarded as being subject to waste disposal rules.
20 This is not an issue for the use of whole tires by cement kilns.
Potential expansions of the septic drainage field market are not limited by contractor’s willingness to use chips. Chips can reduce a contractor’s cost by 5% to 6% in some parts of the state. In other parts of the state -- with longer hauling distances from chip producers -- current low prices for gravel can reduce the competitiveness of chips. A major limitation on the use of chips for septic drainage fields is seemingly the fact that, while Georgia regulators have approved the use of chips for septic systems, a good number of Georgia’s local governments have not. The market for chips used in septic drainage fields would be enhanced under circumstances in which local governments that now ban such use remove the ban.

Thus, under current conditions, there is a reasonable basis for anticipating an expansion in the market for scrap tire chips. All else equal, such expansions will likely be modest -- less than a million pte per year. Large expansions would require substantive upgrading in the quality of chips. On the other hand, we noted above the potential for changes in the competitive structure of the scrap tire processing industry which could have the effect of substantially reducing tipping fees thereby exerting upward pressures on the product prices for chips. Under this scenario the prognosis for the future end-user market could change dramatically. The tdf market as well as the market for drainage uses of chips may be very sensitive to increases in price -- significant decreases in the market for chips would likely attend conditions leading to higher product prices.

Shifting attention to the market for crumb rubber, we are now talking about an international market as opposed to local markets relevant for chips. In this market, it seems clear that the market for low-quality crumb rubber is saturated -- there appears to be little basis for optimism in terms of substantive growth in this market. Industry professionals agree, however, that the market for high quality crumb rubber is virtually unlimited. Industry sources see substantial potential for the use of such products in tire re-manufacturing (potentially, with a fine grade of crumb, up to 10% of a new tire as opposed to 3% with coarser grains), in spray coatings, roof coatings, and a wide range of solvents. As something of a bottom line, markets for high quality crumb rubber appear to be supply-constrained rather than demand-constrained -- more, perhaps much more, production capacity could be accommodated.

One use of crumb rubber that has generated a great deal of policy interest nationally is in rubber-modified asphalt (RMA). Potentially, such use could absorb a significant volume of scrap tires. Florida, Arizona, and California have made substantial use of crumb rubber in paving materials. The Georgia DOT has run a number of tests of RMA and has found no advantage to using the material that would offset the higher costs. A recent review of the national experience with RMA (Hicks, et al. 1995) reports that “All agencies feel they are obtaining added value with RMS. However, there are inadequate data to quantify the benefits.”

Other considerations work against promoting RMA as an outlet for Georgia scrap tires.

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21 Apparently, environmental and health inspectors with some local governments have (unspecific) concerns about “future problems” that could arise with the use of chips.
Crumb can be economically transported much longer distances than chips. Thus, the state would have to create a layer of regulatory oversight to ensure that RMA applications used Georgia-originating crumb. In our judgement the case for RMA is not sufficiently strong at this time to warrant state investments for promoting its use.
III. Policy Issue #1: The Continued Viability Of Georgia’s Scrap Tire Network

With the background provided by section II, attention can now be turned to the policy issues that are of central concern for this study. We begin with policy issue #1: what can be said about the continued viability of Georgia’s scrap tire network?

We must begin by making explicit what is meant by “the continued viability of Georgia’s scrap tire network.” We take this expression to imply a very specific and a very limited goal by the State, viz., reference is made to a system in which scrap tires generated in Georgia are being collected, diverted from landfills, and appropriately reused or recycled. The limited goals by the State are to assure that tires are diverted into appropriate end-uses and that we do not have a reoccurrence of illegal piles of scrap tires.

With this definition in mind, we find a reasonably solid basis for expecting the viability of Georgia’s scrap tire network to continue over the next three to six years. This expectation follows from our observations given above in section II.b concerning the viability of Georgia’s processing industry: absent significant growth in processing capacity (again, particularly for crumb rubber) in the region, Georgia’s users of scrap tires (processors and direct-to-end-use users) will in all likelihood maintain current or modestly expanded production levels.

In the longer run, however, one might anticipate significant growth in the Southeast Region’s (indeed, the national and international) scrap tire processing industries. Such growth can be expected to increase the competition for scrap tires which may depress tipping fees. This process will most likely accelerate as scrap tire piles in the region become depleted. Depressed tipping fees could lead to the processor’s need to raise product prices. This in turn could lead to reductions in tdf uses of whole tires and, more likely, reduced demand for tdf and civil engineering uses of chips. Substantial growth in crumb rubber production in the region could result in the diversion of scrap tires directly for use in crumb rubber plants and/or the diversion of chips from tdf/engineering uses to feed stock for crumb rubber.

These longer run changes -- should they in fact develop -- would surely result in changes in the character of Georgia’s scrap tire producing industry. However, these changes are primarily a reflection of changes in the demand for scrap tires as scrap tires are becoming increasingly valuable. This suggests a continuing market for the 7 million-plus scrap tires generated annually in the State. Thus, these changes do not appear to impose a threat to the general viability of Georgia’s scrap tire network and its goals of assuring the proper disposition of scrap tires.

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22 The General Assembly, in enacting the 1991 scrap tire legislation, specifically stated its intent: “...that every effort be undertaken to ensure the proper management of scrap tires from the point of generation to the ultimate point of reuse, recycling, or disposal and that every effort be made to ensure that, where possible, they be reused or recycled rather than being disposed.” (Georgia Code §12-8-21(f) O.C.G.A., 1991)
generated in the State.

These considerations suggest a basis for cautious optimism for the continued viability of Georgia’s scrap tire management system as it is defined above. All else equal there seems to be more than adequate demand for scrap tires to assure that scrap tires generated in the State will find a home. However, the operative word here is “cautious.” Georgia has a history of management practices that resulted in significant amounts of illegally-disposed tires resulting in major build-ups of scrap tires -- scrap tire piles that the State was then forced to clean up. Some processors operate on a relatively thin margin, and their continued viability can be problematic in the event of major equipment break-downs or fires.

Moreover, earlier mention was made of a primary characteristic of Georgia’s scrap tire processing industry: change. This is a relatively young industry. It has and will continue to undergo stretches and strains as it strives to improve the quality of its products through technological change. We also noted earlier the strong reliance of chip processors on tipping fees -- some 85% of chip processor’s revenues derive from this source. Competition for scrap tires among the region’s chip processors, competition which may take on new dimensions if or when major increases in crumb processing capacity occur in the region, will have the effect of reducing tipping fees. When this happens, impersonal market forces will drive higher cost firms out of business. We can only speculate as to whether the losing firms will be Georgia firms or firms in other states.

All of this is to say that it would appear that the market is indeed “working.” But the basic nature of markets is a process of change in which low-cost, high quality producing firms survive while others may not survive. This process involves short-term instability in many cases. But over the longer run the promise of profits -- a promise that is becoming increasingly realized in the evolving scrap tire industry -- would lead one to expect the existence of a demand for tires that is sufficient to achieve Georgia’s goal of avoiding build-ups of scrap tires.

The potential for short-term periods of instability raises questions related to the need for state policy, however. Attention is now turned to a consideration of these needs.
IV. Policy Issue #2: Are Existing State Policies Adequate?

Provisions of existing state law related to scrap tire management that are most relevant for our study include the following (State Code 12-8-40.1), which underlie waste disposal and environmental (Appendix B) regulations established and enforced by the EPD.

(1) Landfill disposal of scrap tires is prohibited; landfill disposal of shredded, chopped, or chipped tires is permitted under some conditions.

(2) An EPD permit is required for individuals involved in the processing, disposal, collection, or transporting of scrap tires. Carriers that are not in compliance with this provision can be ordered to cease operations, and all property used in unlawful operations may be seized.

(3) A performance bond or letter of credit is required by scrap tire carriers as a condition for obtaining a permit.

(4) Scrap tire generators must obtain an identification number from the EPD which is used on shipment manifests; must have scrap tires collected and transported by collectors with appropriate EPD permits; and must maintain records indicating the disposal site or processing facility to which scrap tires are sent, along with other information.

(5) Limits are placed on the amount of scrap tires that can be stored by any individual or company:
   - Any individual: 100 tires.
   - Tire retailers: 3,000 tires.
   - Tire retreaders: 1,500 tires of the type the retreader is actively retreading.
   - Auto salvage yards: 500 tires.
   - Scrap tire processors: a quantity approved by the EPD.

(6) Financial responsibility for the removal/clean-up of stored tires in excess of limits stipulated above in (5), or abandoned piles, is placed on those responsible for the piles; if such individuals cannot be found, the EPD assumes such responsibility and costs for clean-up are taken from the Solid Waste Trust Fund (also referred to as the Scrap Tire Fund).

(7) A scrap tire fee of $1.00/tire is imposed on the retail sale of new tires; some parts of the funds obtained from the scrap tire fee are placed in the State’s Solid Waste Trust Fund. A “sunset” provision is placed on the fee: it expires June 30, 2000.

With two exceptions, our interviews with Georgia processors, end-users, and industry specialists have not identified needs for changes in state policies, nor have changes been suggested by our research. The two exceptions concern ongoing debates related to, first, the desirability of maintaining the existing ban on landfill disposal of scrap tires (provision (1) above) and, second, the sunset provision for the scrap tire fee (provision (7)).

Looking first to landfill disposal, proponents for continuing the ban argue that the ban is a fundamental prerequisite for the continued viability of the scrap tire industry and the State’s

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23 Present regulations imposed by the EPD is a quantify equal to 60 days of a firms production.
scrap tire management program. It is argued that removal of the ban would result in urban recycling of scrap tires, but rural landfill disposal of scrap tires. Particularly for small collectors of scrap tires, removal of the ban would provide incentives for landfill disposal. These arguments extend to conditions in which the ban on whole tire disposal in landfills is maintained, but the ban on shredded tires is removed: so long as shredding costs are less than processors’ tipping fees, the urban/rural pattern of scrap tire disposal mentioned above will obtain. Opponents of the ban offer two counter arguments. First, it is argued that the ban provides stronger incentives for the illegal disposal of scrap tires -- payments of tipping fees required for the legal disposal of tires may be avoided by their less-than-legal disposal. Second, under conditions where legal landfill disposal of tires is limited to shredded tires, the cost of shredding still provides incentives for illegal disposal. A “solution” to the scrap tire problem consistent with the position of opponents of the ban would be a state managed scrap tire collection program, analogous to what one sees in North Carolina.

While one can find merit in arguments posed for and against the existing ban on landfill disposal of scrap tires, the conditions favorable to a centralized collection system such as that in North Carolina do not appear to exist in Georgia, viz., limitations on private sector systems imposed by inadequate final demands for scrap tire products. Moreover, we find no evidence of significant illegal disposal of tires in Georgia with the existing ban on landfill disposal. We acknowledge that removal of the ban need not result in landfill disposal of scrap tires under conditions where landfills impose tipping fees that are no smaller than those charged by processors. In the end, our suggestions regarding this issue appeal to the adage “if it ain’t broke don’t fix it.” The goals of the General Assembly in establishing the ban appear to be achieved under existing conditions. Scrap tires generated in the state, as well as a large volume of scrap tires generated in other states, seem to be winding up where they’re supposed to: recycling by processors. Absent evidence that the ban is in fact giving rise to illegal disposal of tires within the State, we would recommend the continuation of the ban.

The second exception noted above relates to the “sunset” provision for the scrap tire fee. The rationale underlying the Georgia General Assembly’s adoption of the scrap tire fee was to provide funds required for the following purposes.

i. clean up known scrap tire piles which, in 1991, contained some 7 million tires;

ii. provide funds for a regulatory construct charged with the development and implementation of a scrap tire management system designed to protect public health and safety;

iii. finance assessment activities required of the Director of the EPD concerning the feasibility of systems for reusing/recycling scrap tires;

24 One individual interviewed as a part of this study provides a succinct statement of this position: “...if the ban is removed the industry dies!”
iv. provide funds required for enforcement and education activities related to scrap tire management by local governments.

The sunset provision for the scrap tire fee logically presupposes that the need for purposes (i)-(iv) will no longer exist as of June 30, 2000. Our analyses suggest that this supposition is not correct, in which case the elimination of the scrap tire fee would be tantamount to the state walking away from the scrap tire management program -- an action that in our view would be a serious mistake. Thus, we wish to argue that the fee should be extended for the following reasons.

First, referring to purpose (i), the State’s scrap tire management program has had remarkable success in cleaning up scrap tires since 1993, eliminating some 7.5 million tires in scrap tire piles. It is also true, however, that the EPD continues to discover previously unknown scrap tire piles. Referring to Figure 1 below, the known number of tires in scrap tire piles in the state has **tripled** since the beginning of the scrap tire management program in 1993. Newly discovered scrap tires in piles have increased at an annual rate of 24%. Indeed, only recently the EPD discovered two previously unknown piles that may contain more than one million scrap tires. Other states have had similar experiences. For example, North Carolina is presently examining newly discovered piles with 200,000 to 300,000 tires. The fact that newly discovered piles may be increasingly smaller in terms of number of tires is not necessarily a source of comfort. Unit costs for cleaning up small piles can be higher than those for larger piles. Further, it would be sanguine to base policy on the supposition that by June 30, 2000 the state will have seen the end of abandoned piles from defunct businesses, the disposition of which is the responsibility of the EPD under provision (6) given above. All of this is simply to say that informed public policy should be based upon the anticipation that rationale underlying purpose (i) will continue to be relevant well beyond 2000.

In these regards, Georgia is well advised to consider experiences in other states that have allowed their scrap tire fee to sunset. The States of Washington, Oregon, and Texas, all of whom allowed their scrap tire fee to sunset, are now experiencing a build-up of scrap tire piles. The State of California is in the process of extending the sunset date for their scrap tire fee.

Referring next to purposes (ii) and (iii), these purposes relate to the State’s need for an effective scrap tire management program, a need which will definitely **not** “sunset” in the year 2000. Indeed, it seems clear that this need will become increasingly important in future years, and that the State’s existing program should be **expanded**, not eliminated. Our analysis of Georgia’s scrap tire industry has repeatedly emphasized the continuing uncertainties and instabilities that characterize the industry. We have demonstrated that change is one of the

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25 See North Carolina Department of Environment and Natural Resources [1997].
26 Telephone interview with Mr. Michael Blumenthal, Scrap Tire Management Council, Washington, DC, September 29, 1998. Only three other states have reached the sunset date for their scrap tire fee: Idaho, Wisconsin, and Minnesota, and these states have allowed the fee to sunset without serious adverse consequences.
industry’s most

Figure 1

dominant characteristics. Processors and end users have come and gone over the years, and may continue to do so. The fragile margin at which many processors operate make their continued viability vulnerable to such things as accidents, major breakdowns in machinery, and fire. The state must improve its ability to monitor these changes so that the state’s goals continue to be met. The State’s scrap tire management program is fast approaching a critical juncture at which it must reorient its primary mission from that of abatement to that of management.

27 We have tried to give particular emphasis to the fact that with a “young” industry like the scrap tire industry, any crystal ball is necessarily clouded. The forward-looking state will attempt to anticipate adverse developments that might arise over the next decade. This process is made possible by the dedication of funds to be used for this particular kind of environmental monitoring. Of course, needs of this genre are basic to the rationale underlying the legislature’s initial establishment of a Solid Waste Trust Fund. This rationale, in our view, makes compelling the argument that the state’s scrap tire management program should continue to contribute its share to the Fund.
To summarize, we have argued that while the scrap tire fee “sunsets” on June 30, 2000 the purposes served by the fee do not sunset on that date. There is surely appeal in the notion that those who create such purposes -- purchasers of new tires -- should accept the resultant cost. A continuation of the activities required to serve these purposes could then be financed by a continuation of the existing scrap tire fee. On average over the last five years, approximately 35% of the $5.2 million that is provided annually from the scrap tire fee has been spent on the abatement of scrap tire piles; 39% spent on local enforcement, waste reduction, and education grants; and 26% for the State’s scrap tire management and regulatory programs. The expansions in the scope of the State’s scrap tire management program and in local and country government programs suggested above could be financed by the present scrap tire fee by shifting monies made available by reduced needs for abatement activities into these programs. Such shifts in the allocation of funds provided by a scrap tire fee are consistent with what one observes in many sister states. For example, some 40% of funds from scrap tire fees in North Carolina are expended solely for purposes akin to purpose (iii) given above; more than 40% of fees are then dedicated to their scrap tire management program, compared with 26% in Georgia. The present allocation of funds from scrap tire fees to local governments is very modest relative to what is seen in several sister states, and as suggested above the burden placed on local governments in terms of education and enforcement will likely grow in future years. Funds significantly in excess of the $2 million presently allocated to local governments in Georgia are allocated in states such as North Carolina and Kentucky.

Adequate response to this management challenge will require that the EPD carefully reassess its charges under purposes (i) and (ii) given above. Assessment activities required of the Director of the EPD concerning the feasibility of systems for reusing/recycling scrap tires may (and in our view should) take on new meanings. The state’s scrap tire management program must strengthen its oversight role so as to assure that state policy is based on complete information as to relevant developments and trends not only within the State of Georgia but in the Southeast Region. In these regards we will recommend that the state produce an annual report which sets out the “state” of the industry in the Southeast Region and which identifies current and potential problem areas. Such “forward looking” activities position the State’s scrap tire management program such that it anticipates conditions rather than reacts to them, and continually searches for alternative policy designs that can resolve problems so identified. These activities would include, among others:

* an ongoing evaluation of regulatory burdens on end users, particularly in terms of the impacts of environmental regulations;
* the monitoring of new policy developments at the national level that affect end users;
* and the evaluation of new information on end use technologies, such as new cost-benefit analyses of RMA.

Finally, referring to purpose (iv), local and county governments are clearly not relieved of their responsibilities for enforcement of regulations related to the disposal of scrap tires, for
clean-up of small deposits of scrap tires in rural areas, nor for related educational activities in the year 2000. Our review of developments in sister states suggests that the importance and need for these activities will surely grow in future years. There is certainly no compelling basis for arguing that such activities should cease in 2000.

V. Policy Issue #3: Are New State Policies And/Or Programs Needed?

There exists in the scrap tire literature something of a conventional wisdom: a fundamental prerequisite for a successful scrap tire management program is state leadership in the expansion of end-use markets. This may be true in some states, particularly in states that have relied upon the development of “low-end” crumb rubber producers. It does not appear to us that this “wisdom” applies to the State of Georgia, however. We find the spirit of free enterprise working quite well in this state. Georgia’s entrepreneurs appear to be functioning quite well in terms of pushing technological advancement and obtaining markets for their output. As noted repeatedly above, existing production levels far exceed the annual generation of new scrap tires in the state. For the limited purposes related to Georgia’s concerns for assuring that tires generated in the state do not once again wind up in scrap tire piles, we then find no compelling case for the state’s intervention in the processing or end-use sides of the market. Indeed, as we have noted, problems associated with a scarcity of scrap tires appear to be much more likely than problems associated with lack of production capacity or of end use demand.

The same arguments apply to the crumb rubber industry. Most (but not all) industry experts with whom we have spoken have high expectations for the future of the “high-end” crumb rubber market. Our discussions with these individuals leave us with the impression that there exists a general feeling of intellectual excitement concerning the near-term promise of new technologies for producing crumb rubber, and confidence in the extraordinary breadth of potential uses for high quality materials. Once again, it would appear that the “invisible hand” of markets is doing its job, and doing it without state intervention.

Thus, there appears to be no case for providing tax credits or subsidies for the use of products arising from scrap tires or for the installation of equipment required for such uses. Appropriate market incentives for these activities seem to be operative in Georgia. Furthermore, we find no compelling case for providing research assistance toward the development of new scrap tire end uses or lower cost methods for using or processing scrap tires, as such activity is in full bloom. This is especially true for crumb rubber, given that crumb rubber products are traded and related technologies developed in worldwide markets. Only a fraction of the benefits of expenditures of Georgia dollars on such research would accrue to Georgia.

This is not to say that the state could not help the industry, however gratuitous such help might be relative to the state’s limited interests. The most obvious immediate areas for such help would be in joint-venture projects that focus on technologies that remove wire from tire chips in more cost-effective ways, and demonstration projects designed to enhance our understanding of potential environmental benefits associated with various uses of scrap tires. Funds for such joint ventures could be provided from the Solid Waste Trust Fund.
A number of individuals interviewed as a part of this study suggest a case for expansions in the bonding requirements established by Georgia Code 12-8-40.1(l). This section provides for performance bonds or letters of credit as a prerequisite for the EPD’s issuance of a permit to scrap tire carriers. While company’s described above in provision (5) are responsible for the legal disposition of tire inventories (as provided in (6)), it can be (and has been) the case that with business failures in the scrap tire industry responsible parties can not be found or are financially unable to cover disposal costs. The result is “abandoned” inventories of scrap tires, disposition of which must be accomplished by the State. Present law provides that funds for such activities be made available from the Solid Waste Trust Fund (thus our earlier argument for maintaining the scrap tire fee). Application of the “user pays” principle might suggest the need to expand the bonding provisions of 12-8-40.1(l) to include individuals and companies that are permitted to hold “large” stocks of scrap tires and/or scrap tire materials.

Without diminishing the substance of this case for expanding bonding requirements, we must note the case for not expanding bonding requirements to processors. Such requirements may impose significant costs on firms, costs which via their effects on the entry of new, small firms, could have the effect of adversely affecting the competitive market conditions relevant for the processing industry -- market conditions which we have noted appear to be operating well in terms of the State’s interests. Profit margins for chip producers do not appear to be inordinately high at the present time, and one can only speculate as to the impacts that new bonding requirements might have on such margins. All of this is to argue that one should move cautiously in considerations of the possibility of expanding bonding requirements in this particular industry.
VI. Conclusions And Recommendations

Georgia’s evolving scrap tire management system has benefitted greatly from the existence of substantial processing capacity and the relatively stable demand for tire chips for uses as tdf by paper mills, as well as a growing market for septic drainage field uses of tire chips. These uses -- some 8 million tire-equivalents in recent years -- relative to the annual generation of scrap tires -- some 7 million tires -- has effectively insulated Georgia from many confounding end-user problems faced by sister states in their efforts to develop similar systems.

We conclude that the short and long run prospects for Georgia’s scrap tire industry to be reasonably good at the present time. It is a young industry which has been changing and will continue to change. Demand in Georgia for tires to process is sufficiently high that processors are importing tires from other states. Processors are successfully finding end users willing to purchase this expanded volume of tire products. It seems highly likely that competition among processors for scrap tires, not only in Georgia but in the Southeast Region, will increase over time. Economic promise for producers of high quality crumb rubber seem to be quite high, and Georgia will almost surely benefit from expansions in this niche of the scrap tire industry. There is also room for growth in civil engineering uses of tire products.

We find no compelling case for new state policies governing this industry, whether through tax credits, subsidies, or other market and/or technology development efforts, given the state’s limited interest in assuring a scrap tire management program focused on economically and environmentally viable structures for recycling scrap tires generated in the state. There are two possible exceptions, however. First, a case can be made for the use of funds from the Solid Waste Fund for such purposes as joint-venture projects focused on technologies that remove wire from tire chips in more cost-effective ways, and demonstration projects designed to enhance our understanding of potential environmental benefits associated with various uses of scrap tires. Second, the state may wish to consider the possibility of establishing uniform (across counties) standards related to the use of chips for septic drainage fields.

We certainly find compelling reasons for maintaining the policies and programs that the state now has in place and for shifting the emphasis of the scrap tire program from abatement to management. Thus, our analysis leads us to make the following recommendations.

Recommendation 1

Maintain the existing ban on landfill disposal of scrap tires, as codified in State Code 12-8-40.1.
Recommendation 2:

*Extend the existing scrap tire fee for five years.*

Recommendation 3:

*As a corollary to Recommendation 2, maintain and strengthen local government education and enforcement programs.*

Recommendation 4:

*Establish a continuing process for monitoring the scrap tire industry in Georgia and in the Southeast region.*

Recommendation 5:

*Charge Georgia’s scrap tire management program with the responsibility of preparing an annual report which describes the state of the system, describes relevant changes that have the potential for affecting the economic and environmental viability of the system, and identifies actions and/or studies required to ameliorate or eliminate effects from these changes.*

Recommendation 6:

*Carefully consider the possibility of establish bonding requirements for scrap tire processors and, possibly, for end-users that maintain unusually large stocks of scrap tire materials.*

Recommendation 7:

*Consider the possibility of establishing state-wide standards for the approved use of chips for septic drainage systems.*
Bibliography


Organisation for Economic Cooperation and Development, “Used Tyres in Solid Waste


Recycling Research Institute, *Scrap Tire News*, various issues.


Scrap Tire Management Council, “An Informational Brochure” (Washington, DC: no date)


APPENDIX A

Scrap Tire Processing Capacity in the Southeast

I. Introduction

Scrap tires are often transported across state lines for processing. Therefore, in order to understand the stability of the processing market in Georgia it is necessary to understand the processing capacity in the surrounding states. This Appendix presents the methodology and results used to better understand the scrap tire processing capacity in the southeast.

II. Methodology

Eight states were chosen to represent the southeast region. They are as follows:

- Alabama
- Florida
- Georgia
- Kentucky
- Mississippi
- North Carolina
- South Carolina
- Tennessee

The Scrap Tire Management Council in Washington, D.C. publishes a summary of the state regulations, major markets, and state contacts for scrap tire issues for each of the 50 states. In addition, regulators for each of the states (except Georgia, of course) were contacted by phone and asked to participate in a brief survey of the scrap tire processors in their state. Five of the seven states participated in the survey. The remaining two states, Alabama and South Carolina, did not return repeated phone calls. Initially, it was thought that the state contacts would provide adequate information regarding the scrap tire processing capacity within their particular state. But, after conducting the survey, it was found that the quality of the responses varied from very good (detailed information regarding the processors in the state) to very poor (rough guesses on the processors within the state) to non-existent (unreturned phone calls from two states). Therefore, it was decided to supplement this information with a survey of processors listed in The Scrap Tire and Rubber Users Directory. Each listing in this directory includes the name, address, and telephone number of processors by state. Additional information included for some, but not all, listings includes a contact name, fees charged for tires, processing capacity, services, and end-products.

It is important to note that these surveys are subject to error and bias due to non-responses and self-reported information. Therefore, the information is provided to indicate general trends only.

28 Copies of all surveys are available upon request from the principal investigator.
III. Results

As stated above, five of the seven state contacts were surveyed, representing 75% of the states. Of the firms listed in The Scrap Tire and Rubber Users Directory, 90 were identified as possible processors; 61 of these firms were successfully contacted. Of the firms contacted 36 were identified as current scrap tire processors and were administered the survey. Information was provided by state contacts on 18 additional processors. Therefore, a total of 54 processors are included in this report.

A. Current Market Situation. Table A.1 summarizes the processing capacity in passenger tire equivalents (PTE’s) per year by state, current volume processed in PTE’s/year by state, number of processors in each state, the average capacity per processor in each state, and 1997 population by state. The latter number corresponds to the number of tires generated, using the rule of thumb of a one tire per capita annual generation rate. If tires generated exceed current volume then the state must be exporting tires, and vice versa. Thus, Florida, Kentucky, Tennessee and South Carolina are net exporters of tires and Alabama, Mississippi, and North Carolina are net importers. Georgia is most likely included in this flow of tires. We are probably sending our tires to Alabama and South Carolina and importing tires from Tennessee and Florida.29

Processing capacity exceeds current processing volume in many Southeastern states. Five states (Alabama, Kentucky, Mississippi, North Carolina, and Tennessee) are currently processing within one million tires of their capacity. Florida and South Carolina are only processing about 70% of capacity. Three states that border Georgia (Florida, North Carolina, and South Carolina) have a combined ability to process almost 7 million additional tires. This almost matches Georgia’s current annual tire generation. Thus, Georgia’s tires could be processed even if all three processors in Georgia shut down. Of course, this simple analysis assumes, unrealistically, that transportation costs are negligible. Nonetheless, surrounding states do have the capacity to absorb substantial amounts of Georgia tires, should one or more Georgia processors falter.

North Carolina, Alabama, and Florida are the largest processors based on average capacity per processor, suggesting that the processing capacity within these states is primarily composed of a few large processors. Tennessee, Mississippi, and Kentucky are primarily composed of many small processors, mostly consisting of either mobile operations or small mom and pop shops. Kentucky recently modified its reporting and permitting requirements for processors, which may eliminate some of these small operations within the state. The large

29 There is both documented and anecdotal evidence to support these findings based on the surveys with Georgia processors. One processor indicated a long standing contract with the state of Tennessee to take tires. One processor has a sister plant in South Carolina to which many Georgia tires are sent. Several processors indicated having an issue with tire jockeys taking tires to Alabama, where landfilling restrictions were lenient at best.
operations are the most likely to be serious contenders for picking up excess tires in Georgia.

<table>
<thead>
<tr>
<th>State</th>
<th>Capacity (PTE/year)*</th>
<th>Current Volume (PTE/year)*</th>
<th># of processors</th>
<th>Avg. capacity/processor</th>
<th>Tires Generated (1997 population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>6,990,000</td>
<td>6,990,000</td>
<td>4</td>
<td>1,747,500</td>
<td>4,319,000</td>
</tr>
<tr>
<td>Florida</td>
<td>15,152,400</td>
<td>10,602,400</td>
<td>9</td>
<td>1,683,600</td>
<td>14,654,000</td>
</tr>
<tr>
<td>Kentucky</td>
<td>2,122,000</td>
<td>1,466,000</td>
<td>7</td>
<td>303,143</td>
<td>3,908,000</td>
</tr>
<tr>
<td>Mississippi</td>
<td>3,316,000</td>
<td>2,908,600</td>
<td>9</td>
<td>368,444</td>
<td>2,731,000</td>
</tr>
<tr>
<td>North Carolina</td>
<td>9,350,000</td>
<td>8,350,000</td>
<td>4</td>
<td>2,337,500</td>
<td>7,425,000</td>
</tr>
<tr>
<td>South Carolina</td>
<td>4,754,000</td>
<td>3,314,000</td>
<td>5</td>
<td>950,800</td>
<td>3,760,000</td>
</tr>
<tr>
<td>Tennessee</td>
<td>2,200,000</td>
<td>2,200,000</td>
<td>3</td>
<td>733,333</td>
<td>5,368,000</td>
</tr>
<tr>
<td>Georgia</td>
<td>12,100,000</td>
<td>12,100,000</td>
<td>3</td>
<td>3,367,000</td>
<td>7,486,000</td>
</tr>
</tbody>
</table>

* Current volume was assumed to equal capacity and capacity was assumed to equal current volume when only one figure was available.

The figures for Georgia are included as a comparison. Georgia is processing at capacity and is importing tires to do so.

This preliminary evidence suggests that excess processing capacity exists in the Southeast and that the states surrounding Georgia are well suited to compete for excess Georgia tires, should that situation arise.

It is also necessary to examine the stability of the processors in each state, which can be based on the average number of years that the processors have been in business. The average number of years that processors have been in business by state is as follows:

<table>
<thead>
<tr>
<th>State</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>21</td>
</tr>
<tr>
<td>Florida</td>
<td>6</td>
</tr>
<tr>
<td>Kentucky</td>
<td>6</td>
</tr>
<tr>
<td>Mississippi</td>
<td>8</td>
</tr>
<tr>
<td>North Carolina</td>
<td>12</td>
</tr>
<tr>
<td>South Carolina</td>
<td>9</td>
</tr>
<tr>
<td>Tennessee</td>
<td>3</td>
</tr>
<tr>
<td>Georgia</td>
<td>9</td>
</tr>
</tbody>
</table>
Alabama and North Carolina have the oldest processors, while Tennessee has the youngest. Interestingly enough, Alabama is processing more tires than it generates, while Tennessee processes fewer tires than it generates. These results are consistent with the age of the markets in these states. The Alabama market is more well developed and therefore has found ways to import tires, while the opposite is true of Tennessee. Perhaps this suggests that as the processing market develops, the processor begins looking out of state to gain access to tires.

Mississippi and Kentucky each have the greatest percentage of processors landfilling tires; 67% and 43%, respectively. Interestingly enough, these are the states in the report who do not share a border with Georgia. Also, anecdotal evidence has suggested that Alabama has very lenient landfilling laws and yet it is the only state in which none of the processors indicated tires were landfilled. This could be due to lenient permitting standards for mobile processors, though. Mobile processors might not be required to report their activities to the state and therefore would not be included in any listings.

**B. Historical Trends.** Table A.2 shows any known changes in processing capacity since 1990 by state. Florida shown the most turnover in processors, though there is no information regarding the reasons for shut down or the capacity when the processors were in business. It does not appear as though any of the now-defunct processors were large companies in any of the states. No state has experienced a major drop in capacity.

<table>
<thead>
<tr>
<th>State</th>
<th># of Defunct Processors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida</td>
<td>4</td>
</tr>
<tr>
<td>Kentucky</td>
<td>1</td>
</tr>
<tr>
<td>Mississippi</td>
<td>2</td>
</tr>
<tr>
<td>Tennessee</td>
<td>1</td>
</tr>
<tr>
<td>South Carolina</td>
<td>1</td>
</tr>
</tbody>
</table>

**C. Future Trends.** Table A.3 shows any known future processing capacity that may arise in any of the eight states. Florida and Tennessee both show the greatest potential for new processors, though the additional capacity in Tennessee is low. Each of these states is currently exporting tires, therefore tires do appear to be available for in-state processing. Mississippi is currently processing almost all of the tires they are currently generating; therefore, it is uncertain where the new processor will find additional tires. The same will hold true for the potential new processors in Georgia.
IV. Conclusions

There is evidence to suggest that there currently is excess current processing capacity in the southeast. With regards to the states bordering Georgia, Florida, North Carolina, and South Carolina have a combined excess capacity of almost 7 million tires. The three states in this report who do not share a border with Georgia, Kentucky, Mississippi, and Virginia, have a combined excess capacity of a little over 9 million tires. This suggests that in the southeast region there is currently the capacity to process many more tires than the current volume.

There is also evidence to suggest that the processing capacity has not changed drastically since 1990 and that while there do exist several potential processors, there is little reason to believe that any will pose a serious threat to the current processors in the southeast.

Overall, the processing industry in the southeast appears to be relatively stable. Furthermore, should a current Georgia processor exit the industry, there appears to be the potential for Georgia tires to be absorbed by the surrounding states, assuming that transportation costs are negligible.

<table>
<thead>
<tr>
<th>Table A.3: Potential Future Processing Capacity by State</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>Florida</td>
</tr>
<tr>
<td>Mississippi</td>
</tr>
<tr>
<td>Tennessee</td>
</tr>
<tr>
<td>Georgia</td>
</tr>
</tbody>
</table>
Appendix B
Issues Pertaining to The Pollution Arising From Industrial Combustion of Scrap Tires

This Appendix reports on two dimensions of the effects of pollution regulation on the use of scrap tires as fuel. First, we review the literature on how emissions change when tires are added to industrial processes as supplements to other fuels. We find that the direction and magnitude of change in emissions depend on the pollutant and on characteristics of each individual facility, especially their existing pollution control devices and their fuel mix. No general conclusion can be drawn, except that zinc emissions increase significantly. Second, we summarize the key issues that will arise as regulatory regimes change in the future, and explain why current and potential users are wary of the possible changes.

1. Emission from Industrial Combustion of Scrap Tires. To evaluate the effect of scrap tire-based fuels on emissions, three publications were found and reviewed:


   Clark, Charlotte; Kenneth Meardon; and Dexter Russell, Burning Tires for Fuel and Tire Pyrolysis, December 1991, Pacific Environmental Services for the US EPA.


   These publications review emissions tests conducted at facilities considering TDF use; the third publication also reports results from large-scale laboratory testing. The first two publications appear together as:


   In addition to the review, discussions concerning changes in emissions occurred as part of the process of interviewing end users.

   The most important lesson drawn is that the direction and magnitude in which emissions
change as scrap tires are added as a fuel depends primarily on the boiler, furnace, and pollution control technologies at each facility, as well as the type and quantity of fuel being displaced. Thus, general patterns are difficult to determine, and changes in pollution as companies adopt TDF in the future must be evaluated on a case-by-case basis. However, the following quote, from Reisman (1997, p. ii-iii), gives an indication of the generally acceptable effects of the use of TDF:

“Based on the results of <a laboratory test program>, it was concluded that, with the exception of zinc emissions, potential emissions from TDF are not expected to be very much different than from other conventional fossil fuels, as long as combustion occurs in a well-designed, well-operated, and well-maintained combustion device… The results <from 22 industrial facilities> indicate that properly designed existing solid fuel combustors can supplement their normal fuels … with 10 to 20% TDF and still satisfy environmental compliance emissions limits.”

Thus, TDF is generally equal to other fuels in its effects on emissions, other than perhaps zinc emissions. What follows are summaries of the changes in the levels of individual pollution categories when TDF is introduced as a supplemental fuel. These summaries are vague because of the variation in effects across individual facilities. They also do not indicate whether any emission increases result in violations of permitted levels.

Changes in pollutant levels when TDF is added to fuel mix.

Measured in most tests:

Particulates: Generally decreases or remains constant in cement kilns and power plants, large increases in paper mills. [Aside: the effects on particulates are probably determined primarily by the type of air pollution control device installed: scrubber, baghouse, etc.]

SO2: Generally decreases in cement kilns, increases in paper mills, results variable in power plants.

NOx: Generally decreases in cement kilns, paper mills, and power plants, but increases at some facilities.

Measured in some tests:

VOC: Generally decreases or remains constant.

CO: Generally increases at cement kilns and at various other facilities.

Heavy Metals other than Zinc: Generally decreases at cement kilns, but some
notable increases; results variable for other facilities.

Zinc: Often increases substantially, but not always.

2. Regulatory Policy Affecting The Use Of Scrap Tires As A Fuel. During our survey of current users of scrap tires, a number of users of tires as fuel expressed concerns regarding the future of environmental regulation in this area. These concerns were generally of three types. First, a number of users were concerned about the contribution that zinc emissions make toward their reports for the Toxics Release Inventory. Second, users were concerned that regulatory constraints may tighten in the future. Third, users were concerned about the regulatory status of the ashes generated in the combustion process.

Zinc emissions have not received a great deal of attention by regulators to date. Zinc is not considered a major pollutant, as compared to pollutants such as nitrous oxides, sulfur dioxide, volatile organic compounds, or particulates. Thus, while regulators have been cognizant of the zinc emissions arising from tire combustion, they have not focused their efforts on controlling zinc emissions.

Zinc emissions are considered toxic, however, and so are subject to the regulations associated with the Toxics Release Inventory. All sources of zinc emissions must report the quantities they emit; these reports are eventually made available to the public. Recently the public’s access to these reports has increased, as they are now conveniently accessed through the Internet. Thus, the use of tires as a fuel generally leads to an increase in toxics emissions. Firms that are sensitive to public opinion regarding pollution (which means most if not all firms) thus perceive an additional cost to the use of scrap tires as a supplemental fuel. This additional cost may compel some users of TDF to switch back to coal or other alternatives.

Users of TDF as fuel expressed uncertainty as to the regulations they may face in the future. Georgia EPD knows of no forthcoming changes in air or solid waste regulations that would affect the use of tires. The trade press has reported on various proposals, expectations, and rumors, however. Certainly pollution regulations have become more stringent over time, and most expect the trend to continue. Thus, user concerns are reasonable.

In summary, changes in the regulatory environment have the potential to affect decisions to burn tires as fuel in Georgia. Thus, one important task for EPD’s increased oversight responsibilities is to more closely monitor forthcoming changes in the regulatory environment and its effects on individual firms.

Some firms have expressed the desire that the regulatory process take the additional step of recognizing that their consumption of tires diverts those tires from other uses that cause harmful effects. Those firms feel that they should be credited for their role in the tire recycling/disposal system. We find it difficult to conceive of how such a system could be implemented on top of the layers of existing regulations. Furthermore, such credit would have to be made in the context of regulations made not by Georgia EPD but by US EPA. More
importantly, such a system would be a significant change from current regulatory practice, with implications for all recycled materials industries. Thus, we cannot support such a system at this time. As always, regulators are able to consider such issues informally.

**APPENDIX C**

**Individuals And Organizations Contacted As A Part Of This Study**

Alan Ball  
Department of Environment and Conservation,  
Division of Solid Waste Management  
L&C Building  
401 Church Street  
Nashville, Tennessee  
615-532-0091

Larry Chambee  
Chamblee and Sons  
P.O. Box 1538  
Anderson, SC 29622  
864-226-2451

Hal Bartlett  
Plant Manager  
Blue Circle Cement  
2520 Paul Avenue  
Atlanta, GA 30318  
404-792-5625

W. Lewis Chatham  
Chief Operating Officer and General Manager  
United Rubber Recycling  
375 Buford Drive  
Lawrenceville, GA 30045  
770-822-1355

Steve Basssler  
Southdown, Inc.  
P.O. Box 120  
Clinchfield, GA 31013  
912-987-2121

Steve Coe  
Department of Waste Management  
101 North 145th Street, 11th Floor  
Richmond, Virginia 23219  
804-698-4029

Clayton Black  
Middle Georgia Rural Development Center  
175-C Emery Highway  
Macon, GA 31217  
912-751-6160

Jennifer Wynn Edge  
Southeast Paper Manufacturing Co.  
P.O. Box 1169  
Dublin, GA 31040  
912-277-5389

Michael Blumenthal  
Executive Director  
The Scrap Tire Management Council  
1400 K Street, NW  
Suite 900  
Washington, DC 20005  
202-408-7781

Georgia Recycling Coalition, Inc.  
2508 Kiner Court  
Lawrenceville, GA 30043  
770-822-9308

Tia Bohannon  
Environmental Manager  
Blue Circle Cement  
2520 Paul Avenue  
Atlanta, GA 30318  
404-792-5605

Harry Griede  
Recycling Coordinator  
GreenMan Technologies of Georgia, Inc.  
138 B Sherrel Ave.  
Jackson, GA 30233  
770-775-6107

Steven Busbin  
Blue Circle Cement  
2520 Paul Avenue  
Atlanta, GA 30318  
404-792-5605

Wouter Gulden  
State Materials and Research Engineer
Georgia Department of Transportation  
15 Kennedy Drive  
Forest Park, GA 30297-2599  
404-363-7510

Vice President  
GreenMan Technologies of Georgia, Inc.  
138 B Sherrel Ave.  
Jackson, GA 30233  
770-775-6107

Stephanie Hubbard  
H-Works  
2508 Kiner Court  
Lawrenceville, GA 30043  
770-822-9308

Mark E. Mintz  
Environmental Specialist  
Solid Waste Section, Division of Waste  
Management  
N.C. Department of Energy & Natural Resources  
401 Oberlin Road, Suite 150  
Raleigh, NC 27605-1350  
919-733-0692

James and Jerry Hunt  
American Recycling Technology  
2029 Clearview Drive  
Ringgold, GA 30736

Bill Parker  
Bureau of Solid & Hazardous Waste  
Department of Environmental Protection,  
Division of Waste Management  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400  
850-922-6104

David and Susan Wilbanks  
Knights Concrete  
226 Lovers Lane  
Covington, GA 30016  
770-786-7505

Pat Mitros  
Brad Ragan Tire  
2068 Marietta Blvd.  
Atlanta, GA 30318  
404-355-3575

Phil Lackey  
General Manager  
Waste Recovery, Inc.  
1593 Huber St., NW  
Atlanta, GA 30318  
404-355-0547

Carlton Peake  
Inland Paper  
Rome, GA  
706-236-5455

Harvey Levitt  
Dalton-Whitfield SWM Authority  
PO Box 1205  
Dalton, GA 30722  
706-277-2545

Mike Playdon  
Director of Operations  
United Rubber Recycling  
375 Buford Drive  
Lawrenceville, GA 30045  
770-822-1355

Marcus Price  
Marcus Price Enterprises  
Hwy 57 West  
Wrightsville, GA 31096  
912 864 3898

Richard Purcell  
Conectiv  
302-429-3724

James Maust  
Bureau of Solid & Hazardous Waste  
Department of Environmental Protection,  
Division of Waste Management  
Frankfort Office Park  
18 Reilly Road
David Sapp
Liberty County Solid Waste Authority
PO Box 829
Hinesville, GA 31310
912-884-3310

Tony Sexton
Toby Sexton Tire
P.O. Box 1768
Loganville, GA 30052
770 466 1060

Michael Sorcher
MAS Associates
8101 College Blvd., Suite 210
Overland Park, KS 66210
913-663-0100

Shelli Stewart
Southdown, Inc.
P.O. Box 120
Clinchfield, GA 31013
912-988-2312

Tim Stuckey, Department Manager
Southeast Paper Manufacturing Co.
P.O. Box 1169
Dublin, GA 31040
912-277-5324

David Watson
Blue Circle Cement
2609 No. 145th East Ave
Tulsa, OK 74116
918-461-2464

Dexter White
Dougherty County Solid Waste
2106 Habersham Road
Albany, GA 31701
912-430-3044

Mark Williams
Department of Environmental Quality
Office of Pollution Control, Solid Waste