

**Waste Tires in the NEWMOA States
February 11, 2002**

This report focuses on waste tire generation, those tires for which reuse as a tire is not possible. The Scrap Tire Management Council estimates that 10 percent of all tires removed from vehicles have adequate tread and are reused, and another 10 percent of used tires are retread. Generally, used tires that can be reused or retread are effectively removed from the waste stream and are not sent to scrap tire processing facilities. Therefore, in this report, all tires that a facility reports as processing are included as waste tires, including those that are resold. This report focuses on the management of current waste tire generation. However, waste tire piles that have accumulated over time are also discussed to a limited extent.

Discussion of Data Quality and Assumptions

Unless noted, all data is for the 2000 calendar year. The state of origin and the corresponding number of waste tires processed at most facilities was estimated by the facility and, in most cases, significant generalization and rounding of numbers is highly likely. In addition, in many cases the overall number of tires processed by many facilities, particularly those that are not permitted, was also estimated. The data obtained by Connecticut Department of Environmental Protection (CT DEP) from facilities in Connecticut regarding the origin of tires processed is significantly more detailed than that reported by the other states. Therefore, with the exception of the Connecticut information, NEWMOA used its best judgment to adjust the numbers regarding the origin of tires based on all the information obtained.

The waste tire generation numbers are estimated based on population and could be inaccurate. However, NEWMOA is not aware of any information that more accurately quantifies waste tire generation rates. NEWMOA did not assume 100 percent capture of all waste tires in any state. When numerical calculations could not be used to determine the quantity of tires unaccounted for in a particular state, NEWMOA adjusted information so that approximately five percent of current generation was not captured. Unaccounted for tires are assumed to result from overestimation of generation numbers; or inaccurate or incomplete reporting by facilities; or to find reuse as tire swings and tarp weights at farms, remain on vehicles at junk yards, and/or be illegally disposed of.

Waste Tire Generation

Although today's tires last for more miles than they did in the past, the number of cars on the road is increasing and the average number of miles driven annually is also increasing. Therefore, according to

the Scrap Tire Management Council,¹ the standard assumption that waste tires are generated at a rate of one tire per person per year remains the accepted estimate. Therefore, the number of waste tires produced within a state each year is approximately equal to the state's population. The estimated number of waste tires produced each year within the NEWMOA states is:²

Connecticut	3.41 million	New York	18.98 million
Maine	1.27	New Jersey	8.41 million
Massachusetts	6.35		
New Hampshire	1.24		
Rhode Island	1.05		
<u>Vermont</u>	<u>0.61</u>		
New England Total	13.93 million		

The New England states are grouped together because generally all the waste tires generated within New England are managed within New England. Due to New York's size and New York and New Jersey's location, the market for waste tires generated within New York and New Jersey is not as self-contained. This distinction becomes important when discussing current markets in the next section.

Current Markets for Waste Tires

Generally, within New England, most current waste tire generation is used as fuel, either at paper mills in Maine or at a tire-to-energy facility in Connecticut. There are three paper mills in Maine that supplement their fuel use with tire derived fuel (TDF): Mead Paper, Champion Paper, and Georgia-Pacific.³ Together the three mills consumed approximately 71,000 tons of TDF in 2000, roughly equivalent to 7.1 million passenger tires,⁴ of which 4.9 million were from current generation. Generally, the TDF to supply these mills is produced by one of two processors: JP

¹ The Scrap Tire Management Council is an organization of the Rubber Manufacturer's Association (RMA). Most manufacturers of passenger car tires are members of the RMA.

² U.S. Census Bureau, data from 2000 census.

³ The tire shreds typically displace coal and Maine DEP considers them a good alternative. TDF has a lower unit cost and a higher heating value than coal and reduces NOx and SOx emissions.

⁴ One passenger car tire weighs approximately 20 pounds. Therefore, one ton of waste tires is equal to 100 tire equivalents.

Routhier in Ayer, Massachusetts or Casella in Elliot, Maine. JP Routhier and Casella receive waste tires from collection systems throughout New England and Casella also obtains a large portion of tires from pile remediation projects. The dedicated tire-to-energy facility, Exeter Energy Limited in Sterling, Connecticut burns mainly whole tires, and consumed 10.13 million tire equivalents in 2000. In addition, approximately 3.48 million tire equivalents from current generation (not tire pile remediation projects) were used in various landfill applications (including alternative daily cover) supplied by JP Routhier, F&B Recycling (New Bedford, Massachusetts) and Lakin Tire East (West Haven, Connecticut). Lastly, F&B Recycling converted approximately 1.0 million tire equivalents into various marine products for the fishing industry.

The waste tire market in New York is somewhat independent from New England.⁵ There are no significant users of waste tires within New York other than landfill applications which appear to have consumed approximately 4.1 million tire equivalents in 2000, and backfill and playground/horse arena uses which consumed up to 654,000 tire equivalents in New York in 2000. Approximately 3.4 million tire equivalents from southeastern New York and the Albany area were sent to Exeter Energy in Connecticut in 2000. Additional tires from the Albany area are processed and used for fuel in Pennsylvania, at landfills, and exported to Canada. Tires produced in the more populated areas of northeastern New York, as well as some from Vermont appear to be sent to facilities in Quebec. Tires from western New York are generally processed into TDF that is consumed in Pennsylvania, used in various landfill applications, or used for playgrounds, horse arenas and other miscellaneous applications in New York and Pennsylvania. The disposition of tires produced in the other areas of New York, as well as those produced in southeastern New York that are not sent to Exeter Energy, is not fully characterized.

There are several facilities in New Jersey that together processed approximately 992,000 waste tires for end uses such as playground/horse arena uses, landfill liners, and TDF in 2000. A facility in Delaware, one in Maryland, and two in Pennsylvania obtained approximately 1.92 million waste tires from New Jersey in 2000. In addition, processing facilities in Connecticut received approximately 1.02 million waste tires generated in New Jersey and approximately 600,000 tires were sent to F&B in Massachusetts. There are currently no waste tire processing facilities in northern New Jersey. The known facilities that process tires generated by New Jersey do not fully account for the number of waste tires that are generated.

The following sections discuss the situation within each state in more detail.

Connecticut

⁵ This summary provided by the Scrap Tire Management Council supplemented by information obtained during preparation of this report.

Connecticut does not permit the landfilling of waste tires, either whole or in pieces. DEP requires that all facilities that process (shred, sort, etc.), burn or bury tires are required to report quarterly on the origin of the waste received, amounts received, and amounts recycled and disposed, and the destination of all materials leaving their facility. DEP does not track the transport of tires. Connecticut has three facilities with permits to process tires.

<p><u>Input</u></p> <p>4.68 mil (Lakin Tires East, CT) 1.83 mil (Casings, NY) 1.39 mil (Don Stevens, CT) 1.32 mil (Meridian, CT) 230,000 (RUTS, NY) 197,000 (Integrated, NJ) 157,000 (JBH, NY) 148,000 (Central Landfill, RI) 82,000 (CLF Warehouse, RI) 51,000 (Ricelli, NY – pile remediation project) <u>51,000 (misc. sources in CT)</u> 10.13 million tires</p>	<p>Exeter Energy Limited in Sterling is a tire-to-energy facility and received 10.13 million tire equivalents in 2000. The facility burns mainly whole tires with some TDF. The origin of all of the tires is not exactly known because the facility reports the tonnages by source (vendor) not state of origin. However, due to other information collected, the state associated with most vendors can be determined. Exeter Energy does not appear to have any environmental compliance issues at this time. However, particularly as the electricity markets deregulate, the financial condition of this facility is continuously rumored to be tenuous. See the below chart for the 2000 figures of tires collected by Exeter Energy (arranged by vendor).</p>
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An analysis of the information from Exeter Energy combined with their suppliers,⁶ indicates that in 2000, the approximate number of tires received at Exeter Energy from each state is summarized in the table below:

⁶ Lakin’s numbers were adjusted down 23.1% to account for resold tires and those used at landfills.

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3.48 million	New York*
2.58 million	Connecticut
1.33 million	Massachusetts
989,000	New Jersey
702,000	Pennsylvania
661,000	Rhode Island
296,000	New Hampshire
70,000	Maine
15,000	Delaware
7,000	Vermont

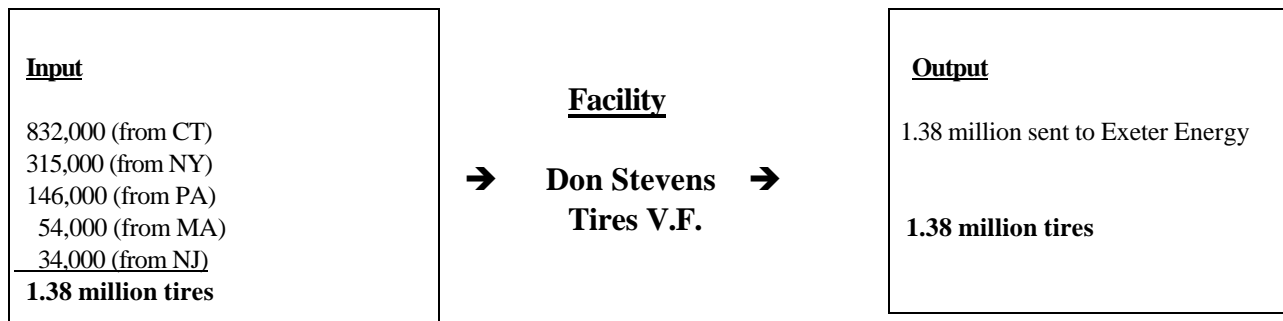
10.13 million TOTAL

* includes 51,000 from pile remediation

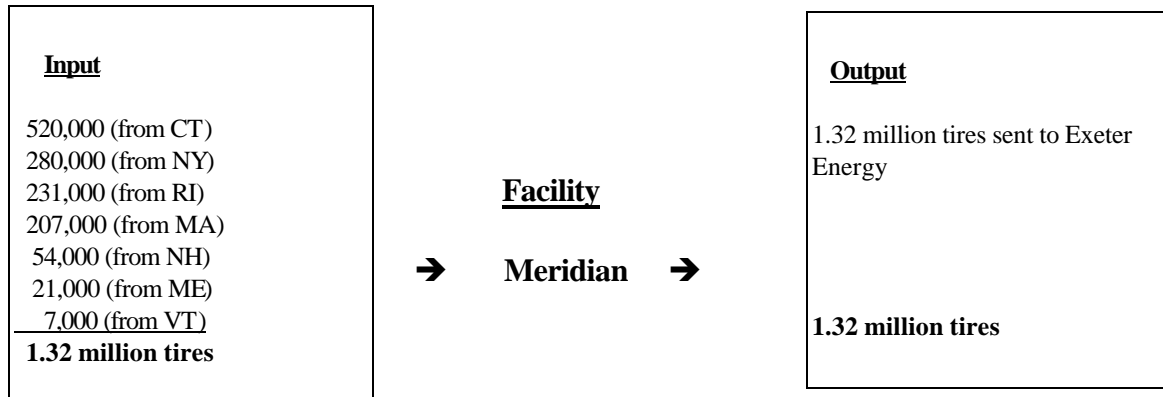
Lakin Tire East in West Haven received 6.09 million tire equivalents in 2000. The below chart illustrates where these tires came from and how they were managed:



Don Stevens Tires V.F. in Southington received 1.38 million waste tires in 2000, most of which were sent to Exeter Energy. The below chart represents the 2000 input/output figures for Don Stevens.



Meridian hauled 1.32 million tire equivalents to Exeter Energy; however there is not breakdown indicating where the tires originated. However, in 2001, through April 13, Meridian reports that 39.4 percent of the tires received were from Connecticut, 21.2 percent from New York, 17.5 percent from Rhode Island, 15.7 percent from Massachusetts, 4.1 percent from New Hampshire, 1.6 percent from Maine, and 0.5 percent from Vermont. These same percentages were applied to the 2000 data to develop the chart below that illustrates where the tires originated. Meridian is in the process of obtaining a permit from DEP.



The number of waste tire equivalents generated in Connecticut and processed by Connecticut facilities is 2.94 million. NEWMOA estimates that F&B Recycling in Massachusetts received approximately 175,000 tires from Connecticut in 2000. Municipal recycling reports to DEP indicate that approximately 34,200 tire equivalents were sent to Casings in New York, and 2,500 were sent to R.U.T.s, also in New York. No other facilities outside Connecticut report accepting tires from Connecticut. Using the assumption that tire generation is equivalent to population, approximately 183,000, or 5.4 percent of waste tires produced in Connecticut in 2000 are not accounted for by the known processing facilities. However, the underlying assumption regarding generation could be in error and the true number unaccounted for could be lower. The disposition of waste tires generated in Connecticut is shown in the following figure.

Connecticut
(3.41 million)

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- 2.94 million tires to facilities in CT (Exeter, Lakin Tire East, Don Stevens, Meridian)
 - 250,000 tires to F&B Recycling (MA)
 - 37,000 to Casings and R.U.T.s (NY)
 - 183,000 remainder (however, the estimated quantity generated could also be lower)
- 3.41 million tires**

The table below summarizes the total usage of waste tires by facilities in Connecticut. Please note that the 10.13 million waste tires used as TDF (by Exeter Energy) are not solely from Connecticut, but from numerous states, as is described in the earlier section.

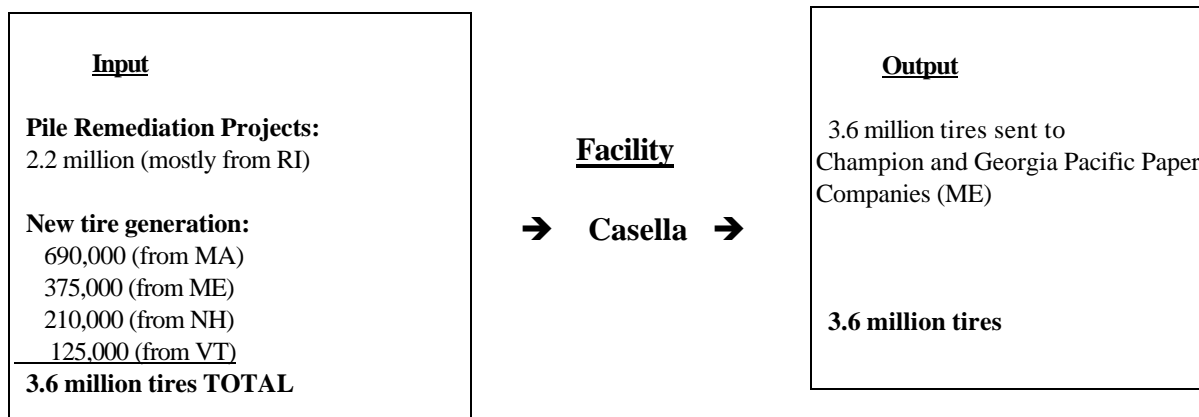
State	TDF	Landfill Uses	Resold	Total
Connecticut	10.13 million	332,000	1.07 million	14.52 million

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Maine

Maine is one of the most progressive states in the entire country in developing markets for waste tires and remediating stockpiled tires. DEP keeps track of waste tire management mainly through requiring that transporters manifest their shipments. Maine does permit the disposal of tire shreds in landfills; however this option is not widely used due to the cost of landfill disposal. Maine has one permitted processor.

Casella, in Elliot, is Maine's one permitted shredder. They provide tire chips to two of the three paper mills that use TDF for a fuel supplement. The shredder handled approximately 3.6 million tires in 2000 and with input sources and output destinations depicted in the boxes below.



Another processor that has processed tires from pile remediation projects in Maine is in the process of obtaining a permit to operate a commercial tire processing facility. Approximately 750,000 tire equivalents from Maine's current generation are collected by JP Routhier and processed in Massachusetts and 84,000 tire equivalents were processed in Connecticut.

To date, most of the civil engineering applications for waste tires in Maine have used tires from pile remediation projects. DEP has an aggressive program to eliminate their existing tire piles. DEP estimates that it cost them approximately \$0.85 per tire to remediate the tire piles. Maine imposes a \$1.00 per tire fee on new tire sales which is collected by the tire dealer and submitted to the state's general revenue. Below are the figures for how many tires were used in different civil engineering projects.

Waste Tires Used for Civil Engineering Applications in Maine in 2000 and 2001

leachate collection (2000)	highway drainage project (2000)	embankment fill (planned for 2001)	roadway drainage (planned for 2001)	total
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800,000	630,000	1.7 million	200,000	3.3 million
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The number of tire equivalents generated in Maine and processed by facilities in Connecticut, Maine, and Massachusetts is approximately 1.2 million. Using the assumption that tire generation is equivalent to population, NEWMOA estimates that approximately 61,000, or 4.8 percent of waste tires produced in Maine in 2000 are not processed by the known facilities. However, the underlying assumption regarding generation could be in error and the true number unaccounted for could be lower. The disposition of waste tires generated in Maine is shown in the following figure.

Maine
(1.27 million)

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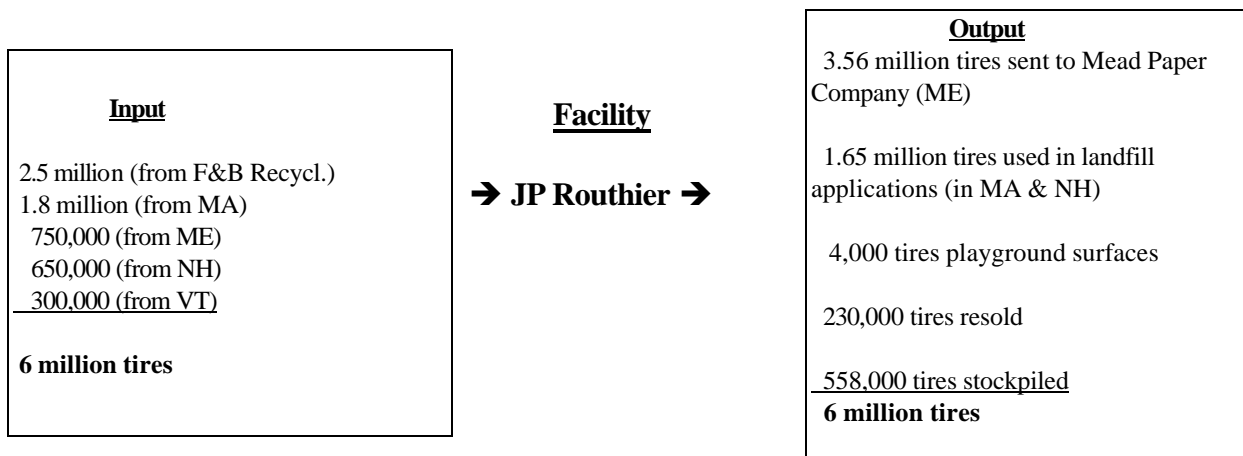
- 375,000 to Casella (ME)
- 750,000 to JP Routhier (MA)
- 63,000 to Lakin Tire East (CT)
- 21,000 to Meridian (CT)
- 61,000 remainder (however, the estimated quantity generated could also be lower)

1.27 million

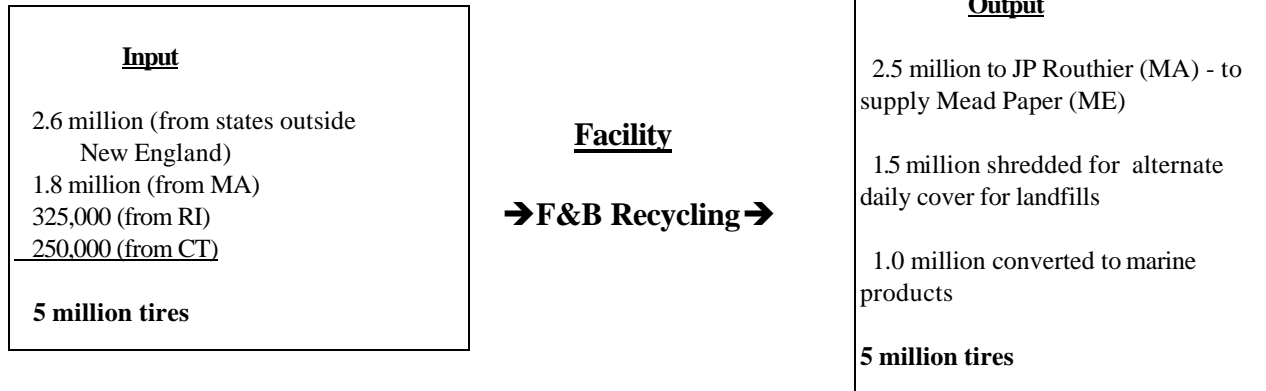
Massachusetts

DEP does not regulate the transport of tires. There are no facilities that burn tires in Massachusetts. Massachusetts does allow the landfilling of processed tires, but not whole tires. However, as in Maine and the other states, landfill disposal is rarely used due to the cost. There are two primary processing facilities in Massachusetts.

JP Routhier, a tire shredder in Ayer, operates the only facility that currently possesses a solid waste site assignment permit. Routhier took in approximately 6 million tire equivalents from current generation in 2000. The below chart illustrates the generation of input/output of the JP Routhier facility.

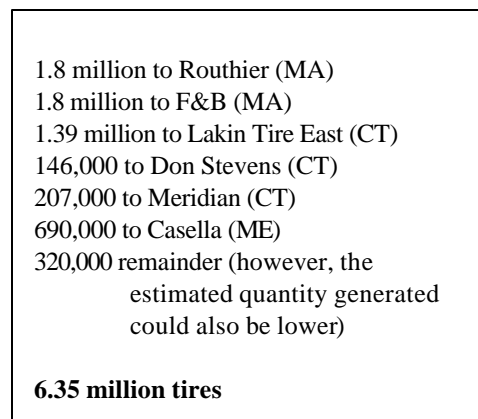


F&B Recycling and New Bedford Tire Recycling makes over 100 different marine products that they supply to the fishing industry throughout the Atlantic, including Iceland and Germany. The marine products are primarily made from truck and heavy equipment tires which they obtain from throughout New England and as far away as Pennsylvania, New Jersey, and New York. In 2000, F&B Recycling and New Bedford Tire Recycling together processed approximately 5 million tire equivalents of current generation.



The number of waste tire equivalents generated in Massachusetts and processed by facilities in Maine, Massachusetts, and Connecticut is approximately 6.13 million. Using the assumption that tire generation is equivalent to population, NEWMOA estimates that approximately 320,000, or 5.0 percent of waste tires produced in Massachusetts in 2000 are not processed by the known facilities. However, the underlying assumption regarding generation could be in error and the true number unaccounted for could be lower. JP Routhier has a large quantity of tires stored at his facility. The disposition of waste tires generated in Massachusetts is shown in the following figure.

Massachusetts ?
(6.35 million)



Tony Canale, Inc. is located in Egg Harbor Township. The company accepted 234,270 scrap tires in 2000 despite only being open for six months that year. The facility stopped its scrap tire operation in 2000 when the Conectiv power plant in Cape May County terminated its TDF operation and left the company without an end market. The company reopened its scrap tire operation in 2001 as the company found a civil engineering end market for its processed scrap tires. Tony Canale, Inc. produces 3"- 5" scrap tire chips for use in landfill liner construction. As per an August, 2001 price survey, the company charges \$100 per ton for the receipt of scrap passenger tires.

Integrated Tire was located in Bayonne. The company no longer operates a scrap tire processing facility at this location. An examination of the information provided by Connecticut shows that 197,000 tire equivalents were sent from Integrated to Exeter Energy in 2000.

Recycling Technology Center (RTC) is located in Tinton Falls and accepted 106,724 scrap tires in 2000. Scrap tires are accepted primarily from New Jersey sources. RTC processes scrap tires into small pieces and markets the material for use in landfill liner systems. As per an August, 2001 price survey, the company charges \$170 per ton for the receipt of scrap passenger tires.

The following companies operated scrap tire storage and transfer operations in New Jersey in the Year 2000:

Casings, Inc. is located in Hillside. The company accepted approximately 1,400,000 scrap tires at its New Jersey facility in 2000.

Bridgewater Resources, Inc. (BRI) is located in Bridgewater. The company operates a solid waste transfer station that also includes a scrap tire operation. The company accepted 19,473 scrap tires in 2000.

Absolute Auto is located in Middlesex. The company accepted approximately 18,000 scrap tires in 2000.

Solid Waste Transfer & Recycling, Inc. (SWTR) is located in Newark. The company operates a solid waste transfer station that also includes a scrap tire operation. The company sends its scrap tires to American Ref-fuel, a fuel market located in Pennsylvania. In order to avoid double-counting, the number of scrap tires accepted at SWTR in 2000 is included as part of American Ref-fuel's scrap tire total and is not listed separately.

Cape May County Municipal Utilities Authority (CMCMUA) is located in Woodbine. This county-run facility accepted 55,500 scrap tires in 2000. Scrap tires received at the CMCMUA

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facility are then shipped to existing recycling centers. In order to avoid double-counting, scrap tires received at the CMCMA facility are not included in calculations or figures illustrating New Jersey's management of this material.

As noted above, scrap tires generated in New Jersey are also transported to out-of-state facilities. The major out-of-state processing facilities that received scrap tires from New Jersey sources in 2000 are as follows:

Lakin Tire East of West Haven, CT reports accepting approximately 985,000 scrap tires from New Jersey sources. As per an August, 2001 price survey, the company charges \$125 per ton for the receipt of scrap passenger tires.

Magnus Environmental of Wilmington, DE accepted approximately 750,000 scrap tires from New Jersey sources. As per an August, 2001 price survey, the company charges \$100 per ton for the receipt of scrap passenger tires.

F & B Recycling of New Bedford, MA reports obtaining tires from New Jersey and NEWMOA estimates that approximately 600,000 waste tire equivalents from New Jersey were sent to F&B in 2000.

Emmanuel Tire (formerly Domino Salvage) of Conshohocken, PA accepted approximately 562,000 scrap tires from New Jersey sources. As per an August, 2001 price survey, the company charges \$72.50 per ton for the receipt of scrap passenger tires.

Systech Environmental of Whitehall, PA accepted 511,191 scrap tires from New Jersey sources. As per an August, 2001 price survey, the company charges \$95 per ton for the receipt of scrap passenger tires.

Emmanuel Tire of Baltimore, MD accepted approximately 450,000 scrap tires from New Jersey sources. As per an August, 2001 price survey, the company charges \$75 per ton for the receipt of scrap passenger tires.

The following out-of-state facilities received smaller quantities of scrap tires from New Jersey in 2000:

- JBH in New York received approximately 174,000 tire equivalents.
- Mahantango in Liverpool, PA reports taking in approximately 160,000 tire equivalents.
- American Ref-fuel in Pennsylvania received approximately 105,700 tires equivalents.
- Approximately 76,100 tire equivalents were sent to Meridian in Connecticut.
- Don Stevens in Connecticut reports receiving 34,000 tire equivalents.
- 22,500 tire equivalents were sent to Seneca Meadows in New York.
- 6,900 tire equivalents were sent to R.U.T.S. in New York

Finally, approximately 40,100 tires were properly disposed of as a solid waste at New Jersey disposal facilities, and due to enforcement actions, DEP is aware that in 2000 approximately 226,250 tires that were sent to three illegal facilities in New Jersey and Pennsylvania.

Therefore, the total number of New Jersey waste tires processed by or disposed at known facilities in 2000 is approximately 7.02 million. Using the assumption that tire generation is equivalent to population, waste tire generation in New Jersey is estimated at 8.41 million (however, the underlying assumption regarding generation could be in error). In New Jersey waste tires are also handled at temporary storage sites operating pursuant to an exemption from the recycling center approval process. Such sites are supposed to notify the DEP of their operation and submit tonnage information on an annual basis; however, compliance with these requirements is not uniform. Those operating in accordance with the exemption are not allowed to process (shred, chip, etc.) scrap tires and must move the scrap tires out to recycling end markets.

**New Jersey →
(8.41 million)**

106,724 to RTC (NJ)
343,785 to Rubbercycle (NJ)
234,270 to Tony Canale, Inc. (NJ)
1,400,000 to Casings, Inc. (NJ)
19,473 to BRI (NJ)
18,000 to Absolute Auto (NJ)
197,000 to Integrated (NJ) – to Exeter Energy
750,000 to Magnus Environmental (DE)
450,000 to Emmanuel Tire (MD)
562,000 to Emmanuel Tire (PA)
160,000 to Mahantango (PA)
511,191 to Systech Environmental (PA)
105,717 to American Ref-fuel (PA)
174,000 to JBH (NY)
22,500 to Seneca Meadows (NY)
6,856 to R.U.T.S. (NY)
985,000 to Lakin Tire East (CT)
34,000 to Don Stevens (CT)
76,148 to Meridian (CT)
600,000 to F&B (MA)
226,250 to 3 illegal facilities
40,100 to proper disposal as solid waste
1.39 million remainder (however, the estimated quantity generated could also be lower)
8.41 million tires

Note: Ocean County Recycling Center, Inc. in Toms River opened a scrap tire processing operation in 2001. As per an August, 2001 price survey, the company charges \$100 per ton for the receipt of scrap passenger tires. In addition, Rubbercycle, Inc. and Tony Canale, Inc. were fully operational in 2001. Therefore, it is likely that a greater percentage of New Jersey’s scrap tires were processed in 2001, and

that a greater percentage of those were processed in-state.

New York

New York prohibits the disposal of whole tires in landfills and there are no facilities that burn tires in New York. However, waste to energy facilities can incorporate tires up to 5 or 10 percent of their total solid waste. DEC permits waste transporters who haul waste tires for a fee under 6NYCRR Part 364, but does not track where the tires are hauled. DEC permits the storage of waste tires (6NYCRR Part 360-13) and there are 5 permitted facilities in New York:

Casings, Inc. in Catskill handled approximately 5.5 million tire equivalents in 2000. Virtually all of the tires processed at Casings are generated in New York. In 2000, the waste tire equivalents were processed as follows:

- 2.94 million to fuel (with 1.83 million sent to Exeter Energy in CT)
- million landfilled in Canada
- 339,000 shredded for backfill projects
- 249,000 landfilled domestically
- 247,000 chipped for landfill cell liner applications
- 45,000 exported to Canada for crumb and reuse
- 15,000 chipped for house foundation insulation.
- 405,000 reused domestically
- 242,000 exported for reuse

Casings did not accumulate tires on-site in 2000.

Modern Recycling in Model City managed approximately 2.0 million tire equivalents in 2000. Approximately 1.8 million were from New York, and of those, approximately 1.0 million were from current generation and 800,000 from various pile cleanup projects.

- 1 million to TDF to supply a paper mill in Pennsylvania
- 700,000 for landfill drainage projects
- 300,000 processed to the 3/8th inch size for use at playgrounds and horse arenas

Modern is affiliated with the Model City landfill and only accumulates a small number of tires on site.

Integrated Tire in Buffalo processed approximately 3.5 million waste tire equivalents into tire chips in 2000. Approximately 2.3 million were generated in New York.

- 1.8 million for landfill applications
 - ↳ 1.4 million in NY and 400,000 in PA
- 1 million sent to PA to be processed into crumb rubber for playgrounds and horse arenas
- 700,000 used as TDF by a paper mill in PA

Integrated handled an additional 1.0 million tires that were sold for reuse.

Huron Recovery in Buffalo processed approximately 678,000 tire equivalents into chips for use at five landfills in New York in 2000:

- 392,500 to BFI
- 171,000 to Angelica
- 96,000 to Waste Management
- 11,700 to Seneca Meadows
- 6,500 to Superior Greentree

An additional 20,000 incoming tires were in good condition and were sold for reuse. In 2000, approximately 166,000 tires accumulated at the facility.

U-Save Tire: is very small, sending 35,000 tire equivalents per year to Canada for TDF.

In addition to these permitted processing facilities, **Seneca Meadows** is a registered waste tire storage facility that received approximately 1.77 million waste tire equivalents in 2000:

- 800,000 tire equivalents directly from current generation
- 57,500 whole tires and 388,300 tire equivalents chipped from Casings
- 2,200 from Integrated
- 11,700 from Huron
- 514,000 tire equivalents from pile remediation projects

Adirondack Resource Recovery Facility (ARRF) incinerates approximately 250,000 tires equivalents each year. Two other facilities located in New York, R.U.T.S. and JBH sent a total of approximately 387,000 waste tires directly to Exeter Energy in Connecticut.

The table on the following page provides a summary of the uses of tires processed by facilities in New York. As indicated in the table, New York facilities processed approximately 12.14 million waste tires that were generated in New York in 2000. In addition, approximately 1.4 million waste tires equivalents generated in New York were processed by facilities in Connecticut, and NEWMOA estimates that 1.38 million waste tire equivalents from New York were sent to F&B in Massachusetts. Therefore, the total number of New York waste tires accounted for in 2000 is approximately 14.92 million.

Processors and other users of whole tires in Pennsylvania and New Jersey were contacted to see if there could be New York tires that are hauled directly out-of-state. There are three major processors and two cement kilns in Pennsylvania and one major processor in New Jersey that accept whole tires. Each of these facilities report that none of their suppliers are from New York, but that some suppliers could be obtaining some of their tires from New York. However, there are millions of tires generated in New Jersey and Pennsylvania, so the number of New York tires entering those facilities is not likely to be great due to transportation costs.

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Uses of Tires Processed by New York Facilities

Facility	Landfilled	Landfill Project Use	Backfill/Insulation	Fuel	Crumb/Playground/Horse Arenas	Resold	TOTAL Waste Tires
Casings, Inc.	1.26 million	247,000	354,000	2.94 million (1.83 mil. To Exeter)	45,000	650,000	5.5 million
Modern Recycling	----	700,000	----	1 million	300,000	----	2 million*
Integrated Tire	----	1.8 million	----	700,000	1 million	1 million	4.5 million*
Huron Recovery		678,000	----	----	----	20,000	864,000 (166,000 stockpiled)
U-Save Tire	----	----	----	35,000	----	----	35,000
Seneca Meadows		1.31 million**					1.31 million*
ARRF	----	----	----	250,000	----	----	250,000
JBH	----	----	----	157,000 to Exeter	----	----	157,000
RUTS	----	----	----	230,000 to Exeter	----	----	230,000
TOTAL	1.26 million	4.74 million	354,000	5.31 million	1.35 million	1.67 million	14.85 million*

** Seneca Meadows took in 1.77 million tire equivalents, of which 459,700 were from other NY processing facilities and are not included to avoid double-counting.

* At Modern Recycling only 1.0 million are current generation waste tires New York (1.0 million from pile remediation). At Integrated only 3.3 million waste tires are current generation from New York (1.2 million are from out of state). At Seneca Meadows only 800,000 are from current generation (514,000 from pile remediation). So the total number of current generation tires generated by New York and handled at New York facilities is 12.14 million.

Using the standard one waste tire per capita per year assumption, waste tire generate in New York is estimated at 18.98 million. However, the underlying assumption regarding generation could be in error. It is likely that the percentage of residents in New York City that do not own cars is higher than the percentage in other cities in the United States. Subsequently, it is likely that waste tire generation from residents of New York City is somewhat less than one waste tire per person per year. The population of New York City is over 8 million. Therefore, the number of waste tires not processed by known facilities in 2000 is likely to be less than 4.1 million tire equivalents calculated using standard assumptions. The disposition of waste tires generated in New York is shown in the following figure.

**New York →
(18.98 million)**

5.5 million to Casings (NY)
 1.0 million to Modern Recycling (NY)
 3.3 million to Integrated (NY)
 844,000 to Huron (NY)
 35,000 to U-Save Tire (NY)
 800,000 to Seneca Meadows (NY)
 250,000 to AARF (NY)
 157,000 to JBH (NY) – to Exeter Energy
 230,000 to RUTS (NY) – to Exeter Energy
 800,000 to Lakin Tire East (CT)
 315,000 to Don Stevens (CT)
 280,000 to Meridian (CT)
 1.38 million to F&B (MA)
 4.06 million remainder (however, the estimated quantity generated could also be lower, particularly due to NYC)

18.98 million tires

Rhode Island

There are no tire processing or tire-to-energy facilities in Rhode Island. Rhode Island has had an aggressive program to eliminate their existing tire piles. The program is partially financed through a \$0.50 per tire fee on new tires that is collected by the tire dealer and submitted to the state. Due to Rhode Island’s small size, the fee program has fallen short of revenue projections as citizens can easily purchase tires in Massachusetts and Connecticut. Using the assumption that tire generation is equivalent to population, NEWMOA estimates that approximately 50,000 tire equivalents or 4.8 percent of waste tire generation was not processed by known facilities in 2000. However, the underlying assumption regarding generation could be in error and the true number unaccounted for could be lower. The disposition of waste tires generated in Rhode Island is shown in the following figure.

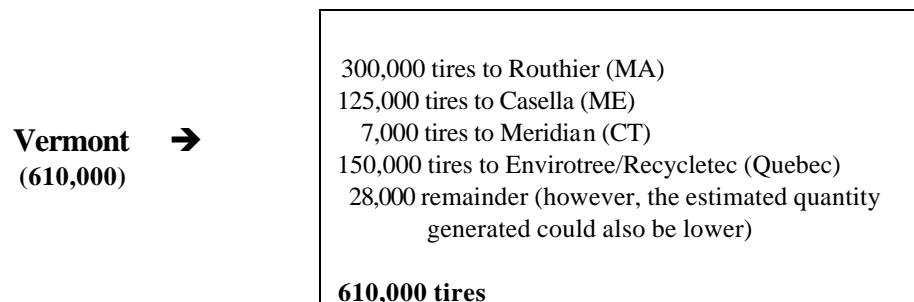
**Rhode Island →
(1.05 million)**

675,000 tires to CT
 includes 661,000 to Exeter Energy (CT)
 325,000 tires to F&B Recycling (MA)
 50,000 remainder (however, the estimated quantity generated could also be lower)

1.05 million tires

Vermont

Vermont does not have any tire processing or tire-to-energy facilities. All haulers of solid waste (which includes tires) must be permitted by the DEC; however, shipments are not manifested. DEC estimates that less than five percent of waste tires in Vermont are reused. Using the assumption that tire generation is equivalent to population, NEWMOA estimates that 28,000 tire equivalents or 4.6 percent of waste tire generation is not processed at known facilities. However, the underlying assumption regarding generation could be in error and the true number unaccounted for could be lower. Most reuse is probably for bunker weights on farms. DEC has approved the use of waste tire shreds for retaining walls and drainage in roadway projects. The disposition of waste tires generated in Vermont is shown in the following figure.



Summary of NEWMOA State's Information

Combined, in 2000 facilities in New England consumed approximately 21.45 million tire equivalents from current generation (including resale and the 558,000 added to storage at Routhier). Of this, approximately 5.77 million are documented as coming into Connecticut processing facilities from outside New England, primarily from New Jersey, New York, and Pennsylvania. In addition, F&B Recycling estimates that 2.6 million tire equivalents processed by their facility come from outside New England. Current generation in New England is approximately 13.93 million tire equivalents of which only 185,000 is reported to be processed outside of New England (150,000 sent from Vermont to Quebec, and 35,000 sent from Connecticut to New York). Therefore, using the standard assumption that generation is equivalent to population, the disposition of approximately 690,000, or 5.0 percent of the waste tires generated in New England is not fully known. However, estimated generation could be in error and the true number of tire unaccounted for could be lower.

The situation in New York and New Jersey is less favorable. Known processing and disposal facilities in New Jersey handled 2.36 million of the approximately 8.41 million waste tires generated in New Jersey in 2000. Out of state facilities are known to have handled another 4.44 million, and a total of 226,000 were sent to three illegal facilities in New Jersey and Pennsylvania that are subject to

enforcement actions. Therefore, using the standard assumption that generation is equivalent to population, the disposition of approximately 1.39 million of New Jersey's waste tires are not accounted for by known facilities. However, estimated generation could be in error and the true number of tire unaccounted for could be lower. In addition, New Jersey has numerous temporary storage sites that operate pursuant to an exemption from the recycling center approval process and DEP believes that most of these unaccounted for tires are at those sites. Another factor could be incomplete or inaccurate reporting by facilities.

In New York, the Albany, Buffalo, and possibly the Adirondack areas appear to have adequate tire processing capacity. However, the rest of the state appears to be underserved. 14.92 million tire equivalents were processed by known facilities in New York and neighboring states. Using standard assumptions regarding generation, up to 18.98 million tire equivalents could be generated each year, leaving approximately 4.06 million unaccounted for. However, due to New York City's probable low car ownership rate combined with its size, waste tire generation could be somewhat less than 18.98 million per year.

States Outside the NEWMOA Region

There are only ten states that have not collected a fee on tires and six of them are NEWMOA states. The only NEWMOA states that impose a fee on tires are Maine and Rhode Island. Connecticut, Massachusetts, New Hampshire, New Jersey, New York, and Vermont do not collect tire fees. The only other states in the country that have not collected fees are: Alabama, Alaska, Delaware, and Wyoming.⁷ Generally, the fees are imposed on tires sales. However, some states tie the fee to vehicle title transfers and a few to vehicle registrations or sales. Tire sale fees range from \$0.25-\$2.00 per tire or a 2% sales tax. Title transfer fees range from \$2.00-\$5.00.

The Scrap Tire Management Council has identified four states as leaders in waste tire management: Maine, Florida, Georgia, and South Carolina. Maine's market development and pile remediation were highlighted in the Maine section above. Florida has mainly dealt with its waste tire piles. Information was obtained from Georgia and South Carolina for this report. In addition, Pennsylvania was contacted

⁷ A few states imposed fees that were sunset in 1992 or 1996 and are no longer collected: Idaho, Oregon, Washington, and Wisconsin.

while preparing this report. The scrap tire management programs in these three states are outlined below.

Georgia: imposes a \$1 per tire fee on new purchases which provides the state with approximately \$6.5 million per year. To date, most of this income has been used to cleanup over 8 million tires in stockpiles throughout the state. The fee also supports enforcement and education efforts by local and county governments. The landfilling of whole or shredded tires is banned. Georgia estimates that their processors import approximately 5 million tire equivalents from surrounding states. Approximately 40 percent of the tires processed in Georgia is used as TDF by paper mills and 20 percent is burned as whole tires at two cement kilns. Approximately 30 percent is used for civil engineering applications, primarily septic system installations. The remaining 10 percent is converted to crumb rubber for the manufacture of rubber products.

South Carolina: imposes a \$2 per tire fee on all new tire purchases. \$1 can be kept by the tire dealer when he takes back a used tire and send it to a state-approved recycler. Whole tires are banned from landfilling and the state has not approved the use of tire shreds for alternative daily cover at landfills. South Carolina has developed a design specification for using tire chips in place of gravel in septic system installations. The state estimates that septic system use now accounts for approximately 88 percent of all waste tire generation in South Carolina. In addition, tires chips are imported from North Carolina and Virginia. One county in South Carolina, Horray, installed approximately 1,200 septic systems in 2000 with each using an average of 800 tires. Therefore this one county used almost 1.0 million tires in septic systems in one year. Approximately 10 percent of South Carolina tires are used as a fuel supplement at a cement kiln and some paper mills. The remaining 2 percent is processed into crumb rubber that is sent to North Carolina for use in new products. South Carolina has just developed a Asphalt Technology Center located a university to work on developing specifications for rubber-modified asphalt and provide grants for installation projects.

Pennsylvania: imposes a \$1 per tire fee that is used primarily to remediate the approximately 16 million tires stockpiled in the state. Paper mills and cement kilns in Pennsylvania consume a large portion of current tire generation. All landfills in Pennsylvania use tire chips for landfill gas vents, and most use them for leachate collection systems and as cover material. Highway projects are beginning to incorporate tire chips as lightweight fill and the use of tire chips for septic system installations is growing. Pennsylvania estimates that one septic system uses approximately 1,800 tires. The state is developing a specification to permit the use of tire chips as pipe bedding for sewer lines, except where they cross state highways.

Markets for Waste Tires

Generally, other than use as TDF the most promising market for high volumes of waste tires in the NEWMOA states is civil engineering applications. Increasing the use of waste tires in new tire

manufacture is unlikely to impact waste tire management in the Northeast because there is only one facility in the region, on the western edge in Buffalo, New York. Most tires are manufactured in North and South Carolina and Alabama. An increase in the use of waste tires would draw in tires mainly from that portion of the country and would not be likely to significantly impact the Northeast. In addition, according to the Scrap Tire Management Council there is a reluctance to incorporate used tires into new production due to the public's perception that tires with a recycled content would be less safe than tires made completely from virgin material.

A major benefit to substituting tire shreds or chips for traditional gravel, stone, or soil in civil engineering applications is that the unit weight of tire chips is substantially less, reducing transportation costs and increasing the ease of placement in many cases. The in-place weight of tire shreds is 45-58 pounds per cubic foot, whereas soil fill typically weighs 125 pounds per cubic foot. There were some problems with heating of tire shreds in some early civil engineering projects; however, installation guidelines have been developed that have eliminated this problem.

The civil engineering applications that are currently being implemented in some locations that consume the largest number of waste tires are highway and landfill construction projects. House foundations and septic system installations are also current uses for waste tires but the potential quantities are smaller. However, the quantity would not be insignificant in areas where new house construction is strong and sewer systems are not in place. Materials made out of waste tires are also used at playgrounds, running tracks, horse arenas and other smaller applications. Each of these uses is briefly described below.

Highway Applications

As discussed in the Maine section, tire shreds can be used as lightweight fill in highway embankments, such as approach fills to overpass bridges, retaining wall backfills, drainage and insulation to limit frost penetration. Lightweight fill is often needed when constructing on sites with coastal marine soils. The two highway embankments planned in Maine are estimated to require 1.7 million tire equivalents. A project already completed in Maine used 1.2 million tire equivalents. When lightweight fill is needed, tire shreds are often the least expensive alternative. Tire shreds are ideal as retaining wall backfill due to their light weight, high permeability and high insulating value. A retaining wall backfill project in Maine consumed 100,000 tires for 3 foot thick layer behind the 36 foot high wall over a total length of 610 feet. The high permeability and a high insulating value of tire shreds also make them useful as a drainage layer beneath roads and to limit frost penetration. A 12 inch layer of tire shreds was shown to prevent frost penetration below that layer at a test site in Maine. Another highway application that could consume large quantities of tires is as the insulation in sound attenuation walls.

Rubber-modified asphalt is another application that could consume waste tires. Three states routinely use rubber-modified asphalt in projects throughout the state: Arizona, California, and Florida. Both Arizona and California have areas of their states that have a climate similar to that found in the Northeast

and rubber-modified asphalt performs well in those climates. Roadways using rubber-modified asphalt wear better, require less maintenance, and less frequent replacement. However, the preparation and application of rubber-modified asphalt is less forgiving than traditional asphalt, requiring adherence to more exacting specifications. On average, one lane over one mile would use approximately 2,000 tires. Therefore, this use would not be likely to consume as large a quantity of tires than other highway applications.

Landfill Applications

The use of tire shreds in various landfill applications is seeing increasing use; however there is a potential to increase this use further. Landfill applications include: leachate collection layer above the liner; foundation layer beneath the cap; drainage layer in the cap; and alternative daily cover. The leachate collection layer for a new landfill cell or a landfill cell closure drainage layer can consume approximately 1 million tire equivalents.

House Foundations and Septic Systems

The main benefit of tire chips in house foundation projects is that they provide excellent drainage. They provide some insulation value but it is not great due because the upper portion of the foundation rises above the ground surface. The use of tire chips in septic systems has become the norm in several states. South Carolina uses an average of 800 tires per system, whereas Pennsylvania reports 1,800 per system. A test system in Massachusetts was reported to use 3,000 tires. Studies of septic systems over time have shown that tire chips perform better than gravel. Reportedly, once an installation contractor uses tire chips, they don't want to use gravel again.

Playgrounds, Tracks and Horse Arenas

Rubber products made from tires, or small tire chips themselves provide excellent shock absorption and have been shown to reduce injury. Generally, the product can be loose fill or a solid mat. For loose fill, all non-rubber materials are removed and the chips are washed. Mats can be one of two types, pour-in-place or conventional matting cut to size or pieced together.

Conclusions and Recommendations

Overall, New England's current waste tire generation appears adequately managed. However, the New England states should not become complacent. A paper mill in Maine could cease operations, eliminating their need for TDF. Exeter Energy is perennially in a precarious financial situation. If this facility was to shut down, over 10 million tires per year would need to find an alternative use. Management of New York and New Jersey's current generation is not completely clear, with the

unknown disposition of approximately 4 million tires per year in New York and over 1 million in New Jersey.

There are substantial opportunities to increase the use of waste tires in the region. The use of waste tires in many civil engineering applications is now routine in Maine. However, these applications are not well utilized in the other Northeast states. The Northeast states should learn about Maine's experience with waste tire use in the highway environment. These uses of waste tires should become routine in highway projects in all the NEWMOA states. Most of the Northeast states have some experience with the use of tires in landfill applications; however these uses are not routinely accepted everywhere. The Northeast states should focus on this use with the goal of ensuring that all possible uses of waste tires at landfills are fully exploited.

The use of tire chips in septic systems is widespread in some states outside the NEWMOA region and specifications have been developed. The Northeast states should examine these specifications to develop specifications that would sanction this use throughout the Northeast. The use of tire chips as building foundation backfill should also be examined and promoted is appropriate.

Several waste tires processors expressed frustration with the current lack of support for the beneficial use of waste tires in most Northeast states. Processors indicate that the civil engineering uses discussed in the previous section (highway projects, landfills applications, septic systems, building foundation backfill, and playgrounds, tracks and horse arenas) show the most promise. One recurring recommendation is that states should work to reduce barriers to these uses. Several suggest that states should routinely use waste tires in government-sponsored projects and then promote those projects to the construction community so their use in private projects is accepted. A stakeholder meeting with the major tire processors in the Northeast might prove beneficial as the states determine how best to promote the greater use of waste tires.