Final Report
Waste Characterization Study

Prepared For:

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INTRODUCTION AND BACKGROUND

The Solid Waste Management Authority of Puerto Rico (SWMA) contracted with Wehran Puerto Rico Inc. (WEHRAN) to conduct a Waste Characterization Study at the 31 landfills and 2 transfer stations in Puerto Rico.

The scope of the services contracted by SWMA is summarized below.

WASTE STUDY PROTOCOL

A Waste Characterization Study Plan (Protocol) was prepared to assist the SWMA in evaluating solid waste disposal activities at the 31 landfills operating in Puerto Rico. The Protocol focused on the project objectives:

a. Identify the solid waste sources; commercial, industrial, institutional or residential.

b. Identify the types of waste being disposed;

c. Identify the amounts of waste (by weight and volume) received daily at the landfills and the daily average amount of waste received by source (commercial, industrial, institutional or residential).

WASTE MEASUREMENTS

Waste measurements were made at 31 landfills to determine the weight and volume of the solid waste being disposed of on the Island. Waste measurements were conducted for one week at each site and compiled information on the source of the waste, generators, date, route and other relevant data.

WASTE CHARACTERIZATION

To provide an estimate of the waste composition (types of waste) being disposed at the landfills, waste characterization was performed at 12 selected landfills and 2 transfer stations.

RESAMPLING OF WASTE CHARACTERIZATION

For the landfills at Cabo Rojo, Fajardo, Vieques and Culebra a second sampling for waste characterization was performed after a holiday week (Independence Day weekend) to measure the impact of the vacationing population at these sites.

LANDFILL PERIMETER DELINEATION

The perimeter or footprint of the 31 landfills was delineated using the Puerto Rico State Plan Coordinate System – North American Datum of 1983 (NAD 83). This information is provided as points, lines, and polygons in shapefile format to be used with ArcView, in Appendix I of the Final Report.

STATISTICAL ANALYSIS

Data and statistics are provided on the amounts of waste deposited at each one of the landfills. Comparable data are presented for the four landfills which were resampled. The statistical data allow for comparisons of volume, weight and characteristics of waste being deposited at the landfills.

MEETINGS

WEHRAN has met periodically with SWMA to discuss project status, information on completed activities, coordination and logistics issues, and other issues related to the project.

MONTHLY REPORTS

WEHRAN has been delivering to SWMA Monthly Progress Reports summarizing previous month activities.

FINAL REPORT

A Final Report has been prepared and has been submitted in writing and in electronic format, Word 2000. The data base is presented in electronic format Access 2000.

CONTRACT AMMENDMENT

On August 13, 2003 a contract amendment was executed which authorized WEHRAN to conduct supplemental work in connection with this project. The scope of the services contracted by SWMA in this amendment is summarized as follows:

Waste measurements to record the weight and volume of waste throughout one (1) week at the Yabucoa, Peñuelas, Ponce, Humacao, Toa Baja and Arecibo landfills. Also measurement for weights and volumes were performed at the Caguas and San Juan Transfer Station for a period of one (1) week each.

Waste characterization activities throughout one (1) week at the Ponce, Humacao, Toa Baja and Arecibo landfills. Waste characterizations activities were also performed at the Caguas and San Juan Transfer Stations for a period of one (1) week each.

The perimeter of the Yabucoa and Peñuelas landfills was delineated.

The tasks contained in the August 13, 2003 contract amendment have been completed and this Executive Summary and the Final Report contain the results from these additional activities.

METHODOLOGY

A Waste Study Protocol was developed and used as a guide to conduct field activities. The Waste Study Protocol addressed procedures and sample forms that WEHRAN used for the Waste Measurements at 31 Landfills, 2 transfer stations and the Landfill Perimeter Delineation, health and safety concerns, as well as, daily safety briefings with project team members.

Four separate crews were utilized to conduct the weekly work effort at four different landfills simultaneously. A summary of the methodology and field activities is presented in this section.

WASTE MEASUREMENTS

Each crew measured the weight and volume of each vehicle delivering solid wastes to the landfill or transfer station in accordance with the protocol.

Preparation and Logistics

The crew performing the waste measurement task at each facility consisted of one Task Manager and two laborers. The working hours of the crews varied among sites, as their working hours matched each facility's operating hours for a period of one week (including weekends). The laborers were trained for the tasks they were performing during the study and were also trained in health and safety precautions and procedures. Each crew had its own portable scales to weigh each truck that entered the landfill. The Task Managers and the laborers were trained in how to use the scale. They set up and calibrated the scale every morning and demobilized it every evening. Some landfills already had operating scales. At these sites, the crews used the landfill's scale readings for the study and did not set up separate scales.

Data Gathering

Each crew gathered the following data for each vehicle transporting waste to the landfill or transfer station:

- Date and Time of Delivery
- Vehicle License Plate

- Transporter Name
- Municipality of Origin
- Type of vehicle entering the landfill (e.g., rear loader, front loader, roll off, trailer, dump truck, etc.), documenting waste (container) volume
- Time Schedule of Collected Route
- Type of wastes (C&D, Automobile, MSW, Yard Waste, Special Waste)
- Weight of each vehicle entering and leaving the landfill, documenting net weight

Each crew completed the Daily Traffic Log to document the data gathered as part of this task. On a weekly basis, this data was entered into an electronic database and double-checked for accuracy against the handwritten forms.

Schedule

The schedule for the field portion of this project was developed to collect data at four landfills each week. The project schedule is presented in Figure E-1.

WASTE CHARACTERIZATION

Waste characterization activities were performed concurrently with waste measurement activities at the selected landfills and transfer stations.

The waste samples were separated into containers according to the waste categories specified for the Waste Characterization Study by the SWMA (Appendix A). The sorting team dumped a manageable amount of waste onto the sorting table. Each team member was responsible for extracting materials that could be sorted into the designated containers. Sample weights were recorded along with truck identification and net weight information on the Waste Characterization Data Sheet. On a weekly basis, data was entered into an electronic database and reviewed for accuracy.

The purpose of this part of the study was to provide an estimate of the waste composition (type of wastes) being disposed at the landfills. The waste characterization was generally done following the ASTM Standard Test Method for Determination of the

Composition of Unprocessed Municipal Solid Waste (ASTM D 5231-92). In addition, duplicate characterization was performed at specific sites to estimate the effect of holidays on waste volumes and characteristics.

The waste characterization study was performed at the following 12 landfills:

- Ponce
- Mayagüez
- Jayuya
- Salinas
- Yauco
- Arecibo
- Toa Baja
- Humacao
- Cabo Rojo
- Fajardo
- Vieques
- Culebra

Four of the 12 landfills were sampled a second time to compare holiday impact of the vacationing population in these municipalities. The four landfills were:

- Cabo Rojo
- Fajardo
- Vieques
- Culebra

Supplemental waste characterization was conducted in September 2003 at the four largest landfill sites (Humacao, Ponce, Toa Baja, and Arecibo) and at transfer stations in San Juan and Caguas.

The methods that were utilized to complete the waste characterization are described in detail in the Protocol and are summarized below.

Waste sorting operations were planned and conducted to coincide with landfill operations at each selected landfill and transfer station. The crew was present at the selected site at the time that the facility opened for introductions, briefing, training, and mobilization. Sampling and sorting activities took place during facility operating hours each sampling day. The work schedule for the waste characterization crews was limited to 40 hours weekly (typically 8 hours daily, Monday through Friday). In the event that inclement weather conditions (i.e., heavy rain) required a stoppage, additional hours were worked during that week's facility operating hours (i.e., more than 8 hours on subsequent weekdays or Saturdays) to complete the 40 hour schedule.

The waste sort required a crew of 5, in addition to the task manager. The crew members staffed the sorting table and assisted the task manager with the weighing of materials.

Personal protective equipment and other required equipment and support supplies were provided for each sorting crew.

Prior to beginning project field activities, a training session was scheduled where all project personnel were trained in the expectations of the waste measurements and waste characterization tasks. This training was held at an active landfill and included a demonstration of and hands-on participation in the various required tasks. In addition, the task managers met with the sorting crews at the beginning of each work day to review the technical and safety expectations for the waste sort.

Sample Collection

Vehicles were selected randomly throughout each day for sampling. At the beginning of the day, a waste vehicle was selected from those ready to tip their loads by drawing a random card from a deck where each card represented one truck. For example, if there were 4 trucks ready to tip, the 1 through 4 of hearts were shuffled together and one card was drawn. If the 3 of hearts was drawn, the third truck was selected for sampling. As the sorting of each load was completed and the crew was ready to collect the next sample, the next available truck was selected for sampling.

Loads that were not well suited to hand sampling were visually estimated and their weights matched to scale house records. Typically, a significant proportion of self-haul waste and uncompacted roll-off boxes have loads that were either made up of only a few materials, were difficult to sample accurately due to bulk of items, or both. Supplementing the hand sampling of bulky roll-off boxes and self-haul waste with visual estimates, where appropriate, improved the sampling crew's productivity. In addition, vehicles containing special wastes (e.g., asbestos waste) or liquid wastes (e.g., tuna packing waste) were not selected for sampling.

The sampling crew assisted the task manager in collecting the following information about the selected loads:

- Name and or type of business or organization producing the waste
- Vehicle number and route number, if applicable
- Gross vehicle weight and tare weight
- A description of the dominant waste type, if relatively homogeneous, using the following categories: C&D, Automobile, MSW, Yard Waste, Special Waste.
- The Solid Waste Source: Residential, Commercial or Industrial.

Waste sampling generally followed ASTM D-5231. Each selected vehicle was directed to tip in a designated area near both the sorting area and the landfill's working face or the transfer stations tipping floor. After the selected vehicle has discharged its load, the skid steer loader was used to collect approximately 800-1,000 pounds of the load by extracting bucket loads from numerous locations longitudinally along one entire side of the tipped waste load and placing them at the sample preparation area. Sampling personnel attempted to obtain a representative cross-section of the entire tipped load for sample preparation.

The skid steer loader was used to mix the waste at the sample preparation area until the waste appeared fairly homogenous. The loader then quartered the homogenized pile and one quarter was selected as the sorting sample by drawing one card from 4 cards (each card representing one quarter). Sampling staff collected this random sample into plastic waste bins, or other suitable containers, and moved them to the sorting area. The remaining three quarters of the sample was moved back to the working face of the landfill on transfer station tipping floor.

Once the waste samples were collected, they were separated into containers according to the waste categories specified for the Waste Characterization Study by the SWMA. The sorting crew dumped a manageable amount of waste onto the sorting table. Each crew member was responsible for extracting materials that can be sorted into the designated containers nearest them.

After the sample had been sorted, waste category weights were recorded along with truck identification and net weight information on the Waste Characterization Data Sheet. On a weekly basis, this data was entered into an electronic database and double-checked for accuracy against the handwritten forms.

LANDFILL PERIMETER DELINEATION

Concurrent with the waste measurement and waste characterization activities, the perimeters of the 31 landfills were delineated and surveyed.

The perimeter delineation was directed by the Task Managers, based on visual interpretation of the limits of waste placement. A 2-man survey crew utilized differential phase positioning global positioning system (GPS) equipment to locate the perimeter delineation in the field relative to the Puerto Rico State Plane Coordinate System North American Datum of 1983 (NAD83).

SUMMARY

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This procedure provided a 1.00 meters or less accuracy on baselines, but since the landfill perimeters are not clearly defined, the accuracy level to be certified on footprint data will be ± 5 meters on horizontal plane and ±10 meters on vertical plane.

Survey point data collected from the perimeter of the 31 subject landfills was imported into ArcView, converted to a shapefile, and checked for spatial accuracy against field sketches and by plotting on the USGS Quadrangle for the area

Metadata was created for the point and polygon shapefiles in accordance with the Federal Geographic Data Committee (FGDC) standard (FGDC-STD-001-1998).

SUMMARY OF RESULTS

WASTE MEASUREMENT RESULTS

Table E-1 presents the results of the weekly waste measurements at each of the 31 landfills in Puerto Rico. Waste measurements at 29 of these landfill sites were conducted between May 19, 2003 and July 19, 2003, while measurements at the Peñuelas and Yabucoa landfills were conducted between August 25, 2003 and August 29, 2003. Results show a weekly total of 69,211 tons discarded at all 31 landfill sites. Nearly 72% of this waste was characterized as municipal solid waste (MSW), based on the characteristics of the waste delivery vehicle. For example, compactors and large transfer trailers, where waste was not visible, were characterized as MSW, as were loads that contained mostly MSW but included materials that would be separated into yard waste or other categories in the characterization study. Nearly 19% of this waste was characterized as construction and demolition debris (C&D), while yard waste and special waste, each represented about 4% and 5% by weight, respectively. Discarded automobiles, the final category from waste measurements represents less than 1% of the observed waste deliveries.

Table E-2 shows the results of the weekly waste measurements at the 31 landfills by day of the week. The table shows that waste deliveries were generally evenly distributed throughout the week, Monday through Friday. Monday waste delivery totals are somewhat diminished because the Guaynabo landfill was closed to waste deliveries on Monday May 26, 2003 (Memorial Day). The Friday waste delivery totals are also somewhat diminished to the occurrence to the July 4th holiday during the period of measurement for the Cabo Rojo, Fajardo and Vieques landfills. Waste measurements were not made at those landfills on July 4th. Saturday waste deliveries are generally lower because many landfills are either closed on Saturdays, or are open for fewer hours than during a weekday. This is due to a generally diminished schedule of waste collection on Saturdays.

Table E-3 shows the results of the weekly waste measurements by reported municipality of origin. The top ten municipalities listed in the table account for approximately 50% of the total weekly discards. As expected, the Municipality of San Juan, which has the largest population in Puerto Rico, is the leader in reported waste

discarded. This pattern is generally followed among the other most populated municipalities, with a few exceptions. The municipality of Cataño is reported as the second largest waste generator, which is greatly out of proportion to its population. This is an anomalous result which is due in part to the location of two privately operated transfer stations in Cataño at the time of the waste measurements. One transfer station, operated by BFI, delivered its waste to the Ponce and Salinas Landfill. A second transfer station, operated by ARB, delivered its waste to the Toa Baja landfill. In both cases, the waste measurement program reported this waste from these transfer stations as originating within Cataño. WEHRAN believes that most of this reported waste did not actually originate in Cataño, but instead was from sources in other municipalities in the metropolitan San Juan area which delivered their waste to the one of these transfer stations. Waste deliveries to these transfer stations were not measured as part of this study.

Table E-4 shows the results of the weekly waste measurements by landfill where the waste was delivered. The top three landfills, Humacao, Toa Baja, and Ponce, account for nearly 45 % of the weekly waste disposal. The top ten landfills listed in the table account for nearly 75% of the total weekly waste disposal.

Based upon the weekly waste measurement results, an island-wide estimate of waste discards can be made for all of Puerto Rico. These results are presented in Table E-5. Assuming that the weekly measurements are representative of average annual conditions, an estimated 3.6 million tons of solid waste will be delivered for disposal to landfills in Puerto Rico in the year 2003. Using population data from the 2000 Census, this translates to an average discard rate of 5.18 lb / person / day.

These estimates can be used for comparison to estimates of waste generation and discards that are made by the United States Environmental Protection Agency (USEPA). In their report on MSW generation for the year 2000, the USEPA estimates per capita MSW generation rate to be 4.51 lb / person / day. After considering recycling and composting, average MSW discards after recovery are now estimated by EPA at a rate of 3.15 lb / person / day. This rate has continued to decline from its estimated peak of 3.77 lb / person / day in the year 1990.

As shown on Table E-5 the corresponding rate of MSW discards is Puerto Rico is approximately 3.91 lb / person / day. This rate reflects the exclusion of C&D debris, special waste, and automobiles, which are not included in the EPA estimates of MSW. This per capita discard rate may also be slightly overestimated, due to the use of population data from the 2000 Census. If year 2003 population of Puerto Rico is higher than year 2000, then a lower per capita discard rate would result.

SUMMARY

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Follow-up waste measurements were made during the holiday week of July 7, 2003 at landfills in Cabo Rojo, Culebra, Fajardo and Vieques. These communities are holiday resorts and were expected to exhibit increases in waste generation during a holiday week. Table E-6 presents a summary of the totals tonnages of waste delivered to these sites on both the week of June 30th and the week of July 7th. Overall, a 37% increase in weekly waste delivery was exhibited at these landfills during the holiday week.

Table E-7 presents a comparison of the total tonnages at each of these four sites during the two week period, by waste type. C&D and MSW increased by 34% during the holiday week, while yard waste increased by 116%. Special Waste was identified at the Cabo Rojo and Fajardo landfill during this holiday week. Automobile waste decreased significantly during the holiday week at these four landfills.

Supplemental weekly waste measurements were made at 4 landfill sites during September 2003 in order to examine trends in seasonal variation. Table E-8 presents a comparison of these results for the Humacao, Ponce, Toa Baja, and Arecibo landfills. These are the four largest landfills in Puerto Rico as measured by waste acceptance, and collectively account for over 50% of the recorded waste disposal on the island. Table E-8 indicates, there is little seasonal variation when the waste measurements at all four landfills are considered as a whole.

Table E-9 presents a comparison of the supplemental waste measurement results by waste type. No substantial differences in waste composition are apparent from the comparison. During September 2003, nearly 74% of the waste was characterized as municipal solid waste (MSW), compared with 77% during June 2003. During September, over 17% of this waste was characterized as construction and demolition debris (C&D), compared to about 15% during June.

During the week of September 2 through September 7, 2003, weekly waste measurements were also performed at the Transfer Station sites in San Juan and Caguas. Table E-10 presents a comparison of these measurements by waste type. The San Juan Transfer Station handled almost 7,000 tons during that week, with over 82% MSW, 16% C&D and about 1.5% yard waste. The Caguas Transfer Station handled about 1,700 tons during that week, with almost 97% MSW, and about 1.5% each for C&D and yard waste.

WASTE CHARACTERIZATION RESULTS

Detailed analysis of waste composition was conducted at 12 landfill sites. This work commenced on the week of June 16, 2003 through the week of June 30, 2003, with four sites sampled each week.

Table E-11 presents the results of this waste characterization for each of the 12 landfills during the initial 3 week characterization period. Yard waste, C&D and Organic waste are consistently the largest three waste fractions at most of the 12 landfills. On average, yard waste is the largest fraction, at 23%. This is much larger than the estimated 4% yard waste fraction developed from the waste measurement and presented in Table E-1. This difference is explained by the fact that the waste measurement assessment of waste types relied exclusively on visual characterization of waste as it came across the weigh scales. During the waste measurement program, waste delivered in packer trucks and other enclosed vehicles was routinely categorized as MSW. What this waste characterization program has shown is that significant quantities of yard waste are being delivered in these enclosed vehicles, and that this represents a very sizable fraction of the waste stream at this point in time.

The average C&D debris fraction at the 12 landfills examined is 17.1%, which is only slightly less than the estimated 18.7% C&D debris fraction developed from the waste measurement and presented in Table E-1. This consistency is expected because most C&D debris is delivered in open containers or vehicles, and these can be effectively characterized by visual observation at the landfill entrance.

Organic waste is the third highest category, averaging 12.4% of the waste characterized at the 12 landfill sites.

It is worth noting here that the overall averages presented above, and in the average column on the far right hand side of Table E-11, should not be inferred to be representative of waste composition for Puerto Rico as a whole. Some of the landfills presented in Table E-11 are among the largest in Puerto Rico, while others are very small. The computation of an island–wide average should be weighted to reflect the relative size of each of the 12 landfills measured. WEHRAN has made this estimate of island-wide waste composition, using a weighted average based on each of the landfills respective weekly tonnage. The results of this weighted average are presented in Table E-12.

It should also be noted that the waste characterization study did not include a separate category for electronic waste, such as TVs, telephones, and personal computers. These waste were included in the “not otherwise defined” category, or Plastic Type 3, or

Ferrous Metals as appropriate. The detailed records of the waste characterization study can be examined to determine if there were any weight records of these materials that could be quantified. Interviews with site supervisors indicated that there was no significant waste deliveries of this type observed. During supplemental waste measurements which were undertaken in September, 2003, special attention was paid to categorize the electronic waste component. No significant quantities of electronic waste were observed.

Table E-13 presents the results of this waste characterization for each of the 4 landfills and 2 transfer stations where supplemental waste characterization was performed during September of 2003. As with the initial waste characterization results, yard waste, C&D and organic waste are consistently the largest three waste fractions at most of these sites. Table E-14 presents a weighted average composition for September 2003, based on the results from the 4 landfill sites only. These results from September 2003 are very similar to the results from June-July 2003, indicating no substantial variation in waste composition between these two seasons.

Waste characterizations were also performed during the holiday week of July 7, 2003 at landfills in Cabo Rojo, Culebra, Fajardo and Vieques. Table E-15 presented these results, in comparison to the waste characterizations which were performed at these same landfills during the previous week of June 30, 2003. With some exceptions, the percentage of waste in each category remained consistent week to week. At the Cabo Rojo landfill, yard waste fraction declined by over 10 percentage points during the week of July 7th, while the "not otherwise defined" fraction increased by almost 7 percentage points. At the Fajardo landfill, the C&D fraction increased by over 7 percentage points during the week of July 7th, while the "not otherwise defined" fraction decreased by over 5 percentage points. At the Vieques landfill, the yard waste fraction declined by over 8 percentage points during the week of July 7th, while the organic waste fraction increased by over 6 percentage points.

Table E-16 presents a comparison of waste characterization at the 4 landfill sites that were subject to the supplemental seasonal waste characterization study. These 4 landfills are estimated to account for about 50% of the waste discarded Puerto Rico. Yard waste is the largest waste component at all 4 of the landfills, averaging almost 22% overall, and increased between June and September at 3 of the 4 landfill sites. Organic waste is the second largest fraction at 2 of the 4 landfill sites, averaging nearly 12% overall. The organic fraction decreased between June and September at 3 of the 4 landfills. C&D debris was either the second largest or third largest fraction at each of the 4 landfill sites, but averaged nearly 16% overall. The C&D fraction decreased between June and September at 3 of the 4 landfills.

LANDFILL PERIMETER DELINEATION RESULTS

Table E-17 shows the results of the landfill perimeter delineation conducted at each of the 31 landfill sites. It presents a Total Impacted Area of approximately 3,592,713 square meters or nearly 888 acres for all the 31 sites surveyed during our Waste Characterization Study. The top ten landfills listed in the table account for about 60% of the Total Impacted Area, and account for over 68% of the weekly waste disposal. On the other hand, the top four landfills (Arecibo, Ponce, Toa Baja and Humacao) represent about 32% of the impacted area, but account for about 50% of the weekly waste disposal.

Table E-18 shows the results of the landfill perimeter delineation along with the weekly tonnages for each landfill and an average of weekly landfill tonnage per acre of impacted area. This average represents a type of index of environmental efficiency, with more tons per acre representing a higher level of efficiency. Due to the high capital cost of landfill liners and leachate collection systems, landfill facilities which have these improvements have an economic incentive to maximize the amount of waste disposed of over any given landfill area.

TABLE E-1
WASTE MEASUREMENTS RESULTS
TOTAL WEEKLY TONNAGE
(BY TYPE OF WASTE)

WASTE TYPE	WEEKLY TONNAGE	%
MSW	49,463	71.5%
C & D	12,943	18.7%
YARD WASTE	2,733	3.9%
SPECIAL WASTE	3,636	5.3%
AUTOMOBILES	436	0.6%
TOTAL	***69,211***	***100%***

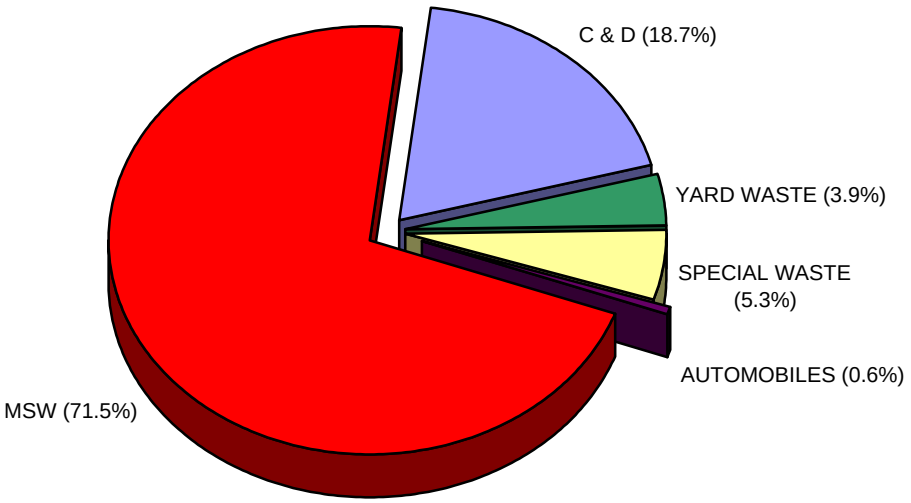


TABLE E-2
WASTE MEASUREMENTS RESULTS
PERCENTAGE OF TOTAL WEEKLY TONNAGE
(BY DAY OF THE WEEK)

DAY OF WEEK	% TOTAL TONNAGE
MONDAY (1)	19%
TUESDAY	20%
WEDNESDAY	21%
THURSDAY	20%
FRIDAY (2)	16%
SATURDAY	5%
TOTAL	***100%***

Notes

(1) No waste delivered on Monday (May 26, 2003) at the Guaynabo Landfill.

(2) No waste delivered on Friday (July 4, 2003) at the following landfills: Cabo Rojo, Fajardo and Vieques.

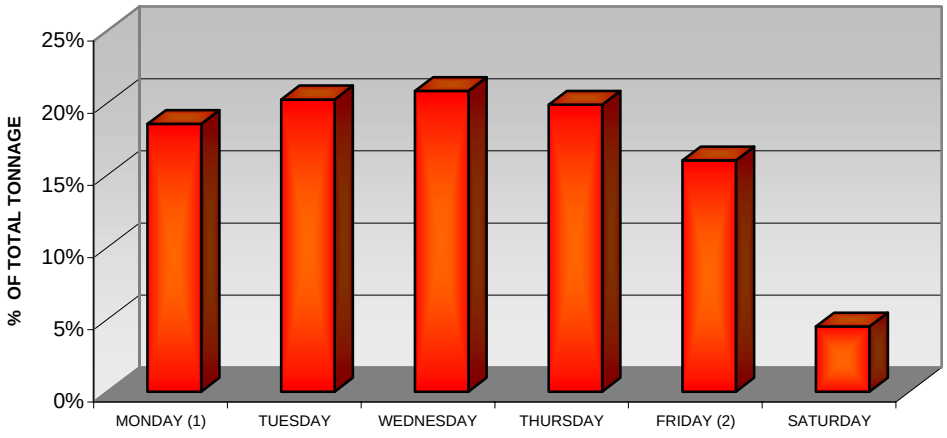


TABLE E-3
WASTE MEASUREMENTS RESULTS
TOTAL WEEKLY TONNAGE
(BY MUNICIPALITY OF ORIGIN)

	MUNICIPALITY	TOTAL TONNAGE	% OF TOTAL
1	***San Juan***	8,148	11.8%
2	***Cataño***	5,078	7.3%
3	***Ponce***	4,762	6.9%
4	***Carolina***	3,206	4.6%
5	***Caguas***	3,104	4.5%
6	***Bayamon***	2,894	4.2%
7	***Arecibo***	2,056	3.0%
8	***Mayaguez***	1,980	2.9%
9	***Toa Baja***	1,855	2.7%
10	***Guaynabo***	1,748	2.5%
11	***Humacao***	1,421	2.1%
12	***Guayama***	1,406	2.0%
13	***Aguadilla***	1,296	1.9%
14	***Canovanas***	1,248	1.8%
15	***Juncos***	1,226	1.8%
16	***Juana Diaz***	1,111	1.6%
17	***TrujilloAlto***	1,080	1.6%
18	***Salinas***	1,004	1.5%
19	***Toa Alta***	1,004	1.5%
20	***Cayey***	947	1.4%
21	***Fajardo***	872	1.3%
22	***Barceloneta***	843	1.2%
23	***Vega Baja***	829	1.2%
24	***Ceiba***	751	1.1%
25	***Manati***	701	1.0%
26	***Santa Isabel***	697	1.0%
27	***Ciales***	681	1.0%
28	***Yauco***	676	1.0%
29	***Cidra***	610	0.9%
30	***Cabo Rojo***	596	0.9%
31	***Isabela***	592	0.9%
32	***San Sebastián***	588	0.8%
33	***Rio Grande***	584	0.8%
34	***Añasco***	551	0.8%
35	***Vega Alta***	531	0.8%
36	***Coamo***	522	0.8%
37	***Moca***	488	0.7%
38	***Hatillo***	482	0.7%
39	***Yabucoa***	460	0.7%
40	***Gurabo***	455	0.7%
41	***Barranquitas***	451	0.7%
42	***Las Piedras***	451	0.7%
43	***San German***	388	0.6%

TABLE E-3
WASTE MEASUREMENTS RESULTS
TOTAL WEEKLY TONNAGE
(BY MUNICIPALITY OF ORIGIN)

	MUNICIPALITY	TOTAL TONNAGE	% OF TOTAL
44	***Aguada***	380	0.5%
45	***Lajas***	376	0.5%
46	***Guanica***	363	0.5%
47	***Quebradillas***	363	0.5%
48	***San Lorenzo***	362	0.5%
49	***Peñuelas***	353	0.5%
50	***Camuy***	352	0.5%
51	***Aibonito***	351	0.5%
52	***Guayanilla***	349	0.5%
53	***Corozal***	326	0.5%
54	***Utuado***	322	0.5%
55	***Morovis***	318	0.5%
56	***Loiza***	303	0.4%
57	***Naranjito***	292	0.4%
58	***Arroyo***	289	0.4%
59	***Rincón***	288	0.4%
60	***Hormigueros***	281	0.4%
61	***Naguabo***	276	0.4%
62	***Lares***	262	0.4%
63	***Sabana Grande***	258	0.4%
64	***Dorado***	245	0.4%
65	***Jayuya***	232	0.3%
66	***Aguas Buenas***	220	0.3%
67	***Adjuntas***	212	0.3%
68	***Patillas***	195	0.3%
69	***Villalba***	186	0.3%
70	***Luquillo***	179	0.3%
71	***Orocovis***	172	0.2%
72	***Comerio***	155	0.2%
73	***Florida***	132	0.2%
74	***Maunabo***	125	0.2%
75	***Vieques***	123	0.2%
76	***Culebra***	99	0.1%
77	***Las Marias***	60	0.1%
78	***Maricao***	39	0.1%
	TOTAL	***69,211***	***100%***

TABLE E-4
WASTE MEASUREMENTS RESULTS
TOTAL WEEKLY TONNAGE
(BY LANDFILL)

LANDFILL	TONNAGE	%
1 ***Humacao***	12,951	18.7%
2 ***Toa Baja***	9,496	13.7%
3 ***Ponce***	8,500	12.3%
4 ***Arecibo***	3,791	5.5%
5 ***Juncos***	3,753	5.4%
6 ***Yauco***	3,136	4.5%
7 ***Salinas***	2,906	4.2%
8 ***Aguadilla***	2,697	3.9%
9 ***Carolina***	2,255	3.3%
10 ***Fajardo***	2,167	3.1%
11 ***Toa Alta***	1,965	2.8%
12 ***Peñuela***	1,951	2.8%
13 ***Juana Diaz***	1,827	2.6%
14 ***Vega Baja***	1,516	2.2%
15 ***Mayaguez***	1,516	2.2%
16 ***Añasco***	1,076	1.6%
17 ***Guaynabo***	1,061	1.5%
18 ***Cabo Rojo***	963	1.4%
19 ***Guayama***	821	1.2%
20 ***Moca***	771	1.1%
21 ***Isabela***	567	0.8%
22 ***Cayey***	558	0.8%
23 ***Arroyo***	536	0.8%
24 ***Barranquitas***	492	0.7%
25 ***Florida***	487	0.7%
26 ***Yabucoa***	399	0.6%
27 ***Lajas***	356	0.5%
28 ***Hormigueros***	271	0.4%
29 ***Jayuya***	206	0.3%
30 ***Vieques***	123	0.2%
31 ***Culebra***	99	0.1%
TOTAL	***69,211***	***100.0%***

TABLE E-5
WASTE MEASUREMENTS RESULTS
ESTIMATED ISLAND-WIDE DISCARDS

RESULTS	
TOTAL WEEKLY TONNAGE	69,211
WEEKS PER YEAR	52
ESTIMATED TONS PER YEAR	3,598,972
DAYS PER YEAR	365
ESTIMATED TONS PER DAY	9,860
ESTIMATED POUNDS PER DAY	19,720,000
PUERTO RICO POPULATION (2000 Census)	3,808,610
AVERAGE DAILY DISCARD RATE PER PERSON	5.18 lbs
% MSW AND YARD WASTE	75.4%
AVERAGE DAILY DISCARD RATE (MSW & Yard Waste)	3.91 lbs

TABLE E-6
WASTE MEASUREMENTS RESULTS
COMPARISON OF HOLIDAY WEEK AT SELECTED SITES
(TOTAL TONS)

LANDFILL	WEEK OF June 30, 2003	WEEK OF July 7, 2003	% CHANGE
Cabo Rojo	962	1,397	**45%**
Culebra	99	133	**33%**
Fajardo	2,167	2,888	**33%**
Vieques	123	159	**29%**
Total	***3,351***	***4,576***	**37%**

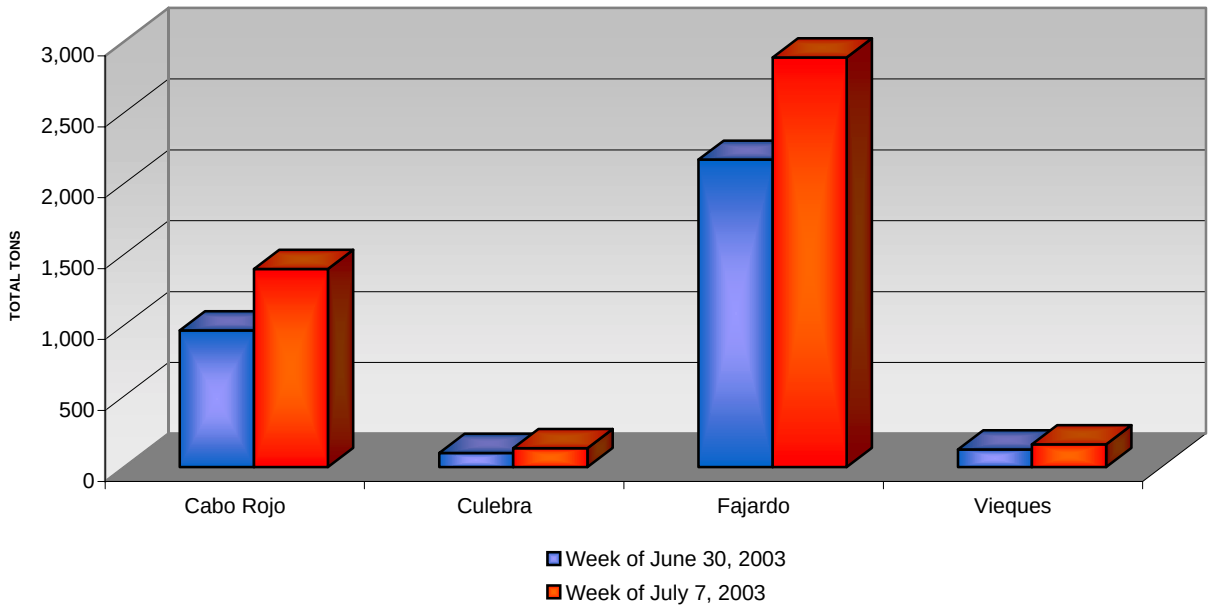


TABLE E-7
WASTE MEASUREMENTS RESULTS
COMPARISON OF HOLIDAY WEEK AT SELECTED SITES
(BY WASTE TYPE IN TONS)

WASTE TYPE	WEEK OF June 30, 2003	WEEK OF July 7, 2003	% CHANGE
C&D	618	830	**34%**
MSW	2,571	3,445	**34%**
YARD WASTE	133	287	**116%**
SPECIAL WASTE	0	9	
AUTOMOBILE	30	4	**-87%**

Note: Waste Measurements from 4 Landfills in Cabo Rojo, Culebra, Fajardo and Vieques.

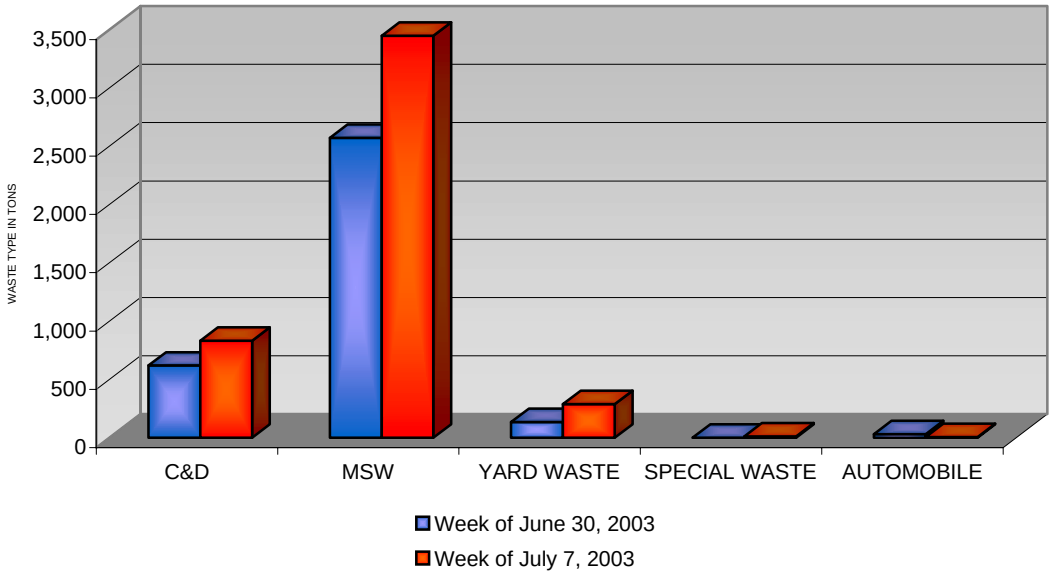


TABLE E-8
WASTE MEASUREMENTS RESULTS
COMPARISON OF SUPPLEMENTAL WEEK AT SELECTED SITES
(TOTAL TONS)

LANDFILL	WEEK OF JUNE 2003	WEEK OF SEPTEMBER 2003	% CHANGE
Humacao	12,951	12,252	**-5%**
Ponce	8,500	9,880	**16%**
Toa Baja	9,496	9,542	**< 1%**
Arecibo	3,791	3,406	**-10%**
Total	***34,738***	***35,080***	**1%**

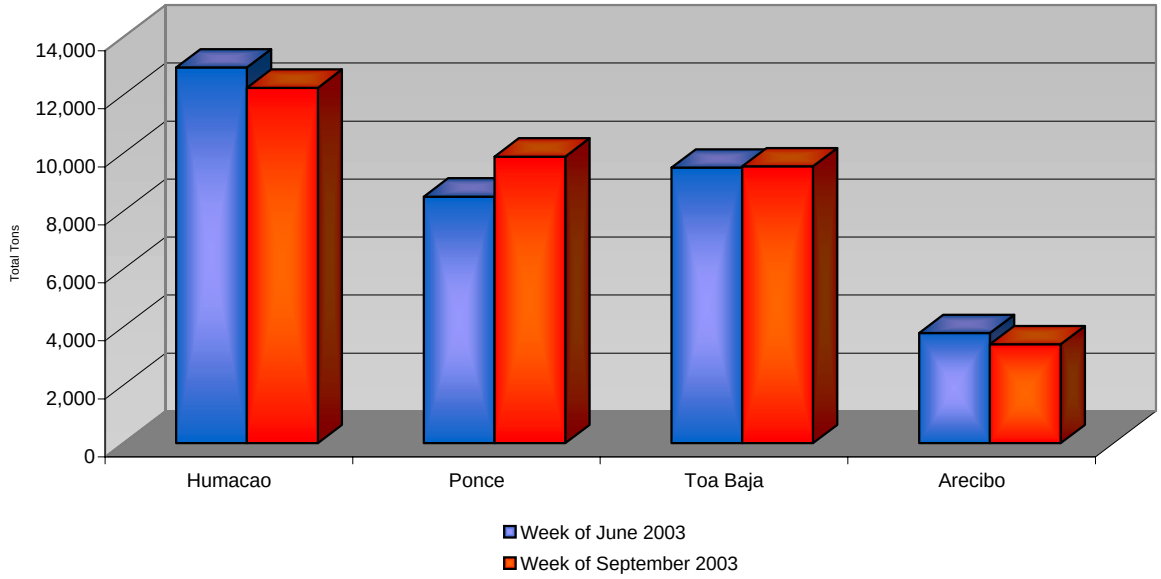


TABLE E-9
WASTE MEASUREMENTS RESULTS
COMPARISON OF SUPPLEMENTAL WEEK AT SELECTED SITES
(BY WASTE TYPE IN TONS)

WASTE TYPE	WEEK OF JUNE 2003	%	WEEK OF SEPTEMBER 2003	%
C&D	5,193	15.0%	6,043	17.2%
MSW	26,656	76.7%	25,903	73.9%
YARD WASTE	1,065	3.1%	586	1.7%
SPECIAL WASTE	1,646	4.7%	2,434	6.9%
AUTOMOBILE	178	0.5%	114	0.3%
	34,738	**100%**	**35,080**	**100%**

Note: Waste Measurements from 4 Landfills in Humacao, Ponce, Toa Baja and Arecibo.

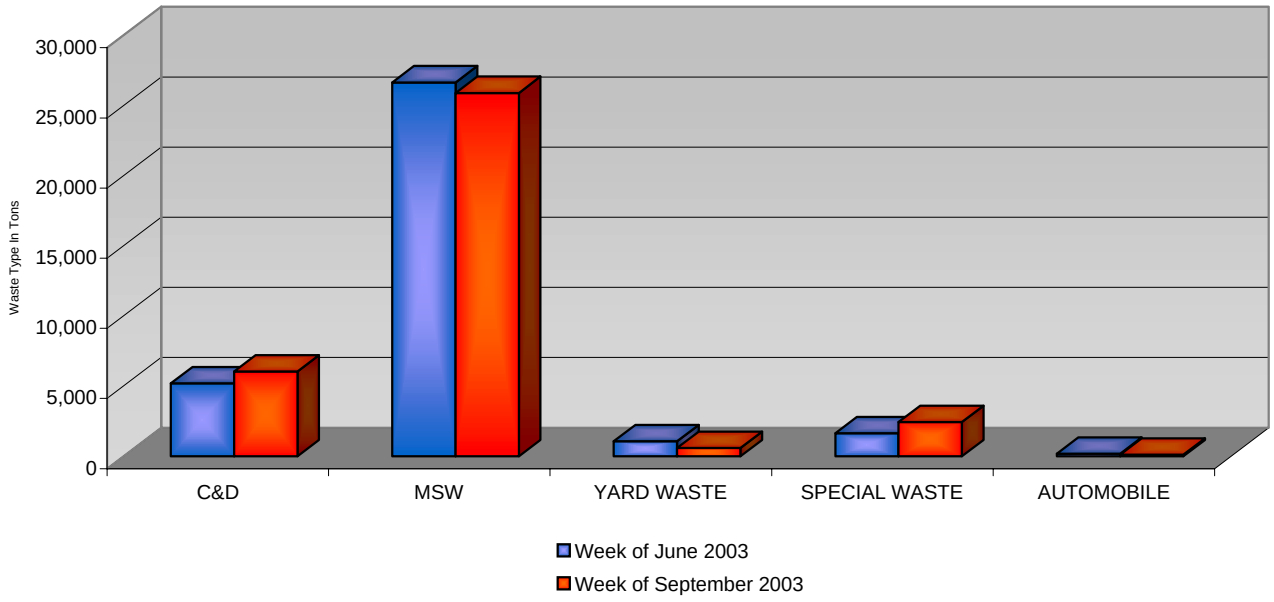


TABLE E-10
WASTE MEASUREMENTS RESULTS
COMPARISON OF TRANSFER STATIONS
(BY WASTE TYPE IN TONS)

WASTE TYPE	SAN JUAN TRANSFER STATIONS	%	CAGUAS TRANSFER STATIONS	%
C&D	1,081	15.5%	27	1.6%
MSW	5,727	82.3%	1,654	96.7%
YARD WASTE	152	2.2%	29	1.7%
SPECIAL WASTE	0	0.0%	0	0.0%
AUTOMOBILE	0	0.0%	0	0.0%
TOTAL	**6,960**	**100%**	**1,710**	**100%**

Note: Waste Measurement Results at Transfer Stations Were Taken fron September 2, 2003 to September 7, 2003.

TABLE E-11
WASTE CHARACTERIZATION RESULTS
JUNE 2003

Component		Arecibo	Cabo Rojo	Culebra	Fajardo	Humacao	Jayuya	Mayaguez	Ponce	Salinas	Toa Baja	Vieques	Yauco	Total Average
Plastic	Type 1 – Polyethylene	0.94%	1.29%	1.15%	1.12%	1.08%	0.70%	0.98%	0.92%	1.01%	1.05%	1.13%	1.62%	**1.08%**
	Type 2 - HDPE	3.58%	2.98%	1.03%	2.97%	1.46%	1.50%	1.31%	3.96%	2.22%	2.97%	0.84%	6.26%	**2.59%**
	Types 3 – 7 (PVC, LDPE, PP, PS, Mixed)	7.49%	4.25%	6.00%	8.58%	8.55%	10.39%	15.91%	1.98%	7.63%	6.41%	6.03%	2.92%	**7.18%**
Paper/ Cardboard	High Quality Paper	0.84%	0.77%	1.84%	0.55%	2.22%	0.83%	2.18%	0.93%	1.63%	0.73%	0.02%	0.84%	**1.11%**
	Low Quality Paper	9.92%	7.57%	3.26%	12.30%	7.39%	8.26%	9.43%	7.10%	6.00%	11.90%	7.57%	8.14%	**8.24%**
	Corrugated Carton	10.11%	4.93%	7.62%	5.61%	15.41%	6.14%	11.69%	5.62%	11.47%	4.94%	5.38%	6.71%	**7.97%**
Metals	Ferrous Metals	9.81%	10.24%	4.68%	8.70%	9.84%	4.25%	6.29%	10.30%	15.04%	6.77%	3.93%	9.87%	**8.31%**
	Non-Ferrous Metals	0.90%	1.54%	3.52%	0.94%	1.65%	0.64%	0.71%	0.64%	1.85%	0.62%	0.81%	1.87%	**1.31%**
Yard	Yard Waste	17.58%	29.85%	32.32%	20.91%	13.07%	10.16%	20.30%	27.34%	16.50%	24.41%	41.83%	23.45%	**23.14%**
Organic	Organic Waste	14.22%	9.27%	8.59%	15.32%	13.45%	19.71%	10.39%	9.45%	10.15%	16.00%	9.28%	12.54%	**12.36%**
C&D	Construction Debris	13.31%	17.20%	23.52%	9.31%	17.27%	26.10%	13.44%	24.86%	14.20%	14.74%	14.44%	16.87%	**17.11%**
Glass	All Types Glass	3.45%	3.04%	3.06%	3.52%	2.26%	3.17%	1.37%	1.64%	2.82%	2.33%	4.27%	2.88%	**2.82%**
HHW	Household Haz. Waste	0.46%	0.73%	0.77%	0.19%	0.19%	0.47%	0.21%	0.65%	0.41%	0.63%	0.11%	1.32%	**0.51%**
Other	Not Otherwise Defined	7.37%	6.33%	2.64%	9.98%	6.16%	7.69%	5.77%	4.61%	9.08%	6.51%	4.36%	4.72%	**6.27%**
		100.00%	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
Number of Samples		**58**	**65**	**54**	**32**	**59**	**35**	**44**	**50**	**45**	**55**	**53**	**51**	**50**

TABLE E-12
WASTE CHARACTERIZATION RESULTS
AVERAGE COMPOSITION OF SOLID WASTE DISCARDS IN PUERTO RICO
JUNE 2003

Component		Combined % by Weight
Plastic	Type 1 – Polyethylene	1.1%
	Type 2 - HDPE	2.9%
	Types 3 – 7 (PVC, LDPE, PP, PS, Mixed)	6.5%
Paper/ Cardboard	High Quality Paper	1.3%
	Low Quality Paper	8.7%
	Corrugated Carton	9.3%
Metals	Ferrous Metals	9.4%
	Non-Ferrous Metals	1.1%
Yard	Yard Waste	20.4%
Organic	Organic Waste	12.9%
C&D	Construction Debris	17.1%
Glass	All Types Glass	2.4%
HHW	Household Haz. Waste	0.5%
Other	Not Otherwise Defined	6.3%
Total		**100.0%**

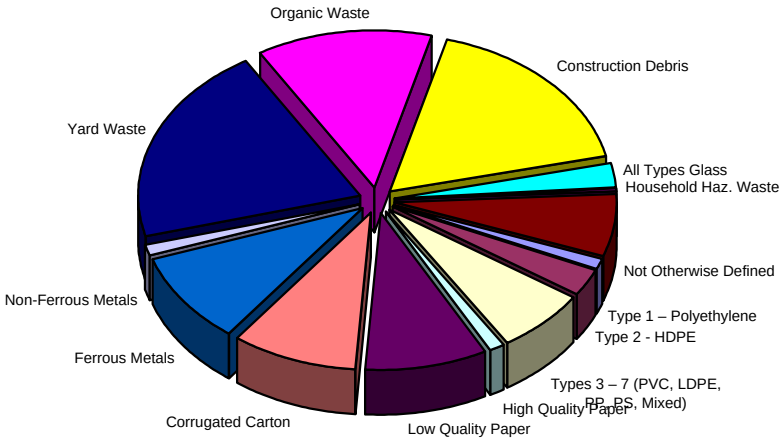


TABLE E-13
WASTE CHARACTERIZATION RESULTS
SEPTEMBER 2003

Component		Arecibo	Humacao	Ponce	Toa Baja	San Juan	Caguas	Total Average
Plastic	Type 1 – Polyethylene	0.71%	0.99%	0.56%	0.68%	0.78%	1.55%	**0.88%**
	Type 2 - HDPE	7.05%	1.93%	4.21%	1.70%	3.80%	1.86%	**3.43%**
	Types 3 – 7 (PVC, LDPE, PP, PS, Mixed)	3.96%	9.52%	2.93%	7.97%	1.87%	8.30%	**5.76%**
Paper/ Cardboard	High Quality Paper	2.33%	0.50%	1.46%	0.61%	2.26%	1.24%	**1.40%**
	Low Quality Paper	6.60%	9.89%	5.97%	11.16%	7.70%	12.27%	**8.93%**
	Corrugated Carton	8.93%	9.93%	5.88%	5.84%	10.84%	11.17%	**8.77%**
Metals	Ferrous Metals	14.51%	4.95%	16.72%	7.16%	11.02%	7.82%	**10.36%**
	Non-Ferrous Metals	0.94%	0.67%	0.99%	0.50%	1.31%	1.50%	**0.99%**
Yard	Yard Waste	20.58%	17.30%	23.46%	27.53%	31.33%	21.69%	**23.65%**
Organic	Organic Waste	9.32%	17.09%	7.13%	14.39%	5.92%	14.05%	**11.32%**
C&D	Construction Debris	13.45%	11.35%	21.48%	13.06%	16.98%	8.43%	**14.13%**
Glass	All Types Glass	2.25%	2.99%	1.66%	2.33%	1.89%	2.91%	**2.34%**
HHW	Household Haz. Waste	1.24%	0.17%	0.88%	0.24%	0.83%	0.50%	**0.64%**
Other	Not Otherwise Defined	8.12%	12.71%	6.66%	6.83%	3.48%	6.69%	**7.41%**
		100.00%	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
Number of Samples		**70**	**60**	**87**	**65**	**74**	**52**	**68**

TABLE E-14
AVERAGE COMPOSITION OF SOLID WASTE DISCARDS IN PUERTO RICO
SEPTEMBER 2003

Component		Combined % by Weight
Plastic	Type 1 – Polyethylene	0.8%
	Type 2 - HDPE	3.0%
	Types 3 – 7 (PVC, LDPE, PP, PS, Mixed)	6.7%
Paper/ Cardboard	High Quality Paper	1.0%
	Low Quality Paper	8.8%
	Corrugated Carton	7.6%
Metals	Ferrous Metals	9.8%
	Non-Ferrous Metals	0.7%
Yard	Yard Waste	22.1%
Organic	Organic Waste	12.8%
C&D	Construction Debris	14.9%
Glass	All Types Glass	2.4%
HHW	Household Haz. Waste	0.5%
Other	Not Otherwise Defined	9.0%
Total		**100.0%**

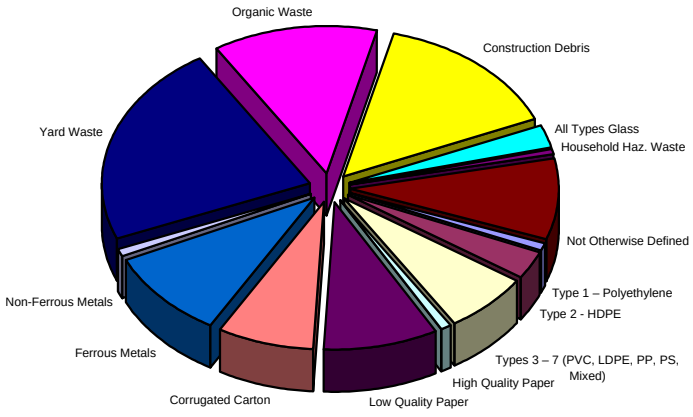


TABLE E-15
WASTE CHARACTERIZATION RESULTS
COMPARISON OF HOLIDAY WEEK AT SELECTED SITES

Component		Cabo Rojo		Culebra		Fajardo		Vieques	
		1st week	2nd week	1st week	2nd week	1st week	2nd week	1st week	2nd week
Plastic	Type 1 – Polyethylene	1.31%	**0.73%**	1.15%	**1.04%**	1.12%	**1.22%**	1.08%	**1.39%**
	Type 2 - HDPE	3.02%	**3.37%**	1.03%	**0.89%**	2.98%	**1.71%**	0.83%	**1.18%**
	Types 3 – 7 (PVC, LDPE, PP, PS, Mixed)	4.26%	**5.24%**	6.05%	**5.58%**	8.58%	**9.71%**	6.01%	**5.09%**
Paper/ Cardboard	High Quality Paper	0.77%	**0.27%**	1.84%	**0.52%**	0.55%	**0.64%**	0.41%	**0.16%**
	Low Quality Paper	7.61%	**6.65%**	3.26%	**2.71%**	12.30%	**10.49%**	7.25%	**8.47%**
	Corrugated Carton	4.95%	**7.40%**	7.62%	**4.97%**	5.61%	**6.39%**	5.37%	**6.62%**
Metals	Ferrous Metals	10.25%	**12.03%**	4.68%	**6.04%**	8.70%	**6.85%**	3.92%	**1.96%**
	Non-Ferrous Metals	1.56%	**0.81%**	3.52%	**1.97%**	0.94%	**0.97%**	1.82%	**1.78%**
Yard	Yard Waste	29.56%	**18.64%**	32.32%	**32.03%**	20.91%	**22.71%**	40.76%	**32.72%**
Organic	Organic Waste	9.30%	**8.72%**	8.57%	**8.60%**	15.33%	**14.46%**	9.29%	**15.41%**
C&D	Construction Debris	17.23%	**19.09%**	23.52%	**28.51%**	9.31%	**16.51%**	14.63%	**14.05%**
Glass	All Types Glass	3.10%	**3.23%**	3.05%	**3.31%**	3.52%	**3.29%**	4.28%	**7.64%**
HHW	Household Haz. Waste	0.73%	**0.81%**	0.76%	**0.37%**	0.19%	**0.54%**	0.11%	**0.05%**
Other	Not Otherwise Defined	6.35%	**13.02%**	2.64%	**3.46%**	9.95%	**4.53%**	4.24%	**3.47%**
		100.00%	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
Number of Samples		**65**	**67**	**54**	**87**	**32**	**56**	**53**	**54**

TABLE E-16
WASTE CHARACTERIZATION RESULTS
COMPARISON OF SUPPLEMENTAL WEEK AT SELECTED SITES

Component		Arecibo		Humacao		Ponce		Toa Baja	
		June-03	September-03	June-03	September-03	June-03	September-03	June-03	September-03
Plastic	Type 1 – Polyethylene	0.94%	**0.71%**	1.08%	**0.99%**	0.92%	**0.56%**	1.05%	**0.68%**
	Type 2 - HDPE	3.58%	**7.05%**	1.46%	**1.93%**	3.96%	**4.21%**	2.97%	**1.70%**
	Types 3 – 7 (PVC, LDPE, PP, PS, Mixed)	7.49%	**3.96%**	8.55%	**9.52%**	1.98%	**2.93%**	6.41%	**7.97%**
Paper/ Cardboard	High Quality Paper	0.84%	**2.33%**	2.22%	**0.50%**	0.93%	**1.46%**	0.73%	**0.61%**
	Low Quality Paper	9.92%	**6.60%**	7.39%	**9.89%**	7.10%	**5.97%**	11.90%	**11.16%**
	Corrugated Carton	10.11%	**8.93%**	15.41%	**9.93%**	5.62%	**5.88%**	4.94%	**5.84%**
Metals	Ferrous Metals	9.81%	**14.51%**	9.84%	**4.95%**	10.30%	**16.72%**	6.77%	**7.16%**
	Non-Ferrous Metals	0.90%	**0.94%**	1.65%	**0.67%**	0.64%	**0.99%**	0.62%	**0.50%**
Yard	Yard Waste	17.58%	**20.58%**	13.07%	**17.30%**	27.34%	**23.46%**	24.41%	**27.53%**
Organic	Organic Waste	14.22%	**9.32%**	13.45%	**17.09%**	9.45%	**7.13%**	16.00%	**14.39%**
C&D	Construction Debris	13.31%	**13.45%**	17.27%	**11.35%**	24.86%	**21.48%**	14.74%	**13.06%**
Glass	All Types Glass	3.45%	**2.25%**	2.26%	**2.99%**	1.64%	**1.66%**	2.33%	**2.33%**
HHW	Household Haz. Waste	0.46%	**1.24%**	0.19%	**0.17%**	0.65%	**0.88%**	0.63%	**0.24%**
Other	Not Otherwise Defined	7.37%	**8.12%**	6.16%	**12.71%**	4.61%	**6.66%**	6.51%	**6.83%**
		100.00%	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
Number of Samples		**58**	**70**	**59**	**60**	**50**	**87**	**55**	**65**

TABLE E-17
LANDFILL PERIMETER DELINEATION RESULTS
(BY IMPACTED AREA)

LANDFILL	LANDFILL PERIMETER DELINEATION AREA		
	SQ. METERS	ACRES	CUERDAS
1 Arecibo	314,214.66	77.65	79.95
2 Ponce	312,688.77	77.27	79.56
3 Toa Baja	265,510.07	65.61	67.55
4 Humacao	245,212.47	60.60	62.39
5 Carolina	239,594.72	59.21	60.96
6 Mayagüez	198,973.46	49.17	50.62
7 Fajardo	161,421.58	39.89	41.07
8 Guaynabo	144,393.65	35.68	36.74
9 Juana Diaz	139,700.16	34.52	35.54
10 Juncos	119,413.76	29.51	30.38
11 Cayey	109,498.48	27.06	27.86
12 Cabo Rojo	106,427.72	26.30	27.08
13 Salinas	100,107.11	24.74	25.47
14 Yauco	99,337.34	24.55	25.27
15 Toa Alta	98,367.74	24.31	25.03
16 Vega Baja	85,841.08	21.21	21.84
17 Moca	82,986.97	20.51	21.11
18 Añasco	78,411.94	19.38	19.95
19 Lajas	76,522.22	18.91	19.47
20 Peñuelas	70,558.65	17.44	17.95
21 Barranquitas	68,516.18	16.93	17.43
22 Guayama	68,368.78	16.89	17.40
23 Isabela	63,758.27	15.76	16.22
24 Florida	54,606.85	13.49	13.89
25 Aguadilla	53,895.79	13.32	13.71
26 Hormigueros	51,262.98	12.67	13.04
27 Arroyo	49,019.40	12.11	12.47
28 Vieques	39,050.06	9.65	9.94
29 Jayuya	36,065.86	8.91	9.18
30 Yabucoa	30,635.37	7.57	7.79
31 Culebra	28,401.11	7.02	7.23
TOTAL	**3,592,763.18**	**887.82**	**914.09**

TABLE E-18
SUMMARY OF FIELD INVESTIGATION
COMPARISON OF LANDFILL FOOTPRINT WITH WEEKLY TONNAGE

LANDFILL	LANDFILL AREA ACRES	WEEKLY TONNAGE	WEEKLY TONS PER ACRE
1 Humacao	60.60	12,951	214
2 Aguadilla	13.32	2,697	203
3 Toa Baja	65.61	9,496	145
4 Yauco	24.55	3,136	128
5 Juncos	29.51	3,753	127
6 Salinas	24.74	2,906	117
7 Peñuelas	17.44	1,951	112
8 Ponce	77.27	8,500	110
9 Toa Alta	24.31	1,965	81
10 Vega Baja	21.21	1,516	71
11 Añasco	19.38	1,076	56
12 Fajardo	39.89	2,167	54
13 Juana Diaz	34.52	1,827	53
14 Yabucoa	7.57	399	53
15 Arecibo	77.65	3,791	49
16 Guayama	16.89	821	49
17 Arroyo	12.11	536	44
18 Carolina	59.21	2,255	38
19 Moca	20.51	771	38
20 Cabo Rojo	26.30	963	37
21 Florida	13.49	487	36
22 Isabela	15.76	567	36
23 Mayagüez	49.17	1,516	31
24 Guaynabo	35.68	1,061	30
25 Barranquitas	16.93	492	29
26 Jayuya	8.91	206	23
27 Hormigueros	12.67	271	21
28 Cayey	27.06	558	21
29 Lajas	18.91	356	19
30 Culebra	7.02	99	14
31 Vieques	9.65	123	13
TOTAL	**887.82**	**69,211**	**78**

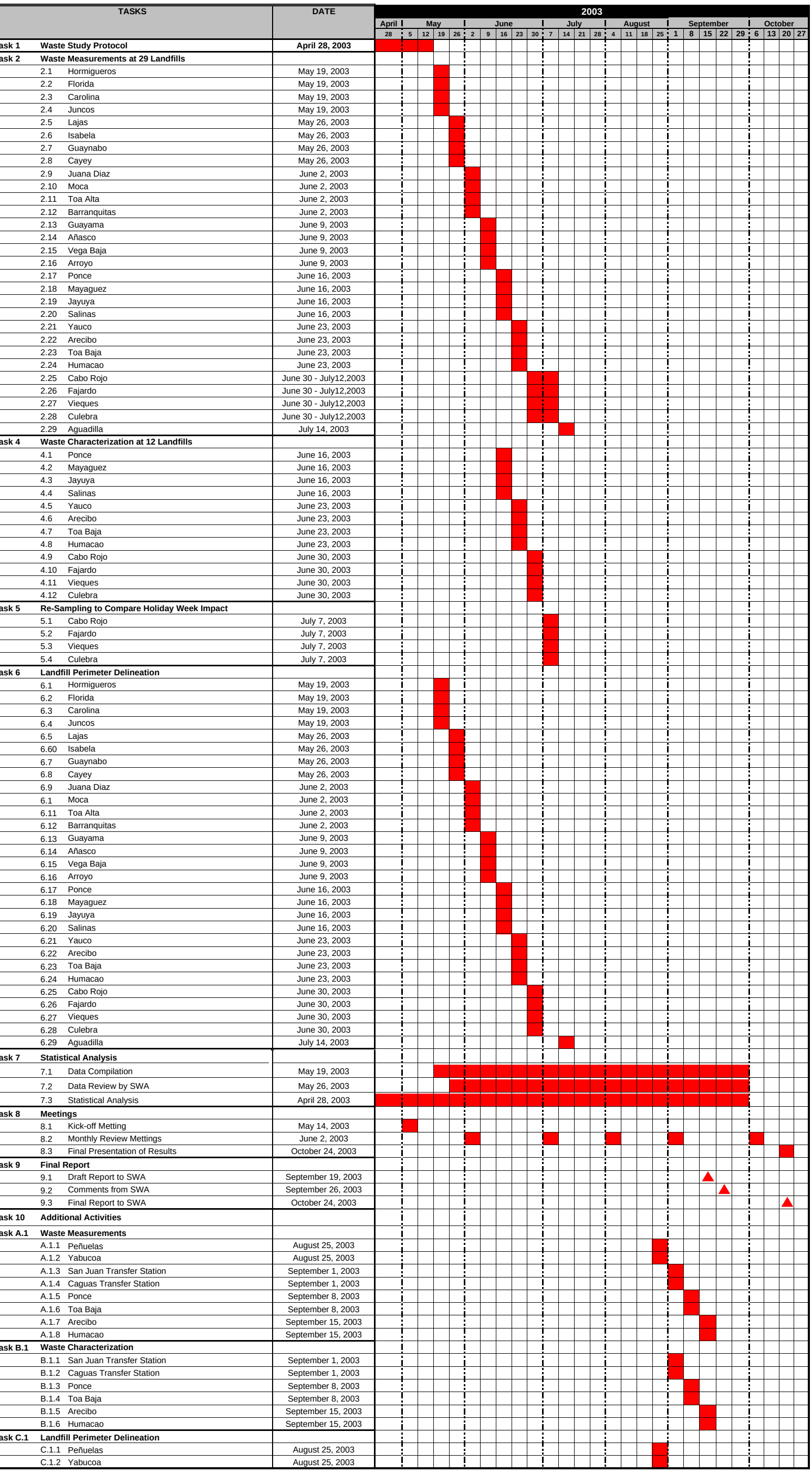
FIGURE E-1

PROJECT SCHEDULE

WASTE CHARACTERIZATION STUDY - SOLID WASTE AUTHORITY

October 24, 2003

TASKS			DATE
Task 1	**Waste Study Protocol**		**April 28, 2003**
Task 2	**Waste Measurements at 29 Landfills**		
	2.1	Hormigueros	May 19, 2003
	2.2	Florida	May 19, 2003
	2.3	Carolina	May 19, 2003
	2.4	Juncos	May 19, 2003
	2.5	Lajas	May 26, 2003
	2.6	Isabela	May 26, 2003
	2.7	Guaynabo	May 26, 2003
	2.8	Cayey	May 26, 2003
	2.9	Juana Diaz	June 2, 2003
	2.10	Moca	June 2, 2003
	2.11	Toa Alta	June 2, 2003
	2.12	Barranquitas	June 2, 2003
	2.13	Guayama	June 9, 2003
	2.14	Añasco	June 9, 2003
	2.15	Vega Baja	June 9, 2003
	2.16	Arroyo	June 9, 2003
	2.17	Ponce	June 16, 2003
	2.18	Mayaguez	June 16, 2003
	2.19	Jayuya	June 16, 2003
	2.20	Salinas	June 16, 2003
	2.21	Yauco	June 23, 2003
	2.22	Arecibo	June 23, 2003
	2.23	Toa Baja	June 23, 2003
	2.24	Humacao	June 23, 2003
	2.25	Cabo Rojo	June 30 - July12,2003
	2.26	Fajardo	June 30 - July12,2003
	2.27	Vieques	June 30 - July12,2003
	2.28	Culebra	June 30 - July12,2003
	2.29	Aguadilla	July 14, 2003
Task 4	**Waste Characterization at 12 Landfills**		
	4.1	Ponce	June 16, 2003
	4.2	Mayaguez	June 16, 2003
	4.3	Jayuya	June 16, 2003
	4.4	Salinas	June 16, 2003
	4.5	Yauco	June 23, 2003
	4.6	Arecibo	June 23, 2003
	4.7	Toa Baja	June 23, 2003
	4.8	Humacao	June 23, 2003
	4.9	Cabo Rojo	June 30, 2003
	4.10	Fajardo	June 30, 2003
	4.11	Vieques	June 30, 2003
	4.12	Culebra	June 30, 2003
Task 5	**Re-Sampling to Compare Holiday Week Impact**		
	5.1	Cabo Rojo	July 7, 2003
	5.2	Fajardo	July 7, 2003
	5.3	Vieques	July 7, 2003
	5.4	Culebra	July 7, 2003
Task 6	**Landfill Perimeter Delineation**		
	6.1	Hormigueros	May 19, 2003
	6.2	Florida	May 19, 2003
	6.3	Carolina	May 19, 2003
	6.4	Juncos	May 19, 2003
	6.5	Lajas	May 26, 2003
	6.60	Isabela	May 26, 2003
	6.7	Guaynabo	May 26, 2003
	6.8	Cayey	May 26, 2003
	6.9	Juana Diaz	June 2, 2003
	6.1	Moca	June 2, 2003
	6.11	Toa Alta	June 2, 2003
	6.12	Barranquitas	June 2, 2003
	6.13	Guayama	June 9, 2003
	6.14	Añasco	June 9, 2003
	6.15	Vega Baja	June 9, 2003
	6.16	Arroyo	June 9, 2003
	6.17	Ponce	June 16, 2003
	6.18	Mayaguez	June 16, 2003
	6.19	Jayuya	June 16, 2003
	6.20	Salinas	June 16, 2003
	6.21	Yauco	June 23, 2003
	6.22	Arecibo	June 23, 2003
	6.23	Toa Baja	June 23, 2003
	6.24	Humacao	June 23, 2003
	6.25	Cabo Rojo	June 30, 2003
	6.26	Fajardo	June 30, 2003
	6.27	Vieques	June 30, 2003
	6.28	Culebra	June 30, 2003
	6.29	Aguadilla	July 14, 2003
Task 7	**Statistical Analysis**		
	7.1	Data Compilation	May 19, 2003
	7.2	Data Review by SWA	May 26, 2003
	7.3	Statistical Analysis	April 28, 2003
Task 8	**Meetings**		
	8.1	Kick-off Metting	May 14, 2003
	8.2	Monthly Review Mettings	June 2, 2003
	8.3	Final Presentation of Results	October 24, 2003
Task 9	**Final Report**		
	9.1	Draft Report to SWA	September 19, 2003
	9.2	Comments from SWA	September 26, 2003
	9.3	Final Report to SWA	October 24, 2003
Task 10	**Additional Activities**		
Task A.1	**Waste Measurements**		
	A.1.1	Peñuelas	August 25, 2003
	A.1.2	Yabucoa	August 25, 2003
	A.1.3	San Juan Transfer Station	September 1, 2003
	A.1.4	Caguas Transfer Station	September 1, 2003
	A.1.5	Ponce	September 8, 2003
	A.1.6	Toa Baja	September 8, 2003
	A.1.7	Arecibo	September 15, 2003
	A.1.8	Humacao	September 15, 2003
Task B.1	**Waste Characterization**		
	B.1.1	San Juan Transfer Station	September 1, 2003
	B.1.2	Caguas Transfer Station	September 1, 2003
	B.1.3	Ponce	September 8, 2003
	B.1.4	Toa Baja	September 8, 2003
	B.1.5	Arecibo	September 15, 2003
	B.1.6	Humacao	September 15, 2003
Task C.1	**Landfill Perimeter Delineation**		
	C.1.1	Peñuelas	August 25, 2003
	C.1.2	Yabucoa	August 25, 2003

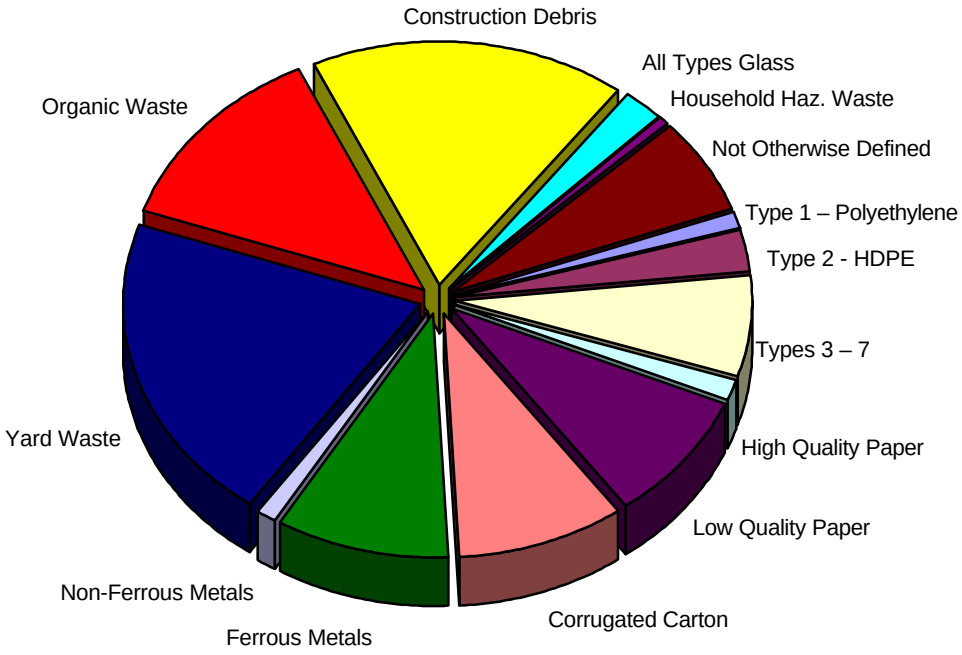


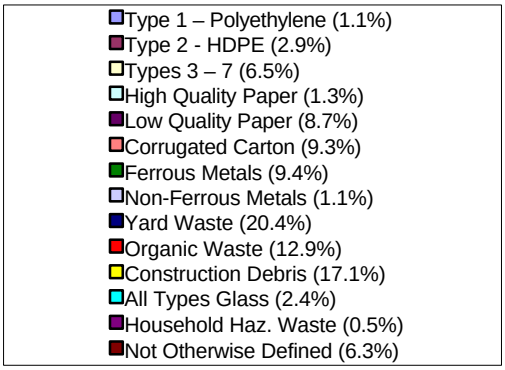
Completed Activities

Wehran – Puerto Rico, Inc.

Shaw EMCON/OWT, Inc.

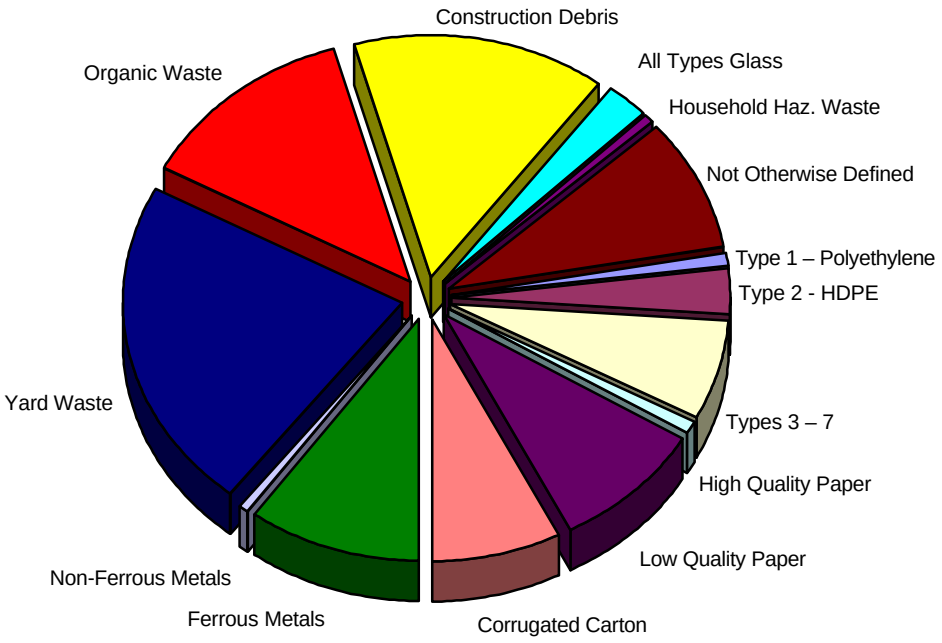
FIGURE 2
AVERAGE COMPOSITION OF
SOLID WASTE DISCARDS IN PUERTO RICO
JUNE 2003

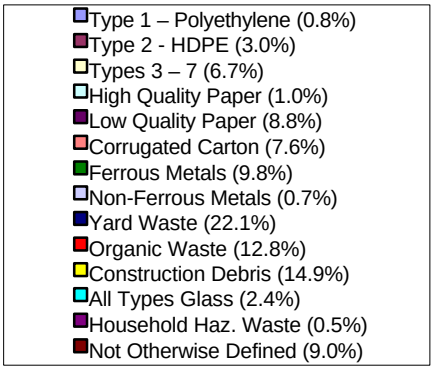




Note: 2003 Waste Characterization Study
Wehran - Puerto Rico, Inc.
October 24, 2003

FIGURE 3
AVERAGE COMPOSITION OF SOLID WASTE DISCARDS IN PUERTO RICO SEPTEMBER 2003





Note: 2003 Waste Characterization Study
Wehran - Puerto Rico, Inc.
October 24, 2003