

## APPENDIX J

### VEHICLE DISMANTLING FACILITIES (VDFS)

#### OVERVIEW/STATE OF THE STATE

On July 26, 2006, Chapter 180 of the Laws of 2006 created Article 27 Title 23: Vehicle Dismantling Facilities (VDFs). This law expands the solid waste management requirements for facilities that dismantle end-of-life vehicles (ELVs) and generate used vehicle fluids and other materials such as mercury switches, PCB capacitors, etc. Previously, such facilities were exempt from solid waste permitting requirements under 6 NYCRR Part 360, provided they submitted an annual fluids report. Under the new law, VDFs are required to submit detailed annual reports and comply with management practices that are protective of the environment.

FIGURE 1: NUMBER OF VDF FACILITIES

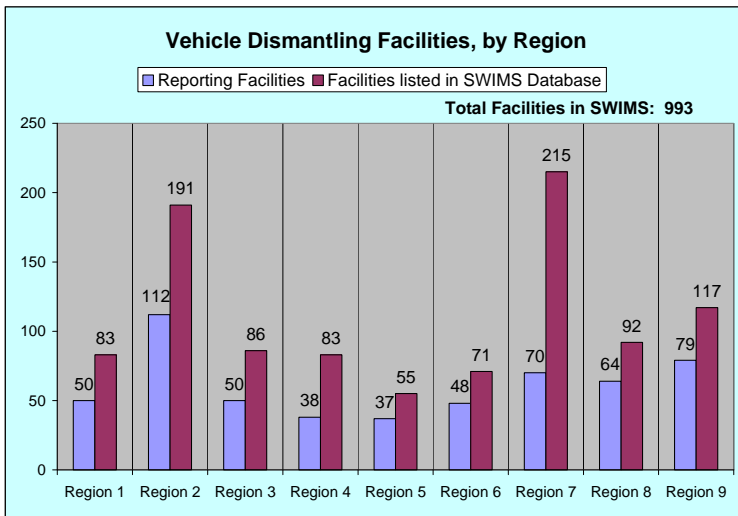


FIGURE 2: VDF BREAKDOWN BY ELVS RECEIVED

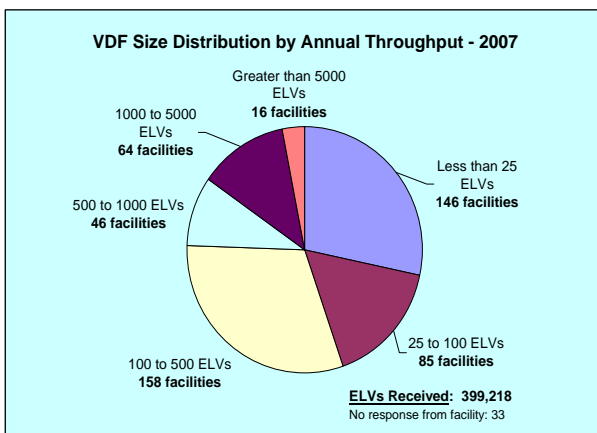
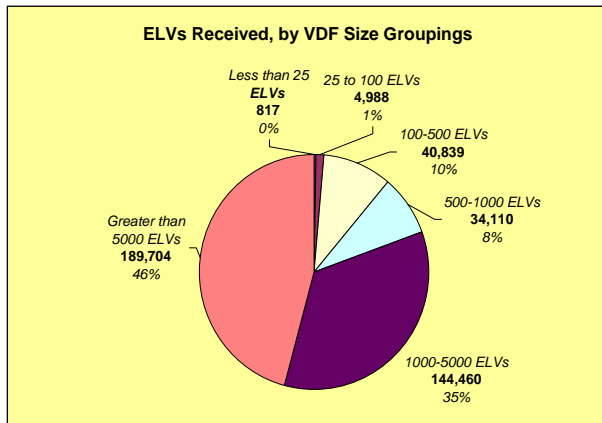


FIGURE 3: ELVS RECEIVED BY SIZE OF VDF



VDFs are located in each region of the state, and regional inspectors perform VDF inspections in addition to their other solid waste responsibilities. The multi-media nature of these facilities often leads to the involvement of other DEC divisions, most notably the Division of Environmental Remediation.

The data submitted in the required VDF annual reports for 2007, the first full year in which Article 27, Title 23 was enforceable, have been summarized in DEC's report, which is available on the website <http://www.dec.ny.gov/chemical/58165.html>. Of the 993 VDFs currently listed in the Solid Waste Information Management System (SWIMS) database, 548 facilities (55 percent) submitted annual reports. See Figure 1. Almost 400,000 vehicles were reported recycled in New York State in 2007.

### FACILITY SIZE

Data indicate that almost half of VDFs are small operators taking in less than 100 ELVs per year. (See Figure 2.) High numbers of small facilities increase the difficulty and expense of inspection, compliance enhancement, and enforcement. In areas where low-throughput, high-storage area facilities are located, department staff focus on facilities' leak inspection procedures, continuing leak observation procedures and timely decommissioning of ELVs because long storage times could lead to increased soil and water contamination in the storage areas.

Data also suggest that the majority of ELVs are handled by a few high-throughput facilities. (See Figure 3.) The top 16 facilities of the 548 that reported handle 46 percent of New York's ELVs, while the top 80 facilities handle 81 percent. Clearly, increased focus on compliance and operating procedures at these high-throughput facilities could lead to increased material collection volumes and compliance rates on a per-car basis. High-throughput facilities are directed toward improved and enhanced decommissioning operating procedures to maximize fluids and material recovery. High-throughput facilities are located in almost every region; however, most operate in regions 2 and 9.

## STORAGE TIME

Annual report data indicate that during 2007, the number of ELVs stored at dismantling facilities did not increase significantly. DEC concludes that favorable economic conditions and scrap metal markets drove this condition of high throughput and low storage buildup. However, since mid-2008, the vehicle dismantling industry has seen huge drops in scrap metal values. Falling scrap values may lead dismantlers to store vehicles for longer periods with the hope of increasing prices. Longer storage times will increase the potential of environmental impact from spilled automotive fluids, especially if fluids are not removed from vehicles soon after receipt. Further, lower profit margins may lead some dismantlers to improperly store or handle ELVs and/or automotive residuals to reduce operating costs. Lower scrap values may lead to improper storage and handling of end-of-life vehicles and related environmental impacts across the state.

## APPENDIX K

# WASTE TIRE MANAGEMENT AND RECYCLING ACT IMPLEMENTATION

### BACKGROUND

To ensure the proper management of waste tires in New York State, the legislature enacted the “Waste Tire Management and Recycling Act,” which became effective on September 12, 2003. The act established waste tire management priorities for the state, created a Waste Tire Management and Recycling Fund derived from a recycling fee of \$2.50 on each new tire sold, and required DEC to prepare a comprehensive plan designed to abate all non-compliant waste tire stockpiles in New York State by December 31, 2010.

Consistent with the requirements of the act, DEC released the New York State Waste Tire Stockpile Abatement Plan (Plan) in August 2004. This Plan established the framework to eliminate all non-compliant waste tire stockpiles in the state by the statutory deadline using a combination of voluntary site owner/operator effort and DEC actions, should the site owners/operators fail to abate the non-compliant waste tire stockpiles in a timely manner.

The Tire Management and Recycling Act also required the NYS Department of Economic Development (dba Empire State Development, ESD) to prepare an annual analysis of markets and market trends for New York State’s annually generated waste tires and to implement a comprehensive program to expand value-added markets for those tires.

#### *Waste Tire Stockpile Abatement Program Status*

In August 2004, there were an estimated 29 million waste tires stockpiled in 95 sites throughout the state. A priority list for abatement of each stockpile was developed by establishing criteria to assess potential adverse impacts on public health, safety or welfare, the environment, or natural resources. Since then, 51 additional non-compliant waste tire stockpiles have been identified, bringing the total to an estimated 36.3 million waste tires stockpiled at 146 non-compliant sites.

Since 2004, 16 contracts for the cleanup of 14 larger waste tire stockpiles have been issued by the Office of General Services (OGS) on behalf of DEC. To date, of those 14 waste tire stockpiles, 11 have been completely cleaned, and work is underway at the remaining 3 sites. In addition, OGS issued three regional contracts for cleanup of the smaller waste tire stockpiles for which the state has had to assume abatement responsibility. Currently these contracts include provision for 33 waste tire stockpiles. Of these stockpiles, 21 have been completely abated.

In addition to the direct efforts of the state, approximately two million tires at 78 sites have been cleaned up by the owner/operator as a result of enforcement actions taken by DEC. Of those 78 sites, at least 62 have been completely cleaned up by the owner/operator.

TABLE 1 SUMMARY OF SCRAP TIRE ABATEMENT ACTIVITIES

	# of Sites	# of Tires	# of Tires Removed	# of Tires Remaining on Sites	% of Total Tires Cleaned Up
Cleaned Up by State	33	8,543,555	8,543,555	0	24%
Cleanup by State in Progress	3	18,922,400	15,377,441	3,544,959	43%
Cleaned Up by Responsible Parties	62	1,177,981	1,177,981	0	3%
Cleanup by Responsible Parties in Progress	16	1,567,472	771,894	795,578	2%
Remaining to be Addressed	32	5,749,600	0	5,749,600	0%
<i>Total</i>	<i>146</i>	<i>35,961,008</i>	<i>25,870,871</i>	<i>10,090,137</i>	<i>72%</i>

The vast majority of tires removed by the state through the scrap tire abatement program were processed into a product and used in a number of beneficial applications. The largest uses were in landfill construction and operation and in road construction activities in cooperation with DOT and the New York State Thruway Authority (NYSTA).

TABLE 2 SUMMARY OF SCRAP TIRE ABATEMENT TIRE USE

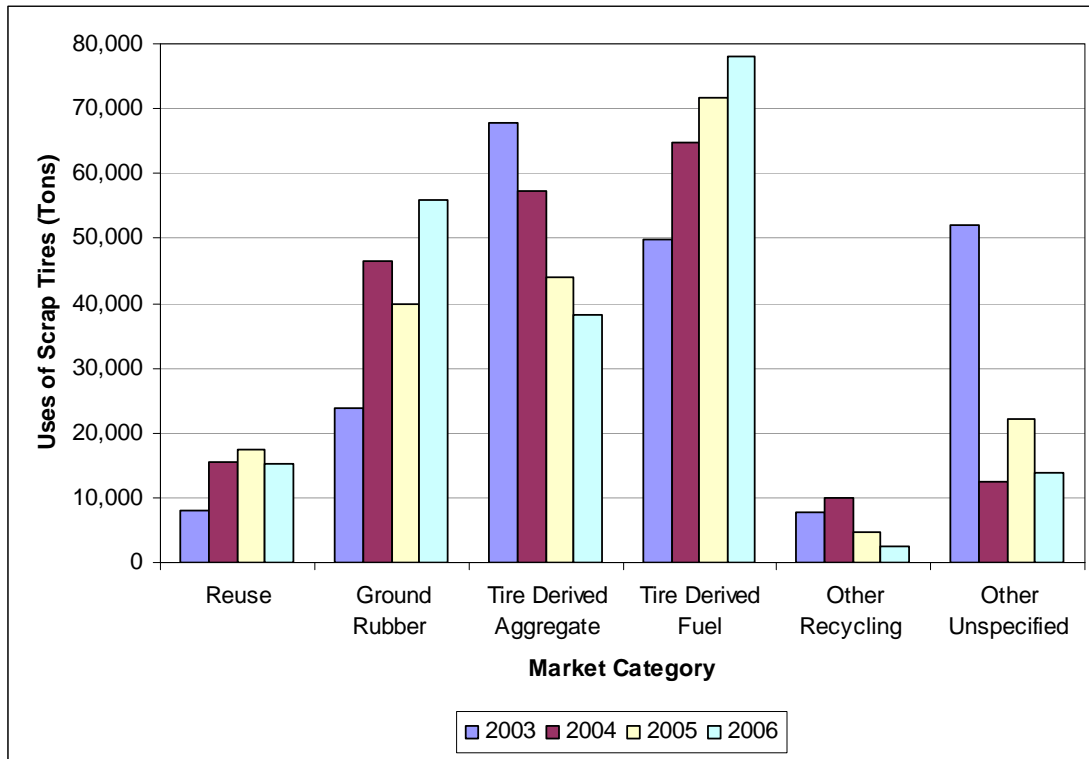
	# of Tires
Landfill Use	14,1758,296
DOT & NYSTA Road Construction (7 projects)	5,140,100
Crumb Rubber Processor	1,196,000
Whole Tires Removed for Processing	3,426,600
<i>Total</i>	<i>23,920,996</i>

Total costs for the abatement portion of the program charged to the Waste Tire Management and Recycling Fund (Fund) by December 31, 2008 was approximately \$81 million. This includes \$8,350,000 sub-allocated by DEC to ESD for market research and development activities and \$3,820,000 sub-allocated to DOT for use for their road construction efforts.

*Waste Tire Market Analysis*

As in previous years, 2006 markets for New York State-generated scrap tires were relatively diversified and strong. R.W. Beck documented the flows of 203,528 tons (which equals 20.3 million passenger tire equivalents or PTE) of scrap tires generated in New York in 2006. The 2008 market analysis update indicated that by 2006 (the year on which the report focused), a little more than 80 percent of all tires generated annually in NYS flowed to in-state, end-use markets. The remainder flowed to other states and Canada. In general, use of NYS annually generated tires in tire-derived fuel and ground rubber applications steadily grew, while use in tire-derived aggregate applications and, to a lesser degree, other recycling steadily declined. Ground rubber grew from the fourth-largest use in 2003 to the second-largest use in 2006, more than doubling in size. Reuse has held steady.

COMPARISON OF 2003 – 2006 NEW YORK SCRAP TIRE MARKETS



The table indicates trends for four years, showing tires flowing into five broad-use categories:

- Driven by higher costs for conventional power generation fuels, **tire-derived fuel** demand grew by 10 percent from 2005 and was the largest market for NYS annually generated waste tires.
- **Ground rubber** markets were growing - Within this market, athletic surfacing (sports turf infill) and horticulture (mulch) and playground cushioning products showed the largest increases.
- **Tire-derived aggregate**, mostly used in landfill engineering applications, continued its four-year decline (down 15 percent from 2005) but remained a significant use. Reduced landfill cell expansion activity and strong demand from tire--derived fuel markets were likely causes for reduced demand by this market.
- The **Reuse category** is likely underestimated since the response rate from tire re-treaders was low.
- The **Other Uses** category is dominated by a New York steel mill using tires as a carbon source in its electric arc furnace.

ESD began investing in New York State waste-tire markets many years prior to enactment of the 2003 Waste Tire Management and Recycling Act. ESD has invested in ground rubber production expansion projects, the promotion of tire-derived aggregate and strengthening and expanding scrap tire markets in general. As shown in the following table, these investments and market trends are resulting in a greater amount of value-added recycling, with the estimated total value (based on the assumed typical values shown in the table) increasing from \$11.1 million in 2003 to \$20 million in 2006.

ESTIMATED VALUE-ADDED FOR NEW YORK SCRAP PROCESSING ACTIVITIES

	Typical Value to Processors [1] (\$/ton)	2003		2004		2005		2006	
		Tons	Value (\$M)	Tons	Value (\$M)	Tons	Value (\$M)	Tons	Value (\$M)
Reuse	\$300	8,140	\$2.4	15,441	\$4.6	17,507	\$5.3	15,231	\$4.6
Ground Rubber	\$220	23,938	\$5.3	46,485	\$10.2	39,800	\$8.8	55,901	\$12.3
Tire-Derived Aggregate	\$31	67,883	\$2.1	57,302	\$1.8	44,062	\$1.4	38,107	\$1.2
Tire-Derived Fuel	\$25	49,834	\$1.2	64,737	\$1.6	71,801	\$1.8	78,074	\$2.0
<b>Total</b>		<b>149,795</b>	<b>\$11.1</b>	<b>183,966</b>	<b>\$18.3</b>	<b>173,171</b>	<b>\$17.2</b>	<b>187,313</b>	<b>\$20.0</b>

The following is a summary of investments made by Empire State Development under the authority of the Waste Tire Management and Recycling Act of 2003 to strengthen and expand markets for tires in New York State. In the 15 years prior to the act, ESD committed an additional \$5.8 million to 34 tire recycling projects.

Information on tire recyclers and end markets can be found in ESD's Recycling Markets Database at <http://www.empire.state.ny.us/recycle>.



## INVESTMENTS IN SCRAP TIRE MARKET EXPANSION

Following is a summary of investments made by Empire State Development under the authority of the Waste Tire Management and Recycling Act of 2003 to strengthen and expand markets for tires generated in New York State<sup>1</sup>. To locate a tire recycler, use the ESD markets database at <http://www.empire.state.ny.us/recycle>.

### NIAGARA COUNTY INDUSTRIAL DEVELOPMENT AGENCY

Award: \$499,800                      Total Project: \$1,045,075

Capital project to assist RubberForm Recycled Products, LLC, Lockport, NY, to purchase additional machinery and equipment to increase the production of recycled rubber molded products. The project will increase current production to 5.25 tons per day, increase recycled crumb rubber usage by 425 tons per year, manufacturing several new value-added rubber molded products. (March 2008) <http://www.rubberform.com/>

### RE-TREAD PRODUCTS, INC.

Award: \$200,000                      Total Project: \$250,000

Research project to assist Re-Tread Products, Inc., Great Valley, NY, to develop an automated manufacturing process for its Tire Log™ retaining wall component system. (March 2008) <http://www.retreadproducts.com/>

### COLONIE (TOWN OF) INDUSTRIAL DEVELOPMENT AGENCY

Award: \$410,000                      Total Project: \$1,920,000

Capital project to assist CRM, LLC with the purchase of equipment to expand its cryogenic tire recycling facility in Colonie, NY. Success of this project will result in additional tire recycling capacity of one million tires per year, bringing the total throughput the facility to 5.5 million tires annually. (February 2008) <http://www.crmrubber.com/NewSite/index2.asp>

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<sup>1</sup> Prior to the act, ESD committed \$5.8 million for fifteen years to 34 tire recycling projects. The act enabled ESD to accelerate investments.

#### **RUBBER PAVEMENTS ASSOCIATION**

Award: \$14,800                      Total Project: \$14,800

Seminar to educate key members of the road paving community in NY State, including DOT, paving contractors, asphalt producers and tire recyclers, about the benefits of modifying liquid asphalt with ground tire rubber to improve product properties. (October 2007)  
<http://www.rubberpavements.org/>

#### **NEW YORK STATE DEPT. OF TRANSPORTATION**

Award: \$300,000                      Total Project: \$600,000

Demonstrate the use of an improved asphalt chip seal that incorporates recycled tire rubber to create an improved binder, extending the 2006 program to three additional DOT regions, continuing to provide local DOT regions with exposure to the technology. (Summer 2007)

#### **NEW YORK STATE FAIR**

Award: \$100,000                      Total Project: \$110,000

Demonstrate the use of an improved synthetic horse arena surface at the Coca Cola Equestrian Arena at the State Fairgrounds. The surface material incorporates recycled tire rubber and tire fiber as components of the highly engineered surface. Fair staff will evaluate the effectiveness of the surface, and the installation will increase exposure of New York tire recycling companies to the equestrian market. (Summer 2007)

#### **AMSTERDAM (TOWN OF)**

Award: \$271,500                      Total Project: \$1,014,272

Capital project to assist **BCD Tire Chip Manufacturing, Inc.**, Hagaman, NY, to purchase tire-shredding equipment. Success of the project will increase capacity to 38,000 tons per year; process at least 10,956 tons of tires per year; increase revenue by \$250,000 per year; retain six jobs, and create six, new, full-time positions. (June 2007)

#### **NIAGARA COUNTY INDUSTRIAL DEVELOPMENT AGENCY**

Award: \$53,650                      Total Project: \$108,802

Capital project to assist Rubbersidewalks, Inc., Lockport, NY with the purchase of molds and associated tooling to produce rubber sidewalks from recycled crumb rubber. Success of this project will enable Rubbersidewalks, Inc. to manufacture its product in New York State, using a minimum of 469 tons of recycled crumb rubber while producing a minimum of 15,000 units per year. (March 2007) <http://www.rubbersidewalks.com/>

**COLONIE (TOWN OF) INDUSTRIAL DEVELOPMENT AGENCY**

Award: \$675,000                      Total Project: \$2,500,000

Capital project to assist CRM, LLC to expand its Colonie, NY tire recycling facility with the addition of an ambient ground rubber line. Success of this project will result in additional tire recycling capacity of 2 million tires per year, producing 24 million pounds of ground rubber per year with a sales value of \$3.6 million annually. (November 2006) <http://www.crmrubber.com/NewSite/index2.asp>

**NEW YORK STATE DEPT. OF TRANSPORTATION**

Award: \$200,000                      Total Project: \$400,000

Demonstrate the use of an innovative new technology that incorporates recycled tire rubber to create an improved asphalt chip seal. The project will place the improved chip seal on four stretches of road within New York State. If adopted as regular practice, this technology would create additional demand for finely ground rubber from New York State. (Summer 2006)

**RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK**

**UNIVERSITY AT BUFFALO CENTER FOR INTEGRATED WASTE MANAGEMENT**

Award: \$1,823,667                      Total Project: \$1,823,667

Five-year project forming the New York State Tire Derived Aggregate Program. Will expand the acceptance of recycled tire-derived aggregate (TDA) in civil engineering applications in New York State. Civil engineering applications for TDA include septic system leach fields, insulating layers for road base, lightweight fill behind bridge embankments and backfill for building foundations and similar uses. Program activities include developing a central information clearinghouse on the Internet and conducting targeted research. (January 2006) <http://www.tdanys.buffalo.edu/>

**COLONIE (TOWN OF) INDUSTRIAL DEVELOPMENT AGENCY**

Award: \$750,000                      Total Project: \$5,000,000

Capital project to assist CRM, LLC with the purchase of equipment to establish a cryogenic ground rubber recycling facility in Colonie, NY. Success of this project will result in additional tire recycling capacity of 2.5 million tires per year, producing 30 million pounds of ground rubber per year with a sales value of \$6 million annually. (December 2005) <http://www.crmrubber.com/NewSite/index2.asp>

#### **NIAGARA COUNTY INDUSTRIAL DEVELOPMENT AGENCY**

Award: \$485,000                      Total Project: \$1,004,991

Capital project to assist RubberForm Recycled Products, LLC, Lockport, NY to purchase the machinery and equipment necessary to manufacture molded rubber products out of crumb rubber (processed from scrap passenger tires). Success of this project will result in the manufacture of new products made from 625 tons of crumb annually and the creation of eight full-time jobs. (October 2005) <http://www.rubberform.com/>

#### **NIAGARA COUNTY INDUSTRIAL DEVELOPMENT AGENCY**

Award: \$265,500                      Total Project: \$531,500

Capital project to assist High Tread International, Lockport, NY to purchase equipment to increase its passenger tire recycling capacity and significantly increase the value of its products. This project will increase passenger tire recycling by 1,800 tons per year, realize an annual economic benefit of \$975,000, and create three new jobs. (September 2005) <http://www.hightread.com/>

#### **SCHENECTADY METROPLEX DEVELOPMENT AUTHORITY**

Award: \$500,000                      Total Project: \$1,744,000

Capital project to assist New York Rubber Recycling (formerly RTG - New York), Schenectady, NY with the purchase and installation of a new grinding system to increase the volume and quality of its ground rubber production. Success of this project will increase throughput by 1.5 million tires per year. (April 2005) NYRR is now a unit of Permalife Products, LLC. <http://www.permalife.com/>

#### **RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK**

##### **UNIVERSITY AT BUFFALO CENTER FOR INTEGRATED WASTE MANAGEMENT**

Award: \$200,000                      Total Project: \$297,080

Research, development and demonstration project to identify ways to overcome the remaining barriers (technical, practical and economic) to using tire-derived aggregate (TDA) in septic system leachfield applications. (March 2005) <http://www.tdanys.buffalo.edu/>

#### **AN-COR INDUSTRIAL PLASTICS, INC.**

Award: \$200,000                      Total Project: \$249,094

Research, development and demonstration project to assist this North Tonawanda, NY company in evaluating the manufacture and testing of a new "tire log" made from scrap tires. The project will determine the cost to manufacture as well as demonstrate its use in a retaining wall application.

(March 2005) This project later led to the formation of Re-Tread Products, Inc.  
<http://www.retreadproducts.com/>

**NP & G INNOVATIONS, INC.**

Award: \$194,310                      Total Project: \$616,310

Research, development and demonstration project to assist this Cazenovia, NY company with completion of engineering design, process development and construction, testing and certifications required by the American Railway Engineering and Maintenance of Way Association for its innovative railroad cross ties made from recycled tire strips and steel. (November 2004)  
<http://www.npginnovations.com/>

**R.W. BECK INC.**

Award: \$544, 181                      Total Project: \$544,181

Contractor is assisting Empire State Development to carry out its mandates under the Waste Tire Management and Recycling Act of 2003, by creating a comprehensive tire recycling market analysis for New York State and up to four annual updates. (July 2004) The initial report and annual updates completed to date can be found at: <http://www.empire.state.ny.us/recycle>

## APPENDIX L

# MUNICIPAL WASTE COMBUSTOR TECHNOLOGY SUMMARY

DEC Division of Air Resources

Municipal Waste Combustor

Facility Status Report

April 17, 2006

Region	Facility	Technology Type	Air Pollution Control	Grate Type
1	Babylon	MB/WW	DSCRUB; FF; SNCR; CC CARBIJ; CEM	RG
1	Hempstead	MB/WW	SDA; FF; SNCR; CC; CEM	ROLG
1	Huntington	MB/WW	SDA; FF; SNCR; CARBIJ; CEM; CC	RG
1	Islip	MB/ROT	SDA; FF; LIME; CARBIJ; CEM; CC	RD
3	Dutchess County	MB/ROT	SDA; FF; CARBIJ; CEM; CC	RD
3	Westchester	MB/WW	SDA; FF; CARBIJ; SNCR; CEM; CC	RRG
5	Wheelabrator Hudson Falls	MB/WW	DSCRUB; ESP; CC; CARBIJ; CEM	RG
7	Onondaga County	MB/WW	SDA; FF; SNCR; CARBIJ; CEM; CC	RRG
7	Oswego County	MOD	SDA; FF; LIME; CARBIJ; CEM	UAT-TR
9	Covanta Niagara	MB/WW	SDA; FF; SNCR; CARBIJ; CEM	ROLG

### Key:

#### Technology Type -

MB = Mass Burn  
WW = Water Wall  
ROT = Rotary  
MOD = Modular

#### Air Pollution Control -

DSCRUB = Dry Scrubber  
SDA = Spray Dry Absorber  
LIME = Lime Injection  
CARBIJ = Carbon Injection  
FF = Fabric Filter  
ESP = Electrostatic Precipitator  
SNCR = Selective Non-Catalytic Reduction  
CEM = Continuous Emission Monitor  
CC = Combustion Controls (e.g., over-fire air)

#### Grate Type -

RRG = Reverse-Reciprocating Grate  
ROLG = Roller Grate  
RG = Reciprocating Grate  
RD = Reversed Drum  
UAT-TR = Under-fire Air Tubes-Transfer Rams  
TG = Traveling Grate

### *Exempt Landfills*

Few categories of landfills are exempt from most regulatory requirements. These include sites that receive certain limited types of construction and demolition debris under certain conditions or in certain locations, disposal areas located at single-family residences and farms, and sites under NYSDOT or NYS Thruway Authority jurisdiction.

## APPENDIX M

### DESCRIPTION OF SOLID WASTE LANDFILL REGULATIONS

This appendix contains a brief summary of the regulatory requirements applicable to landfills in New York State. The 6 NYCRR Part 360 regulations can be found at: <http://www.dec.ny.gov/regs/2491.html>. The regulations applicable to all solid waste management facilities are found in Subpart 360-1. The regulations applicable to landfills are found in Subpart 360-2, with more specific regulations for C&D debris landfills in Subpart 360-7 and Long Island landfills in Subpart 360-8.

#### *Technical Requirements for Permitted Landfills*

##### 1. Siting Requirements

The Part 360 regulations include a number of siting prohibitions on all types of solid waste management facilities (see 6 NYCRR 360-1.7(a)(2)) and additional siting restrictions for landfills (see 6 NYCRR Part 360-2.12). Some of them include restrictions related to:

- Agricultural land
- Impacts on endangered species
- Potential impacts on regulated wetlands, floodplains, surface water bodies, aquifers and groundwater
- The proximity of landfills to airport runways and landfill height restrictions related to air traffic safety
- Unstable areas, fault areas and seismic impact zones
- Areas where environmental monitoring or site remediation cannot be adequately conducted
- Thickness and permeability requirements for soil underlying landfill liner system

##### 2. Design and Construction Requirements: Liner and Cover Systems

The Part 360 regulations include detailed liner and cover system requirements. See 6 NYCRR Part 360-2.13(f) for the liner system description; 360-2.14 for industrial waste monofills and solid waste incinerator ash residue monofill requirements; 360-7.3 and 360-7.4 for C&D debris landfill requirements, and 360-2.15(d) for the final cover system requirements.

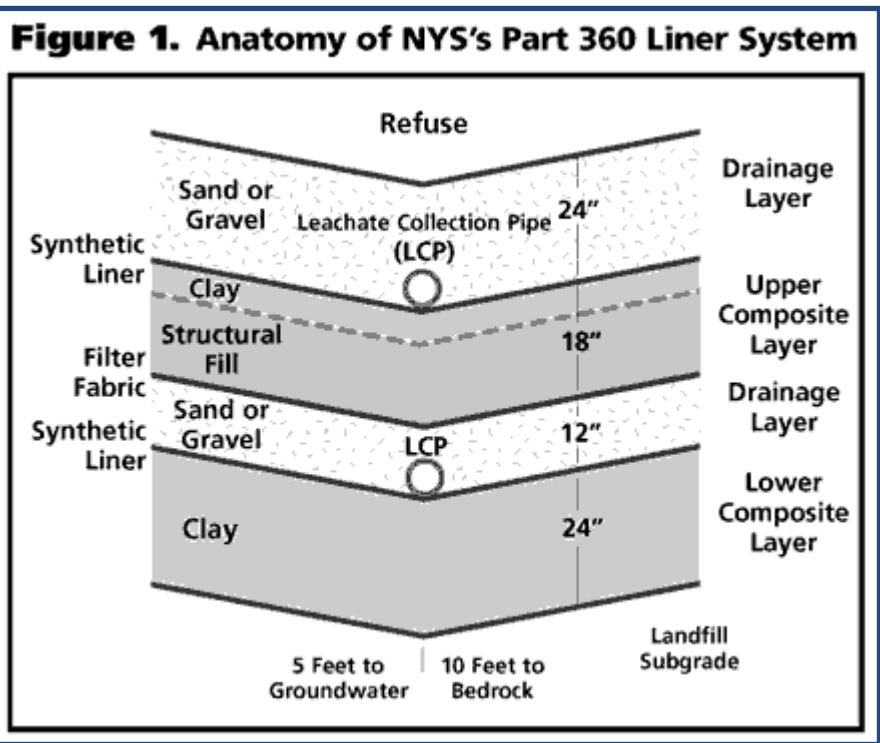
Mixed solid waste landfills, solid waste incinerator ash monofills on Long Island and monofills that dispose of only untreated fly ash must have a double-composite liner system. A composite liner consists of a layer of low-permeability soil covered by an impervious plastic polymer geomembrane sheet. The low-permeability soil greatly limits any leakage through defects in the geomembrane which may remain after construction of the liner system. Individual rolls of geomembrane are



seamed into a continuous layer covering several acres. A leachate collection and removal system (LCRS) is constructed directly above the composite liner. By removing the leachate and keeping the hydraulic head on the composite liner as low as possible, potential for leakage through the composite liner is further minimized. A double-composite liner system consists of one composite liner and LCRS above another composite liner and LCRS to provide redundancy.

Alternative liner systems may be approved for industrial waste monofills based on the pollution potential of the waste. A single-composite liner system with an LCRS is required for most solid waste incinerator ash monofills outside of Long Island and for most C&D debris landfills. A  $1 \times 10^{-5}$  cm/sec clay liner with no leachate collection is required for C&D debris landfills of three acres or less which accept no more than 200 tons of C&D debris per week and which do not accept pulverized C&D debris.

A landfill that is no longer accepting waste must be closed with a final cover system to contain the waste and minimize leachate production. The final cover system consists of: a gas-venting layer; low-permeability soil, geomembrane or composite made up of both barrier layers; a barrier protection layer, and a topsoil layer. Monofills used for the disposal of untreated solid waste incinerator fly ash only and solid waste incinerator ash monofills on Long Island



are not required to include gas venting layers in the final cover systems. The inclusion of a gas-venting layer in the final cover system of a paper mill sludge landfill may not be required, as determined by the results of the explosive gas investigation performed at the time of closure. For C&D debris landfills of three acres or less which do not accept pulverized C&D debris and which accept no more than 200 tons of C&D debris per week, the need for the inclusion of a gas-venting system is determined on a case-by-case basis.

### 3. Operation and Maintenance

Landfills are required to have an operation and maintenance manual which contains a comprehensive description of their daily facility operations throughout the active life of the facility.

The operation and maintenance manual includes samples of all reporting forms, logs and plans, and includes the following: landfill disposal methods; personnel requirements; machinery and equipment; landfill operational controls; fill progression; waste amounts and characterization; solid waste receiving process; cover materials management plan; environmental monitoring plan; leachate management plan; gas monitoring program; winter and inclement weather operations; first lift placement procedures, and a fire prevention plan.

#### 4. Leachate Collection, Treatment and Monitoring

Mixed solid waste landfills and some other landfills are required to be constructed with double-composite liner systems to minimize the potential for environmental impact. Under 360-2.7(b)(9)(i) the double-composite liner system must be designed to ensure that the depth of leachate on the upper composite liner does not exceed one foot. This minimizes the volume of leakage through the upper composite liner which must be contained by the lower composite liner since the depth of leachate is the driving force behind leakage. According to 360-2.7(b)(9)(iv) the leakage rate through the upper composite liner as measured in the lower leachate collection and removal system (LCRS) must not exceed 20 gallons per acre per day based on a 30-day average. According to 360-2.15(k)(5) maintenance and operation of the leachate collection system and treatment of leachate must be continued after landfill closure for as long as leachate is capable of adversely impacting the environment.

The design, operation and closure of on-site leachate storage facilities must meet the requirements of Subpart 360-6, which addresses storage in tanks and surface impoundments. According to 360-2.3 (k)(3) if an on-site leachate treatment and discharge system is to be used by a landfill then the owner or operator must obtain a State Pollutant Discharge Elimination System (SPDES) permit. Otherwise, under 360-2.3(k)(4) the landfill must have a contractual agreement with an off-site wastewater treatment facility to accept and treat the leachate. In either case, the effluent from the treatment of the leachate or from the treatment of the leachate combined with other wastewaters must be analyzed to ensure that it complies with the specific parameter concentration limits included in the SPDES permit.

#### 5. Environmental Monitoring

All operating MSW landfills in New York State are required to identify the pre-operational water quality at a proposed site, conduct operational water quality at an existing site and monitor a closed landfill for a minimum of 30 years.

Pre-operational water quality is determined by analyzing groundwater from every existing well at least four times before a landfill becomes operational. The groundwater is analyzed for leachate indicators, inorganic and organic parameters. The purpose of this program is to establish the existing water quality at a proposed site.

Operational water quality is required during the operation of the landfill. Every operating landfill must monitor the groundwater quarterly during the life of the landfill. The purpose of this requirement is to determine whether the operating landfill is contributing to groundwater contamination surrounding the landfill.

Post-closure monitoring of groundwater is required quarterly for a minimum of 30 years. This is to ensure that the landfill cover system, designed to protect groundwater, is working effectively.

## 6. Closure and Post-closure Care

All landfills subject to the Part 360 solid waste regulations must comply with its closure and post-closure care requirements. In terms of closure, this includes submittal of a conceptual closure plan as part of a landfill construction and expansion application and a final closure plan prior to last receipt of waste or the end of the operating permit. To prepare an adequate closure plan, a closure site investigation must be performed. This involves monitoring and analysis of the site's hydrogeology, explosive gases, leachate generation, and possible vectors. The final closure plan must include a final cover system design and address landfill gas controls, leachate collection, vector control, and post-closure operation and maintenance.

Post-closure care must ensure proper operation and maintenance of drainage control structures, the cover system, the leachate collection system, and environmental monitoring throughout the post-closure care period, which continues for a minimum of 30 years. The landfill owner or operator must also have a contingency plan, financial assurance updated at least annually, perform inspections, and describe planned uses of the closed landfill. The landfill owner or operator must also register the closed landfill with DEC and renew the registration every five years until they demonstrate to DEC's satisfaction that the post-closure care period can be ended.

## 7. Financial Assurance

The purpose of this financial responsibility is to ensure that resources are available to pay for the cost of closure, post-closure care and corrective actions for known releases if the owner/operator is unable or unwilling to pay. Financial responsibility is demonstrated by establishing financial assurance that these costs will be paid through an approved mechanism. The approved financial assurance mechanisms specified in 6 NYCRR Part 360 include trust funds, surety bonds, letters of credit, insurance policies, corporate financial tests, local government financial tests, corporate guarantees, local government guarantees and other state-approved mechanisms.

Financial assurance is required by 6 NYCRR Part 360 for closure, post-closure care and corrective measures for MSW landfills, industrial/commercial landfills and Long Island landfills; closure and post-closure care for C&D landfills greater than three acres; closure of permitted C&D processing facilities and RMW treatment facilities, and closure and worst-case contingencies for waste tire processing facilities. The amounts of the financial assurance mechanisms for these facilities range from \$3,000 to \$32 million, with the exception of Fresh Kills Landfill, which assures approximately

\$965 million. Approximately \$293 million is assured for active MSW landfills, whose estimated costs range from \$3 million to \$32 million.

### *Registered Landfills*

Land-clearing debris landfills of less than three acres are eligible to be registered rather than permitted. Land-clearing debris includes vegetation, soil and rock resulting from land clearing, grubbing, utility maintenance or storm cleanup. It does not include yard waste collected at curbside. Registration requirements place a few restrictions on the location, operation and closure of these landfills. There are about 115 such landfills operating in the state.

### *Exempt Landfills*

Few categories of landfills are exempt from most regulatory requirements. These include sites that receive certain limited types of construction and demolition debris under certain conditions or in certain locations, disposal areas located at single-family residences and farms, and sites under NYSDOT or NYS Thruway Authority jurisdiction.