ENDNOTES

Introduction

1. The term "New York City" waste throughout this report refers to the waste stream collected by DSNY. This stream is generated by New York City residents and public institutions, and does not include commercial waste. The Department, while not responsible for collecting commercial waste, did work with a local, environmental consulting group, who performed an economic and technical viability study for composting commercial waste in New York City. The study includes the results of the commercial-waste component of the New York City Composting Trials conducted at the Marlborough facility. Appendix D contains the final report to the Empire State Development Environmental Services Unit, which helped to fund the study.

2. "Solid Waste Composting Trends in the U.S.," *BioCycle*, November 2000.

3. *"Solid Waste Management Plan,"* Chapter 19, p. 19-3, section 19.1.1.

Chapter 1

1. Since the writing of this report, Bedminster Marlborough, LLC sold the Marlborough facility to WeCare Environmental, LLC, which now owns and operates it.

2. After the five days dedicated to composting New York City MSW (residential and institutional waste as collected by DSNY), the Marlborough drum was loaded for five days with New York City commercial waste. Therefore, the total drum capacity Marlborough dedicated to NYC waste as a whole was 10 consecutive days.

3. In 2000, the Swedish firm Rondeco acquired the assets of Bedminster Bioconversion Corporation and changed its name to Bedminster AB. Bedminster AB is the licensor of the patented Eweson Digester (the drum-based portion of the MSW-composting process). For more information on the company's history, see www.bedminster.se/index.html.

4. The contract is a 20-year, put-or-pay agreement, with CPI escalators, under which Marlborough has made an annual tonnage commitment of 15,000 tons of MSW, and 7,500 wet tons of biosolids.

5. DSNY employs agitated-bay technology at its Rikers Island food-waste–composting facility. For more information on this facility, see *Composting in New York City: A Complete Program History,* at the Department's website (www.nyc.gov/html/dos/html/recywprpts.html).

6. It should be noted that the Day 1 windrow sample consisted of sub-samples taken from the length of the completed windrow. Therefore, while it is called "Day 1," it actually represents the end of the first week on the aeration floor, and should not be confused with the Day 1 discharge (unders and overs) samples.

7. The following theoretical example illustrates the relationship between these different

measurements. Assume, for example, that paper were to comprise 30 percent (or 4,200 tons) of New York City's approximately 14,000-tons-per-day, municipal solid-waste stream, and DSNY recycling trucks were to bring an average of 4,000 tons per day of paper to its processors, out of which 3,600 tons were used to make new paper products. Based on these hypothetical figures, the paper recycling program would have achieved a *capture rate* of 95 percent (4,000/4,200), a *diversion rate* of 29 percent (4,000/14,000), and a *recovery rate* of 90 percent (3,600/4000).

Chapter 2

1. For more information on the Rodale Quality Seal-of-Approval program, see www.woodsend.org.

2. This research is summarized in an October 1997 article entitled, "Improving the Nutrient Status of WSU Compost." The article can be found in the Washington State University Cooperative Extension journal, *The Compost Connection for Washington Agriculture* available online at: www.csanr.wsu.edu/programs/compost/Cc5.pdf.

3. The inerts-characterization data from the laboratory is attached in Appendix F for the residential and institutional waste portion of the NYC Composting Trials. The inerts-characterization data for the commercial-waste portion of the Trials is attached in Appendix D, and the data for the four-facility survey is in Appendix F. These data sheets present inerts levels for the five categories listed in Table 3-8 and Table 3-9, plus the categories paper, wood, stones, food, and bone/shell/seeds. These latter five categories are comprised of degradable materials and do not count toward the two-percent (2%) inerts level proscribed by the DEC in the updates to the regulations.

4. This extended list of parameters required for biosolids testing was not outlined in the draft revisions to the DEC regulations circulating while DSNY was conducting the laboratory tests associated with the NYC Composting Trials. They are outlined in the DEC's November 2001 draft revisions. DSNY was therefore unaware of these requirements and did not test the incoming biosolids against this extended list of parameters. It should be noted that if a facility can consistently meet the DEC's quality standards, the testing frequency for Group A, B, or C may be reduced.

Chapter 3

1. In addition to the Tracy facility, Conporec has contracted with Delaware County, NY for development of a 110-ton-per-day facility (38,000 tpy of MSW and 6,000 tpy of liquid waste), and with the City of Toronto for a facility that would be built in capacity increments of 125 tons per day.

2. The Canadian Council of Ministers of the Environment's Guidelines for Compost Quality (CCME-106E) specify two categories for compost, A and B. Category A compost has lower levels of trace metals and inerts and is granted unrestricted application. Category B compost has restricted uses, which may be controlled under Provincial or Territorial regulations.

3. The term material, as it is used throughout this section, should be understood as immature compost, or material in the process of decomposing. The word compost implies a finished compost, or a stable product that has largely completed the decomposition process. All material was sampled beyond Day 21, and New York City material was sampled even further. However, to keep the data symmetrical, the ANOVA was used only on these first four sample points (Day 1, 7, 14, and 21). As one of the survey facilities did not produce a finished compost, only the three facilities that did were included in the ANOVA evaluation.

Chapter 4

1. MSW-composting technology was developed during the 1930s and '40s in Europe and wasn't introduced to the United States until twenty years later. Another reason that MSW-composting systems are not designed with much emphasis on recovering non-degradable materials might be that their original designers were faced with processing a very different type of municipal waste stream. It is only in the past 30 years that such a diversity of non-degradable and potentially recyclable products (particularly plastics) has entered the MSW stream in the United States.

2. There were 34.18 tons of primary screen residue. (See Appendix B for the scale receipts verifying all residue, labeled *Overs*, that left the facility for disposal during the Trials.) Using the characterization data from these overs, film plastic comprised an average of 35.2 percent, or 27.44 tons, and textiles comprised an average 27.7 percent, or 21.59 tons of this material. Using the consultant's weight-gain numbers, plastic bags gain 24 percent and textiles gain 34 percent "wet weight" in the digester drums. Removing this wet weight (by not running film plastics and textiles through the digesters) would remove 13.93 tons ([.24 x 27.44] + [.34 x 21.59]), or 41 percent of the total primary screen residue.

Chapter 5

1. If such a facility were to be built, the final design and technology choices would be procured through a competitive bidding or "RFP" (request for proposals) process.

2. The waste characterization performed in association with DSNY's mixed-waste–composting research project, revealed that by far the largest component of the waste stream is paper. Even after recycling, paper comprised 32 percent of the total waste stream. The results of this waste characterization are summarized in Chapter 2. Appendix A contains the full report on the waste-characterization study.

3. The DEC requires that compost facilities employing enclosed-vessel methods (such as digester drums) must maintain and document temperatures of 55°C for at least three consecutive days throughout the mixture. Based on the experience of other operational MSW-composting facilities, the pilot facility would therefore meet this requirement in the digester drums.

4. As noted in Chapter 2, optimal moisture levels for digester output is between 52 and 54 percent. Typical MSW has a moisture content of 40 percent. However, after the extensive

sorting process, the remaining MSW will largely be comprised of paper and should have a moisture content more like 30 percent. New York City biosolids are dewatered to 26 percent solids and therefore contain 74 percent water. Loading 166.32 tons of sorted MSW and 200 tons of biosolids into the digester drums will yield an output recipe with 54 percent moisture ([166.32 x .3]+[200 x .74])/366.32).

5. The technology proposed for the Second-Phase Composting and Curing Building is the same technology that one of the two engineer and design teams favored for the Edmonton MSW-composting facility. The other team favored the air-floor system described in the *First-Phase, Post-Drum Composting* section, and in the end this was the system installed. Everyone involved with the design, construction, and operation of the Edmonton facility is pleased with the performance of the air floor that was ultimately selected, but report that there are elements of the one that was not chosen that are appealing.

Chapter 7

1. The rate is based on the Consumer Price Index (Total All Urban), average percent change from August 2001 through March 2003, as published in the New York City, Office of Management and Budget's *Monthly Report on Current Economic Conditions* (May 2, 2003).