NYC WasteLe$$ Summary Report

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BWPRR Overview

This report is one of a number of waste prevention reports prepared under a long-term contract by consultant Science Applications International Corporation, and issued at contract conclusion. The reports are listed below. The New York City Department of Sanitation (DOS, or the Department), Bureau of Waste Prevention, Reuse and Recycling (BWPRR), the sponsor, has issued a Foreword to the studies; it acknowledges the many contributors and frames a position based on its considerable efforts to review, practice, and measure waste prevention. The Foreword appears at the beginning of the first report in the series, *Measuring Waste Prevention in New York City*. Interested readers are strongly encouraged to access the material through the Department's web site at www.ci.nyc.ny.us/strongest. Print or electronic versions are available through BWPRR. Release of the reports are not an endorsement of recommendations made by the consultant.

This report documents an almost five year effort on the part of DOS, with its consultant, to reach out to the business and institutional sector to provide waste prevention information and consulting services. With funding for some portions of the project from U.S. EPA Region 2, NY State Department of Environmental Conservation, and NY State Energy Research and Development Authority, this represents an extensive, and perhaps unprecedented, offer of public services to try to get businesses to review their day to day business practices to find opportunities for waste prevention.

While the report documents successes, it also points to difficulties in recruiting participants and in getting them to record sufficient information to provide documentation. And this is despite the program planners' enthusiasm for, and commitment to, waste prevention. The "Lessons Learned" section reminds us that changing the way business is done requires time and effort, and that most changes will be 'incremental.' Since participating entities pay for the waste that they must dispose, and since most businesses are bottom-line driven, it is likely that process changes have been put in place where savings from reduced waste clearly outweigh the costs of those changes. In contrast, waste prevention opportunities that appear to be 'untapped' from one perspective may not save money in the short or even the longer term when all management and staff costs are taken into account. The detailed Facility Assessment Reports in the appendix to this report suggest the time commitment required.

To determine whether particular efforts make sense, business and institutional waste generators are encouraged to review situations recorded here that might be applicable to them. These include, but are not limited to, taking the time to arrange for wood pallet recycling, and accessing New York Wa$teMatch (www.wastematch.org) to find users for particular streams of what would otherwise be considered waste. A WasteLe$$ website (www.nycwasteless.com) contains newsletters, case studies, and measurement tools to assess particular waste prevention changes.

Waste Prevention Reports:

- *Measuring Waste Prevention in New York City*
- *Survey of Waste Prevention Programs in Major Cities, States and Countries*
- *Procurement Strategies Pursued by Federal Agencies and Jurisdictions Beyond NYC for Waste Prevention and Recycled Products*
- *Inter-Agency Task Force Action Plan to Encourage the Use of Recycled-Content Building Materials*
- *Materials Exchange Research Report*
- *Characterization of NYC's Solid Waste Stream*
- *Life Span Costing Analysis Case Studies*
- *Packaging Restrictions Research: Targeting Packaging for Reduction, Reuse and Recycled Content*
- *NYCitySen$e Summary Report*
- *NYC WasteLe$$ Summary Report*

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Section 1. Executive Summary

In 1994, the New York City Department of Sanitation (DOS) launched *NYC WasteLe$$*. DOS contracted with Science Applications International Corporation of Newport, Rhode Island to provide waste prevention technical assistance to businesses throughout the City and to conduct a City-wide information and outreach campaign to promote *NYC WasteLe$$* initiatives.

Through *NYC WasteLe$$* DOS sought to pursue three major goals. The first was to provide technical assistance to participating businesses and institutions. The second was to work with these businesses to identify, implement, measure, and document promising waste prevention measures. Then, based on these successes, the third goal was to showcase effective efforts such that other similar businesses and institutions can follow suit and thus to serve to institutionalize waste prevention strategies Citywide.

NYC WasteLe$$ focused efforts to promote waste prevention opportunities in nine business and institutional sectors: airlines and airports; restaurants; retail food; manufacturers; retailers; wholesalers; stadiums, arenas, and convention centers; schools; and hospitals. Working with specific businesses and organizations in each of these sectors, the technical assistance teams performed on-site waste generation and energy efficiency assessments to:

- Identify specific opportunities to:
    - reduce the volume and toxicity of solid wastes;
    - increase energy efficiency; and
    - reduce waste-related costs.
- Provide waste prevention implementation support.
- Provide waste prevention training for business employees.
- Track and measure the businesses' waste prevention achievements and cost savings.
- Develop strategies to showcase waste prevention and cost savings for the potential benefit of other businesses within each sector.

In addition to providing technical assistance to the specific participating businesses and organizations, the project team conducted a broad-based information, guidance and outreach campaign through the development and distribution of sector-specific waste prevention newsletters and a promotional video, and through the conduct of sector-specific seminars and the development of Internet-based waste prevention guidance in the form of *NYC WasteLe$$* on the web, accessible at http://www.nycwasteless.com.

The web site presents perhaps the most comprehensive record of project experiences and successes, providing a section addressing the project background and history, descriptions of the industry sectors of concern to *NYC WasteLe$$*; profiles of the businesses that participated in the technical assistance dimension of the project; case studies of successful initiatives; general and sector-specific waste prevention recommendations; cost/benefit information; links to other sites presenting information and guidance on waste prevention, and frequently asked questions

pertaining both to general waste prevention issues as well as sector-specific questions. The project resulted in a vast array of waste prevention success stories including the following:

U.S. Airways project participants discovered that, rather than disposing the good, used pallets generated by their cargo shipments at LaGuardia Airport, they could reuse them in their trucking operation at JFK International Airport. U.S. Airways staff from JFK now pick up 80 to 100 pallets per week for reuse. This practice has eliminated the monthly disposal of sixty cubic yards of waste. Total annual savings, accounting both for waste disposal and pallet purchase, as well as labor and trucking costs of the reuse program, are estimated at over $40,000 per year.

The Jacob K. Javits Convention Center now takes advantage of opportunities to donate unwanted materials remaining after conventions. For example, the Javits Center donated 60 rolls of carpet and carpet padding and 250 folding chairs to Materials for the Arts. These goods were valued at over $30,000, and the donation provided avoided disposal savings for the Javits Center.

Jamaica Market Food Court, in Queens, NY generates almost 100 tons of food waste per year. The *NYC WasteLe$$* team recommended establishing an on-site composting program for organic materials, involving installation of composting bins behind the Market and use of a color-coded collection system throughout the Market so that food vendors and restaurateurs could separate fruit and vegetable scraps easily. As a result of this recommendation, and with the assistance of programs beyond *NYC WasteLe$$*, about 1,000 lbs. (about one cubic yard) of food preparation wastes are collected weekly for composting at a savings, to the Market, of about $6,500 a year. The finished compost is used in landscaping projects at the Market, in the Market's community gardens, and by employees in their gardens.

Technical assistance provided to the **Eagle Electric Manufacturing Company** in Queens enabled the business to identify a new reuse market for its urea plastic scrap, which is sold as blast medium for paint removal, generating more than $69,000 in annual revenue. The *NYC WasteLe$$* team also identified, for Eagle, a vendor that would accept its unwanted pallets for reuse and recycling. During the course of one year, approximately 5,000 pallets were sent for reuse, avoiding 100 tons of waste and generating $5,200 tons of revenue for Eagle Electric. An additional 3,900 broken pallets were sent to a recycler and chipped for use as mulch.

These are examples of the success stories resulting from the project's technical assistance efforts. In pursuing such initiatives, the project team learned some valuable lessons with direct bearing on future efforts to promote business waste prevention throughout the City.

Specifically, the team learned that businesses, particularly in a fast-paced, highly competitive, high overhead environment such as New York City, inevitably are subject to a host of pressing priorities that compete for management time and resources that might be devoted to voluntary waste prevention projects. Waste prevention assistance programs should be designed with this expectation. In a non-legislated program, an enormous range of competing priorities face

those promoting waste prevention programs. These obstacles must be anticipated and accepted by the project team. Other major lessons of the project include:

- The need to engender both the local and corporate office commitment of those seeking technical assistance.
- Program visibility is an incentive that is key to the recruitment process and the development of additional incentives may enhance recruitment efforts and program implementation.
- Program efforts are more likely to produce results when businesses are recruited who profess and who demonstrate a firm commitment to waste prevention.
- The potential for program successes is enhanced by efforts to take maximum advantage of and work within the businesses' existing infrastructures.
- Pursuit of incremental goals and progress may, in the long run, prove more fruitful than efforts to launch and implement comprehensive programs.
- Efforts to measure results need to be designed such that the measurement process and tools are simple and clear — the use of complex forms and calculations may discourage participation.

Based on project observations and discussions with *NYC WasteLe$$* partners, the team determined that offering technical assistance through a competition among businesses may help promote success by limiting the recruited businesses to those with a sincere interest in waste prevention. Further, the team observed that drawing on models of waste prevention success nationwide, and worldwide enhances program strategies. Efforts to engage experts through focus groups and peer review panels also program efforts.

The *NYC WasteLe$$* program provided an essential vehicle for DOS efforts to build new partnerships, and strengthen alliances that will enhance New York City's ability to address its growing waste management challenges. In the final phase of the program, the project team developed an institutionalization plan to promote the project's waste prevention lessons Citywide through a systematic process, working through the existing infrastructure established to support commercial enterprise. Throughout the course of the project, the importance of partnering with trade associations, business assistance organizations, utilities, and other government agencies became increasingly evident. Representatives of such organizations reviewed materials to help enhance their quality and to reinforce their credibility. They also co-sponsored, hosted, and helped to publicize the *NYC WasteLe$$* seminars. Such organizations are vital to the success of DOS efforts to institutionalize the program throughout the targeted businesses and institutions Citywide.

Section 2. Project Description

2.1 Overview of Objectives, Context, Sectors and Partners

In 1994, the New York City Department of Sanitation (DOS) launched *NYC WasteLe$$* to promote solid waste prevention among New York City-based businesses and institutions in nine major sectors. The program was sponsored and primarily funded by DOS, with additional funding support and assistance provided by the U.S. Environmental Protection Agency (EPA) Region II and the New York State Energy Research and Development Authority (NYSERDA).

The program was developed to provide information and guidance to businesses and institutions throughout New York City to promote cost-effective efforts to prevent waste. By demonstrating effective waste prevention and significant related cost savings through pilot efforts in individual sectors, DOS sought to establish waste prevention models suitable for adoption Citywide. Upon completion of the consultant contract, DOS plans to implement an "institutionalization" plan to utilize the project work products in a manner that will motivate and assist businesses and institutions Citywide to prevent waste cost-effectively.

Identifying and implementing practical waste prevention measures requires time, planning, and in some cases capital investment. By providing technical assistance to participating businesses and organizations to motivate and assist them to pursue practical waste prevention initiatives, and by showcasing resulting success stories, DOS seeks to accelerate the adoption of waste prevention measures throughout New York's industrial, commercial and institutional sectors.

NYC WasteLe$$* focused on waste prevention activities that eliminate or reduce the amount and/or toxicity of solid waste. In the context of the *NYC WasteLe$$ program, the term "waste prevention" includes the following:

- process modifications leading to the generation of less waste or less toxic waste;
- the procurement of products and materials that are more durable, reusable, and/or repairable; and
- diverting products and materials from disposal for beneficial reuse.

In addition, waste prevention includes using items that have less packaging and/or are less toxic than alternative products and packaging. Waste prevention does not refer to using items that are recyclable or contain recycled material, or to the diversion and collection of recyclables for processing.

Efforts pursued through the project did, however, address recycling options and opportunities to buy recycled products, in response to the requests of the businesses and institutions that participated as *NYC WasteLe$$* "partners." The program also integrated a focus on energy conservation, since NYSERDA co-funded the project. Although, both energy conservation and recycling represent areas of significant interest to project partners, waste prevention remained the primary focus throughout the project.

NYC WasteLe$$ targeted waste prevention opportunities in the following nine business and institutional sectors: airlines and airports; restaurants; retail food; manufacturers; retailers; wholesalers; stadiums, arenas, and convention centers; schools; and hospitals. These sectors were selected by DOS primarily based on their prominence in the City and their significance to its economy per the following profile:

- **Airlines and Airports:** New York City airports generate more than $26 billion in economic activity annually. The partners in this sector included **US Airways, LaGuardia Airport and the Port Authority of NY&NJ and New Jersey, and British Airways.**
- **Restaurants:** City residents and visitors spend more than $2.5 billion to eat and drink in New York's 9000 restaurants annually and the City's restaurants employ more than 15% of all people employed in New York City. The partners in this sector included **Pizzeria Uno, the Greater Jamaica Development Corporation, and the Sheraton New York Hotel and Towers.**
- **Retail Food:** New York City retail food stores have sales of approximately $8.1 billion per year. Almost 80 percent of retail food sales are attributed to grocery stores. New York City's retail food sector employs more than 54,000 people. The partners in this sector included **Blue Ridge Farms, Met Foods, and ShopRite Supermarket.**
- **Manufacturing:** Manufacturers in New York City employ more than 300,000 persons including more than 80,000 employed by the apparel manufacturing industry alone. The partners in this sector included **Eagle Electric Manufacturing Company, Sign City, and Delphi Studios.**
- **Retail:** More than 411,433 people are employed in the retail sector in New York City. The partner in this sector included **South Street Seaport.**
- **Wholesale:** The wholesaling industry is a major contributor to New York City's economy, with sales of almost $170 billion annually. The partners in this sector included **Hunts Point Terminal Market, D'Arriga Bros. Co., and D.M. Rothman Co., Inc.**
- **Stadiums, Arenas, and Convention Centers:** New York City's convention revenue is estimated to be more than $1 billion per year. In addition, total overnight visitor spending by convention guests is approximately $9 billion per year. The partners in this sector included **Shea Stadium and the Jacob K. Javits Convention Center.**
- **Schools:** the New York City public school system encompasses 66,000 teachers teaching 1.1 million students in a system of more than 1,100 buildings with a budget of nearly $9 billion. The partners in this sector included **The Brearley School and Public School # 48 in the Bronx.**
- **Hospitals:** The health care sector accounts for more than 12 percent of all employment and wages in New York City's regional economy. The partners in this sector included the **Greater New York Hospital Association, Jacobi Medical Center, Staten Island University Hospital, and The New York Hospital.**

Viewing these sectors as prominent in New York City's economy and key to its waste generation profile, DOS directed its research and technical assistance to these target industries and institutions.

2.2 Scope of Work

Through a nationwide competitive solicitation process, DOS contracted with Science Applications International Corporation (SAIC) of Newport, Rhode Island to develop, with DOS, pilot waste prevention programs for businesses and institutions in each targeted sector. SAIC was contracted to conduct research, provide on-site assessments, develop recommendations, assist the participants with implementation and measurement, and to develop final work products with DOS that would enable the City to motivate and assist other businesses and institutions within the targeted sectors to initiate waste prevention efforts.

The specific technical services SAIC offered to each *NYC WasteLe$$* participant under the direction of DOS included:

- Performing on-site waste generation, and energy efficiency assessments.
- Recommending specific waste prevention opportunities to:
    - reduce the volume and toxicity of solid wastes;
    - increase energy efficiency; and
    - reduce costs.
- Providing implementation and training support.
- Tracking and measuring waste prevention achievements and cost savings.
- Developing strategies to showcase waste prevention and cost savings for the potential benefit of other businesses within each sector.

2.2.1 Sector Research

SAIC researched each of the targeted sectors. The research was conducted to:

- Develop an understanding of the quantity and composition of waste generated by each sector.
- Establish the demographic distribution of organizations throughout the City.
- Identify likely waste prevention opportunities.
- Seek other relevant information needed to recruit appropriate participants from throughout the five boroughs.
- Facilitate working productively with each of the selected project partners.

2.2.2 Partner Recruitment

SAIC, with DOS's assistance, recruited businesses and institutions in each sector to serve as clients, or partners, in the program. In recruiting partners, the project team focused on the intent to help the partner businesses save money, and discussed positive recognition for partners' efforts to reduce waste to be highlighted via project work products. Potential partners were offered confidentiality when necessary, and assured that *NYC WasteLe$$* was a non-regulatory project that would not result in enforcement actions.

Before DOS approved work with any particular business, each selected participant was required to provide a letter of commitment. Critical components of the commitment letter included agreeing to:

1) provide the consultant team with access to facilities so they could observe operations;
2) allow the project team to meet with operations and procurement staff; and
3) provide the team with access to invoices, hauling contracts, and other records necessary to establish baseline waste and cost information, and against which to track waste prevention and cost savings progress.

Partner businesses and institutions also committed to implement those waste prevention recommendations deemed by them to be practical. Further they committed to assisting in efforts to track waste prevention results and agreed to allow DOS to publicize their successes. Finally, they were asked to help DOS reduce project costs, to demonstrate their commitment to the project and to formalize and document their ownership of project successes. Among the financial support offerings partner businesses provided in accordance with this requirement were the following:

1) hotel, food, or travel costs for the consultant team;
2) hosting the seminar to be conducted for their industry sector; and
3) paying printing costs.

An authorized representative of each business or organization signed a formal letter to document their commitment to the project. Throughout the recruitment process, DOS sought to procure the commitment letters with signatures from corporate officials serving in as high a level in the organization as possible. In some cases, DOS secured commitments from company representatives who served as directors of operations or corporate environmental affairs if they were considered to have sufficient authority to ensure implementation of the project.

2.2.3 On-Site Assessments

The project team launched the work with each client with a pre-assessment, during which each partner business completed a questionnaire that provided the consultant team with background information about the company's operations. Following the pre-assessment, the team conducted a meeting to discuss the questionnaire and the company's responses. Typically, the

team then conducted a two-day walk-through assessment, accompanied by DOS, to observe operations and gather data necessary to develop recommendations.

The consultant technical assistance teams provided recommendations and offered services intended to assist the businesses' and institutions' efforts to reduce packaging wastes, revise purchasing specifications, identify composting and other waste reduction options, provide waste prevention training for employees, identify energy and water conservation opportunities, and develop detailed waste prevention and measurement programs.

During the assessments, the project team met with representatives of the participating businesses and organizations and discussed their operations and decision-making processes. Team members toured the client facilities and noted practices and areas offering suitable targets for waste prevention measures. SAIC also reviewed and analyzed purchasing records, waste hauling records, utility bills and other pertinent documentation, as possible, to identify promising waste reduction strategies. At the conclusion of the waste assessment phase of the effort, the project team prepared a waste assessment report for DOS review, comment, and approval, presenting to each partner all observations and findings and specifying those opportunities with potential to save money while reducing waste. Two sample waste assessment reports are presented in the Appendix.

2.2.4 Implementation Plans

Based upon information gathered during assessments, and discussions conducted during subsequent meetings with the clients, the partners selected the most promising waste prevention measures for implementation. SAIC then prepared and distributed reports to DOS for review, comment, and approval before submitting them to the respective partners for consideration. These reports described strategies for the implementation of the selected waste prevention measures and identified potential benefits.

2.2.5 Outreach

The Project team presented the DOS-approved implementation reports to the *NYC WasteLe$$* partners and met with DOS and each partner to formalize and initiate the implementation phase of the program. The *NYC WasteLe$$* team assisted businesses and organizations with their implementation and measurement efforts and provided technical assistance in a broad range of waste prevention opportunities. Many of the partners adopted waste prevention strategies that are believed to have significantly reduced their waste generation. However, very few elected to measure the level of waste prevented using the tools developed by SAIC for this purpose.

For each sector, SAIC also developed sector-specific outreach and guidance materials. The guidance was delivered in four basic formats:

(1) a series of sector-specific seminars showcasing success stories and highlighting lessons learned from the *NYC WasteLe$$* partners;

(2) three sector-specific newsletters addressing energy conservation, recycling, and waste prevention/seminar highlights, except for hospitals for which a

single guide was produced per the expectations of the Greater New York Hospital Association;

(3) a web site, www.nycwasteless.com, that provides sector-specific waste prevention guidance, case studies and on-line interactive measurement tools; and

(4) a promotional video.

2.2.6 Institutionalization

Finally, SAIC also developed a listing for follow-up outreach to be conducted by DOS, through trade groups and business assistance organizations. These organizations could be provided with the results of the *NYC WasteLe$$* program to further promote waste reduction. (Some have already partnered in *WasteLe$$* programs, or partnered earlier with DOS.)

2.2.7 Measurement Effort

Waste prevention measurement constituted a major goal of the *NYC WasteLe$$* project. *NYC WasteLe$$* was designed to establish a mechanism to develop accurate measurement and reporting of waste prevented through program initiatives. It further was intended to provide a means for extrapolating waste prevention potential based on the partners' achievements, and the size and activity of the respective business and institutional sectors.

To measure the effects of the waste prevention activities implemented through *NYC WasteLe$$*, participating businesses and institutions were asked to agree to use facility-specific tracking and waste reduction measurement systems, consisting of spreadsheets and a series of data entry forms, developed by SAIC in consultation with DOS and NYSERDA. With SAIC's assistance, businesses were instructed to track changes in the volume and characterization of their waste streams and associated energy and economic impacts of each waste prevention activity implemented.

The initial measurement tools SAIC developed were very specific. Based on comments from *NYC WasteLe$$* partners and the results of trial applications, SAIC simplified the tools. Nevertheless, clients expressed little to no interest in actually using the tools to measure the results of their efforts. In fact, the project fairly conclusively demonstrated that the businesses and institutions that participated in *NYC WasteLe$$* do not consider waste prevention measurement to be a priority. For the most, part business owners and managers characterized measurement as time-consuming and offering little or no direct benefit to their operations. Thus, in virtually every case, businesses chose not to complete the measurement aspects of the program. When possible, SAIC developed practical strategies to assemble critical data necessary to estimate, document, and extrapolate the quantities of waste prevented by various implementation efforts.

By conducting a detailed review of records and projecting cost savings achievable through waste reduction activity, SAIC did succeed in motivating businesses to improve operational efficiencies in many cases, despite businesses' reluctance to measure.

Section 3. Recruitment of Clients — Strategies/Challenges/Lessons

3.1 Strategies

Efforts to recruit project partners/clients to participate *in NYC WasteLe$$* were extensive. A promotional flyer was developed by SAIC and approved by DOS, which presented program services and benefits. The flyer was mailed, with an accompanying cover letter/letter of invitation, to numerous organizations, including each of the Borough President Offices, Local Development Corporations, trade associations, and directly to many potential clients. The project team conducted a telephone campaign following the mailings. DOS assisted SAIC's client recruitment effort by supplementing mailings, initiating phone calls with potential partners and trade organizations, and by accompanying SAIC on personal visits with potential clients.

3.2 Challenges and Lessons

Recruitment proved to be among the most challenging aspects of the program. For example, despite extensive outreach to what is believed to be every stadium, arena and convention center in New York City, *NYC WasteLe$$* was not able to recruit a third organization to participate from this sector. Among the organizations within this sector contacted during the recruitment exercise were the following:

- Madison Square Garden
- Yankee Stadium
- Lincoln Center
- Carnegie Hall
- St. John's University
- St Joseph's University
- Fordham University
- Manhattan College
- Wagner College
- Downing Stadium
- Radio City Music Hall
- Hammerstein Ballroom
- Chelsea Piers
- Aqueduct Raceway
- Columbia University
- Museum of Modern Art
- American Museum of Natural History
- Brooklyn Museum
- National Tennis Center
- Queens Museum

Factors believed to have contributed to difficulties in recruiting clients are described in the following section.

3.2.1 The Terms of the Project: Eligibility of Potential Participating Businesses

One intent of the program was to recruit participants from each of the five boroughs, and to establish a representative cross-section of each targeted sector. For example, the restaurant sector included an upscale restaurant, family sit-down restaurant, and a food court containing small restaurants that provide "fast-food" options. Therefore, at least initially, the program

was very particular in the type of organization that would be deemed acceptable as a project partner, which may have hampered the recruitment process.

3.2.2 Timing of the Enactment of the City's Trade Waste Commission Rules

The enactment of the City's Trade Waste Commission rules significantly reduced waste removal costs for many NYC businesses. Just as the *NYC WasteLe$$* project was launched and the recruitment effort was initiated, the City reduced and capped maximum hauling rates. As a result, waste removal costs for businesses plummeted. Because of this drop in waste management costs, some business managers' interest in pursuing further waste management cost reduction also fell, reducing the incentive of New York City's businesses to participate in *NYC WasteLe$$*. Such was the case when the project team sought to recruit Macy's downtown Manhattan store. Store mangers explained that their waste management costs had recently been reduced to a fraction of their former levels, and that they had no interest in investing time or energy in pursuing further cost reductions.

3.2.3 *NYC WasteLe$$* Requirement for Staff and Management Time and Facility Access

Businesses and institutions approached by the project team often considered their time too limited and too valuable to allow for their participation, or the participation of their staff, in the *NYC WasteLe$$* program. Some businesses and institutions also expressed concern over the presence of the project's audit teams and implementation teams working in their facilities.

For example, when the project team sought to recruit Cumberland Packaging of Brooklyn to participate as a manufacturing sector partner, the company acknowledged that they were not capitalizing on the waste prevention opportunities available to them. Nonetheless, when they weighed the time and resources they would have to devote to implement a practical and productive program, they decided the staff time requirement outweighed any potential waste management cost savings. Cumberland Packaging, because they package food products, also expressed concern over the potential presence of the project staff working in their food packing facilities where contamination of product or equipment cannot be tolerated.

3.2.4 Determining Who Within an Organization Should Serve as the Project Liaison

Because the *NYC WasteLe$$* program had no real precedents within the operations of any of the businesses contacted, individuals contacted had difficulty determining who, within their organization, might serve as the point of contact for the program and who might serve as the decision-makers authorized to commit to program participation. Such was the case when the project team approached Duane Reed to participate as a partner in the retail sector.

A large chain, with many stores throughout the City and the region, Duane Reed seemed an ideal partner. However the store representatives could not establish whether participation could occur at the individual store level, at the local level or at the corporate level. Because the commitment to participate potentially affected relationships and contracts not only with waste haulers, but also with a wide variety of suppliers, vendors and service providers, store and company personnel could not establish a clear line of authority for the types of decisions required.

This same problem hampered recruitment of Columbia University's athletic operations as participants in the Stadium Sector. The project team exchanged letters with University officials, the directors of the athletic department and with facility managers as project plans were discussed and commitments sought. The project team met with the facility managers at their offices twice to discuss possible project organization before Columbia decided not to go forward as a *NYC WasteLe$$* partner, because, while senior administrators supported participation, operations level personnel within the athletic department and the facilities department could not determine a viable staffing strategy for the University's participation. The complication of exactly where within an organization waste prevention program decisions should be made persisted even when recruitment was successful, as was evident in the Met Foods partnership, discussed later in this report.

3.2.5 The Need to Engender both Local and Corporate Commitment

In some cases, local businesses expressed interest in participating, but their corporate offices did not want to participate or release any data for the project. In other cases, corporate managers were interested, but local representatives would not sign up. Successful recruiting required both corporate and local commitment.

This conflict of commitment between local and corporate offices characterized the project team's effort to recruit Ann Taylor, a potential retail partner for whom promising waste prevention opportunities were identified that interested the local store personnel. Although the local store expressed interest, the corporate offices were concerned about project team access to proprietary data. The corporate offices further expressed concern over the feasibility of working productively with suppliers to effect specific packaging and delivery changes, a key aspect of the waste prevention opportunities of most immediate interest. As a result, Ann Taylor, after extended negotiations, chose not to participate in the project. Even clients who were successfully recruited, sometimes had difficulty implementing waste prevention measures successfully as a result of differences of approach between the local offices and the corporate offices. Such was the case with British Airways, Pizzeria Uno and others.

3.2.6 Businesses Perceiving Waste Prevention as a NON-Priority

Many organizations, such as Macy's, the Museum of Modern Art, and Chelsea Piers, targets of the team's recruitment efforts, indicated strongly that they did not view waste prevention as a priority, nor did they consider waste management costs to be manageable costs. Rather they perceived them as being a fixed operating cost.

3.2.7 Interest in Receiving High Visibility of *NYC WasteLe$$* Effort

A general lack of media coverage when the program was launched, and the prospect of engaging in a partnership with agencies that perform regulatory functions (DOS and EPA) may also have presented obstacles to recruitment efforts. In the case of efforts to recruit Manhattan Mall as a participant in the retail sector, the project team learned that publicity and public relations benefits of the program would have offered a major incentive, but largely because the program offered no tangible evidence that the Mall's efforts would be highly publicized prior to

the completion of project work products, and its contribution visible to the consumer and the political community, the recruitment effort was unsuccessful.

3.2.8 Commitment Letter Requirements and Project Contributions

The *NYC WasteLe$$* requirement that each participating business provide a commitment letter signed by a member of senior management with authority to fulfill the necessary commitment to the project, may have hampered recruitment efforts. DOS and the project team considered the formalization of this commitment from upper level management as essential to project success.

The project team's strategy was consistent with the strategies of other similar business partnership programs. For example, the partner recruitment methodology advocated by the Alliance for Environmental Innovation (AEI), a project of the Environmental Defense Fund and The Pew Charitable Trusts, emphasizes formal written commitments. In its report on Catalyzing Environmental Results, Lessons in Advocacy Organization-Business Partnerships, AEI discusses the importance of formalizing partnerships through memoranda of agreement signed by senior managers from each organization, and they "strongly encourage all organizations entering into a partnership to develop a formal agreement." The *NYC WasteLe$$* commitment letters are similar in form and purpose to AEI's model agreements.

Although obtaining commitment letters was an essential component of recruitment, in some cases their consummation actually delayed the recruitment process, particularly within large organizations that required approvals from numerous individuals along an extended chain of command. In various instances, it appeared that a commitment was forthcoming, only to ultimately be denied.

NYC WasteLe$$ initially requested that partners also commit to providing some form of financial contribution to help underwrite project costs. The purpose of this requirement was to engender, within the participating businesses, a sense of ownership in the program, enhancing commitment and encouraging action and follow-up by participating businesses. However, this requirement also delayed recruitment by requiring additional levels of approval. Ultimately, although many clients did provide financial commitments to the project, this request was abandoned to help facilitate quicker client recruitment.

DOS expected a considerable investment of time, thought, and energy on the part of the selected *NYC WasteLe$$* partners. The project team emphasized for the prospective participants that their participation would require time and energy, in the context of their competing priorities. Because they were expected to serve as waste prevention model businesses, they were expected to participate actively and, in return, would benefit from the positive recognition their hard work would generate Citywide. However, this expectation demanded that prospective partners commit, not only to allowing the project team and DOS to review their operations and offer advice, but also to commit substantial staff time to consider waste prevention recommendations in detail, implement selected recommendations, and track and report on the results.

Experience with Stuyvesant High School offers a case in point. Various individuals, including the principal and at least one teacher at the school, expressed significant enthusiasm over joining the *NYC WasteLe$$* program. Meetings were convened, and a commitment letter was drafted. However, shortly before the commitment letter was to be signed and work was to proceed, Stuyvesant determined that it could not participate due to the demands that an impending substantial construction project would exert on their time and attention. After determining that the construction project would be likely to interfere with their ability to invest in a comprehensive and representative study of the school's operations, they decided not to participate.

3.3 Recruitment Summary

A wide variety of factors influenced the willingness or unwillingness of businesses in all sectors to participate in such a comprehensive and rigorous waste prevention technical assistance program. In general, many businesses and institutions seemed not to consider waste prevention or waste management costs to be of sufficiently high priority concern to their potential for success, to warrant the investment of time and energy necessary to participate effectively. In the event that waste disposal costs rise dramatically and/or legislation is passed and enforced making waste prevention a requirement or monetarily penalizing wasteful practices, businesses may be more eager to seek technical assistance and to implement waste prevention programs.

Section 4. Results with Clients

4.1 Successes

Through the audit and opportunity assessment process, and through implementation technical assistance, the project team assisted the *NYC WasteLe$$* partners to effect significant operational and procurement changes. Many of the suggested changes yielded substantial waste prevention and cost savings. Exhibit 1 presents a few selected highlights of some of the waste prevention successes of some of the partner businesses. The discussions that follow provide additional details concerning the actual program efforts instituted by these organizations.

Exhibit 1. Results of Specific Business Waste Prevention Initiatives

Sector	Business	Waste Prevention Initiative	Waste Prevented (Annual)	Basis of Estimate
Airlines/Airports	US Airways	Pallet reuse	200,000 pounds of wood	40 lbs./pallet x 80 – 100 pallets/month
Restaurants	Jamaica Market	Composting of food preparation wastes	52,000 pounds of food	Average weight of bucket of food x buckets generated by participating restaurants
Stadiums/Arenas/ Convention Centers	Jacob Javits Convention Center	Carpet, carpet padding and chair donations from trade shows	8,000 pounds of reusable goods	Average weight of carpet roll or chair x number of items donated
Manufacturing	Eagle Electric Mfg. Co.	Sales of scrap plastic as feedstock for manufacture of blasting medium	460,000 pounds of urea plastic	Average monthly scrap generation rate

In the case of **US Airways,** project participants discovered, based on the opportunity assessment project phase, that they could reuse the pallets they received with cargo shipments at LaGuardia Airport. Although their operational mode was to discard these pallets, by reusing them in their trucking operation at JFK International Airport US Air operations personnel realized that they could avoid pallet disposal costs at LaGuardia and cut pallet purchase costs at JFK.

US Airways workers from JFK now pick up 80 to 100 pallets per week for reuse. This practice has eliminated the disposal of two thirty-cubic yard containers, per month, of waste by US Air at LaGuardia. Total annual savings, accounting both for waste disposal and pallet purchase, as well as labor and trucking costs associated with the reuse program, are estimated at over $40,000 per year.

In the case of **The Jacob K. Javits Convention Center,** the Center staff, working with the project team, identified opportunities to donate unwanted materials remaining after conventions.

For example, the Javits Center donated 60 rolls of carpet and carpet padding and 250 folding chairs to Materials for the Arts. These goods were valued at over $30,000, and the donation provided avoided disposal savings for the Javits Center.

Jamaica Market Food Court, in Queens, NY, is an enclosed food court surrounded by ten small restaurants and six retailers. An on-site farmers' market operates during the summer months. The Market generates almost 100 tons of food waste per year. The *NYC WasteLe$$* team recommended establishing an on-site composting program for organic materials, involving installation of composting bins behind the Market and use of a color-coded collection system throughout the Market so that food vendors and restaurateurs could separate fruit and vegetable scraps easily. As a result of this recommendation, and with the assistance of programs and consultant services beyond *NYC WasteLe$$*, about 1,000 lbs. (about one cubic yard) of food preparation wastes are collected weekly for composting at a savings, to the Market, of about $6,500 a year. The finished compost is used in landscaping projects at the Market, in the Market's community gardens, and by employees in their gardens.

Technical assistance provided to the **Eagle Electric Manufacturing Company** in Queens enabled the business to identify a new reuse market for its urea plastic scrap, which is sold as blast medium for paint removal, generating more than $69,000 in annual revenue. The *NYC WasteLe$$* team identified, for Eagle, a vendor that would accept its unwanted pallets for reuse and recycling. During the course of one year, approximately 5,000 pallets were sent for reuse, avoiding 100 tons of waste and generating $5,200 in revenue for Eagle Electric. An additional 3,900 broken pallets were sent to a recycler and chipped for use as mulch.

These are a few case examples provided to indicate the kinds of waste prevention measures that led to program successes. Some partner businesses implemented measures without reporting all significant issues, achievements and measurement data. For example, the Jacob Javits Convention Center implemented a carpet donation program in response to *NYC WasteLe$$* recommendations, but their efforts were brought to light through the project team's involvement with the recipient organization, Materials for the Arts.

4.2 Challenges

Each program phase faced various challenges. Some of the same challenges that affected recruitment efforts also influenced efforts to maintain partner commitment and progress. Among the factors that complicated implementation efforts and affected project results with clients are discussed in the following summaries.

4.2.1 Maintaining a Sustained Commitment from Company Management

In some cases in which senior managers chose not to maintain involvement with the project, the partner business did not persevere and project efforts faltered. For example, British Airways had been working productively with DOS for many months, but suddenly shifted its focus to a major construction project that was assigned a high priority for key personnel on the *NYC WasteLe$$* effort. The focus on the construction project, combined with other factors

(i.e., tracking, measurement, and reporting expectations; and difficulties/constraints encountered by the purchasing Department in drawing in participants from other areas of the operation, compounded by the directions provided by corporate policy makers in Great Britain), led to this organization essentially to discontinue its participation in *NYC WasteLe$$*.

Although DOS and the project team communicated the expected level of commitment explicitly to each partner before their commitment was formalized, in retrospect, many partners seem not to have truly appreciated how much time and effort ultimately would be required. The partners may not have fully anticipated the efforts involved to meet with the consultant team, review reports, analyze specific recommendations, coordinate with decision makers within their own organizations, implement and track results from recommendations, and report on the results. In the case of British Airways, when the point of contact realized that a successful project required not only a significant project commitment of his time, but also effective coordination and a commitment of time and effort from other managers who were unfamiliar with the project (including environmental staff from the U.K.), he may have determined that he did not have access to sufficient resources or authority to persevere.

The project experience at Shea Stadium provides another example of the importance of maintaining upper management commitment. Shea's commitment letter was signed by the Vice President for Operations. Several meetings were conducted between project staff and the Vice President for Operations, including meetings conducted to present and review recommendations with him. However, part way into the project he decided to assign implementation and follow-through responsibility to a lower level staff person. Based on a review of project developments subsequent to this decision, the delegation of the task liaison function seemingly weakened the effort. The person to whom the responsibility was delegated devoted only limited time to the project, and did not have the requisite authority to ensure the full cooperation of the vendor operations; cooperation that was key to the success of numerous waste prevention opportunities. The designee also was not effective in providing the required reports of project achievements to *NYC WasteLe$$* during the course of Shea's participation in the program.

When requested to provide feedback on the ultimate value of the program to the organization, the Shea Stadium Vice President for Operations stated that he was no longer involved, and deferred to his staff. This circumstance is not presented in an effort to criticize the management of Shea Stadium, but is referenced to illustrate some of the challenges involved in maintaining sustained involvement of a senior official within a business organization endeavoring to balance a wide range of competing priorities.

4.2.2 Maintaining the Sustained Cooperation of Key Employees

A related challenge encountered throughout the project involved ensuring sufficient participation by key staff within participant organizations. For example, *NYC WasteLe$$* worked primarily through the corporate environmental affairs office at Wakefern/ShopRite. While this corporate office was enthusiastic about the project goals and process, their difficulty in enlisting the sustained cooperation of the manager of the individual store that was selected to work with

NYC WasteLe$$, weakened the project. A similar difficulty emerged at Pizzeria Uno, where the corporate headquarters committed to the project with enthusiasm, but the specific restaurant selected for the program was consumed by competing demands, weakening their performance in pursuit of waste prevention achievements.

4.2.3 Maintaining the Pace of Technical Assistance

One key challenge inherent in any project that involves a large and diverse number of organizations, simultaneous efforts, and multiple levels of management, is maintaining the pace of a given initiative. When scheduling must accommodate the calendars of senior staff as well as the operations personnel with multiple competing demands, and DOS officials and consultant teams, complications will arise. When the pace requires partner comments on written documents or decisions on suggested opportunities, schedule delays can be expected. In the case of the *NYC WasteLe$$* program, in cases in which initial meetings and agreements were not promptly followed-up, project momentum slowed, commitment lagged and progress suffered.

In some cases, partner-controlled delay, such as the case with Sign City, and South Street Seaport, eventually led to project withdrawal. In the case of South Street Seaport, the pace of progress was delayed by the unavailability of key decision-makers of the partner organization. The prolonged delay, which may have reflected the array of competing demands typical of a large management company and a lower priority concern for the success of the project, eventually translated into withdrawal of that partner.

In the case of Sign City, progress was underway, site visits had been conducted, opportunities had been identified and the project team requested a meeting with the partner to discuss and select and implement recommendations. Despite faxes, letters, and phone calls, and despite the consultant team's provision of all recommendations in English, in a tabular format and fully translated into Chinese for ease of comprehension by the company's staff, the partner simply ceased involvement, with delay leading to withdrawal.

In other cases, circumstances beyond the control of the project sponsors also translated into troublesome delays, such as the occasion when, due to fiscal constraints, DOS had to provide a stop work order to SAIC, which caused a six-month lapse in delivery of consultant services. This delay particularly affected the program at Shea Stadium which was put on hold for six months, from the time of the assessment to the implementation phase, which broke positive momentum.

4.2.4 Data Tracking, Reporting and Record Keeping

Another significant deterrent to program success may relate to the level of detail required for data tracking, reporting, and record-keeping. Client organizations characterized these requirements, on more than one occasion, as cumbersome and demanding. In general, the partner organizations were unwilling to maintain accurate tracking data, owing to the time, effort and training involved. Establishing reliable baseline and tracking information was vital to *NYC WasteLe$$*'s mission to showcase client organizations as models, yet, regrettably, tracking and reporting wasn't of particular interest to the clients.

For example, an official at British Airways stated that while he thought that the recommendations when implemented would produce monetary savings, the savings were unlikely to be sufficiently significant to justify the amount of time needed to track the results and quantify the savings.

4.2.5 Staff Turnover

Many of the businesses engaged in *NYC WasteLe$$* typically experience high turnover of staff. In several cases a partnership of the client organization and the *NYC WasteLe$$* technical assistance team had been successfully forged, only to have the client contact leave their position for a new job, either within or outside of the client organization. Such cases required the *NYC WasteLe$$* team to reestablish relationships and goals, to explain the program and to describe the company's progress to date, and essentially to duplicate all previous work with that client; a costly and time-consuming process. For example, staff turnover necessitated re-establishment of program direction, momentum, and goals for at least the following partner businesses:

- Jacob K. Javits Convention Center
- US Airways
- Sheraton Hotel and Towers
- Eagle Electric
- Met Foods
- Pizzeria Uno
- British Airways

A case in point, illustrating the effects of high staff turnover on project continuity is that of the Sheraton Hotel and Towers. At the beginning of the *NYC WasteLe$$* program, the hotel manager provided staff support, data and encouragement to the project. After a strong start with abundant feasible projects identified and initial projects underway, a break in staff continuity stalled progress. In fact, following the implementation of the recycling program for glass bottles, the Sheraton management became concerned about the commitment of staff time to pursue the other waste prevention and recycling opportunities to which the hotel had committed and diverted the original team liaison to other duties, leaving the project team with no designated point of contact. SAIC staff endeavored to explain the project to the janitorial and kitchen staffs and to gain their support and cooperation. These individuals found the requests to review menu choices, portion sizes and buffet presentation daunting, without direct support from management. In addition, kitchen staff resisted the initiation of a food preparation residuals composting pilot project, since no management message was issued encouraging them to participate or directing them to cooperate.

The hotel management withdrawal of support for the project was not communicated to the *NYC WasteLe$$* staff directly. Rather, the project liaison and other hotel staff simply stopped responding to telephone calls and requests for information and interaction, leaving project initiatives incomplete. Although Sheraton staff were encouraged by the *NYC WasteLe$$* team to participate in the waste prevention seminar for restaurants, they declined, despite the fact that they "hosted" the event at their facility.

Despite the major obstacles to program success identified above and other recurring issues, barriers, and problems, many clients implemented a wide range of project initiatives that led to

significant waste reduction and related cost savings. The following section addresses highlights of program successes.

4.3 Highlights of Achievements with Clients

Although a variety of circumstances and factors complicated the realization of waste prevention achievements and related cost savings in some contexts, many businesses implemented program elements that led to notable achievements. Exhibit 2 indicates some aspects of the project team's work with various clients that promoted success and in many cases led to improved understanding of waste generation issues. Many of these factors also led clients to implement practices that resulted in significant cost savings.

A key to achieving results with projects was to identify and work through a "champion" within each organization who was highly motivated and had the authority to follow through on project commitments. One such champion was the project contact person at the Greater Jamaica Development Corporation for the work conducted at the Jamaica Market. Program successes in this case were realized primarily through the work of this one individual, who remained involved in *NYC WasteLe$$* throughout the duration of the project. She was particularly effective in eliciting input from key personnel throughout the Market, as well as ensuring effective follow-up to program activities and suggestions; a critical ingredient for successful implementation of selected recommendations. She also helped to arrange for additional consultant services to be leveraged from another project to complement the work performed through *NYC WasteLe$$*.

Exhibit 2. Examples of Program Aspects that Led to Successes, Improved Client Understanding of Waste Prevention, and/or Cost Savings

Partner	Beneficial Interactions
British Airways: Airlines/Airports	
Assessments	British Airways provided the team with access to personnel in all operations, a factor that helped the team to identify promising waste reduction strategies. Significant opportunities were identified.
US Airways: Airlines/Airports	
Assessments	US Airways provided the team with access to all operations, a factor that helped shed light on promising opportunities and reinforced the importance of coordinating efforts targeted at different operations.
Implementation	Corporate and operations coordination and commitment to the pallet reuse program yielded significant cost savings.
Documentation/Evaluation	US Airways provided waste hauling invoices and pallet counts, a factor that facilitated calculation of cost savings.

Exhibit 2. (continued) Examples of Program Aspects that Led to Successes, Improved Client Understanding of Waste Prevention, and/or Cost Savings

Partner	Beneficial Interactions
Port Authority of NY & NJ at LaGuardia: Airlines/Airports	
Implementation	A strong commitment and active involvement of the point of contact strengthened program design and implementation. The client staff participated actively and productively in scheduled planning and implementation meetings with *NYC WasteLe$$* staff and provided access to purchasing and material use information. Data access led to effective composting program implementation and fluorescent light recycling program.
Evaluation/Documentation	The Port Authority incorporated program successes in their "Greening LaGuardia" report to their corporate offices.
Eagle Electric: Manufacturer	
Assessments	Assessments revealed promising enhanced reuse potential for a plastics waste stream and potential for significant cost savings. Assessments also revealed excellent potential for a pallet recycling/reuse program. Client was amenable to new ideas and solutions.
Implementation	The implementation of waste prevention solutions for urea scrap reuse as a blast medium proved successful, as did the rebid of their hauling contract, which led to considerable cost savings. In addition, the client implemented a mixed-paper recycling program and a pallet recycling program. Of the 9000-plus wooden pallets Eagle Electric generates annually, more than 5,000 pallets are now sold to a pallet recycler, avoiding 10 tons of waste. Eagle's waste carter now collects close to 4,000 additional broken pallets that are chipped for use as mulch.
Evaluation/Documentation	Structure of new contract facilitates waste tracking. Successes publicized in articles in the *Long Island Business Journal*.
Jamaica Market: Restaurant	
Implementation	After an initial reluctance to implement recommendations, the client realized waste prevention advantages and cost savings and commenced recommending program to other businesses. The client also conducted training programs for all vendors and established a successful composting program for food scraps as well as recycling within the food court.
Evaluation/Documentation	City Green, a consultant that assisted the Market beyond *NYC WasteLe$$*, maintained waste diversion records for the compost pilot program.
Sheraton: Restaurant	
Assessments	The Sheraton worked with SAIC to conduct a plate-waste study which was key to identifying waste prevention possibilities.
Implementation	Client initiated a bottle recycling program, installed closet light timers, and established a program for cloth napkin reuse.

Exhibit 2. (continued) Examples of Program Aspects that Led to Successes, Improved Client Understanding of Waste Prevention, and/or Cost Savings

Partner	Beneficial Interactions
Blue Ridge Farms: Retail Food	
Implementation	Working with this client opened up a promising opportunity to partner efforts with another client, Shop Rite. Cooperation with other entities such as Wakefern, Cryovac, Long Island City Business Development Corporation's INWRAP program (for bucket donation) and a pig feed producer also led to promising possibilities.
Brearley School: School	
Assessment	Promising opportunities that were presented to this client were enthusiastically adopted, both by staff and by students. The positive attitude toward waste prevention coupled with autonomy as a private school not subject to NYC Board of Education rules and policies, led the Brearley School client to successful implementation of waste reduction measures.
Implementation	Clients scheduled a "*NYC WasteLe$$* Week" that was popular with the students and the staff and helped promote waste prevention awareness throughout the school. They also conducted a food waste study, an energy audit, and a toxics inventory and upgraded chemistry lab procedures based on their inventory.
PS 48: School	
Assessment	The project served as a catalyst to enhance the school's recycling program.
Implementation	The school managed to procure an extra dumpster to store recyclables and conducted training for teachers and students. The school implemented milk carton recycling.
Javits: Stadiums, Convention Centers and Arenas	
Implementation	Utilized alternative floor strippers to reduce volatile organic emissions and considered diverting food scraps to a pig feed producer. The client implemented a materials donation program.
Evaluation /Documentation	Materials for the Arts maintains records of those items donated by Javits through this organization.
Shea Stadium: Stadiums, Convention Centers and Arenas	
Implementation	The client pursued the feasibility of implementing grass composting and requested office waste recycling outreach materials and support. Implemented wood crate recycling and its food service provider, Aramark, implemented food donations to Island Harvest.
Hunts Point: Wholesale	
Implementation	The client was eager to compost food waste, to chip wood waste, and to improve staff awareness of source separation programs.
Evaluation/Documentation	Client maintained data for wood waste diversion.

4.4 Highlights of Obstacles/Challenges

As previously noted, all businesses and organizations that participated in the program signed an agreement, a commitment letter, in which they pledged to participate fully in all phases of the program. Despite having signed an agreement with DOS, many of the businesses in the program would not, or found that they could not, put in the necessary effort to ensure program success. That success, or lack of success, was measured against their effectiveness in working to identify the most promising opportunities open to them, implement the most promising opportunities, measure their waste prevention performance, and serve as a model for other businesses.

An example illustrating perhaps the major challenge faced throughout the project, waste prevention measurement, is evident in the project team's work with US Airways. At US Airways, managers and staff declined to complete the forms provided to track and document the waste prevented and/or money saved through pallet reuse and through changes to the waste container pull schedule. They declined also to characterize and record the content of waste containers, or to track new pallet purchases or related indicators of waste prevention activity. Given the time pressures of their primary airline operations demands, the staff and management simply did not regard record maintenance concerning waste prevention achievements as a priority, even though they were provided with the necessary tools, instruction and encouragement.

In this case, SAIC endeavored to develop information necessary to monitor waste reduction and cost savings by meeting with the US Airways staff responsible for payment of invoices and working with them to review waste carting invoices and to evaluate the payment terms and process. SAIC also reviewed the waste carter weight tickets against the invoices. Working with the staff responsible for approving the weight tickets, SAIC constructed a matrix arraying the number of pulls per unit time and the corresponding material weight and costs for removal. Based on the observed trends and apparent inefficiencies, SAIC highlighted for US Airways the cost-saving potential of alternative payment terms. Through this process, SAIC identified, for US Airways, cost saving strategies based on a reduced number of pulls. SAIC also identified cost savings related to reduced pallet purchases, achievable by reusing pallets that were destined for disposal. SAIC demonstrated that it would be cost-effective to determine if these discarded pallets from the US Airways LaGuardia operations could easily be used in other US Airways operations, where pallets were being purchased.

The pallet reuse program saves US Airways more than $40,000 annually. The revised waste pick up schedule for the LaGuardia operations could save US Airways an additional $30,000 annually, had they chosen to implement it. Using such research methods, SAIC was able to establish the value, in terms of potential waste prevented and potential costs avoided, of various waste prevention measures. However, this example highlights the difficulty of working with project partners to measure program achievements.

In addition to the projects that yielded waste prevention and cost saving success stories, SAIC embarked on several initiatives that demonstrated exceptional potential, but which were abandoned before the anticipated benefits were realized fully. In some cases, cooperation from

non-client organizations was essential to implement the strategies effectively. In other cases, capital investments were required, but were not forthcoming. In yet other instances, project implementation required the cooperation of multiple agencies. Exhibit 3 summarizes selected opportunities with promising potential unrealized owing to a variety of circumstances that arose during the various project phases.

Exhibit 3. Examples of Promising though Unrealized Waste Prevention Opportunities

Partner	Project Description
Greater Jamaica Development Corporation (GJDC): Restaurant	
Implementation	This project offers great potential to achieve even greater savings if this partner arranges with the carter to schedule fewer trash pulls. Data concerning the benefits of cooperative purchasing, portion size reconsideration, and source reduction of grease might lead to programs that would yield greater financial benefits to tenant operations.
Evaluation/Documentation	CityGreen provided data on the quantity of food preparation residuals diverted from disposal to composting in the test phase of the project when they were working with students and using a "Hot Box." After installation of the Green Mountain in-vessel equipment, data were not forthcoming concerning the quantity of material processed or the quantity of compost produced for use in the Community Garden. GJDC tried to develop data on the benefits of group purchasing, reducing portion size and on-site recycling of containers and grease. However, GJDC's tenants provided only anecdotal information and GJDC was unable to develop usable data. GJDC has not actively pursued a reduction in pulls of their waste container based on reduced waste generation. Thus, GJDC has not realized the potential cost savings from the implementation of the composting and recycling programs.
Blue Ridge Farms: Retail Food	
Implementation	The client has enormous potential to reduce waste further provided an investment is made in new equipment and a strategy is developed to capture materials that can be donated rather than divert them for disposal.
Shop Rite: Retail Food	
Implementation	Upper management interest in waste prevention programs is strong. With planning and coordination, this partner can capitalize on promising food donation programs.
South Street Seaport: Retail	
Assessments	A major difficulty in this effort concerned the relationship between South Street Seaport and its tenants. A program such as this is difficult to conduct without active participation by both the management group and the tenant stores. The project team provided South Street Seaport with tips for increasing energy efficiency and for reducing water use; a draft vendor survey concerning disposable vs. reusable trays; a price list for reusable trays; suggestions for HVAC disposable

Exhibit 3. (continued) Examples of Promising though Unrealized Waste Prevention Opportunities

Partner	Beneficial Interactions
Assessments (continued)	filter replacement; information concerning reusable scrubber brushes; information concerning food waste diversion services available through City Harvest; draft environmental policy statement language; suggestions for improving recycling signage to enhance clarity and compliance; EcoLab information; measurement tools; information concerning fluorescent lamp recycling services and options; and yet no opportunities were pursued.
Brearley School: School	
Implementation	Scheduling around the school calendar posed a challenge.
Evaluation/Documentation	DOS picks up waste from the Brearley School waste, so there were no waste reduction cost-saving opportunities beyond purchasing savings.
PS 48: School	
Implementation	The Board of Education provides centralized purchasing services. This factor complicated efforts to procure dishwashers to eliminate disposables in the cafeteria. Custodial staff also exercise considerable control over operations. P.S. 48 needs to work through its custodial staff and Board of Education to maximize its ability to cost-effectively reduce waste.
Javits: Stadiums, Convention Centers and Arenas	
Implementation	A change in leadership interfered with project progress. Service America, the food vendor at the Javits Center, would not commit to the project and their activities were key to its success.

Exhibit 4 presents more detailed descriptions of several projects, offering significant waste prevention potential, that may be implemented in the future if particular issues can be resolved.

Exhibit 4. Examples of Opportunities that May Prove Successful Over Time

Partner	Basic Project Description	Waste Prevention and/or Cost Saving Potential	Summary of Project Obstacles
Hunts Point Terminal Produce Market: Wood Waste Management	Hunts Point Market generates about eight tons of wood per day from the discard of wood crates and pallets. The Market management agreed to pilot a wood chipping program for compost/fuel or other reuse options.	Because the land where the market operates is owned by the City, the wood waste from the common area is tipped at Fresh Kills free of charge to the carters. Thus, project implementation offered the potential to save DOS more that $800 per day in management costs or	A tub grinder was stationed on site and proved effective in generating compostable or combustible chipped wood. Markets for the material were glutted at the time of the pilot study owing to a severe ice storm in the region that felled many trees. DOS compost operations at Fresh Kills, other City-operated

Exhibit 4. (continued) Examples of Opportunities that May Prove Successful Over Time

Partner	Basic Project Description	Waste Prevention and/or Cost Saving Potential	Summary of Project Obstacles
Hunts Point Market *(continued)*		export to out-of-state-disposal facilities.	compost programs, or other potential end-use options could not accept the material. The wood is now exported as trash, while other markets are sought.
Hunts Point Terminal Produce Market: Food Waste Project	Through project efforts, vendors enhanced source separation, enabling collection of food waste for composting. Hunts Point is interested in establishing an in-vessel composting operation on-site. Pilot projects were conducted during which produce waste was sent off-site to a Long Island site to be composted and applied to farmland and to a New Jersey composting site. In addition, through a grant from Empire State Development Corporation to Waste Management, the carter leased a pulper to dewater the material, reducing transport costs by reducing the weight of the material. The project was a success.	Hunts Point Terminal Market generates about 10-40 tons of food waste per day.	While the grant funding from the Empire State Development Corporation to fund Waste Management's dewatering of the material provided for a pilot study of the waste prevention option, when the funding was not extended, the cost for transportation of the material and for leasing of the pulping equipment proved to be an impediment to project continuation. While the majority of organic waste is removed by a private carter, organic material that is discarded onto the common areas at the market continues to be collected by Waste Management and exported for disposal.
Shea Stadium: Grass Clippings Compost Initiative	Leaves and trimmings from grounds surrounding Shea Stadium are picked up by the NYC Department of Parks and Recreation. The project team sought to divert the grass from the playing field to a composting site operated by DOS at Ferry Point, or to an alternative site at one of the Botanical Gardens.	Approximately 350 cubic yards of grass is disposed per year from Shea Stadium. The cost for management of this grass is about $4300.	Owing to a City policy designed to control odors in residential and commercial neighborhoods, City-operated compost sites are not permitted to accept grass, leaving few options for off-site grass clipping composting. In addition concerns over the effects of pesticide-contaminated material from the Stadium's

Exhibit 4. (continued) Examples of Opportunities that May Prove Successful Over Time

Partner	Basic Project Description	Waste Prevention and/or Cost Saving Potential	Summary of Project Obstacles
Shea Stadium *(continued)*			maintenance activities further complicated the search for a suitable compost site to accept the material. Several composting facility managers potentially interested in taking the material required detailed information concerning pesticide use.
Blue Ridge Farms: Packaging Reduction Initiative	Blue Ridge Farms had received requests from clients, including Wakefern/ ShopRite, to take steps to reduce the volume of waste generated by their use of plastic tubs for packaging of prepared foods. Blue Ridge sought new packaging options. Cryovac offers a promising, waste reduced, plastic pouch as an alternative to the tubs. In addition, less product would be lost through the use of the Cryovac squeegee.	Wakefern discards more than 150 cubic yards of plastic tubs and coated cartons generated from sales of Blue Ridge Farms prepared foods annually. The costs for disposal of the tubs is about $6800 annually.	Blue Ridge was interested in testing the packaging equipment and is seeking State funding to underwrite the costs. The parties are still considering this waste prevention option.
Sheraton New York Hotel and Towers and Jacob Javits Convention Center: Organic Waste Composting Initiative	The Sheraton and the Javits Center wanted to divert their food preparation wastes from disposal to an animal feed production company, Envirofeed. Envirofeed wanted the food waste and was willing to provide digestible and degradable waste bags as well as collection/storage bins. To make the venture cost-realistic, the organizations needed to form a food waste cooperative so that a cost-effective food waste collection route could be established.	Second only to paper, commercial food waste is the largest waste stream in New York City. This project has enormous waste diversion potential depending on the size of the food waste cooperative that can be established. The Jacob Javits Convention Center alone is estimated to generate about 16 tons of food waste per year.	At the time SAIC was working to assemble a collection route, enlisting other hotels and restaurants such as the Hilton and the Marriott from mid-town Manhattan, Envirofeed was not fully operational. The project lost momentum. Still a viable concept, food waste diversion to Envirofeed is underway from hospitals in New York City, as well as casinos, supermarkets, and restaurants in New Jersey.

Throughout the course of the project, a number of clients made meaningful progress and implemented promising changes, but ultimately withdrew from the project before the results of their efforts could be measured and recorded within the project context. Exhibit 5 summarizes the circumstances surrounding the withdrawal of several client organizations from the project.

Exhibit 5. Circumstances Surrounding Project Withdrawal by Various *NYC WasteLe$$* Partners

Status at Time of Project Withdrawal	Reason for Withdrawal or Termination
U.S. Airways	
Client completed assessment phase and received assessment report, implementation plan, and measurement tools. After implementing one successful initiative, U.S. Airways provided data to develop a case study. Although encouraged to participate in the seminar and video, client chose not to attend seminar as speaker or to appear in video.	The client point-of-contact became too busy with other duties to continue the program. As the POC's job responsibilities increased, the other managers at the client's facility did not provide sufficient support to implement additional initiatives.
South Street Seaport	
Facility assessments and waste prevention recommendations were completed and the client received assessment report, implementation plan, and measurement tools. Client was unable to implement any of the initiatives prescribed in the plan.	The client determined that the time and effort necessary to follow through on any of the initiatives prescribed in the implementation plan was too great.
Sign City	
Facility assessments and waste prevention recommendations were completed. The client received assessment report and implementation plan in both English and Chinese. The client also received a health and safety assessment and recommendations in Chinese. Client implemented improved housekeeping initiatives and formed a worker awareness program and task force, but would not track progress.	For personal reasons, the client point-of-contact was unable to continue to support the program. Other staff at the facility lacked the authority to commit company resources to the project. Changes were implemented but not effectively monitored or communicated to the project team.
Shea Stadium	
Facility assessments and waste prevention recommendations were completed. The client received assessment report, implementation plan, and measurement tools.	Client management stated that the proposed cost savings did not justify the staff time commitment needed to implement the initiatives.

Exhibit 5. (continued) Circumstances Surrounding Project Withdrawal by Various *NYC WasteLe$$* Partners

Status at Time of Project Withdrawal	Reason for Withdrawal or Termination
Sheraton New York Hotel and Towers	
Facility assessments and waste prevention recommendations were completed. The client received assessment report, implementation plan, and measurement tools. Client implemented one successful initiative and provided data to develop a case study. Although encouraged to take part in the seminar and video, the client declined to participate.	Management determined that the project was too time-consuming and assigned additional competing responsibilities to the point-of-contact. The additional duties complicated and then prevented his continued participation in the project.
Blue Ridge Farms	
Facility assessments and waste prevention recommendations were completed. The client received assessment report, implementation plan, and measurement tools.	Client was unable to commit resources to the implementation of the initiatives prescribed in the implementation plan.
Pizzera Uno	
Facility assessments and waste prevention recommendations were completed. The client received assessment report, implementation plan, technical assistance and measurement tools.	The organization delegated the project responsibility to regional and store management. These managers faced too many competing demands to fulfill the original commitment signed by corporate headquarters.
Met Foods	
The client received assessment report, implementation plan, and measurement tools.	The organization point-of-contact became too busy to continue with the program. Store managers did not follow through on the organization's commitment.

Section 5. Work Products

The original plan for the outreach component of the *NYC WasteLe$$* program called for sector-specific guidance documents. DOS specified that the guidance documents present detailed step-by-step recommendations for designing and implementing waste prevention programs in each industry sector. In accordance with this requirement, SAIC developed a draft guidance document for the Restaurant Sector and submitted it to DOS.

DOS sent the draft guide to the Kansas State University Department of Hotel, Restaurant, Institution Management and Dietetics for review and comment. The reviewer was Professor Carol Shanklin, PhD, RD, author of *Environmental Issues Impacting Foodservice Operations*, indicated that she thought the guide a useful tool.

In addition to obtaining Ms. Shanklin's feedback, DOS decided that input from the actual target audience — restaurants in New York City — was essential for assessing the anticipated effectiveness of the guide as a tool for motivating and assisting residents in New York City to institute practical, cost-effective waste prevention strategies. With the assistance of two restaurant trade associations, and the contracted services of a professional focus group facilitator, DOS convened two focus groups. Each focus group was comprised of 6-8 restaurant owners/managers to review, discuss, and make recommendations concerning format, content, tone and level of detail for the final guidance document.

The focus groups proved to be particularly valuable in redirecting program efforts to ensure their practicality and suitability for acceptance by the business community of concern *to NYC WasteLe$$*. The groups offered extensive comments including the following perspectives:

The Guide is easy to read but is too long.
The discussion of the benefits of waste prevention is key.
Eliminate some of the more common sense recommendations.
Add case studies.
It is hard to address the needs of a wide range of restaurant types (fast food vs. sit down vs. pub style vs. family style) with one guide.
A discussion of energy efficiency is key.
The identified sources of information and products are helpful.
A shorter presentation perhaps on a small pamphlet would be more practical.
Restaurant saving can be largely realized through utility bill reductions.
Utility cost discussions are key.
If we could access a pig farmer to cart away food waste we would do it "in a heartbeat"; guidance of this sort is valuable.
The book offers nothing new; it suggests measures restaurants already take.
The book offers good reminders and strategies to get others involved.
The book would be more useful if the information were broken down into categories, such as energy vs. composting vs. recycling vs. water conservation.

Essentially the group reached consensus that while the information and guidance offered in the handbook was practical and useful, albeit to varying degrees for different types of restaurants, its depth and comprehensiveness were excessive for New York's restaurant community. The restaurant owners and operators simply do not have enough time to review this much information. Rather, they suggested producing a brief guidance brochure or newsletter featuring key topics of direct concern to their operations. The project team expected that members of other industry sectors would offer similar comments regarding similarly formatted guidance documents with similar depth concerning waste prevention in their sectors. The focus groups highlighted for DOS and SAIC that it was vital for *NYC WasteLe$$* to adapt, in order to effectively reach out to the targeted audience through the work products that would ultimately be produced.

5.1 Newsletters

Based on the feedback obtained from the restaurant focus groups, DOS adopted a new approach to guidance under which the project team was to develop a series of newsletters, specific to each sector, highlighting the following themes:

- energy efficiency;
- recycling; and
- waste prevention coupled with summaries of issues discussed in the waste prevention seminars.

The articles featured in the newsletters showcase model waste prevention programs and success stories concerning businesses within the subject industry sectors. By highlighting cost savings and operational efficiencies achieved by businesses throughout New York, around the country, or even across the globe, DOS can provide proven waste prevention and energy efficiency models in an effort to motivate other businesses to design and implement similar programs. The newsletters also are formatted so as to provide extensive lists of resources for those who wish to pursue specific areas of waste prevention further or who seek more in-depth information.

The approach presented above was not applied to the hospital sector. In consultation with Waste Tech (Waste Energies Technologies, Inc.), a project subcontractor with substantial expertise working with NYC hospitals, and with the Greater New York Hospital Association, it was determined that a single guide would still be issued for the hospital sector.

NYC WasteLe$$ Energy Issue Newsletters can be viewed at **www.nycwasteless.com**. The project team consulted the Direct Marketing Association's List of Mailing Service Companies to develop a mailing list to ensure that the newsletter guidance extended to a significant number of the relevant businesses within the City. In the case of each mailing, the business owner and manager and/or president and principal were targeted to receive the *NYC WasteLe$$* materials. Exhibit 6 presents the basic criteria used to develop the mailing lists. In addition to the distribution of the newsletters to the sectors identified in Exhibit 6, the Greater New York Hospital Association (GNYHA) will be promoting and distributing the hospital guide Citywide.

Exhibit 6. Newsletter Mailing Lists: Development and Circulation

Sector	Newsletter Circulation	Mailing List Criteria Applied
Airlines	2492	Included all airlines and airports identified.
Manufacturing	4120	Businesses with fewer than 20 employees were eliminated. Several industry groups were eliminated including meat products, dairy products, canned and frozen preserved fruits, vegetables, grain mill products, bakery products, candy, fats and oils, beverages, tobacco, lumber products, chemical and allied products, petroleum refining, tires, stone, clay, glass, concrete, primary meal industries, fabricated metal products, industrial machinery (with the exception of computer equipment), and electrical components (with the exception of electrical lighting and wiring).
Restaurants	7524	Restaurants with fewer than 20 employees were eliminated.
Retail	8316	Automotive stores and fuel dealers were eliminated as were businesses with fewer than 20 employees.
Retail Food	2208	Businesses with fewer than 20 employees were eliminated.
Schools	8468	Included all schools of any type and size.
Stadiums, Arenas, and Convention Centers	836	Included hotels that may have convention facilities with more than 100 rooms.
Wholesale	5,368	Automotive, metals, minerals, chemicals, and farm products wholesalers were eliminated.

The project team sought feedback on the newsletters from an array of reviewers. Their comments indicated that the format and the content were effective in reaching out to the business community and to schools. The shortened presentation, as compared to the originally envisioned guidance document, was appropriate for the clients' needs, as evidenced by requests from various trade associations for additional copies to distribute to their membership.

The peer/expert review process enlisted throughout the development of all outreach materials (newsletters, video, and web site) as well as in preparation of the seminar agendas and related materials proved useful in enhancing the effectiveness of the tone, format, and content of the materials, serving to enhance the quality of the work products throughout. In a number of cases, for example, DOS recruited "partners" to review the newsletters. The efforts of the participating reviewers were recognized on the newsletters, a measure implemented both to acknowledge their efforts and to reinforce and enhance the credibility of the work product when received by the target audience. The project team employed the same measures in conjunction with waste prevention seminar promotion. Exhibit 7 presents a list of peer reviewers who were extended an opportunity to review newsletter materials. These reviewers participated with varying levels of rigor.

Exhibit 7. Sample Peer Reviewer List for Recycling Newsletter Articles

Airlines/Airports	
Ken Sagrestano, Physical Plant Manager Lincoln Tunnel 500 Boulevard East Weehawken, NJ 07087-6796	Kevin Bleach, Aviation Department Port Authority of NY & NJ One World Trade Center New York, NY 10048
Louise Riggen City of Los Angeles Department of Airports Chief, Construction and Maintenance Bureau 7411 World Way West Los Angeles, CA 90045	Carter Morris, Director Environmental Affairs and Airport Projects American Association of Airport Executives 4212 King Street Alexandria, VA 22302
Manufacturing	
Lenore Neier Government Affairs and Administrative Services Eagle Electric Manufacturing Co. 45-31 Court Square Long Island City, NY 11101	John Okun, Director Waste Prevention and Recycling, Long Island City Business Development Corporation 29-11 Queens Plaza North Long Island City, NY 11101
Kevin England, Director Environmental Programs HASBRO 1027 Newport Ave. Pawtucket, RI 02861	Joe Chan Brooklyn Chamber of Commerce 7 Metrotech Center Brooklyn, NY 11201
Phil Voss, New York Wa$teMatch Industrial Technology Assistance Corporation (ITAC) 253 Broadway, Room 302 New York, NY 10007-2300	Janet Chambers East Williamsburg Valley Industrial Development Corporation 11-29 Catherine Street Brooklyn, NY 11211
Restaurants	
Mary Reda Greater Jamaica Development Corporation 90-04 161st Street Jamaica, NY 11432	Scott Wexler, Executive Director Empire State Restaurant and Tavern Association 40 Sheridan Ave. Albany, NY 12210
Bill Matthews Culinary Institute of America 433 Albany Post Rd. Hyde Park, NY 12538	Richard J. Amato, Vice President Hotel Association of New York City 437 Madison Ave. New York, NY 10022-7398
E. Charles Hunt, New York City Executive V.P. New York Restaurant Association 505 8th Ave. New York, NY 10018	Ed Doyle, Head Chef Seaport Hotel — Aura Restaurant One Seaport Lane Boston, MA 02210

Exhibit 7. (continued) Sample Peer Reviewer List for Recycling Newsletter Articles

Retail	
David Morrow Seaport Marketplace, Inc. 19 Fulton Street, Suite 201 New York, NY 10038	Michael Smith/Joyce Coward Department of Business Services 110 William Street New York, NY 10038
Bruce Peterson Vice President of Perishables Wal-Mart Supercenters 702 SW 8th Street Bentonville, AR 72716-9102	
Retail Food	
Patricia Broadhagen Food Industry Alliance of New York 50 Broadway, 36th Floor New York, NY 10004	Kristy Applestein Food Marketing Institute 800 Connecticut Ave., NW Washington, DC 20006
Tim Vogel, Manager Environmental Affairs Wakefern Food Corporation 33 Northfield Ave., P7-10 P.O. Box 7812 Edison, NJ 08818-5083	
Schools	
Laurie Seminara/Erin Kaufman The Brearley School 610 East 83rd Street New York, NY 10028	Michael Grobshteyn, Supervisor Recycling and Solid Waste Management Program City of New York Board of Education 28-11 Queens Plaza North Long Island City, NY 11101
Kathleen Samways Recycling for Rhode Island Education P.O. Box 6264 Providence, RI 02940	Ms. Kari Afrstrom American Association of School Administrators 1801 North Moore Street Arlington, VA 22209
Lynn Tiede 425 East 114th St., #4RE New York, NY 10029	Anne Marie Alonso and Mike Zamm Council on the Environment of New York City 51 Chambers Street, Room 228 New York, NY 10007

Exhibit 7. (continued) Sample Peer Reviewer List for Recycling Newsletter Articles

Stadium/Convention Centers/Arenas	
Kevin McCarthy, Stadium Operations New York Mets Shea Stadium Flushing, NY 11368	John Swinburn, Challenge Management (formerly of International Association of Exposition Management) 16947 Old Pond Drive Dallas, TX 75248-1525
Mike Eisgrau, Director of Public Affairs Jacob K. Javits Convention Center 655 West 34th Street New York, NY 10001-1188	Don Hancock, Director Research and Education International Association of Auditorium Managers 4425 W. Airport Fwy., Ste. 590 Irving, TX 75062
Al Tomaczuk, Director of Housekeeping Jacob K. Javits Convention Center 655 East 34th Street New York, NY 10001-1188	Ron Naples Maple Mountain Hospitality 7379 Main Street Manchester Center, VT 05255
Wholesale	
Myra Gordon, Executive Administrative Director Hunts Point Terminal Produce Market 2A New York City Terminal Market Bronx, NY 10474	John Okun, Director Waste Prevention and Recycling Long Island City Business Development Corporation 29-11 Queens Plaza North Long Island City, NY 11101
Ed Campbell, Empire State Development Corporation 633 3rd Ave., 33rd Floor New York, NY 10017	Joe Chan Brooklyn Chamber of Commerce 7 Metrotech Center Brooklyn, NY 11201
Ellen Harrison Center for the Environment Cornell University 469 Hollister Ithaca, NY 14853-3501	Janet Chambers East Williamsburg Valley Industrial Development Corporation 11-29 Catherine Street Brooklyn, NY 11211
All Sectors	
Office of Federal Environmental Executive Recycling Specialist for Businesses 401 M Street, SW Washington, DC 20460	James Chin, Senior Director, City Affairs NYC Chamber of Commerce Partnership 1 Battery Park Plaza New York, NY 10004
Lorraine Graves U.S. EPA Region I, Solid Waste Division 290 Broadway, 22nd Floor New York, NY 10007-1886	

5.2 Video

Targeted primarily at business owners, managers, school administrators, trade associations, and business assistance organizations, the intent of the video is to reinforce the simplicity of waste prevention and to demonstrate the potential for cost savings. Recognizing that the broader audience will include the press, the public, special interest groups, city managers and other government officials, essentially the video represents DOS's effort to point the way for businesses and institutions to implement sustainable business practices and to improve their environmental performance. The video is designed to motivate viewers in all sectors to examine their own operations, access guidance materials developed by *NYC WasteLe$$* (*i.e.*, the newsletters and web site), request information on waste prevention from DOS, and contact other resources highlighted within the video.

The basic process SAIC and its subcontractor, The Writing Company, followed in producing the video involved the following eight tasks conducted in consultation with, and as directed, modified, or approved by DOS:

1. Establish major messages to convey.
2. Develop draft story-board.
3. Identify prime *NYC WasteLe$$* clients to feature in the video.
4. Develop basic script essentially structured around:
    - Introductory material concerning waste management pressures and prevention opportunities in NYC emphasizing the business community;
    - Interviews with and testimonials from partners; and
    - DOS's vision of its role in promoting business waste prevention and efficiency.
5. Coordinate on-site filming.
6. Conduct and film interviews and background material.
7. Chose suitable music/photos.
8. Edit and produce.

Midway through the project, the consultant project team met to discuss project progress relative to the various businesses and institutions and to review issues of major concern and to inventory major success stories in preparation for video script development. The group conducted a day-long review of experience to date and prepared a list of messages, success stories, images and techniques for video production. The group also reviewed a series of videos centered on a wide range of environmental themes and discussed the comparative effectiveness of various presentation and transition techniques.

5.3 *NYC WasteLe$$* on the web

When the *NYC WasteLe$$* project was first launched in 1994, the Internet was not considered to be a promising outreach tool for promoting waste prevention. Over the five-year course of the project, web technology and access options grew enormously, creating an exciting opportunity to produce web-based outreach for the *NYC WasteLe$$* project. As presented in a June 20, 1999 *Washington Post* article entitled: *"Internet's E-conomy Gets Real,* by Mark Leibovich, Tim Smart and Ianthe Jeanne Dugan...

> *".... only five years ago, the Internet was essentially a fringe tool, the province of selected government officials, university researchers and geeky hobbyists. Executives mostly ignored it, and some called it a fad; politicians never mentioned the medium, let alone took credit for it. Few declared it revolutionary...*
>
> *...The precise impact of the Internet is still hard to quantify. One reason is its sheer rate of growth: Every second, another seven people around the globe tap in for the first time. ...*
>
> *Meanwhile, the online population continues to climb. Currently, about 80 million Americans are online, according to the Commerce Department. In 3 1/2 years, that number will grow by about 60 percent to about 130 million — or half of the nation's population."*

In recognition of the powerful potential of the web to serve as a platform for waste prevention guidance, DOS directed SAIC to develop a web site presenting the following key elements:

Project Background and History

NYC WasteLe$$ Sector Descriptions

NYC WasteLe$$ Partner Profiles

Current Trends: Best Business Models

Objectives of Waste Prevention and Energy Efficiency

Client Case Studies

General Waste Prevention Recommendations

Sector-Specific Waste Prevention Recommendations

Sector Profiles

Cost/Benefit Information

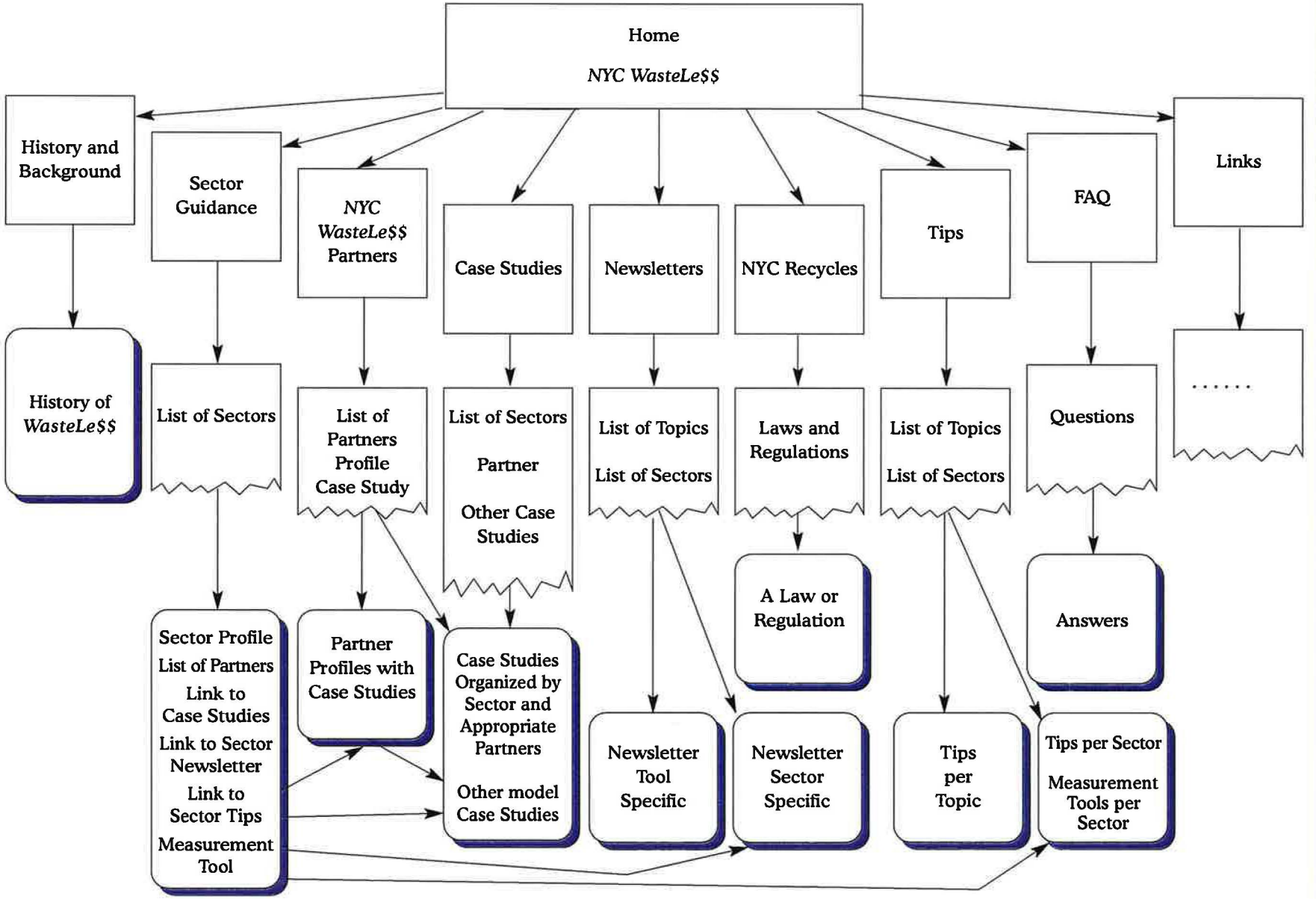
Measurement Information

Links to Relevant Sites

Frequently Asked Questions

SAIC developed a prototype "look" and draft navigation strategy and an organizational plan for review and comment by DOS. The basic organizational plan is presented as Exhibit 8.

Exhibit 8. *NYC WasteLe$$* on the web: Basic Organizational Plan



SAIC developed the necessary text, data and graphics, and assembled the necessary photographs and related materials to establish the web site as www.nycwasteless.com.

To ensure the relevance of the content and the effectiveness of the presentation, SAIC also developed web site evaluation forms specific to each sector and distributed them to approximately 45 reviewers for comment and suggestions.

5.4 Seminars

In addition to the *NYC WasteLe$$* newsletters and *NYC WasteLe$$ on the Web*, DOS also launched a series of sector-specific seminars to provide guidance and outreach to business owners and operators within the sectors of interest. The objectives of the seminars were to:

1) showcase model businesses and institutions;
2) present and discuss their efforts to promote waste prevention within their operations; and
3) allow for networking and dialogue among other similar businesses and institutions seeking to implement waste prevention programs.

SAIC developed draft agendas, in consultation with DOS, covering topics of concern to business owners, operators, and managers within the sectors and recruited speakers from the industries and from other relevant organizations. SAIC provided the draft agendas and options for seminar formats (e.g hands-on small group exercises on waste prevention and energy efficiency vs. facilitated group discussions using topics presented by speakers or mock scenarios) to members of the communities of interest for review and comment before finalizing the seminar topics. The reviewers commented on topics, formats, and recommended speakers.

For example, following preparation of the draft agenda for airlines and airports, SAIC submitted it to the Senior Director of Airport Facilities and Services of the Airports Council International for comments. Among her remarks were the following:

> *"All of your selected topics are relevant to the industry, though I have some thoughts on organization..."*
>
> *"Environmental image at the Corporate Level: Good topic. I would keep it, but be aware that here are several independent corporations at any one airport facility and the need for cooperative agreements between the air carriers and the airport should be stressed."*
>
> *"Negotiating Waste Hauling and Recycling Contracts: This is, or should be, an element of the comprehensive recycling plan."*
>
> *"Lighting for Terminal and Parking Lots: Lighting has significant security implications that should be considered when you develop this topic. You should also add administrative buildings to your source list."*

Among the topics presented at the seminars were:

> **Manufacturing:** *"Knowing Your Waste Stream Can Save You Money,"* presented by Lenore Neire, Government Affairs, Eagle Electric Manufacturing Company.

Wholesale: *"Managing Wood and Organic Waste,"* presented by Jeanne Carlson, Sector Leader, SAIC for Myra Gordon, Market Administrator, Hunts Point Terminal Market.

Schools: *"Overview of Waste Prevention Program,"* presented by Joy Garland and Jason McDonald, Faculty, United Nations International School.

Stadiums, Arenas, and Convention Centers: *"Comprehensive Waste Prevention Program at a Public Assembly Facility,"* presented by Dr. Norman Richards, Mohegan Sun Casino and Resort, CT.

Retail: *"Waste Prevention, Leading by Example at Target,"* presented by Doug Chellman, Operations Manager, Target Stores, Long Island.

In promoting for the seminars, SAIC utilized the mailing lists of businesses and institutions within each sector developed for newsletter distribution. In addition, DOS established partnerships with various trade organizations and sector leaders to share in seminar promotion and sponsorship. The partnerships were established to obtain input to enhance the quality of the seminars, to strengthen the credibility of the project and the events in the eyes of the invitees and to ensure the topics and agendas were suitable to the respective audiences. The following trade associations and other organizations worked with the project team to host and promote the respective seminars:

Airline/Airports	Port Authority of New York & New Jersey
Restaurants	New York State Restaurant Association Empire State Restaurant and Tavern Association
Retail	Bell Atlantic New York City Department of Business Services Bryant Park Restoration Corporation Grand Central Partnership 34th Street Partnership
Retail Food	Food Industry Alliance of New York
Wholesale/Manufacturing	L.I.C. Business Development Corporation Con Edison
Schools	The Brearley School The New York City Board of Education
Stadiums and Convention Centers	New York Convention & Visitors Bureau
Hospitals	Greater New York Hospital Association

Each invitation included a registration form. Recipients were requested to fill out the registration form and fax it to SAIC to indicate their intent to participate.

As the registration forms were received, the consultant project team monitored the responses. In the majority of cases, response levels were below expectations. In cases in which, two weeks before the scheduled date for the seminar, fewer than the targeted 50 participants were

registered, the project team conducted a telephone campaign to recruit seminar participants. The telephone follow-up effort was extensive and rigorous. For example, in the case of the restaurant seminar, SAIC phoned 721 restaurants to recruit seminar participants following the distribution of the direct mailing. Direct mailings included cover letters from two trade groups and were distributed in addition to the distribution of a flyer at the NY State Restaurant Association's trade show at the Javits Center. The seminar, despite being hosted at a well known facility, with breakfast provided free of charge, had only 31 participants from New York's restaurants.

In the cases of all seminars, the recruiting efforts were time-consuming and yielded few participants compared to the effort and expense involved. Participation levels simply did not meet expectations and yet, the seminar speakers were strong and their messages were practical and suitable to the project purpose.

The discussions and audience interest was strong and the outreach was effective as evidenced by the participants' evaluations of the sessions. For example, in the Airline/Airport seminar, 80 percent of the participants found the information presented in the seminars to be "very useful" and 20 percent found the information presented in the seminar to be somewhat useful. No participants characterized the information as "not useful at all." In addition, 67 percent of the participants in the Airline/Airport seminar found the seminar topics to be "very relevant" to their operations and 33 percent found them to be "somewhat relevant to their operations."

The project team reviewed the probable reasons underlying the project's inability to achieve seminar attendance goals, targeted at 50 participants per seminar. Time pressures/competing priorities on potential participants is a major factor suspected of contributing to low participant turnout. The Long Island City Business Development Corporation, 34th Street Partnership, and other organizations corroborated the seminar participation rate challenge by citing their own experiences.

Although the project was not an effective draw in the area of seminar participant recruiting, professionals in all of the targeted business sectors do participate in professional meetings and conferences. To promote waste prevention among the membership of specific industry groups, DOS may pursue including discussion of waste prevention on the agendas of scheduled conventions or meetings as an alternative approach to convening stand-alone waste prevention seminars. Such an approach may enhance organizers' success in attracting those professionals who are already tasked with tracking industry developments and trends and who have already committed to spend time away from the business or facility of their employment.

Section 6. Measurement, Evaluation, and Projections

The ideal method, from the standpoint of accuracy, of measuring waste prevention, on a business or a facility basis, involves a simple, direct, straightforward four-step process per the following tasks:

Task 1: Establish baseline data concerning waste generation at that facility or business.

Task 2: Target specific waste streams and implement programs targeting the reduction of those wastes.

Task 3: Monitor and measure the amount of those waste materials generated after waste reduction measures are implemented.

Task 4: Subtract the amount of waste generated after program implementation from the baseline amount to calculate waste prevention.

As an alternative to subtracting the waste generated after program implementation from the baseline amount, one can also simply measure the amount of waste diverted following program implementation, such as the case in the US Airways pallet reuse program. In that case, the project team simply tracked the number of pallets diverted for reuse and multiplied them by the weight of a pallet to determine the amount of waste prevented. Exhibit 9 presents an example case study of the US Airways pallet diversion project, to illustrate this waste prevention measurement process.

Exhibit 9. *NYC WasteLe$$* Case Study: US Airways
Cargo Operation Pallet Diversion Program at LaGuardia Airport

Baseline Circumstances: US Airways, a domestic and international airline, operates a cargo operation at LaGuardia Airport in addition to providing passenger service. Incoming cargo arrives on pallets, and is disbursed throughout the airport and to the public, leaving behind a large surplus of empty pallets.

Based on hauling receipts, *NYC WasteLe$$* determined that US Airways emptied five thirty-cubic-yard, open-top containers each month. Based on observations of these containers, approximately 90 percent of the waste in each container were pallets. Although one container was designated for pallets and the other for trash, both containers contained numerous pallets commingled with general trash, prior to US Airways' participation in *NYC WasteLe$$*.

Description of the Waste Prevention Opportunity: US Airways staff learned through their participation in *NYC WasteLe$$* that they could use pallets received with cargo at LaGuardia Airport, which they had been discarding, at the airline's trucking operation at JFK International Airport. Cargo staff at LaGuardia is now storing usable pallets, and staff from the trucking operation picks up 80 to 100 pallets once per week from the cargo operation for use at JFK operations. This has reduced the disposal of waste to two thirty-cubic-yard containers per month, and reduced purchasing costs.

Strategy and Approach: The strategy was to divert pallets from the waste stream to a reuse program. US Airways staff quantified the number of available pallets in the waste containers,

Exhibit 9. (continued) *NYC WasteLe$$* Case Study: US Airways
Cargo Operation Pallet Diversion Program at LaGuardia Airport

identified a use for the pallets within its operations, and established procedures for stacking and storing pallets for collection by the end user. The team determined that 80-100 pallets were could be salvaged for reuse each week. If an average of 90 pallets, weighing about 40 pounds each, is salvaged per week, they represent the potential for diversion of 3600 pounds of waste per week.

Time frame: US Airways implemented the program in mid-1997. Within several months of the initial recommendation to reduce pallet waste, staff identified the specific opportunity and undertook implementation of the pallet reuse system.

Waste Prevention Calculation:

Monthly waste hauling prior to implementation:	five 30-cubic yard pulls
Monthly waste hauling after implementation:	two 30-cubic yard pulls
Monthly waste prevention:	90 cubic yards per month or 1080 cubic yards per year
Weekly average of 90 pallets diverted per week:	3600 pounds diverted per week
Annual weight of waste prevented:	93.6 tons of waste

This approach is precisely the strategy the *NYC WasteLe$$* team sought to follow.

For the most part, the *NYC WasteLe$$* partners chose not to participate in the measurement component of the project. So, while the project team developed estimates relative to baseline conditions, based on site assessments, observations and purchasing and hauling record reviews, for the most part, the partners did not incorporate the measurement program into their routines. In some cases, the partners sought to measure cost savings, based on waste prevented, as presented in Case Study of Cost Savings presented in Exhibit 10.

Exhibit 10. *NYC WasteLe$$* Cost Savings Case Study: US Airways
Cargo Operation Pallet Diversion Program at LaGuardia Airport

Baseline Circumstances: Based on hauling receipts, *NYC WasteLe$$* determined that US Airways emptied five thirty-cubic-yard open top containers each month. Although one container was designated for pallets and the other for trash, both containers contained pallets commingled with general trash before US Airways participated in *NYC WasteLe$$*. Since containers of pallets were contaminated with trash, they were removed at the $600 per container rate charged for trash collection rather than the $450 per container rate that applies to non-contaminated pallet containers.

Description of the Waste Prevention Opportunity: Cargo operations at LaGuardia are now storing usable pallets. Approximately 80 to 100 pallets are shipped per week from the cargo operation for use at JFK operations. This measure has reduced the disposal of waste to two thirty-cubic-yard containers per month, and reduced purchasing costs.

Exhibit 10. (continued) *NYC WasteLe$$* Cost Savings Case Study: US Airways
Cargo Operation Pallet Diversion Program at LaGuardia Airport

Assumptions Incorporated in Cost Savings Analysis:

Labor required for a pick up of pallets	eight hours (one hour drive each way and two hours each for loading and unloading pallets for two employees)
Labor rate	$20 per hour
Cost of trucking	20 miles at 0.31 per mile once per week
Monthly waste hauling prior to implementation	five 30-cubic-yard pulls at $600 each
Monthly waste hauling after implementation	two 30-cubic-yard pulls at $600 each
New pallets cost	$6.00 each
Weekly average number of pallets diverted	90 pallets diverted per week

Labor for managing pallets in piles versus bringing them to container for disposal is approximately the same.

Cost Savings Information: ***Annual Operating Cost Analysis for Reuse of Pallets***

	Before Implementation	After Implementation
Operational Costs:		
Waste Management Costs	$36,000	$14,400
Mileage/Truck Cost	$0	$ 322
Labor	$0	$ 8,320
Total Operational Costs	$36,000	$23,042
Savings on Operational Costs	—	$12,958
Savings on Pallet Purchase	—	$28,080
Total Annual Savings	—	$41,038

Payback Period: Since no capital investments were made, a payback period does not apply to this initiative.

While in some cases, *NYC WasteLe$$* partners, working with the project team were able to calculate waste prevented through participation in *NYC WasteLe$$*, and were able to determine the cost savings associated with waste prevention efforts, most partners did not measure waste prevented or costs saved, despite the fact that in the case of eleven partners, SAIC prepared business-specific/partner-specific measurement tools for recording waste prevention-related activities and results. The first tools prepared were detailed and comprehensive. These were then revised to provide for streamlined record-keeping to be as simple and easy to use as possible. Nevertheless, they were not adopted for use by the partners in any case, despite repeated encouragement and technical assistance.

The primary reason the city businesses chose not to participate in the measurement activity, concerns the time and attention required to produce meaningful data on a routine basis. Training is required so that employees can record the amount of material diverted or disposed consistently. Training takes time, as does measurement. Given that time translates into money for these businesses and that time emerged as the single most significant factor hindering recruitment efforts, waste prevention opportunity selection efforts, and implementation rates, the problem with the measurement requirement becomes evident — it is time-consuming. Measurement also requires management commitment so that the time employees devote to measurement and away from their other responsibilities is approved.

In the case where managers do seek opportunities to reduce waste and to save money through waste prevention, measurement tools can be valuable provided they are simple and the assumptions and calculations are clear and unambiguous. In an effort to provide suitable tools for such an audience, SAIC prepared a variety of web-based interactive tools to enable businesses to calculate costs and savings and payback periods on the web, using a model structure and inputting their own data.

A sample tool is provided below as Exhibit 11, which, when on the web, can be manipulated by users' entering their own data. The example provided compares the waste and costs of using permanent filters for vehicle motor oil versus disposable ones. It provides sample data for purposes of illustration, but, when it is accessed on the web, users can input values based on their own facility operations.

Exhibit 11. Economic Analysis for Permanent Filter for Vehicle Motor Oil

Assumptions:	
Number of vehicles with reusable filters	**30**
Oil filter changes per year per vehicle	**12** per year
Cost for conventional filter	**8** dollar(s)
Additional time to clean reusable filter in the parts washer	**5** minute(s)
Labor rate	**30** dollar(s) per hour
Weight of conventional filter	**1** pound(s)
Number of uncrushed oil filters	**100** per drum
Disposal cost for one drum of uncrushed oil filters	**100** dollar(s)
Minimal impact on the change rate of parts washer fluid	**0**
Typical cost for reusable filter and adapter	**250** dollar(s)

Annual Operating Cost Comparison for Permanent Filters Versus Conventional Filters:

Cost Comparison:	**Conventional Filters**	**Permanent Filters**
Capital Costs to change	**$0.00**	**$7,500.00**

Exhibit 11. (continued) Economic Analysis for Permanent Filter for Vehicle Motor Oil

Cost Comparison:	Conventional Filters	Permanent Filters
Operational Costs:		
Additional Labor for Filter Cleaning	$0.00	$900.00
Disposable Filter Cost	$2,880.00	$0.00
Filter Disposal	$360.00	$0.00
Total Operational Costs	$3,240.00	$900.00

Cost Analysis Summary:	
Annual Savings for Permanent Filter per Vehicle	$2,340.00
Capital Cost for Diversion Equipment/Process	$7,500.00
Payback Period for Investment in Equipment/Process	3.21 years
Waste Prevention Summary:	
Weight of Waste Prevented	360.00 pounds
Volume of Waste Prevented	0.98 cubic yards

Businesses can be persuaded to take an active role in measurement and related program elements if the top managers recognize benefits from waste prevention measurement, find ways to measure waste prevention that are not inordinately time consuming or complicated, and are willing to establish incentives for participation. In some cases, incentive programs that reward measurable have proved effective.

For example, at Staten Island University Hospital (SIUH) employees, from the custodian to the top surgeon, are empowered to suggest new ideas. If a committee agrees, the idea is piloted. Most new ideas target cost reduction. But many of the ideas adopted promote waste reduction as well. At the hospital, employees receive a percentage of the cost savings as a reward. Such incentives promote new ideas as well as measurement follow-through to track results to calculate rewards.

SIUH has an active working group representing various areas within the hospital. A vendor of a new product can come before the committee or a specific group, such as infection control, and request a pilot project to test a new product. Through such initiative the staff has initiated many waste prevention efforts. For example, nurses in the recovery room realized that every patient received an uncomfortable oxygen mask that then was discarded. They suggested that they test a smaller, more comfortable, but equally effective, product as a substitute for the mask for appropriate patients. This idea reduces costs and reduces waste and the suggestion came from employees trying to improve patient care. Through such efforts SIUH employees benefit from implementation of their suggestions. One employee received $17,000 for a single cost-saving idea.

6.1 Extrapolating Citywide Waste Prevention Potential

One ambition of the *NYC WasteLe$$* project was to enable DOS to project the potential for waste prevention Citywide, based on experience with businesses in the sectors of concern. Clearly, efforts to extrapolate prevention potential are best performed within a context of waste composition and corresponding prevention strategies.

Throughout the project, considerable information concerning the composition of the waste streams was developed through waste assessments and throughout technical assistance efforts. This information corresponds fairly consistently with the results of other waste composition surveys of businesses within the sectors of interest. For example, information developed in connection with site assessments, although based on records review and observation rather than on waste sorts and compositional analysis, correlates closely with waste composition survey information generated by New York City's Department of Sanitation (NYC DOS *A Statistical Profile of New York City for Solid Waste Management Planning*, May 17, 1991). Further it corresponds closely to information presented in the California Integrated Waste Management Board's (CIWMB), *Solid Waste Characterization Database*, accessible on the web at http://www.ciwmb.ca.gov/wastechar/.

Observations concerning the composition of the waste streams of participating businesses also reflect trends reported nationally, such as through the EPA-sponsored *Characterization of Municipal Solid Waste in the United States, Franklin Associates, 1998 Update.*

Thus, such analyses are valuable to extrapolation efforts because they enable the analyst to focus productively on high priority target streams. Since some rudimentary estimates are available from DOS surveys concerning the total amount of waste generated in New York City for specific sectors, the compositional information helps guide efforts to predict waste prevention potential by sector by emphasizing those streams that *NYC WasteLe$$* targeted for reduction and those streams for which waste prevention solutions are feasible. For example, in the cases of the Sheraton Hotel and Towers and Pizzeria Uno, food waste was the predominant waste, accounting for about 40-45% of the waste stream generated in both cases. Of this amount, approximately 50% represented food preparation waste, as distinguished from plate waste, unserved food and spoilage. Food preparation waste is one waste for which composting is a viable waste prevention solution.

The DOS waste composition survey estimated food waste to account for about 43% of the waste stream from restaurants which correlates well with the information from the California Integrated Waste Management Board study, providing estimates that food waste accounts for about 43.9% of the restaurant waste stream. These estimates were used as a basis to extrapolate the potential size of this waste stream that can be prevented through composting or through animal feed collection programs coordinated with the New York City restaurant sector.

The DOS study estimates the total waste generated by New York's restaurant sector to be about 765,000 tons per year. If 40%-50% of this waste is food waste, and of this about 50% is food preparation waste which can be diverted from disposal to composting or collection routes to support animal feed production, the city logically could reduce its annual business waste

generation by between 153,000 tons and 191,250 tons per year, which, if the annual waste generation rate for New York businesses is estimated at 4.34 million tons (14,000 tons per day for 310 days per year), represents about 3.5%-4.4% of the business waste stream.

Similarly, in the manufacturing sector, project estimates correlate well with waste composition data from the DOS and CIWMB studies. For example, in the case of Eagle Electric, a *NYC WasteLe$$*, manufacturing partner, a predominant waste stream, accounting for 15% of the waste was corrugated cardboard, which corresponds well to the estimates for cardboard from the CIWMB study (10.2%) and the Franklin estimates (13.9%). In the case of Eagle Electric, effective systems were in place to recycle this cardboard and thus to eliminate it from the waste stream. Wood pallets also represented a major waste stream targeted for prevention at Eagle Electric through reuse and refurbishment. Assuming that cardboard and wood pallets, together, represent approximately 30% of the manufacturing waste stream, we can estimate the amount of waste that could be prevented by this sector by implementing the prevention strategies identified for the *NYC WasteLe$$* partners, in the context of the total estimated waste stream from the manufacturing sector in New York City. The DOS survey estimates the manufacturing sectors contribution to the waste stream to be 980,000 tons per year. Thus, 30% of this quantity of waste equals about 294,000 tons per year. If the annual waste generation rate for New York businesses is estimated at 4.34 million tons (14,000 tons per day for 310 days per year), the elimination of pallet waste and cardboard waste would reduce the overall NYC business waste stream by about 6.8%.

Thus, in developing waste prevention projections for selected sectors, the project team first considered:

- estimates of the annual waste generated through the activities and operations of the specific industry sectors; and
- those wastes generated in the greatest quantities and for which specific waste prevention options are readily available.

For each sector, the team then identified the most effective waste prevention measures implemented, either by *NYC WasteLe$$* partner businesses or by industry leaders to estimate the potential waste prevention and cost savings that could be achieved if the entire sector in New York City implemented similar waste prevention programs. The team estimated that these major streams, targeted for feasible waste prevention, represent between 30% and 60% of any sector's waste stream. The team then considered the potential effectiveness of the institutionalization plan to reach and influence businesses throughout the various sectors to promote effective waste prevention, focusing first on the waste streams of greatest significance within their sectors.

By applying some basic assumptions regarding program institutionalization, the team estimated potential waste prevention focusing on these streams. Thus, the drivers of the assumptions are the level of and effectiveness of the institutionalization effort, the cooperation among businesses and institutions within each sector, and the resulting sector-wide commitment to adopt waste prevention mechanisms; all of which will affect the potential amount of waste diverted from disposal. Based on four scenarios of outreach and action assumptions, preliminary estimates of

the ranges (25 percent, 50 percent, and 75 percent in institutionalizing the program) of the waste prevention impact of the *NYC WasteLe$$* program were developed.

The resulting projections are presented in Exhibit 12 for the six dominant sectors studied. SAIC focused this analysis on these sectors because they represent approximately 73% of New York's business waste stream and about $288.48 billion dollars to the New York City economy, which according to the New York City Economic Development Corporation's estimate of the Gross City Product of $366.6 billion, they represent about 79% of New York's economic activity. Starting from the total amount of waste generated by target industries, this exhibit presents the target waste streams in each sector, the assumed quantity (as a range) of the targeted waste streams within each sector and their corresponding prevention strategies. The three final columns present the potential for waste prevention achievable through efforts focused on those wastes, assuming the institutionalization plan served to motivate 25% of the businesses within that sector to prevent that waste, assuming 50% of the businesses took effective action to eliminate that waste and assuming 75% of the businesses were successful in eliminating that waste.

Based on this approach to extrapolation, the program impact is expected to range from a low of 237,474 tons at the 25 percent participation rate focusing on wastes that represent 30% of the waste streams to a high of 1,347648 tons at the 75 percent participation rate focusing on streams that represent 60% of the waste stream.

However, project experience and observations of the *NYC WasteLe$$* clients' follow-through patterns and efforts to track waste prevention successes suggest that many factors and obstacles influence NYC businesses willingness to practice waste prevention. Based on the observed level of clients' commitment to, investment in, and persistence in pursuing project goals, the expectation that businesses will reduce waste by 25% to 75% is considered largely unrealistic. Projections of citywide waste prevention successes inspired by the *NYC WasteLe$$* and the model businesses and agencies it established can be more realistically set at 10% or less. Therefore Exhibit 12 also presents estimated extrapolations at the 10% participation level. This 10% maximum probable projection estimate is reinforced by the fact that although the *NYC WasteLe$$* businesses had access, free of charge, to technical assistance and waste prevention support resources:

- many participating businesses failed to establish baseline data on total waste generation and chose not to measure progress against waste prevention goals, indicating a perception that waste generation is not a high priority concern deserving of corporate investment and attention;
- many clients, while active in the early program phases, did not maintain program support and momentum to implement fully the proposed waste prevention measures; and
- many clients did not complete implementation within the time frame and did not maintain visible programs to promote awareness and success toward waste prevention goals through future efforts.

Thus, even when outreach and technical assistance were highly focused on specific business, those businesses often abandoned program efforts before successful programs were firmly in

place and leading to operational cost savings. Therefore, a more realistic estimate of the level of waste prevention that can be expected to result from the establishment of model businesses in the sectors of concern, and from associated outreach campaigns, is closer to 10% waste reduction among the affected sectors.

Exhibit 12. Example Analysis of Potential for Sector-Specific Waste Prevention

Sector	Total Waste Generated by Sector (tons)[1]	Target Wastes	Estimated Percent of Target Wastes in the Waste Stream	Estimate Waste Prevented per Sector (Tons) Potential Participation Rates			
				25%	50%	75%	10% (maximum probable)
Restaurants	765,000	Food Waste	30%-60% (229,500-459,000 tons)	57,375-114,750 tons	114,750-229,500 tons	172,125-344,250 tons	22,950-45,900 tons
Retail non-food	353,000	Pallets, Packaging Cardboard	30%-60% (105,900-211,800 tons)	26,475-52,950 tons	52,950-105,900 tons	79,425-158,850 tons	10,590-21,180 tons
Wholesale	378,000	Pallets and Cardboard	30%-60% (113,400-226,800 tons)	28,350-56,700 tons	56,700-113,400 tons	85,050-170,100 tons	11,340-22680 tons
Manufac-turing	980,000	Pallets Cardboard	30%-60% (294,000-588,000 tons)	73,500-147,000 tons	147,000-294,000 tons	220,500-441,000 tons	29,400-58,800 tons
Retail Food	433,000	Food Waste, Pallets and Cardboard	30%-60% (129,900-259,800 tons)	32,475-64,950 tons	64,950-129,900 tons	97,425-194,850 tons	12,990-25,980 tons
Hospitals	257,325	Packaging	30%-60% (77,197-154,395 tons)	19,299-38,599 tons	38,599-77,198 tons	19,299-115,796 tons	7,720-15,440 tons
Total	**3,166,325**			**237,474-474,949 tons**	**474,949-949,898 tons**	**673,824-1,347,648 tons**	**94,990-189,980 tons**

[1] NYC DOS *A Statistical Profile of New York City for Solid Waste Management Planning*, May 17, 1991.

Although these extrapolations are merely estimates for waste prevention potential, they can provide a tailored blueprint for action and a basic yardstick for gauging, and fueling program success. The scaled up estimates of waste prevention potential can:

(1) provide DOS with an estimated projection of high priority waste prevention goals;

(2) help DOS to establish explicit Citywide business waste prevention targets to focus waste prevention efforts productively; and

(3) help DOS encourage business assistance organizations to view business waste prevention as a means to enhance competitiveness and lead these entities to accept responsibility for promoting waste prevention within the business community.

The figures in Exhibit 12 merely represent speculation concerning the levels of waste prevention attainable if New York City businesses in the targeted sectors were to follow-through on key prevention initiatives aimed at reducing the highest volume wastes. Nevertheless, the estimates do suggest the potential for waste prevention efforts promoted through the institutionalization program to eliminate close to one third of the waste generated by the business community, if institutionalization programs could reach and serve to engage 10%-75% of the target businesses in the six dominant sectors. However, unless waste prevention is mandated legislatively and enforced rigorously, the apparent likelihood that businesses will approach even a 10% reduction through voluntary initiative seems low at best.

Section 7. Overall Lessons Learned

The *NYC WasteLe$$* program yielded a significant complement of valuable lessons. Perhaps the most resounding message conveyed through the experience is to maintain realistic expectations. There are waste prevention opportunities in virtually every business. Nevertheless, motivating and fostering change in the manner in which people do business requires considerable time and effort. Successes are attainable. Each individual change may be relatively small, but each change will reflect and may promote raised awareness. Solid waste planners, and business people, must not set themselves up for disappointment by thinking that massive reductions in solid waste and equally massive cost savings achieved through waste prevention are realistic expectations. Incremental successes are attainable for those who are prepared to apply creativity, hard work and perseverance.

7.1 Lessons

In reviewing the overall performance of all of the businesses participating in *NYC WasteLe$$* and upon comparing the results achieved and the waste prevented by each, a number of key lessons emerge which may be used to guide and strengthen future efforts. Among the major lessons learned are the following:

7.1.1 Voluntary Programs

When voluntary efforts are compared to legislated efforts, the waste prevention achievements of the legislated efforts will dwarf the counterpart efforts of the voluntary programs, particularly in cases where enforcement initiatives are active and visible. A case in point is evident in Europe's experience with packaging waste reduction. For example, when Germany introduced the German Packaging Ordinance in June of 1991, it led the way to a one million tonne packaging material decrease over the period 1991-1993, which translated into a 15kg per capita packaging material decrease (Nels, Margaret Brown, *Extended Producer Responsibility: Case Study of the German Packaging Ordinance*, 1994, p.18). No comparable achievement can be expected in the United States without legislation and an effective enforcement program.

7.1.2 Partner and Program Visibility

When waste prevention programs are launched, program visibility and publicity are key to recruiting interested and willing partners and to providing background information on what benefits can be expected from participation and at what price. Fanfare through press releases, brochures, and web sites all can provide background information and serve to authenticate a program and document its sponsorship for prospective recruits.

7.1.3 Incentives

As evidenced through the Staten Island Hospital example, participants in pilot initiatives, on an individual or a company level, can be expected to respond favorably to recognition and rewards for their efforts and successes. Such incentives can serve both to encourage participation and promote progress and tangible, measurable achievement.

7.1.4 Commitment

Corporate commitment and business manager commitment are key to implementation, therefore, not surprisingly, efforts will yield more positive results if only highly motivated businesses are recruited and provided with technical assistance. Upon reflecting on the lessons learned throughout this project, the following realization emerges as key: wavering commitment on the part of businesses recruited to pilot waste prevention programs is a likely and unavoidable obstacle. Businesses, particularly in a fast-paced, highly competitive, high overhead environment such as New York City, inevitably are subject to more pressing priorities than voluntary waste prevention projects. Programs should be designed with this expectation. Developers of waste prevention programs must plan their efforts realistically when working with businesses and institutions. There is just so much that a waste prevention program can reasonably expect to accomplish. In an non-legislated program, an enormous range of obstacles confront any outsider promoting waste prevention. These obstacles must be anticipated and accepted by the project team.

7.1.5 Working Within the Existing Infrastructure

The project team also must realize the critical importance of working exclusively within the structural framework of the business organization engaged in the program and tailor the program to reflect the needs, priorities, and capabilities of each business/institution.

7.1.6 Incremental Goals and Progress

When working with businesses, those technical assistance teams that focus first on the most significant and most easily implemented opportunities, or perhaps just a single opportunity, depending on the partner organization, may find greater success in the long run. Expecting businesses to implement a wide range of diverse projects simultaneously may delay positive results and overwhelm available resources, thereby discouraging participants. Perhaps by focusing on fewer, but the most substantial opportunities with each business, programs such as *NYC WasteLe$$* may actually make greater strides in the long run.

7.1.7 Starting With the Most Motivated Businesses

Recruitment should target first those organizations that express genuine commitment to project goals, rather than accepting businesses who were curious and looking for some good publicity. Had the *NYC WasteLe$$* project taken such an approach, however the results might have led the team to over-state the effects DOS could expect Citywide on waste prevention, since the project partners would have represented some of the City's most proactive and committed organizations; a group not necessarily representative of NYC businesses overall.

7.1.8 Working With Multiple Companies Operating Under One Management Umbrella

Program success when working with multiple companies operating under one management organization, such as the case in South Street Seaport, necessitates buy-in from all. In the

context of a voluntary program, this issue reflects an unavoidable obstacle. Any sponsor of a voluntary waste prevention program can expect to encounter this difficulty which can be expected to emerge as a limiting factor.

7.1.9 Measurement

Some of the basic lessons learned concerning waste prevention "measurement" include the following:

a) The process and tools need to be simple and clear — requiring complex forms and calculations will discourage participation.

b) Targeting one measure at a time may enhance participation. Success with one project may help win support for further efforts.

c) Minimizing the level of detail required from partners, leaving the project team to research all issues by contacting vendors (*e.g.*, to research size of containers, costs of substitutes, etc.) to simplify the process for the business will only help promote cooperation from the partners.

d) Providing an interactive spreadsheet to automate calculations for the partners can streamline further the measurement and planning.

7.1.10 Consider Competition to Promote Recruitment/Retention of Partners

DOS has concluded that recruitment efforts, and maintaining partner commitment throughout the duration of the project, may have been facilitated by a high visibility competition and promotion to recruit businesses and institutions to receive *NYC WasteLe$$* program services. A project kick-off could have included press releases, promotion via trade associations, paid advertisements, and highlighting key City figures' support. Announcing the program as a competition for technical assistance services might have helped DOS and SAIC more readily to identify businesses and institutions with a genuine interest in waste prevention and a demonstrated commitment to waste reduction.

Those who responded to the competition may very well have placed greater value on the services they received, since they would have had to compete to receive them. In addition, DOS could have had an opportunity to pick-and-choose the "best" participants, based on pre-established criteria for selection. *NYC WasteLe$$* clients also may have also been more eager to offer in-kind services to enhance their likelihood of selection. Thus, competition might have facilitated project efforts to generate "in-kind" service or potential alternative financial support as well as strengthening corporate commitment on the part of the *NYC WasteLe$$* clients.

Although we have no way of knowing for sure to what extent this approach would have enhanced the program, trade association representatives, including representatives of the Food Industry Alliance (FIA) of New York State and the NY State Restaurant Association (SRA), believe that this may very well have generated greater interest and otherwise enhanced the

project. The SRA representative suggested that well-placed ads and promotion through the trade association would have generated considerable interest. The FIA representative remarked that this approach would have proved effective, and noted that by announcing the program with a focus on money savings, and perhaps with FIA playing an active role in promoting the program through its Board, the program would have been more successful at recruiting and maintaining involvement of individual restaurants. Although outreach to these trade associations occurred early on in project implementation, perhaps input was not obtained early enough. An advisory board representing the targeted sectors, established prior to issuing the Request for Proposals for contractor services, might very well have generated ideas for more effective recruitment and retention of the recipients of the on-site services.

7.1.11 Minimize Implementation, Tracking, Measurement and Reporting Expectations

Programs that offer waste prevention technical assistance to businesses and institutions, including at the federal level, and in other states and municipalities, often are limited to providing a brief on-site visit, identifying a small number of significant recommendations, providing some implementation advice and assistance, and parting company/moving on to work with other businesses or institutions. Programs such as WasteCap in New England, the Waste Assessment and Reduction Program of the East Williamsburg Valley Industrial Development Corporation, and the waste reduction and recycling program of the Council on the Environment of New York City generally follow this model of providing assistance.

DOS chose its approach with the intent of developing new models, including quantifying and documenting the results through implementation of a broad array of recommendations. However, as discussed throughout this report, the *NYC WasteLe$$* partners, such as British Airways, viewed the level of effort involved to implement, track, analyze, measure, and report on the results as overly burdensome. DOS recognizes that the program might have been better served by streamlining measurement and reporting expectations, while focusing on just the more substantial recommendations. This may have served to move the partners more quickly through the project, maintain their involvement and enthusiasm, and ensure the necessary follow-up from within the participating organizations.

7.1.12 Draw on Models and Resources Beyond the *NYC WasteLe$$* Program

NYC WasteLe$$* demonstrated that to maximize the impact of the program Citywide, required incorporating information and resources into the project work products beyond those focusing on achievements of the *NYC WasteLe$$* project partners. This decision was intended to provide quantified case studies and as useful information as possible to motivate and assist businesses and institutions Citywide. SAIC was directed to research practical, cutting-edge waste prevention initiatives implemented by non-*NYC WasteLe$$ participants, including many examples within New York City, along with identifying resources for obtaining additional assistance, which could be documented and shared through the project's final work products (seminars, newsletters, video, web site).

7.1.13 Reach Out to Experts Through Focus Groups and Peer Review

NYC WasteLe$$ also demonstrated the importance of ensuring that the information to be disseminated, and the methods for its dissemination, make practical sense. Although it wasn't deemed feasible or necessary to convene focus groups to review each and every work product, DOS determined that work products benefit when they are developed with extensive input and review by organizations and individuals working actively within the target sectors.

7.1.14 Build New Partnerships

Throughout the course of the project, the importance of forming new partnerships with trade associations, business assistance organizations, utilities, and other government agencies became increasingly evident. These organizations served as reviewers to enhance the quality and credibility of work products. They also co-sponsored, hosted, and helped to publicize the *NYC WasteLe$$* seminars. Such organizations are considered vital to the success of DOS efforts to distribute and promote the final work products, a process which is essential for ensuring that information gets into the hands of the right people within the targeted businesses and institutions Citywide.

Section 8. Institutionalization

The final component of the *NYC WasteLe$$* Program was the development of an institutionalization plan, which is a list with descriptions of organizations that could be recipients of program information. Some of the organizations have already partnered with DOS as seminar sponsors and peer reviewers, and have distributed *NYC WasteLe$$* newsletters to their members.

The plan has two sections. The first lists business organizations and business improvement districts, local development corporations, government agencies and programs, academic institutions, the media, community groups, and non-profit groups to communicate strategies for waste prevention and improved energy efficiency. It includes a profile and overview of organizational avenues, an annotated list of relevant publications, and a calendar of events. The second section provides a brief description of each of nine sectors. It lists publications that might be outlets for articles on *NYC WasteLe$$*, web sites, and annual meetings and conferences. Some of the organizations listed are local; many are state and national trade associations.

APPENDICES

NYC WasteLe$$ Case Studies

- Eagle Electric Manufacturing Company
- Hunts Point Terminal Produce Market
- The Jacob K. Javits Convention Center
- Jamaica Market Food Court
- East Village Pizzeria UNO Chicago Bar & Grill
- Sheraton New York Hotel and Towers
- ShopRite Supermarkets
- US Airways

* * *

Waste Reduction Recommendations and Facility Assessment Reports

- Sheraton New York Hotel and Towers Food and Beverage Services Including Overview of Potential Tracking Measures
- Port Authority Operations; LaGuardia Airport

* * *

NYC WasteLe$$ Newsletters

- 24 *Newsletters* can be viewed at www.nycwasteless.com These address:
  (1) energy conservation,
  (2) recycling, and
  (3) waste prevention/seminar highlights for 8 sectors:
  Airlines/Airports;
  Manufacturing;
  Retail Food;
  Restaurants;
  Retail;
  Schools;
  Wholesale;
  Stadiums/Arenas/Convention Centers.

NYC WasteLe$$ Case Studies

NYC WasteLe$$* was established by the New York City Department of Sanitation (DOS) to assist businesses and institutions to cost-effectively reduce waste. Funding also was provided by the New York State Energy Research & Development Authority and the U.S. Environmental Protection Agency. Case studies were developed for DOS by its *NYC WasteLe$$ contractor, Science Applications International Corporation, in September 1999, based on work done over the preceding three to four years.

Eagle Electric Manufacturing Company
Recycling and Reuse Program

Baseline Circumstances: Eagle Electric Manufacturing Company, one of the largest manufacturing employers in New York City, with 1,500 employees in the corporate offices and on the production floor, is the second largest producer of residential wiring devices in the world. Eagle Electric's three facilities in Long Island City house metal forming, plating, plastic molding, and packaging operations, as well as warehousing and administrative offices. Eagle Electric participated in the *NYC WasteLe$$* project to help reduce its waste streams.

Description of the Waste Prevention Opportunities: Eagle Electric's largest waste streams are plastic scrap, used oils, scrap metal, corrugated cardboard, pallets, and office paper. Eagle Electric considers recovery of materials for reuse and recycling a common sense approach to waste management that saves money and conserves resources. Eagle Electric's comprehensive waste management program includes recovery of a variety of materials through in-house reuse processes, and by providing materials to other organizations for reuse or recycling.

Strategy and Approach: Eagle Electric reuses scrap plastic generated by compression and injection molding operations. Eagle Electric regrinds reject parts and runners, and feeds back to the press a mixture of 75 percent virgin plastic and 25 percent regrind.

Eagle also collects several materials that are sent for recycling. Each year, Eagle Electric generates as much as 100 tons of urea scrap. In the early 1990s, Eagle Electric staff worked with Long Island City Business Development Corporation's Industrial Waste Recycling and Prevention (INWRAP) program to determine the recyclability of this plastic. *NYC WasteLe$$* assisted Eagle in finding additional markets for its urea scrap for reuse as a blast medium for paint removal. In addition, more than six tons of phenolic scrap and 2.5 tons of phenolic flash are returned to the manufacturer for reprocessing, eliminating an additional 8.5 tons of waste.

Eagle Electric generates more than 9,000 wooden pallets annually. Eagle Electric sold more than 5,000 pallets to a pallet recycler during the course of one year, avoiding 10 tons of waste. Eagle's waste carter collected an additional 3,900 broken pallets and chipped them for use as mulch. This allowed Eagle Electric to avoid the cost of disposing of the broken pallets.

Corrugated cardboard is diverted, flattened, consolidated on the loading dock and collected at no charge by the waste carter. Eagle Electric operations annually generate approximately 50 tons of corrugated cardboard for recycling.

High-grade white paper from administrative offices is diverted to cardboard cartons near each line printer. At the end of the work day, porters empty the cartons into canvas hampers, which are collected by the waste carter about every two weeks. In 1997, Eagle Electric recycled more than 21.5 tons of high-grade white paper. In addition, Eagle Electric estimates that its 178 office workers annually generate an additional 23 tons of mixed paper. In August 1999, management launched a desk-side mixed paper recycling program.

Through sales to a local scrap dealer, Eagle Electric annually recycles more than 1,700 tons of scrap metal, primarily steel and brass.

Timeframe: Eagle Electric began its recycling and reuse efforts in 1997 and continues to improve and enhance them. In August 1999, Eagle initiated a mixed office paper recycling program, in addition to the white paper and corrugated cardboard program already in place.

Cost Savings Information: Selling urea scrap generates more than $69,000 in annual revenue.

In one year, Eagle Electric sold more than 5,000 pallets to a pallet recycler for $1.00 each, generating $5,200 in revenue. The waste carter collected an additional 3,900 broken pallets and chipped them for use as mulch. This cost Eagle Electric approximately $4,320. Overall revenue from pallet management is approximately $880.

Cardboard is collected for recycling at no charge. Therefore, avoided disposal costs are approximately $12,250 per year, excluding any additional labor costs for preparing the material for recycling. If Eagle received the market value for its cardboard, the company could earn an additional $1,830 in revenue from cardboard recycling (based on average current market price of $28-$45 ton as reported in the *Waste News Commodity Pricing Report* on prices paid in New York City by recyclers for loose materials, August 1999).

Both white and mixed paper are collected at no charge. Avoided disposal costs are approximately $3,900 per year, excluding any additional labor costs for preparing the material for recycling. If Eagle received the market value for its paper, the total potential revenue from paper recycling would be approximately $3,000 annually (based on average current market price of $15-$25 ton as reported in the *Waste News Commodity Pricing Report* on prices paid in New York City by recyclers for loose materials, August 1999).

Eagle does not track its revenues from the sale of scrap metal, but based on the quantities recycled and the general value of metals, the revenues are substantial.

Payback Period: Since no capital investments have been made, a payback period does not apply.

Hunts Point Terminal Produce Market
Food Waste Composting and Wood Recycling

Baseline Circumstances: The Hunts Point Terminal Market, located on approximately 126 acres in the Bronx, NY, is one of the premier produce markets in the world. Hunts Point is home to approximately 65 fruit and vegetable wholesalers, each of whom operates his/her own individual operations as a separate entity within the market. The market itself is run as a cooperative, owned and operated by the wholesalers. Wholesalers sell directly out of the Market, and many of the wholesalers deliver to customers

from the Market. The primary customers are grocery store owners, restaurant suppliers and operators, and other wholesale and retail produce vendors.

Description of the Waste Prevention Opportunities: One of the primary waste streams generated at the market is food waste. Through its participation in *NYC WasteLe$$*, Market staff worked with individual wholesalers to educate them about source separation of organics. In 1997, in cooperation with the Association for Resource Conservation (ARC), the Market's waste carter, Waste Management, Inc., began sending truck loads of source separated produce scraps to farms on Long Island for on-farm composting. With a grant from the NY State Environmental Management Investment Group, Waste Management, Inc. leased a commercial food pulper/screw press for a three month pilot. The pulper successfully reduced the volume of the organics by 50%, cutting in half the number of loads to composting facilities on Long Island and in New Jersey.

Wood waste also is a primary component of the Market's waste stream. Approximately 40 percent of the waste is wood, or roughly 40 tons per day. The wood waste consists primarily of pallets and wood packaging. Pallets in repairable condition are collected by a pallet repair company located on-site, refurbished, and resold to vendors in the market. Unrepairable pallets and crates can be diverted from the waste stream and chipped for use as mulch, fuel, compost bulking agent, and other uses.

Strategy and Approach for Wood Waste: Since February of 1998, Waste Management, Inc. and the Hunts Point Cooperative Association have been conducting a pilot project to recover wood waste pulled from the common area of the Market, where much of the wholesaler waste is placed for removal. This wood waste consists almost exclusively of broken, unrepairable pallet wood. Waste Management, Inc. participated in *NYC WasteLe$$* meetings convened at the market, and elected to initiate and fully fund a pilot to grind wood waste for composting and weed suppression uses. The company provided a tub grinder to grind recovered wood, hired additional personnel to improve source separation of the wood from non-pallet wood waste streams, and provided labor to operate the tub grinder. This wood is pulled out of the Market's common area waste stream by Waste Management, Inc. personnel, placed in a truck and moved to the tub grinder that the company located on-site. The tub grinder reduced the wood to two-inch pieces.

During the project, approximately two loads of ground wood were sent weekly to the Rikers Island Compost facility, operated by Organics Recycling, Inc. for the Department of Sanitation. In addition, some ground wood was sent to Botanical Gardens for use in composting projects sponsored by the Department of Sanitation, and has been used by a not-for-profit organization, The Point, for weed suppression throughout the Hunts Point area. The search for new markets is ongoing.

Timeframe: The wood waste pilot project ran from February through October 1998. The Market and Waste Management, Inc. worked together for six months to identify end markets for the recovered wood and to refine the program to improve source separation and ensure that the ground pallet wood met the specifications of potential end markets. Potential end markets include waste-to-energy facilities, fiber-board manufacturers, wood brokers, and compost facilities. In addition, Waste Management met with a variety of government agencies, e.g., the New York City Economic Development Corporation, the U.S. Forest Service, and the New York State Office of Recycling Market Development, in an attempt to identify long-term markets for the ground wood.

Identifying long-term, high-volume markets for the wood waste has been problematic due to the closing of several major waste-to-energy facilities in the New York region, a result of utility deregulation. Because of the closing of these very high-volume end users, the ground wood market recently has

become saturated. This situation has been exacerbated by the severe ice storms of 1998 that resulted in thousands of tons of free, uncontaminated green wood entering the ground wood market. As a result, traditional end markets for the wood essentially ceased to be an option for the foreseeable future. The wood chipping project is not currently in operation until markets for the wood can be identified.

Wood Waste Cost Savings Information: During the course of the pilot project (February through October 1998), Waste Management, Inc. recovered approximately 100 cubic yards, or approximately eight tons, of wood waste per day from the common area of the market. More than 1,200 tons of material were diverted, even taking into account that separation and recycling operations were halted for several extended periods to repair equipment and allow for the dispersion of stockpiled material.

Nearly all of the wood captured for grinding comes from the common area waste stream. The New York City Department of Sanitation is charged for disposal of all waste dumped in this area because it falls on City-owned property. With a landfill operating cost of $41.50 per ton, diverting this material saved the City almost $50,000 during 1998. However, waste from the Bronx is currently being exported at a cost to the City of approximately $70 per ton. At that rate, the savings to the City would be $84,000. For a full year (assuming continuous collection of 100 cubic yards, or eight tons, of wood waste per day) at a tip fee of $70 per ton, the savings would be $204,400. Data needed to calculate cost savings from the food waste composting pilot were not obtainable from the individual wholesalers that participated in the pilot.

Payback Period: The savings are realized by different parties than those making capital investments. Waste Management Inc. purchased the tub grinder at a cost of $300,000. If the Market paid the cost for exporting its common area waste currently borne by the City, and if the Market had purchased a tub grinder at the same cost paid by Waste Management, Inc., the payback period for annual disposal savings of $204,400 is about 1.5 years, excluding labor costs for Waste Management, Inc.

The Jacob K. Javits Convention Center of New York City
Recycling and Reuse Programs

Baseline Circumstances: The Jacob K. Javits Convention Center, New York City's largest convention facility, covering a total of 1.8 million square feet, generates almost 4,000 tons of waste per year. Prior to working with *NYC WasteLe$$*, the Javits Center was paying for waste disposal on a flat annual fee basis. Any cost savings that could be achieved through reductions in the facility's waste stream were not being realized through reduced waste hauling costs.

Description of the Waste Prevention Opportunity: The exhibition and food service operations of the Javits Center are large generators of cardboard, mixed paper and visqueen (plastic film used to protect flooring during event set-up), as well as materials that could be reused, such as chairs and carpeting. If these materials were diverted from the waste stream for recycling and reuse, the quantity of waste removed from the facility could be greatly reduced.

Strategy and Approach: The *NYC WasteLe$$* waste reduction technical assistance team conducted on-site assessments to determine the most efficient methods of collecting materials for reuse and recycling. The team also made suggestions for including recycling and waste prevention activities in the new waste carter contract. The request for bids asked that all bidding carters include a plan to recycle materials from the show floors, food concessions, and the Center's operations by providing recycling containers and transporting recyclables to processing facilities and markets. The request for bids also asked for reports of waste and recyclables quantities and costs.

Timeframe: In April 1996, the new waste hauler contract was in place. The *NYC WasteLe$$* recommendation to donate various unwanted materials leftover from conventions was implemented by the Javits Center, and quantities were tracked for 1998.

Cost Savings Information: In 1998, the Javits Center recycled 240 tons of corrugated cardboard, 24 tons of mixed paper, and eight tons of visqueen. The Javits Center also donated 60 rolls of carpet and carpet padding and 250 folding chairs to the Materials for the Arts (MFA)/Project ARTS Program. MFA/Project Arts, is a program of the NYC Department of Cultural Affairs in partnership with the Department of Sanitation and the Board of Education. MFA, and its Project ARTS program, accepts goods for donations to institutions with arts programs, government agencies, and schools. MFA valued the donations at $33,415. This was the money saved by receiving organizations in reduced purchase costs if they were to purchase the materials rather than receive them as donations.

The Javits Center reduced annual quantities disposed by almost 5,000 cubic yards through recycling efforts and approximately 32 cubic yards through donation efforts. At the maximum carting rate for loose waste of $12.20/cu. yd., the annual savings is approximately $60,500.

Payback Period: Additional recycling bins were provided as part of the waste carter contract, and the labor costs to collect materials for recycling and reuse is assumed to be comparable to that for disposal. Therefore, the payback for the estimated $60,500 in annual cost savings is immediate.

Jamaica Market Food Court
On-Site Composting

Baseline Circumstances: Jamaica Market Food Court, in Queens, NY, a *NYC WasteLe$$* partner, is an enclosed food court surrounded by ten small restaurants and six retailers. An on-site farmers market operates during the summer months. The Market generates almost 100 tons of food waste a year. With ten separate restaurants and an on-site farmers market, organic waste is a significant part of the Market's waste stream. Therefore, the Greater Jamaica Development Corporation, which operates the Market, investigated composting the Market's organic waste.

Description of the Waste Prevention Opportunity: On-site composting of organic materials was a recommendation of the *NYC WasteLe$$* assessment team. Most of the restaurants use fresh fruit and vegetables in the preparation of their menu items. If these materials are combined, they probably do not produce enough waste to warrant transportation of the materials to an off-site composting facility. However, investigation of an on-site composting system was recommended, including installation of composting bins behind the Market and a color-coded collection system throughout the Market so that food vendors and restaurateurs can separate fruit and vegetable scraps easily.

Strategy and Approach: Working with City Green, an environmental consultant, and using grants from the Empire State Economic Development Corporation and the Urban Resources Partnership, Jamaica Market now operates two Green Mountain Technologies Earth Tubs for composting. Four to six vendors participated in the composting program during the evaluation period of June 1998 through November 1998. About 1,000 lbs. (about one cubic yard) of food wastes are collected weekly for composting (150 to 200 lbs./day for 5 to 6 days/week). Participation and quantities collected have increased since the evaluation period. Employees reported that they enjoy working with the composting equipment.

Timeframe: The composting program began in 1997 and continues to be operated by Market staff.

Cost Saving Information: "We've saved about $6,500 a year on our carting costs," says Mary Reda, Director at the Greater Jamaica Development Corporation. About $1,000 of this can be attributed to composting efforts, and the remainder from other *NYC WasteLe$$* waste reduction initiatives. Up-front costs for the composting program were $19,530 for site preparation and supplies. This was subsidized through grants from the Empire State Economic Development Corporation. Supplies included the Earth Tubs, as well as storage containers for bulking agent and food waste, carting bins, and assorted tools.

Ongoing costs are about $120 per month and include labor, energy, bulking agent, and lab testing for the finished compost. The finished compost is used in landscaping projects at the Market, in the Market's community gardens, and by employees in their own gardens.

Payback Period: Since much of the capital cost of the program was subsidized through grants, a payback period for the Greater Jamaica Development Corporation was not calculated.

East Village Pizzeria UNO Chicago Bar & Grill
Reusable Beverage Coasters

Baseline Circumstances: East Village Pizzeria UNO is one of a chain of casual family restaurants specializing in pizza and a wide range of Italian dishes. This sit-down restaurant is located at 55 3rd Avenue in Manhattan's East Village. The restaurant serves approximately 400 to 600 people per day.

Description of the Waste Prevention Opportunity: Pizzeria UNO investigated replacing cocktail napkins for drinks at the bar and at tables, with reusable coasters. Reusable coasters reduce paper purchasing costs and disposal costs associated with the use of disposable cocktail napkins.

Strategy and Approach: The store manager contacted the store's beverage distributor about the potential to provide promotional reusable coasters free of charge. A pilot was instituted at the East Village Pizzeria Uno, as well as all of its other stores that are accountable to the same regional headquarters.

Timeframe: Pizzeria UNO began this project in 1996.

Cost Savings Information: Pizzeria UNO in the East Village spent approximately $1,950 annually on cocktail napkins before the pilot. It was estimated that the store achieved a 60 percent reduction in its use of cocktail napkins, saving approximately $1,160 in napkin purchasing costs.

Payback Period: There is no payback period associated with this activity, as there are no capital investments involved. Beverage distributors provide reusable coasters free of charge

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Sheraton New York Hotel and Towers
Food Donation Program

Baseline Circumstances: The Sheraton New York Hotel and Towers in Manhattan consists of a 1,700-room hotel, three restaurants, an employee cafeteria, room service operations, banquet facilities, Club

and Tower level lounges, and an off-site catering operation. The combined food service facilities in the hotel serve approximately 2,500 meals every day.

Description of Waste Prevention Opportunity: A large portion of the hotel's daily waste is generated through food service activities. Most of the waste generated through food service activities is food, in the form of kitchen preparation waste and uneaten, served food. The Sheraton realized that it was discarding large quantities of food waste and began a program to divert uneaten, edible foods from the waste stream and donate them to a food rescue organization, City Harvest, which distributes the food to soup kitchens, homeless shelters, and other organizations that help combat hunger in New York City.

Strategy and Approach: The Sheraton has a regularly schedule weekly pick-up of edible food with City Harvest. The hotel began its donation program by setting aside bakery products, such as rolls, breads, and desserts. In 1997, prepared foods were added to the collection route. These are unserved items from buffets, large parties, and other catering events, and include prepared salads, cold cut and cheese trays, and other items.

Chefs determine what items can be safely stored for donation. Then kitchen and service staff package, label, and store food items in coolers or freezers for weekly collection by City Harvest.

Timeframe: The Sheraton began donating food several years ago. Since the program's inception, donations have increased each year, and in 1997 the hotel began donating prepared foods along with the bakery and packaged items it had been donating.

Cost Savings Information: In 1996, The Sheraton donated 1,880 pounds of food or the equivalent of 2.5 cubic yards. In 1997, the hotel donated 4,570 pounds or 6.1 cubic yards. Over the course of the two years, the food donated was enough to feed approximately 3,225 people. The combined reduction in waste quantities also could have reduced the hotel's waste carting bills by $357, but this savings was most likely not realized. The quantity of waste diverted was not substantial enough to warrant changes in the waste collection schedule.

Payback Period: The effort to donate food to City Harvest does not require any initial capital investments. City Harvest will provide necessary food packaging. No additional labor costs were reported to be incurred by The Sheraton Hotel to set food aside, rather than discard it.

ShopRite Supermarkets
Save-A-Bag Grocery Bag Reuse Program

Baseline Circumstances: Wakefern Foods/ShopRite Supermarkets, a *NYC WasteLe$$* partner, is the largest retailer-owned food cooperative in the U.S. With more than 190 stores in New York, New Jersey, Pennsylvania, Connecticut, and Delaware, ShopRite's waste prevention efforts have made a significant impact on the communities in which they operate.

Description of the Waste Prevention Opportunity: In 1990, ShopRite began a customer bag reuse program — Save-A-Bag — in its stores, including all of its New York City stores, in an effort to reduce costs internally and to reduce the solid waste burden on customers. "We found that reusing bags is good for the community because it reduces the amount of waste that goes to the landfills. It's also good for business because buying and warehousing fewer bags leads to significant savings for the company," says Tim Vogel, Wakefern Corporation's Manager of Environmental Affairs.

Strategy and Approach: The program involved distributing educational materials and offering a refund of 2¢ per bag. Every bag was printed with information about the bag reuse program, and signs were posted in stores. The refund was tracked through the computerized cash registers, and stores with the highest bag reuse rate were rewarded with prizes at the end of the year. Since 1990, the bag reuse rate has climbed steadily from about five million bags per year to about 8.4 million bags per year in 1998. Approximately 182 ShopRite stores now participate in the program. "Our customers have reused over 50 million bags, getting two cents back for each bag," says Vogel.

Timeframe: The program began in 1990 and continues to grow each year.

Cost Saving Information: At a cost of 2¢ per bag (after subtracting the 2¢ rebate), ShopRite saves about $168,000 per year in reduced bag purchases. According to Wakefern, if labor, storage, and transportation are factored in, ShopRite saves closer to $300,000 to $800,000 per year. The wide range is a result of differences in bag type, material, size, and use (*i.e.*, partially full versus completely full). Since its inception, the Save-A-Bag program has saved customers $1.2 million and has saved ShopRite $1.5 million.

Payback Period: No information is available about the initial costs of developing and distributing outreach materials, printing outreach information on the bags, and programming the tracking feature in cash registers. Therefore, a payback period achieved by Save-A-Bag has not been calculated by *NYC WasteLe$$*.

US Airways
Pallet Diversion Program at Cargo Operation at LaGuardia Airport

Baseline Circumstances: US Airways, a domestic and international airline, operates a cargo operation at LaGuardia Airport in addition to providing passenger service. Incoming cargo arrives on pallets, and is disbursed throughout the airport and to the public, leaving behind a large surplus of empty pallets.

Based on hauling receipts, *NYC WasteLe$$* determined that US Airways emptied two thirty-cubic-yard, open-top containers each week. Based on observations of these containers, approximately 90 percent of the waste in each container was pallets. Although one container was designated for pallets and the other for trash, both containers contained numerous pallets commingled with general trash before US Airways participated in *NYC WasteLe$$*. Since containers of pallets were contaminated with trash, they were removed at the $600 per container rate for trash charged by the trash carter, instead of the $450 per container rate that they would be charged for non-contaminated containers of pallets.

Description of the Waste Prevention Opportunity: US Airways staff learned through their participation in *NYC WasteLe$$* that they could use pallets received with cargo at LaGuardia Airport, which they had been discarding, at the airline's trucking operation at JFK International Airport. Cargo staff at LaGuardia are now storing usable pallets, and staff from the trucking operation pick up 80 to 100 pallets once per week from the cargo operation for use at JFK operations. This has reduced the disposal of waste to two thirty-cubic-yard containers per month, and reduced purchasing costs.

Strategy and Approach: The strategy was to divert pallets from the waste stream to a reuse program. US Airways staff quantified the number of available pallets in the waste containers, identified a use for the pallets within its operations, and established procedures for stacking and storing pallets for collection by the end user.

Timeframe: US Airways implemented the program in mid-1997. Within several months of the initial recommendation to reduce pallet waste, staff identified the specific opportunity and undertook implementation of the pallet reuse system.

Assumptions and Cost Savings Information: (from Exhibit 10)

Assumptions Incorporated in Cost Savings Analysis:

Labor required for a pick up of pallets	eight hours (one hour drive each way and two hours each for loading and unloading pallets for two employees)
Labor rate	$20 per hour
Cost of trucking	20 miles at 0.31 per mile once per week
Monthly waste hauling prior to implementation	five 30-cubic-yard pulls at $600 each
Monthly waste hauling after implementation	two 30-cubic-yard pulls at $600 each
New pallets cost	$6.00 each
Weekly average number of pallets diverted	90 pallets diverted per week

Labor for managing pallets in piles versus bringing them to container for disposal is approximately the same.

Cost Savings Information: ***Annual Operating Cost Analysis for Reuse of Pallets***

	Before Implementation	After Implementation
Operational Costs:		
Waste Management Costs	$36,000	$14,400
Mileage/Truck Cost	$0	$ 322
Labor	$0	$ 8,320
Total Operational Costs	$36,000	$23,042
Savings on Operational Costs	—	$12,958
Savings on Pallet Purchase	—	$28,080
Total Annual Savings	—	$41,038

Payback Period: Since no capital investments were made, a payback period does not apply to this initiative.

SHERATON NEW YORK HOTEL AND TOWERS FOOD AND BEVERAGE SERVICES

WASTE REDUCTION RECOMMENDATIONS AND FACILITY ASSESSMENT REPORT

Final Report

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Bureau of Waste Prevention, Reuse and Recycling
New York City Department of Sanitation

and

Sheraton New York Hotel and Towers

January 22, 1996

FOREWORD

NYC WasteLe$$ is a non-regulatory waste prevention program initiated and primarily funded by the New York City Department of Sanitation (DOS) with support from the New York State Energy Research and Development Authority (NYSERDA). NYC WasteLe$$ is an ambitious effort to support City efforts to meet waste prevention objectives while helping local businesses to maintain and enhance their competitiveness. DOS' contracted consultant is providing technical assistance to local businesses to reduce waste and wasteful practices and promote energy efficiency. Technical support for the WasteLe$$ program is provided by Science Applications International Corporation (SAIC), an international consulting firm with more than two decades experience in wide-ranging environmental program support to Federal, state, local, and private sector clients. SAIC's expert staff are helping to design waste prevention programs that promote efficient procurement and economic benefits from waste reduction and improved waste management.

As part of the WasteLe$$ partnership, SAIC is providing the following services to each participating company:

- conduct pre-assessment research concerning solid waste management in the industry sector;
- perform an on-site waste and energy assessment;
- recommend specific waste prevention opportunities that reduce the volume and toxicity of the facility's waste stream, increase energy efficiency, and reduce costs;
- research and assist in implementing promising waste prevention options;
- track waste stream and economic impacts of implementing these options and document cost savings; and
- showcase the facility's achievements via a video, guidebook, and seminar.

As a partner in the WasteLe$$ program, each participating company has committed to:

- establishing written corporate waste reduction goals and policies;
- assisting the assessment team in the waste assessment process;
- implementing promising waste prevention options;
- tracking waste stream and economic impacts of implementing these options;
- serving as a role model for others within the industry sector by allowing SAIC and DOS to share selected waste prevention and cost saving achievements via a video, guidebook, and seminar; and
- working with NYC WasteLe$$ to publicize the facility's waste reduction success.

A major goal of the NYC WasteLe$$ program is to provide continuing support to each facility in terms of research and technical assistance so that ambitious waste reduction options can be pursued. The report that follows documents the findings of SAIC's waste assessment of a participating facility.

1. INTRODUCTION

This report describes the findings of SAIC's waste assessment of the Food and Beverage operations at the Sheraton New York Hotel and Towers (Sheraton). The Sheraton is owned by ITT Sheraton and located at 57th Street and Seventh Avenue in midtown Manhattan. SAIC personnel, Steven Rolander, Colton Seale and Jeanne Carlson, performed the assessment on December 18-20, 1995.

In Section 2 of the report, SAIC provides a description of the facility and in Section 3 describes the waste generating processes in the hotel's food and beverage operations. SAIC provides available, baseline waste generation data in Section 4 and a description of current waste management practices for the facility in Section 5. Existing waste reduction activities are described in Section 6. Finally, in Section 7, SAIC identifies potential options for reducing the quantity of waste generated, reducing the toxicity of the waste stream and reducing both energy and water use at the Sheraton.

The report describes the facility's waste stream on a materials flow basis, analyzing the waste stream from initial purchasing decisions, through storage and food preparation, to clean-up and disposal. The recommendations are ordered in a similar manner, with more detailed discussion of each option included in the report. Taken alone, some of these recommendations may appear to provide only minimal waste reduction benefits or cost savings; however, when the recommendations are aggregated into a comprehensive program, cost savings and waste reduction may prove substantial. Some of the recommendations may present a challenge to facility staff and will require further discussion and research.

Sheraton staff will review the recommendations provided in this report and target specific waste prevention opportunities for further investigation by SAIC. During the second phase of the assessment, SAIC will explore the technical and economic feasibility of implementing the selected options at the Sheraton. In the third phase, SAIC and Sheraton staff will work together to implement those waste prevention options found to be technically and economically achievable. A summary of the initial options is provided in Exhibit 1.

During the assessment, the SAIC team conducted multiple walk-throughs of all food and beverage facilities (*e.g.*, kitchens, restaurants, storage areas etc.) and met with staff representatives. The first morning consisted of a meeting with Mr. Gary Budge, the Hotel Manager and Sean Cassidy, Property Operations and Head of the Sheraton Environment Committee. The assessment team also met with Douglas Thorne (Purchasing), Pedro Fortun (Event Services), and Ron Roccasecca (Kitchen Operations) and discussed the goals of the program with several staff members (primarily cooks) selected at random during the assessment. Much of the information in this report is based on interviews conducted with these individuals and documents provided to the assessment team by the Environment Committee. SAIC especially would like to thank Mr. Budge, Mr. Cassidy, Mr. Thorne, Mr. Fortun, and Mr. Roccasecca for their enthusiasm, assistance, and courtesy.

Exhibit 1. Summary List of Recommended Waste Red. .on Options

Options	Discussion	Considerations	Benefits
Purchasing			
Conduct detailed assessment of products that could be purchased in bulk/standardize product container sizes/purchase products in bulk	Products are ordered in multiple package sizes to correspond with menu specifications.	• Employee training. • Storage space. • Change recipes in CD-ROM database to specific measurements (*e.g.*, cups).	• Reduced shipping/receiving/ packaging wastes. • Cost savings from bulk purchase. • Consolidated storage.
Specify that products be delivered in returnable crates/racks/etc.; contact vendors to determine whether returnable/reusable crates/racks/totes are available.	Almost all products are delivered in single-use disposable packaging.	• Identify products amenable to reusable shipping containers. • Quick turn-around of containers/storage space. • Ensure containers are sanitized. • Identify additional materials for recovery and reuse.	• Reduced shipping wastes such as corrugated cardboard, plastic wrap, strapping, wood crates. • Reduced disposal cost.
Conduct a survey of suppliers to solicit waste reduction ideas.	Vendors may be able to provide suggestions for further waste reduction given their greater knowledge of the packaging process.	• Identify relevant vendors and solicit vendor cooperation.	• Potential for innovative waste reduction ideas.
Eliminate multiple points of purchasing.	Implementation of IBUs may increase overpurchasing and duplicative purchasing.	• Coordination of purchasing through one person, for all items.	• Better coordination of purchasing. • Reduced waste from overpurchasing.
Storage			
Date and rotate stock.	Stock does not appear to be consistently dated and rotated.	• Label shelf space. • Educate all staff.	• Better control of inventory. • Reduced loss and spoilage.
Shutdown walk-ins that are not in use.	During slower periods, half-empty walk-ins are left lighted and running.	• Logistics of consolidating food into fewer coolers. • Ensure food remains properly rotated and does not get "lost."	• Energy savings. • Reduction in CFC use. • Cost savings.
Turn-off lights in walk-ins when not in use.	Lights are always on in walk-ins.	• Select between timers or reminder stickers. • Employee training.	• Energy savings. • Cost savings.
Install plastic thermal strips over cooler and freezer doors.	Rails for thermal strips are above many cooler/ freezer doors, but strips have been removed.	• Employee dissatisfaction.	• Energy savings. • Cost savings.
Use heat in cooler compressor lines to pre-heat water in main water heaters.	Channel heat from walk-in cooler and freezer compressor lines to tanks that pre-heat water for the main water heaters.	• May be difficult to re-route lines and change system. • Cost considerations.	• Energy and cost savings from condenser and water heater.
Food Preparation and Cooking			
Implement a composting program.	Some unserved food is served in employee cafeteria,	• Identify composting facility.	• Avoided disposal costs.

Options	Discussion	Considerations	Benefits
	some is donated to City Harvest, and some scraps are used as stock. However, all buffet and post-consumer food waste is disposed and most of the food prep scraps are disposed. This represents the most significant component of the waste stream. Food prep scraps comprise 50% of the food waste stream.	• Identify containers and storage space. • Investigate purchasing food pulper. • Transportation costs. • Employee training.	
Update and re-implement recycling programs.	Corrugated cardboard is recycled at the facility. Other materials are pulled from the waste stream by the hauler, if sorted.	• Negotiations with hauler regarding charges and potential rebates. • Verification of commodities recycled by hauler and separation requirements. • Reinstitute source separation program. • Develop employee training and motivation video and materials.	• Rebates on hauling charges. • Avoided disposal costs. • Compliance with NYC laws.
Reinstate cooking grease recycling and combine fat and bone trimmed from meat with grease for recycling.	Grease is placed in compactor in container.	• Identification of reliable grease recycler.	• Waste reduction. • Reduced potential for contamination potential of recyclables in compactor. • Cost savings.
Analyze consumption patterns and leftovers.	Uneaten food portions comprise 40% of the food waste stream.	• Analysis of leftovers to determine which foods are not eaten. • Reconsideration of portions and product mix.	• Waste reduction. • Avoided disposal costs.
Purchase pre-cut fruit and vegetable items.	Food prep wastes comprise 50% of the food waste stream. Using some pre-cut fruits, vegetables, and meat products could reduce this waste stream.	• Identification of cost-effective products that do not diminish food quality. • Identification of alternative job assignments for some food prep personnel.	• Waste reduction. • Avoided disposal costs.
Turn off equipment not in use.	Ovens, stoves, and heat lamps were left on in most of the kitchens even when not in use.	• Maintenance of ovens/stoves at cooking temperature so ready when needed.	• Energy savings. • Cost savings.
Launder kitchen rags.	All kitchen rags are currently disposed because of problems laundering greasy rags.	• Implementation of system to keep separate greasy and non-greasy rags.	• Energy reduction. • Possible cost savings.
Turn off faucets and water hoses; install spray nozzles; fix leaking pipes.	Water often is left running in kitchen and pipes under equipment have numerous leaks.	• Coordination with maintenance to fix faucets and leaking pipes. • Employee training. • Employee dissatisfaction.	• Water savings. • Cost savings.
Food Service			
Frequently restock buffet displays.	Buffet is stocked very full for display purposes. Leftover food must be disposed.	• Reorganization of buffet area in a manner consistent with display objectives.	• Waste reduction. • Cost savings.

Options	Discussion	Considerations	Benefits
Change back to refillable container soda system.	Bag-in-box soda dispensing systems are now used, generating non-recyclable wastes.	• Supplier cooperation. • Availability of refillable canisters.	• Waste reduction.
Eliminate disposable serviceware in employee cafeteria.	All serviceware in employee cafeteria is now disposable plastic and paper items.	• Purchase of institutional china. • Training of employees to use dishwashing station in employee cafeteria.	• Cost savings. • Waste reduction.
Minimize napkins in Hudson's; purchase, or obtain from beer vendors, recycled-content/reusable coasters.	Disposable napkins are served with all drinks in Hudson's.	• Identification of suitable coasters.	• Cost savings. • Waste reduction.
Cleanup			
Increase quantity of food donated to City Harvest.	Baked goods currently are donated to City Harvest.	• Meet with City Harvest to discuss delivery requirements and collection schedule.	• Waste reduction.
Collect buffet waste for composting.	Buffet leftovers are disposed.	• See composting considerations.	• Waste reduction.
Collect beer and other glass bottles for return or recycle.	All glass at the facility is discarded.	• Discussion with suppliers concerning possibility of returning bottles. • Logistics of bottle storage. • Discussion with hauler about possible recycling options.	• Waste reduction. • Cost savings. • Compliance with NYC laws.
Additional Energy Conservation			
Investigate technical assistance from EPA Green Lights Program.	The Sheraton is conducting a pilot program to changeover to energy efficient lighting.	• Sign MOU with EPA Green Lights making commitment to energy-efficient lighting in return for technical assistance.	• Energy savings. • Cost savings.
Procure computers that meet Energy Star requirements.	Computer equipment in Sheraton may not be the most energy efficient.	• Analysis of computer needs and efficiency of current computer system.	• Energy savings. • Cost savings.
Pursue sub-metering of hotel.	The Sheraton, per direction from Sheraton ITT, is investigating sub-metering hotel to monitor energy use.	• Cost of implementation. • Time-frame of implementation.	• Better prioritization of energy and cost saving options.
Reducing Toxicity			
Check dilution requirements for cleaning solutions.	Night manager mixes cleaning fluids per specifications.	• Consideration of whether more dilute mix could do same job.	• Less toxicity. • Cost savings.
Eliminate air and surface deodorizer.	Aerosol air and surface deodorizer is used throughout the facility, including kitchens.	• Employee training. • Identification of alternative deodorizer.	• Less toxicity. • Safer food prep area.
Implement better cleaning supply management practices.	Many cleaning supplies were in containers that did not properly close, allowing spills and leaks.	• Employee training. • Identification/installation of pumps/lids that fit.	• Safer work space. • Less toxicity.
Review cleaning and pest-management contracts.	More toxic pesticides and cleaners may be used than are necessary.	• Discussion with contractors about toxic use reduction options.	• Less toxicity.

Options	Discussion	Considerations	Benefits
Additional Waste Reduction Options			
Issue waste prevention policy statement.	A policy statement from top management detailing goals and actions may encourage employee participation.	• Employee cynicism. • Lack of understanding of general waste prevention principles among employees.	• Increased employee participation. • Employee feedback and ideas.
Incorporate waste prevention statement/questions in guest telephone survey.	Inclusion of waste prevention statement or questions in guest survey may help to identify areas guests consider important.	• Most waste prevention options are "behind-the-scenes." • Avoid perception that Sheraton is currently wasteful.	• Guest feedback and identification of guest concerns.
Consider participation in other waste reduction programs.	Participation in other waste prevention programs (*e.g.*, EPA WasteWi$e) may spur new ideas and elevate public awareness of Sheraton's environmental endeavors.	• Avoid overloading staff with too many programs and directives.	• Positive relations. • Additional waste prevention ideas.

2. FACILITY DESCRIPTION

The Sheraton New York Hotel and Towers consists of a 1,700 room hotel, three restaurants, an employee cafeteria, room service operations, banquet facilities, Club and Tower level lounge facilities, an off-site catering operation, and associated kitchens and stewarding, storage and dishwashing areas.

During the assessment, the team conducted several walk-throughs of all food and beverage facilities (e.g., kitchens, restaurants, storage areas, etc.) and met with several staff representatives. The first morning consisted of a meeting with Mr. Gary Budge, the Hotel Manager and Sean Cassidy, Property Operations and Head of the Sheraton Environment Committee. The assessment team also met with Douglas Thorne (Purchasing), Pedro Fortun (Event Services), and Ron Roccasecca (Kitchen Operations). Much of the information in this report is based on interviews conducted with these individuals and documents provided to the assessment team by the Environment Committee.

Streeter's New York Cafe

Streeter's, with a seating capacity of 190, serves breakfast, lunch, and dinner. The breakfast menu offers a breakfast buffet of pastries, sliced fresh fruit, cereal, yogurt, eggs, bacon, sausage, and hash browns, and a complete Japanese-style breakfast. In addition, eggs, omelettes, pancakes, and meat breakfasts may be ordered from the menu. The lunch menu consists of seafood and vegetable appetizers; soups and salads; pastas; meat sandwiches; and various meat, seafood, and egg entrees. The dinner menu is basically an expanded version of the lunch menu, with a greater emphasis on beef entrees such as filet mignon and prime rib.

Hudson's Sports Bar & Grill

Hudson's, with a seating capacity of 140, is primarily a sports bar, serving draft and bottled beer, wine, and mixed drinks, and offering appetizers and a meat and seafood dinner menu. Hudson's and Streeter's share the same kitchen areas.

Lobby Court Lounge

The Lobby Court Lounge, seating 110, is primarily a bar, serving draft and bottled beer, wine, mixed drinks, as well as soda and coffee, and some appetizers. While Streeter's and Hudson's tend to draw most of their clientele from within the hotel, the Lobby Court is attempting to draw more clients from off the street by offering live entertainment nightly.

Room Service

Room service is offered from a menu similar to the Streeter's menu with the addition of cheese plates. Room service food is prepared in the Streeter's and Hudson's lobby level kitchen. In addition, mini bars, containing canned beer and soda, small wine and liquor bottles, and an assortment

of candies are offered in the hotel guest rooms.

Banquet Services

The Sheraton hotel has a ballroom that can seat up to one thousand guests and an exhibit space for conferences and exhibitions. Banquet foods are prepared in a separate kitchen (the Commissary kitchen) from that in which entrees for the main restaurants are prepared. Some salads and sandwiches served in the restaurants also are prepared in this kitchen. Adjoining the banquet kitchen is a pastry kitchen that prepares pastries and baked goods for all food services.

Employee Cafeteria

The employee cafeteria serves breakfast, lunch, and dinner to employees, often using food left over from restaurant entrees. The menu varies daily, but consists primarily of a limited variety of hot foods and side dishes such as fruit and yogurt.

3. PROCESSES THAT GENERATE WASTE

The easiest way to understand waste generation at the Sheraton facility and, ultimately, to identify and recommend waste reduction options, is to analyze all aspects of the waste generation and management process through a materials flow approach. This approach starts with purchasing decisions and continues through to an analysis of final cleanup operations. At each point in the product flow, different types of wastes are generated. In general, reducing the quantity and/or type of wastes generated at one step will reduce wastes generated at that step, but also will reduce the quantity and range of wastes generated in many of the subsequent phases.

The first phase is purchasing, which consists primarily of how materials are ordered and the decision-making process associated with selection of products and materials for purchase. This is followed by receipt and storage of materials in assorted walk-in pantries, refrigerators, and freezers. From storage, materials go to the food preparation and cooking area, or for certain products, such as napkins, directly to the food service area. Following preparation and cooking is food service. The final phase is the clean-up and disposal of post-consumer products (*e.g.*, uneaten food, beer bottles).

In addition to the wastes generated by each specific phase of the food preparation operation, wastes also are generated by maintenance and service operations associated with the facility. These include lighting, uniform cleaning, general maintenance, and other facility cleaning. Many of the maintenance and cleaning wastes may add more to the toxicity of the waste stream than to the quantity of waste generated.

Purchasing

Purchasing is coordinated through the ADACO Sheraton computer-based purchasing program. The Sheraton New York electronically sends messages to Sheraton ITT's central purchasing office. The central purchasing office assigns orders to vendors based on weekly bids or

existing contracts. Suppliers fax order confirmation notices directly back to the Sheraton New York when orders are received. The central purchasing officer at the Sheraton New York coordinates most of the facility's purchases, but the managers of the various restaurants may place some orders directly (*e.g.*, for specialty meat cuts or with contracted suppliers such as Oscar Meyer).

Purchasing decisions are based on a variety of factors, the most prevalent of which appears to be professional judgment, based on a daily inventory appraisal, familiarity with daily/weekly/seasonal fluctuations, and restaurant needs and specifications. Additionally, room occupancy levels are tracked to forecast demand for food and beverages and managers track stocks in supply areas and place orders accordingly.

Although difficult to quantify, a substantial amount of waste may be generated during the ordering process, due to over-ordering and duplicative ordering when orders are sent out from various points. At present, this may not be a significant problem, but as the Sheraton moves to a system of individual business units (IBUs), where operations are given greater responsibility for the day-to-day operation of their unit, operations managers may have greater freedom to place orders themselves, exacerbating the problem of duplicative ordering.

Delivery and Storage

When products arrive at the facility, they are taken from the loading dock to the C level storage area. Generally, supplies (food and beverages, cooking products, napkins and paper products) common to most of the food and beverage operations (*e.g.*, Mel-Fry cooking oil) are stored in the main dry cage on that level. Many perishable items are held in coolers adjacent to the receiving areas and are moved to coolers in the kitchens as needed. At the time of the waste assessment, it did not appear that many items were delivered on pallets. Only a few pallets were stacked in the loading dock area.

The primary waste generated during storage is corrugated cardboard. A limited amount of spoiled food product and obsolete menus and other printed products (*e.g.*, flyers for Cuisine of the Americas events) also enter the waste stream at this point. Additional packaging wastes such as paperboard and shipping and receiving materials such as pallets, wood crates, plastic wrap and strapping also may be generated at this point.

Sheraton staff stated that inventory is taken almost continuously. However, on the day of the assessment it did not appear that goods were being consistently rotated as new stock arrives and certain products (most notably spices and specialty items) appear to have been ordered in large quantities and left to sit on the shelves for extended periods (some with shipment labels dated early 1994).

Food Preparation and Cooking

Food preparation takes place in three kitchens: The Commissary kitchen on C-Level, the main restaurant kitchen on the Lobby level, and the pastry kitchen on C-Level. A significant amount of

the food preparation takes place in the C Level Commissary kitchen. Here, salads, sandwiches, and other prepared dishes are prepared in advance for banquets and the main restaurants. Preparation involves cutting, trimming, and slicing of fruits and vegetables; trimming and slicing of meats; unpackaging and portioning other foods; and mixing and preparing recipes.

Additionally, a significant amount of food preparation also takes place in the main kitchen adjoining Streeter's and Hudson's. In this kitchen, the emphasis is on entrees; however, the chefs prepare a number of appetizers and side dishes, as well. The pastry kitchen produces a more limited array of food items. These are primarily baked goods and deserts, but may also include appetizers such as small quiches.

The food preparation process is where most of the organic waste is generated. In general, organic wastes comprise the greatest portion of a full service restaurant's waste stream. Fruit and vegetable scraps and trimmings, meat and fish trimmings, bread trimmings and stale and spoiled food are the largest components of the food waste stream.

Other wastes generated in the food preparation areas include packaging from all types of food products, such as corrugated cardboard boxes; linerboard/paperboard boxes; waxed cardboard from produce, chicken, and some other meats; plastic wrap from meats; paper wrapping from meats; HDPE plastic bottles and jugs and PET plastic containers; steel cans (primarily #10 cans); glass bottles; aluminum cooking trays; and plastic clamshells from berries, mushrooms etc.

Wastes from the pastry kitchen varied somewhat and consisted primarily of dough waste and aluminum pastry molds. Disposable aluminum pans also are used in the off-site catering operations.

Food Service

Food and beverage service consists of plating and serving food at the restaurants and putting out food at buffet displays; serving food at banquets; preparing food for off-site catering or delivery; preparing food for room service delivery; and serving drinks in bars and restaurants.

In both Streeter's and Hudson's, food is served on durable china and napkins and table clothes made of launderable linen are used. In Streeter's drinks are served primarily in glasses and china. In Hudson's, most of the drinks are served in beer bottles, with a reusable glass regardless of whether one is requested by the customer, or from glass liquor bottles. Hudson's uses paper napkins. Food in the employee cafeteria is served on polystyrene plates with disposable serviceware and paper napkins and drinks are served in paper cups. Room service is provided on china but is accompanied by disposable glass condiment bottles. Condiments used in the restaurants are purchased in bulk.

Wastes generated from food service operations consist primarily of damaged foods; bag-in-boxes from soda service; and corrugated cardboard, paperboard, and plastic bottles.

Cleanup

The cleanup phase consists of clearing tables, bar areas, and food prep areas. A major source of waste in this phase is unserved food portions, i.e., perishable food that has been prepared in bulk but is not served during that day or meal service. Another major source is glass beer bottles and liquor bottles. Another significant source of waste is food that is served but not eaten (40% of all organic wastes generated); napkins and paper products from the bar and lounge areas; and polystyrene and other wastes from the employee cafeteria. Additionally, during cleanup a significant quantity of cleaning rags are disposed and toxic cleaning supplies are used.

4. BASELINE DATA - QUANTITIES GENERATED AND DISPOSED

All wastes from the Sheraton facility go into a single 30 cubic yard roll-off compactor. This compactor is pulled at least every other day and often is pulled every day. The Sheraton estimates that 90 percent of the waste going into the compactor is generated by food and beverage services. The data presented in Exhibit 1 provide insight into the various sources of this waste stream and the relative contribution of various waste generating activities in the food and beverage services. Exact quantities of materials disposed most often were not available.

Meals

Exhibit 1. Total meals served in the Sheraton Hotel

Area	Average Number of Covers (per day)
Streeter's	523
Hudson's	143
Lobby Court Lounge	(combined with Hudson's)
Room Service	177
Employee Cafeteria	750
Banquets	739
Towers and Club Lounge	250
Total	2,582

The Sheraton provided estimates that divide the above figures among breakfast, lunch, and dinner: approximately 571 total breakfasts served per day, 380 total lunches served each day, and 482 dinners served each day. The remaining 1,149 covers do not fall into one of these three categories and are considered snacks or other miscellaneous orders.

Source of Food Wastes

The hotel estimates that the portion of the total quantity of waste generated that is attributable to each meal is 40 percent from breakfasts, 20 percent from lunches, and 40 percent from dinners. Sheraton staff did not indicate into which category wastes from snacks and other miscellaneous orders falls. Additionally, the Sheraton provided estimates of the percent of food wastes generated at different stages in the food service process. These estimates are provided in Exhibit 2.

Exhibit 2. Breakdown of Total Food Wastes

Source	Percentage of Total Food Waste
Preparation	50%
Uneaten portions	40%
Unserved foods	8%
Spoilage	2%

Overall, food wastes are composed of 40 percent vegetable scraps, 40 percent fruit scraps, and 20 percent meat and seafood scraps.

Beverages

Eighty percent of the total beverages served at the Sheraton are in bottles, primarily glass bottles, although a significant quantity of soda is served in 10 ounce plastic bottles (especially at banquets). A high percentage of the glass bottles are beer bottles subject to the New York State bottle bill. Ten percent of all beverages are served in cans (mainly from mini-bars in guest rooms, with a small percentage attributable to the two soda machines in the hotel). An additional 10 percent are served fountain-style from disposable soda bag-in-box systems or refillable beer kegs.

The Sheraton's newly formed Environment Committee estimates that glass consumption from beverages in the hotel equals 579,654 bottles annually (including everything from the 6 oz. soda mixer bottles to the liquor bottles). This is equivalent to 295 cubic yards (or 10 pulls of the 30 cu yd. compactor) of uncrushed glass per year.

Other Materials

The Environment Committee estimates that steel can generation is approximately 10 percent of glass generation, or approximately 58,000 steel cans per year. A breakdown was not available regarding what percent of all cans generated are #10 steel cans and what percent are smaller. However, the assessment team observed that a majority of the cans appear to be the #10 size.

Additionally, although not directly related to food and beverage services, the Environment

Committee estimates that the Sheraton facility generates 85,000 pounds per year of mixed paper and 329,177 pounds per year of newspaper.

5. CURRENT WASTE MANAGEMENT PRACTICES

All waste generated at the Sheraton facility (except corrugated cardboard destined for recycling) is taken by elevator to the loading dock on 52nd Street where it is dumped into a 30 cubic yard compacting roll-off. Staff estimate that 90 percent of the total wastes generated at the facility come from Food and Beverage operations. Responsibility for moving the wastes to the compactor is divided among several functional areas in the Sheraton and access to the compactor is unrestricted, provided little opportunity to control what is placed in the compactor.

The compactor roll-off container is pulled daily unless the pull is canceled by the Sheraton. Pulls are canceled about 100 times per year, so that the annual average is about 5 pulls per week. The hauler, Vigliotti and Sons (Vigliotti), has a contract with the Sheraton through 1997. The contract includes trash hauling as well as a specification for recycling services. Sheraton staff indicated that they believe recycling through sorting of materials takes place at the Vigliotti transfer station.

Hotel staff indicate that they are charged by the pull ($840/pull), although the contract specifies billing by the cubic yard. The contract states that in 1995 the rate per compacted cubic yard is $33.50. This is scheduled to increase to $35.00 per cubic yard in February, 1996. Total waste management charges are estimated in the hauler contract to be $275,400 for 1995 and $288,736 for 1996. On occasion, the hotel will rent an open-top roll-off for special clean-outs, such as discards of old office furniture or other large materials. During these periods, the hotel will notify all areas of the hotel that the roll-off is available if any large materials need to be discarded. The contract states that the hotel is to be charged $12.00 per cubic yard for loose trash although, based on invoices, it appears that a flat rate of $575 is charged for a 30 cubic yard open top ($19.20 per cubic yard).

The only Sheraton-sponsored on-site recycling activity is the baling and separate collection of corrugated cardboard. The hotel has a cardboard baler on-site and cardboard is collected from all areas and baled in half cubic yard bales. Smaller bales are produced since the full-sized bales are too heavy for one person to maneuver. Another employee would be required if full-sized bales were produced.

Steel cans, glass containers, and paper used to be separated for recycling; however, this recycling program diminished over time and now these commodities are commingled with all other garbage. A few employees continue to separate the containers in color coded bins and, as noted above, these may be pulled out by Vigliotti at the transfer station. SAIC has requested information regarding the materials recycled by Vigliotti and specifics regarding the recycling program. This information will be available for use during the upcoming phases of this project.

The Sheraton places baled cardboard on the loading dock and Vigliotti picks up

approximately 12-15 cardboard bales every three days. The hotel is charged $12.25 for each bale, based on invoices provided by the Sheraton. A set price for cardboard recycling is not contained in the waste management contract between the Sheraton and Vigliotti. The Sheraton and Vigliotti agreed on this price for one cubic yard bales and no adjustment has yet been made to account for the bales being only half size.

Food and Beverage linens (*e.g.*, napkins and tablecloths) are sent off-site to Princeton Laundry for cleaning.

6. CURRENT WASTE REDUCTION/ENERGY CONSERVATION ACTIVITIES and IMPACT

The Sheraton has implemented several successful waste reduction programs. As with most businesses, these activities are based primarily on the economic savings to the facility, increased efficiency in facility operations, and improved quality of customer service. The Sheraton has formed an Environment Committee to investigate a range of additional waste reduction and energy saving activities.

Corrugated Cardboard Recycling

Most notable among the Sheraton's waste reduction programs is the baler for corrugated cardboard, which produces approximately 12-15 bales (1/2 cubic yard bales) every three days. One employee is dedicated full time to operating the baler and moving the bales to the pick up area. Based on documents provided by the Environment Committee, it appears that the hotel may be saving approximately $28,000 per year in avoided waste disposal and hauling costs through the corrugated cardboard recycling program, even though the facility pays a $12.25 hauling charge per bale.

Fluorescent Lights

The Sheraton is working on installing fluorescent lights throughout the facility. At present, lighting appears to be mixed fluorescent and incandescent, with most of the public areas still being incandescent. Two floors of guest rooms have been retrofitted with long-life fluorescent bulbs. If the Sheraton introduces a more comprehensive program of fluorescent lighting, staff should investigate establishing a program for capture and recycling of fluorescent tubes and ballasts to avoid introducing mercury into the waste stream.

Reusing Old Towels as Rags

Washcloths and towels that are no longer in satisfactory condition for use in rooms are dyed orange and used as rags throughout the facility. The orange dye is used to keep staff from using cloth that is in good condition as rags. SAIC was unable to determine what type of dye is used.

Efficient Freezer Arrangement

Freezers for food storage, in most cases, are located behind coolers to reduce temperature

loss when the freezers are opened. Energy loss is greater from an open freezer (cooled to 10 degrees) than from a cooler or walk-in storage area (cooled to 39-42 degrees). Sheraton staff stated that the refrigeration units currently use CFC-12, CFC-22, and CFC-28. These units are checked approximately every 60 days and serviced as needed. SAIC would like to further discuss the issue of CFCs with the Sheraton to determine how they are managed.

Reuse and Donation of Food Items

In the kitchens, food preparation scraps are occasionally used in making other dishes (*e.g.*, as stock for soups). Unserved food often is served in the employee cafeteria. Unserved baked goods (a relatively small portion of the waste stream) are collected by City Harvest.

Some meat, fruit and vegetable items are purchased pre-cut or pre-trimmed, but the Sheraton indicated that it has not had much success purchasing pre-cut fruits of sufficient quality.

Electricity Sub-Monitoring

Sheraton ITT has issued a directive to the hotel to investigate sub-metering of areas to monitor electricity charges throughout the facility. The facility has investigated installing such a metering system and staff indicated that if this system is installed, it will not be completed and operational for several years.

7. OPPORTUNITIES FOR WASTE REDUCTION (AND FEASIBILITY)

The recommendations provided in this section follow the same pattern as the overview of operations presented above. That is, waste reduction recommendations are made to correspond with the flow and generation of products and associated wastes through the facility, from purchasing to final cleanup.

Purchasing

Purchasing practices represent the first line of opportunity in a waste reduction strategy. In general, the primary recommendation here is to refine purchasing practices. A substantial amount of solid waste is generated from food product packaging. This could be reduced with increased bulk purchasing and specification of reusable crates, racks, or totes. Purchasing potentially could be more centralized to eliminate the possibility of over-purchasing or duplicative purchasing. Finally, while purchases are somewhat tied to projected occupancy, purchasing could be made more systematic based on past and projected trends. These recommendations are explained in greater detail below.

1. Purchase products in bulk/standardize product container sizes/conduct detailed assessment

[1] City Harvest is a non-profit, privately funded, corporation providing transportation and distribution services to move food products from restaurants and institutions to over 150 certified food distribution programs in New York City.

of products that could be purchased in bulk.

At present, the Sheraton often purchases the same product in several different container sizes. For example, Uncle Ben's Rice is purchased in 16 ounce, 36 ounce, and 5 pound packages. Sheraton staff indicate that the reason for this is that recipes specify package size (*e.g.*, 16 oz. box) instead of measurement (*e.g.*, 2 cups). Most of the Sheraton's recipes are stored in a CD-Rom database compiled by Sheraton ITT. The collection of recipes in this manner should make it relatively easy to convert recipes to specific measurements, allowing the Sheraton to purchase products in larger packages. Products purchased in bulk could be stored for long periods in reusable plastic containers, just as the pastry chefs store flour and sugar. Similarly, other kitchens could store bulk flour, rice, barley, oatmeal, and other items that are presently ordered in a variety of smaller boxes.

Package size of other products (*e.g.*, olive oil, peanut butter, bittersweet sauce, condiments) may not be directly tied to recipe specifications; however, numerous small bottles, jars, and cans of these items are purchased at the same time. Inventory and purchasing decisions could be analyzed to determine which of these products could be purchased in larger quantities to reduce waste generation and storage requirements. Most items are already stored in walk-in coolers prior to use or once opened, hence spoilage should not be a concern for items used relatively frequently. Another, more specific, option is to purchase a coffee bean grinder and purchase coffee beans in bulk rather than numerous packages of ground coffee. In conjunction with this, the Sheraton could consider purchasing cloth coffee filters that could be laundered with table linens for reuse. We realize that for some items, such as room service condiment bottles, Sheraton ITT has issued specifications and these items may be difficult to replace.

Many of the products ordered by the Sheraton New York are ordered through Sheraton ITT's central purchasing. The Sheraton New York, as the flagship hotel for the Sheraton chain, may be in a prime position to work with Sheraton ITT to incorporate waste reduction options, such as bulk purchasing or purchasing of items in homogenous containers for easier recycling, into the purchasing specifications when items are sent out for bid. As this project progresses, the Sheraton may wish to keep this option in mind to facilitate the development of options that might not be feasible if applied only to the confines of the Sheraton New York.

Changing to bulk purchasing can reduce storage space requirements, reduce waste generation, and reduce purchasing and disposal costs. Primary wastes avoided include paperboard, plastic bottles, glass bottles, steel cans, and corrugated cardboard.

2. *Specify that products be delivered in returnable crates/racks; contact vendors to determine whether returnable/reusable crates/racks/totes are available.*

The Sheraton receives daily shipments of products from several vendors. Vendors that deliver to the Sheraton on a daily basis or several times a week, (*e.g.*, Fink Bakery) may have the option of using reusable plastic crates, racks, or totes in place of single-trip cardboard

boxes. These reusable carriers would need to be picked up and backhauled daily or several times a week by the supplier. The use of reusable crates or racks instead of single-use cardboard boxes for shipping could substantially reduce packaging discards. The Sheraton may wish to coordinate with its suppliers to identify those products for which reusable delivery containers may be feasible. The next step would be to designate an area where crates or trays would be left for next day pickup.

Sheraton staff expressed concern that reusable crates may lead to food contamination. In general, this should not be a concern since 1) bread and other products are already individually packaged and never come in direct contact with any container and 2) to comply with health regulations and to meet good business practices, it seems reasonable to assume that reusable cartons would be sanitized between use by the supplier. Literature reviews indicate that such sanitation is standard practice in the food service industry; however, the Sheraton would first want to verify that this will take place.

Additionally, while the assessment team did not identify any materials, such as polystyrene packing peanuts or molded packaging, that might be backhauled by a supplier, the Sheraton should consider further evaluating its waste stream to determine whether such materials exist in sufficient quantity that could be sent back to the supplier for reuse, rather than to disposal at the Sheraton facility. Similarly, while the assessment team did not notice many wooden pallets, if a sizable quantity of pallets is normally managed by the Sheraton, the Sheraton may wish to consider joining a pallet pool. During the next phase of this project, if the Sheraton wishes, SAIC can further evaluate these options.

3. *Eliminate multiple points of purchasing.*

Doug Thorne acts as a central purchasing agent for the Sheraton, but the managers of each restaurant also may directly purchase products without going through Mr. Thorne. As the Sheraton implements their plan for Individual Business Units, managers may receive even greater latitude in making purchasing decisions, potentially resulting in duplicative purchasing and increased waste. To eliminate this potential, the Sheraton may want to consider placing a single individual in charge of consolidating purchase requests made by individual business units to eliminate over-purchasing and unnecessary orders.

Examination of the dry storage area indicated that for some items, especially spices and specialty items, duplicative or over-purchasing may be a problem. Multiple bottles of the same spice were noted by the assessment team, with shipment tags indicating that these had been there for over a year. Additionally, it appeared that for some products, where numerous different package sizes had been ordered, some sizes remained on the shelf for extended periods while larger package sizes were consumed more rapidly. More coordinated ordering, combined with bulk purchasing, may help to eliminate this situation, and thus, diminish a potential source of waste.

In conjunction with a system of more coordinated ordering, the Sheraton may wish to

institute a database that clearly tracks the type and quantity of items ordered and the type and quantity of items that have been consumed. Conversations with Sheraton staff intimated that inventory is presently kept based on daily walk-throughs of the storage areas and an understanding of the type and quantity of items used each day. Purchases are based primarily on this professional knowledge and to a lesser extent, it appears, on forecasts of hotel occupancy rates. A constantly updated database of inventory could be tied to forecasted occupancy rates. This may provide for more consistent ordering and better facilitate a bulk ordering process.

4. *Conduct a survey of suppliers to solicit waste reduction ideas.*

The Sheraton may wish to consider sending a letter to their suppliers inviting them to make recommendations on potential options for waste reduction, either on the part of the vendor or the Sheraton. Vendors may be packaging items in a certain way, believing that this is how the Sheraton prefers items to be packaged when, in fact, changing the packaging design would reduce materials purchased by the vendor and disposed by the Sheraton, while achieving the same end. Additionally, such a survey could incorporate questions regarding recyclability of packaging materials and recycled content in the packaging materials. Columbia University conducted such a survey that could potentially serve as a model if the Sheraton wishes to pursue this option.

5. *Implement double-sided copying and/or printing.*

It appeared that many of the purchasing records and other records maintained by the Sheraton were printed single sided, almost doubling the amount of paper required. The Sheraton may want to consider educating employees about double-sided copying capability or if such capability is not available, purchasing printers and copiers with duplex capability the next time such equipment is ordered.

Storage

While storage is not a primary point of waste generation, some changes, such as better stock management, could reduce waste and increase efficiency throughout the system. Several energy efficiency recommendations that would save the facility money and conserve energy resources are applicable to the storage phase. These recommendations are detailed below.

1. *Date and rotate stock.*

Based on the assessment team's observations, it did not appear that the Sheraton is implementing a consistent system of dating and rotating stock in its various storage areas. It appeared to the assessment team that some dated stock had not been rotated and many items were not dated at all. Dating and rotating stock will help to reduce spoilage and will facilitate better inventory control.

Additionally, many of the same items were located in different parts of the same storage area or in several different storage areas. This may be due to a lack of storage space and inconsistent knowledge among employees where items should be stored. Labelling shelf space in storage rooms may help to reduce this problem. Additionally, bulk purchasing and consistent rotation and organization of stocks may free up additional storage space. Most important, consolidating like items may help to reduce overpurchasing and misplaced stock.

2. *Shutdown walk-ins that are not in use.*

The assessment team noted several walk-in coolers that held minimal stocks. Sheraton staff indicated that at least one of these would not be in use during the coming few weeks because of seasonal fluctuations. During slower periods, the Sheraton may want to consider consolidating items into fewer walk-ins and shutting off the lights and cooling systems in those that are not in use. Consolidating items makes those in use more energy efficient and shutting down the others will obviously save energy. We recognize that consolidating items in such a manner may lead to increased problems of organization. However, developing a facility-wide organization and storage strategy may assist staff in consolidating items throughout the various storage units, where possible.

3. *Turn-off lights in walk-ins when not in use.*

Lights were left on, it appeared, 24 hours a day in many of the walk-ins. Motion sensors could be installed to ensure that lights are turned off when no one is in the storage area. More economically feasible, perhaps, would be to install timers or consistently remind staff, verbally and with stickers near the lights, to turn off the lights when they exit infrequently used areas.

4. *Install plastic thermal strips over cooler and freezer doors.*

The Sheraton has an excellent layout of freezers and coolers, with freezers often located behind the walk-in coolers, greatly reducing lost energy as doors are opened. However, plastic thermal strips over the freezer and/or cooler doors would further reduce the loss of energy as staff enter and exit the walk-ins or when doors are held open to move in/out larger quantities of stock. Tracks are already in place above many of the doors to accommodate installing thermal strips.

5. *Use heat in cooler compressor lines to pre-heat water in main water heaters.*

The facility could augment its energy saving freezer arrangement by channelling heat from walk-in coolers and freezer compressor lines to tanks that pre-heat water for the main water heaters in the kitchen areas. Instead of running compressor lines directly to a condenser, the lines could be run through a preheating water tank and then to the condenser. This eases the burden on both the water heater and the condenser.

Food Preparation and Cooking

Changes in the food preparation phase represent the greatest waste reduction opportunity to the Sheraton. Sheraton staff estimate that 50 percent of all organic wastes are generated in this phase. Additionally, a majority of the food packaging wastes are generated during this phase. Within this phase, the greatest impact on wastes that require disposal could be realized by establishing a composting program and reimplementing recycling programs. Changes in purchasing, such as purchasing pre-prepared vegetables and fruits could have an impact on organic waste generation and post-consumer organic wastes might be reduced by a comprehensive analysis of menu items and the amount of leftovers returned with each dish. Additional savings can be realized by shutting off unused equipment and not disposing reusable items.

1. Implement a composting program.

Several studies have estimated that approximately 40 percent of a sit-down restaurant's waste stream will be composed of organics from food. The Sheraton estimates that 50 percent of its organic waste originates from food preparation and another 40 percent is from unserved food. The Sheraton already recycles corrugated cardboard, the largest fraction of the waste stream. Implementing a composting program will then have the greatest impact on diverting waste from disposal by the Sheraton. The assessment team estimates that at least 30 percent of the Sheraton's waste stream is compostable. Implementing a composting program will require an initial investment of personnel time to organize and initiate the program. If the Sheraton identifies composting as a waste reduction opportunity they wish to pursue, the SAIC assessment team will be available to facilitate this process.

In implementing a composting program, the first priority would be to identify a potential site to accept the compostable materials and then to arrange for transportation of the materials. At this point it would be necessary to determine whether, over an agreed upon period of time, sending wastes to a composting facility was economically preferable to the alternative of placing wastes in the compacting roll-off for disposal. Once these decisions are made, the next priority will be to arrange for storage of the materials destined for composting and to identify suitable storage containers. To minimize storage requirements, the assessment team will work with the Sheraton to investigate the possibility of installing a food pulper (or mini pulper) to reduce the waste volume and reduce the frequency of pickup. Sheraton staff indicated that certain walk-in coolers could be used to store compostable material, provided that pickup occurred on a regular schedule and that the materials did not generate noxious odors. The third phase in implementing a composting program will be to conduct employee

education. This could be incorporated into the recycling education program discussed below.

At present, composting restaurant and retail food organics is one of the fastest growing trends in the waste management industry. Therefore, while implementing a composting program would not be a simple task, it is nevertheless a very realistic possibility, especially taking into account the volume of material generated by the facility. Many restaurants in the New York City area are beginning to investigate composting as a means to reducing hauling and waste disposal costs. The Composting Council is implementing numerous pilot projects and the Cornell Institute of Waste Management is very active in the field of composting. Therefore, if composting is pursued as an option, numerous facilities with experience in this area may be available to assist in implementing such a program.

Alternatively, sending organic materials to an animal feed processor would involve similar logistics to composting in terms of identifying a facility and storage space and educating kitchen staff. The Sheraton may wish to consider this option in conjunction with composting and then select the more economically feasible option, assuming at least one results in sufficient savings or avoided costs when compared to the present system of disposal.

2. *Update and re-implement recycling programs.*

The Sheraton has, in place, a relatively successful old corrugated cardboard (OCC) recycling program. However, the Sheraton may want to investigate the possibility of receiving rebates on the cost of hauling the OCC, based upon the value of the corrugated cardboard. The contract between the Sheraton and Vigliotti and Sons states that "further credits for other commodity recyclable materials may become available as future markets develop." Since markets for OCC clearly are developed, the Sheraton may want to initiate discussions with Vigliotti to negotiate a rebate. Additionally, while the OCC recycling program has been successful, the assessment team noted that some corrugated cardboard is being placed in the trash compactor. The Sheraton may benefit from assessing this situation and developing a plan to direct the remainder of the OCC to the baler rather than the compactor.

The facility has been less successful in recycling other commodities such as steel cans and glass. After the OCC recycling program is enhanced, the Sheraton may wish to focus its efforts on reimplementing recycling of other materials such as steel cans, plastic containers, and glass containers through a source separation system. This source separation system also can include organics for composting. Sheraton staff indicated that a source separation program has been tried previously, but with little long-term success because of employee perception that no actual recycling was taking place. Sheraton staff stated that separated recyclables were still placed in the compactor, but that Vigliotti and Sons would pull the recyclable commodities from the waste stream as the compactor is unloaded at its transfer station. Local Law 87 (September 30, 1993) requires all New York City businesses to separate specified materials from their waste and to arrange for the separate collection of these materials for recycling, rather than disposal. Commercial food or beverage service establishments are required to source separate metal cans, aluminum foil wrap and trays,

including pans and tins, glass bottles and jars, and plastic bottles and jugs. Designated metal, glass and plastic containers may be commingled, but they must be stored in designated collection containers separate from waste intended for disposal. Mixed recyclables must be placed in clear or blue plastic bags if picked up by a truck that also contains paper, corrugated cardboard or garbage. Regulations prohibit separation of recyclable materials from mixed waste at the transfer station.

An option for improving the current recycling arrangement would be to place separate collection containers, lined with clear or blue plastic bags in the area where OCC is set out for pickup. Staff can store source separated recyclable metal, glass and plastic containers here. The bags of recyclables can be collected with the corrugated cardboard. This option assumes that the Sheraton will continue its hauling arrangement with Vigliotti and Sons. However, another option is to investigate recycling services offered by other carters or recyclers.

To avoid continued problems in implementing and maintaining recycling programs, new employee training and motivation programs could be developed. Such programs may include a video demonstrating that if recyclable materials from the Sheraton are properly separated and placed in appropriate containers, the materials will be recycled. Additionally, a brief summary of how materials are recycled and potential end products may help to increase the understanding of recycling by employees and increase "buy in" to a new recycling program. Such a video and education program will be most effective if it is presented in both Spanish and English, as many of the kitchen staff better comprehend Spanish. Additionally, to ensure the success of waste reduction and environmental efforts, the Sheraton might consider implementing a training program for all new hires as well as existing employees. Such a program would be most effective if it were updated and offered annually.

Once a recycling program is implemented, statistics showing the reduction in garbage and the quantity of materials recovered could be placed on the bulletin board in the employee cafeteria. Such data would allow employees to see tangible results that relate directly to their actions and encourage continued participation.

Additionally, it may be worthwhile to consider negotiating with Vigliotti for rebates on materials other than OCC, as the current contract specifies may be done. Although paper generation is not specific to the food and beverage operations, the Sheraton may want to include paper in discussions regarding other recyclables. If the mixed paper and newspaper generated by the hotel were recycled, the Environment Committee estimates savings on waste disposal charges of $4,800 and $19,200, respectively, for these commodities.

Similarly, the Sheraton may want to discuss with Vigliotti a billing system for trash removal that is based on the actual volume of waste contained in the compactor since it appears that the compactor may not always be full on removal. The language of the current contract specifies that the Sheraton will be billed by cubic yard of waste rather than the flat rate that is currently assessed.

Finally, the Sheraton might consider implementing a more coordinated system of monitoring whether the trash compactor is full to determine whether it actually needs to be pulled on a given day. If a comprehensive waste reduction program is adopted, it is likely that the compactor will not need to be pulled as often. Hence, a system placing a single individual in charge of checking the compactor daily at a specific time and determining whether a pull is warranted may prove beneficial.

3. *Reinstate cooking grease recycling and combine fat and bone trimmed from meat with grease for recycling.*

Up until about six months ago, the Sheraton had a grease recycling program. However, the renderer who collected the grease was unreliable, not showing up at the specified time, which led to grease sitting in walk-ins, at times, for several weeks. Now the Sheraton has special containers in which it puts the grease for disposal in the compactor. The problems with allowing grease to collect on-site for weeks are clear, but the Sheraton may want to contact a new renderer and make arrangements for grease collection with the provision that if the renderer does not show up on the specified day, the grease will be disposed. Additionally, fat trimmings and bones from meat preparation can be incorporated into the grease and sent to the renderer, although the details of what is acceptable should be discussed with the contracted renderer.

4. *Analyze Consumption Patterns and Leftovers.*

An option the Sheraton may wish to consider to reduce the amount of food waste generated is to analyze the quantity of food left over on consumer's plates for each menu item. While we understand that more abundant quantities on the plate may increase customer satisfaction, regardless of whether the food actually is consumed, such an analysis may show that for certain items portions are indeed excessive or that the product mix is not right and might need to be reexamined.

Discussions with Sheraton staff indicated that consumption patterns of various foods are not regularly scrutinized. More vigorous scrutiny of the foods that are left in buffets may provide a better gauge of the relative amount of each food that needs to be displayed or may suggest the possibility of changing to items that will be consumed in greater quantities. For example, while pineapple adds to the aesthetics of a display, if analyses indicate that it is not being eaten, the Sheraton could perhaps switch to a fruit that looks nice and also will be consumed.

In a similar vein, the Sheraton may wish to consider conducting more frequent analyses of menu items, with an eye toward deleting those which are less frequently ordered. If these items are prepared, even in limited quantities, prior to the meal service but are then not consumed, they may go in the trash, or, in a best case scenario, to the employee cafeteria or City Harvest. The most efficient option, however, would be to not prepare them. Another option, which the assessment team did not investigate during the assessment, would be to

change the menu seasonally, eliminating "heavier" items during hotter weather and scaling back the menu during less busy periods.

5. *Purchase pre-cut fruit and vegetable items.*

Pre-cut (or value-added) products do not universally reduce waste. However, they do reduce the restaurant's waste and allow for easier management of a much more homogeneous waste stream at the facility where the fruits, vegetables, or meat are prepared. Pre-cut items may be especially applicable to the fruit and salad buffets in Streeter's and the cheese and vegetable platters served by room service. Sheraton staff indicated that some pre-cut fruits and vegetables have been purchased. Discussions with Sheraton staff indicated a concern that using pre-prepared fruits and vegetables would cut jobs. Given the Sheraton's desire not to eliminate positions, if value-added products are used, staff normally responsible for food preparation may be able to assist in implementing recycling programs and undertaking other activities if it is found that using value-added items impacts the number of food prep positions required.

6. *Turn off equipment not in use.*

The assessment team noted several instances in the kitchens and stewarding areas where equipment, left on, was not in use for extended periods and could have been shut off. For example, gas and pilots could be shut off in the 3rd floor stewarding area, as it was apparent that this area is not often used or at least is sometimes not used for extended periods. Additionally, ice machines in that area could be shut down.

Ovens in the pastry kitchen are left on 24 hours a day. Timers could be installed on these ovens so that when the chefs arrive in the morning the ovens are up to temperature and are then automatically turned off in the afternoon when they are no longer in use.

In the Streeter's/Hudson's kitchen, gas stoves were left on high all day, although for a substantial portion of that time they were not in use. Heat lamps throughout the kitchen were left on all day, although it appeared that these were rarely used.

7. *Launder kitchen rags.*

Rags used in the kitchen are disposed after one use. Sheraton staff indicated that this was because grease from the rags clogged the laundry machinery. Old wash cloths from guest rooms are dyed orange and used as rags throughout the hotel and appear to be laundered. Half of the kitchen rags could be dyed another color, say green, to distinguish them as kitchen rags. Undyed kitchen rags could be used for heavy grease cleaning, while the dyed rags would be used for more general cleaning and then laundered in the same manner as the orange rags, thus cutting the rag waste. A cost-benefit analysis might also reveal that sending the dyed rags to an industrial laundry may prove more cost effective than disposal. The Sheraton may wish to investigate this option, as well.

8. *Turn off faucets and water hoses; install spray nozzles; fix leaking pipes.*

Throughout the food preparation and dishwashing areas, the assessment team noted faucets that were only turned half way off, hoses that were left running into drains for extended lengths of time (possibly days) for no apparent reason, and pipes leaking under many of the dishwashing and food preparation areas. The Sheraton may want to consider minor maintenance on many of the faucets to make it easier for staff to turn the faucets all the way off. Additionally, signs could be posted above the sinks to remind employees to turn the faucets off. In many areas there are hoses coming down from faucets that require staff to reach up to turn them off. Hotel management indicated that staff do not like to reach up to turn off the hoses and instead just leave them running all of the time. To solve this problem, nozzles could be installed that only allow the water to flow when a trigger is held down. Finally, facility maintenance could be notified of the need to fix the leaking pipes. Not only do these leaks contribute substantially to water loss and increased water bills, but the constant flow of water appears to be ruining the floors under the areas and expediting the deterioration of the piping.

Food Service

As discussed above, the greatest gains in waste reduction can most likely be made in the food preparation and cooking stage, but some of these carry over into service as well. Issues to consider in the service phase are buffet display practices, the drink distribution system, and the use of disposables in the employee cafeteria.

1. *Frequently restock buffet displays.*

The Sheraton places large quantities of fruits and vegetables on display in buffets (*e.g.*, buffets in Streeter's, the Club and Tower levels), primarily for aesthetic purposes. Lesser quantities of fruits and vegetables could be prepared and displayed by placing more emphasis on frequent restocking of smaller displays to maintain the same type of aesthetic. This would reduce the amount of food that is wasted, especially since once food has been on display it cannot be reused, even if it is not consumed.

2. *Change back to refillable container soda system.*

The Sheraton recently switched over to Bag-in-Box soda distribution systems. Sheraton staff indicated that a decision was made by their supplier, rather than by the hotel. Bag-in-box components are not easily recycled and are therefore disposed, contributing to the waste stream. The Sheraton has the infrastructure to return to a refillable tank system and may want to discuss this option with their supplier.

3. *Eliminate disposable serviceware in employee cafeteria.*

The public restaurants at the Sheraton use china while the employee cafeteria uses disposable

plates and serviceware, as well as individual condiment packets, all of which are disposed. Along with contributing to the waste stream and procurement costs, this also may have a somewhat negative impact on employee moral. The employee cafeteria has a dishwasher in place and a window to the dishwashing rooms for employees to drop off dishes right at the dishwasher. Prior analyses of disposable plates, cups and silverware versus china, glasses and reusable coffee mugs, and stainless steel silverware indicate that greater cost savings can be realized by switching to the washable items.

Additionally, for coffee mugs, the Sheraton might consider installing a mug rack on which employees could hang their own mugs. This has been shown to be effective and popular in many other similar facilities. If the Sheraton purchases reusable china, it may wish to consider purchasing mugs with employee names printed on them to encourage participation in the reuse and waste reduction program.

4. *Minimize napkins in Hudson's and purchase recycled-content or reusable coasters.*

At present, paper napkins are served underneath all drinks at Hudson's. The Sheraton could consider changing over to recycled-content pressboard coasters. These can be reused several times before disposal, whereas several napkins often may be used for a single beverage purchase. The Sheraton also may want to consider purchasing durable, reusable coasters. Some coasters would be stolen, but if printed with Hudson's logo, this could constitute advertising. The Sheraton may wish to consider a cost-benefit analysis of this option. Changing over to coasters would reduce waste from napkins and may reduce purchase costs. Changing over to coasters will surely reduce purchase costs if coasters can be obtained at no charge from the Sheraton's beer vendor.

Similarly, many restaurants that custom order napkins have requested that suppliers reduce the size of the napkin or the number of folds in the napkin. This reduces materials used in the production process, the volume of waste at the facility, and may substantially increase the number of napkins sent in a shipment, thus reducing shipping wastes.

Cleanup

The cleanup phase is closely related to the service phase in that much of the waste generated results from beverage service and buffet displays. Refocusing the manner in which buffets are displayed and unserved foods are managed would limit the amount of waste disposed, or composted. Regarding beverage distribution, during the cleanup phase, greater emphasis could be placed on collecting beer bottles for return or recycling.

1. *Increase quantity of food donated to City Harvest.*

At present, it appears that the Sheraton only sends unserved baked goods to City Harvest for distribution to shelters and other meal programs. If buffets displays were reduced and more frequently restocked, more of the buffet items that are not consumed could be collected and

sent to City Harvest. Additionally, unserved soups, sandwiches, and other appetizer and entree items could be sent to City Harvest. City Harvest is willing to pick up foods on a daily schedule, minimizing storage requirements and, although City Harvest does not provide collection containers, containers that the Sheraton would have to purchase are tax deductible. City Harvest has expressed a willingness to come on-site during the implementation phase of this program to assist in developing a pick-up schedule and finding acceptable means and containers to store the food. City Harvest has suggested that daily pick-ups may be feasible and that the night routes (5 p.m. to 1 a.m.) may work well for the Sheraton. City Harvest also indicated that they would be willing to take overpurchased items, such as spices, if the Sheraton were to purge its storage area.

2. *Collect buffet waste for composting.*

If a composting system is installed to collect food preparation scraps, buffet wastes also may be included.

3. *Collect beer and other glass bottles for return or recycle.*

Currently, all beer bottles served at the Sheraton are disposed. This represents a substantial portion of the waste stream (the equivalent of approximately 10 compactor pulls per year) that could be returned or recycled, and that by law in New York City should be recycled. Removing glass from the waste stream, without any rebate or deposit refund, could save the facility almost $10,000 per year, according to an analysis by the Environment Committee. The Sheraton has considered installing a glass crusher to reduce the bulk of the glass. This, however, does not reduce the quantity of bottles that are disposed.

The Sheraton may want to consider the following three options: 1) switch over to more draft beers and away from emphasis on bottled beers; 2) collect bottles behind the bar in the six pack cases and return these to the distributor; and/or 3) discuss with Vigliotti potential options for recycling the glass such as placing a separate container for glass pickup. At present, the boxes and six pack cases in which the beer are shipped are not broken down and are left behind the bar during the evening, hence a system of placing the bottles back in the boxes would not present substantial space problems. Additionally, since cases of beer are removed from the coolers without being replaced by new cases, the empties could be stored in the coolers before pick up to minimize potential vector problems. Beer deliveries are made as frequently as every day, so storage times would be minimal. This possibility would have to be discussed in further detail with the suppliers. If Vigliotti agrees to recycle the glass, there appears to be plenty of room behind the bars, especially at Hudson's, for an additional collection container.

Additional Energy Conservation

1. *Investigate technical assistance from Green Lights Program.*

Sheraton staff expressed an interest in technical assistance to modify the lighting at the facility. USEPA operates Green Lights, a voluntary, non-regulatory program promoting pollution prevention through the installation of energy efficient lighting. Partners agree to upgrade lighting to maximize energy savings wherever it is profitable. The Green Lights program benefits participants by lowering electricity bills, improving lighting quality, and increasing worker productivity. After joining Green Lights, McDonald's Corp. realized an average of 30 percent savings in facility lighting bills by replacing T12 fluorescent tubes with energy-efficient T8s (with solid-state electronic ballasts). In addition to cost savings, the T8 tubes provide a light that is much more flattering to food and restaurant decor, making for a better restaurant atmosphere.

Green Lights provides free technical assistance to participants through written materials, information hotlines, and survey and analysis software products that allow Green Lights participants to analyze their options for installing energy-efficient lighting. The system helps participants survey the lighting systems in their facilities, assess their retrofit options, select the option that maximizes energy and pollution savings while simultaneously rating or improving lighting quality and meeting the Green Lights profitability criteria, and produces reports suitable for use by facility managers, financial staff, and senior management.

2. *Procure computers that meet Energy Star requirements.*

For future computer equipment purchases, the Sheraton may want to consider specifying equipment that is energy efficient. The EPA Energy Star Program is a voluntary partnership with the computer industry to promote energy-efficient personal computers, monitors and printers. Participating companies have committed to develop computer equipment that powers down when not in use. The "sleep" feature cuts energy use by 50 to 75 percent. Energy Star also includes a category for controlling devices, external retrofit products that reduce the energy consumption of existing computer equipment by automatically turning them off when not in use. The Federal Supply Service offers a product called the Intelligent Energy Saver, a PC add-on device that controls electrical power to the PC and its peripherals. The complete PC system can be powered on and off at user-defined dates and times.

3. *Pursue sub-metering of hotel.*

The Sheraton may wish to consider pursuing Sheraton ITT's recommendation of sub-metering the hotel to monitor electricity usage. Sub-metering the hotel will allow the Sheraton to identify areas where excessive energy use may be occurring and assist in targeting energy efficiency initiatives. To minimize the cost of implementing this program, it may be possible to prioritize areas for sub-metering or meter certain areas to better monitor the success other energy saving programs.

Additionally, the Sheraton may want to consider a similar program for water usage in the kitchen areas, given the nearly constant flow of water from many of the faucets.

Reducing Toxicity of Cleaning Supplies

Overall, the Sheraton appeared to be doing a good job in reducing the toxicity of cleaning supplies. Supplies are purchased in pellet form and diluted and a night employee has the job of mixing all cleaning supplies, thus controlling distribution of supplies and better ensuring proper dilution. The Sheraton may wish to consider the following recommendations to further reduce the toxicity of their waste stream.

1. *Check dilution requirements for cleaning solutions.*

   Many companies have found that the dilution specified by the manufacturer is more concentrated than is required to perform adequately. The Sheraton may wish to determine whether more diluted mixtures could be used with the same effect, thus reducing the amount of concentrate purchased. Additionally, the assessment team did not verify whether Butcher "no contact" mixing units were in place. If not, the Sheraton may wish to contact Butcher to have these units installed. Eco-Lab also may be contacted to determine if similar units are available for Eco-Lab products.

2. *Eliminate Air and Surface Deodorizer.*

   Throughout the facility the assessment team noted aerosol cans of air and surface deodorizer. Although these cans specified that the deodorizer was not to be used on food contact surfaces, several cans were noted in food preparation areas. These should be removed. In public areas, the Sheraton may want to consider installing more live plants to clean the air instead of using chemical air deodorizers.

3. *Implement better cleaning supply management practices.*

   In the Streeter's kitchen, cleaning agent from the barrel containing soap/degreaser for mopping appeared to be leaking from the pump. The pump should be secured to the barrel to avoid leakage and the hose better attached to minimize spillage on the floor.

   Additionally, throughout the facility (*i.e.*, not just in food and beverage areas) the assessment team noted undiluted chemicals in storage containers without tops. The Sheraton may want to consider reminding employees to properly close and store all cleaning supplies and other chemicals.

4. *Post Material Safety Data Sheets.*

   Sheraton staff indicated that Material Safety Data Sheets (MSDs) would be posted in the kitchen for easy access by employees. At the time of the assessment, however, the binder was still empty and all MSDSs were on file in the security area. Filling the MSDS binder in the kitchen will help to ensure employee understanding of the chemicals in use and to assist in case of an emergency.

5. *Review cleaning and pest-management contracts.*

To further reduce the quantity of toxic materials used in the facility, the Sheraton may wish to consider reviewing their current cleaning and pest-management contracts to determine whether it would be possible to specify substitute materials that achieve the desired end, but that are less toxic than those currently used.

Additional Recommendations

1. *Issue waste prevention policy statement.*

The management of the Sheraton New York could issue an official policy statement, declaring support from top management for specific waste reduction goals and actions enumerated in the statement, including support for participation in the WasteLe$$ program. If such a policy statement were made, it should be communicated to all employees and a system should be implemented to solicit employee feedback on additional waste reduction options. Such a declaration of support for waste prevention policies could serve as a model on which Sheraton ITT could base a corporate-wide policy.

2. *Incorporate waste prevention statement/questions in guest telephone survey.*

Sheraton management may wish to consider incorporating a discussion of waste prevention activities undertaken by the facility in the guest telephone survey and question whether guests have identified any areas in which they feel the Sheraton could pursue further waste reduction in guest and food services. Such a question could be posed either open-ended or to gauge public support for specific waste reduction ideas the hotel is considering implementing.

3. *Consider participation in other waste reduction programs.*

The Sheraton may wish to consider participating in other waste reduction programs such as the NYC Partnership for Waste Prevention, the EPA WasteWi$e program, or the CONEG Challenge. Beyond furthering the Sheraton's waste reduction goals, participation in such programs can greatly increase the public's perception of the Sheraton as an environmentally conscious company. Such a perception could prove helpful in marketing the hotel's conference, meeting, and banquet facilities.

8. CONCLUSION

The options presented in this report represent the primary and most feasible waste reduction opportunities identified by the SAIC assessment team during the December 18-20 on-site assessment of the Sheraton New York's food and beverage operations. These options are provided for consideration by the Sheraton. As part of the WasteLe$$ program, the Sheraton will select those options that they would like to pursue. SAIC, in conjunction with the NYC Department of Sanitation, will then investigate in more detail the technical and economic feasibility of implementing the selected options at the Sheraton and provide further recommendations. Based on these recommendations, the Sheraton will then choose which options to implement as part of the WasteLe$$ program. Again, SAIC will provide assistance in implementing the selected waste reduction options as well as assistance in tracking and documenting the success of each option.

Overview of Potential Tracking Methods
for Measuring Progress Towards Sheraton WasteLe$$ Program Recommendations

Recommendation		Suggested Tracking Method
A.	Baseline Waste Disposal	• Track the number of compactor pulls per week for a four week period. • Track how full the compactor is each pull. • Multiply the number of pulls by the cost per pull to determine baseline management costs.
B.	Bulk Purchasing	• Provide information regarding the size of product package prior to bulk purchases, specifically type of packaging, product to package ratio and quantity purchased (*e.g.*, 15 20 oz boxes of rice; box weighs 12 ounces net of product). • Track products which, based on NYC WasteLe$$ recommendations, are purchased in bulk, specifying the quantity now ordered, the type of packaging, and the product to package ratio for each (*e.g.*, 5 1-pound polyethylene bags of rice; bag weighs one ounce net of product). • Calculate avoided waste based on changes to bulk purchasing after implementation of NYC WasteLe$$ and reduced disposal costs based on cubic yardage of avoided waste. • Calculate reduction in per unit cost of product and cost savings associated with bulk purchasing.
C.	Reusable Shipping Containers	• Provide information regarding the size of product package prior to use of reusable shipping containers, specifically type and size of packaging (*e.g.*, 2 0.5-cubic yard boxes containing 20 #10 cans of mushrooms). • Track products which now are shipped in reusable containers, specifying type and size of reusable packaging (*e.g.*, 1 1-cubic yard corrugated plastic container containing 40 #10 cans of mushrooms). • Track the number of reusable containers received and returned to vendors on a weekly basis. • Calculate reduction in packaging based on above data.
D.	Date and Rotate Stock	• Establish baseline quantity (*e.g.*, pounds or cubic yards) of product disposed on a weekly basis due to spoilage during storage or expired shelf life. • Track quantity of spoiled product discarded after implementation of NYC WasteLe$$ recommendations to date and rotate stock. • Calculate avoided disposal costs.
E.	Shutdown Walk-ins	• Record number of days that each walk-in is not in use. • Calculate energy savings by multiplying number of hours each walk-in is not in use by manufacturer's estimate of hourly energy consumption for walk-in.
F.	Timer Switches for Lights in Walk-ins	• Post tracking sheet next to door of one walk-in. Over a one week period, ask employees to make a notation on the tracking sheets when they enter the walk-in and note the amount of time for which they set the timer for the light. • Calculate energy savings based on energy that would have been used (per manufacturers estimates) if lights were left on 24 hours a day.

Overview of Potential Tracking Methods
for Measuring Progress Towards Sheraton WasteLeS$ Recommendations (cont.)

Recommendation		Suggested Tracking Method
G.	Send Food to Pig Farmer	• Track quantity of food waste picked up by pig farmer each week. • Calculate number of pulls avoided based on total cubic yards collected by pig farmer. • Compare cost of management by pig farmer to cost of disposal in compactor.
H.	Donations to Food Bank (*e.g.*, City Harvest)	• Record quantity (volume or weight) and type of food donated to a charitable organization *e.g.*, City Harvest. • Calculate avoided disposal costs.
I.	Kitchen Rags	• Establish baseline number and cost of rags purchased prior to installation of washer/dryer. • Track number of rags purchased after installation of washer/dryer. Calculate cubic yards of waste avoided each year based on difference between past and present rag purchases and calculate avoided disposal costs by multiplying this figure by cost of waste disposal of a cubic yard of waste. • Track number of loads of rags laundered for a week. • Estimate cost of water, electricity and additional labor consumed by washer/dryer. • Calculate total savings by subtracting additional costs from avoided disposal costs.
J.	Minimize use of Napkins	• Establish baseline quantity of napkins purchased and purchase costs. • Track quantity of napkins purchased after introduction of coasters and employee training to reduce quantity of waste from both napkins and coasters. • Track quantity of coasters used and discarded in a week. • Calculate reduction in purchasing cost. • Calculate reduction in quantity of napkins disposed, adjust for quantity of coasters disposed, and calculate avoided disposal costs based on net cubic yardage of waste. • Estimate overall cost savings associated with switching from napkins to coasters.
K.	Deposit Bottles	• Obtain from Bowery Mission a periodic tally of deposit bottles collected from the Sheraton.
L.	Computers Meeting Energy Star Requirements	• Track percent of purchases that meet Energy Star requirements each time equipment purchase is made. • Calculate percentage of total computer inventory that meets the energy star requirements by conducting an initial inventory, then adjust percentage based on new purchases and discarded equipment.

Overview of Potential Tracking Methods
for Measuring Progress Towards Sheraton WasteLeSS Recommendations (cont.)

Recommendation		Suggested Tracking Method
M.	Reduce Toxicity of Cleaning Supplies	• Prepare baseline inventory of cleaning products used by the Sheraton. • Track purchase of alternative, less toxic products and show which products have been replaced. • Track cost differential between initial products and reduced toxicity products. • Track quantity used of initial products and reduced toxicity products. • Interview staff regarding performance of reduced toxicity products.
N.	Guest Survey	• Periodically tally and summarize survey results and share information with staff and with guests. If possible, track guest opinion of NYC WasteLe$$ recommendations.
O.	Cooking Grease Recycling	• Track the number of 50 gallon drums filled and provided to renderer. Multiply by 50 to estimate gallons of waste diverted from disposal. • Calculate cost savings based on the number of dumpster pulls represented by number of 50 gallon drums of grease, meat and bones sent to renderer. Adjust for rebate from or payment to renderer.
P.	Re-implement Recycling Programs	• Track number of bags of each type of recyclable placed on loading dock for recycling. • Multiply by an average quantity/volume for a single bag to obtain estimate of materials diverted from disposal. • Calculate cost savings by comparing cost of recycling with avoided disposal costs (*i.e.*, number of dumpster pulls represented by quantity of materials recycled and multiply by cost of one dumpster pull).

PORT AUTHORITY OPERATIONS
LAGUARDIA AIRPORT

FACILITY ASSESSMENT AND
WASTE REDUCTION RECOMMENDATIONS REPORT

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New York City Department of Sanitation
Bureau of Waste Prevention, Reuse and Recycling

and

Port Authority of NY & NJ

July 10, 1996

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LIST OF EXHIBITS

FOREWORD

The New York City *WasteLe$$* project is a non-regulatory waste prevention program initiated by the NYC Department of Sanitation (DOS) with support from the New York State Energy Research and Development Authority (NYSERDA) and the U.S. Environmental Protection Agency/Region II. The NYC *WasteLe$$* project is an ambitious project designed to support the City's efforts to meet specific waste prevention objectives. Through participation in the NYC *WasteLe$$* project, NYC businesses will identify waste prevention opportunities throughout their operations and agree to implement waste reduction practices that are both cost-effective and feasible. Science Applications International Corporation (SAIC), under contract to DOS, is providing technical assistance to businesses to identify opportunities and implementation alternatives for reducing waste and improving energy efficiency. SAIC's staff will work in conjunction with participating businesses to design waste prevention programs that promote efficient use of resources and provide economic benefits from waste reduction and improved waste management practices.

As part of the NYC *WasteLe$$* partnership, SAIC provides the following services to each participating business:

- Conducting pre-assessment research on the management of solid waste within the industry sector,
- Conducting an on-site waste and energy assessment,
- Providing recommendations for specific waste prevention opportunities that reduce the volume and toxicity of the facility's waste stream, increase energy efficiency and reduce waste management and energy costs,
- Conducting research and assisting in implementing promising waste prevention options,
- Developing a mechanism to track the waste stream and economic impacts of the waste reduction practices and document the cost savings, and
- Showcasing the facility's achievements through a video presentation, guidance document and seminar.

By joining the NYC *WasteLe$$* program, each participating business has committed to:

- Establishing written corporate waste reduction goals and policies,
- Assisting the assessment team in the waste prevention process,
- Implementing the promising waste prevention options,
- Tracking waste stream and economic impacts of implementing the waste prevention options,
- Serving as a role model for similar businesses within the industry sector, and
- Working with the NYC *WasteLe$$* program to publicize waste reduction successes via a video, guidance document and seminar.

One of the NYC *WasteLe$$* program goals is providing the continuing technical assistance required for businesses to pursue implementation of ambitious waste reduction opportunities. The report that follows documents the findings of SAIC's waste assessment conducted at the Port Authority of NY & NJ operations at LaGuardia airport. By documenting Port Authority's current waste generating activities and identifying waste prevention opportunities, Port Authority staff at LaGuardia and SAIC can work together to implement a comprehensive waste prevention program at LaGuardia.

ACKNOWLEDGEMENTS

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A special thank you is extended to Mr. Kevin Bleach, Mr. Ken Sagrestano, Mr. Ray Graziano and to all of the Port Authority's LaGuardia staff for their assistance and continued commitment to the NYC *WasteLe$$* project. Mr. David Kleckner, DOS, manages the NYC *WasteLe$$* project and participated in the initial meeting with Port Authority staff.

1. INTRODUCTION

This report describes the findings of the waste and energy assessment of the Port Authority of NY & NJ operations at LaGuardia airport (PA/LGA) in Flushing, New York. Victor Bell, Henry Huppert and Melody Drnach of SAIC conducted the assessment on April 9-10, 1996. In addition, David Kleckner, NYC Department of Sanitation, and Bette Fishbein, of INFORM, participated in the first day of the assessment.

As part of their commitment to the NYC *WasteLe$$* program, PA/LGA staff from the Environmental Unit at LaGuardia airport and the Office of Environmental Policy & Management will review the recommendations provided in this report and target specific waste prevention opportunities for further investigation. This report summarizes the first phase of the NYC *WasteLe$$* program. During the second phase, SAIC and PA/LGA will explore the technical and economic feasibility of implementing waste prevention and energy conservation opportunities identified by SAIC and selected by PA/LGA. In the third phase, SAIC will assist PA/LGA in the implementation of selected waste prevention options and in tracking the impact of the options. A summary of the initial options is provided as Exhibit 1. The options are divided into those measures that could be implemented by PA/LGA staff at LaGuardia airport, those options that will require the assistance of PA/LGA staff at the World Trade Center, and options that PA/LGA staff at LaGuardia airport can implement in conjunction with other airport tenants. The operations at LaGuardia airport are only a part of PA/LGA's overall operations. As a result, implementation of many of the recommendations presented within this report may represent a tremendous challenge.

Prior to conducting an on-site assessment of the PA/LGA facilities, the SAIC assessment team met with Mr. Kevin Bleach, Manager of Policy Analysis and Planning, Office of Environmental Policy & Management, Mr. Kenneth Sagrestano, Senior Environmental Programs Specialist, Environmental Unit, Mr. Ken Alberts and Mr. Ray Graziano of PA, Ms. Bette Fishbein of INFORM and Mr. David Kleckner, Department of Sanitation to review the assessment process and PA/LGA responses to an initial questionnaire regarding PA/LGA waste generation and management practices. The questionnaire is included in Appendix A. During a two-day site visit, SAIC staff conducted walk-through assessments of the following areas: administrative offices, structural maintenance, stockroom, automotive maintenance, small engine repair shop, terminal operations, parking lots, and the leased facilities at LaGuardia airport. SAIC staff met with managers or key staff within each of these operational areas to discuss the project and to assess the operations of each area.

Section 2 of this report, provides a description of each of the facilities included in the assessment and Section 3 describes the waste generating processes at each of the operational areas of the facility. Section 4 describes the current waste management practices at the facility and available baseline waste characterization data is presented in Section 5. Existing waste reduction practices are highlighted in Section 6. Section 7 presents the potential waste reduction options for reducing the quantity of waste generated, reducing the toxicity of the waste stream and reducing both energy and water usage at the facility.

Exhibit 1. Waste Prevention Options for Port Authority of NY & NJ - LaGuardia Operation

Recommended Options	Discussion	Considerations	Benefits
Central Terminal Operations/Administration			
Issue a Waste Prevention Policy Directive	The PA/LGA should issue a waste prevention policy directive to all employees and tenants. Such a directive would state the PA/LGA's commitment to environmentally responsible policies and programs and require implementation of specific waste prevention and efficient materials management practices throughout the facilities.	• Management support and commitment • Staff cooperation • Tenant cooperation and participation	• Demonstrates management commitment to waste reduction • Increased awareness of waste generation and waste reduction efforts
Reduce Paper Consumption by: **Setting Photocopy Default to Duplex** **Reusing Paper Products When Possible** **Increasing the Use of Electronic Mail**	Administrative staff indicated that most photocopies are single-sided. The default setting on copy machines is single-sided. PA/LGA staff can reuse paper and paper products such as manila envelopes and jiffy bags for many internal deliveries and communications. PA/LGA can make more extensive use of electronic mail for both internal and external communications.	• Management support and commitment • Staff cooperation • Lease/procure machines with two-side copy capability • Reset default setting to double-sided copying on existing equipment • Write procurement specifications requirement duplex copying	• Reduces cost for paper purchases • Reduces quantity of paper disposed or recycled
Implement Rag Cleaning Option	Currently all personnel throw dirty rags into the trash. Many rags can be laundered and reused.	• Identify rag cleaning services in NYC • Set-up procedures for contracting, collecting and dispensing rags	• Prevents rag waste • Reduces the risk of improper disposal of soiled rags • Reduces costs associated with the purchase of new rags • Annual Savings Approximately $1,044
Eliminate Paper Towels in Restrooms	Restrooms used by PA/LGA staff use paper towels. Paper towels can be replaced with air dryers.	• Purchase and installation of equipment • Increased electricity use • Employee preference	• Eliminates paper towels from waste stream • Reduces cost associated with the purchase of paper towels • Reduces labor associated with stocking towel dispensers

Exhibit 1. Waste Prevention Options for Port Authority of NY & NJ - LaGuardia Operation

Recommended Options	Discussion	Considerations	Benefits
Eliminate Disposable Taxi Tickets System and Use Rigid Plastic Tickets	Taxi cabs wait in a queue and receive a sequenced disposable ticket. The taxi drivers exit the holding area and drive several hundred yards where they hand the ticket to the dispatcher. The dispatcher immediately throws the disposable ticket into the trash can. If tickets were made of a more durable material, the tickets can be collected by dispatchers and reused.	• Research on alternative system • Educating the taxi cab drivers • Additional cost if new system is more labor intensive • Purchase cost for new rigid tickets	• Reduces paper waste • Reduces costs associated with purchase of disposable tickets
Establish Waste Prevention Guidelines for Tenant Operations **Develop Take-Back Program for Packaging**	PA/LGA can provide new and existing tenant's with guidelines to reduce the amount of waste they generate and to encourage participation in a facility-wide recycling program. Conduct a vendor survey to identify opportunities for vendors to initiate programs that require suppliers to take back packaging or use two-way shipping containers and pallets.	• Tenant cooperation and participation • Development of facility-wide waste prevention guidance • Implementation of recycling program	• Reduces waste management costs • Positive public perception • Increases supply of recyclables that generate revenue
Consider Opportunities to Set-Up a Pig Feed/Composting Program for Food Waste	Investigate the possibility of composting food waste and/or identifying a pig farmer that can collect the food waste.	• Tenant cooperation and participation • Development of a facility-wide plan to collect the food waste for composting and or pig farms • Space available to collect and store food waste for pick-up	• Reduces disposal costs
Establish Green Building Specifications for New Construction	As new construction is planned/performed, PA/LGA can adopt the Green Building specifications currently under development by the Office of the Mayor and Columbia University.	• Corporate management support • Contracting specifications • Contractor cooperation • Product availability	• Increases energy efficiency • Positive public perception • Increased market for recyclables
Eliminate the Purchase of Disposable Cups and Provide Reusable Mugs	All of the offices and shops use disposable cups, rather than reusable mugs or glasses for coffee and other beverages.	• Initial cost to purchase mugs • Staff cooperation • Extra mugs for guests • Increased water and soap use	• Reduces costs • Reduces waste • Positive public perception • Annual Savings approximately $5,920

Exhibit 1. Waste Prevention Options for Port Authority of NY & NJ - LaGuardia Operation

Recommended Options	Discussion	Considerations	Benefits
Reduce the Use of Products in Aerosol Cans and Implement Proper Disposal Procedures for Aerosol Containers that Can Not be Replaced	Products in aerosol cans are used throughout the operations. These cans could be replaced/eliminated by establishing a policy of purchasing products in non-aerosol recyclable containers.	• Procurement staff cooperation and education • Alternative product/container availability • Residual management • Market for recyclables	• Prevents waste and reduces waste management costs • Increases revenue from the sale of scrap metal • Reduces VOCs released to atmosphere
Reduce Lighting Levels and Modify Changeout Schedule for Tubes **Install Motion Detectors** **Replace Incandescent Bulbs Where Possible**	Currently, all fluorescent tubes are changed annually, regardless of tube condition. Currently, lighting system could be altered to use fewer tubes and tubes could be replaced on an "as needed" basis or on an extended schedule. In addition, current tubes can be replaced with less toxicity, reduced mercury content tubes.	• Availability and cost of reduced mercury and/or longer life bulbs • Contractual issues • Lighting disruptions	• Reduces costs if fewer lights purchased and less energy is used • Reduces toxicity • Reduces energy use
Change Air Filters Based on Need/Pressure Drop and Investigate the Feasibility of Reusable Air Filters	PA/LGA facilities generate approximately 6,837 air filters of varying sizes per year at a cost of approximately $39,000. Filters are changed on 4, 8, 12, 16 or 26 week schedules depending on the function of the equipment. PA/LGA should first ensure that filters are changed based on need (e.g., pressure drop) and not based strictly on a schedule. The PA/LGA should investigate the feasibility of using reusable/washable air filters.	• Corporate management support • Contracting specifications • Contractor cooperation • Technical requirements	• Reduces number of filters generated • Reduces cost of purchase of filters
Purchase Energy Efficient Office Equipment	When replacing computers or copy machines, purchase *Energy Star* computers and photocopiers designed to go into "sleep mode" when idle. Turn off equipment when not in use.	• Management support • Equipment specification may require changes • Staff cooperation and encouragement to turn off equipment	• Reduces energy use

Exhibit 1. Waste Prevention Options for Port Authority of NY & NJ - LaGuardia Operation

Recommended Options	Discussion	Considerations	Benefits
Vehicle Maintenance Operation			
Purchase a Bulk Distribution Rack for Automotive Fluids	PA/LGA purchases oil, antifreeze and lubricants in quart and gallon containers. A bulk distribution system reduces product waste, reduces the number of containers disposed in the solid waste stream and reduces spills.	• Equipment cost • Employee training	• Reduces packaging waste • Reduces spills and spill cleanup wastes • Reduces cost associated with waste management and spill cleanup
Purchase Re-Usable/Washable Oil Filters for Vehicles	Vehicle maintenance shop uses conventional filters. Used filters are disposed as non-hazardous material in a drum.	• Staff cooperation, performance • Comparative cost • Space requirements and employee training with washing operation	• Reduces quantity of filters disposed • Reduces costs
Purchase a Crusher for Used Oil Filters and Recycle Used Filters	Used oil filters are manually drained and disposed of with the trash. Crushed oil filters allow the recovery of more used oil from the filter, reduce the storage requirements for filters and allow easier recycling.	• Equipment cost/increased labor • Staff cooperation • Availability of market for filters • Space/training	• Reduces disposal cost. • Reduces quantity of used oil to landfill. • Potential revenues from sale of scrap metal
Improve Spill Prevention and Improve Clean Up of Oil Spills	Spills observed on shop floor can be avoided by increasing the use of drip pans under vehicles in shop area. Shop uses rags and absorbent to clean up oil spills. Rags are discarded in the trash. Reusable oil sorbent pads and vacuums can reduce use of rags and sorbent.	• Staff cooperation • Cost of drip pans • Alternative clean-up procedures	• Reduces clean-up time. • Reduces purchases of rags and absorbent. • Decreases spills and spill cleanup wastes • Reduces costs for sorbents, rags and labor to clean-up spills
Improve Secondary Containment	Storage areas/containers for waste oil and batteries destined for disposal did not have secondary containment.	• Purchase containment pallets/corrosive containers	• Reduces the risk of spills into environment. • Reduces the use of material to clean-up spills.
Replace Oil Pan Drain Plugs with Quick Drain Connectors	Current practice involves removing a plug from the oil pan and draining oil into a collection basin. Basin is then emptied into a larger oil reservoir. This system can be replaced using quick drain connectors.	• Equipment costs • Staff training	• Reduces spills. • Reduces labor to clean-up spills. • Reduces time to complete oil change. • Drains more sludge and dirt from oil pan.

Exhibit 1. Waste Prevention Options for Port Authority of NY & NJ - LaGuardia Operation

Recommended Options	Discussion	Considerations	Benefits
Replace Conventional Oils with Synthetic Oils	Internal combustion engines are using petroleum-based oil. Synthetic oils are graphite-based lubricants that last significantly longer, reduce engine friction and require fewer oil changes.	• Purchase cost • Oil change frequency changes • Staff cooperation	• Fewer oil changes reduces the quantity of used oil generated. • Reduces labor costs associated with oil changes. • Increases life of engine parts. • Annual savings of approximately $6,700
Purchase Environmentally-Preferable Paints and Reduce Aerosol Painting	Aerosol cans of spray paint are used to spot-paint equipment in the vehicle maintenance shop. These containers release a high level of VOCs.	• Staff cooperation. • Purchasing changes	• Reduces use of VOC- and metal containing paints. • Reduces aerosol cans in the waste stream. • Reduces waste caused by overspray. • Reduces labor costs associated with clean-up.
Purchase Aqueous-Based Parts Washer	Solvent sinks are changed out on a six-week scheduled basis. PA/LGA can base changeout interval on solvent condition, use a more environmentally friendly solvent, or purchase an aqueous parts washer.	• Equipment cost • Staff training	• Reduces toxicity • Reduces long-term waste management costs • Reduces employee exposure to toxic solvents/fumes • Annual savings approximately $1,420
Recycle Spent Antifreeze	Spent antifreeze is disposed of as a hazardous waste.	• Cost of on-site or off-site recycling service • Space limitations/employee cooperation and training	• Reduces product cost and hazardous waste disposal cost
Implement a Tire Inspection and Maintenance Program	PA/LGA pays a vendor to remove tires generated by the VMF. None of the tires used by PA/LGA are retreads/recaps. There did not appear to be any formal inspection and maintenance system for tires. The PA/LGA should develop a program of regular tire inspection and maintenance.	• Staff training/cooperation	• Reduce tire waste generated • Increase tire life • Less vehicle down-time • Reduced tire costs

Exhibit 1. Waste Prevention Options for Port Authority of NY & NJ - LaGuardia Operation

Recommended Options	Discussion	Considerations	Benefits
Recycled Wastewater from Vehicle Washing	Water, oils and grit from washing are disposed via the sanitary sewer. The current vehicle washing system could be improved by capturing the wastewater and recycling the water for reuse.	• Equipment cost • Staff training	• Reduces loadings to sanitary sewer • Reduces water use
Stockroom			
Revise Stock System to Allow Return of Unused Items to Stock and to Provide Items in Requested Quantities	Stockroom does not accept unused items for return and redistribution and the current system only allows receipt of pre-packaged quantities. This system could be improved to allow the removal of the specific quantity of a product needed to complete a job.	• Staff cooperation • Central administration cooperation and accounts tracking modifications • Design stockroom system to accept and re-shelve returns	• Reduces quantity and cost of supplies purchased • Allows use of excess material • Reduces waste
Work with Central Stockroom to Develop and Implement a Reusable Two-Way Shipping/Receiving System	Products received from "Central" are delivered on pallets. Pallets that are in good condition are reused by the stockroom. Pallets delivered to other PA/LGA areas are not returned to the stockroom and were observed stacked on-site or disposed in open top trash containers. Vendors are not required to back haul pallets or shipping materials. Current pallet practices could be improved by returning pallets for reuse. In addition, PA/LGA can identify reusable shipping containers and implement a system of return and reuse.	• Staff cooperation • Cost of reusable pallets/containers • Training	• Reduces disposable packaging and pallet wastes • Reduces waste management costs
Recycling of Broken Pallets	Broken pallets can be sent for repair, donated to a materials exchange or chipped for mulch.	• Staff cooperation • Market for broken pallets	• Reduces disposal costs
Implement a System to Track and Return Infrequently Used Stock to Central Stockroom	Stock appears to be rotated but some of items in the stock room are no longer used by LaGuardia staff. Identify these items and return them to Central Stockroom before shelf-life expires and they become waste.	• Staff cooperation • System for returning items and crediting accounts for purchase costs	• Reduces disposal related to shelf-life expirations • Reduces disposal costs

Exhibit 1. Waste Prevention Options for Port Authority of NY & NJ - LaGuardia Operation

Recommended Options	Discussion	Considerations	Benefits
Investigate Use of Rechargeable Batteries	Currently using alkaline batteries that are discarded as solid waste. Rechargeable batteries can be used in some of the equipment.	• Staff cooperation. • Increased labor and energy costs • Space to set-up rechargers and system for return • Equipment cost	• Reduces the cost of purchasing batteries • Reduces the quantity of batteries discarded in the waste stream • Annual savings approximately $542
Develop a Hazardous Materials Pharmacy	Distribution of materials containing hazardous constituents from the stockroom is not tracked to ensure proper use and disposal practices. Waste can be reduced by creating a system whereby staff return unused portions of materials for reuse and return an empty container to receive a full container.	• Management support • Staff cooperation • Stockroom redesign	• Reduces purchase of hazardous materials • Reduces waste of products containing hazardous materials • Reduces waste • Reduces costs if accounting system can be altered to allow credit for return of unused portion of material and redistribute remaining product as needed
Improve the Management of Construction and Demolition Debris	PA/LGA currently generates approximately 10 cubic yards of C&D wastes per week and contractors generate unknown additional quantities of waste. PA/LGA can develop programs to reduce, reuse, and recycle C&D waste.	• Corporate management support • Contracting specifications • Contractor cooperation • Employee training/cooperation	• Reduces purchase of construction materials • Reduces quantity of C&D waste generated • Reduces waste disposal costs
Develop a Public Outreach Campaign Designed to Provide Waste Prevention Education to the Public	PA/LGA can develop outreach opportunities designed to promote waste prevention to the travelling public, airline employees, tenant staff and PA staff. PA/LGA can promote the waste prevention measures that will be implemented as a result of participation in the NYC *WasteLe$$* program.	• Management support • Time and resources to publicize the success stories	• Provides public education • Educates PA work force, tenant staff and all airline staff • Positive public relations potential

Exhibit 1. Waste Prevention Options for Port Authority of NY & NJ - LaGuardia Operation

Recommended Options	Discussion	Considerations	Benefits
<u>Recycling Opportunities</u>			
Develop Terminal-Wide Recycling Program	Recycling is random throughout PA/LGA operations. P&F Trucking collects co-mingled recyclable containers. Steel is not included in the current recycling program. Toner cartridges are not currently recycled. Work with PA/LGA to develop specifications and design of program.	• Program design • Staff education/cooperation • Coordination among tenants • Vendor negotiations and/or contract modifications	• Reduces disposal • Reduces costs • Potential revenues from sale of recyclables
Implement an Affirmative Procurement Program	PA/LGA does not have a policy directing the purchase of products with recycled content and environmentally preferable products. PA/LGA can implement a policy incorporating USEPA's affirmative procurement guidelines.	• Staff cooperation • Purchasing staff cooperation • Product availability • Cost competitive	• Potential waste and energy use reductions • Improves markets for recyclables
Consider Participation in Other Waste Reduction Programs	PA/LGA may wish to consider participating in other waste reduction programs such as the NYC Partnership for Waste Prevention, the EPA WasteWiSe program, or the CONEG Challenge.	• Management support • Time and resources	• Improves waste reduction efforts • Increase the public's perception of PA/LGA as an environmentally conscious organization.

2. FACILITY DESCRIPTION

General Information

The PA controlled operations at LaGuardia airport (PA/LGA) are based in several separate buildings. Those buildings included in the assessment are: 1) Hangar No. 7, 2) Central Terminal, 3) Marine Air Terminal, 4) Building #84, 5) Parking Lots and a multi-level parking garage, and 6) a hazardous storage area. Hangar #7 houses several PA/LGA operational areas including: administrative office space, snow removal equipment and large vehicle storage area as well as the associated stockroom, carpenter shop, paint shop, and electrical shop. Building #84 houses vehicle maintenance operations and a small engine repair shop. The trash compactor and collection containers for mixed recyclables are located outside of Building #84. Exhibit 2 provides a facility layout of the areas included in the assessment.

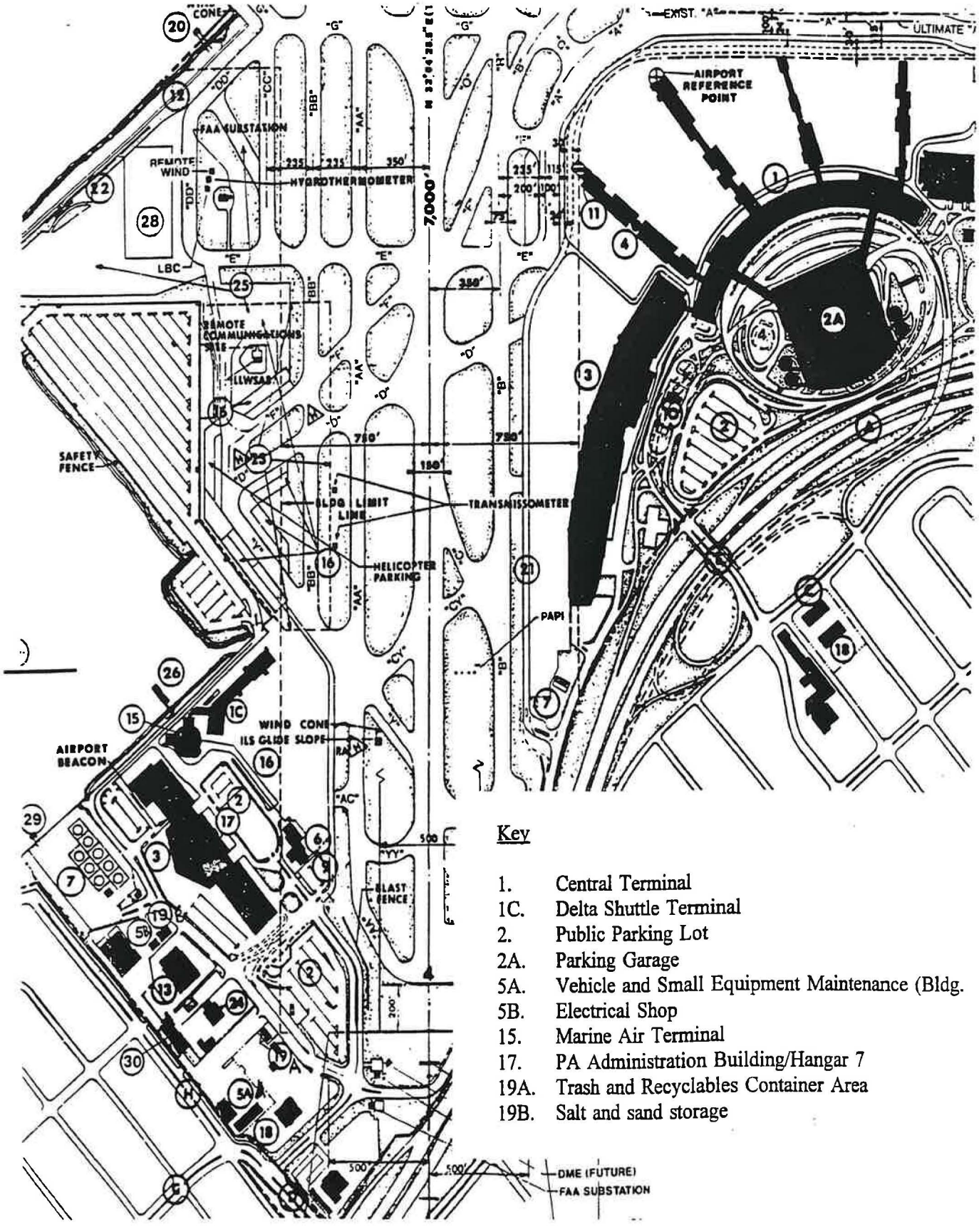
In addition, the assessment team walked through leased areas to determine how the individual tenant operations impact PA/LGA's solid waste stream. The tenant operations included Delta Airlines in the Marine Air Terminal, American Airlines in the Central Terminal, and the restaurant/bar areas and passenger lounge of a private commuter airline, also in the Marine Air Terminal.

PA/LGA is responsible for operating and maintaining part of the Central Terminal Building and part of the Marine Air Terminal. The PA/LGA maintains, services, and cleans the lobby and ticketing areas up to the point where the individual airlines queue passengers waiting for service. The hallways leading to the concourse areas are controlled by PA/LGA, as are the concourse areas up to each airline's individual carpeted waiting areas. The restrooms and hallways leading to the food service areas are controlled and maintained by PA/LGA. Each airline tenant and food service tenant is responsible for maintaining and servicing its leased space and customer seating area. PA/LGA is constructing a new food court and retail area in the Central Terminal that will be managed by PA's Market Place Development Group.

Solid Waste Collection Area

The PA is responsible for managing only that waste generated in the PA/LGA controlled areas of the airport. PA currently contracts with P & F Trucking, Inc. for all waste removal and recycling services. Tenants are responsible for managing the waste that they generate and each tenant negotiates an individual agreement with the waste carter of its choice. In addition, the construction contractor renovating the Central Terminal Building is responsible for removal of all construction and demolition debris and for removal of the solid waste generated by the construction activities. As a result, there are multiple waste haulers on-site at LaGuardia airport. PA/LGA and each individual tenant has negotiated different levels of service for both solid waste removal and recycling services.

Exhibit 2. Facility Layout of PA/LGA Areas Targeted During Assessment



Key

1. Central Terminal
1C. Delta Shuttle Terminal
2. Public Parking Lot
2A. Parking Garage
5A. Vehicle and Small Equipment Maintenance (Bldg.
5B. Electrical Shop
15. Marine Air Terminal
17. PA Administration Building/Hangar 7
19A. Trash and Recyclables Container Area
19B. Salt and sand storage

PA/LGA maintains a central waste consolidation area behind Building #84. At this site are two 30 cubic yard compactors and one 30 cubic yard open top container. In addition, PA/LGA has a 30 cubic yard container that is moved as needed and a 30 cubic yard open top container near hangar 7. There are also numerous 2 cubic yard containers associated with different PA operations. These containers are emptied by a PA truck and the solid waste is transported to the central solid waste collection area. PA/LGA solid waste management system is discussed in Section 4 of this report.

Pest Management Practice

PA contracts with Verazzano Extermination for pest management services for the Central Terminal, Marine Terminal and all PA controlled buildings. Verazzano has one on-site, full time employee providing integrated pest management and other pest control measures. In addition, the PA/LGA performs monthly health inspections of all food vendors. Vendors are reminded to eliminate potential food sources which attract pests. Verazzano Extermination uses many types of pest control measures including Ditrex, glueboards, tracking dust (outside public view), closed bait stations, Dursban Pro, and boric acid. Each area is treated on a regular schedule with problem areas targeted for more frequent observation and treatment. In addition, Verazzano Extermination provides pest management services to PA's tenant operations. For example, USAir staff indicated that Verazzano Extermination provides pest management services to them under their contract with PA.

3. WASTE GENERATION PROCESSES

The waste generating processes that take place within the PA controlled areas of LaGuardia airport are described in the following section. The discussion is divided facility.

Public Areas of the Central Terminal Building and Marine Terminal Building

The majority of waste generated within the PA controlled sections of the public areas consists of paper (*e.g.*, white paper, newspaper, mixed paper, food wrappers, ticket jackets, magazines etc.), non-deposit glass bottles, aluminum cans and corrugated cardboard. The collection of trash and recyclables in the public areas is constantly in flux due to changing security demands. For example, when PA is instructed to take the airport to a higher security level, all collection receptacles are removed from the public areas. LaGuardia airport has been under heightened security for more than five months and just recently began to move trash cans back into the terminal areas.

There is no organized separation or collection of recyclable materials within the PA controlled public areas of the airport. The assessment team did note several randomly placed, specially designed newspaper collection containers in the public areas. According to Ken Sagrestano and Ray Graziano, PA/LGA once had recycling containers designed for aluminum cans and for newspapers throughout the terminal. At one point, security measures required the removal of all containers from the public area and these recycling containers never were returned. PA/LGA staff indicated that they are uncertain of the whereabouts of the recycling containers. At the time of the assessment, the security measures were being downgraded and PA/LGA staff were in the process of replacing trash containers in public areas.

The activities of airline passengers and people who are dropping off or meeting arriving passengers can generate solid waste in the Central terminal. The activities and potential wastes types generated are listed in Exhibit 3.

Exhibit 3. Passenger Activity and Potential Wastes

Activity	Potential Waste
Parking	Parking Ticket, Receipt, Misc. Trash
Check Luggage	Baggage Claim Check, Wax Paper Peel-off Backing, Corrugated Garment Bag Box
Ticketing	Paper ticket, Boarding Pass, Ticket Jacket
Gate Check-In	Boarding Pass, Ticket Jacket

Passengers who are checked in for their flight and have time to spare may proceed into any of the retail shops or retail-food outlets and buy newspapers, magazines, coffee, soda

and/or food. The paper and plastic food wrappers, newspapers, cups, bottles, cans, packaging, plastic bags and left over food may be discarded to trash receptacles located anywhere throughout the terminal. Currently, there are no recycling bins in the PA/LGA controlled areas of the terminals and very few trash containers.

Although PA tenants are not participating clients in the NYC *WasteLe$$* program, the amount and type of waste generated by the tenant operations has a direct impact on the PA/LGA's waste stream. For example, passengers and airline employees who purchase food and beverage from the retail-food vendors do not necessarily consume the food and beverage items within the confined food court area. Once customers remove the food and food service items from the food court, they can, and will, discard uneaten food, food wrappers and food and beverage containers into waste receptacles located throughout the terminal. PA/LGA then becomes responsible for the disposal of trash (and recyclables) generated as a result of tenant operations.

The types of waste generated by the food court tenant operation include; 1) food waste, 2) food service items (*e.g.*, plates, polystyrene "clamshells," beverage containers) and 3) behind-the-counter wastes (*e.g.*, steel cans, corrugated cardboard). Food and beverage, throughout the terminal area, is served on polystyrene plates or paperboard plates and in polystyrene cups. In addition, restaurant staff provide customers with polystyrene cutlery, straws, and napkins. Beverages also are served in non-deposit glass bottles, plastic bottles and aluminum cans.

The assessment team observed that there is no consistent trash/recycling system for the public areas of LaGuardia airport. For example, PA/LGA collects only trash, while the passenger concourse areas of both Delta and American airlines have varying levels of recycling in place. Both airlines attempt to collect recyclables and trash in separate containers, although the container system and container labelling of each airline is different. For example, the PA/LGA recycling containers are black metal and are labeled cans and newspapers. The newspaper collection container has a lid with an opening designed to accept a flat newspaper and to discourage passengers from placing trash in the container. The lid for the recycling container for the collection of cans has a hole in the top of the lid. The design of the lid for the newspapers does not allow passengers interested in reading/reusing a newspaper to retrieve a paper from the bin.

The containers designated for recycling by the airlines are similar to the trash cans (*i.e.*, beige or gray plastic trash cans with lid) and have small stickers, applied to the sides of the containers, designating the commodity to be collected in each container. The lack of a uniform approach to the collection of materials is discussed in greater detail in Section 7.

PA/LGA Administrative Offices

The administrative offices support the daily operations of PA/LGA. The activities of the office staff include purchasing office supplies, reproducing documents, preparing reports for distribution and other administrative functions (*e.g.*, answering phones, typing, filing, etc.)

One of the functions of the administrative staff is purchasing office supplies directly from the contracted vendor, Corporate Express. Office supplies include photocopy paper, pens, pencils, folders, and desk top accessories. Discussions with support staff indicated that there are no purchasing guidelines specifying the purchase of environmentally preferable or recycled content products. Administrative staff also indicated that they make purchasing decisions based solely on price, selecting the least expensive items.

One administrative staff person noted that regardless of how many times she requests that Corporate Express hold the delivery of a multi-item order until all of the items are in-stock, she receives the order in multiple shipments. For example, she mentioned ordering several items, including a box of pencils. The only item Corporate Express had in stock was the pencils, so she requested that they deliver the pencils when the entire order was complete. A few days later she received a medium-sized corrugated cardboard box with packing material wrapped around a single box of pencils.

PA does not have a policy requiring double-sided photocopying. PA/LGA staff make double-sided copies if the document that they are copying is double-sided. If the document is single-sided, the copy will be single-sided. A review of PA/LGA's vendor-direct purchases indicates that PA/LGA staff ordered approximately 240 reams of 8½" x 11" paper over a three-month period. Annually, PA/LGA uses approximately 960 8½" x 11" reams of paper per year at a cost of $7,680.

Many of the photocopy machines are equipped to perform two-sided photocopying. However, most staff indicated that they do not make an effort to make double-sided copies. The Environmental Unit's copy machine, capable of duplex copying, was replaced with a copy machine that does not have duplex capabilities. PA/LGA staff indicated that, according to the service contractor, the number of copies made per month did not support the need for a machine that has duplex capabilities and, therefore, the contractor made the decision to remove the machine and replace it with a photocopier without the duplex feature.

PA/LGA uses a "one can system" throughout their offices and operations, excluding the public use areas, to collect recyclables. As part of the current collection system, glass, aluminum and paper are supposed to be co-collected with the trash and the recyclables are placed in a the 30 cubic yard compactor designated for recyclables. P&F Trucking, Inc. informed PA/LGA that they then re-separate the materials for recycling off-site. The trash is placed by cleaning staff in the trash containers.

There was no program in place to recycle spent toner cartridges.

Heating/Cooling Plant

PA/LGA operates a Central Heating and Cooling plant that provides climate control to the entire facility. The air filtering operations throughout the PA/LGA facilities generate approximately 6,837 air filters of varying sizes per year costing approximately $39,000. The filters are disposed by the filter maintenance contractor. Filters are changed on a 4, 8, 12, 16 or 26 week schedules depending on the service.

Maintenance Complex

The maintenance complex is responsible for all of the PA/LGA grounds maintenance including lawn care and litter control. The facility houses a small engine repair operation to service the lawn mowers and hand tools. In addition, there are designated cages for the storage of lawn and garden supplies, including herbicides and fertilizers.

PA/LGA staff indicate that grounds maintenance generates very little trash or recyclables. The litter control staff do not separate materials for recycling. Homeless individuals collect the aluminum cans from the trash containers, presumably for return to a retail outlet for the five cent deposit on each aluminum can. The grounds staff practice "grass cycling" and chip yard clippings for use as mulch in the flower beds surrounding the airport. In addition, Mr. Pappalardo mentioned that PA is discussing participating in the Queens Botanical Garden's compost program. Although the garden cages were locked, bags of fertilizer are stacked on shelves. PA/LGA staff indicate that PA policy requires the minimization of spraying for pests or fertilization.

The small quantity of used oil from small equipment maintenance is taken to the vehicle maintenance area and added to the used oil collection tank. This shop has an aqueous based parts cleaner but it is not used extensively. When parts cleaning is needed, parts are brought to the VMF solvent sink for cleaning.

The carpentry shop staff was not present during the assessment. However, the assessment team noted that there were a number of paint cans and other flammable materials stored in regular cabinets, while a flammables cabinet in the shop was used for parts storage. The trash containers contained scrap wood and metal. There was no sign that any of the waste materials are separated for recycling when the shop is in operation.

Stockroom

The LaGuardia stockroom is part of the Central Service stockroom under the Central Administration Unit and PA staff who work in the stockroom are part of the Central Administration Unit. The PA/LGA stockroom carries 4,000 items that are purchased and delivered to LaGuardia by PA's Central Purchasing Department. Some of the items used at the airport are stored at the Central Stockroom and some items are delivered by vendors directly to the requestor. The products are delivered in corrugated cardboard and although

there is no apparent cardboard recycling in the stockroom, PA staff indicated that they do try to reuse the boxes when they fill order requests from the various PA facilities. There is no program in place to reuse pallets and PA/LGA was not able to quantify the number and types of pallets generated. The assessment team noted pallets stacked at numerous locations throughout the facility.

According to the stockroom staff, PA's computerized system only allows materials to be dispensed in pre-determined quantities. For example, a review of PA's print out listing all of the items purchased and used at LaGuardia indicates that there are more than 275 different types of screws, nuts, bolts, and anchors. The 275 items are stocked and released in quantities ranging from 25 to 1,000 per box and nails are issued by the pound. Discussions with PA/LGA staff revealed that if a small repair job requires 10 bolts, the stockroom's computerized system does not allow only 10 bolts to be released. The stockroom requires that the person making the request take a box of bolts. In addition, the stockroom does not accept unused product or materials. Since leftover materials are not required to be returned or tracked, there is no data available on the amount of unused materials either stored indefinitely at various locations throughout the airport, discarded in the waste stream or otherwise removed from the premises. The purchasing information provided below does not include materials purchased by WECO (the PA/LGA cleaning and maintenance contractor) for use at PA/LGA.

Batteries

A wide variety of batteries are purchased and used by all of the operational areas at LaGuardia airport. The annual usage report indicates that PA/LGA procured 918 AAA, 4,176 AA, 703 C and 1,605 D cell batteries last year. The remaining batteries purchased for use by PA/LGA staff are used in specialized equipment. For example, PA/LGA purchases 12 specific batteries per year for use in a digital thermometer. PA purchasing records indicate that they purchase nearly 6,000 disposable batteries per year. Communication radios use rechargeable Ni-Cad batteries and in only a limited number of other applications. PA/LGA staff indicated that they are hesitant to use rechargeables because of the increased potential for unauthorized removal from the premises. Exhibit 4 provides a breakdown of the type and number of disposable batteries purchased by each operating unit. Disposable batteries are used to power flashlights and radios although some of PA's radios use rechargeable batteries.

Exhibit 4. Summary of Battery Usage and Costs, CY 1995

Location	Battery Type			
	AAA	AA	C	D
Administration	-	16	24	-
Police	48	324	96	144
Operations	36	120	48	48
Facilities	24	40	5	-
Contract Services	56	-	-	12
Electrical	72	120	12	60
Heat/Cool	66	-	12	28
Redevelopment	6	-	-	6
Environmental	48	-	-	18

Rags

There are two sizes of rags available from the Central warehouse: rags made of T-shirt material and a 15" x 36" cotton rag. The rags come in 50 pound boxes and all of the rags are disposed after they become too soiled to reuse. Exhibit 5 provides an overview of the number of pounds of rags used by selected PA/LGA units. Purchasing information provided by PA indicates that 2,750 pounds of the white cotton rags are used and disposed per year at a cost of $770. An additional 1,350 pounds of the 15" x 36" rags at $918 are used and disposed annually.

PA Unit	3 month	Annual
Police	100 lbs.	400 lbs.
Operations	50 lbs.	200 lbs.
Electrical	150 lbs.	600 lbs.
Structural	100 lbs.	400 lbs.
Heat/Cool	50 lbs.	200 lbs.

Exhibit 5. Pounds of Disposable Rags Used by Select PA Units

Paper Towels

Although hand dryers are installed in some of the restroom facilities, PA/LGA purchasing records indicate that paper towels also are purchased. Specifically, the PA/LGA purchases approximately 175 cartons of c-fold towels each year at a cost of $2,992 and 59 cartons of single fold towels at an annual cost of $1,014. The largest users of c-fold and single fold towels are the police department and operations.

Disposable Cups

PA/LGA staff purchase 339 cartons of disposable cups (1,000 cups per carton) per year at an annual cost of $7,858. The largest user of disposable cups is the police department.

Absorbent

PA/LGA uses a natural organic granular absorbent to soak up spills of oil and grease. The absorbent is delivered in 40 pound bags and according to the purchasing records, PA/LGA purchased and disposed of 440 bags in 1995 at a total cost of $3,022. This material is primarily used by vehicle maintenance and the environmental unit.

Spray Paint

There are cans of spray paint sitting on the shelves and on tables in several of the shops and offices. Exhibit 6 provides an overview of select PA/LGA units purchasing spray paint. Discussions with PA/LGA staff indicated that they do not do much painting and that most of the paint is used for small touch-up jobs. The annual purchase of 837 cans of spray paint for PA/LGA totals $1,414.

PA Unit	Cans Purchased per Year
Police	72
Operations	104
Electrical	76
Structural	376
Environment	4

Exhibit 6. Spray Paint Purchases by Select Units

Fluorescent Lamps

According to purchasing records, 17 different types of fluorescent lamps are purchased for use at LaGuardia airport. Annually, PA/LGA installs approximately 2,292 new fluorescent lamps. The single largest purchase in 1995 was 1,710 F40/T12 cool white lamps with a medium base. Under PA's contract with WECO (the PA/LGA maintenance contractor), fluorescent tubes are changed annually, regardless of the condition of the lamps. The PA/LGA recently began recycling spent fluorescent lamps.

Oil

According to purchasing records, a large percentage of all motor oil purchased is purchased in quart containers. Exhibit 7 provides an overview of the various types of motor oil used in vehicles at the airport. PA/LGA spends $1,841 per year to purchase quarts of 15W-40 and $87 for 10W-30. Discussions with PA/LGA staff indicate that they believe that oil purchased in quarts is less likely to be misused or taken for personal use when compared to oil that is dispensed from drums or totes. After the oil is dispensed, the quart containers are disposed in the trash containers.

PA/LGA also purchases 495 gallons of Rando Ho-32 oil at $5.23 per gallon for use in the HVAC compressors. The gallon containers are discarded with the trash.

Transmission Fluid

Transmission fluid is purchased in quart containers for use in PA/LGA vehicles. Purchasing records indicate that PA/LGA purchased 456 quarts of transmission fluid at an annual cost of $487. The containers are discarded into the trash.

Type	Quantity Per Year
15W-40	1,860 Quarts
10W-30	96 Quarts
30 Weight	108 Quarts
Compressor Oil	495 Gallons

Exhibit 7. Type and Quantity of Oil Used in PA Vehicles at LaGuardia

Parking Lots

LaGuardia airport has both open parking lots and a multi-deck parking garage. Trident, PA's cleaning contractor, provides 24-hour cleaning service with a nine person team. Trident staff work in three shifts and perform various levels of service. The 7:00 am - 3:30 pm shift picks up litter, pulls full trash bags and attempts to recycle the newspapers which are collected in the parking garage (Lot 2). The next shift works from 3:30 pm - 11:30 pm picking up litter, disposing corrugated cardboard garment boxes and returning illegally disposed car batteries to the automotive shop for recycling. The third shift works from 11:00 pm - 7:00 am and their primary function is to sweep the parking lots. The waste stream generated as a result of activities in the parking lots and parking garage mostly consists of paper, cigarette butts, non-deposit beverage containers, corrugated cardboard garment bag boxes and newspapers.

There are three separate taxi bullpens at LaGuardia and taxicabs are cycled through the taxi stands. The taxi holding areas are often mentioned as one of the greatest waste management challenges facing PA/LGA and the contractors responsible for cleaning and maintenance. The taxi drivers often wait for long periods of time before they receive a passenger for transport. During the wait they tend to eat meals, read newspapers or magazines and clean and/or perform minor maintenance on their taxis. Despite that fact that PA/LGA provides multiple trash containers for the taxi drivers, PA/LGA staff indicate that the taxi holding areas are often littered and "generally, a mess." SAIC staff observed several cans overflowing with trash and very few newspaper recycling containers in the parking lot area used by the taxi drivers. SAIC recognizes that PA/LGA is faced with several challenges in identifying solutions to the litter crisis, including both language barriers and cultural differences. Although taxicabs are not the client for the program, the waste generated by taxi drivers must be addressed in any plans to reduce PA/LGA's overall waste.

There are three taxi holding areas at LaGuardia where taxi cabs queue up to wait until their turn for a fare from the airport. Prior to being released from the holding area, taxi

drivers are issued a 2" x 5" ticket with a number. Each taxi driver proceeds to the front of the terminal and hands the ticket to the person responsible for monitoring the pickup of passengers by the taxicabs at the airport. The ticket is in the possession of the driver for only a few minutes and is then turned over as a passenger steps into the taxi. The tickets are then discarded into the trash. PA/LGA purchases 810,000 green tickets and 460,000 white tickets each year.

Maintenance Operations

Vehicle Maintenance

The Vehicle Maintenance unit services and maintains approximately 215 vehicles. The shop performs all vehicle services in-house except for body repair, vehicle painting and some transmission work. The types of vehicles and the schedule for preventative maintenance is presented in Exhibit 8.

Exhibit 8. Summary of Vehicle Maintenance Schedules

Equipment Type	Number of Vehicles	Monthly cycle	Mileage/Hours between Scheduled Maintenance
Police Cars		Monthly	Not Available (NA)
Wreckers		Monthly	NA
Field Sedans		Three Months	3000 miles or 100 hrs
Pickup Trucks		Three Months	3000 miles or 100 hrs
Small Dump Trucks		Three Months	3000 miles or 100 hrs
Large Dump Trucks		Three Months	NA
Mgr. Sedans		Three Months	3000 miles or 100 hrs
Sweepers		Monthly	NA
Construction equipment		Four Months	NA
Spreaders		Six Months	Seasonal
Small Loaders		Four Months	NA
Large loaders		Four Months	NA
Gardening equipment		Four times per season	Seasonal

The shop has the following general operations.

Administration: Administration activities are located in an office where staff maintain fleet maintenance records and purchase, receive and track supplies and parts. Wastes generated and/or managed by administrative activities include: pallets, shrink wrap, strapping, corrugated cardboard, office and computer paper, toner cartridges, fluorescent tubes and ballasts, and employee wastes including food and beverage containers.

Vehicle Maintenance: Vehicle maintenance is performed at scheduled intervals. Based on the maintenance schedule or vehicle mileage, the VMF performs routine maintenance that may include changing fluids and replacement of worn or broken parts such as belts, hoses, batteries, windshield wipers, and tires. Wastes include oil, antifreeze, grease, filters, metals, rubber, batteries, tires, degreasers, solvents, rags, plastic and metal containers and corrugated cardboard.

Vehicle Repair: Vehicle repair can include everything from windshield replacement, to engine, exhaust system or brake repair. Additional wastes may include rust removers, glass, parts such as brakes, alternators or radiators, adsorbents, empty aerosol cans and other containers such as plastic bottles from oil or other products. The VMF does not perform body repair or major painting of vehicles. Spot painting is performed using spray paints

Vehicle Washing: PA/LGA vehicles are washed on an as needed basis. Vehicle washing takes place on-site in a vehicle washing station. The PA/LGA uses only pressurized water for washing and the water is discharged to the sanitary sewer. The major wastes generated include water, grit, and oils.

Exhibit 9 provides an overview of significant VMF waste streams and current waste management practices.

Exhibit 9. Summary of Waste Management in the Vehicle Maintenance Facility

WASTE	WASTE MANAGEMENT
Oil, transmission fluid	Remove for recycling
Antifreeze	Disposal as hazardous waste
Engine and brake part cleaning solvents	Disposal via Safety Kleen Contract on six week schedule
Oil filters	Drummed and disposed as non-hazardous waste
Batteries	Shipped to vendor
Tires	Pay vendor for removal
Repairable parts (rotors, alternators, carburetors)	Rebuild or repair or Reuse
Metals: body work, wheel rims, containers including aerosol and paint cans	Recover for metals recycling
Absorbent	Disposed as solid waste

Exhibit 9. Summary of Waste Management in the Vehicle Maintenance Facility

WASTE	WASTE MANAGEMENT
Rags	Disposed as solid waste
Wash water	Sent to sanitary sewer via oil water separator

A detailed discussion of pollution prevention opportunities for material specific waste categories, as indicated in Exhibit 9, are included in Section 7.

Construction & Demolition

PA/LGA performs construction and demolition on an on-going basis. Small construction projects are performed by maintenance staff. Larger construction projects (e.g., Central Terminal renovation) are contracted out. Contractors are responsible for removal of all construction and demolition debris and for removal of the solid waste generated by the construction activities. Construction and Demolition (C&D) debris consists of any waste or excess material generated during construction or demolition activities. C&D debris includes unused/excess materials from construction and renovation projects, as well as the wastes generated during demolition activities. The primary activities that generate C&D debris and their associated components are:

ACTIVITY	COMPONENTS
Construction	Wood, roofing, fixtures, wall board, wire, insulation, ducts, pipes, carpet, paneling
Demolition	Mixed rubble, concrete, steel, brick, timber, fittings, fixtures
Roadwork	Asphalt, concrete, and earth fill
Excavation	Earth, sand, and stones
Site Clearance	Trees, brush, earth, mixed concrete, rubble, sand, steel
Overpasses/Bridges	Wood, asphalt, cement, rubble, steel

Construction and demolition debris is composed primarily of inert waste and, in most states, is disposed in dedicated C&D landfills, when not recycled. Some states prohibit disposal of C & D waste in municipal landfills. Some demolition debris may contain hazardous materials, such as asbestos, and should be evaluated for potential hazardous content prior to selecting a management option. PA/LGA generates approximately 10 cubic yards of C&D waste per week.

4. CURRENT WASTE MANAGEMENT PRACTICES

P&F Trucking, Inc. is the current solid waste hauler for PA at LaGuardia airport. PA/LGA solid waste is collected in two 30 cubic yard compactors, two 30 cubic yard containers and one 10 cubic yard dumpster. The main collection area is located behind building #84 and consists of one 30 cubic yard compactor that is designated for the collection of co-mingled recyclables (*e.g.*, glass, metal, and paper), a 30 cubic yard dumpster designated for construction debris and one 30 cubic yard compactor designated to hold garbage. There is one 30 cubic yard dumpster behind Hangar #7 designated for the collection of garbage and one 10 cubic yard dumpster that is moved to various PA/LGA areas as needed.

All of the containers are pulled on call. PA/LGA staff estimated that there are weekly pulls for the two 30 cubic yard compactors and the 10 cubic yard dumpster. The 30 cubic yard construction debris dumpster is pulled approximately every three weeks and the 30 cubic yard garbage dumpster is pulled approximately every other day. Exhibit 10 provides a summary of the containers at PA/LGA. P & F Trucking invoices, provided to SAIC, do not reflect the weight of the solid waste collected and hauled offsite.

Exhibit 10. Summary of Waste Containers at PA LaGuardia

LOCATION	DUMPSTER OR COMPACTOR	CAPACITY (CU. YD.)	MATERIAL	FREQUENCY OF PULL
Building 84	Compactor	30	Mixed glass, metal and paper recyclables	On call but typically weekly
Building 84	Compactor	30	Garbage	On call but typically weekly
Building 84	Dumpster	30	Construction Debris	On call but typically every three weeks
Hangar 7	Dumpster	30	Garbage	Every other day
Floater	Dumpster	10	Construction Debris	On call but typically weekly

5. BASELINE DATA

As part of the on-site assessment, PA/LGA provided copies of purchasing records. In addition, the SAIC assessment team reviewed the purchasing records and gathered data during the assessment by conducting interviews with PA/LGA staff. The following section provides an overview of the information gathered during the on-site assessment.

PA/LGA staff provided the waste hauling and recycling data presented in Exhibit 11.

Exhibit 11. Summary of Solid Waste Disposal and Recycling At PA - LaGuardia

Waste Type	Average Number of Pulls per Month	Estimate of Monthly Quantity (cubic yards)
Trash	4 pulls of the 30 cu. yd. compactor 11 pulls of the 30 cu. yd. container 5 pulls of the 10 cu. yd. container	860
Mixed Recyclables (glass, paper, metals)	3-5 pulls of the 30 cu. yd. container	90 - 150
C&D Special Project	20 pulls of the 20 cu. yd. container between August and November	130

PA central purchasing provided information on more than 4000 items ordered by the PA at LaGuardia. Exhibit 12 provides typical annual quantities and costs of selected items purchased by the PA at LaGuardia.

Exhibit 12. Summary of Selected Purchases by PA at LaGuardia CY 1995

Stock #	Material	Quantity Purchased and Unit Size	Cost/Unit	Total Cost
AA0100715	Disposable Cups, 8-oz	339 cases	$21.72/case	$7,363
AU0100100	Deodorizer, Aerosol	33 cans	$2.71 ea.	$89
AU0100237	Absorbent, Oil and Grease, 40 lb bags	440 bags	$6.87/bag	$3023
AU0100510	Rags, Wiping cotton	2750 lbs	$0.28/lb	$770
AU0100520	Rags, Bridge Painter 15 x 36	1350 lbs	$0.68/lb	$918
AU0100750	Towels, paper hand single fold	59 cartons (4000 per ctn)	$17.22/ctn	$3,014
AU0100755	Towel, White C Fold Paper	175 cartons	$17.10/ctn	$2993
AU0100758	Towel, Hand White Paper Nylon	10 cartons	47.55/ctn	$476
AU0100760	Towel, Cloth Turkish, White	300 lbs	$1.86/lb	$558
AU0700180	Cleaner, Window concentrate	31 Gallons	$10.81 ea.	$335
AU0700195	Cleaner, Glass 19 oz Aerosol	169 cans	$2.12 ea.	$358
AU0700275	Disinfectant, Aerosol Spray	101 cans	$2.12 ea.	$214
BE0100768	Lectra Clean 19 oz aerosol	87 cans	$3.91 ea.	$340
BE0800015	Battery, AAA Alkaline	918	$0.25 ea.	$230
BE0800025	Battery AA Alkaline	4,176	$0.22 ea.	$918
BE0800040	Battery, C Alkaline	703	$0.40 ea.	$281

Exhibit 12. Summary of Selected Purchases by PA at LaGuardia CY 1995

Stock #	Material	Quantity Purchased and Unit Size	Cost/Unit	Total Cost
BE0800050	Battery, D Alkaline	1,605	$0.48 ea.	$770
BK0400230	Lamp, F40/T12 cool white fluorescent	1,710	$0.44 ea.	$753
CW0100100	Ticket, Taxi Spitter 2 x 5	810,000	NA	NA
CW0100110	Ticket, Taxi Spitter 2 x 4	470,000	NA	NA
EQ0100030	Oil, Rando-Ho-32 Compressor oil	495 gal.	$3.18/gal	$1574
EQ0100063	Oil, 5W-30	72 qts	NA	NA
EQ0100064	Oil, SAE 40	24 qts	NA	NA
EQ0100067	Oil, SAE 40	102 qts	NA	NA
EQ0100073	Oil, 15W-40	1860 qts	$0.99/qt.	$1841.4
EQ0100076	Oil, 15W-40	650 qts	$5.23/gal	$3399.50
EQ0100077	Oil, 10W-30	96 qts	$0.91/qt	$87.36
EQ0100086	Oil, 30	108 qts	NA	NA
EQ0100130	Transmission Fluid	465 qts	$1.07/qt	$530

Hazardous Waste Generation

The PA/LGA has generator ID NYD 980648505 and generated 13,368.95 pounds of hazardous waste in 1995. The PA/LGA is considered a small quantity generator. Exhibit 13 provides a summary of the hazardous waste generated in 1995.

Exhibit 13. Summary of Hazardous Waste Generation

Date	Waste Code	Waste Description	Weight (lbs.)	Cost $
1/18/95	D001, D039, D018, D008, D006, D035, D040	RQ, Waste Combustible Liquid, Petroleum Naphtha	204	
3/1/95	D001, D039, D018, D008, D006, D035, D040	RQ, Waste Combustible Liquid, Petroleum Naphtha	204	
4/11/95	D001, D039, D018, D008, D006, D035, D040	RQ, Waste Combustible Liquid, Petroleum Naphtha	210.8	
5/24/95	D001, D039, D018, D008, D006, D035, D040	RQ, Waste Combustible Liquid, Petroleum Naphtha	204	
7/12/95	D001, D039, D018, D008, D006, D035, D040	RQ, Waste Combustible Liquid, Petroleum Naphtha	204	
7/26/95	D008	RQ, Hazardous Waste Solid (Lead)	1,000	
8/22/95	D001, D039, D018, D008, D006, D035, D040	RQ, Waste Combustible Liquid, Petroleum Naphtha	204	
9/6/95	B001	PCB's, liquid (oil)	1,294	
9/6/95	B004	PCB's, solid (light ballasts)	708	
9/19/95	B002	PCB's, liquid (elec. equip. fluid)	7,286	
10/2/95	D001, D039, D018, D008, D006, D035, D040	RQ, Waste Combustible Liquid, Petroleum Naphtha	217.6	

Exhibit 13. Summary of Hazardous Waste Generation

Date	Waste Code	Waste Description	Weight (lbs.)	Cost $
10/26/95	D001	Waste Flammable Liquid, Methyl Ethyl Ketone, Toluene	1,251.75	
11/14/95	D001, D039, D018, D008, D006, D035, D040	RQ, Waste Combustible Liquid, Petroleum Naphtha	176.8	
12/29/95	D001, D039, D018, D008, D006, D035, D040	RQ, Waste Combustible Liquid, Petroleum Naphtha	204	
Total			**13,368.95**	

6. CURRENT WASTE REDUCTION/ENERGY CONSERVATION ACTIVITIES AND IMPACT

Administrative Offices

Administrative personnel have access to an electronic-mail system, but it is not well used. Staff indicated that they end up making hard copies for the files of most mail messages. Some of the paper and paper products, purchased by administrative staff, contain recycled content, but this was not uniform throughout PA/LGA operations. Photocopiers with double-sided capabilities are available in some offices and when an original is double-sided, in some cases, the photocopies will be double-sided.

Lighting/Energy

Motion sensitive lights are in place in the Airport Facilities Division (AFD) conference rooms and the AFD Manager's office. Fluorescent tubes are used in most areas and PA/LGA staff pack the spent fluorescent bulbs and send them offsite for recycling.

Grounds Maintenance

The grounds maintenance staff practices "grass cycling" and chips tree trimmings and downed branches into mulch that is used in the flower beds. PA is investigating alternatives for sending compostable materials to the Queens Botanical Garden.

Restroom Facilities

As PA/LGA renovates restroom facilities, hand dryers are being installed in the restrooms resulting in the removal of a tremendous number of paper towels. There are some paper towels in use in temporary restrooms. In addition, as restrooms are renovated, PA/LGA installs automatic faucets activated by placing hands under the faucet. Although no data is available to quantify the reduction in water usage, this measure has been documented to reduce the amount of water that is wasted by running faucets.

PA/LGA currently uses a double roll toilet paper sequenced system. The switch from single to double rolls reduced the amount of packaging waste generated.

Janitorial Services

WECO, the contracted janitorial service, has implemented several programs that reduce the amount of waste that it generates. WECO uses a 3-M blending system to mix water with concentrated cleaning solutions, which are then poured into pump containers for use by the janitorial staff. This results in fewer cleaning product containers in the waste stream.

Pest Control

The PA/LGA uses preventative measures to reduce pest problems. PA/LGA staff perform monthly health inspections of all food vending operations to ensure that food storage and waste handling operations are performed properly. These inspections are supplemented by yearly inspections by the New York City health department. Regular inspections reinforce proper procedures which lead to lower infestation rates and reduces the quantity of pesticides and rodenticides used by the PA/LGA's pest control contractor.

7. WASTE PREVENTION OPPORTUNITIES AND FEASIBILITY

The following section provides a discussion of the waste prevention opportunities that were presented previously in Exhibit 1. Where data is available, preliminary cost-benefit analyses have been prepared. For each cost-benefit analysis presented in this section, the assumptions used to calculate the costs and payback period are provided. These cost-benefit analyses should be considered as a starting point for the discussion and consideration of the waste reduction opportunities identified during the waste assessment; they are not conclusive. Where enough information was available, the estimated payback period (i.e., the length of time required to make the change cost-effective) is provided.

For the waste prevention opportunities selected by PA/LGA, SAIC will perform the necessary research and conduct a thorough cost-benefit analysis. Taken individually, each waste prevention opportunity may yield minor reductions in PA/LGA's waste stream. However, taken collectively, these opportunities, once implemented, represent a significant reduction in both the quantity and toxicity of the wastes generated and a significant reduction in the PA/LGA's waste management costs.

Waste Prevention Policy Directive

The PA/LGA might issue a waste prevention policy directive to all employees and tenants. Such a directive would state the PA/LGA's commitment to environmentally responsible policies and programs and require implementation of specific waste prevention and efficient materials management practices throughout the facilities. For example, the directive could mandate duplex copying of all multiple page documents. The directive might also provide for the establishment of an employee education session, provide for signage to remind employees of environmental behavior, mechanisms for tracking the effectiveness of environmental programs, employee and tenant environmental awards, and public education. Should the PA/LGA select this option for implementation, SAIC staff will provide assistance in drafting the policy directive and implementing the programs.

Reduce Paper Consumption

Paper products represent a significant portion of the solid waste generated by PA/LGA facilities. While recycling of waste paper products is preferable to disposal, the ultimate goals of the PA/LGA waste prevention program can be to reduce both paper consumption and the overall amount of waste paper generated.

Currently, PA/LGA purchases 960 reams of paper per year at an annual cost of more than $7,600. PA does not have a program targeting reduction of paper consumption in facility operations. Although the facility has a paper recycling program, this program does not appear to be particularly effective. Therefore, large amounts of paper continue to be purchased and discarded as solid waste.

PA/LGA could reduce the amount of paper waste generated and its cost of managing discarded paper by developing a facility-wide program to encourage staff to reduce paper consumption. Posters can be placed throughout the facility to remind and encourage staff to reduce their paper use. Some suggested methods to reduce paper consumption include:

Implementing a facility-wide double-sided copying policy. All PA copiers at LaGuardia are leased. The leasing company decides which type of copier to place in each area, depending on the number of copies made in the area. As a result, only some offices have copiers with double-sided capabilities. PA/LGA should specify that only copiers with double-sided capabilities be provided by the leasing company. In those offices that have copiers with double-sided printing capabilities, personnel can be encouraged to make double-sided copies whenever possible. Instructions on making double-sided copies can be placed near the copier for ease and increased participation in the program. This practice reduces the generation of office paper waste, and can greatly reduce paper purchases. Reducing the paper usage also reduces the amount of space dedicated as paper storage. PA/LGA can write contract specifications to include a requirement that the machine default to double-side or set the machine to require a choice between single- or double-side copy mode before copying.

Expanding and encouraging the use of electronic mail. While electronic-mail is available to office employees, it is not widely used. PA/LGA could reduce office paper waste generation by encouraging staff members to use electronic mail in place of paper memos and distribution copies. PA/LGA can host a short training course that provides staff members with an overview of the electronic mail system and how to access and use the system.

Identifying opportunities to reuse paper and paper products. Corrugated cardboard boxes, jiffy bags, manila envelopes and other paper products are reusable for their original function. In addition, paper with a single side remaining blank can be reused as scrap paper, message pads, and to print draft copies.

Reducing the consumption of office paper at the PA/LGA can significantly reduce the amount of paper products purchased, thereby generating substantive cost savings. For example, by implementing a double-sided copying policy and reusing once used office paper, the facility might reduce its paper consumption by as much as 50 percent, resulting in a savings of $3,800 per year. The facility also will reduce the cost of solid waste disposal of paper products and packaging materials.

Due to the fact that corrugated cardboard is not separated for recycling and that it is deposited into the trash compactor and containers, PA/LGA could not provide estimates of the quantity of corrugated cardboard that is disposed or the percentage of corrugated cardboard in the waste stream. Corrugated cardboard is generated by all operating units at the airport. PA/LGA can significantly reduce the amount of solid waste disposed each month by separating the corrugated cardboard for recycling. PA/LGA may want to consider designating a separate compactor for corrugated cardboard or leasing/purchasing a baler, depending on

which option is more likely to eliminate the possibility of contamination of the corrugated cardboard.

The addition of corrugated cardboard to a facility-wide recycling program requires staff training. Specifically, staff that are assigned to operate a corrugated cardboard compactor or baler need to understand that contamination of the recycled cardboard will result in the entire load being disposed of as trash. PA/LGA can design a system whereby access to the compactor/baler is limited. Limiting access will ensure that only trained PA/LGA staff are depositing corrugated cardboard into the compactor/baler and that other airline personnel are not depositing solid waste into the compactor/baler.

Implement a comprehensive office paper recycling program. PA/LGA can improve the current recycling program and separate office paper for recycling. The current program of co-mingling office paper with other recyclable materials contaminates the recycled paper and renders it trash.

Revise vendor specifications to ensure minimal packaging. PA/LGA can write specifications for vendors (*e.g.*, Corporate Express) indicating that overpackaged shipments will be refused. Inform vendors that when PA/LGA staff, who specify "no delivery of a partial shipments," receive a partial delivery, the delivery will be refused. PA/LGA management can empower administrative staff to make waste prevention decisions and can encourage PA/LGA staff to educate the vendors and suppliers on waste prevention measures. PA/LGA can consider writing specifications that requires vendors to use two-way and/or reusable shipping containers.

Implement a Rag Cleaning Option

Rags are used in most shops at PA/LGA for cleaning parts and absorbing spills. In addition, rags are used by the cleaning contractor in facility maintenance operations. These rags are currently discarded after a few uses as solid waste. In 1995, PA/LGA purchased 4,000 pounds of rags at a cost of $1,688 (approximately $0.42 per pound).

PA/LGA may consider the lease/purchase of machines that are capable of cleaning rags on-site. Exhibit 14 provides a cost breakdown of implementing on-site rag cleaning. Another option that PA/LGA may want to consider is investigating the availability of rag cleaning services. Under a rag cleaning contract with an industrial laundry service, clean rags are either purchased or rented through an industrial laundry service and soiled rags are collected in designated containers and picked up by the company.

Either of these options will reduce solid waste generation, as well as environmental liabilities associated with potential improper disposal practices. Costs associated with the new practice are significantly lower than the current procedures.

Exhibit 14. Preliminary Cost Comparison for Rag Options

Current Practice	Purchase Machine and Launder On-Site
Purchase Rags at $1,688 per year Dispose of 4,000 pounds of rags as solid waste: $88 Assumptions: 1. 500 lbs/compacted cubic yard of rags 2. Disposal fee is $11/compacted yard of waste ($330 per 30 cubic yard compactor)	Equipment Costs: Washing Machine $ 683 Small Industrial Dryer $ 440 Installation $ 100 $1,223 Operating Costs: Cleaning Agent $ 50/yr Utilities $ 120/yr Replace 33 percent rags/yr $ 562/yr $ 732/yr Payback = $1223 / ($1776 - $732) **Annual Savings = $1,044** **Payback = approximately 14 months** (Assumes one 16-20 pound load (4000 pounds per 250 days) of wash per day does not include maintenance and labor costs.)

Complete Changeover from Towel Dispensing Systems in Restrooms to Electric Dryers

As PA/LGA renovates restroom facilities, it removes paper towel dispensers and installs hand dryers in the restrooms. This produces a significant decrease in the purchase and disposal of paper towels. There are still some paper towels in use in some restrooms. PA/LGA may want to consider replacing all remaining towel dispensers with hand dryers. PA/LGA may recognize some increase in energy costs associated with the use of electric dryers. The increase in energy costs will be offset by the reduced purchase and disposal costs associated with paper towels.

Require Taxi Dispatch Contractor to Use Reusable Tickets.

The taxi dispatch system at LaGuardia is managed by a contractor. It is the contractor's responsibility to move taxis in and out of the terminal areas as quickly as possible. As taxis leave one of three bullpen areas, they are handed a sequentially numbered ticket to ensure that taxis follow in a first-in first-out schedule. As the taxi picks up its passengers, the numbered ticket is surrendered to the dispatcher at the terminal. The tickets

are then discarded in the trash. To reduce paper waste associated with taxi tickets, the PA/LGA could require the contractor to use a reusable ticketing system to reduce waste from taxi dispatch. From the purchasing information provided during the assessment, it appears that PA/LGA is spending approximately $5,700 dollars per year to purchase more than 810,000 disposable numbered tickets each year.

Follow-on research may identify procedures that other airports have implement to control taxi cabs. For example, some airports have designed a taxi-only curbed lane leading from the holding queue to the pick up point in front of the terminal. Research may uncover other solutions to the problem of monitoring taxi cabs.

Establish Waste Prevention Guidelines for Tenant Operations

Tenants are responsible for managing the waste that they generate and each tenant selects and negotiates an agreement with the waste hauler of his/her choice. As a result, there are multiple waste haulers on-site at LaGuardia airport. PA and each tenant have negotiated for different levels of service for both solid waste removal and recycling. The PA/LGA could develop source reduction and recycling guidelines for tenants, to reduce trash generated as a whole from airport operations. Once PA/LGA identifies the waste prevention opportunities for implementation and designs a more comprehensive recycling plan that meets NYC regulations, guidelines can be developed and presented to each tenant. The costs to develop the guidance includes PA/LGA staff time and minor costs to develop outreach materials. Should PA/LGA identify the development of waste prevention guideline as one of the recommendations for implementation, SAIC will identify the waste prevention opportunities available to the tenants and determine how PA tenant leases can be revised to incorporate a waste prevention requirement. For example, tenants can require suppliers to use reusable shipping containers, take back pallets and reduce the quantity of packaging materials delivered to the tenant facilities.

Consider Composting and/or Collection of Food Waste for Pick Up by Pig Farm

PA/LGA and the retail food tenants can consider implementing a food composting program to collect the food waste generated by the food court. In addition, PA/LGA can determine if a program to collect the food waste for pick-up by a pig farmer is feasible. The retail food tenants were not part of the assessment therefore, should PA/LGA identify this recommendation for implementation, SAIC will require the cooperation of the PA/LGA tenants.

Establish Green Building Specifications for New Construction

The Office of the Mayor is currently working with Columbia University to develop Green Building construction guidelines. These guidelines are expected to be completed within six to 12 months. The PA/LGA can track the development of these guidelines and implement them as part of any new construction projects. In addition, PA/LGA may want to review the

current construction projects at the airport and identify opportunities to incorporate environmentally preferable products and materials that are compatible with the ongoing construction. A review of the lighting specifications can determine if the most energy efficient fixtures and lighting will be installed. Although not considered waste prevention, PA/LGA may want to consider purchasing furnishings, floor coverings and carpeting that contain recycled content. A list of USEPA's affirmative procurement guideline items is included as Appendix B.

Use Reusable Mugs and Dishware in Administrative Areas

PA/LGA is spending more than $7,000 per year on disposable coffee cups and depositing 339,000 cups per year into the trash. To eliminate the cost of the cups and the disposal costs, PA/LGA can request that employees bring their own mug for coffee or PA/LGA can provide a reusable mug for each employee. In addition, PA/LGA can maintain a supply of reusable mugs for guests.

For example, assume PA/LGA purchases 450 (350 employees and 100 for guest use) reusable plastic coffee mugs with lids, made with 80 percent post-consumer industrial acrylic, and a lid at a cost of $2.40 each. PA/LGA will make a one-time purchase of $1,080. This will provide an annual savings of approximately $5,920. The payback period for this waste prevention opportunity is less than 2 months. Even if PA/LGA replaces lost or broken mugs every year, the cost is significantly less than purchasing the disposables.

Improve Energy Conservation

The rationale for including energy conservation as a waste prevention goal is that energy-saving practices reduce the demand for electricity. As a result, less greenhouse gases, heavy metals, boiler ash, scrubber residue, and spent nuclear fuel (the by-products of power products) are produced. In addition, acid precipitation is reduced. At the facility level, energy conservation can help to reduce operating costs.

The monthly energy usage data for the PA at LaGuardia Airport for 1995 is summarized below:

Electric - 2,780,078 KW hours per month at a total cost of $183,532 per month.

There are a variety of opportunities to improve energy conservation at the PA/LGA. Energy conservation strategies include:

Lighting

- Reduce lighting levels and the number of fixtures. Use energy efficient bulbs or fixtures as encouraged by EPA's Green Lights Program. The Green Lights information hotline for program, technical, and software support is (202) 775-6650.

- Turn off lights when not in use; install motion sensors or timers to automatically switch lights off when an area is unoccupied.
- Replace incandescent bulbs with fluorescent bulbs.
- Take advantage of natural sunlight; use top-silvered blinds and light colored finishes to reflect light or install glass panel atop office partitions.

Office Equipment

- Consider energy efficiency when purchasing/leasing new equipment.
- Turn off electrical machines such as fans, typewriters, calculators, and copiers when not in use.
- Use *Energy Star* computer and copier equipment designed to go into a "sleep mode" when idle.

Heating, Ventilating, and Air Conditioning (HVAC)

- Keep HVAC systems serviced and in top operating condition.
- Set core air temperature at the maximum allowable temperature required for proper equipment cooling; set office thermostats to 70 degrees Fahrenheit year round.
- Properly insulate walls, floors, and ceilings, install weather stripping and caulking, and install storm doors and windows .
- Install solar energy systems to reduce electric demand from HVAC systems.
- Plant shrubs around windy side of buildings to block wind and decrease building heat loss.

Change Air Filters Based on Need/Pressure Drop and Investigate the Feasibility of Reusable Air Filters

The air filtering operations throughout the PA/LGA facilities generate approximately 6,837 air filters of varying sizes per year at a cost of approximately $39,000. The filters are disposed by the filter maintenance contractor. Filters are changed on 4, 8, 12, 16 or 26 week schedules depending on the function of the equipment. PA/LGA should first ensure that filters are changed based on need and not based strictly on a schedule. Pressure drop across the filter should be measured to determine whether the filter requires a change.

The PA/LGA should investigate the feasibility of using reusable air filters. Reusable air filters are available in several types. Filter holding frames are available in standard and non-standard sizes. These frames hold the filter pads in place. The filter pads can be disposable but aluminum filters that are easily cleaned and serviced can also be used. While PA/LGA is not directly paying for the disposal of the filters, this cost is likely built into the maintenance contract costs.

Improve the Current Fluorescent Light Changeout System

PA/LGA currently generates numerous fluorescent bulbs for disposal/recycling each year because of the maintenance contract provisions. The current maintenance contract requires that all fluorescent light bulbs be changed once per year, whether or not they are burned out or not. This generates excess quantities of spent fluorescent tubes, many of which may be still functional. PA/LGA personnel explained that they believed that it was more cost effective to change out the bulbs in this manner rather than as they burn out. The PA/LGA has begun to recycle the tubes. However, additional resources and equipment costs could be saved if PA/LGA modifies its maintenance contract to replace bulbs as needed only.

VEHICLE MAINTENANCE

Purchase Aqueous-Based Parts Washing Systems

The Vehicle Maintenance shop currently uses a solvent sink maintained by Safety Kleen. The solvent used in this sink is changed approximately every 6 weeks. The PA/LGA is spending $1,620 annually to maintain the sink regardless of need.

PA/LGA should adopt a more environmentally friendly parts cleaning method. Choices include using a less hazardous cleaning solution in the existing sink, replacing the solvent solution in the sink less frequently, or replacing the existing solvent-based parts washing sink with an aqueous based system that is both less harmful to the operator and to the environment. For example, PA/LGA could reduce the fugitive air releases from the solvent and the quantity of hazardous waste requiring disposal. While it is preferable to replace the solvent-based parts washing operation with an aqueous or semi-aqueous system, recommendations also have been made for improving the existing system.

Continued Use Of The Existing Sink. If continued use of the existing solvent sink is necessary, the PA/LGA should both investigate changing the solvent solution less frequently and contact Safety Kleen regarding substitution of more environmentally preferable cleaning solutions. Changing the solution less frequently will reduce the contract cost as well as the quantity of waste solvent requiring disposal.

Aqueous-Based Parts Washing Systems. Several different aqueous cleaning methods have been developed that may meet the facility's needs. The two most popular methods are immersion with agitation (ultrasonic or mechanical) and pressurized, jet spray washers. For a small-scale cleaning operation, aqueous cleaner manufacturers recommend that the systems be used in a heated parts washing sink for maximum performance. A typical aqueous system combines heat and a caustic detergent to physically and chemically remove organic and inorganic contaminants. The detergent solution recirculates in the unit; oils are usually removed by an oil skimmer. Units range from inexpensive heated, drum-mounted parts cleaning stations to automated, fully-enclosed systems. Most of these systems use an aqueous

degreasing solution sold in a liquid concentrate form. Once mixed with water, the solution may be diluted as much as 10 times for general degreasing purposes. Depending on the contaminants from the parts washing operation, the facility may still have to dispose of the spent wash water as hazardous waste. Exhibit 15 provides a preliminary cost comparison for an aqueous parts washer.

Exhibit 15. Preliminary Cost Comparison for Aqueous Parts Washer

Assumptions: 1. Labor to perform job is less because of automatic operation 2. Limited additional labor to change filter and water in aqueous parts washer 3. Wastewater from aqueous parts cleaner is non-hazardous 4. The material generated from the aqueous parts washer is not hazardous	
Current Costs for Safety Kleen Service: $1670 per year	**Aqueous Parts Washer Cost:** (one time cost) $3,957 **Installation:** (one time cost) $500 **Detergents, Rust Inhibitors, Defoamers:** (annual cost) $250
Total: $1670	**Annual Savings: $1,420**
	Payback Period: 3.1 years

Example Vendors:

Graymills, 3705 N. Lincoln Ave., Chicago, IL 60613, (312) 477-8673,
Model DH 226-A, Heated water based drum mount; drum capacity 16 gallons, motor: 115 V, 60/50 Hz, 1 pH; heater: 115V, 1500W, 15A; price: $649.75; 55 gallon drum of Aquatene 330 concentrated (makes 275-500 gallons of degreaser): $303.75.

Better Engineering Mfg., Inc., 8361 Town Center Court, Baltimore, MD 21236-4964
(800) 229-3380

Impulse Model, 23.5"L X 17"W work rack, 12" work height, 220 V/1 phase, 4.5 kw of heat, 20 gallon tank, 1.0 HP pump; GSA price: $2,438.70;

Model 200-LS, 27" turntable diameter, 36" work height, 220 V/1 phase, 50 gallon tank, 6 kw heat, 2.0 HP pump; GSA price: $3,956.70. Detergents/Rust Inhibitors/Defoamers price range: $85.14 - $204.60.

Hotsy, 21 Inverness Way East, Englewood, CO 80112, (800) 525-1976
Model 287, 59H X 32"W X 34"D, water pump volume 24 gpm, water pump pressure 38psi, motor 220V, 1 pH, 1.5 HP; basket dia. 21" inside diameter; tank capacity 27 gallons; price: $2,750.00; Hotsy has a biodegradable detergent for use with this unit.

Kleer Flo, 15151 Technology Dr., Eden Prairie, MN 55244, (612) 934-2555, fax (612)934-3909.

Spraymaster, Model 300; 40" X 56"; 1.5 HP, 3 pH, 230/460V; diameter 30"; working height above turntable 26", load capacity 400 lbs; price $13,995 (larger model).

The models listed above are only an example of what the vendors have available. Several different sizes are available from each vendor.

Purchase A Bulk Distribution Rack

The Vehicle Maintenance shop purchases and uses fluids in quart- and gallon-sized containers. Purchasing commonly-used, non-shelf life sensitive products (such as oils, lubricants, antifreeze, and general purpose cleaners) in these smaller units of issue creates unnecessary waste that the facility must then pay to dispose. Major advantages of bulk distribution racks are: (1) reduced disposal of empty containers; (2) cost savings associated with purchasing in bulk; (3) reduced loss of product (*i.e.*, residual material left in smaller containers); (4) increased operating efficiency; and (5) conservation of valuable shop floor space.

The vehicle maintenance shop estimates using the following quantities of materials:

2,762 qts. Engine Oil @ ~$.99/qt
650 gallons Engine Oil (varies) $3.18/gal - $4.04/gal
660 qts Hydraulic Fluid @ $1.21

To reduce the loss of residual oil in the small containers and spills the facility can purchase and install a bulk fluids distribution rack for the VMF. Upon installation of the dispensing racks, non-shelf life sensitive products can be purchase in larger units of issue (*i.e.*, 55-gallon drums) and dispensed. The facility may need to continue purchasing some items in smaller units for the purpose of servicing a vehicle that is unable to be moved into the shop for service.

Purchasing products in bulk will significantly decrease the facility's costs. Typically, oil products cost up to 30 percent less when purchased in bulk rather than quarts or gallons. For example, engine oil costs approximately $0.99 per quart when purchased in bulk (versus $1.28 per quart in quart-sized containers).

Vendor Information:

Sauk Valley Equipment Co., 200 E. Third Street, P.O. Box 30, Rock Falls, IL 61071 (800) 435-7003 **Chief Systems Model HDS4-054100** (two-rack, four-drum dispenser)

Purchase a Crusher for Used Oil Filters and Recycle Used Filters

Although crushing and recycling used oil filters does not prevent waste it does reduce the volume of waste that PA/LGA disposes into a landfill. In addition, crushing and recycling the oil filters can decrease the toxicity of PA/LGA waste stream because more of the used oil contained in the filter can be captured and recycled.

Used oil and used oil filters in vehicles are regularly replaced. Typical oil change intervals are at least twice a year, leading to the generation of two used oil filters per vehicle. Used oil filters generally consist of a metal casing, an encased paper filter element, and a small amount of residual oil. The used oil filters are currently sent off-site in drums as nonhazardous waste. The facility should consider purchasing a used oil filter crusher to maximize the number of oil filters that can be placed in the drums for disposal as non-hazardous or solid waste. The crusher forces residual oil from the filter for collection and reduces the volume of the filter 70 to 80 percent of the original volume which makes storage of used filters easier. Vendors estimate that using a filter crusher reduces the filters' volume from 20 to 33 percent of the original volume. Oil filter crushers are generally stand-mounted, cabinet-type enclosures that utilize either a pneumatic or electric ram to crush the oil filters, a process which generally takes approximately 10 seconds. Crushing of oil filters can remove, depending on the size and design of the filter, up to 16 oz. of oil that can still be trapped after hot draining. Oil filters must drain for a minimum of 24 hours.

The potential benefits include: increased recovery of used oil for recycling, increased recovery of scrap metal for recycling, reduced risk of releasing used oil still trapped in the filter to the environment, and reduced disposal costs.

Vendor Information:

OBERG International, Inc. 6120 195th St., NE, Arlington, WA 98223; (206) 435-9100. Model P-50 for auto and light truck filters. Crushes one filter at a time and mounts on a 55-gallon drum. One time cost: $1,636. Model P-100C for crushing single or multiple filters at once. One time cost: $2,455.

PBR Industries, 400 Farmingdale Rd., West Babylon, NY 11704; (516) 422-0057 Model Jumbo Filter Crusher. One time cost: $3,025.

AUTOTOP of NA, Inc. 2608 Grisson Dr., Nashville, TN 37204; (615) 255-7434. Model EC200 Oil and Fuel Filter Recycling Center crushes and slices the filter canister apart to capture residual oil from the filter media. Includes a waste oil reservoir caddie for transferring waste oil to storage tank. One time cost: $3,461.

Gray Automotive Products Co., 1316 Frederick Ave., P.O. Box 728, St. Joseph, MO 64502; (800) 821-7320 or (816) 233-6121.

Industrial Press: Model QP-100, pneumatic. One time cost: $1,296.
Automotive Press: Model QP-50, pneumatic. One time cost: $702.

Airboy Sales Co. Inc., P.O. Box 2649, Santa Rosa, CA 95405; (800) 221-8333.

Automotive Press: Model AB-2008, TA457, electric. One time cost: $2,100.
Industrial Press: Model AB-1225, electric. One time cost: $4,200-5,500.

Hesco, 8505 N.W. 74th St., Miami, FL 33166; (305) 597-0243.

PA/LGA also could investigate establishing a used oil filter recycling program. By improving used oil filter management practices, PA/LGA will increase recovery of scrap metal, reduce the risks associated with accidental releases to the environment, and reduce solid waste disposal costs by diverting more material from the solid waste stream. Once crushed, the filters can be stored in 55-gallon drums for recycling by a local contractor.

Used Filter Hotline, 1-800-993-4583. A service of the Filter Manufacturers Council, this hotline provides information on state regulations and vendors accepting filters for recycling.

Purchase Re-Usable/Washable Filters For Vehicles

Currently, the Vehicle Maintenance shop uses conventional oil and fuel filters to maintain the fleet. The oil filters are replaced monthly on some vehicles filters; filters are changed in other vehicles every three months, 3,000 miles or every 100 hours of use. The oil filters are collected in a drum and disposed as a non-hazardous waste.

As an alternative to crushing and recycling the oil filters and to reduce the quantities of waste generated by spent filters and the costs associated with managing this waste, the VMF could integrate reusable filters into their maintenance schedule. Since reusable filters are cleaned and then reused, they eliminate the used oil filter waste stream. The filter contains a three-part system of stainless steel cloth instead of paper. The mechanic opens the filter casing and cleans the steel cloth filter in any solvent or aqueous parts washer. Reusable filters are cleaned during normal vehicle oil changes. Shop mechanics can clean the filters in a parts washer sink after allowing the fluids to drain from the filter. Ultrasonic cleaning systems have proven to be the most effective in cleaning reusable filters. Reusable fuel and oil filters are installed in the same manner as conventional filters and do not require any additional equipment or fittings. Reusable filters can be moved from vehicle to vehicle, so the capital investment in the filter will not be lost if a vehicle is later taken out of service. The filters can be used in a wide range of vehicles including General Motors, Chrysler, and Ford manufactured passenger vehicles and construction equipment. Use of reusable filters reduces the quantity and cost of purchasing oil filters. Labor costs may be equivalent or slightly higher for the reusable filter. In comparison to paper filters, the reusable filters increase oil flow and improve engine protection.

PA/LGA purchases 1,020 disposable oil filters per year at a cost of $5.00 per filter or $5,100 per year. In addition, PA/LGA pays $100 per drum to dispose of the used filters. Assuming that a 55-gallon drum holds approximately 100 uncrushed oil filters. The annual disposal cost for all filters is more than $1,000 per year. The combined cost for using disposable filters is more than $6,000 per year.

When considering changing from disposable oil filters to reusable oil filters, PA/LGA consider the example of a PA police car that requires a new oil filter once a month. At $5.00 per filter, PA/LGA will spend $60.00 per year for disposable filters for one police car. In addition, there is an added cost to dispose of the used oil filter. Should PA/LGA make a decision to switch to reusable oil filters, at a cost of $75.00 per filter, the payback will be less than two years. In switching to reusable oil filters, PA/LGA will recognize a minimal increase in the labor cost to place the reusable oil filter in the parts washer. The basic labor involved in an oil change will not change.

PA/LGA should consider specifying reusable filters and providing employee training so that the Vehicle Maintenance staff understand the benefits and the new process. PA/LGA may encounter some staff resistance to the new system and training will help offset some of the misunderstanding and will help transition the staff into the new procedures.

Vendor Information:

System 1 Filtration, 6080 Leonard Noell Drive, P.O. Box 1097, Tulare, CA 93275 , (209) 687-1955. Estimated price: oil filters range from $75.00 to $100.00.

Improve Spill Prevention And Cleanup Procedures

Personnel at several shops, including Vehicle Maintenance use drip pans when draining fluids from vehicles and equipment. However, the drip pans do not always fully capture the minor drips from the vehicles and equipment during servicing. Leaks were observed on the floor in some shops. Absorbent materials, including dry sweep and rags then are used to clean up these minor drips. The rags are disposed of as solid waste. Improving spill prevention practices and cleanup procedures will reduce raw material costs and waste generation and also may reduce labor time required to clean up unnecessary spills and leaks. Currently, PA/LGA pays approximately $4,400 dollars per year to dispose spent absorbent.

The shops can improve their spill prevention and cleanup practices to reduce waste generation. This involves a hierarchy of options which are listed below:

Replace Oil Pan Drain Plugs with Quick Drain Connectors

Oil changes for vehicles and ground equipment currently involves removing a plug from the oil pan and draining the oil into a collection basin, which is then emptied into a larger waste oil reservoir. The draining of oil into a collection basin and the subsequent

movement/emptying of the collection basin may lead to spills or other releases of waste oil. In addition, the current process of gravity draining may not remove all of the used oil from the engine (especially sludge that has settled to bottom of the oil pan). The total amount and cost of spill response material used to respond to spills directly related to oil changes was unavailable.

The VMF can consider replacing existing oil pan drain plugs with a bayonet style, quick connector. With this type of connector in place, the plug does not have to be removed for oil changes. Instead, a flexible hose connected to a suction pump is attached to the bayonet connector during oil changes to suction the used oil out of the engine into a stationary waste oil collection reservoir for disposition. Many sizes of bayonet style quick connectors are available to fit different vehicle oil pans. This system has the following benefits:

- Reduced likelihood of spilling oil during removal of the oil because there is no drain plug to remove.
- Reduced likelihood of spilling oil during the draining of the engine because a continuous hose connects the engine's oil pan with the shop's waste oil collection reservoir.
- Waste oil from engines is less likely to become contaminated during the change procedure (e.g., dirt from the underside of the engine falling into a collection basin). Cleaner oil is more desirable and valuable to recyclers.
- Oil changes can be accomplished more quickly. Up to approximately 5 quarts per minute can be drained with suction pump system.
- More dirty oil and sludge will be drained out of the engine with a suction pump assisted system. Approximately 2 to 6 additional ounces will be drained out of a typical automotive engine.
- A permanent bayonet style quick connector eliminates wear on the oil pan threads and eliminates problems associated with stripped or damaged drain plugs.

Use drip pans: Shop personnel can continue to use drip pans to collect the fluids during the draining process. The drip pans can be placed under the vehicles and equipment to collect minor drips and leaks during servicing. This will prevent the leaks from dripping to the floor which will reduce the need to use absorbent material or rags to clean the spills. This also will reduce labor time to clean the floors.

Shop Vacuum for Oil Spills: When spills occur, vacuuming spilled oil provides the most environmentally sound way of managing uncontained oil. This process ensures recovery of the spilled oil for recycling. Several vacuums are commercially available for use in wet or dry situations from the Pig Corporation: "VAC-U-MAX Vacuum" and "Minuteman Heavy Duty Industrial Vacuum" (see below for ordering information).

Reusable pads and wringer: If the shop does not have a vacuum, spill cleanup generated waste may be minimized by using reusable absorbent pads to clean the spills and leaks. (See

vendor information below) These pads are highly absorbent and can be used several times before disposal. Once the absorbent pads are saturated with oil, the pads are passed through a wringer that removes a large amount of the oil, allowing the pad to be reused. Depending on the amount of spills and leaks, the pad can be reused approximately 4 to 10 times before disposal.

Collect and reuse dry sweep: If it is not possible to use absorbent pads, shop staff should continue to use dry sweep. However, the dry sweep can be collected and reused. It is recommended that the shops purchase or construct a dry sweep "sifter." This device is simply a mesh screen which filters usable dry sweep from saturated dry sweep. The saturated dry sweep forms clumps which cannot pass through the screen, whereas the unclumped, clean dry sweep can be reused. A small trap door located at the bottom of the drum is then used to distribute the reusable dry sweep.

Hydrophobic Mops: A hydrophobic mop has a high viscosity oil mop head composed of 100% polyethylene, which makes it very effective at absorbing and containing oil spills. The advantage of using this type of mop head is that if other materials (*i.e.*, water, engine coolant) are part of the spill, the mop will only absorb the oil. The mop can be reused up to 7 times or more before disposal.

Reuse Rags and Absorbent Materials: To reduce wastes generated from spill cleanups, all material used to wipe, absorb, or clean-up spills can be reused to the maximum extent possible before being laundered or disposed. Applicable materials include rags, floor sweep, absorbent pads, or any disposable rags or towels. It is recommended that shop personnel designate two separate containers for rags, one for partially-used rags that can be reused and one for rags to be laundered.

Vendor Information:

Shop Vacuum Cleaners

New Pig Corporation, One Pork Avenue, Tipton, PA 16684-0304 (1-800-HOT-HOGS) has these three vacuums (at a one time cost) from which to choose:

VAC-U-MAX (TLS271J), $657
Minuteman Heavy Duty Industrial Vacuum for a 55-gall Drum (TLS274J), $749
Minuteman Heavy Duty Industrial Vacuum - 15 gallon capacity (TLS275J, $430

Absorbent Pads and Wringers

3M Corporation, Building 275-6W-01, PO Box 33275, St. Paul, MN 55133-3275, (800) 896-4223

Pads and Production Pads, Production Pad M-PD720GG, $7^{1/2}$" x $20^{1/2}$", 100/case
Pads and Production Pads, Pad M-PD1520DD, $15^{1/2}$" x $20^{1/2}$", 100/case
Maintenance Sorbent-Folded, Folded M-FL550DD, 5" x 50'/box, 3 boxes/case

Rolls, Rolls M-RL1510DD, 15[1/2]" x 150', 1/case
Rolls, Rolls M-RL33150DD, 33" x 150', 1/case
Rolls, Rolls M-RL38150DD, 38" x 150', 1/case
Wringer, A-WNGR-1

New Pig Corporation, One Pork Avenue, Tipton, PA 16684-0304, (800) 468-4647
RE-UZ-IT Pad (#PAD201, 15 pads/bale, 18" x 18", absorbs 135 oz. per pad); cost: $115/bale (if purchasing 10 or more bales)
LITE-DRI Absorbent (#PLP201, 22 lbs./bag, absorbs 11 gallons/bag); cost: $10/bag (if purchasing 1 to 12 bags)
Pig Squeezer, (#RNG202) (21" W x 24" H, 81 lbs/unit); cost: $695; Filters and Hardware (#RNG201-0001, box of 12, 23" diam. x 1/2" thick); cost: $39

Hydrophobic Mops

Automotive Service Counsel (ASC) San Jose Chapter 42, 1741 Saratoga Ave, Suite 215, San Jose, CA 95129; POC: Kathy Martinelli (408) 725-0500. Hydrophobic mops are $12.00/mop (plus shipping).

Absorbent Materials

Sorbent Products Co. Inc., 645 Howard Avenue, Somerset, NJ 08873, (908) 302-0080. (Polypropylene and cellulose in socks, mats, rolls, spill kits and drip pans.)

Oclanspill Inc., 601 S. Meadow Ln., El Campo, TX 77437, (800) 392-7736, "Oclansorb" (Incinerable).

Safety Kleen (Home Office), 1000 N. Randall Rd., Elgin, IL 60123, (800) 669-5740, "Corn Cob Fines".

Worldwide Environmental, 3901 NE 5th Terrace, Ft. Lauderdale, FL 33334, (800) 257-7236, "SorbAnt" (Polyisocyanurate Foam).

Breg International, 300 Central Road, P.O. Box 595, Fredericksburg, VA 22404, (800) 433-1013 (Polypropylene and cellulose fiber in drum covers, pillows, mats, rolls, etc.)

Improve Secondary Containment

The hazardous waste storage area did not appear to have secondary containment in case of accidental or incidental spills. In addition, containers of materials destined for disposal generally were not labeled. Having a strong waste management program will help avoid notice of violation citations and future liabilities from regulatory agencies. Proper hazardous waste management also helps reduce the potential generation of waste through mislabeling, improper storage and handling, and exposure to weather. Reducing the quantity

of hazardous waste generated, in turn, reduces the facility's reporting burden and cost of hazardous waste disposal. PA/LGA personnel stated that a hazardous materials storage locker was on order.

PA/LGA should provide secondary containment for materials stored in the hazardous waste storage area. Secondary containment can range from constructing a concrete berm around the storage area to using a dedicated building or outdoor storage locker. Other types of secondary containment include pallet systems, flooring systems and flammable/combustible storage cabinets which can store various size containers (5-gallon containers to 55-gallon drums). Most large storage lockers (or outside storage buildings) offer various optional features such as modular flooring systems, interior lighting, air conditioning and heating, chemical fire suppression systems, storage shelves, spill cleanup kits, spill containment sumps, sprinkler systems, and roller conveyer floors. Whatever storage secondary containment system is used, it should provide the facility with the adequate protection and comply with applicable regulations. It is generally good practice to store other wastes (i.e., waste oil, waste antifreeze, used oil absorbent pads) in well labeled containers with secondary containment and to develop a means of securing the containers if a secure centralized facility can not be used or is not available.

Secondary containment systems are available from a wide variety of vendors. Some are listed below:

Direct Safety Company, 7815 S. 46th St., Phoenix, AZ 85044; 1-800-528-7405. Double Drum Waste Collection Center - $699; 2-Drum Spill Control Pallets - $281; Spill Killer Containment Unit - $148.75.

C&H Distributors, 400 S. 5th St., P.O. Box 04499, Milwaukee, WI 53204; 1-800-558-9966. Polyethylene Spill Sump Basin - $45; 2-Drum Spill Container Base and Lid - $414.

P&D Systemtechnic, 3026 River Park Dr., Louisville, KY 40211; (502)776-7776.

Safety Storage Inc., 2301 Bert Dr., Hollister, CA 95023; (408)637-5955.

HazStor Hazardous Material Storage, 2454 E. Dempster St., Desplaines, IL 60016; (708)294-1000.

Precision Quincy Corp., 1625 North Lake Shore Dr., Woodstock, IL 60098; (815)338-2960.

Replace Lubricating Oil Used in Internal Combustion Engines with Synthetic Oil

The PA/LGA may want to investigate the applicability of replacing the currently used petroleum-based oil with synthetic oil. Synthetic oils are graphite-based lubricants that can be used to replace petroleum derived lubricants. Synthetic oils have been tested in a wide variety of temperature conditions, including Alaska, and have been found to out-perform petroleum

lubricants under these conditions. Mobil's synthetic oils have passed API service tests and satisfy SH, SG/CC, CD warranty requirements. Castrol's synthetic oils have passed API, SH/GD, CCMC, G-4, G-5, PD-2, and JASO wear tests, and exceed engine protection requirements ILSHC GF-1 API for certified engine oils and GN4718M.

Manufacturer tests have shown that synthetic oil lasts significantly longer and protects engines better than conventional oils. Over the long-run, vehicle and engine life should be extended. Synthetic lubricants have several advantages over petroleum lubricants. First, synthetic lubricants are more resistant to thermal breakdown than petroleum lubricants. Hence, synthetics last longer under normal operating conditions. Second, synthetics adhere better to engine parts to provide better lubrication during initial engine start-up. Hence, synthetics provide better protection to engine components. Lastly, synthetics distribute the concentration throughout the fluid matrix to protect the engine from wear due to particulate matter.

Although the cost per unit of synthetic oil is greater than the cost for conventional engine oils, synthetic oil proves to be cost effective because it is changed less frequently. Factors included in the cost benefit analysis are the savings in reduced labor spent on oil changes, and increased engine life-span. Also, reducing the frequency of oil changes may result in a cost savings from reduced spills and spill cleanup wastes. Preliminary cost-benefit analysis is demonstrated in Exhibit 16.

Exhibit 16. Preliminary Cost Comparison for Oil Usage

Petroleum-derived Oil	**Synthetic Oil**
Assumptions: Labor at $100 per hour 5 quarts per oil change One hour of labor to perform one oil change Perform 85 oil changes per year Oil 425 quarts @ $1.02 $ 434 Oil Filters (85) @ $5.00 per filter $ 425 Labor $100 x 85 hours $8,500 Total $9,359	**Assumptions:** Labor at $100 per hour One hour of labor to perform one oil change Oil changes performed at ¼ frequency Oil 106 quarts @ $3.60 per quart $ 382 Oil filters 21 @ $5.00 per filter $ 105 Labor $100 x 21 hours $2,100 Total $2,587 **Annual Savings: $6,772**

Implement a Tire Inspection and Maintenance Program

The VMF generates 400 to 500 automobile and truck tires per year at the VMF. The PA/LGA currently pays the tire vendor $1.00 to take auto tires and $3.00 to remove truck

tires. None of the tires used by PA/LGA are retreads/recaps. There did not appear to be any formal inspection and maintenance system for tires. The PA/LGA should develop a program of regular tire inspection and maintenance. This should include formalized inspection practices including check of inflation pressure, cuts, and abrasions. This type of inspection program can reduce the number of flat tires, fewer discarded tires, and fewer tires removed because of other damage or low tread depth. There also should be a concerted effort to save casings for recapping. The VMF should use retread tires when feasible.

Purchase Wastewater Recycling System for Vehicle Cleaning.

The PA/LGA washes its vehicles on an as needed basis using only water from a high pressure hose. The amount of water used and annual cost for washing operations are not tracked independent of the facility's total water usage.

PA/LGA could install wash water recycling systems to avoid discharge of contaminated wastewater to the sanitary sewer system. These units remove oils, grease, soils, and most other contaminants from the wash water and allow reuse, eliminating wastewater discharge and reducing the facility's consumption of water for washing operations by an estimated 90 percent. A wash water recycling system would greatly reduce the amount of water consumed as a result of vehicle and equipment washing operations and contribute towards the facility's water conservation. Some systems require construction of an inclined wash pad and installation of a submersible processing pump. Wash water from cleaning should be tested for metal concentrations to determine if a pre-metal isolation filter for the system is necessary. This system should be installed at the VMF.

Purchase an Antifreeze Recycler or Recycle All Used Antifreeze Off-Site

The PA/LGA Vehicle Maintenance shops at LaGuardia generate approximately 110 gallons of used antifreeze per year. This antifreeze is collected and disposed of as hazardous waste. Two options are recommended for consideration: (1) recycle all used antifreeze generated at a nearby off-site facility or (2) purchase an antifreeze recycling unit. Option 1 is a procedural change which may require additional labor, while Option 2 requires a capital expenditure but may reduce labor costs. If a recycler is available nearby, the facility may wish to implement Option 1 (which carries a lower cost). PA/LGA should reevaluate the option of buying its own antifreeze recycler if the volume of used antifreeze generated increases in the future. These options would help PA/LGA to reduce purchases of virgin antifreeze as well as the volume of waste antifreeze disposed.

Deicing

There are substantial opportunities for reduction, recovery and reuse associated with the use of ethylene or propylene glycol for aircraft deicing. Relocating deicing operations to a stationary dispenser allows aircraft to stop over a drain that captures glycol-based fluids for

reuse in non-aviation equipment. The Department of Energy and the Environmental Protection Agency co-funded a test of a new deicing system which reduces the quantity of glycol-based chemicals by up to two-thirds through improved application technology, reuse and recycling. This report does not address these opportunities because deicing is a separate operation of each airline. However, the Port Authority of NY & NJ should review deicing operations and opportunities with tenant airlines.

Develop A Facility-Specific Affirmative Procurement Program

Affirmative procurement consists of the purchase and use of environmentally preferable products and products and materials containing recycled content in the greatest amounts practicable, given resource and performance constraints. Affirmative procurement includes efforts to identify and purchase less or non-toxic substitutes for products with hazardous constituents.

Purchasing environmentally preferable products increases product life, reducing cost over the life of the product as well as cost of waste management and energy use. PA/LGA should purchase long-lived products such as synthetic motor oil, reusable sorbents, reusable air filters for the HVAC system, and rechargeable batteries, as well as Energy Star computers and other office equipment. Rag cleaning services also reduce waste through product reuse. New York City's Department of General Services/Division of Municipal Supply Services can provide life span analysis and vendors for environmentally preferable products and services.

Purchasing products with recycled content "closes the recycling loop" by stimulating demand for recovered materials. This helps to ensure that there will be a viable market for the recyclable commodities collected from PA/LGA and other facilities and organizations. PA/LGA should increase purchases of recycled content products. USEPA has published Procurement lines for 24 categories of products with recovered content including paper and paper products, retread tires, re-refined lubricating oil, engine coolants, insulation and office products such as waste receptacles, desktop accessories and binders. A complete list of the Guidelines is provided in Appendix B. Each Guideline specifies the minimum acceptable recycled content level for specific products. Lists of vendors of recycled products are available from USEPA through the RCRA Hotline at (800) 424-9346 Additional sources include the General Services Administration's *Environmental Products Guide* and the *Official Recycled Products Guide* available on a subscription basis on line or in hard copy from American Recycling Market, Inc., (800) 267-0707.

USEPA also has published a list of 17 chemicals targeted for reduction. Chemicals of concern include: Benzene, Cadmium and Cadmium compounds, Carbon Tetrachloride, Chloroform, Chromium and Chromium compounds, Cyanide compounds and Hydrogen Cyanide, Lead and Lead compounds, Mercury and Mercury compounds, Methylene Chloride, Methyl Ethyl Ketone, Methyl Isobutyl Ketone, Nickel and Nickel compounds, Tetrachloroethylene (Perchloroethylene), Toluene, 1,1,1-Trichloroethane, Trichloroethylene and all Xylenes. These solvents are typically used for cleaning small electronic components

and for degreasing. PA/LGA should review its purchases to identify those products that contain these constituents and change the purchasing specifications to require substitute products that do not contain the target chemicals. One list of alternative products is the Defense General Supply Center (DGSC) List of Environmentally Preferred Products. Some benefits of toxics reduction include reduced purchase and disposal costs, fewer reporting requirements, and improved worker health and safety.

Steps to initiate an affirmative procurement program include:

- Identification of environmentally preferable, recycled content, and non-toxic products
- Training of purchasing staff
- Developing and implementing a tracking program to monitor progress

Investigate Use of Rechargeable Batteries

Several shops at PA/LGA use alkaline batteries for various operations. The spent alkaline batteries are disposed in the trash. PA/LGA may want to investigate the possibility of using rechargeable batteries in place of alkaline batteries for some activities. Rechargeable batteries can be used in several nonessential functions, such as in flashlights for maintenance activities. Rayovac's patented *Renewal* batteries offer the high performance attributes of regular alkaline batteries along with the cost and environmental benefits of a reusable system. Renewal batteries are available in battery sizes AAA, AA, C, and D. The power stations for recharging batteries also are available from Rayovac. Exhibit 17 provides a preliminary cost-benefit analysis for AA batteries. PA/LGA may want to consider a pilot program with one or two operating units. This system must be set up so that there is a one-for-one swap of batteries at the stock room. This would not allow the issue of a new battery without the return of the discharged battery.

Exhibit 17. Preliminary Cost Comparison for Battery Options

Disposable Batteries	Rechargeable Batteries	
Assumptions: All batteries are discarded and they account for a small percentage of the waste disposed of each year. Purchase 4,176 batteries per year @ $0.28 per battery at an annual cost of $918	**Assumptions:** 3 chargers required 10 charges per battery Electricity and labor not included 418 rechargeable batteries @ $0.90 per battery 3 chargers @ $90 per charger **Annual Savings: $542** **Payback is approximately 6 months**	 $376 $270

Use Of Non-Aerosol Cleaners, Lubricants And Paints And Aerosol Can Puncturing And Recycling

The PA/LGA uses numerous paints, lubricants and cleaners packaged in aerosol cans. When empty, the aerosol cans are discarded as solid waste. The facilities should strive to purchase cleaners and lubricants in non-aerosol containers, reducing the VOCs. In the case of products available only in aerosol containers for which no alternative exists, the facility could purchase an aerosol can evacuator and set up a facility-wide program to collect and recycle aerosol cans. The cans can be combined with other metal scrap for recycling. The residual waste contents in the cans may require management as a hazardous waste.

If an aerosol evacuator is not purchased, the PA/LGA should develop a centralized aerosol can puncturing program to facilitate collection and recycling of aerosol cans for those products that can only be purchased in aerosol containers. Establishing a centralized aerosol can puncturing/recycling program should help the reduction of solid waste by diverting materials that would otherwise become solid waste to a recycler. In addition, the facility may realize the added benefit of cost savings associated with a reduction in its solid waste stream. The facility may also receive revenue from the sale of the cans as scrap metal. The aerosol can puncturing system should be placed in a centralized location to maximize usage. One recommended location would be a vehicle maintenance shop. Aerosol can puncturing systems can be utilized for all types of aerosol cans, including spray paints, gel coats, lubricating oil, etc. Using the aerosol can puncturing system for different types of aerosol products may result in the generation of a mixture of toxic and/or hazardous wastes, which are more costly to dispose. Separate drums should be designated for the collection of the different waste streams to prevent contamination. Collection bins, clearly labeled "metal," should be placed next to the puncturing system to collect the aerosol cans for recycling. The facility should also consider implementing techniques to 'advertise' the availability of the can puncturer for use by all facility shops. All shops should be required to take waste aerosol cans to be punctured and recycled at the centralized location.

An Aerosolv® aerosol can puncturer pierces the dome of the used can, relieving the pressure and collecting any residual liquids. The residual propellant is filtered of VOCs through an activated carbon cartridge. The system only takes seconds and once finished the can is ready to be recycled with other scrap steel. Before operating the aerosol can puncturer the operator should verify that the filter will handle the contents of the can to be punctured.

Aerosolv® Aerosol Can Recycling System
Waste Control Systems, Inc., 2835 Merrymans Mill Rd., Phoenix, MD 21131-1631
(410) 252-9360.

Special Item No. NIIS-F-0946, Aerosol Can Recycling System: Aerosolv Model 5100: $445.36.

Special Item No. NIIS-F-0947, Replacement Activated Carbon Cartridge Model 6363(pkg. of 2): $111.96. Cartridges may need to be replaced every couple years.

Purchase Environmentally-Preferable Paints and Supplies / Reduce Aerosol Spray Painting

Aerosol spray painting is performed at several shops at the PA/LGA to maintain equipment. Aerosol spray paint and the propellant contain high levels of VOCs and other constituents that may negatively impact the environment. To reduce environmental hazards, PA/LGA can consider incorporating environmental considerations into decisions regarding paint type and application method. These environmental considerations can be incorporated into the decision process regardless of whether facility personnel or contract personnel perform the work. The facility should ensure that the alternatives selected meet all applicable specifications. Advantages include reduced use of VOC-, CFC-, and metal containing paints and solvents, as well as reduced emissions. Other advantages include: reduced worker exposure to hazardous materials, quicker clean-up after painting and a reduction in the numbers of aerosol paint cans that are disposed of in solid waste bins.

Low VOC Paints: Paints, coatings, and primers that are low-VOC, no CFC, and/or lead-free are available.

Latex Paints: Use latex paints when possible. Major advantages to using latex paints include: soap and water clean-up, reduced worker exposure to solvent-based paint and cleaning solvents and are readily available. Facility personnel also can assess their need to use aerosol cans for painting operations. A brush can be used to conduct spot painting and a roller can be used to do larger jobs.

Low VOC Coatings:

Deft Coatings, 17451 Karman Avenue, Irvine, CA 92714-6295; (714) 474-0400; MIL-P-53030; primer coating, epoxy, water reducible, lead and chromate free. The primer is compatible with chemical agent resistant and other aliphatic polyurethane topcoats.

EM Industries, Inc., Pigment Division, 5 Skyline Drive, Hawthorne, NY 10532; (914) 592-4660; Afflair Pearl Lustre Pigments.

Maurer-Shumaker, Inc., 37025 Industrial Road, Livonia, MI 48150; (313) 591-0800; Altraseal Coatings; water-based and solvent-based organic coatings; (Altraseal, #6280, olive drab, $19.76/gal).

Recycled Paints: Latex paints made with post-consumer recycled paint also are available. These products are advertised as having 12 percent post-consumer recovered material. Prices are approximately $54 to $65 per 5 gallon can. Recycled paint meets all performance criteria.

Paint Brushes Made From Recycled Materials: Paint brushes made with recycled content are also available. Their prices range from less than $1.00 to $2.00 per brush, depending on brush width.

Revise Stock Room Procedures to Allow Issuance of Smaller Quantities of Materials and Returns of Unused Quantities

The PA/LGA stockroom carries 4,000 items that are purchased and delivered by the Port Authority of NY & NJ's Central Purchasing Department. There are additional items that are delivered by vendors directly to the PA/LGA stockroom. According to the stockroom staff, materials are only allowed to be dispensed in specified quantities. For example, if someone has a need for 10 nails to complete a small repair job the stockroom's computerized system does not allow only 10 nails to be released. One argument against issuing in smaller quantities is that additional paperwork and inventory requirements would be burdensome. The stockroom requires that the person making the request take a pre-set number of nails, in this case, a box of 100 nails. In addition, the stockroom is not designed to accept unused product or materials. Since leftover materials are not required to be returned or tracked, there is no data available on the amount of unused materials either discarded in the waste stream or stored indefinitely.

The PA/LGA stock room could revise its issuance system to allow for the use of smaller quantities of materials. For example, for commonly used items (e.g., nails, screws etc.) a small bin system can be set up to allow smaller quantities to be issued while maintaining inventory control.

Set Up A System That Allows Materials To Be Returned To Central Warehouse If Unused Or Unwanted

The stockroom currently is not allowed to return unwanted materials or supplies to the central warehouse for restocking at the central warehouse even if such items are in usable condition. It appears that stock may stay in the stockroom indefinitely. Once items reach their expiration date, they become a solid or hazardous waste and are discarded. PA/LGA could reduce wastes associated with expired shelf life by implementing a first-in first-out system.

Hazardous Materials Storage/Pharmacy

Hazardous materials in the stock room were well organized and properly stored. However, flammable cabinets in the carpentry room were used for general storage while flammables were found in regular steel cabinets. Flammable cabinets in the VMF were used to store corrosives. It is recommended that PA/LGA could set up a more formalized hazardous materials storage and stock system. The site visit suggested that an hazardous materials pharmacy would improve management of hazardous materials and wastes at the facility. The site visit revealed examples of multiple procurement mechanisms, inadequate

materials tracking systems, purchase of inappropriate products, improper storage of hazardous material and expired shelf-life and residual materials likely to become wastes. The PA/LGA could establish a single point of purchase and issue for all products and materials containing hazardous constituents. Such a system eliminates redundant purchases, discourages improper storage and stockpiling of chemicals, encourages reuse and recycling, reduces hazardous waste generation and disposal, and facilitates hazardous waste disposal record keeping. One of the primary purposes of implementing an HMP is to centralize the purchase, storage, distribution, and management of hazardous materials throughout a facility, as well as to allow for enhanced tracking of the movement of hazardous materials and wastes. The HMP approach provides cradle-to-grave control of hazardous materials.

Central control of hazardous materials offers several advantages. First, waste is reduced by closely tailoring the quantities issued to the needs of the user. Second, the pharmacy can track inventory, reducing or eliminating shelf life expiration problems. This saves supply dollars and reduces the risks and costs of external hazardous waste management. Third, the pharmacy coordinates material availability across a variety of operations and facilitates material reuse and/or recycling to limit the generation and disposal of hazardous waste.

Establish a Waste Prevention/Recycling Public Education Program

While it is important to ensure that the public understands and can easily participate in a comprehensive recycling program, PA/LGA also has a tremendous opportunity to begin public education on waste prevention. PA/LGA can develop an effective outreach program designed to promote waste prevention and recycling to both LGA employees and the travelling public. PA/LGA can develop displays and signage informing the public about PA/LGA's participation in the *NYC WasteLe$$* program and announcing the steps that they are undertaking to become more environmentally responsible. Once PA/LGA has selected specific waste prevention options for implementation, SAIC and PA/LGA can work together to identify effective mechanisms to promote PA/LGA's participation and successes. For example, SAIC can help PA/LGA to design and install a display highlighting waste reduction in airport operations and perhaps visually tracking the waste reduction on an annual basis over several years. Signage over hand dryers can point out the reduction in solid waste and disposal costs achieved by removal of paper towels. The carts utilized by cleaning and maintenance staff can display a sign indicating that only non-toxic products are in use and highlighting the cost and environmental benefits of those products. In addition, PA/LGA can work with airlines and other tenants to develop additional public outreach mechanisms. For example, airlines could include waste prevention messages on electronic sign boards. Food vendors may encourage customers to ask for items--napkins, condiments, straws etc.--that they will use, rather than doling them out in unlimited quantities. PG/LGA has extensive opportunities to have a positive influence on public behavior.

Improve Construction and Demolition Debris Management

PA/LGA generates approximately 10 cubic yards of C&D waste per week. PA/LGA can reduce the quantity of C&D waste disposed through the following practices in its own construction projects as well as requiring contractors to use C&D waste reduction practices.

Reduce the Quantity of C&D Debris Generated

The first step to reducing the amount of debris generated from C&D activities is to reduce the amount of excess construction material. Often, construction materials are overpurchased by about 10 percent. The key to minimizing waste during construction lies in the planning process. Builders should consider when they will need materials and how excess materials from one part of the project might be used in another. For example, lumber cut-offs can be used as spacers in wall construction and sawdust can be used for landscaping or can be composted.

Improper storage can cause material damage. If materials can be ordered incrementally, the potential for loss from damage is diminished. When materials such as lumber and drywall are stored, it is important that they be protected from rain and other adverse weather conditions and stored off the ground.

Using engineered wood products as opposed to dimensional lumber may reduce C&D debris by up to 10 percent. Engineered lumber will not warp and will be relatively free of defects.

Reuse C&D Debris

Reuse is often the best option for C&D materials that have been overstocked or that are off-specification. Materials such as bricks, paint, drywall, wood, and insulation that go unused in a construction project can be stored for later use. However, since warehousing often is more expensive than buying new materials for the next job, materials often are landfilled. Instead of landfilling, these materials can be delivered to C&D debris recyclers for reuse or they can be donated to groups such as Habitat for Humanity for construction of low-income housing, schools, community centers, or other projects.

Refurbish C&D Debris

A primary factor that should be taken into account during design and construction is how easily a structure can be disassembled for reuse during the demolition process. Many businesses have gone beyond recovering immediately reusable items into actually refurbishing and marketing the fixtures from building renovations and demolition. Items that are most easily refurbished include cabinets, doors, plumbing and lighting fixtures, tile, carpeting, door hinges, wall paneling, restroom mirrors, and stairway banisters.

Recycle C&D Debris

In most instances, up to 90 percent of a given C&D debris wastestream can be recycled. However, while recycling of C&D debris is an important element of waste reduction, it is always preferable to prevent the waste or material from being generated in the first place.

Before initiating a demolition project, contact local C&D waste recyclers to determine which materials they will accept. Some materials must be source separated; others may be separated and processed by the recycler. For example, materials such as concrete, roofing materials, and structural wood cannot be reused as recovered from C&D debris. Recyclers separate the various components of the waste stream with magnetic, manual, air, and water separation systems. Potential markets for recovered C&D debris are presented in Exhibit 18.

Exhibit 18. Potential Markets for Recovered C&D Debris

MATERIAL	POTENTIAL USES
Asphalt/tar roofing materials	Road repair materials; Walkway/path construction
Concrete	Aggregate for new concrete or use in septic tanks, roadbeds, drainage fields, fill, driveways, pipe bedding
Metal	Smelter or foundry input for manufacture of new metals (ferrous and nonferrous metals)
Glass	Recycled glass; aggregate for roadway construction
Plastic	Plastic lumber
Wallboard	New wallboard; agricultural fertilizer (gypsum)
Dirt	Soil/soil conditioner; Fill material; Landfill cover
Wood	Mulch; Groundcover; Compost bulking agent; Animal bedding; Molded wood; Cogeneration/boiler fuel; Cordwood (clean)

Improve Recycling Policies and Procedures

PA/LGA should review the specifications for the "Container System for Recyclable Materials/Waste Disposal" contract and where necessary revise the language to ensure that the PA/LGA receives rebates for recyclable commodities and to ensure that the waste hauler provides cost-effective waste management services. SAIC will work with PA to develop contract bid specifications targeting waste prevention and recycling.

Currently, PA/LGA uses a "one can system" throughout their offices and operations, excluding the public use areas, to collect recyclables. As part of the current collection system, glass, aluminum and metal are supposed to be collected and separated by the cleaning staff. However, all of the recyclable material is then co-mingled in a 30 cubic yard compactor. P&F Trucking, Inc. informed PA/LGA that it separates the materials off-site for recycling. Compacting all of the recyclable materials renders the glass and paper not marketable and therefore, these materials must be disposed as solid waste.

Recycling programs are a critical method for diverting materials from disposal and reducing the amount of solid waste disposed. Improving the PA/LGA's existing recycling program and adding additional materials to the recycling program would help the facility to reduce solid waste disposal needs and costs.

Scrap Metals - Only some shops are participating in the metals recycling program. Various metals are valuable and could be reclaimed when they have outlived their initial purpose. Facilities could also identify and collect metals (often left to rust/degrade) and sell them for scrap. Materials such as crushed oil filters, punctured and drained oil filters, punctured and drained aerosol paint cans and other metal items can be included in metal recycling programs.

Aluminum Cans - Aluminum cans are currently collected and the deposit is redeemed by employees. Beverage containers are prevalent and should be collected for recycling. The aluminum will generate revenues for the PA/LGA and reduce the quantity of solid waste that is removed from the waste stream.

Wood -Large quantities of scrap wood might have value for resale or energy recovery. At a minimum, scrap wood generators could collect wood scrap for use in future projects and make such materials available for use by any shops throughout the facility.

Pallets and Shipping Materials - wooden pallets and crates are currently discarded with solid waste. Pallets and crates should be collected for reuse at the facility. Extra pallets and crates could be sent back to the Central Warehouse via the stock room.

Glass and Plastic - These materials can be source separated for recycling.

Toner Cartridges - Toner cartridges can be sent back to the manufacturer using prepaid shipping labels (Hewlett Packard). Local recyclers are also available that reuse the parts of the toner cartridge.

The facility has incentives to capture as many recyclable materials from their solid waste stream as possible. Capturing materials for recycle will reduce the amount of solid waste generated and may reduce the cost of managing the solid waste generated. Currently, it

is difficult for the facility to quantify the impact of its paper/cardboard recycling programs because accurate quantities of solid waste and recyclables are not tracked. The facility can improve its recycling program by implementing the following activities:

Improve recycling awareness to increase participation. This may include: staging contests to reward organizations that collect the most aluminum cans or paper; and posting signs reminding personnel to recycle.

Make recycling convenient. This includes providing bins in all areas where materials are generated. These bins are available from commercial sources or can be constructed using empty drums, crates, boxes, wood or metal depending on the material to be collected.

Schedule regular collections. It is critical that routinely generated materials are collected on a regular basis. In doing so, the facility staff will have storage space available for their recyclables. To do this, the facility engineer should work with the janitorial staff to ensure they routinely collect recyclables and place materials in centralized staging areas.

Establish centralized staging areas. These areas will be used to store materials generated throughout the facility and the point of pickup by the contractor

Establish or modify existing contracts to establish removal of new recyclables. In some instances, it may be more profitable for a facility to haul its recyclables to a company that buys recyclables.

Periodically review market values to ensure facility is getting the best value for materials. It is critical to track the local recycling market to verify that your facility is receiving the best price for valuable materials and is minimizing cost on money losing materials.

Establish Pallet Storage and Reuse Area

Stock room activities generate numerous pallets. Some of these are reused by the stock room but numerous pallets were noted throughout the facility. Usable pallets could be collected and placed in a central storage area for reuse at LaGuardia. If there are excess pallets, these can be collected and returned to the central warehouse for reuse.

Consider Participation in Other Waste Reduction Programs

PA/LGA may wish to consider participating in other waste reduction programs such as the NYC Partnership for Waste Prevention, the EPA Wastewi$e program, or the CONEG Challenge. Beyond furthering PA/LGA's waste reduction goals, participation in such

programs can greatly increase the public's perception of PA/LGA as an environmentally conscious organization.

8. CONCLUSION

The options presented in this report represent the primary and most feasible waste prevention opportunities identified by the SAIC assessment team during the April 9-10 on-site assessment of the Port Authority Operations at LaGuardia Airport. These options are provided for consideration by the Port Authority. As part of the NYC *WasteLe$$* program, the Port Authority will select those options that it would like to pursue. SAIC, in conjunction with the NYC Department of Sanitation, will then investigate in more detail the technical and economic feasibility of implementing the selected options and provide further recommendations. Based on these recommendations, the Port Authority will then choose which options to implement as part of the NYC *WasteLe$$* program. Again, SAIC will provide assistance in implementing the selected waste prevention options as well as assistance in tracking and documenting the success of each option.