

JAPAN INTERNATIONAL COOPERATION AGENCY



MUNICIPALITY OF PANAMA
THE REPUBLIC OF PANAMA



***THE STUDY ON
SOLID WASTE MANAGEMENT PLAN
FOR
MUNICIPALITY OF PANAMA
IN THE REPUBLIC OF PANAMA***

***Final Report
Volume IV***

DATA BOOK

MARCH 2003



KOKUSAI KOGYO CO., LTD.



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03-22

The Study on Solid Waste Management Plan for Municipality of Panama in the Republic of Panama

List of Volumes

- Volume I Summary
- Volume I (S) Summary (Spanish Version)
- Volume II Main Report
- Volume II (S) Main Report (Spanish Version)
- Volume III Annex
- Volume III (S) Annex (Spanish Version)
- Volume IV Data Book
- Volume IV (S) Data Book (Spanish Version)

This is the Data Book.

In this report, the project cost is estimated by using the May 2002 price and an exchange rate of US\$1.00=B/1.00(Balboa)=JP¥125.00.

Contents

Data A	Time and Motion Survey
Data B	Public Opinion Survey
Data C	Recycle Market Survey
Data D	Water Quality Survey
Data E	Traffic Volume Survey
Data F	Topographic Survey
Data G	Geological Survey
Data H	Environmental Survey
Data I	Collection Improvement Manual
Data J	Street Sweeping Improvement Manual
Data K	Drawings

Data A

Time and Motion Survey

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of middle high income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 19, 2002 (Saturday)

Collection area: AN 03-05

Collection route: Bella Vista

Vehicle number: 239 (2956)

Capacity: 18 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance			Collect Point Number	Collect Points Total	Reside number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial		Final		Initial	Kin	Final	Initial	Final				Initial	Final		
			H	M	S	H												
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	0	6	46	0.0	0.0	0.0				0.0	6.8	0.0	
2	T2	From Curundu compound to El Carmen church	0	6	46	0	14	16	0.0	4.7	4.7				6.8	14.3	4.7	
3	T3	Loading (in front of El Carmen church)	0	14	16	0	16	36	4.7	4.7	1				14.3	16.6	2.3	
4	T3	Traveling	0	16	36	0	18	1	4.7	5.1					16.6	18.0	1.4	
5	T3	Loading	0	18	1	0	18	35	5.1	5.1	2				18.0	18.6	0.6	
6	T3	Loading	0	18	35	0	19	23	5.1	5.1	3				18.6	19.4	0.8	
7	T3	Traveling	0	19	23	0	20	9	5.1	5.3					19.4	20.2	0.8	
8	T3	Loading	0	20	9	0	20	48	5.3	5.3	4				20.2	20.8	0.7	
9	T3	Loading door-to-door - lots of waste	0	20	48	0	47	41	5.3	6.6	A	24			20.8	47.7	26.9	
10	T3	Loading door-to-door	0	47	41	0	50	1	6.6	7.0	B	4			47.7	50.0	2.3	
11	T3	Traveling	0	50	1	0	55	54	7.0	7.5					50.0	55.9	5.9	
12	T3	Loading	0	55	54	0	56	12	7.5	7.5	4				55.9	56.2	0.3	
13	T3	Traveling	0	56	12	0	56	22	7.5	7.6					56.2	56.4	0.2	
14	T3	Loading	0	56	22	0	57	13	7.6	7.6	5				56.4	57.2	0.9	
15	T3	Loading point-to-point	0	57	13	1	20	15	7.6	8.4	C	22			57.2	80.3	23.0	
16	T3	Loading dumpster (Cresta Palace)	1	20	15	1	23	9	8.4	8.4	6				80.3	83.2	2.9	
17	T3	Traveling	1	23	9	1	23	25	8.4	8.4					83.2	83.4	0.3	
18	T3	Loading dumpster (Cresta Palace)	1	23	25	1	27	1	8.4	8.4	7				83.4	87.0	3.6	
19	T3	Loading point-to-point	1	27	1	1	30	0	8.4	8.6	D	6			87.0	90.0	3.0	
20	T3	Loading locked trash can (" Sandra" building)	1	30	0	1	40	46	8.6	8.6	8				90.0	100.8	10.8	
21	T3	Traveling	1	40	46	1	41	36	8.6	8.7					100.8	101.6	0.8	
22	T3	Loading door-to-door	1	41	36	1	45	2	8.7	8.8	E	2			101.6	105.0	3.4	
23	T3	Traveling	1	45	2	1	45	30	8.8	8.9					105.0	105.5	0.5	
24	T3	Loading door-to-door	1	45	30	2	9	0	8.9	9.4	F	21			105.5	129.0	23.5	
25	T3	Loading trash can-building	2	9	0	2	9	53	9.4	9.4	9				129.0	129.9	0.9	
26	T3	Loading door-to-door	2	9	53	2	15	34	9.4	10.0	G	14			129.9	135.6	5.7	
27	T3	Traveling	2	15	34	2	16	39	10.0	10.2					135.6	136.7	1.1	
28	T3	Loading door-to-door	2	16	39	2	33	15	10.2	10.8	H	18			136.7	153.3	16.6	

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Date: January 19, 2002 (Saturday)

Collection area: AN 03-05

Collection route: Bella Vista

Vehicle number: 239 (2956)

Capacity: 18 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Reside number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S									
29	T3	Traveling	2	33	15	2	34	39	10.8	11.0			153.3	154.7	1.4	0.2	
30	T3	Loading door-to-door lots of waste (Yesterday rest.)	2	34	39	2	55	26	11.0	11.1	I	8	154.7	175.4	20.8	0.1	
31	T4	To Patacon	2	55	26	3	6	21	11.1	17.2			175.4	186.4	10.9	6.1	
32	T7	Stopped at convenient store (Martin) Ave La Paz	3	6	21	3	10	57	17.2	17.2			186.4	191.0	4.6	0.0	
33	T4	To Patacon	3	10	57	3	19	30	17.2	24.3			191.0	199.5	8.6	7.1	
34	T5	Weighing	3	19	30	3	21	48	24.3	24.3			199.5	201.8	2.3	0.0	
35	T5	Unloading	3	21	48	3	37	51					201.8	217.9	16.1	2.7	
36	T4	To Bella Vista	3	37	51	3	55	33	24.3	37.3			217.9	235.6	17.7	13.0	
37	T7	Stopped at gas station	3	55	33	3	58	49	37.3	37.3			235.6	238.8	3.3	0.0	
38	T4	To Bella Vista (near Bennigan's restaurant)	3	58	49	3	59	50	37.3	37.7			238.8	239.8	1.0	0.4	
39	T3	Loading door-to-door, lots of waste	3	59	50	5	0	56	37.7	40.2	J	20	239.8	300.9	61.1	2.5	
40	T3	Traveling	5	0	56	5	2	59	40.2	40.6			300.9	303.0	2.1	0.4	
41	T3	Loading door-to-door	5	2	59	5	14	41	40.6	41.0	K	8	303.0	314.7	11.7	0.4	
42	T3	Loading dumpster ("Stones" Restaurant)	5	14	41	5	22	2	41.0	41.0	L	10	314.7	322.0	7.4	0.0	
43	T3	Loading door-to-door	5	22	2	6	19	3	41.0	43.0			322.0	379.1	57.0	2.0	
44	T3	Traveling	6	19	3	6	20	10	43.0	43.2			379.1	380.2	1.1	0.2	
45	T3	Loading door-to-door	6	20	10	6	26	54	43.2	43.6	M	10	380.2	386.9	6.7	0.4	
46	T7	Selling metals in Monte Oscuro	6	26	54	6	58	2	43.6	52.2			386.9	418.0	31.1	8.6	
47	T4	To Patacon	6	58	2	7	16	31	52.2	62.6			418.0	436.5	18.5	10.4	
48	T5	Weighing	7	16	31	7	17	12	62.6	62.6			436.5	437.2	0.7	0.0	
49	T5	Unloading	7	17	12	7	25	32					437.2	445.5	8.3	2.7	
50	T6	To Curundu compound	7	25	32	7	41	29	62.6	77.9			445.5	461.5	16.0	15.3	

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Target area: Urban area of middle high income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 21, 2002 (Monday)

Collection area: AN 03-05

Collection route: Bella Vista

Vehicle number: 1902

Capacity: 18 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S	Kn	Kn				(min)	(min)		
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	0	0	0	0.0	0.0			0.0	0.0	0.0	0.0	
2	T2	From Curundu compound to Bella Vista	0	0	0	0	11	15	0.0	4.8			0.0	11.3	11.3	4.8	
3	T3	Loading door-to-door	0	11	15	0	16	6	4.8	5.1	A	9	11.3	16.1	16.1	4.9	
4	T3	Traveling	0	16	6	0	17	1	5.1	5.2			16.1	17.0	17.0	0.9	
5	T3	Loading dumpster	0	17	1	0	17	39	5.2	5.2	1		17.0	17.7	17.7	0.6	
6	T3	Loading door-to-door	0	17	39	0	24	21	5.2	5.4	B	6	17.7	24.4	24.4	6.7	
7	T3	Loading large trash can	0	24	21	0	25	4	5.4	5.4	2		24.4	25.1	25.1	0.7	
8	T3	Traveling	0	25	4	0	25	45	5.4	5.5			25.1	25.8	25.8	0.7	
9	T3	Loading door-to-door	0	25	45	0	42	20	5.5	5.9	C	17	25.8	42.3	42.3	16.6	
10	T3	Loading medium trash can	0	42	20	0	43	59	5.9	6.0	3 y 4	2	42.3	44.0	44.0	1.7	
11	T3	Loading door-to-door	0	43	59	0	47	43	6.0	6.1	D	6	44.0	47.7	47.7	3.7	
12	T3	Loading medium trash can	0	47	43	0	50	13	6.1	6.2	5		47.7	50.2	50.2	2.5	
13	T3	Traveling	0	50	13	0	50	45	6.2	6.2			50.2	50.8	50.8	0.5	
14	T3	Loading dumpster - lots of waste	0	50	45	0	58	26	6.2	6.2	6		50.8	58.4	58.4	7.7	
15	T3	Traveling	0	58	26	0	58	59	6.2	6.3			58.4	59.0	59.0	0.6	
16	T3	Loading door-to-door	0	58	59	1	3	38	6.3	6.4	E	4	59.0	63.6	63.6	4.7	
17	T3	Traveling	1	3	38	1	4	18	6.4	6.5			63.6	64.3	64.3	0.7	
18	T3	Loading dumpster	1	4	18	1	6	7	6.5	6.5	7		64.3	66.1	66.1	1.8	
19	T3	Traveling	1	6	7	1	7	42	6.5	6.7			66.1	67.7	67.7	1.6	
20	T3	Loading door-to-door	1	7	42	1	9	37	6.7	6.9	F	3	67.7	69.6	69.6	1.9	
21	T3	Loading door-to-door	1	9	37	1	15	46	6.9	7.2	G	9	69.6	75.8	75.8	6.2	
22	T3	Traveling	1	15	46	1	16	5	7.2	7.2			75.8	76.1	76.1	0.3	
23	T3	Loading door-to-door	1	16	5	1	18	57	7.2	7.2	H	2	76.1	79.0	79.0	2.9	
24	T3	Loading dumpster	1	18	57	1	20	8	7.2	7.2	8		79.0	80.1	80.1	1.2	
25	T3	Traveling	1	20	8	1	22	56	7.2	7.2			80.1	82.9	82.9	2.8	
26	T3	Loading door-to-door	1	22	56	1	26	43	7.2	7.3	I	3	82.9	86.7	86.7	3.8	
27	T3	Traveling	1	26	43	1	27	57	7.3	7.6			86.7	88.0	88.0	1.2	
28	T3	Loading door-to-door	1	27	57	1	33	35	7.6	8.0	J	5	88.0	93.6	93.6	5.6	

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Target area: Urban area of middle high income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

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Collection area: AN 03-05

Collection route: Bella Vista

Vehicle number: 1902

Capacity: 18 yards3

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S	Kn	Kn				(min)	(min)		
29	T3	Loading dumpster	1	33	35	1	34	25	8.0	8.0	9		93.6	94.4	0.8	0.0	
30	T3	Traveling	1	34	25	1	35	59	8.0	8.1			94.4	96.0	1.6	0.1	
31	T3	Loading door-to-door	1	35	59	1	37	45	8.1	8.1	K	2	96.0	97.8	1.8	0.0	
32	T3	Traveling	1	37	45	1	38	24	8.1	8.3			97.8	98.4	0.7	0.2	
33	T3	Loading door-to-door	1	38	24	1	40	19	8.3	8.3	L	1	98.4	100.3	1.9	0.0	
34	T3	Loading door-to-door	1	40	19	1	42	13	8.3	8.3	M	3	100.3	102.2	1.9	0.0	
35	T3	Traveling	1	42	13	1	43	2	8.3	8.5			102.2	103.0	0.8	0.2	
36	T3	Loading door-to-door	1	43	2	1	43	50	8.5	8.7	N	2	103.0	103.8	0.8	0.2	
37	T3	Traveling	1	43	50	1	45	15	8.7	8.8			103.8	105.3	1.4	0.1	
38	T3	Loading door-to-door	1	45	15	1	50	2	8.8	9.0	O	10	105.3	110.0	4.8	0.2	
39	T3	Traveling	1	50	2	1	51	7	9.0	9.2			110.0	111.1	1.1	0.2	
40	T3	Loading dumpster ("Ebbelle Marbella" towers)	1	51	7	1	55	50	9.2	9.2	10		111.1	115.8	4.7	0.0	
41	T3	Loading door-to-door	1	55	50	1	59	56	9.2	9.3	P	3	115.8	119.9	4.1	0.1	
42	T3	Traveling	1	59	56	2	0	0	9.5	9.5			119.9	120.0	0.1	0.0	
43	T3	Loading dumpster (Contraloria)	2	0	0	2	13	5	9.5	9.8	11		120.0	133.1	13.1	0.3	
44	T3	Traveling	2	13	5	2	13	38	9.8	10.1			133.1	133.6	0.5	0.3	
45	T3	Loading door-to-door	2	13	38	2	20	3	10.1	10.4	Q	9	133.6	140.1	6.4	0.3	
46	T3	Loading dumpster (" Madame Chang" restaurant)	2	20	3	2	21	38	10.4	10.4	12		140.1	141.6	1.6	0.0	
47	T3	Loading dumpster (behind "Mr. Frogs" restaurant)	2	21	38	2	26	35	10.4	10.4	13		141.6	146.6	5.0	0.0	
48	T3	Traveling	2	26	35	2	27	2	10.4	10.5			146.6	147.0	0.4	0.1	
49	T3	Loading trash can ("Stones" restaurant)	2	27	2	2	29	15	10.5	10.6	14		147.0	149.3	2.2	0.1	
50	T4	To Patacon	2	29	15	2	48	52	10.6	23.3			149.3	168.9	19.6	12.7	
51	T5	Weighing	2	48	52	2	49	48	23.3	23.3		6.22	168.9	169.8	0.9	0.0	
52	T5	Unloading	2	49	48	2	58	57					169.8	179.0	9.1	2.7	
53	T4	To Bella Vista (near "Bennigan's" restaurant)	2	58	57	3	19	20	23.3	36.3			179.0	199.3	20.4	13.0	
54	T3	Loading large trash can	3	19	20	3	32	36	36.3	36.3	15		199.3	212.6	13.3	0.0	
55	T3	Traveling	3	32	36	3	33	27	36.3	36.7			212.6	213.5	0.8	0.4	
56	T3	Loading large trash can (Balboa gallery)	3	33	27	3	35	37	36.7	36.7	16		213.5	215.6	2.2	0.0	

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No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial (min)	Final (min)		
			H	M	S	H	M	S									
57	T3	Traveling	3	35	37	3	36	58	36.7	36.9			215.6	217.0	1.3	0.2	
58	T3	Loading large trash can	3	36	58	3	42	40	36.9	37.0	17		217.0	222.7	5.7	0.1	
59	T3	Traveling	3	42	40	3	43	35	37.0	37.0			222.7	223.6	0.9	0.0	
60	T3	Loading trash can ("Coral Reef" restaurant)	3	43	35	3	50	35	37.0	37.0	18		223.6	230.6	7.0	0.0	
61	T3	Loading trash can ("Costa del Mar" restaurant)	3	50	35	3	51	48	37.0	37.0	19		230.6	231.8	1.2	0.0	
62	T3	Traveling	3	51	48	3	53	19	37.0	37.4			231.8	233.3	1.5	0.4	
63	T3	Loading trash can ("Casa del Marisco" restaurant)	3	53	19	3	54	33	37.4	37.4	20		233.3	234.6	1.2	0.0	
64	T3	Traveling	3	54	33	3	55	40	37.4	37.6			234.6	235.7	1.1	0.2	
65	T3	Loading door-to-door	3	55	40	3	55	49	37.6	37.6	R 2		235.7	235.8	0.2	0.0	
66	T3	Loading trash can (Shell gas station)	3	55	49	4	4	10	37.6	37.6	21		235.8	244.2	8.3	0.0	
67	T3	Traveling	4	4	10	4	4	56	37.6	37.8			244.2	244.9	0.8	0.2	
68	T3	Loading door-to-door	4	4	56	4	8	35	37.8	38.1	5 4		244.9	248.6	3.7	0.3	
69	T3	Loading door-to-door	4	8	35	4	12	40	38.1	38.2	T 2		248.6	252.7	4.1	0.1	
70	T3	Traveling	4	12	40	4	13	35	38.2	38.2			252.7	253.6	0.9	0.0	
71	T3	Loading scattered waste at "La cocote" restaurant	4	13	35	4	17	17	38.2	38.2	V 1		253.6	257.3	3.7	0.0	
72	T3	Traveling	4	17	17	4	17	41	38.2	38.3			257.3	257.7	0.4	0.1	
73	T3	Loading door-to-door	4	17	41	4	21	47	38.3	38.5	X 7		257.7	261.8	4.1	0.2	
74	T3	Traveling	4	21	47	4	24	9	38.5	39.1			261.8	264.2	2.4	0.6	
75	T3	Loading dumpster (Bipan Bank)	4	24	9	4	38	49	39.1	39.1	26		264.2	278.8	14.7	0.0	
76	T3	Loading door-to-door	4	38	49	4	47	55	39.1	39.3	Y		278.8	287.9	9.1	0.2	
77	T3	Traveling	4	47	55	4	48	42	39.3	39.5			287.9	288.7	0.8	0.2	
78	T3	Loading dumpster	4	48	42	5	7	9	39.5	39.5	23		288.7	307.2	18.5	0.0	
79	T3	Traveling	5	7	9	5	8	55	39.5	40.2			307.2	308.9	1.8	0.7	
80	T3	Loading door-to-door	5	8	55	5	12	19	40.2	40.7	Z 3		308.9	312.3	3.4	0.5	
81	T3	Traveling	5	12	19	5	13	4	40.7	40.9			312.3	313.1	0.8	0.2	
82	T3	Loading door-to-door	5	13	4	5	19	19	40.9	41.1	a 5		313.1	319.3	6.3	0.2	
83	T3	Traveling	5	19	19	5	20	55	41.1	41.5			319.3	320.9	1.6	0.4	
84	T3	Loading door-to-door	5	20	55	5	22	35	41.5	41.6	b 3		320.9	322.6	1.7	0.1	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpster,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of middle high income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 21, 2002 (Monday)

Collection area: AN 03-05

Collection route: Bella Vista

Vehicle number: 1902

Capacity: 18 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	M	S	H	M	S	Initial	Final				Initial	Final		
85	T3	Loading door-to-door	5	22	35	5	31	27	41.6	41.8	d	8		322.6	331.5	8.9	0.2
86	T3	Traveling	5	31	27	5	32	4	41.8	41.9				331.5	332.1	0.6	0.1
87	T3	Loading door-to-door	5	32	4	5	36	30	41.9	41.9	e	4		332.1	336.5	4.4	0.0
88	T3	Traveling	5	36	30	5	38	15	41.9	42.6				336.5	338.3	1.8	0.7
89	T3	Loading door-to-door	5	38	15	5	42	30	42.6	43.1	b	5		338.3	342.5	4.3	0.5
90	T3	Loading dumpster	5	42	30	5	45	10	43.1	43.1	24			342.5	345.2	2.7	0.0
91	T3	Traveling	5	45	10	5	45	36	43.1	43.1				345.2	345.6	0.4	0.0
92	T3	Loading door-to-door	5	45	36	5	47	16	43.1	43.3	i	4		345.6	347.3	1.7	0.2
93	T3	Traveling	5	47	16	5	47	46	43.3	43.4				347.3	347.8	0.5	0.1
94	T3	Loading door-to-door	5	47	46	5	49	41	43.4	43.5	j	4		347.8	349.7	1.9	0.1
95	T3	Traveling	5	49	41	5	50	26	43.5	43.6				349.7	350.4	0.8	0.1
96	T3	Loading dumpster ("Cresta Palace" restaurant)	5	50	26	5	56	16	43.6	43.6	25	2		350.4	356.3	5.8	0.0
97	T3	Traveling	5	56	16	5	56	45	43.6	43.7				356.3	356.8	0.5	0.1
98	T3	Loading door-to-door	5	56	45	5	57	57	43.7	43.8	U	4		356.8	358.0	1.2	0.1
99	T3	Traveling	5	57	57	5	58	56	43.8	44.1				358.0	358.9	1.0	0.3
100	T3	Loading door-to-door	5	58	56	6	0	34	44.1	44.2	t	3		358.9	360.6	1.6	0.1
101	T3	Traveling	6	0	34	6	2	14	44.2	44.6				360.6	362.2	1.7	0.4
102	T3	Loading container ("Damon s" restaurant)	6	2	14	6	5	9	44.6	44.6	26			362.2	365.2	2.9	0.0
103	T3	Traveling	6	5	9	6	5	30	44.6	44.8				365.2	365.5	0.4	0.2
104	T3	Loading dumpster (Athen's store)	6	5	30	6	27	8	44.8	44.8	27			365.5	387.1	21.6	0.0
105	T7	Selling metal at Monte Oscuro	6	27	8	6	52	56	44.8	53.4				387.1	412.9	25.8	8.6
106	T4	To Patacon	6	52	56	7	11	49	53.4	64.1				412.9	431.8	18.9	10.7
107	T5	Weighing	7	11	49	7	12	36	64.1	64.1			5.62	431.8	432.6	0.8	0.0
108	T5	Unloading	7	12	36	7	30	24						432.6	450.4	17.8	2.7
109	T1a	Cleaning vehicle	7	30	24	7	34	35						450.4	454.6	4.2	0.0
110	T6	To Curundu compound	7	34	35	7	51	0	64.1	78.8				454.6	471.0	16.4	14.7

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection *(house-to-house, dumpsters,*

Method *or both*): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of middle high income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 22, 2002 (Tuesday)

Collection area: AN 03-05

Collection route: Bella Vista

Vehicle number: 1902

Capacity: 18 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance			Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Km	Final				Initial (min)	Final (min)		
			H	M	S	H	M	S										
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	0	22	26	0.0	0.0	0.0				0.0	22.4	0.0	
2	T2	From Curundu compound to Bella Vista	0	22	26	0	31	1	0.0	4.8	4.8				4.8	8.6	4.8	
3	T3	Loading point-to-point	0	31	1	0	36	21	4.8	5.1	5.1	A	7		31.0	36.4	5.3	
4	T3	Loading dumpster (Gaston Farauado high school)	0	36	21	0	44	22	5.1	5.1	5.1	1			36.4	44.4	8.0	
5	T3	Traveling	0	44	22	0	45	3	5.1	5.2	5.2				44.4	45.1	0.7	
6	T3	Loading large trash can	0	45	3	0	47	15	5.2	5.2	5.2	2			45.1	47.3	2.2	
7	T3	Loading point-to-point	0	47	15	0	55	24	5.2	5.5	5.5	B	7		47.3	55.4	8.2	
8	T3	Traveling	0	55	24	0	55	54	5.5	5.6	5.6				55.4	55.9	0.5	
9	T3	Loading	0	55	54	0	56	25	5.6	5.6	5.6				55.9	56.4	0.5	
10	T3	Traveling	0	56	25	0	57	31	5.6	5.7	5.7				56.4	57.5	1.1	
11	T3	Loading point-to-point	0	57	31	1	3	21	5.7	5.8	5.8	C	7		57.5	63.4	5.8	
12	T3	Traveling	1	3	21	1	3	52	5.8	5.9	5.9				63.4	63.9	0.5	
13	T3	Loading point-to-point	1	3	52	1	9	1	5.9	5.9	5.9	D	2		63.9	69.0	5.2	
14	T3	Traveling	1	9	1	1	9	35	5.9	6.0	6.0				69.0	69.6	0.6	
15	T3	Loading point-to-point	1	9	35	1	16	54	6.0	6.2	6.2	E	5		69.6	76.9	7.3	
16	T3	Traveling	1	16	54	1	17	46	6.2	6.3	6.3				76.9	77.8	0.9	
17	T3	Loading point-to-point	1	17	46	1	23	27	6.3	6.7	6.7	F	7		77.8	83.5	5.7	
18	T3	Loading dumpster (Texaco gas station)	1	23	27	1	25	0	6.7	6.7	6.7	3			83.5	85.0	1.6	
19	T3	Loading point-to-point, lots of waste (Econoplade)	1	25	0	1	38	25	6.7	7.1	7.1	G	6		85.0	98.4	13.4	
20	T3	Loading dumpster	1	38	25	1	42	19	7.1	7.1	7.1	4			98.4	102.3	3.9	
21	T3	Traveling	1	42	19	1	43	13	7.1	7.2	7.2				102.3	103.2	0.9	
22	T3	Loading point-to-point, lots of waste (Sucasa)	1	43	13	1	49	16	7.2	7.3	7.3	H	3		103.2	109.3	6.1	
23	T3	Traveling	1	49	16	1	50	10	7.3	7.5	7.5				109.3	110.2	0.9	
24	T3	Loading point-to-point	1	50	10	1	52	3	7.5	7.8	7.8	I	4		110.2	112.1	1.9	
25	T3	Traveling	1	52	3	1	53	45	7.8	8.0	8.0				112.1	113.8	1.7	
26	T3	Loading point-to-point, lots of waste	1	53	45	2	7	31	8.0	8.2	8.2	J	6		113.8	127.5	13.8	
27	T3	Traveling	2	7	31	2	8	10	8.2	8.3	8.3				127.5	128.2	0.6	
28	T3	Loading point-to-point	2	8	10	2	10	45	8.3	8.7	8.7	K	4		128.2	130.8	2.6	
29	T3	Loading dumpster (Shell gas station)	2	10	45	2	12	52	8.7	8.7	8.7	5			130.8	132.9	2.1	
30	T3	Large trash can locked (Hosana church)	2	12	52	2	25	45	8.7	8.7	8.7	6			132.9	145.8	12.9	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection area: AN 03-05

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of middle high income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 22, 2002 (Tuesday)

Collection area: AN 03-05

Collection route: Bella Vista

Vehicle number: 1902

Capacity: 18 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Time (min)		Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final	
			H	M	S	H	M	S								
31	T3	Loading point-to-point	2	25	45	2	27	24	8.7	9.2	L	4	145.8	147.4	1.7	0.5
32	T3	Traveling	2	27	24	2	28	21	9.2	9.3			147.4	148.4	0.9	0.1
33	T3	Loading point-to-point	2	28	5	2	38	5	9.3	9.6	M	10	148.4	158.1	9.7	0.3
34	T3	Traveling	2	38	5	2	39	25	9.6	9.8			158.1	159.4	1.3	0.2
35	T3	Loading point-to-point	2	39	25	2	43	35	9.8	9.9	N	3	159.4	163.6	4.2	0.1
36	T3	Traveling	2	43	35	2	45	47	9.9	10.7			163.6	165.8	2.2	0.8
37	T3	Loading point-to-point	2	45	47	2	53	25	10.7	11.2	N	11	165.8	173.4	7.6	0.5
38	T3	Traveling	2	53	25	2	54	12	11.2	11.3			173.4	174.2	0.8	0.1
39	T3	Loading point-to-point	2	54	12	2	55	50	11.3	11.5	O	5	174.2	175.8	1.6	0.2
40	T3	Loading dumpster (Cresta Palace)	2	55	50	2	57	32	11.5	11.5	7		175.8	177.5	1.7	0.0
41	T3	Loading point-to-point	2	57	32	2	59	52	11.5	11.6	P	7	177.5	179.9	2.3	0.1
42	T3	Traveling	2	59	52	3	2	26	11.6	11.8			179.9	182.4	2.6	0.2
43	T3	Loading point-to-point	3	2	26	3	3	50	11.8	12.0	Q	4	182.4	183.8	1.4	0.2
44	T3	Traveling	3	3	50	3	5	10	12.1	12.1			183.8	185.2	1.3	0.0
45	T3	Loading point-to-point	3	5	10	3	8	6	12.1	12.4	R	4	185.2	188.1	2.9	0.3
46	T3	Loading dumpster	3	8	6	3	11	14	12.4	12.4	8		188.1	191.2	3.1	0.0
47	T3	Loading point-to-point	3	11	14	3	13	16	12.4	12.6	S	2	191.2	193.3	2.0	0.2
48	T3	Traveling	3	13	16	3	13	56	12.6	12.7			193.3	193.9	0.7	0.1
49	T3	Loading point-to-point	3	13	56	3	16	57	12.7	12.8	T	2	193.9	197.0	3.0	0.1
50	T3	Traveling	3	16	57	3	18	23	12.8	13.4			197.0	198.4	1.4	0.6
51	T3	Loading point-to-point	3	18	23	3	22	50	13.4	13.6	V	6	198.4	202.8	4.5	0.2
52	T3	Traveling	3	22	50	3	24	14	13.6	13.8			202.8	204.2	1.4	2.7
53	T3	Loading point-to-point	3	24	14	3	31	52	13.8	14.0	X	9	204.2	211.9	7.6	0.2
54	T4	To Patacon	3	31	52	3	55	16	14.0	26.3			211.9	235.3	23.4	12.3
55	T5	Weighing	3	55	16	3	56	13	26.3	26.3		6.23	235.3	236.2	0.9	0.0
56	T5	Unloading	3	56	13	4	18	32					236.2	258.5	22.3	2.7
57	T4	To Bella Vista	4	18	32	4	26	3	26.3	33.0			258.5	266.1	7.5	6.7
58	T7	Stopped at convent store (Martin) Ave. La Paz	4	26	3	4	37	24	33.0	33.0			266.1	277.4	11.4	0.0
59	T3	Loading dumpster (Benmigan's restaurant)	4	37	24	4	50	30	33.0	39.0	9		277.4	290.5	13.1	6.0
60	T3	Traveling	4	50	30	4	51	6	39.0	39.2			290.5	291.1	0.6	0.2

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of middle high income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 22, 2002 (Tuesday)

Collection area: AN 03-05

Collection route: Bella Vista

Vehicle number: 1902

Capacity: 18 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
61	T3	Loading dumpster (Extreme Planet)	4	51	6	4	53	50	39.2	39.2	39.2	10		291.1	293.8	2.7	0.0
62	T3	Traveling	4	53	50	4	54	58	39.2	39.5				293.8	295.0	1.1	0.3
63	T3	Loading dumpster (Invercasa)	4	54	58	4	57	42	39.5	39.5	11			295.0	297.7	2.7	0.0
64	T3	Traveling	4	57	42	4	58	34	39.5	39.6				297.7	298.6	0.9	0.1
65	T3	Loading dumpster (Panama Marina Survey)	4	58	34	5	1	45	39.6	39.6	12			298.6	301.8	3.2	0.0
66	T3	Traveling	5	1	45	5	2	50	39.6	39.7				301.8	302.8	1.1	0.1
67	T3	Loading large trash can (Coral Reef)	5	2	50	5	5	11	39.7	39.7	13			302.8	305.2	2.4	0.0
68	T3	Loading large trash can (Costa del Mar)	5	5	11	5	12	12	39.7	39.8	14			305.2	312.2	7.0	0.1
69	T3	Traveling	5	12	12	5	13	56	39.7	40.0				312.2	313.9	1.7	0.3
70	T3	Loading	5	13	56	5	15	13	40.0	40.1	Y	1		313.9	315.2	1.3	0.1
71	T3	Loading dumpster (Shell gas station-Balboa)	5	15	13	5	22	22	40.1	40.1	15			315.2	322.4	7.2	0.0
72	T3	Traveling	5	22	22	5	23	24	40.1	40.4				322.4	323.4	1.0	0.3
73	T3	Loading point-to-point	5	23	24	5	26	28	40.4	40.5	Z	2		323.4	326.5	3.1	0.1
74	T3	Loading dumpster	5	26	28	5	31	9	40.5	40.5	16			326.5	331.2	4.7	0.0
75	T3	Traveling	5	31	9	5	31	43	40.5	40.6				331.2	331.7	0.6	0.1
76	T3	Loading point-to-point	5	31	43	5	37	50	40.6	40.8	a	7		331.7	337.8	6.1	0.2
77	T3	Loading dumpster (Madame Chang restaurant)	5	37	50	5	39	54	40.8	40.8	17			337.8	339.9	2.1	0.0
78	T3	Loading	5	39	54	5	40	56	40.8	40.9				339.9	340.9	1.0	0.1
79	T3	Traveling	5	40	56	5	42	25	40.9	41.1	b	1		340.9	342.4	1.5	0.2
80	T3	Loading dumpster (Ebbelle Marbella towers)	5	42	25	5	45	6	41.1	41.1	18			342.4	345.1	2.7	0.0
81	T3	Loading point-to-point	5	45	6	5	50	35	41.1	41.5	d	5		345.1	350.6	5.5	0.4
82	T3	Loading dumpster (Stones)	5	50	35	5	57	2	41.5	41.5	19			350.6	357.0	6.5	0.0
83	T3	Traveling	5	57	2	5	57	55	41.5	41.7				357.0	357.9	0.9	0.2
84	T3	Loading point-to-point	5	57	55	6	0	45	41.7	41.8	e	4		357.9	360.8	2.8	0.1
85	T3	Loading dumpster (Damon's)	6	0	45	6	3	52	41.8	41.8	20			360.8	363.9	3.1	0.0
86	T3	Traveling	6	3	52	6	6	8	41.8	41.9				363.9	366.1	2.3	0.1
87	T3	Loading dumpster (Athen's)	6	6	8	6	13	2	41.9	41.9	21			366.1	373.0	6.9	0.0
88	T3	Traveling	6	13	2	6	13	30	41.9	42.0				373.0	373.5	0.5	0.1
89	T3	Loading point-to-point	6	13	30	6	14	24	42.0	42.5	i	3		373.5	374.4	0.9	0.5
90	T3	Traveling	6	14	24	6	15	57	42.5	42.6				374.4	376.0	1.6	0.1

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection *(house-to-house, dumpsters,*
Method *or both):* Both
Collection shift: Night from 6:00 p.m. to 2:00 a.m.
Target area: Urban area of middle high income
Vehicle type: Back loading compactor
Personnel: 4 (driver: 1 collectors: 3)

Date: January 22, 2002 (Tuesday)
Collection area: AN 03-05
Collection route: Bella Vista
Vehicle number: 1902
Capacity: 18 yards³
Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Time		Distance (Kms)	
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
91	T3	Loading dumpster (Bipan)	6	15	57	6	27	39	42.6	42.6	22			376.0	387.7	11.7	0.0
92	T3	Loading point-to-point	6	27	39	6	40	34	42.6	43.2	r	11		387.7	400.6	12.9	0.6
93	T3	Traveling	6	40	34	6	42	19	43.2	44.1				400.6	402.3	1.8	0.9
94	T3	Loading point-to-point	6	42	19	6	44	45	44.1	44.2	x	2	x	402.3	404.8	2.4	0.1
95	T3	Traveling	6	44	45	6	52	40	44.2	45.0				404.8	412.7	7.9	0.8
96	T3	Loading dumpster (Contraloria)	6	52	40	7	2	24	45.0	45.0	23			412.7	422.4	9.7	0.0
97	T7	Selling metals in Monte Oscuro	7	2	24	7	24	8	45.0	53.4				422.4	444.1	21.7	8.4
98	T4	To Patacon	7	24	8	7	38	53	53.4	63.9				444.1	458.9	14.8	10.5
99	T5	Weighing	7	38	53	7	39	41	63.9	63.9			6.28	458.9	459.7	0.8	0.0
100	T5	Unloading	7	39	41	7	54	42						459.7	474.7	15.0	2.7
101	T1a	Cleaning vehicle	7	54	42	8	0	47	63.9	63.9				474.7	480.8	6.1	0.0
102	T6	To Curundu compound	8	0	47	8	21	4	63.9	78.6				480.8	501.1	20.3	14.7

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 24, 2002 (Thursday)

Collection area: AN 01-03

Collection route: Marañon

Vehicle number: 1905

Capacity: 20 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	Final					Initial	Final				Initial	Final		
			H	M	S	H	M	S	Kn	Kn			(min)	(min)			
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	0	54	23	0.0	0.0			0.0	54.4	54.4	0.0	0.0
2	T2	From Curundu compound to Marañon	0	54	23	1	4	25	0.0	4.4			54.4	64.4	10.0	4.4	4.4
3	T3	Loading point-to-point	1	4	25	1	6	36	4.4	4.6	A	6	64.4	66.6	2.2	0.2	0.2
4	T3	Loading dumpster (La Loteria)	1	6	36	1	15	4	4.6	4.6	I	1	66.6	75.1	8.5	0.0	0.0
5	T3	Loading point-to-point	1	15	4	1	19	15	4.6	4.7	B	7	75.1	79.3	4.2	0.1	0.1
6	T3	Traveling	1	19	15	1	19	37	4.7	4.8			79.3	79.6	0.4	0.1	0.1
7	T3	Loading point-to-point	1	19	37	1	22	41	4.8	5.0	C	8	79.6	82.7	3.1	0.2	0.2
8	T3	Traveling	1	22	41	1	24	2	5.0	5.2			82.7	84.0	1.3	0.2	0.2
9	T3	Loading point-to-point	1	24	2	1	25	34	5.2	5.3	D	4	84.0	85.6	1.5	0.1	0.1
10	T3	Traveling	1	25	34	1	25	45	5.3	5.4			85.6	85.8	0.2	0.1	0.1
11	T3	Loading point-to-point	1	25	45	1	27	5	5.4	5.5	E	4	85.8	87.1	1.3	0.1	0.1
12	T3	Traveling	1	27	5	1	27	34	5.5	5.5			87.1	87.6	0.5	0.0	0.0
13	T3	Loading point-to-point	1	27	34	1	30	53	5.5	5.6	F	5	87.6	90.9	3.3	0.1	0.1
14	T3	Traveling	1	30	53	1	31	12	5.6	5.6			90.9	91.2	0.3	0.0	0.0
15	T3	Loading point-to-point	1	31	12	1	32	22	5.6	5.7	G	4	91.2	92.4	1.2	0.1	0.1
16	T3	Traveling	1	32	22	1	33	20	5.7	5.8			92.4	93.3	1.0	0.1	0.1
17	T3	Loading point-to-point *lots of waste*	1	33	20	1	34	20	5.8	5.8	H	1	93.3	94.3	1.0	0.0	0.0
18	T3	Traveling	1	34	30	1	36	14	5.8	6.5			94.5	96.2	1.7	0.7	0.7
19	T3	Loading point-to-point *lots of waste*	1	36	14	1	40	26	6.5	6.5	I	1	96.2	100.4	4.2	0.0	0.0
20	T3	Traveling	1	40	26	1	41	12	6.5	6.5			100.4	101.2	0.8	0.0	0.0
21	T3	loading dumpster	1	41	12	1	57	59	6.5	6.5	2		101.2	118.0	16.8	0.0	0.0
22	T3	Traveling	1	57	59	1	58	23	6.5	6.6			118.0	118.4	0.4	0.1	0.1
23	T3	Loading dumpster	1	58	23	2	8	25	6.6	6.6	3		118.4	128.4	10.0	0.0	0.0
24	T3	Traveling	2	8	25	2	9	47	6.6	6.9			128.4	129.8	1.4	0.3	0.3
25	T3	Loading point-to-point	2	9	47	2	13	37	6.9	7.0	J	7	129.8	133.6	3.8	0.1	0.1
26	T3	Loading dumpster	2	13	37	2	17	40	7.0	7.0	4		133.6	137.7	4.0	0.0	0.0
27	T3	Traveling	2	17	40	2	18	55	7.0	7.5			137.7	138.9	1.3	0.5	0.5
28	T3	Loading point-to-point	2	18	55	2	21	45	7.5	7.6	K	2	138.9	141.8	2.8	0.1	0.1

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 24, 2002 (Thursday)

Collection area: AN 01-03

Collection route: Marañon

Vehicle number: 1905

Capacity: 20 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S	Km	Km				(min)	(min)		
29	T3	Loading dumpster	2	21	45	2	24	31	7.6	7.6	5		141.8	144.5	2.8	0.0	
30	T3	Traveling				2	24	31	7.6	7.8			144.5	145.1	0.6	0.2	
31	T3	Loading dumpster	2	25	6	2	30	2	7.8	7.8	6		145.1	150.0	4.9	0.0	
32	T3	Traveling				2	30	2	7.8	7.9			150.0	150.4	0.4	0.1	
33	T3	Loading point-to-point	2	30	26	2	31	26	7.9	8.0	L	2	150.4	151.4	1.0	0.1	
34	T3	Traveling				2	31	26	8.0	8.1			151.4	152.2	0.8	0.1	
35	T3	Loading point-to-point	2	32	14	2	34	22	8.1	8.2	M		152.2	154.4	2.1	0.1	
36	T3	Traveling				2	34	22	8.2	8.2			154.4	154.8	0.4	0.0	
37	T3	Loading dumpster	2	34	49	2	41	40	8.2	8.2	7		154.8	161.7	6.8	0.0	
38	T3	Traveling				2	41	40	8.2	8.3			161.7	161.9	0.2	0.1	
39	T3	Loading dumpster	2	41	54	2	44	1	8.3	8.3	8		161.9	164.0	2.1	0.0	
40	T3	Traveling				2	44	1	8.3	8.3			164.0	164.4	0.3	0.0	
41	T3	Loading dumpster	2	44	22	2	46	12	8.3	8.3	9		164.4	166.2	1.8	0.0	
42	T3	Traveling				2	46	12	8.3	8.4			166.2	166.8	0.6	0.1	
43	T3	Loading dumpster	2	46	45	2	50	34	8.4	8.4	10		166.8	170.6	3.8	0.0	
44	T3	Traveling				2	50	34	8.4	8.5			170.6	171.2	0.6	0.1	
45	T3	Loading point-to-point	2	51	9	2	51	52	8.5	8.6	N	2	171.2	171.9	0.7	0.1	
46	T3	Traveling				2	51	52	8.6	9.1			171.9	175.4	3.6	0.5	
47	T3	Loading point-to-point	2	55	26	2	57	31	9.1	9.2	N	4	175.4	177.5	2.1	0.1	
48	T3	Traveling				2	57	31	9.2	9.3			177.5	177.9	0.4	0.1	
49	T3	Loading point-to-point	2	57	54	2	58	38	9.3	9.3	O	2	177.9	178.6	0.7	0.0	
50	T3	Loading dumpster	2	58	38	3	4	10	9.3	9.3	11		178.6	184.2	5.5	0.0	
51	T3	Traveling				3	4	10	9.3	9.4			184.2	185.0	0.8	0.1	
52	T3	Loading point-to-point	3	4	57	3	6	40	9.4	9.6	P	4	185.0	186.7	1.7	0.2	
53	T3	Traveling				3	6	40	9.6	9.6			186.7	187.4	0.8	0.0	
54	T3	Loading point-to-point	3	7	26	3	8	35	9.6	9.7	Q	1	187.4	188.6	1.2	0.1	
55	T3	Traveling				3	8	35	9.7	9.9			188.6	189.5	0.9	0.2	
56	T3	Loading point-to-point	3	9	30	3	10	6	9.9	9.9	R	2	189.5	190.1	0.6	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 24, 2002 (Thursday)

Collection area: AN 01-03

Collection route: Marañon

Vehicle number: 1905

Capacity: 20 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	Final	H	M	S	Initial	Final	Initial				Final			
57	T3	Traveling	3	10	6	3	10	36	9.9	10.0				190.1	190.6	0.5	0.1
58	T3	Loading	3	10	36	3	12	19	10.0	10.1	S	1		190.6	192.3	1.7	0.1
59	T3	Traveling	3	12	19	3	12	45	10.1	10.2				192.3	192.8	0.4	0.1
60	T3	Loading dumpster	3	12	45	3	19	6	10.2	10.2	12			192.8	199.1	6.3	0.0
61	T3	Traveling	3	19	6	3	19	38	10.2	10.3				199.1	199.6	0.5	0.1
62	T3	Loading	3	19	38	3	22	6	10.3	10.3	T	1		199.6	202.1	2.5	0.0
63	T4	To Patacon	3	22	6	3	43	29	10.3	24.1				202.1	223.5	21.4	13.8
64	T5	Weighing	3	43	29	3	44	40	24.1	24.1			6.98	223.5	224.7	1.2	0.0
65	T5	Unloading	3	44	40	3	49	13						224.7	229.2	4.6	2.7
66	T4	To Patacon	3	49	13	4	6	59	24.1	37.4				229.2	247.0	17.8	13.3
67	T3	Loading (Americana School)	4	6	59	4	14	46	37.4	37.4				247.0	254.8	7.8	0.0
68	T4	To Patacon	4	14	46	4	17	42	37.4	38.7				254.8	257.7	2.9	1.3
69	T3	Loading dumpster	4	17	42	4	28	38	38.7	38.7	13			257.7	268.6	10.9	0.0
70	T3	Traveling	4	28	38	4	29	19	38.7	38.8				268.6	269.3	0.7	0.1
71	T3	Loading point-to-point	4	29	19	4	32	21	38.8	38.9	V	5		269.3	272.4	3.0	0.1
72	T3	Traveling	4	32	21	4	32	41	38.9	39.0				272.4	272.7	0.3	0.1
73	T3	Loading point-to-point	4	32	41	4	40	0	39.0	39.2	X	7		272.7	280.0	7.3	0.2
74	T3	Traveling	4	40	0	4	40	52	39.2	39.2				280.0	280.9	0.9	0.0
75	T3	Loading point-to-point	4	40	52	4	42	13	39.2	39.4	Y	2		280.9	282.2	1.3	0.2
76	T3	Traveling	4	42	13	4	42	46	39.4	39.5				282.2	282.8	0.6	0.1
77	T3	Loading dumpster (lots of waste)	4	42	46	5	0	47	39.5	39.5	14	2		282.8	300.8	18.0	0.0
78	T3	Traveling	5	0	47	5	1	29	39.5	39.6				300.8	301.5	0.7	0.1
79	T3	Loading point-to-point	5	1	29	5	5	34	39.6	39.7	Z	4		301.5	305.6	4.1	0.1
80	T3	Traveling	5	5	34	5	6	21	39.7	39.7				305.6	306.4	0.8	0.0
81	T3	Loading point-to-point	5	6	21	5	10	56	39.7	39.8	a	6		306.4	310.9	4.6	0.1
82	T3	Traveling	5	10	56	5	12	4	39.8	40.0				310.9	312.1	1.1	0.2
83	T3	Loading point to point (lots of waste scattered)	5	12	4	5	16	39	40.0	40.0	b	3		312.1	316.7	4.6	0.0
84	T3	Traveling	5	16	39	5	18	49	40.0	40.7				316.7	318.8	2.2	0.7

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,
Method or both*): Both
Collection shift: Night from 6:00 p.m. to 2:00 a.m.
Target area: Urban area of low income
Vehicle type: Back loading compactor
Personnel: 4 (driver: 1 collectors: 3)

Date: January 24, 2002 (Thursday)
Collection area: AN 01-03
Collection route: Marañon
Vehicle number: 1905
Capacity: 20 yards³
Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
85	T3	Loading dumpster - waste in surroundings	5	18	49	6	26	18	40.7	40.7	15			318.8	386.3	67.5	0.0
86	T4	To Patacon	6	26	18	6	30	27	40.7	42.2				386.3	390.5	4.1	1.5
87	T7	Selling cans	6	30	27	6	34	52	42.2	42.2				390.5	394.9	4.4	0.0
88	T4	To Patacon	6	34	52	6	49	27	42.2	56.1				394.9	409.5	14.6	13.9
89	T5	Weighing	6	49	27	6	50	26	56.1	56.1		5.58		409.5	410.4	1.0	0.0
90	T5	Unloading	6	50	26	7	1	24						410.4	421.4	11.0	2.7
91	T1a	Cleaning vehicle	7	1	24	7	7	9						421.4	427.2	5.8	0.0
92	T6	To DIMAUD-Curundu	7	7	9	7	22	49	56.1	70.8				427.2	442.8	15.7	14.7

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,
Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.
Target area: Urban area of low income

Vehicle type: Back loading compactor
Personnel: 4 (driver: 1 collectors: 3)

Date: January 26, 2002 (Saturday)

Collection area: AN 01-03

Collection route: Marañon

Vehicle number: 240 (2957)

Capacity: 20 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km			
1	T1	Readiness (waiting the personnel - fueling)	0	0	0	0	4	9	0.0	0.0			
2	T2	From Curundu compound to Marañon	0	4	9	0	11	6	0.0	3.3			
3	T3	Loading point-to-point	0	11	6	0	14	35	3.3	3.5	A	8	
4	T3	Traveling	0	14	35	0	15	14	3.5	3.6			
5	T3	Loading point-to-point	0	15	14	0	17	50	3.6	3.7	B	5	
6	T3	Traveling	0	17	50	0	18	15	3.7	3.8			
7	T3	Loading point-to-point	0	18	15	0	18	59	3.8	3.9	C	3	
8	T3	Traveling	0	18	59	0	19	39	3.9	4.0			
9	T3	Loading point-to-point	0	19	59	0	21	8	4.0	4.2	D	3	
10	T3	Traveling	0	21	8	0	21	37	4.2	4.3			
11	T3	Loading point-to-point	0	21	37	0	24	2	4.3	4.3	E	3	
12	T3	Traveling	0	24	2	0	24	31	4.3	4.4			
13	T3	Loading point-to-point	0	24	31	0	28	47	4.4	4.5	F	5	
14	T3	Traveling	0	24	47	0	29	29	4.5	4.6			
15	T3	Loading point-to-point	0	29	29	0	30	24	4.6	4.7	G	1	
16	T3	Traveling	0	30	24	0	34	3	4.7	5.3			
17	T3	Loading (lots of scattered waste. "Energy" Store)	0	34	3	0	39	8	5.3	5.3	H	1	
18	T3	Traveling	0	39	8	0	40	27	5.3	5.4			
19	T3	Loading point-to-point	0	40	27	0	42	27	5.4	5.5	I	2	
20	T3	Loading container	0	42	27	0	45	43	5.5	5.5	I		
21	T3	Traveling	0	45	43	0	46	18	5.5	5.5			
22	T3	Loading locked trash can	0	46	18	0	48	14	5.5	5.5	2		
23	T3	Traveling	0	48	14	0	49	4	5.5	5.7			
24	T3	Loading dumpster	0	49	4	0	52	1	5.7	5.7	3		
25	T3	Traveling	0	52	1	0	52	16	5.7	5.7			
26	T3	Loading dumpster	0	52	16	0	54	54	5.5	5.7	4		
27	T3	Traveling	0	54	54	0	55	28	5.7	5.8			
28	T3	Loading point-to-point	0	55	28	0	56	45	5.8	5.9	J	2	

Accumulated Time	Time (min)	Distance (Kms)
0.0	4.2	0.0
4.2	11.1	3.3
11.1	14.6	0.2
14.6	15.2	0.1
15.2	17.8	0.1
17.8	18.3	0.1
18.3	19.0	0.1
19.0	19.1	0.1
20.0	21.1	0.2
21.1	21.6	0.1
21.6	24.0	0.0
24.0	24.5	0.1
24.5	28.8	0.1
24.8	29.5	0.1
29.5	30.4	0.1
30.4	34.1	0.6
34.1	39.1	0.0
39.1	40.5	0.1
40.5	42.5	0.1
42.5	45.7	0.0
45.7	46.3	0.0
46.3	48.2	0.0
48.2	49.1	0.2
49.1	52.0	0.0
52.0	52.3	0.0
52.3	54.9	0.2
54.9	55.5	0.1
55.5	56.8	0.1

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 26, 2002 (Saturday)

Collection area: AN 01-03

Collection route: Marañon

Vehicle number: 240 (2957)

Capacity: 20 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance			Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final	Km				Initial (min)	Final (min)		
			H	M	S	H	M	S										
29	T3	Traveling	0	56	45	0	57	35	5.9	6.0				56.8	57.6	0.8	0.1	
30	T3	Loading point-to-point	0	57	35	1	0	31	6.0	6.1	K	2		57.6	60.5	2.9	0.1	
31	T3	Traveling	1	0	31	1	0	56	6.1	6.1				60.5	60.9	0.4	0.0	
32	T3	Loading dumpster	1	0	56	1	12	12	6.1	6.1	5	2		60.9	72.2	11.3	0.0	
33	T3	Loading dumpster	1	12	12	1	18	13	6.2	6.2	6	2		72.2	78.2	6.0	0.0	
34	T3	Traveling	1	18	13	1	19	17	6.2	6.3				78.2	79.3	1.1	0.1	
35	T3	Loading dumpster	1	19	17	1	22	29	6.3	6.3	7			79.3	82.5	3.2	0.0	
36	T3	Traveling	1	22	29	1	23	9	6.3	6.4				82.5	83.2	0.7	0.1	
37	T3	Loading point-to-point	1	23	9	1	24	8	6.4	6.5	L	2		83.2	84.1	1.0	0.1	
38	T3	Traveling	1	24	8	1	25	10	6.5	6.5	8			84.1	85.2	1.0	0.0	
39	T3	Loading dumpster	1	25	10	1	34	19	6.5	6.5				85.2	94.3	9.1	0.0	
40	T3	Traveling	1	34	19	1	34	46	6.5	6.5				94.3	94.8	0.5	0.0	
41	T3	Loading dumpster	1	34	46	1	48	24	6.5	6.5	9			94.8	108.4	13.6	0.0	
42	T3	Traveling	1	48	24	1	50	16	6.5	6.8				108.4	110.3	1.9	0.3	
43	T3	Loading point-to-point	1	50	16	1	52	38	6.8	7.0	M	3		110.3	112.6	2.4	0.2	
44	T3	Traveling	1	52	38	1	53	45	7.0	7.3				112.6	113.8	1.1	0.3	
45	T3	Loading point-to-point	1	53	45	1	59	15	7.3	7.4	N	3		113.8	119.3	5.5	0.1	
46	T3	Traveling	1	59	15	1	59	55	7.4	7.5				119.3	119.9	0.7	0.1	
47	T3	Loading dumpster and scattered waste	1	59	55	2	77	0	7.5	7.5	10			119.9	197.0	77.1	0.0	
48	T3	Traveling	2	7	0	2	7	55	7.5	7.6				127.0	127.9	0.9	0.1	
49	T3	Loading point-to-point	2	7	55	2	11	8	7.6	7.9	Ñ	3		127.9	131.1	3.2	0.3	
50	T3	Traveling	2	11	8	2	13	6	7.9	8.4				131.1	133.1	2.0	0.5	
51	T3	Loading dumpster and scattered waste	2	13	6	2	19	59	8.4	8.4	11			133.1	140.0	6.9	0.0	
52	T3	Traveling	2	19	59	2	20	41	8.4	8.5				140.0	140.7	0.7	0.1	
53	T3	Loading point-to-point	2	20	41	2	25	16	8.5	8.6	O	4		140.7	145.3	4.6	0.1	
54	T3	Loading dumpster	2	25	16	2	52	59	8.6	8.6	12			145.3	173.0	27.7	0.0	
55	T4	To Patacon	2	52	59	3	15	34	8.6	22.1				173.0	195.6	22.6	13.5	
56	T5	Weighing	3	15	34	3	16	28	22.1	22.1				195.6	196.5	0.9	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 26, 2002 (Saturday)

Collection area: AN 01-03

Collection route: Marañon

Vehicle number: 240 (2957)

Capacity: 20 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)					
			H	M	S	H	M	S	Initial Km	Final Km								
57	T5	Unloading	3	16	28	3	24	49							196.5	204.8	8.3	2.7
58	T4	To collecting site	3	24	49	3	41	2	22.1	35.4					204.8	221.0	16.2	13.3
59	T3	Loading dumpster	3	41	2	3	47	46	35.4	35.4	13				221.0	227.8	6.7	0.0
60	T3	Traveling	3	47	46	3	49	8	35.4	36.1					227.8	229.1	1.4	0.7
61	T3	Loading dumpster and scattered waste	3	8	4	4	37	36.1	36.1	36.1	14	2			180.1	244.6	64.5	0.0
62	T3	Traveling	4	4	37	4	5	22	36.1	36.2					244.6	245.4	0.8	0.1
63	T3	Loading dumpster - "Titan" store	4	5	22	4	10	23	36.2	36.2	15				245.4	250.4	5.0	0.0
64	T3	Traveling	4	10	23	4	11	26	36.2	36.2					250.4	251.4	1.1	0.0
65	T3	Loading point-to-point	4	11	26	4	18	32	36.2	36.4	P	2			251.4	258.5	7.1	0.2
66	T3	Traveling	4	18	32	4	19	10	36.4	36.4					258.5	259.2	0.6	0.0
67	T3	Loading point-to-point	4	19	10	4	22	53	36.4	36.5	Q	4			259.2	262.9	3.7	0.1
68	T3	Traveling	4	22	53	4	23	56	36.5	36.7					262.9	263.9	1.1	0.2
69	T3	Loading point-to-point	4	23	56	4	24	35	36.7	36.7	R	2			263.9	264.6	0.6	0.0
70	T3	Traveling	4	24	35	4	25	21	36.7	36.9					264.6	265.4	0.8	0.2
71	T3	Loading point-to-point	4	25	21	4	29	59	36.9	36.9	S	2			265.4	270.0	4.6	0.0
72	T3	Loading dumpster	4	29	59	4	31	57	36.9	36.9	16				270.0	272.0	2.0	0.0
73	T3	Traveling	4	31	57	4	32	40	36.9	37.0					272.0	272.7	0.7	0.1
74	T3	Loading point-to-point	4	32	40	4	33	45	37.0	37.1	T	4			272.7	273.8	1.1	0.1
75	T3	Traveling	4	33	45	4	34	23	37.1	37.2					273.8	274.4	0.6	0.1
76	T3	Loading point-to-point	4	34	23	4	36	7	37.2	37.2	V	4			274.4	276.1	1.7	0.0
77	T3	Traveling	4	36	7	4	36	33	37.2	37.2					276.1	276.6	0.4	0.0
78	T3	Loading point-to-point	4	36	33	4	44	19	37.2	37.4	X	9			276.6	284.3	7.8	0.2
79	T3	Traveling	4	44	19	4	47	13	37.4	38.4					284.3	287.2	2.9	1.0
80	T3	Loading dumpster	4	47	13	5	1	50	38.4	38.4	17	3			287.2	301.8	14.6	0.0
81	T3	Traveling	5	1	50	5	4	17	38.4	38.7					301.8	304.3	2.5	0.3
82	T3	Loading dumpster	5	4	17	5	6	11	38.7	38.7	18				304.3	306.2	1.9	0.0
83	T3	Traveling	5	6	11	5	8	9	38.7	39.3					306.2	308.2	2.0	0.6
84	T3	Loading dumpster	5	8	9	5	12	25	39.3	39.3	19				308.2	312.4	4.3	0.0

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 26, 2002 (Saturday)

Collection area: AN 01-03

Collection route: Marañon

Vehicle number: 240 (2957)

Capacity: 20 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial (min)	Final (min)		
			H	M	S	H	M	S									
85	T4	To Patacon	5	12	25	5	36	59	39.3	52.9			312.4	337.0	24.6	13.6	
86	T5	Weighing	5	36	59	5	37	50	52.9	52.9		4.68	337.0	337.8	0.8	0.0	
87	T5	Unloading	5	37	50	5	45	3					337.8	345.1	7.2	2.7	
88	T1a	Cleaning vehicle	5	45	3	5	48	19					345.1	348.3	3.3	0.0	
89	T6	To DIMAUD-Curundu	5	48	19	6	7	8	52.9	67.6			348.3	367.1	18.8	14.7	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,
Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.
Target area: Urban area of low income

Vehicle type: Back loading compactor
Personnel: 4 (driver: 1 collectors: 3)

Date: January 28, 2002 (Monday)

Collection area: AN 01-03

Collection route: Marañon

Vehicle number: 333 (2967)

Capacity: 20 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	0	3	52	0.0	0.0			0.0	3.9	3.9	0.0	
2	T2	From Curundu compound to Marañon	0	3	52	0	13	59	0.0	2.6			3.9	14.0	10.1	2.6	
3	T3	Loading dumpster (Mc Donald's)	0	13	59	0	18	56	2.6	2.6	1		14.0	18.9	5.0	0.0	
4	T3	Traveling	0	18	36	0	19	23	2.6	2.8			18.6	19.4	0.8	0.2	
5	T3	Loading dumpster	0	19	23	0	23	14	2.8	2.8	2		19.4	23.2	3.9	0.0	
6	T3	Traveling	0	23	14	0	23	43	2.8	2.9			23.2	23.7	0.5	0.1	
7	T3	Loading dumpster	0	23	43	0	27	9	2.9	2.9	3		23.7	27.2	3.4	0.0	
8	T3	Traveling	0	27	9	0	27	42	2.9	3.1			27.2	27.7	0.6	0.2	
9	T3	Loading point-to-point	0	27	42	0	29	55	3.1	3.3	A	6	27.7	29.9	2.2	0.2	
10	T3	Loading dumpster	0	29	55	0	43	8	3.3	3.3	4	4	29.9	43.1	13.2	0.0	
11	T3	Traveling	0	43	8	0	43	45	3.3	3.4			43.1	43.8	0.6	0.1	
12	T3	Loading point-to-point	0	43	45	0	48	18	3.4	3.5	B	6	43.8	48.3	4.6	0.1	
13	T3	Traveling	0	48	18	0	50	10	3.5	3.7			48.3	50.2	1.9	0.2	
14	T3	Loading dumpster	0	50	10	0	52	52	3.7	3.7	5		50.2	52.9	2.7	0.0	
15	T3	Traveling	0	52	52	0	53	41	3.7	3.8			52.9	53.7	0.8	0.1	
16	T3	Loading point-to-point	0	53	41	0	54	2	3.8	4.0	C	2	53.7	54.0	0.4	0.2	
17	T3	Loading dumpster	0	54	2	0	58	14	4.0	4.0	6		54.0	58.2	4.2	0.0	
18	T3	Traveling	0	58	14	0	59	2	4.0	4.2			58.2	59.0	0.8	0.2	
19	T3	Loading dumpster	0	59	2	1	1	25	4.2	4.2	7		59.0	61.4	2.4	0.0	
20	T3	Traveling	1	1	25	1	2	20	4.2	4.4			61.4	62.3	0.9	0.2	
21	T3	Loading dumpster	1	2	20	1	4	42	4.4	4.4	8		62.3	64.7	2.4	0.0	
22	T3	Traveling	1	4	42	1	6	49	4.4	5.0			64.7	66.8	2.1	0.6	
23	T3	Loading dumpster	1	6	49	1	11	30	5.0	5.0	9	2	66.8	71.5	4.7	0.0	
24	T3	Traveling	1	11	30	1	12	34	5.0	5.2			71.5	72.6	1.1	0.2	
25	T3	Loading dumpster	1	12	34	1	18	30	5.2	5.2	10	2	72.6	78.5	5.9	0.0	
26	T3	Traveling	1	18	30	1	19	9	5.2	5.4			78.5	79.2	0.7	0.2	
27	T3	Loading dumpster	1	19	9	1	25	17	5.4	5.4	11		79.2	85.3	6.1	0.0	
28	T3	Traveling	1	25	17	1	26	34	5.4	5.5			85.3	86.6	1.3	0.1	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 28, 2002 (Monday)

Collection area: AN 01-03

Collection route: Marañon

Vehicle number: 333 (2967)

Capacity: 20 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	Final			Initial	Final	Initial	Final				Initial	Final		
	H	M	S	H	M	S	Initial	Km	Km			(min)	(min)				
29	T3	Loading dumpster	1	26	34	1	31	43	5.5	5.5			86.6	91.7	5.2	0.0	
30	T3	Traveling	1	31	43	1	32	29	5.5	5.6			91.7	92.5	0.8	0.1	
31	T3	Loading point-to-point	1	32	29	1	34	45	5.6	5.7	D	2	92.5	94.8	2.3	0.1	
32	T3	Loading dumpster	1	34	45	1	43	23	5.7	5.7	12	2	94.8	103.4	8.6	0.0	
33	T3	Traveling	1	43	23	1	46	50	5.7	6.2			103.4	106.8	3.4	0.5	
34	T3	Loading dumpster	1	46	50	1	50	13	6.2	6.2	13		106.8	110.2	3.4	0.0	
35	T3	Traveling	1	50	13	1	51	2	6.2	6.3			110.2	111.0	0.8	0.1	
36	T3	Loading dumpster	1	51	2	1	53	27	6.3	6.3	14		111.0	113.5	2.4	0.0	
37	T3	Loading point-to-point	1	54	23	2	54	23	6.3	6.3	E	1	113.5	114.4	0.9	0.0	
38	T3	Loading dumpster	1	54	23	2	0	18	6.3	6.3	15		114.4	120.3	5.9	0.0	
39	T3	Traveling	2	0	18	2	2	33	6.3	6.7			120.3	122.6	2.3	0.4	
40	T3	Load point to point (Mc.Donald's - much waste)	2	2	33	2	45	35	6.7	7.0	F	8	122.6	165.6	43.0	0.3	
41	T3	Traveling	2	45	33	2	46	30	7.0	7.1			165.6	166.5	0.9	0.1	
42	T3	Loading	2	46	30	2	55	36	7.1	7.7	G	1	166.5	175.6	9.1	0.6	
43	T7	Selling wood box, cans, bottles	2	55	36	3	4	3	7.7	7.7			175.6	184.1	8.5	0.0	
44	T4	To Patacon	3	4	3	3	14	34	7.7	14.4			184.1	194.6	10.5	6.7	
45	T7	Flat tire	3	14	34	4	59	45	14.4	14.4			194.6	299.8	105.2	0.0	
46	T4	To Patacon	4	59	45	5	9	17	14.4	21.6			299.8	309.3	9.5	7.2	
47	T5	Weighing	5	9	17	5	10	15	21.6	21.6		7.36	309.3	310.3	1.0	0.0	
48	T5	Unloading	5	10	5	5	19	3					310.1	319.1	9.0	2.7	
49	T4	To Patacon	5	19	3	5	42	23	21.6	34.0			319.1	342.4	23.3	12.4	
50	T3	Loading point-to-point	5	42	23	5	51	26	34.0	34.3	H	8	342.4	351.4	9.1	0.3	
51	T3	Traveling	5	51	26	5	52	0	34.3	34.5			351.4	352.0	0.6	0.2	
52	T3	Loading point-to-point	5	52	0	5	58	16	34.5	35.0	I	13	352.0	358.3	6.3	0.5	
53	T3	Traveling	5	58	16	5	59	17	35.0	35.2			358.3	359.3	1.0	0.2	
54	T3	Loading point-to-point	5	59	17	6	4	14	35.2	35.5	J	9	359.3	364.2	4.9	0.3	
55	T3	Traveling	6	4	14	6	5	0	35.5	35.9			364.2	365.0	0.8	0.4	
56	T3	Loading point-to-point	6	5	0	6	9	17	35.9	35.9	K	4	365.0	369.3	4.3	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 28, 2002 (Monday)

Collection area: AN 01-03

Collection route: Marañon

Vehicle number: 333 (2967)

Capacity: 20 yards³

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	Final	H	M	S	H	M	S				Initial	Final		
57	T3	Traveling	6	9	17	6	10	49	35.9	36.9				369.3	370.8	1.5	1.0
58	T3	Loading point-to-point	6	10	49	6	15	1	36.9	37.4	L	13		370.8	375.0	4.2	0.5
59	T3	Traveling	6	15	1	6	15	41	37.4	37.5				375.0	375.7	0.7	0.1
60	T3	Loading point-to-point	6	15	41	6	17	15	37.5	37.6	M	2		375.7	377.3	1.6	0.1
61	T3	Loading dumpster and scattered waste	6	17	15	6	46	39	37.6	37.6	16	2		377.3	406.7	29.4	0.0
62	T3	Traveling	6	46	39	6	47	37	37.6	38.0				406.7	407.6	1.0	0.4
63	T3	Loading point-to-point	6	47	37	6	49	23	38.0	38.1	N	3		407.6	409.4	1.8	0.1
64	T3	Loading dumpster	6	49	23	6	52	45	38.1	38.1	17			409.4	412.8	3.4	0.0
65	T3	Traveling	6	52	45	6	53	29	38.1	38.4				412.8	413.5	0.7	0.3
66	T3	Loading point-to-point	6	53	29	7	13	19	38.4	38.6	O	12		413.5	433.3	19.8	6.2
67	T3	Traveling	7	13	19	7	14	55	38.6	39.2				433.3	434.9	1.6	0.6
68	T3	Loading point-to-point	7	14	55	7	17	49	39.2	39.3	P	6		434.9	437.8	2.9	0.1
69	T4	To Patacon	7	17	49	7	25	28	39.3	41.1				437.8	445.5	7.6	1.8
70	T7	Selling cans	7	25	28	7	31	52	41.1	41.1				445.5	451.9	6.4	0.0
71	T4	To Patacon	7	31	52	7	46	52	41.1	55.0				451.9	466.9	15.0	13.9
72	T5	Weighing	7	46	52	7	47	17	55.0	55.0				466.9	467.3	0.4	0.0
73	T5	Unloading	7	47	17	7	56	31				6.37		467.3	476.5	9.2	2.7
74	T1a	Cleaning vehicle	7	56	31	8	0	47						476.5	480.8	4.3	0.0
75	T6	To DIMAUD-Curundu	8	0	47	8	14	52	55.0	69.7				480.8	494.9	14.1	14.7

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): House-to-house

Collection shift: Day from 12:00 p.m. to 8:00 p.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 19, 2002 (Saturday)

Collection area: BD 06-01

Collection route: Rio Abajo

Vehicle number: 1917

Capacity: 8 tons

Fuel consumption: 16 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial		Final		Initial	Final	Initial (min)	Final (min)							
			H	M	S	H								M	S		
1	T1	Delay of Workers and vehicle readiness	0	0	0	0	24	0	0.0	0.0			0.0	24.0	24.0	0.0	
2	T2	To Rio Abajo-4 Street	0	24	0	0	32	30	0.0	3.0			3.0	32.5	32.5	3.0	
3	T3	Loading at a commercial center	0	32	30	0	36	30	3.0	3.0	1		3.0	36.5	36.5	4.0	
4	T3	Traveling	0	36	30	0	36	58	3.0	3.1			3.1	37.0	37.0	0.5	
5	T3	Loading door-to-door	0	36	58	0	53	4	3.1	3.4	A		3.4	53.1	53.1	16.1	
6	T3	Traveling	0	53	4	0	53	48	3.4	3.5			3.5	53.8	53.8	0.7	
7	T3	Loading door-to-door	0	53	48	0	55	2	3.5	3.5	2		3.5	55.0	55.0	1.2	
8	T3	Traveling	0	55	2	0	56	20	3.5	3.6			3.6	56.3	56.3	1.3	
9	T3	Loading door-to-door	0	56	20	0	57	60	3.6	3.6	3		3.6	58.0	58.0	1.7	
10	T3	Traveling	0	57	60	0	58	38	3.6	3.7			3.7	58.6	58.6	0.6	
11	T3	Loading door-to-door	0	58	38	1	6	31	3.7	4.0	B	10	4.0	66.5	66.5	7.9	
12	T3	Traveling	1	6	31	1	7	34	4.0	4.2			4.2	67.6	67.6	1.1	
13	T3	Loading door-to-door	1	7	34	1	27	50	4.2	4.8	C	21	4.8	87.8	87.8	20.3	
14	T7	Stopped for snack	1	27	50	1	36	40	4.8	4.8			4.8	96.7	96.7	8.8	
15	T3	Traveling	1	36	40	1	38	38	4.8	5.1			5.1	98.6	98.6	2.0	
16	T3	Loading door-to-door	1	38	38	1	48	22	5.1	5.6	D	16	5.6	108.4	108.4	9.7	
17	T3	Traveling	1	48	22	1	49	5	5.6	5.7			5.7	109.1	109.1	0.7	
18	T3	Loading door-to-door	1	49	5	2	1	50	5.7	6.2	E	22	6.2	121.8	121.8	12.8	
19	T3	Traveling	2	1	50	2	2	30	6.2	6.3			6.3	122.5	122.5	0.7	
20	T3	Loading door-to-door	2	2	30	2	15	15	6.3	6.8	F		6.8	135.3	135.3	12.8	
21	T3	Traveling	2	15	15	2	16	0	6.8	6.9			6.9	136.0	136.0	0.8	
22	T3	Loading door-to-door	2	16	0	2	21	32	6.9	7.4	G	18	7.4	141.5	141.5	5.5	
23	T3	Traveling	2	21	32	2	22	10	7.4	7.5			7.5	142.2	142.2	0.6	
24	T3	Loading door-to-door	2	22	10	2	33	2	7.5	8.0	H	13	8.0	153.0	153.0	10.9	
25	T3	Traveling	2	33	2	2	33	45	8.0	8.1			8.1	153.8	153.8	0.7	
26	T3	Loading door-to-door	2	33	45	2	37	0	8.1	8.2	I a	2	8.2	157.0	157.0	3.3	
27	T7	Arrival of the supervisor	2	37	0	2	39	50	8.2	8.2			8.2	159.8	159.8	2.8	
28	T3	Loading door-to-door	2	39	50	2	54	34	8.2	8.5	I b	15	8.5	174.6	174.6	14.7	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): House-to-house

Collection shift: Day from 12:00 p.m. to 8:00 p.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 19, 2002 (Saturday)

Collection area: BD 06-01

Collection route: Rio Abajo

Vehicle number: 1917

Capacity: 8 tons

Fuel consumption: 16 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	M	S	H	M	Final	Initial	Final				Initial	Final		
29	T3	Traveling	2	54	34	2	56	12	8.5	8.6				174.6	176.2	1.6	0.1
30	T3	Loading door-to-door	2	56	12	3	19	30	8.6	9.6	J	16		176.2	199.5	23.3	1.0
31	T3	Traveling	3	19	30	3	21	40	9.6	9.7				199.5	201.7	2.2	0.1
32	T3	Loading door-to-door	3	21	40	3	28	0	9.7	9.9	K	7		201.7	208.0	6.3	0.2
33	T3	Loading door-to-door	3	28	0	3	32	40	9.9	10.2	L	2					
34	T3	Traveling	3	32	40	3	33	25	10.2	10.3				212.7	213.4	0.8	0.1
35	T3	Loading door-to-door	3	33	25	3	47	36	10.3	10.3	4			213.4	227.6	14.2	0.0
36	T3	Traveling	3	47	36	3	48	51	10.3	10.6				227.6	228.9	1.3	0.3
37	T3	Loading at a Commercial Center	3	48	51	3	58	33	10.6	10.6	5			228.9	238.6	9.7	0.0
38	T3	Traveling	3	58	33	3	59	0	10.6	10.9				238.6	239.0	0.4	0.3
39	T3	Loading door-to-door	3	59	0	4	7	19	10.9	11.8	M	22		239.0	247.3	8.3	0.9
40	T4	To Patacon	4	7	19	4	26	33	11.8	21.4				247.3	266.6	19.2	9.6
41	T5	Weighing	4	26	33	4	27	27	21.4	21.4			7.37	266.6	267.5	0.9	0.0
42	T5	Unloading	4	27	27	4	44	7						267.5	284.1	16.7	2.7
43	T4	To Carrasquilla compound	4	44	7	4	55	50	21.4	28.9				284.1	295.8	11.7	7.5
44	T7	Stopped for snack	4	55	50	4	56	30	28.9	28.9				295.8	296.5	0.7	0.0
45	T4	To Carrasquilla compound	4	56	30	5	3	52	28.9	31.1				296.5	303.9	7.4	2.2
46	T7	Waiting for supervisor	5	3	52	5	36	15	31.1	31.1				303.9	336.3	32.4	0.0

Note: There were only 2 collectors instead of 3 this day, only one trip assigned.

The last T7 is waiting time for the supervisor to end the trip

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): House-to-house

Collection shift: Day from 12:00 p.m. to 8:00 p.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 21, 2002 (Monday)

Collection area: BD 06-01

Collection route: Rio Abajo

Vehicle number: 1917

Capacity: 8 tons

Fuel consumption: 18 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	M	S	H	M	Final	Initial	Final				Initial	Final		
1	T1	Preparation (waiting for the personnel - diesel)	0	0	0	0	11	54	0.0	0.0				0.0	11.9	11.9	0.0
2	T2	To Rio Abajo	0	11	54	0	21	18	0.0	2.0				11.9	21.3	9.4	2.0
3	T3	Loading door-to-door	0	21	18	0	58	53	2.0	3.5	A	25		21.3	58.9	37.6	1.5
4	T3	Traveling	0	58	53	1	0	0	3.5	3.9				58.9	60.0	1.1	0.4
5	T3	Loading door-to-door	1	0	0	1	43	46	3.9	4.4	B	20		60.0	103.8	43.8	0.5
6	T3	Traveling	1	43	46	1	44	2	4.4	4.5				103.8	104.0	0.3	0.1
7	T3	Loading door-to-door	1	44	2	2	6	19	4.5	4.9	C	16		104.0	126.3	22.3	0.4
8	T3	Traveling	2	6	19	2	7	35	4.9	5.1				126.3	127.6	1.3	0.2
9	T3	Loading door-to-door	2	7	35	2	23	40	5.1	5.8	D	23		127.6	143.7	16.1	0.7
10	T3	Traveling	2	23	40	2	24	45	5.8	6.1				143.7	144.8	1.1	0.3
11	T3	Loading door-to-door	2	24	45	2	41	34	6.1	6.6	E	24		144.8	161.6	16.8	0.5
12	T3	Traveling	2	41	34	2	42	58	6.6	6.7				161.6	163.0	1.4	0.1
13	T3	Loading door-to-door	2	42	58	2	59	10	6.7	7.2	F	22		163.0	179.2	16.2	0.5
14	T3	Traveling	2	59	10	3	0	10	7.2	7.3				179.2	180.2	1.0	0.1
15	T3	Loading door-to-door	3	0	10	3	20	35	7.3	7.9	G	20		180.2	200.6	20.4	0.6
16	T3	Traveling	3	20	35	3	21	45	7.9	8.1				200.6	201.8	1.2	0.2
17	T3	Loading door-to-door	3	21	45	3	36	58	8.1	8.5	H	7		201.8	217.0	15.2	0.4
18	T3	Traveling	3	36	58	3	37	40	8.5	8.6				217.0	217.7	0.7	0.1
19	T3	Loading door-to-door	3	37	40	3	54	0	8.6	9.0	I	14		217.7	234.0	16.3	0.4
20	T3	Traveling	3	54	0	3	54	41	9.0	9.2				234.0	234.7	0.7	0.2
21	T3	Loading door-to-door	3	54	41	4	9	0	9.2	9.6	J	13		234.7	249.0	14.3	0.4
22	T4	To Cerro Patacon	4	9	0	4	29	30	9.6	20.9				249.0	269.5	20.5	11.3
23	T5	Weighing	4	29	30	4	31	0	20.9	20.9			8.08	269.5	271.0	1.5	0.0
24	T5	Unloading	4	31	0	4	49	0						271.0	289.0	18.0	2.7
25	T6	To Carrasquilla garage	4	49	0	5	25	12	20.9	30.8				289.0	325.2	36.2	9.9

Note: There were only 2 collectors for this day (normally there should be 3 of them), so it was assigned one trip.

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): House-to-house

Collection shift: Day from 12:00 p.m. to 8:00 p.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 23, 2002 (Wednesday)

Collection area: BD 06-01

Collection route: Rio Abajo

Vehicle number: 1932 and 1933

Capacity: both of 6 to 8 tons

Fuel consumption: 28 and 8 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	0	6	14	0.0	0.0				0.0	6.2	6.2	0.0
2	T2	To Rio Abajo	0	6	14	0	10	9	0.0	4.9				6.2	10.2	3.9	4.9
3	T3	Loading dumpster	0	10	9	0	15	29	4.9	4.9	1	2		10.2	15.5	5.3	0.0
4	T3	Traveling	0	15	29	0	17	39	4.9	5.6				15.5	17.7	2.2	0.7
5	T3	Loading door-to-door	0	17	39	0	34	10	5.6	6.0	A	11		17.7	34.2	16.5	0.4
6	T3	Traveling	0	34	10	0	35	45	6.0	6.1				34.2	35.8	1.6	0.1
7	T3	Loading door-to-door	0	35	45	0	42	19	6.1	6.3	B	6		35.8	42.3	6.6	0.2
8	T3	Traveling	0	42	19	0	42	56	6.3	6.3				42.3	42.9	0.6	0.0
9	T3	Loading door-to-door	0	42	56	1	8	43	6.3	7.0	C	16		42.9	68.7	25.8	0.7
10	T3	Traveling	1	8	43	1	10	30	7.0	7.1				68.7	70.5	1.8	0.1
11	T3	Loading door-to-door	1	10	30	1	18	34	7.1	7.7	D	18		70.5	78.6	8.1	0.6
12	T3	Traveling	1	18	34	1	19	6	7.7	7.8				78.6	79.1	0.5	0.1
13	T3	Loading door-to-door	1	19	6	1	21	44	7.8	7.9	E	7		79.1	81.7	2.6	0.1
14	T3	Traveling	1	21	44	1	24	40	7.9	8.1				81.7	84.7	2.9	0.2
15	T3	Loading door-to-door	1	24	40	1	37	22	8.1	8.6	F	17		84.7	97.4	12.7	0.5
16	T3	Traveling	1	37	22	1	38	19	8.6	8.7				97.4	98.3	1.0	0.1
17	T3	Loading door-to-door	1	38	19	1	48	32	8.7	9.1	G	17		98.3	108.5	10.2	0.4
18	T3	Traveling	1	48	32	1	53	32	9.1	9.9				108.5	113.5	5.0	0.8
19	T3	Loading door-to-door	1	53	32	1	54	15	9.9	9.9	H	2		113.5	114.3	0.7	0.0
20	T4	To Patacon	1	54	15	2	11	20	9.9	20.2				114.3	131.3	17.1	10.3
21	T5	Weighing	2	11	20	2	12	11	20.2	20.2				131.3	132.2	0.8	0.0
22	T5	Unloading	2	12	11	2	25	15						132.2	145.3	13.1	2.7
23	T7	We took the personnel to Carrasquilla in our car	2	25	15	2	52	35	20.2	30.7				145.3	172.6	27.3	10.5
24	T1	Pick up replacement vehicle # 1933	0	0	0	0	3	29	0.0	0.0				0.0	3.5	3.5	0.0
25	T2	To last pick up point (1st round)	0	3	29	0	12	35	0.0	2.8				3.5	12.6	9.1	2.8
26	T3	Loading door-to-door	0	12	35	0	21	45	2.8	3.2	I	8		12.6	21.8	9.2	0.4
27	T3	Traveling	0	21	45	0	23	12	3.4	3.4				21.8	23.2	1.5	0.0
28	T3	Loading door-to-door	0	23	12	0	35	25	3.4	3.8	J	9		23.2	35.4	12.2	0.4

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): House-to-house

Collection shift: Day from 12:00 p.m. to 8:00 p.m.

Target area: Urban area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 23, 2002 (Wednesday)

Collection area: BD 06-01

Collection route: Rio Abajo

Vehicle number: 1932 and 1933

Capacity: both of 6 to 8 tons

Fuel consumption: 28 and 8 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial		Final		Initial	Final	Initial	Final				Initial	Final		
			H	M	S	H	M	S	Km	Km							
29	T3	Traveling	0	35	25	0	36	42	3.8	4.1				35.4	36.7	1.3	0.3
30	T3	Loading door-to-door	0	36	42	0	55	6	4.1	4.6	K	18		36.7	55.1	18.4	0.5
31	T3	Traveling	0	55	6	0	56	9	4.6	4.8				55.1	56.2	1.1	0.2
32	T3	Loading door-to-door	0	56	9	1	5	40	4.8	5.2	L	12		56.2	65.7	9.5	0.4
33	T3	Loading dumpster (BNP Rio Abajo)	1	5	40	1	10	6	5.2	5.2	2			65.7	70.1	4.4	0.0
34	T3	Traveling	1	10	6	1	10	53	5.2	5.5				70.1	70.9	0.8	0.3
35	T3	Loading door-to-door	1	10	53	1	31	29	5.5	6.0	M	17		70.9	91.5	20.6	0.5
36	T3	Traveling	1	31	29	1	32	45	6.0	6.2				91.5	92.8	1.3	0.2
37	T3	Loading door-to-door	1	32	45	1	41	46	6.2	6.3	N	8		92.8	101.8	9.0	0.1
38	T7	Talking among themselves	1	41	46	1	44	28	6.3	6.3				101.8	104.5	2.7	0.0
39	T3	Traveling	1	44	28	1	45	7	6.3	6.3				104.5	105.1	0.6	0.0
40	T3	Loading door-to-door	1	45	7	1	54	52	6.3	6.7	Ñ	10		105.1	114.9	9.8	0.4
41	T6	To Carrasquilla compound	1	54	52	2	7	7	6.7	9.8				114.9	127.1	12.3	3.1

Note: Truck broke down while at Patacon

Truck # 1933 weighted 4.69 tons

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 25, 2002 (Friday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 5.8 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
1	T1	Readiness (waiting for the personnel - fueling)	0	0	0	0	45	35	0.0	0.0			0.0	45.6	45.6	0.0	
2	T2	To San Felipe	0	45	35	0	53	19	0.0	3.0			45.6	53.3	7.7	3.0	
3	T7	Getting air on tires at gas station	0	53	19	0	56	7	3.0	3.0			53.3	56.1	2.8	0.0	
4	T2	To San Felipe	0	56	7	0	58	30	3.0	3.8			56.1	58.5	2.4	0.8	
5	T3	Loading dumpster - 9th street	0	58	30	0	58	30	3.8	3.8	1		58.5	58.5	0.0	0.0	
6	T3	Traveling	0	58	30	1	4	50	3.8	3.9			58.5	64.8	6.3	0.1	
7	T3	Loading dumpster	1	4	50	1	5	30	3.9	3.9	2		64.8	65.5	0.7	0.0	
8	T3	Traveling	1	5	30	1	6	0	3.9	3.9			65.5	66.0	0.5	0.0	
9	T3	Loading dumpster	1	6	0	1	6	48	3.9	3.9	3		66.0	66.8	0.8	0.0	
10	T3	Traveling	1	6	48	1	7	10	3.9	4.3			66.8	67.2	0.4	0.4	
11	T3	Loading dumpster	1	7	10	1	7	42	4.3	4.3	4		67.2	67.7	0.5	0.0	
12	T3	Traveling	1	7	42	1	8	44	4.3	4.4			67.7	68.7	1.0	0.1	
13	T3	Loading dumpster	1	8	44	1	9	10	4.4	4.4	5		68.7	69.2	0.4	0.0	
14	T3	Traveling	1	9	10	1	13	19	4.4	5.1			69.2	73.3	4.1	0.7	
15	T3	Loading dumpster	1	13	19	1	15	44	5.1	5.1	6		73.3	75.7	2.4	0.0	
16	T3	Traveling	1	15	44	1	16	17	5.1	5.2			75.7	76.3	0.5	0.1	
17	T3	Loading dumpster - Victoriano Lorenzo Street	1	16	17	1	17	16	5.2	5.2	7		76.3	77.3	1.0	0.0	
18	T3	Traveling	1	17	16	1	17	55	5.2	5.3			77.3	77.9	0.7	0.1	
19	T3	Loading dumpster - Ave. A	1	17	55	1	19	47	5.3	5.3	8		77.9	79.8	1.9	0.0	
20	T3	Traveling	1	19	47	1	20	30	5.3	5.6			79.8	80.5	0.7	0.3	
21	T3	Loading dumpster	1	20	30	1	21	55	5.6	5.6	9		80.5	81.9	1.4	0.0	
22	T3	Traveling	1	21	55	1	22	40	5.6	5.7			81.9	82.7	0.8	0.1	
23	T3	Loading dumpster	1	22	40	1	22	50	5.7	5.7	10		82.7	82.8	0.2	0.0	
24	T3	Traveling	1	22	50	1	23	0	5.7	5.7			82.8	83.0	0.2	0.0	
25	T3	Loading dumpster	1	23	0	1	23	40	5.7	5.7	11		83.0	83.7	0.7	0.0	
26	T3	Traveling	1	23	40	1	24	0	5.7	5.8			83.7	84.0	0.3	0.1	
27	T3	Loading dumpster	1	24	0	1	24	30	5.8	5.8	12		84.0	84.5	0.5	0.0	
28	T3	Traveling	1	24	30	1	25	20	5.8	6.1			84.5	85.3	0.8	0.3	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 25, 2002 (Friday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 5.8 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S	Km	Km				(min)	(min)		
29	T3	Loading dumpster	1	25	20	1	29	0	6.1	6.1	13-14-15		85.3	89.0	3.7	0.0	
30	T3	Traveling	1	29	0	1	29	30	6.1	6.2			89.0	89.5	0.5	0.1	
31	T3	Loading dumpster	1	29	30	1	30	50	6.2	6.2	16		89.5	90.8	1.3	0.0	
32	T3	Traveling	1	30	50	1	31	15	6.2	6.3			90.8	91.3	0.4	0.1	
33	T3	Loading dumpster	1	31	15	1	32	27	6.3	6.3	18		91.3	92.5	1.2	0.0	
34	T3	Traveling	1	32	27	1	33	0	6.3	6.3			92.5	93.0	0.5	0.0	
35	T3	Loading dumpster	1	33	0	1	33	15	6.3	6.3	19		93.0	93.3	0.3	0.0	
36	T3	Traveling	1	33	15	1	33	50	6.3	6.3			93.3	93.8	0.6	0.0	
37	T3	Loading dumpster	1	33	50	1	34	10	6.3	6.3	20		93.8	94.2	0.3	0.0	
38	T3	Traveling	1	34	10	1	35	50	6.3	6.6			94.2	95.8	1.7	0.3	
39	T3	Loading dumpster	1	35	50	1	37	47	6.6	6.6	21-22		95.8	97.8	2.0	0.0	
40	T3	Traveling	1	37	47	1	38	20	6.6	6.7			97.8	98.3	0.5	0.1	
41	T3	Loading dumpster	1	38	20	1	40	11	6.7	6.7	23-24		98.3	100.2	1.9	0.0	
42	T7	Talking to bystander	1	40	11	1	41	44	6.7	6.7			100.2	101.7	1.6	0.0	
43	T3	Traveling	1	41	44	1	42	0	6.7	6.7			101.7	102.0	0.3	0.0	
44	T3	Loading dumpster	1	42	0	1	44	0	6.7	6.7	25		102.0	104.0	2.0	0.0	
45	T3	Traveling	1	44	0	1	53	20	6.7	8.8			104.0	113.3	9.3	2.1	
46	T3	Loading at a corner of Bolivar Park	1	53	20	1	54	10	8.8	8.8	26		113.3	114.2	0.8	0.0	
47	T3	Traveling	1	54	10	1	55	0	8.8	9.0			114.2	115.0	0.8	0.2	
48	T3	Loading at the end of street by Asis Café	1	55	0	1	55	57	9.0	9.0	27		115.0	116.0	1.0	0.0	
49	T3	Traveling	1	55	57	1	56	20	9.0	9.0			116.0	116.3	0.4	0.0	
50	T3	Loading at other corner of Bolivar Park	1	56	20	1	58	19	9.0	9.0	28		116.3	118.3	2.0	0.0	
51	T7	Found dumpster filled with dirt	1	58	19	2	2	27	9.0	9.0			118.3	122.5	4.1	0.0	
52	T3	Traveling	2	2	27	2	6	40	9.0	9.2			122.5	126.7	4.2	0.2	
53	T3	Loading dumpster	2	6	40	2	7	40	9.2	9.3	29-30		126.7	127.7	1.0	0.1	
54	T3	Traveling	2	7	40	2	7	58	9.3	9.5			127.7	128.0	0.3	0.2	
55	T3	Loading dumpster	2	7	58	2	10	15	9.5	9.5	31		128.0	130.3	2.3	0.0	
56	T3	Traveling	2	10	15	2	12	0	9.5	9.7			130.3	132.0	1.8	0.2	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 25, 2002 (Friday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 5.8 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
57	T3	Loading door to door left side of street - businesses	2	12	0	2	25	24	9.7	10.1	A	21		132.0	145.4	13.4	0.4
58	T4	To Patacon	2	25	24	2	48	58	10.1	24.8			145.4	169.0	23.6	14.7	
59	T5	Weighing	2	48	58	2	51	27	24.8	24.8			169.0	171.5	2.5	0.0	
60	T5	Unloading	2	51	27	3	0	32					171.5	180.5	9.1	2.7	
61	T6	To Curundu compound	3	0	32	3	18	38	24.8	39.3			180.5	198.6	18.1	14.5	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 26, 2002 (Saturday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 10 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial (min)	Final (min)		
			H	M	S	H	M	S									
1	T1	Readiness (waiting for the personnel - fueling)	0	0	0	0	54	30	0.0	0.0			0.0	54.5	54.5	0.0	
2	T7	Repairing vehicle	0	54	30	3	46	19	0.0	0.0			54.5	226.3	171.8	0.0	
3	T7	To Patacon - unload previous night waste	3	46	19	4	6	10	0.0	15.0			226.3	246.2	19.9	15.0	
4	T5	Weighing	4	6	10	4	11	36	15.0	15.0			246.2	251.6	5.4	0.0	
5	T5	Unloading	4	11	36	4	19	40					251.6	259.7	8.1	2.7	
6	T4	To San Felipe	4	19	40	4	52	23	15.0	32.6			259.7	292.4	32.7	17.6	
7	T3	Loading dumpster	4	52	23	4	54	35	32.6	32.6	1	2	292.4	294.6	2.2	0.0	
8	T3	Traveling	4	54	35	4	54	50	32.6	32.7			294.6	294.8	0.3	0.1	
9	T3	Loading dumpster	4	54	50	4	55	43	32.7	32.7	2	1	294.8	295.7	0.9	0.0	
10	T3	Traveling	4	55	43	4	56	0	32.7	32.7			295.7	296.0	0.3	0.0	
11	T3	Loading dumpster	4	56	0	4	56	49	32.7	32.7	3	1	296.0	296.8	0.8	0.0	
12	T3	Traveling	4	56	49	4	57	10	32.7	32.8			296.8	297.2	0.4	0.1	
13	T3	Loading dumpster	4	57	10	4	58	44	32.8	32.8	4	1	297.2	298.7	1.6	0.0	
14	T3	Traveling	4	58	44	4	59	0	32.8	32.9			298.7	299.0	0.3	0.1	
15	T3	Loading dumpster	4	59	0	4	59	46	32.9	32.9	5	1	299.0	299.8	0.8	0.0	
16	T3	Traveling	4	59	46	5	1	0	32.9	32.9			299.8	301.0	1.2	0.0	
17	T3	Loading dumpster	5	1	0	5	1	40	32.9	32.9	6	1	301.0	301.7	0.7	0.0	
18	T3	Traveling	5	1	40	5	2	30	32.9	33.0			301.7	302.5	0.8	0.1	
19	T3	Loading dumpster	5	2	30	5	3	1	33.0	33.0	7	1	302.5	303.0	0.5	0.0	
20	T3	Traveling	5	3	1	5	6	45	33.0	33.2			303.0	306.8	3.7	0.2	
21	T3	Loading dumpster	5	6	45	5	7	11	33.2	33.2	8	1	306.8	307.2	0.4	0.0	
22	T3	Traveling	5	7	11	5	7	50	33.2	33.3			307.2	307.8	0.6	0.1	
23	T3	Loading dumpster	5	7	50	5	9	12	33.3	33.3	9	2	307.8	309.2	1.4	0.0	
24	T3	Traveling	5	9	12	5	9	40	33.3	33.3			309.2	309.7	0.5	0.0	
25	T3	Loading dumpster	5	9	40	5	10	7	33.3	33.3	10	1	309.7	310.1	0.4	0.0	
26	T3	Traveling	5	10	7	5	10	45	33.3	33.4			310.1	310.8	0.6	0.1	
27	T3	Loading dumpster	5	10	45	5	11	2	33.4	33.4	11	1	310.8	311.0	0.3	0.0	
28	T3	Traveling	5	11	2	5	11	20	33.4	33.4			311.0	311.3	0.3	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 26, 2002 (Saturday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 10 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
29	T3	Loading dumpster	5	11	20	5	12	27	33.4	33.4	12	2		311.3	312.5	1.1	0.0
30	T3	Traveling	5	12	27	5	12	45	33.4	33.5				312.5	312.8	0.3	0.1
31	T3	Loading dumpster	5	12	45	5	13	23	33.5	33.5	13	1		312.8	313.4	0.6	0.0
32	T3	Traveling	5	13	23	5	13	35	33.5	33.6				313.4	313.6	0.2	0.1
33	T3	Loading dumpster	5	13	35	5	14	7	33.6	33.6	14	1		313.6	314.1	0.5	0.0
34	T3	Traveling	5	14	7	5	15	20	33.6	33.6				314.1	315.3	1.2	0.0
35	T3	Loading dumpster	5	15	20	5	15	40	33.6	33.6	15	1		315.3	315.7	0.3	0.0
36	T3	Traveling	5	15	40	5	16	24	33.6	33.7				315.7	316.4	0.7	0.1
37	T3	Loading dumpster	5	16	24	5	16	58	33.7	33.7	16	1		316.4	317.0	0.6	0.0
38	T3	Traveling	5	16	58	5	18	9	33.7	33.8				317.0	318.2	1.2	0.1
39	T3	Loading dumpster	5	18	9	5	18	24	33.8	33.8	17	1		318.2	318.4	0.3	0.0
40	T3	Traveling	5	18	24	5	19	0	33.8	33.9				318.4	319.0	0.6	0.1
41	T3	Loading dumpster	5	19	0	5	19	18	33.9	33.9	18	1		319.0	319.3	0.3	0.0
42	T3	Traveling	5	19	18	5	20	0	33.9	33.9				319.3	320.0	0.7	0.0
43	T3	Loading dumpster	5	20	0	5	20	23	33.9	33.9	19	1		320.0	320.4	0.4	0.0
44	T3	Traveling	5	20	23	5	22	9	33.9	34.2				320.4	322.2	1.8	0.3
45	T3	Loading dumpster	5	22	9	5	22	43	34.2	34.2	20	1		322.2	322.7	0.6	0.0
46	T3	Traveling	5	22	43	5	23	5	34.2	34.3				322.7	323.1	0.4	0.1
47	T3	Loading dumpster	5	23	5	5	23	35	34.3	34.3	21	1		323.1	323.6	0.5	0.0
48	T3	Traveling	5	23	35	5	24	23	34.3	34.4				323.6	324.4	0.8	0.1
49	T3	Loading dumpster	5	24	23	5	24	55	34.4	34.4	22	1		324.4	324.9	0.5	0.0
50	T3	Traveling	5	24	55	5	25	32	34.4	34.5				324.9	325.5	0.6	0.1
51	T3	Loading dumpster	5	25	32	5	27	3	34.5	34.5	23	2		325.5	327.1	1.5	0.0
52	T3	Traveling	5	27	3	5	27	40	34.5	34.6				327.1	327.7	0.6	0.1
53	T3	Loading dumpster	5	27	40	5	28	5	34.6	34.6	24	1		327.7	328.1	0.4	0.0
54	T3	Traveling	5	28	5	5	28	26	34.6	34.6				328.1	328.4	0.4	0.0
55	T3	Loading dumpster	5	28	26	5	28	51	34.6	34.6	25	1		328.4	328.9	0.4	0.0
56	T7	Buying soft drinks	5	28	51	5	31	8	34.6	34.6				328.9	331.1	2.3	0.0

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 26, 2002 (Saturday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 10 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
57	T3	Traveling	5	31	8	5	31	26	34.6	34.7	26	1	331.1	331.4	0.3	0.1	
58	T3	Loading dumpster	5	31	26	5	32	22	34.7	34.7	26	1	331.4	332.4	0.9	0.0	
59	T3	Traveling	5	32	22	5	33	2	34.7	34.7			332.4	333.0	0.7	0.0	
60	T3	Loading dumpster	5	33	2	5	34	10	34.7	34.7	27	2	333.0	334.2	1.1	0.0	
61	T3	Traveling	5	34	10	5	34	40	34.7	34.8			334.2	334.7	0.5	0.1	
62	T3	Loading dumpster	5	34	40	5	34	55	34.8	34.8	28	1	334.7	334.9	0.3	0.0	
63	T3	Traveling	5	34	55	5	35	20	34.8	34.8			334.9	335.3	0.4	0.0	
64	T3	Loading dumpster	5	35	20	5	35	45	34.8	34.8	29	1	335.3	335.8	0.4	0.0	
65	T3	Traveling	5	35	45	5	38	5	34.8	35.0			335.8	338.1	2.3	0.2	
66	T3	Loading dumpster	5	38	5	5	38	29	35.0	35.0	30	1	338.1	338.5	0.4	0.0	
67	T3	Traveling	5	38	29	5	39	27	35.0	35.0			338.5	339.5	1.0	0.0	
68	T3	Loading dumpster	5	39	27	5	41	41	35.0	35.0	31	3	339.5	341.7	2.2	0.0	
69	T7	Arrival of the supervisor	5	41	41	5	46	55	35.0	35.0			341.7	346.9	5.2	0.0	
70	T3	Traveling	5	46	55	5	47	45	35.0	35.1			346.9	347.8	0.8	0.1	
71	T3	Loading dumpster	5	47	45	5	49	17	35.1	35.1	32	2	347.8	349.3	1.5	0.0	
72	T3	Traveling	5	49	17	5	49	42	35.1	35.1			349.3	349.7	0.4	0.0	
73	T3	Loading dumpster	5	49	42	5	50	48	35.1	35.1	33	1	349.7	350.8	1.1	0.0	
74	T3	Traveling	5	50	48	5	52	57	35.1	35.3			350.8	353.0	2.1	0.2	
75	T3	Loading dumpster	5	52	57	5	53	36	35.3	35.3	34	1	353.0	353.6	0.7	0.0	
76	T3	Traveling	5	53	36	5	54	23	35.3	35.4			353.6	354.4	0.8	0.1	
77	T3	Loading dumpster	5	54	23	5	55	8	35.4	35.4	35	1	354.4	355.1	0.8	0.0	
78	T3	Traveling	5	55	8	5	56	18	35.4	35.5			355.1	356.3	1.2	0.1	
79	T3	Loading dumpster	5	56	18	5	56	36	35.5	35.5	36	1	356.3	356.6	0.3	0.0	
80	T3	Traveling	5	56	36	5	57	2	35.5	35.6			356.6	357.0	0.4	0.1	
81	T3	Loading dumpster	5	57	2	5	57	39	35.6	35.6	37	1	357.0	357.7	0.6	0.0	
82	T3	Traveling	5	57	39	5	58	40	35.6	35.7			357.7	358.7	1.0	0.1	
83	T3	Loading dumpster	5	58	40	5	59	24	35.7	35.7	38	1	358.7	359.4	0.7	0.0	
84	T3	Traveling	5	59	24	5	59	54	35.7	35.7			359.4	359.9	0.5	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 26, 2002 (Saturday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 10 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)	
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)			
85	T3	Loading dumpster	5	59	54	6	0	4	35.7	35.7	35.7	39	1		359.9	360.1	0.2	0.0
86	T3	Traveling	6	0	4	6	0	38	35.7	35.8					360.1	360.6	0.6	0.1
87	T3	Loading dumpster	6	0	38	6	1	30	35.8	35.8	40	1			360.6	361.5	0.9	0.0
88	T3	Traveling	6	1	30	6	2	7	35.8	35.8					361.5	362.1	0.6	0.0
89	T3	Loading dumpster	6	2	7	6	2	41	35.8	35.8	41	1			362.1	362.7	0.6	0.0
90	T3	Traveling	6	2	41	6	5	50	35.8	36.6					362.7	365.8	3.1	0.8
91	T3	Loading dumpster	6	5	50	6	6	38	36.6	36.6	42	1			365.8	366.6	0.8	0.0
92	T3	Traveling	6	6	38	6	7	20	36.6	36.7					366.6	367.3	0.7	0.1
93	T3	Loading dumpster	6	7	20	6	8	12	36.7	36.7	43	1			367.3	368.2	0.9	0.0
94	T3	Traveling	6	8	12	6	9	0	36.7	36.7					368.2	369.0	0.8	0.0
95	T3	Loading dumpster	6	9	0	6	9	28	36.7	36.7	44	1			369.0	369.5	0.5	0.0
96	T3	Traveling	6	9	28	6	11	0	36.7	36.8					369.5	371.0	1.5	0.1
97	T3	Loading dumpster	6	11	0	6	12	30	36.8	36.8	45	1			371.0	372.5	1.5	0.0
98	T3	Traveling	6	12	30	6	12	45	36.8	36.8					372.5	372.8	0.3	0.0
99	T3	Loading dumpster	6	12	45	6	13	39	36.8	36.8	46	1			372.8	373.7	0.9	0.0
100	T3	Traveling	6	13	39	6	14	30	36.8	37.0					373.7	374.5	0.9	0.2
101	T3	Loading dumpster	6	14	30	6	15	21	37.0	37.0	47	1			374.5	375.4	0.9	0.0
102	T3	Traveling	6	15	21	6	16	14	37.1	37.1					375.4	376.2	0.9	0.0
103	T3	Loading dumpster	6	16	14	6	20	43	37.1	37.1	48	3			376.2	380.7	4.5	0.0
104	T3	Traveling	6	20	43	6	24	30	37.1	37.6					380.7	384.5	3.8	0.5
105	T3	Loading door to door right side of street - businesses	6	24	30	6	28	31	37.6	37.9	A	6			384.5	388.5	4.0	0.3
106	T4	To Patacon	6	28	31	6	57	15	37.9	52.7					388.5	417.3	28.7	14.8
107	T5	Weighing	6	57	15	6	58	11	52.7	52.7			3.43		417.3	418.2	0.9	0.0
108	T5	Unloading	6	58	11	7	9	20							418.2	429.3	11.2	2.7
109	T1a	Cleaning vehicle	7	9	20	7	14	20							429.3	434.3	5.0	0.0
110	T6	To Curundu compound	7	14	20	7	36	32	52.7	67.3					434.3	456.5	22.2	14.6

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 28, 2002 (Monday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 5.5 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
1	T1	No significant readiness	0	0	0	0	35	20	0.0	0.0			0.0	35.3	35.3	0.0	
2	T1	Vehicle check - fueling	0	35	20	1	3	43	0.0	0.0			35.3	63.7	28.4	0.0	
3	T2	To San Felipe	1	3	43	1	11	59	0.0	3.5			63.7	72.0	8.3	3.5	
4	T3	Loading dumpster	1	11	59	1	13	40	3.5	3.5	1		72.0	73.7	1.7	0.0	
5	T3	Traveling	1	13	40	1	14	55	3.5	3.5			73.7	74.9	1.3	0.0	
6	T3	Loading dumpster	1	14	55	1	15	30	3.5	3.5	2		74.9	75.5	0.6	0.0	
7	T3	Traveling	1	15	30	1	16	24	3.5	3.5			75.5	76.4	0.9	0.0	
8	T3	Loading dumpster	1	16	24	1	17	12	3.5	3.5	3		76.4	77.2	0.8	0.0	
9	T3	Traveling	1	17	12	1	18	5	3.5	3.6			77.2	78.1	0.9	0.1	
10	T3	Loading dumpster	1	18	5	1	18	26	3.6	3.6	4		78.1	78.4	0.4	0.0	
11	T3	Traveling	1	18	26	1	18	55	3.6	3.7			78.4	78.9	0.5	0.1	
12	T3	Loading dumpster	1	18	55	1	20	15	3.7	3.7	5		78.9	80.3	1.3	0.0	
13	T3	Traveling	1	20	15	1	21	22	3.7	3.8			80.3	81.4	1.1	0.1	
14	T3	Loading dumpster	1	21	22	1	21	40	3.8	3.8	6		81.4	81.7	0.3	0.0	
15	T3	Traveling	1	21	40	1	22	3	3.8	3.8			81.7	82.1	0.4	0.0	
16	T3	Loading dumpster	1	22	3	1	23	40	3.8	3.8	7		82.1	83.7	1.6	0.0	
17	T3	Traveling	1	23	40	1	24	50	3.8	4.1			83.7	84.8	1.2	0.3	
18	T3	Loading dumpster	1	24	50	1	24	58	4.1	4.1	8		84.8	85.0	0.1	0.0	
19	T3	Traveling	1	24	58	1	25	24	4.1	4.2			85.0	85.4	0.4	0.1	
20	T3	Loading dumpster	1	25	24	1	26	2	4.2	4.2	9	2	85.4	86.0	0.6	0.0	
21	T3	Traveling	1	26	2	1	26	40	4.2	4.2			86.0	86.7	0.6	0.0	
22	T3	Loading dumpster	1	26	40	1	27	20	4.2	4.2	10		86.7	87.3	0.7	0.0	
23	T3	Traveling	1	27	20	1	27	45	4.2	4.3			87.3	87.8	0.4	0.1	
24	T3	Loading dumpster	1	27	45	1	28	37	4.3	4.3	11		87.8	88.6	0.9	0.0	
25	T3	Traveling	1	28	37	1	28	56	4.3	4.3			88.6	88.9	0.3	0.0	
26	T3	Loading dumpster	1	28	56	1	29	55	4.3	4.3	12	2	88.9	89.9	1.0	0.0	
27	T3	Traveling	1	29	55	1	30	35	4.3	4.4			89.9	90.6	0.7	0.1	
28	T3	Loading dumpster	1	30	35	1	30	47	4.4	4.4	13		90.6	90.8	0.2	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 28, 2002 (Monday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 5.5 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
29	T3	Traveling	1	30	47	1	30	55	4.4	4.5			90.8	90.9	0.1	0.1	
30	T3	Loading dumpster	1	30	55	1	31	3	4.5	4.5	14		90.9	91.1	0.1	0.0	
31	T3	Traveling	1	31	3	1	32	8	4.5	4.5			91.1	92.1	1.1	0.0	
32	T3	Loading dumpster	1	32	8	1	33	35	4.5	4.5	15	2	92.1	93.6	1.4	0.0	
33	T3	Traveling	1	33	35	1	34	7	4.5	4.6			93.6	94.1	0.5	0.1	
34	T3	Loading dumpster	1	34	7	1	34	40	4.6	4.6	16		94.1	94.7	0.6	0.0	
35	T3	Traveling	1	34	40	1	35	0	4.6	4.6			94.7	95.0	0.3	0.0	
36	T3	Loading dumpster	1	35	0	1	35	36	4.6	4.6	17		95.0	95.6	0.6	0.0	
37	T3	Traveling	1	35	36	1	35	53	4.6	4.7			95.6	95.9	0.3	0.1	
38	T3	Loading dumpster	1	35	53	1	36	30	4.7	4.7	18		95.9	96.5	0.6	0.0	
39	T3	Traveling	1	36	30	1	36	58	4.7	4.8			96.5	97.0	0.5	0.1	
40	T3	Loading dumpster	1	36	58	1	37	40	4.8	4.8	19		97.0	97.7	0.7	0.0	
41	T3	Traveling	1	37	40	1	38	0	4.8	4.8			97.7	98.0	0.3	0.0	
42	T3	Loading dumpster	1	38	0	1	39	0	4.8	4.8	20		98.0	99.0	1.0	0.0	
43	T3	Traveling	1	39	0	1	40	15	4.8	5.1			99.0	100.3	1.3	0.3	
44	T3	Loading dumpster	1	40	15	1	40	26	5.1	5.1	21		100.3	100.4	0.2	0.0	
45	T3	Traveling	1	40	26	1	40	41	5.1	5.1			100.4	100.7	0.3	0.0	
46	T3	Loading dumpster	1	40	41	1	41	45	5.1	5.1	22		100.7	101.8	1.1	0.0	
47	T3	Traveling	1	41	45	1	42	15	5.1	5.2			101.8	102.3	0.5	0.1	
48	T3	Loading dumpster	1	42	15	1	43	28	5.2	5.2	23		102.3	103.5	1.2	0.0	
49	T3	Traveling	1	43	28	1	44	15	5.2	5.3			103.5	104.3	0.8	0.1	
50	T3	Loading dumpster	1	44	15	1	45	0	5.3	5.3	24		104.3	105.0	0.8	0.0	
51	T3	Traveling	1	45	0	1	45	27	5.3	5.4			105.0	105.5	0.5	0.1	
52	T3	Loading dumpster	1	45	27	1	45	50	5.4	5.4	25		105.5	105.8	0.4	0.0	
53	T3	Traveling	1	45	50	1	47	45	5.4	5.4			105.8	107.8	1.9	0.0	
54	T3	Loading dumpster	1	47	45	1	48	1	5.4	5.4	26		107.8	108.0	0.3	0.0	
55	T3	Traveling	1	48	1	1	48	31	5.4	5.5			108.0	108.5	0.5	0.1	
56	T3	Loading dumpster	1	48	31	1	49	3	5.5	5.5	27		108.5	109.1	0.5	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 28, 2002 (Monday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 5.5 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
57	T3	Traveling	1	49	3	1	49	25	5.5	5.5	28		109.1	109.4	0.4	0.0	
58	T3	Loading dumpster	1	49	25	1	50	48	5.5	5.5	28		109.4	110.8	1.4	0.0	
59	T3	Traveling	1	50	48	1	51	30	5.5	5.6			110.8	111.5	0.7	0.1	
60	T3	Loading dumpster	1	51	30	1	52	35	5.6	5.6	29		111.5	112.6	1.1	0.0	
61	T3	Traveling	1	52	35	1	53	10	5.6	5.6			112.6	113.2	0.6	0.0	
62	T3	Loading dumpster	1	53	10	1	54	37	5.6	5.6	30	2	113.2	114.6	1.4	0.0	
63	T3	Traveling	1	54	37	1	55	40	5.6	5.9			114.6	115.7	1.1	0.3	
64	T3	Loading dumpster	1	55	40	1	56	30	5.9	5.9	31		115.7	116.5	0.8	0.0	
65	T3	Traveling	1	56	30	1	57	20	5.9	6.0			116.5	117.3	0.8	0.1	
66	T3	Loading dumpster	1	57	20	1	58	25	6.0	6.0	32	2	117.3	118.4	1.1	0.0	
67	T3	Traveling	1	58	25	1	58	45	6.0	6.0			118.4	118.8	0.3	0.0	
68	T3	Loading dumpster	1	58	45	1	59	33	6.0	6.0	33		118.8	119.6	0.8	0.0	
69	T3	Traveling	1	59	33	1	59	53	6.0	6.1			119.6	119.9	0.3	0.1	
70	T3	Loading dumpster	1	59	53	2	0	58	6.1	6.1	34		119.9	121.0	1.1	0.0	
71	T3	Traveling	2	0	58	2	1	43	6.1	6.2			121.0	121.7	0.8	0.1	
72	T3	Loading dumpster	2	1	43	2	2	10	6.2	6.2	35		121.7	122.2	0.5	0.0	
73	T3	Traveling	2	2	10	2	2	20	6.2	6.2			122.2	122.3	0.2	0.0	
74	T3	Loading dumpster	2	2	20	2	2	40	6.2	6.2	36		122.3	122.7	0.3	0.0	
75	T3	Traveling	2	2	40	2	2	50	6.2	6.2			122.7	122.8	0.2	0.0	
76	T3	Loading dumpster	2	2	50	2	3	5	6.2	6.2	37		122.8	123.1	0.3	0.0	
77	T3	Traveling	2	3	5	2	3	32	6.2	6.4			123.1	123.5	0.5	0.2	
78	T3	Loading dumpster	2	3	32	2	4	16	6.4	6.4	38		123.5	124.3	0.7	0.0	
79	T3	Traveling	2	4	16	2	4	38	6.4	6.4			124.3	124.6	0.4	0.0	
80	T3	Loading dumpster	2	4	38	2	5	0	6.4	6.4	39		124.6	125.0	0.4	0.0	
81	T3	Traveling	2	5	0	2	6	20	6.4	6.5			125.0	126.3	1.3	0.1	
82	T3	Loading dumpster	2	6	20	2	7	58	6.5	6.5	40		126.3	128.0	1.6	0.0	
83	T3	Traveling	2	7	58	2	8	21	6.5	6.6			128.0	128.4	0.4	0.1	
84	T3	Loading dumpster	2	8	21	2	9	47	6.6	6.6	41		128.4	129.8	1.4	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 28, 2002 (Monday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 5.5 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
85	T3	Traveling	2	9	47	2	10	25	6.6	6.7	42		129.8	130.4	0.6	0.1	
86	T3	Pick up garbage bags at Park	2	10	25	2	15	30	6.7	6.7	42		130.4	135.5	5.1	0.0	
87	T3	Traveling	2	15	30	2	15	50	6.7	6.7			135.5	135.8	0.3	0.0	
88	T3	Loading dumpster	2	15	50	2	16	25	6.7	6.7	43		135.8	136.4	0.6	0.0	
89	T3	Traveling	2	16	25	2	16	45	6.7	6.7			136.4	136.8	0.3	0.0	
90	T3	Loading dumpster	2	16	45	2	18	19	6.7	6.7	44		136.8	138.3	1.6	0.0	
91	T3	Traveling	2	18	19	2	21	24	6.7	7.5			138.3	141.4	3.1	0.8	
92	T3	Loading dumpster	2	21	24	2	21	42	7.5	7.5	45		141.4	141.7	0.3	0.0	
93	T3	Traveling	2	21	42	2	22	3	7.5	7.5			141.7	142.1	0.4	0.0	
94	T3	Loading dumpster	2	22	3	2	22	46	7.5	7.5	46		142.1	142.8	0.7	0.0	
95	T3	Traveling	2	22	46	2	23	23	7.5	7.6			142.8	143.4	0.6	0.1	
96	T3	Loading dumpster	2	23	23	2	24	5	7.6	7.6	47		143.4	144.1	0.7	0.0	
97	T3	Traveling	2	24	5	2	24	58	7.6	7.7			144.1	145.0	0.9	0.1	
98	T3	Loading dumpster	2	24	58	2	27	20	7.7	7.7	48		145.0	147.3	2.4	0.0	
99	T3	Traveling	2	27	20	2	27	45	7.7	7.7			147.3	147.8	0.4	0.0	
100	T3	Loading dumpster	2	27	45	2	29	18	7.7	7.7	49		147.8	149.3	1.6	0.0	
101	T3	Traveling	2	29	18	2	30	0	7.7	7.8			149.3	150.0	0.7	0.1	
102	T3	Pick up garbage bags at Park	2	30	0	2	31	19	7.8	7.8	50		150.0	151.3	1.3	0.0	
103	T3	Traveling	2	31	19	2	32	16	7.8	7.9			151.3	152.3	1.0	0.1	
104	T3	Loading dumpster	2	32	16	2	35	17	7.9	7.9	51	3	152.3	155.3	3.0	0.0	
105	T3	Traveling	2	35	17	2	35	34	7.9	8.0			155.3	155.6	0.3	0.1	
106	T3	Loading dumpster	2	35	34	2	36	49	8.0	8.0	52		155.6	156.8	1.3	0.0	
107	T3	Traveling	2	36	49	2	38	15	8.0	8.3			156.8	158.3	1.4	0.3	
108	T3	Loading dumpster	2	38	15	2	38	35	8.3	8.3	53		158.3	158.6	0.3	0.0	
109	T3	Traveling	2	38	35	2	39	51	8.3	8.4			158.6	159.9	1.3	0.1	
110	T3	Loading door to door right side of street - businesses	2	39	51	2	41	8	8.4	8.4	A	2	159.9	161.1	1.3	0.0	
111	T3	Traveling	2	41	8	2	41	50	8.4	8.5			161.1	161.8	0.7	0.1	
112	T3	Loading door to door right side of street - businesses	2	41	50	2	42	49	8.5	8.6	B	2	161.8	162.8	1.0	0.1	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Small dumpsters

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Old section of the city

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: January 28, 2002 (Monday)

Collection area: AD 03-03

Collection route: San Felipe

Vehicle number: 1903

Capacity: 8 tons

Fuel consumption: 5.5 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial Km	Final Km				Initial (min)	Final (min)		
			H	M	S	H	M	S									
113	T4	To Patacon	2	42	49	3	4	30	8.6	23.4			162.8	184.5	21.7	14.8	
114	T5	Weighing	3	4	30	3	5	52	23.4	23.4			184.5	185.9	1.4	0.0	
115	T5	Unloading	3	5	52	3	13	0					185.9	193.0	7.1	2.7	
116	T6	To Curundu compound	3	13	0	3	30	45	25.9	40.2			193.0	210.8	17.8	14.3	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Partially urbanized areas with businesses

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 26, 2002 (Saturday)

Collection area: BD 04-01

Collection route: 24 de Diciembre

Vehicle number: 1908

Capacity: 8 tons

Fuel consumption: 15 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance			Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km	Initial (min)				Final (min)			
1	T1	Readiness (waiting for the personnel - fueling)	0	0	0	1	4	15	0	0	0				0.0	64.3	64.3	0.0
2	T2	To 24de Diciembre - truck problems, heading back	1	4	15	1	5	45	0	0	1.0				64.3	65.8	1.5	1.0
3	T7	To Carrasquilla (See note)	1	5	45	1	7	30	1	0	1.0				65.8	67.5	1.8	0.0
4	T1	Readiness - change vehicle # 1908	1	7	30	1	24	0	0	0	0.0				67.5	84.0	16.5	0.0
5	T2	To 24 de Diciembre	1	24	0	1	55	56	0	0	24.4				84.0	115.9	31.9	24.4
6	T3	Loading point to point	1	55	56	2	9	12	24.4	25.0	A	7			115.9	129.2	13.3	0.6
7	T3	Loading dumpster	2	9	12	2	20	53	25.0	25.0	1				129.2	140.9	11.7	0.0
8	T3	Traveling	2	20	53	2	21	45	25.0	25.0					140.9	141.8	0.9	0.0
9	T3	Loading dumpster	2	21	45	2	27	20	25.0	25.0	2				141.8	147.3	5.6	0.0
10	T3	Traveling	2	27	20	2	29	0	25.0	25.4					147.3	149.0	1.7	0.4
11	T3	Loading dumpster	2	29	0	2	38	0	25.4	25.4	3				149.0	158.0	9.0	0.0
12	T3	Traveling	2	38	0	2	39	20	25.4	25.5					158.0	159.3	1.3	0.1
13	T3	Loading door to door	2	39	20	2	49	52	25.5	26.0	B	8			159.3	169.9	10.5	0.5
14	T3	Loading dumpster	2	49	52	3	3	21	26.0	26.0	4	2			169.9	183.4	13.5	0.0
15	T3	Traveling	3	3	21	3	10	58	26.0	26.1					183.4	191.0	7.6	0.1
16	T3	Loading door to door	3	10	58	3	28	41	26.1	26.8	C	11			191.0	208.7	17.7	0.7
17	T3	Traveling	3	28	41	3	31	46	26.8	27.8					208.7	211.8	3.1	1.0
18	T3	Loading door to door	3	31	46	3	44	35	27.8	28.7	D	15			211.8	224.6	12.8	0.9
19	T3	Traveling	3	44	35	3	45	41	28.7	28.9					224.6	225.7	1.1	0.2
20	T3	Loading door to door	3	45	41	4	4	8	28.9	30.3	E	32			225.7	244.1	18.5	1.4
21	T3	Traveling	4	4	8	4	5	4	30.3	30.4					244.1	245.1	0.9	0.1
22	T3	Loading door to door	4	5	4	4	35	22	30.4	31.5	F	53			245.1	275.4	30.3	1.1
23	T3	Traveling	4	35	22	4	37	33	31.5	31.7					275.4	277.6	2.2	0.2
24	T3	Loading door to door	4	37	33	4	59	33	31.7	32.5	G	35			277.6	299.6	22.0	0.8
25	T3	Traveling	4	59	33	5	1	56	32.5	33.3					299.6	301.9	2.4	0.8
26	T3	Loading door to door	5	1	56	5	38	44	33.3	34.7	H	26			301.9	338.7	36.8	1.4
27	T4	To Patacon	5	38	44	5	53	32	34.7	42.3					338.7	353.5	14.8	7.6
28	T7	Stops at a refreshment stand.	5	53	32	5	57	8	42.3	42.3					353.5	357.1	3.6	0.0

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*
Method *or both*): Both
Collection shift: Day from 6:00 a.m. to 2:00 p.m.
Target area: Partially urbanized areas with businesses
Vehicle type: Back loading compactor
Personnel: 4 (driver: 1 collectors: 3)

Date: January 26, 2002 (Saturday)
Collection area: BD 04-01
Collection route: 24 de Diciembre
Vehicle number: 1908
Capacity: 8 tons
Fuel consumption: 15 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
29	T4	To Patacon	5	57	8	6	29	12	42.3	64.3				357.1	389.2	32.1	22.0
30	T5	Weighing	6	29	12	6	31	45	64.3	64.3			5.45	389.2	391.8	2.6	0.0
31	T5	Unloading	6	31	45	6	45	23					391.8	405.4	13.6	0.0	
32	T1a	Cleaning vehicle	6	45	23	7	2	25					405.4	422.4	17.0	0.0	
33	T6	To DIMAUD-Carrasquilla compound	7	2	25	7	23	45	64.3	74.5			422.4	443.8	21.3	10.2	

Note: Engine problem, back to compound

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Partially urbanized areas with businesses

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 28, 2002 (Monday)

Collection area: BD 04-01

Collection route: 24 de Diciembre

Vehicle number: 1931

Capacity: 8 tons

Fuel consumption: 13 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
1	T1	Readiness (waiting for the personnel - fueling)	0	0	0	0	19	54	0.0	0.0				0.0	19.9	19.9	0.0
2	T7	To Patacon	0	19	54	0	37	55	0.0	11.0				19.9	37.9	18.0	11.0
3	T7	From Patacon to 24 de Diciembre	0	37	55	1	19	58	11.0	30.9				37.9	80.0	42.1	19.9
4	T7	They are stopped in a DIMAUD department.	1	19	58	1	33	57	30.9	31.0				80.0	94.0	14.0	0.1
5	T7	To 24 de Diciembre	1	33	57	2	0	17	31.0	44.8				94.0	120.3	26.3	13.8
6	T3	Loading point to point	2	0	17	2	4	0	44.8	44.8	A	3		120.3	124.0	3.7	0.0
7	T3	Traveling	2	4	0	2	5	18	44.8	45.0				124.0	125.3	1.3	0.2
8	T3	Loading dumpster	2	5	18	2	8	19	45.0	45.0	1			125.3	128.3	3.0	0.0
9	T3	Traveling	2	8	19	2	8	59	45.0	45.2				128.3	129.0	0.7	0.2
10	T3	Loading dumpster	2	8	59	2	15	23	45.2	45.2	2			129.0	135.4	6.4	0.0
11	T3	Traveling	2	15	23	2	16	45	45.2	45.8				135.4	136.8	1.4	0.6
12	T3	Loading dumpster	2	16	45	2	18	38	45.8	45.8	3			136.8	138.6	1.9	0.0
13	T3	Traveling	2	18	38	2	21	0	45.8	46.5				138.6	141.0	2.4	0.7
14	T3	Loading point to point	2	21	0	2	22	0	46.5	46.5	B	2		141.0	142.0	1.0	0.0
15	T3	Traveling	2	22	0	2	23	55	46.5	47.2				142.0	143.9	1.9	0.7
16	T3	Loading dumpster	2	23	55	2	29	48	47.2	47.2	4			143.9	149.8	5.9	0.0
17	T3	Traveling	2	29	48	2	31	27	47.2	47.7				149.8	151.5	1.6	0.5
18	T3	Loading dumpster	2	31	27	3	21	28	47.7	47.7	5			151.5	201.5	50.0	0.0
19	T7	Vehicle repairs	3	21	28	4	7	42	47.7	47.7				201.5	247.7	46.2	0.0

Note: Went to Patacon to unload waste from night before and weighted 5.29 tons. Waste was determined to be from Punta Paitilla and not 24 Diciembre.

Vehicle broke down in the 24 de Diciembre area, it was towed to the Pedregal compound for repairs

After repairs, it went to Cerro Patacon, where it weighted 3.97 tons

TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF SOLID WASTE IN THE PANAMA CITY DISTRICT

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Partially urbanized areas with businesses

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 29, 2002 (Tuesday)

Collection area: BD 04-01

Collection route: 24 de Diciembre

Vehicle number: 1933

Capacity: 7 to 8 tons
Fuel consumption: 22.6 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S	Km	Km				(min)	(min)		
1	T1	Readiness (waiting for the personnel - fueling)	0	0	0	0	2	59	0.0	0.0			0.0	3.0	3.0	0.0	
2	T2	To 24 de Diciembre	0	2	59	0	49	36	0.0	25.1			3.0	49.6	46.6	25.1	
3	T3	Loading point to point	0	49	36	0	59	45	25.1	25.6	A	6	49.6	59.8	10.2	0.5	
4	T3	Loading dumpster	0	59	45	1	4	41	25.6	25.6	1		59.8	64.7	4.9	0.0	
5	T3	Traveling	1	4	41	1	5	17	25.6	25.7			64.7	65.3	0.6	0.1	
6	T3	Loading dumpster	1	5	17	1	9	59	25.7	25.7	2		65.3	70.0	4.7	0.0	
7	T3	Traveling	1	9	59	1	11	8	25.7	26.0			70.0	71.1	1.2	0.3	
8	T3	Loading dumpster	1	11	8	1	18	9	26.0	26.0	3		71.1	78.2	7.0	0.0	
9	T3	Traveling	1	18	9	1	19	56	26.0	26.5			78.2	79.9	1.8	0.5	
10	T3	Loading door to door	1	19	56	1	25	16	26.5	26.7	B	3	79.9	85.3	5.3	0.2	
11	T3	Loading dumpster	1	25	16	1	37	50	26.7	26.7	4		85.3	97.8	12.6	0.0	
12	T3	Traveling	1	37	50	1	38	20	26.7	26.8			97.8	98.3	0.5	0.1	
13	T3	Loading door to door	1	33	20	1	42	1	26.8	27.4	C	6	93.3	102.0	8.7	0.6	
14	T3	Traveling	1	42	1	1	45	53	27.4	28.4			102.0	105.9	3.9	1.0	
15	T3	Loading door to door	1	45	53	2	41	13	28.4	32.2	D	76	105.9	161.2	55.3	3.8	
16	T3	Traveling	2	41	13	2	41	52	32.2	32.4			161.2	161.9	0.7	0.2	
17	T3	Loading door to door	2	41	52	2	43	2	32.4	32.7	E	2	161.9	163.0	1.2	0.3	
18	T3	Traveling	2	43	2	2	44	50	32.7	33.1			163.0	164.8	1.8	0.4	
19	T3	Loading door to door	2	44	50	2	56	56	33.1	33.6	F	8	164.8	176.9	12.1	0.5	
20	T4	To Patacon	2	56	56	3	38	59	33.6	61.8			176.9	219.0	42.1	28.2	
21	T5	Weighing	3	38	59	3	41	9	61.8	61.8		4.59	219.0	221.2	2.2	0.0	
22	T5	Unloading	3	41	9	3	51	0					221.2	231.0	9.8	2.7	
23	T4	To 24 de Diciembre	3	51	0	4	35	4	61.8	91.3			231.0	275.1	44.1	29.5	
24	T3	Loading door to door	4	35	4	4	49	22	91.3	92.1	G	23	275.1	289.4	14.3	0.8	
25	T3	Traveling	4	49	22	4	54	45	92.1	95.1			289.4	294.8	5.4	3.0	
26	T3	Loading door to door	4	54	45	5	1	26	95.1	95.3	H	23	294.8	301.4	6.7	0.2	
27	T3	Loading dumpster	5	1	26	5	10	5	95.3	96.3	5		301.4	310.1	8.6	1.0	
28	T3	Loading door to door	5	10	5	5	45	49	96.3	98.7	I	34	310.1	345.8	35.7	2.4	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Partially urbanized areas with businesses

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 29, 2002 (Tuesday)

Collection area: BD 04-01

Collection route: 24 de Diciembre

Vehicle number: 1933

Capacity: 7 to 8 tons

Fuel consumption: 22.6 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
29	T3	Traveling	5	45	49	5	48	25	98.7	99.2				345.8	348.4	2.6	0.5
30	T3	Loading door to door	5	48	25	6	5	44	99.2	100.8	J	39		348.4	365.7	17.3	1.6
31	T3	Loading dumpster	6	5	44	6	14	43	100.8	100.9	6	2		365.7	374.7	9.0	0.1
32	T3	Traveling	6	14	43	6	16	59	100.9	101.2				374.7	377.0	2.3	0.3
33	T3	Loading door to door	6	16	59	6	36	56	101.2	103.1	k	39		377.0	396.9	20.0	1.9
34	T3	Traveling	6	36	56	6	38	36	103.1	103.6				396.9	398.6	1.7	0.5
35	T3	Loading dumpster	6	38	36	6	42	57	103.6	103.6	7			398.6	403.0	4.3	0.0
36	T4	To Patacon	6	42	57	7	24	34	103.6	131.5				403.0	444.6	41.6	27.9
37	T5	Weighing	7	24	34	7	26	19	131.5	131.5				444.6	446.3	1.8	0.0
38	T5	Unloading	7	26	19	7	40	33						446.3	460.6	14.2	2.7
39	T1a	Cleaning vehicle	7	40	33	7	58	54						460.6	478.9	18.4	0.0
40	T6	To DIMAUD-Carrasquilla compound	7	58	54	8	30	12	131.5	142.9				478.9	510.2	31.3	11.4

**TIME AND MOVEMENT SURVEY FOR COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): House-to-house

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Partially urbanized areas - low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 1, 2002 (Friday)

Collection area: BD 05-05

Collection route: La Cabima

Vehicle number: 1929

Capacity: 18 yards³

Fuel consumption: 15 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			H	M	S	H	M	S	Initial	Final				Initial (min)	Final (min)		
1	T1	Readiness (waiting for the personnel - fueling)	0	0	0	1	0	30	0.0	0.0				0.0	60.5	0.0	
2	T2	To La Cabima	1	0	30	1	33	18	0.0	20.1				60.5	93.3	20.1	
3	T3	Loading door to door	1	33	18	1	34	13	20.1	20.1				93.3	94.2	0.0	
4	T3	Loading dumpster	1	34	13	1	40	10	20.1	20.1	1			94.2	100.2	0.0	
5	T3	Traveling	1	40	10	1	42	53	20.1	20.4				100.2	102.9	0.3	
6	T3	Loading door to door	1	42	53	1	58	59	20.4	21.5	A	37		102.9	119.0	1.1	
7	T3	Traveling	1	58	59	2	1	18	21.5	22.1				119.0	121.3	0.6	
8	T3	Loading door to door	2	1	18	2	1	56	22.1	22.1				121.3	121.9	0.0	
9	T3	Traveling	2	1	56	2	3	16	22.1	22.7				121.9	123.3	0.6	
10	T3	Loading door to door	2	3	16	2	35	59	22.7	26.7	B	110		123.3	156.0	4.0	
11	T3	Traveling	2	35	59	2	36	44	26.7	26.8				156.0	156.7	0.1	
12	T3	Loading point-to-point	2	36	44	2	49	20	26.8	27.9	C	25		156.7	169.3	1.1	
13	T3	Loading dumpster	2	49	20	2	56	26	27.9	27.9	2			169.3	176.4	0.0	
14	T3	Loading point-to-point	2	56	26	3	5	57	27.9	29.2	C	25		176.4	186.0	1.3	
15	T3	Traveling	3	5	57	3	6	57	29.2	29.3				186.0	187.0	0.1	
16	T3	Loading point-to-point	3	6	57	3	25	23	29.3	31.7	D	22		187.0	205.4	2.4	
17	T3	Traveling	3	25	23	3	28	59	31.7	32.1				205.4	209.0	0.4	
18	T3	Loading point-to-point	3	28	59	3	46	0	32.1	36.2	E	39		209.0	226.0	4.1	
19	T3	Traveling	3	46	0	3	49	15	36.2	36.6				226.0	229.3	0.4	
20	T3	Loading point-to-point	3	49	15	4	3	41	36.6	38.0	F	50		229.3	243.7	1.4	
21	T3	Traveling	4	3	41	4	6	56	38.0	38.6				243.7	246.9	0.6	
22	T3	Loading point-to-point	4	6	56	4	8	40	38.6	38.7	G	11		246.9	248.7	0.1	
23	T3	Loading dumpster	4	8	40	4	14	1	38.7	38.7	3			248.7	254.0	0.0	
24	T3	Loading dumpster	4	14	1	4	27	15	38.7	38.7	4			254.0	267.3	0.0	
25	T3	Loading point-to-point	4	27	15	4	39	33	38.7	39.2	G	12		267.3	279.6	0.5	
26	T4	To Patacon	4	39	33	5	16	45	39.2	59.9				279.6	316.8	20.7	
27	T5	Weighing	5	16	45	5	24	13	59.9	59.9				316.8	324.2	0.0	
28	T5	Unloading	5	24	13	5	35	14						324.2	335.2	2.7	

**TIME AND MOVEMENT SURVEY FOR COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): House-to-house

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Partially urbanized areas - low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 1, 2002 (Friday)

Collection area: BD 05-05

Collection route: La Cabima

Vehicle number: 1929

Capacity: 18 yards³

Fuel consumption: 15 gallons

No.	Activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Time (min)	Distance (Kms)
		Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km					
29	T1a Cleaning vehicle	5	35	14	5	47	7						11.9	0.0
30	T6 To Carrasquilla compound	5	47	7	6	9	13	59.9	70.3				22.1	10.4
													347.1	369.2
													335.2	347.1

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): House-to-house

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Partially urbanized areas - low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 2, 2002 (Saturday)

Collection area: BD 05-05

Collection route: La Cabima

Vehicle number: 1936

Capacity: 6 to 8 tons

Fuel consumption: 15 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance			Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km	Initial (min)				Final (min)			
1	T1	Readiness (waiting for the personnel - fueling)	0	0	0	0	22	30	0.0	0.0	0.0				0.0	22.5	0.0	
2	T2	To La Cabima	0	22	30	0	45	53	0.0	17.0					22.5	45.9	23.4	17.0
3	T3	Loading door to door	0	45	53	0	51	9	17.0	18.4	A	3			45.9	51.2	5.3	1.4
4	T3	Traveling	0	51	9	0	56	17	18.4	20.4					51.2	56.3	5.1	2.0
5	T3	Loading point to point (San Lorenzo)	0	56	17	1	30	37	20.4	24.2	B	65			56.3	90.6	34.3	3.8
6	T3	Traveling	1	30	37	1	31	38	24.2	24.3					90.6	91.6	1.0	0.1
7	T3	Loading at a convenient store	1	31	38	1	34	16	24.3	24.3					91.6	94.3	2.6	0.0
8	T3	Traveling	1	34	16	1	35	17	24.3	24.5					94.3	95.3	1.0	0.2
9	T3	Loading door to door	1	35	17	1	39	15	24.5	25.0	C	10			95.3	99.3	4.0	0.5
10	T3	Traveling	1	39	15	1	42	28	25.0	25.9					99.3	102.5	3.2	0.9
11	T3	Loading at a designated site (Villa Acuario)*	1	42	28	1	48	26	25.9	25.9					102.5	108.4	6.0	0.0
12	T3	Loading door to door (Villa Acuario)	1	48	26	2	5	53	25.9	26.9	D	36			108.4	125.9	17.5	1.0
13	T3	Traveling	2	5	53	2	7	15	26.9	27.1					125.9	127.3	1.4	0.2
14	T3	Loading door to door	2	7	15	2	20	25	27.1	27.8	E	31			127.3	140.4	13.2	0.7
15	T3	Loading at convenient store - El Abasto	2	20	25	2	27	24	27.8	27.8					140.4	147.4	7.0	0.0
16	T3	Traveling	2	27	24	2	27	57	27.8	27.9					147.4	148.0	0.5	0.1
17	T3	Loading door to door	2	27	57	2	57	0	27.9	29.3	F	33			148.0	177.0	29.1	1.4
18	T3	Traveling	2	57	0	3	0	25	29.3	30.4					177.0	180.4	3.4	1.1
19	T7	Supervisor's visit.	3	0	25	3	0	17	30.4	30.4					180.4	183.3	2.9	0.0
20	T3	Traveling	3	3	17	3	7	12	30.4	31.6					183.3	187.2	3.9	1.2
21	T3	Loading door to door (Urb. Santa Teresa)	3	7	12	3	42	4	31.6	33.7	G	64			187.2	222.1	34.9	2.1
22	T7	Vehicle repairs	3	42	4	4	28	33	33.7	33.7					222.1	268.6	46.5	0.0
23	T3	Loading door to door (Urb. Santa Teresa)	4	28	33	4	37	25	33.7	34.2	G	10			268.6	277.4	8.9	0.5
24	T4	To Patacon	4	37	25	5	16	7	34.2	56.3					277.4	316.1	38.7	22.1
25	T5	Weighing	5	16	7	5	17	59	56.3	56.3			5.62		316.1	318.0	1.9	0.0
26	T5	Unloading	5	17	59	5	30	59							318.0	331.0	13.0	2.7
27	T1a	Cleaning vehicle	5	30	59	5	39	47							331.0	339.8	8.8	0.0
28	T6	To Carrasquilla compound	5	39	47	6	3	0	56.3	67.3					339.8	363.0	23.2	11.0

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): House-to-house

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Partially urbanized areas - low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 2, 2002 (Saturday)

Collection area: BD 05-05

Collection route: La Cabima

Vehicle number: 1936

Capacity: 6 to 8 tons

Fuel consumption: 15 gallons

No.	Activity	Description of activity	Accumulated Time			Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time Initial (min)	Accumulated Time Final (min)	Time (min)	Distance (Kms)
			H	M	S	Initial Km	Final Km							

*Note: Designated site in Villa Acuario, Truck is parked and residents deliver waste to it.

**TIME AND MOVEMENT SURVEY FOR COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): House-to-house

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Partially urbanized areas - low income

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: February 4, 2002 (Monday)

Collection area: BD 05-05

Collection route: La Cabima

Vehicle number: 1936

Capacity: 6 to 8 tons

Fuel consumption: 25 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance			Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			H	M	S	H	M	S	Initial	Kin	Final				Initial (min)	Final (min)		
1	T1	Readiness (waiting for the personnel - fueling)	0	0	0	0	15	32	0.0	0.0	0.0				0.0	15.5	0.0	
2	T7	To Patacon	0	15	32	0	32	58	0.0	0.0	9.9				15.5	33.0	17.4	9.9
3	T7	From Patacon to La Cabima	0	32	58	1	18	30	9.9	33.5					33.0	78.5	45.5	23.6
4	T3	Loading door to door (Urb. Santa Teresa)	1	18	30	1	58	1	33.5	36.1	A	71			78.5	118.0	39.5	2.6
5	T3	Traveling	1	58	1	1	59	1	36.1	36.3					118.0	119.0	1.0	0.2
6	T3	Loading point-to-point	1	59	1	2	1	29	36.3	36.4	B				119.0	121.5	2.5	0.1
7	T3	Loading dumpster	2	1	29	2	5	34	36.4	36.4	1				121.5	125.6	4.1	0.0
8	T3	Loading door to door	2	5	34	2	9	53	36.4	36.7	B	54			125.6	129.9	4.3	0.3
9	T3	Loading dumpster	2	9	53	2	17	0	36.7	36.7	2				129.9	137.0	7.1	0.0
10	T3	Loading point-to-point	2	17	0	2	40	9	36.7	38.4	B				137.0	160.2	23.2	1.7
11	T3	Traveling	2	40	9	2	52	29	38.4	39.9					160.2	172.5	12.3	1.5
12	T3	Loading point to point (Ciudad El Amanecer)	2	52	29	3	40	10	39.9	43.1	C	85			172.5	220.2	47.7	3.2
13	T3	Traveling	3	40	10	3	41	53	43.1	43.2					220.2	221.9	1.7	0.1
14	T3	Loading point-to-point	3	41	53	4	19	38	43.2	46.0	D	59			221.9	259.6	37.8	2.8
15	T4	To Patacon	4	19	38	5	3	33	46.0	67.5					259.6	303.6	43.9	21.5
16	T5	Weighing	5	3	33	5	9	33	67.5	67.5			6.29		303.6	309.6	6.0	0.0
17	T5	Unloading	5	9	33	5	19	39							309.6	319.7	10.1	2.7
18	T4	From Patacon to La Cabima	5	19	39	5	52	10	67.5	88.5					319.7	352.2	32.5	21.0
19	T3	Loading point-to-point	5	52	10	6	0	25	88.5	89.0	E	13			352.2	360.4	8.3	0.5
20	T3	Traveling	6	0	25	6	1	49	89.0	89.9					360.4	361.8	1.4	0.9
21	T3	Loading point-to-point	6	1	49	6	7	35	89.9	90.2	F	14			361.8	367.6	5.8	0.3
22	T3	Traveling	6	7	35	6	9	37	90.2	90.5					367.6	369.6	2.0	0.3
23	T3	Loading point-to-point	6	9	37	6	13	16	90.5	91.8	G	9			369.6	373.3	3.6	1.3
24	T3	Traveling	6	13	16	6	17	9	91.8	91.8					373.3	377.2	3.9	0.0
25	T3	Loading point-to-point	6	17	9	7	7	56	91.8	95.4	H	54			377.2	427.9	50.8	3.6
26	T3	Traveling	7	7	56	7	8	35	95.4	95.7					427.9	428.6	0.6	0.3
27	T3	Loading point-to-point	7	8	35	7	22	52	95.7	97.0	I	27			428.6	442.9	14.3	1.3
28	T3	Traveling	7	22	52	7	24	25	97.0	97.3					442.9	444.4	1.6	0.3

**TIME AND MOVEMENT SURVEY FOR COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): House-to-house

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Partially urbanized areas - low income

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: February 4, 2002 (Monday)

Collection area: BD 05-05

Collection route: La Cabima

Vehicle number: 1936

Capacity: 6 to 8 tons

Fuel consumption: 25 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
29	T3	Loading point-to-point	7	24	25	7	50	40	97.3	100.4	J	23		444.4	470.7	26.3	3.1
30	T3	Loading dumpster	7	50	40	7	52	53	100.4	100.4	3			470.7	472.9	2.2	0.0
31	T3	Loading dumpster	7	52	53	7	58	7	100.4	100.4	4			472.9	478.1	5.2	0.0
32	T4	To Patacon	7	58	7	8	40	47	100.4	122.6				478.1	520.8	42.7	22.2
33	T5	Weighing	8	40	47	8	51	23	122.6	122.6			4.82	520.8	531.4	10.6	0.0
34	T5	Unloading	8	51	23	9	1	57						531.4	542.0	10.6	2.7
35	T6	To Carrasquilla compound	9	1	57	9	24	0	122.6	133.4				542.0	564.0	22.1	10.8

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both but more house-to-house

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 26, 2002 (Saturday)

Collection area: BN 03-02

Collection route: Don Bosco

Vehicle number: 1947

Capacity: 8 tons

Fuel consumption: 8 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	M	S	H	M	Final	Initial	Final				Initial	Final		
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	0	7	50	0.0	0.0				0.0	7.8	0.0	
2	T2	To Don Bosco	0	7	50	0	33	8	0.0	14.8				7.8	33.1	25.3	
3	T3	Loading door to door	0	33	8	1	11	34	14.8	15.8	A	70		33.1	71.6	38.4	
4	T3	Loading door to door	1	11	34	1	36	5	15.8	16.2	B	54		71.6	96.1	24.5	
5	T7	Store to buy mirror	1	36	5	1	43	34	16.2	16.2				96.1	103.6	7.5	
6	T3	Traveling	1	43	34	1	47	17	16.2	17.7				103.6	107.3	3.7	
7	T3	Loading door to door	1	47	17	2	21	0	17.7	19.0	C	79		107.3	141.0	33.7	
8	T3	Loading grocery store	2	21	0	2	23	25	19.0	19.0	I			141.0	143.4	2.4	
9	T3	Loading door to door	2	23	25	2	27	32	19.0	19.5	D	6		143.4	147.5	4.1	
10	T3	Traveling	2	27	32	2	28	30	19.5	20.0				147.5	148.5	1.0	
11	T3	Loading door to door	2	28	30	2	44	2	20.0	20.5	E	29		148.5	164.0	15.5	
12	T3	Loading accumulated trash	2	44	2	2	45	5	20.5	20.5	2			164.0	165.1	1.1	
13	T3	Loading door to door	2	45	5	3	0	1	20.5	21.7	F	16		165.1	180.0	14.9	
14	T3	Traveling to the entrance of Don Bosco	3	0	1	3	4	15	21.7	22.8				180.0	184.3	4.2	
15	T7	Personnel arguing	3	4	15	3	9	12	22.8	22.8				184.3	189.2	4.9	
16	T3	Traveling to Plaza Tocumen	3	9	12	3	9	42	22.8	22.9				189.2	189.7	0.5	
17	T3	Loading dumpsters Plaza Tocumen	3	9	42	3	15	40	22.9	22.9	3			189.7	195.7	6.0	
18	T3	Traveling	3	15	40	3	16	22	22.9	23.5				195.7	196.4	0.7	
19	T3	Loading dumpsters Plaza Tocumen	3	16	22	3	21	25	23.5	23.5	4			196.4	201.4	5.0	
20	T3	Traveling	3	21	25	3	23	15	23.5	23.5				201.4	203.3	1.8	
21	T3	Loading dumpsters Plaza Tocumen	3	23	15	3	30	55	23.5	23.5	5			203.3	210.9	7.7	
22	T3	Traveling	3	30	55	3	32	50	23.5	23.7				210.9	212.8	1.9	
23	T3	Loading dumpsters at gas station(Delta)	3	32	50	3	39	20	23.7	23.7	6			212.8	219.3	6.5	
24	T4	To Patacon	3	39	20	4	5	45	23.7	43.1				219.3	245.8	26.4	
25	T5	Weighing	4	5	45	4	7	6	43.1	43.1		3.81		245.8	247.1	1.3	
26	T5	Unloading	4	7	6	4	22	10						247.1	262.2	15.1	
27	T4	To Don Bosco	4	22	10	4	44	7	43.1	63.1				262.2	284.1	22.0	
28	T3	Loading door to door	4	44	7	5	27	4	63.1	66.1	G	190		284.1	327.1	43.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both but more house-to-house

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 26, 2002 (Saturday)

Collection area: BN 03-02

Collection route: Don Bosco

Vehicle number: 1947

Capacity: 8 tons

Fuel consumption: 8 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial		Final		Initial Km	Final Km	Initial (min)	Final (min)							
			H	M	S	H								M	S		
29	T3	Loading door to door	5	27	4	5	40	40	66.1	67.6	H	66	327.1	340.7	13.6	1.5	
30	T3	Loading door to door	5	40	40	5	56	0	67.6	68.4	I	18	340.7	356.0	15.3	0.8	
31	T7	Buying food	5	56	0	6	2	15	68.4	68.4			356.0	362.3	6.3	0.0	
32	T3	Loading door to door	6	2	15	6	10	50	68.4	69.0	J	11	362.3	370.8	8.6	0.6	
33	T7	Selling recyclable cans (Villa Lobo)	6	10	50	6	20	5	69.0	71.3			370.8	380.1	9.3	2.3	
34	T7	Unloading cans, bottles	6	20	5	6	29	2	71.3	71.3			380.1	389.0	9.0	0.0	
35	T4	To Cerro Patacon	6	29	2	6	51	33	71.3	90.8			389.0	411.6	22.5	19.5	
36	T5	Weighing	6	51	33	6	53	0	90.8	90.8			411.6	413.0	1.4	0.0	
37	T5	Unloading	6	53	0	7	1	40	90.8	101.0			413.0	421.7	8.7	2.7	
38	T4	To DIMAUD-Carrasquilla compound	7	1	40	7	15	50	90.8	101.0			421.7	435.8	14.2	10.2	

Note: No vehicle cleaning due to lack of water

TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF SOLID WASTE IN THE PANAMA CITY DISTRICT

Collection (house-to-house, dumpster,

Method or both): Both but more house-to-house

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 28, 2002 (Monday)

Collection area: BN 03-02

Collection route: Don Bosco

Vehicle number: 1938

Capacity: 8 tons

Fuel consumption: 10 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial		Final		Initial	Final	Initial	Final				Initial	Final		
			H	M	S	H											
1	T1	Readiness (waiting for the personnel - fueling)	0	0	0	0	5	18	0.0	0.0			0.0	5.3	5.3	0.0	
2	T2	To Don Bosco	0	5	18	0	49	20	0.0	15.5			15.5	49.3	44.0	15.5	
3	T3	Loading door to door	0	49	20	0	54	5	15.5	15.7	A	3	15.7	49.3	54.1	4.8	
4	T3	Traveling	0	54	5	0	54	20	15.7	15.7			15.7	54.1	54.3	0.3	
5	T3	Loading door to door	0	54	20	1	10	11	15.7	16.6	B	20	16.6	54.3	70.2	15.9	
6	T3	Loading door to door	1	10	11	1	12	11	16.6	16.6	C	3	16.6	70.2	72.2	2.0	
7	T3	Loading point to point	1	12	11	1	23	5	16.6	16.9	D	10	16.9	72.2	83.1	10.9	
8	T7	Picking up snack	1	23	5	1	29	30	16.9	16.9			16.9	83.1	89.5	6.4	
9	T3	Loading door to door	1	29	30	3	35	6	16.9	18.9	E	92	18.9	89.5	215.1	125.6	
10	T4	To Patacon	3	35	6	4	9	38	18.9	40.5			40.5	215.1	249.6	34.5	
11	T5	Weighing	4	9	38	4	11	6	40.5	40.5		5.38	40.5	249.6	251.1	1.5	
12	T5	Unloading	4	11	6	4	20	16						251.1	260.3	9.2	
13	T4	To Don Bosco	4	20	16	4	49	30	40.5	63.2			63.2	260.3	289.5	29.2	
14	T3	Loading door to door	4	49	30	4	58	20	63.2	63.3	F	9	63.3	289.5	298.3	8.8	
15	T3	Loading door to door	4	58	20	5	19	40	63.3	63.8	G	10	63.8	298.3	319.7	21.3	
16	T3	Loading door to door	5	19	40	6	57	10	63.8	68.4	H	379	68.4	319.7	417.2	97.5	
17	T3	Loading point to point	6	57	10	7	10	30	68.4	68.9	I	17	68.9	417.2	430.5	13.3	
18	T7	Talking with supervisor	7	10	30	7	12	1	68.9	68.9			68.9	430.5	432.0	1.5	
19	T3	Loading point to point	7	12	1	7	19	57	68.9	69.0	J	4	69.0	432.0	440.0	7.9	
20	T7	To Pedregal - recycling site	7	19	57	7	33	49	69.0	71.6			71.6	440.0	453.8	13.9	
21	T4	To Patacon	7	33	49	7	47	50	71.6	84.2			84.2	453.8	467.8	14.0	
22	T7	Stop in gas station	7	47	50	7	54	50	84.2	84.2			84.2	467.8	474.8	7.0	
23	T4	To Patacon	7	54	50	8	5	4	84.2	91.2			91.2	474.8	485.1	10.2	
24	T5	Weighing	8	5	4	8	6	21	91.2	91.2		5.54	91.2	485.1	486.4	1.3	
25	T5	Unloading	8	6	21	8	16	15						486.4	496.3	9.9	
26	T1a	Cleaning vehicle	8	16	15	8	21	28	91.2	91.2			91.2	496.3	501.5	5.2	
27	T6	To DIMAUD-Carrasquilla compound	8	21	28	8	37	30	91.2	101.6			101.6	501.5	517.5	16.0	

Note: Started at 5:35 p.m.

**TIME AND MOVEMENT SURVEY FOR COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both but more house-to-house

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 30, 2002 (Wednesday)

Collection area: BN 03-02

Collection route: Don Bosco

Vehicle number: 1928

Capacity: 25 yards³

Fuel consumption: 18 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Time (min)		Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final	
			H	M	S	H	M	S								
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	0	4	51	0.0	0.0			0.0	4.9	4.9	0.0
2	T2	To Don Bosco	0	4	51	0	56	38	0.0	15.3			4.9	56.6	51.8	15.3
3	T3	Loading door to door up to 8th street	0	56	38	2	7	57	15.3	17.8	A	187	56.6	128.0	71.3	2.5
4	T3	Loading door to door	2	7	57	2	23	36	17.8	18.2	B	44	128.0	143.6	15.7	0.4
5	T3	Traveling	2	23	36	2	24	28	18.2	18.3			143.6	144.5	0.9	0.1
6	T3	Loading door to door	2	24	28	2	39	14	18.3	20.1	C	70	144.5	159.2	14.8	1.8
7	T3	Loading door to door	2	39	14	3	17	9	20.1	21.6	D	90	159.2	197.2	37.9	1.5
8	T3	Traveling	3	17	9	3	17	49	21.6	21.8			197.2	197.8	0.7	0.2
9	T3	Loading door to door	3	17	49	3	34	33	21.8	23.2	E	39	197.8	214.6	16.7	1.4
10	T3	Loading door to door	3	34	33	3	45	40	23.2	23.8	F	22	214.6	225.7	11.1	0.6
11	T3	Traveling	3	45	40	3	46	47	23.8	24.0			225.7	226.8	1.1	0.2
12	T3	Loading door to door	3	46	47	4	14	50	24.0	24.6	G	42	226.8	254.8	28.1	0.6
13	T3	Traveling	4	14	50	4	16	8	24.6	25.1			254.8	256.1	1.3	0.5
14	T3	Loading door to door	4	16	8	4	41	32	25.1	26.5	H	79	256.1	281.5	25.4	1.4
15	T4	To Patacon	4	41	32	4	57	9	26.5	40.1			281.5	297.2	15.6	13.6
16	T7	Stopped at the Esso gas station - El Bosque	4	57	9	5	6	26	40.1	40.1			297.2	306.4	9.3	0.0
17	T4	To Patacon	5	6	26	5	13	59	40.1	47.7			306.4	314.0	7.6	7.6
18	T5	Weighing	5	13	59	5	15	36	47.7	47.7		6.03	314.0	315.6	1.6	0.0
19	T5	Unloading	5	15	36	5	25	54					315.6	325.9	10.3	2.7
20	T1a	Cleaning vehicle	5	25	54	5	30	7					325.9	330.1	4.2	0.0
21	T6	To DIMAUD-Carrasquilla compound	5	30	7	5	44	9	47.3	58.1			330.1	344.2	14.0	10.8

Note: T7 Truck overheated - bought food while waiting

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle-low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 1, 2002 (Friday)

Collection area: BN 04-02

Collection route: Radial

Vehicle number: 1932

Capacity: 8 tons

Fuel consumption: 26 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
1	T3	Loading point-to-point	0	0	0	0	1	7	17.9	17.9	1	1	0.0	1.1	0.0		
2	T3	Loading door-to-door	0	1	7	0	3	20	17.9	18.0	A	2	1.1	3.3	0.1		
3	T3	Traveling	0	3	20	0	3	30	18.0	18.1			3.3	3.5	0.1		
4	T3	Loading door-to-door	0	3	30	0	8	32	18.1	18.6	B	17	3.5	8.5	0.5		
5	T3	Loading door-to-door	0	8	32	0	10	40	18.6	18.8	C	13	8.5	10.7	0.2		
6	T3	Loading door-to-door	0	10	40	0	12	17	18.8	19.0	D	3	10.7	12.3	0.2		
7	T3	Loading door-to-door	0	12	17	0	15	30	19.0	19.3	E	19	12.3	15.5	0.3		
8	T3	Loading point-to-point	0	15	30	0	16	47	19.3	19.4	F	2	15.5	16.8	0.1		
9	T3	Loading door-to-door	0	16	47	0	18	25	19.4	19.5	G	9	16.8	18.4	0.1		
10	T3	Loading door-to-door	0	18	25	0	20	55	19.5	19.7	H	13	18.4	20.9	0.2		
11	T3	Loading door-to-door	0	20	55	0	21	58	19.7	19.8	I	3	20.9	22.0	0.1		
12	T3	Loading door-to-door	0	21	58	0	23	47	19.8	20.0	J	5	22.0	23.8	0.2		
13	T3	Loading door-to-door	0	23	47	0	25	10	20.0	20.4			23.8	25.2	0.4		
14	T3	Loading door-to-door	0	25	10	0	26	59	20.4	20.5	K	7	25.2	27.0	0.1		
15	T3	Loading door-to-door	0	26	59	0	27	10	20.5	20.6			27.0	27.2	0.1		
16	T3	Loading point	0	27	10	0	27	58	20.6	20.6	2		27.2	28.0	0.0		
17	T3	Loading door-to-door	0	27	58	0	30	37	20.6	20.9	L	10	28.0	30.6	0.3		
18	T3	Traveling	0	30	37	0	31	1	20.9	21.0			30.6	31.0	0.4		
19	T3	Loading door-to-door	0	31	1	0	33	28	21.0	21.3	M	12	31.0	33.5	0.3		
20	T3	Traveling	0	33	28	0	34	43	21.3	21.5			33.5	34.7	0.2		
21	T3	Loading door-to-door	0	34	43	0	36	30	21.5	21.6	N	3	34.7	36.5	0.1		
22	T3	Traveling	0	36	30	0	37	0	21.6	21.7			36.5	37.0	0.1		
23	T3	Loading door-to-door	0	37	0	0	37	34	21.7	21.8	N	3	37.0	37.6	0.1		
24	T3	Loading door-to-door	0	37	34	0	38	32	21.8	22.0	O	3	37.6	38.5	0.2		
25	T3	Loading door-to-door	0	38	32	0	39	30	22.0	22.3	P	4	38.5	39.5	0.3		
26	T3	Loading door-to-door	0	39	30	0	42	0	22.3	22.4	Q	9	39.5	42.0	0.1		
27	T3	Loading door-to-door	0	42	0	0	46	59	22.4	22.8	R	18	42.0	47.0	0.4		
28	T3	Traveling	0	46	59	0	47	38	22.8	22.9			47.0	47.6	0.1		

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle-low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 1, 2002 (Friday)

Collection area: BN 04-02

Collection route: Radial

Vehicle number: 1932

Capacity: 8 tons

Fuel consumption: 26 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
29	T3	Loading door-to-door	0	47	38	1	3	50	22.9	23.7	S	31		47.6	63.8	16.2	0.8
30	T3	Loading door-to-door	1	3	50	1	9	17	23.7	24.4	T	19		63.8	69.3	5.5	0.7
31	T3	Loading door-to-door	1	9	17	1	10	55	24.4	24.5	V1	4		69.3	70.9	1.6	0.1
32	T7	Stop for a drink of water	1	10	55	1	12	10	24.5	24.5				70.9	72.2	1.3	0.0
33	T3	Loading door-to-door	1	12	10	1	14	30	24.5	24.8	V2	7		72.2	74.5	2.3	0.3
34	T3	Loading door-to-door	1	14	30	1	18	46	24.8	25.0	V3	4		74.5	78.8	4.3	0.2
35	T3	Loading door-to-door	1	18	46	1	24	20	25.0	25.3	V	14		78.8	84.3	5.6	0.3
36	T3	Traveling	1	24	20	1	25	36	25.3	26.0				84.3	85.6	1.3	0.7
37	T3	Loading door-to-door	1	25	36	1	26	56	26.0	26.1	V1	3		85.6	86.9	1.3	0.1
38	T3	Traveling	1	26	56	1	29	0	26.1	26.3				86.9	89.0	2.1	0.2
39	T3	Loading door-to-door	1	29	0	1	42	46	26.3	27.5	V2	28		89.0	102.8	13.8	1.2
40	T3	Loading door-to-door	1	42	46	1	52	0	27.5	28.4	V3	24		102.8	112.0	9.2	0.9
41	T3	Loading door-to-door	1	52	0	1	57	28	28.4	29.0	V4	11		112.0	117.5	5.5	0.6
42	T3	Loading door-to-door	1	57	28	2	10	31	29.0	30.3	V5	16		117.5	130.5	13.1	1.3
43	T3	Traveling	2	10	31	2	12	3	30.3	30.7				130.5	132.1	1.5	0.4
44	T3	Loading door-to-door	2	12	3	2	20	58	30.7	30.9	V6	12		132.1	141.0	8.9	0.2
45	T3	Traveling	2	20	58	2	29	20	30.9	32.7				141.0	149.3	8.4	1.8
46	T3	Loading point-to-point	2	29	20	2	31	52	32.7	33.1	V7	3		149.3	151.9	2.5	0.4
47	T4	To Patacon	2	31	52	2	59	20	33.1	51.2				151.9	179.3	27.5	18.1
48	T5	Weighing	2	59	20	3	0	47	51.2	51.2			4.03	179.3	180.8	1.4	0.0
49	T5	Unloading	3	0	47	3	10	33						180.8	190.6	9.8	2.7
50	T4	To La Radial	3	10	33	3	34	50	51.2	69.8				190.6	214.8	24.3	18.6
51	T7	Loading point-to-point	3	34	50	3	35	0	69.8	69.8	3			214.8	215.0	0.2	0.0
52	T3	Traveling	3	35	0	3	35	50	69.8	70.1				215.0	215.8	0.8	0.3
53	T3	Loading door-to-door	3	35	50	3	41	52	70.1	70.7	a	14		215.8	221.9	6.0	0.6
54	T3	Traveling	3	41	52	3	42	51	70.7	70.9				221.9	222.9	1.0	0.2
55	T3	Loading door-to-door	3	42	51	3	54	12	70.9	71.6	b	39		222.9	234.2	11.4	0.7
56	T3	Loading door-to-door	3	54	12	4	17	48	71.6	72.8	c	77		234.2	257.8	23.6	1.2

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle-low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 1, 2002 (Friday)

Collection area: BN 04-02

Collection route: Radial

Vehicle number: 1932

Capacity: 8 tons

Fuel consumption: 26 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
57	T3	Loading door-to-door	4	17	48	4	39	40	72.8	73.7	d	55		257.8	279.7	21.9	0.9
58	T3	Loading door-to-door	4	39	40	4	56	10	73.7	74.5	e	25		279.7	296.2	16.5	0.8
59	T3	Eating	4	56	10	5	4	21	74.5	74.5				296.2	304.4	8.2	0.0
60	T3	Loading door-to-door	5	4	21	5	9	35	74.5	75.0	f	7		304.4	309.6	5.2	0.5
61	T3	Loading door-to-door	5	9	35	5	12	15	75.0	75.1	g	5		309.6	312.3	2.7	0.1
62	T3	Loading door-to-door	5	12	15	5	16	20	75.1	76.5				312.3	316.3	4.1	1.4
63	T7	Change of clothes	5	16	20	5	19	28	76.5	76.5				316.3	319.5	3.1	0.0
64	T7	To Monte Oscuro, Sale of recyclable waste	5	19	28	5	32	0	76.5	85.0				319.5	332.0	12.5	8.5
65	T7	Sale of recyclable waste	5	32	0	5	38	15	85.0	85.0				332.0	338.3	6.3	0.0
66	T4	To Patacon	5	38	15	5	53	20	85.0	95.2				338.3	353.3	15.1	10.2
67	T5	Weighing	5	53	20	5	54	16	95.2	95.2			2.42	353.3	354.3	0.9	0.0
68	T5	Unloading	5	54	16	6	5	30						354.3	365.5	11.2	2.7
69	T1a	Cleaning vehicle	6	5	30	6	10	26						365.5	370.4	4.9	0.0
70	T6	To DIMAUD-Carrasquilla compound	6	10	26	6	22	50	95.2	105.7				370.4	382.8	12.4	10.5

Note: The initial times were not recorded because the vehicle started at 4:30 p.m.; this route is been studied due to high risk areas

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle-low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 2, 2002 (Saturday)

Collection area: BN 04-02

Collection route: Radial

Vehicle number: 1934 and 1908

Capacity: both of 6 to 8 tons

Fuel consumption: 17 and 13 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S	Km	Km				(min)	(min)		
1	T1	Readiness (waiting for the personnel - fueling)	0	0	0	0	15	13	0	0	0	0	0	0	15.2	15.2	0.0
2	T2	To La Radial	0	15	13	0	39	34	0	0	0	0	12.4	12.4	39.6	39.6	12.4
3	T7	Checking tires	0	39	34	0	41	0	12.4	12.4					41.0	41.0	0.0
4	T3	Loading point	0	41	0	0	44	42	12.4	12.4	1				44.7	44.7	0.0
5	T3	Traveling	0	44	42	0	45	19	12.4	12.5					45.3	45.3	0.1
6	T3	Loading point-to-point	0	45	19	0	49	22	12.5	12.9	A	4			49.4	49.4	0.4
7	T3	Loading point	0	49	22	0	51	27	12.9	12.9	2				51.5	51.5	0.0
8	T3	Loading point-to-point	0	51	27	0	52	50	12.9	13.0	B	2			52.8	52.8	0.0
9	T3	Traveling	0	52	50	0	53	20	13.0	13.1					53.3	53.3	0.2
10	T3	Loading door-to-door	0	53	20	1	2	19	13.1	13.8	C	43			62.3	62.3	0.7
11	T3	Loading door-to-door	1	2	19	1	11	50	13.8	14.5	D	41			71.8	71.8	0.7
12	T3	Traveling	1	11	50	1	12	29	14.5	14.6					72.5	72.5	0.1
13	T3	Loading door-to-door	1	12	29	1	14	19	14.6	15.0	F	5			74.3	74.3	0.4
14	T7	Tighting tire bolts	1	14	19	1	19	14	15.0	15.0					74.3	79.2	0.0
15	T3	Traveling	1	19	14	1	19	59	15.0	15.1					79.2	80.0	0.1
16	T3	Loading door-to-door	1	19	59	1	39	25	15.1	16.3	G	39			80.0	99.4	1.2
17	T3	Loading door-to-door	1	39	25	1	49	28	16.3	17.1	H	21			99.4	109.5	0.8
18	T3	Loading door-to-door	1	49	28	1	55	32	17.1	17.7	I	14			109.5	115.5	0.6
19	T3	Loading door-to-door	1	55	32	2	3	20	17.7	18.4	J	12			115.5	123.3	0.7
20	T3	Traveling	2	3	20	2	4	50	18.4	18.8					123.3	124.8	0.4
21	T3	Loading door-to-door	2	4	50	2	15	29	18.8	19.6	K	36			124.8	135.5	0.8
22	T3	Loading door-to-door	2	15	29	2	33	57	19.6	21.1	L	51			135.5	154.0	1.5
23	T3	Traveling	2	33	57	2	36	37	21.1	21.4					154.0	156.6	0.3
24	T3	Loading door-to-door	2	36	37	2	51	0	21.4	22.9	M	35			156.6	171.0	1.5
25	T3	Loading door-to-door	2	51	0	3	4	6	22.9	23.9	N	37			171.0	184.1	1.0
26	T3	Loading door-to-door	3	4	6	3	9	9	23.9	24.1	Ñ	8			184.1	189.2	0.2
27	T7	To DIMAUD-Carrasquilla (compactor trouble)	3	9	9	3	30	30	24.1	34.9					189.2	210.5	10.8
28	T7	Compactor overheating	3	30	30	3	39	1	34.9	34.9					210.5	219.0	0.0

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle-low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 2, 2002 (Saturday)

Collection area: BN 04-02

Collection route: Radial

Vehicle number: 1934 and 1908

Capacity: both of 6 to 8 tons

Fuel consumption: 17 and 13 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S	Km	Km				(min)	(min)		
29	T7	To DIMAUD-Carrasquilla compound	3	39	1	3	45	17	34.9	37.8			219.0	225.3	6.3	2.9	
30	T7	Repairing compactor	3	45	17	4	11	59	37.8	37.8			225.3	252.0	26.7	0.0	
31	T2	Towards Radial-with vehicle # 1908	4	11	59	4	30	25	37.8	51.7			252.0	270.4	18.4	13.9	
32	T3	Loading door-to-door	4	30	25	4	42	0	51.7	52.2	O	32	270.4	282.0	11.6	0.5	
33	T3	Traveling	4	42	0	4	42	49	52.2	52.3			282.0	282.8	0.8	0.1	
34	T3	Loading door-to-door	4	42	49	5	6	55	52.3	53.1	P	36	282.8	306.9	24.1	0.8	
35	T3	Loading door-to-door	5	6	55	5	16	41	53.1	54.0	Q	34	306.9	316.7	9.8	0.9	
36	T3	Traveling	5	16	41	5	19	27	54.0	54.6			316.7	319.5	2.8	0.6	
37	T3	Loading door-to-door	5	19	27	5	20	43	54.6	54.7	R	10	319.5	320.7	1.3	0.1	
38	T3	Traveling	5	20	43	5	21	10	54.7	54.8			320.7	321.2	0.5	0.1	
39	T3	Loading door-to-door	5	21	10	5	30	46	54.8	55.3	S	29	321.2	330.8	9.6	0.5	
40	T3	Traveling	5	30	46	5	32	37	55.3	55.8			330.8	332.6	1.9	0.5	
41	T3	Loading door-to-door	5	32	37	5	46	30	55.8	56.8	T	47	332.6	346.5	13.9	1.0	
42	T3	Traveling	5	46	30	5	46	55	56.8	56.9			346.5	346.9	0.4	0.1	
43	T3	Loading door-to-door	5	46	55	6	2	22	56.9	57.9	U	48	346.9	362.4	15.5	1.0	
44	T7	Buying soft drink	6	2	22	6	4	22	57.9	57.9			362.4	364.4	2.0	0.0	
45	T7	To Pedregal	6	4	22	6	9	0	57.9	59.2			364.4	369.0	4.6	1.3	
46	T7	Talking with supervisor	6	9	0	6	10	30	59.2	59.2			369.0	370.5	1.5	0.0	
47	T7	To Pedregal	6	10	30	6	15	33	59.2	62.1			370.5	375.6	5.1	2.9	
48	T7	Sale of recyclable material	6	15	33	6	27	34	62.1	62.1			375.6	387.6	12.0	0.0	
49	T4	To Patacon	6	27	34	6	49	50	62.1	82			387.6	409.8	22.3	19.9	
50	T5	Weighing	6	49	50	6	51	8	82	82			409.8	411.1	1.3	0.0	
51	T5	Unloading	6	51	8	7	0	25	82	82			411.1	420.4	9.3	2.7	
52	T6	To DIMAUD-Carrasquilla compound	7	0	25	7	13	10	82	92.6			420.4	433.2	12.8	10.6	

Note: The vehicle was changed due to engine problems, it was replaced by 1908. It was fueled before leaving
No vehicle cleaning due to lack of water

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle-low income

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: February 4, 2002 (Monday)

Collection area: BN 04-02

Collection route: Radial

Vehicle number: 1937

Capacity: 8 tons

Fuel consumption: 18 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
1	T1	Readiness (waiting for the personnel - fuelir	0	0	0	0	0	0	0	0	0			0.0	6.9	6.9	0.0
2	T2	To La Radial	0	6	55	0	39	46	0	0	11.9			6.9	39.8	32.9	11.9
3	T3	Loading Restaurant La cazuela (dumpster)	0	39	46	0	59	13	11.9	12.9	A	22		39.8	59.2	19.5	1.0
4	T3	Traveling	0	59	13	0	59	49	12.9	13.0				59.2	59.8	0.6	0.1
5	T3	Loading point-to-point	0	59	49	1	13	9	13.0	14.4	B	54		59.8	73.2	13.3	1.4
6	T3	Traveling	1	13	9	1	14	7	14.4	14.8				73.2	74.1	1.0	0.4
7	T3	Loading point-to-point	1	14	7	1	32	0	14.8	16.6	C	55		74.1	92.0	17.9	1.8
8	T3	Traveling	1	32	0	1	33	22	16.6	16.8				92.0	93.4	1.4	0.2
9	T3	Loading point-to-point	1	33	22	1	43	48	16.8	17.9	D	34		93.4	103.8	10.4	1.1
10	T3	Traveling	1	43	48	1	44	30	17.9	18.0				103.8	104.5	0.7	0.1
11	T3	Loading point-to-point	1	44	30	2	28	51	18.0	21.1	E	75		104.5	148.9	44.4	3.1
12	T3	Loading point-to-point	2	28	51	2	36	44	21.1	21.6	F	27		148.9	156.7	7.9	0.5
13	T3	Traveling	2	36	44	2	37	13	21.6	21.9				156.7	157.2	0.5	0.3
14	T3	Loading point-to-point	2	37	13	2	47	8	21.9	22.3	G	16		157.2	167.1	9.9	0.4
15	T4	To Patacon	2	47	8	3	13	20	22.3	42.4				167.1	193.3	26.2	20.1
16	T5	Weighing	2	13	20	3	15	25	42.4	42.4			4.05	133.3	195.4	62.1	0.0
17	T5	Unloading	3	15	25	3	24	0						195.4	204.0	8.6	2.7
18	T4	To La Radial	3	24	0	3	51	43	42.4	63.5				204.0	231.7	27.7	21.1
19	T3	Loading point-to-point	3	51	43	4	35	12	63.5	66.9	H	106		231.7	275.2	43.5	3.4
20	T3	Traveling	4	35	12	4	37	18	66.9	67.3				275.2	277.3	2.1	0.4
21	T3	Loading point-to-point	4	37	18	4	48	24	67.3	68.1	I	81		277.3	288.4	11.1	0.8
22	T3	Traveling	4	48	24	4	49	13	68.1	68.3				288.4	289.2	0.8	0.2
23	T3	Loading point-to-point	4	49	13	5	33	40	68.3	71.7	J	126		289.2	333.7	44.5	3.4
24	T3	Loading point-to-point	5	33	40	5	47	55	71.7	72.6	K	34		333.7	347.9	14.3	0.9
25	T3	Traveling	5	47	55	5	49	18	72.6	72.9				347.9	349.3	1.4	0.3
26	T3	Loading point-to-point	5	49	18	6	1	3	72.9	73.9	L	33		349.3	361.1	11.8	1.0
27	T4	To Patacon	6	1	3	6	31	29	73.9	92.5				361.1	391.5	30.4	18.6
28	T5	Weighing	6	31	29	6	33	40	92.5	92.5			3.96	391.5	393.7	2.2	0.0
29	T5	Unloading	6	33	40	6	42	58						393.7	403.0	9.3	2.7

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Single dwelling housing of middle-low income

Vehicle type: Back loading compactor

Personnel: 3 (driver: 1 collectors: 2)

Date: February 4, 2002 (Monday)

Collection area: BN 04-02

Collection route: Radial

Vehicle number: 1937

Capacity: 8 tons

Fuel consumption: 18 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	Final	H	M	S	Initial	Final	Initial (min)				Final (min)			
30	T6	To DIMAUD-Carrasquilla compound	6	42	58	6	57	36	92.5	103.0				403.0	417.6	14.6	10.5

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,
Method or both): Both but more containers

Date: February 2, 2002 (Saturday)

Collection area: AD 03-01

Collection route: El Chorrillo

Vehicle number: 239 (2956) and 1907

Capacity: 20 yards³

Fuel consumption: 15 gallons

Collection (house-to-house, dumpsters,
Method or both): Both but more containers

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Aggregated residential area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	M	S	H	M	S	Initial	Final				Initial	Final		
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	0	5	4.3	0.0	0.0				0.0	5.1	0.0	0.0
2	T7	To Patacon (dumping garbage from night before)	0	5	43	0	22	8	0.0	15.2				5.7	22.1	16.4	15.2
3	T7	Weighing	0	22	8	0	23	29	15.2	15.2				22.1	23.5	1.4	0.0
4	T7	Unloading	0	23	29	0	34	57						23.5	35.0	11.5	2.7
5	T7	To Curundu compound	0	34	57	0	53	47	15.2	29.8				35.0	53.8	18.8	14.6
6	T7	Repairing vehicle (damaged night before)	0	53	47	2	57	30	29.8	29.8				53.8	177.5	123.7	0.0
7	T2	Toward El Chorrillo with vehicle No. 1907	2	57	30	3	5	42	0.0	3.7				177.5	185.7	8.2	3.7
8	T7	Stopped at gas station	3	5	42	3	6	53	3.7	3.7				185.7	186.9	1.2	0.0
9	T3	Traveling	3	6	53	3	7	29	3.7	3.9				186.9	187.5	0.6	0.2
10	T3	Loading point-to-point	3	7	29	3	18	50	3.9	4.1	A	3		187.5	198.8	11.4	0.2
11	T3	Traveling	3	18	50	3	20	13	4.1	4.4				198.8	200.2	1.4	0.3
12	T3	Picking up dumpster	3	20	13	3	24	25	4.4	4.4	1			200.2	204.4	4.2	0.0
13	T3	Traveling	3	24	25	3	25	0	4.4	4.5				204.4	205.0	0.6	0.0
14	T3	Picking up dumpster	3	25	0	3	27	39	4.5	4.5	2			205.0	207.7	2.7	0.0
15	T3	Traveling	3	27	39	3	28	20	4.5	4.5				207.7	208.3	0.7	0.0
16	T3	Picking up dumpster	3	28	20	3	32	28	4.5	4.5	3			208.3	212.5	4.1	0.0
17	T3	Traveling	3	32	28	3	34	40	4.5	4.6				212.5	214.7	2.2	0.1
18	T3	Picking up dumpster	3	34	40	3	36	50	4.6	4.6	4			214.7	216.8	2.2	0.0
19	T3	Traveling	3	36	50	3	37	10	4.6	4.8				216.8	217.2	0.3	0.2
20	T3	Loading point-to-point	3	37	10	3	57	40	4.8	5.2	B	5		217.2	237.7	20.5	0.4
21	T3	Traveling	3	57	40	3	58	30	5.2	5.3				237.7	238.5	0.8	0.1
22	T3	Loading point-to-point	3	58	30	4	27	13	5.3	5.8	C	7		238.5	267.2	28.7	0.5
23	T3	Traveling	4	27	13	4	29	35	5.8	6				267.2	269.6	2.4	0.2
24	T3	Picking up dumpster	4	29	35	4	31	40	6	6	5			269.6	271.7	2.1	0.0
25	T3	Traveling	4	31	40	4	33	48	6	6.1				271.7	273.8	2.1	0.1
26	T3	Picking up dumpster	4	33	48	4	39	10	6.1	6.1	6			273.8	279.2	5.4	0.0
27	T3	Traveling	4	39	10	4	41	18	6.1	6.2				279.2	281.3	2.1	0.1
28	T3	Picking up dumpster	4	41	18	4	44	40	6.2	6.2	7			281.3	284.7	3.4	0.0

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both but more containers

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Aggregated residential area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 2, 2002 (Saturday)

Collection area: AD 03-01

Collection route: El Chorrillo

Vehicle number: 239 (2956) and 1907

Capacity: 20 yards³

Fuel consumption: 15 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Kin	Final Kin				Initial (min)	Final (min)		
29	T3	Traveling	4	44	40	4	47	0	6.2	6.5	8			284.7	287.0	2.3	0.3
30	T3	Picking up dumpster	4	47	0	4	50	26	6.5	6.5	8			287.0	290.4	3.4	0.0
31	T3	Traveling	4	50	26	4	52	20	6.5	6.8				290.4	292.3	1.9	0.3
32	T3	Picking up dumpster	4	52	20	4	55	59	6.8	6.8	9			292.3	296.0	3.7	0.0
33	T3	Traveling	4	55	59	4	57	0	6.8	6.9				296.0	297.0	1.0	0.0
34	T3	Picking up dumpster	4	57	0	5	1	0	6.85	6.85	10			297.0	301.0	4.0	0.0
35	T4	To Patacon	5	1	0	5	37	15	6.9	23.6				301.0	337.3	36.3	16.8
36	T5	Weighing	5	37	15	5	39	45	23.6	23.6		4.2		337.3	339.8	2.5	0.0
37	T5	Unloading	5	39	45	5	52	5						339.8	352.1	12.3	2.7
38	T7	Pushed a DIMAUP dump truck	5	52	5	5	55	2	23.6	23.6				352.1	355.0	3.0	0.0
39	T4	To El Chorrillo	5	55	2	6	21	40	23.6	40.5				355.0	381.7	26.6	16.9
40	T3	Picking up dumpster	6	21	40	6	22	10	40.5	40.5	11			381.7	382.2	0.5	0.0
41	T3	Traveling	6	22	10	6	23	50	40.5	40.8				382.2	383.8	1.7	0.3
42	T3	Picking up dumpster	6	23	50	6	35	27	40.8	40.8	12			383.8	395.5	11.6	0.0
43	T3	Traveling	6	35	27	6	38	30	40.8	40.9				395.5	398.5	3.1	0.1
44	T3	Picking up dumpster	6	38	30	7	6	40	40.9	40.9	13			398.5	426.7	28.2	0.0
45	T3	Traveling	7	6	40	7	8	51	40.9	41.1				426.7	428.9	2.2	0.2
46	T3	Picking up dumpster	7	8	51	7	24	11	41.1	41.1	14			428.9	444.2	15.3	0.0
47	T3	Traveling	7	24	11	7	26	30	41.1	41.4				444.2	446.5	2.3	0.3
48	T3	Picking up dumpster	7	26	30	7	27	7	41.4	41.4	15			446.5	447.1	0.6	0.0
49	T3	Traveling	7	27	7	7	28	15	41.4	41.6				447.1	448.3	1.1	0.2
50	T3	Loading point-to-point	7	28	15	7	40	1	41.6	42.3	D 4			448.3	460.0	11.8	0.7
51	T3	Traveling	7	40	1	7	42	20	42.3	42.5				460.0	462.3	2.3	0.2
52	T3	Picking up dumpster	7	42	20	7	45	50	42.5	42.5	16			462.3	465.8	3.5	0.0
53	T3	Traveling	7	45	50	7	47	20	42.5	42.7				465.8	467.3	1.5	0.2
54	T3	Picking up dumpster	7	47	20	7	51	0	42.7	42.7	17			467.3	471.0	3.7	0.0
55	T3	Traveling	7	51	0	7	52	11	42.7	42.8				471.0	472.2	1.2	0.1
56	T3	Picking up dumpster	7	52	11	7	56	13	42.8	42.8	18			472.2	476.2	4.0	0.0

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,
Method or both*): Both but more containers
Collection shift: Day from 6:00 a.m. to 2:00 p.m.
Target area: Aggregated residential area of low income
Vehicle type: Back loading compactor
Personnel: 4 (driver: 1 collectors: 3)

Date: February 2, 2002 (Saturday)
Collection area: AD 03-01
Collection route: El Chorrillo
Vehicle number: 239 (2956) and 1907
Capacity: 20 yards³
Fuel consumption: 15 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
57	T3	Traveling	7	56	13	7	58	2	42.8	43.3	19		476.2	478.0	1.8	0.5	
58	T3	Picking up dumpster	7	58	2	8	0	0	43.3	43.3	19		478.0	480.0	2.0	0.0	
59	T3	Traveling	8	0	0	8	1	35	43.3	43.8			480.0	481.6	1.6	0.5	
60	T3	Picking up dumpster	8	1	35	8	6	54	43.8	43.8	20		481.6	486.9	5.3	0.0	
61	T3	Traveling	8	6	54	8	8	7	43.8	44			486.9	488.1	1.2	0.2	
62	T3	Loading container	8	8	7	8	16	24	44	44	21		488.1	496.4	8.3	0.0	
63	T3	Picking up dumpster	8	16	24	8	18	40	44	44.2			496.4	498.7	2.3	0.2	
64	T3	Picking up dumpster	8	18	40	8	30	39	44.2	44.2	22		498.7	510.7	12.0	0.0	
65	T3	Traveling	8	30	39	8	32	3	44.2	44.3			510.7	512.1	1.4	0.1	
66	T3	Picking up dumpster	8	32	3	8	32	21	44.3	44.3	23		512.1	512.4	0.3	0.0	
67	T3	Traveling	8	32	21	8	33	50	44.3	44.4			512.4	513.8	1.5	0.1	
68	T3	Picking up dumpster	8	33	50	8	41	21	44.4	44.4	24		513.8	521.4	7.5	0.0	
69	T4	To Patacon	8	41	21	9	15	2	44.4	61.6			521.4	555.0	33.7	17.2	
70	T5	Weighing	9	15	2	9	18	58	61.6	61.6		4.23	555.0	559.0	3.9	0.0	
71	T5	Unloading	9	18	58	9	32	7					559.0	572.1	13.2	2.7	
72	T6	To Curundu compound	9	32	7	10	5	10	61.6	76.2			572.1	605.2	33.1	14.6	

Note: Vehicle broke down the night before, it had to be unloaded in order to repair it.
Vehicle replaced for major repairs. New vehicle No.1907
Delays with some dumpster due to relocation needs

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both but more containers

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Aggregated residential area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 4, 2002 (Monday)

Collection area: AD 03-01

Collection route: El Chorrillo

Vehicle number: 239 (2956)

Capacity: 6 to 8 tons

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial (min)	Final (min)		
			H	M	S	H	M	S									
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	2	12	52	0.0	0.0			0.0	132.9	132.9	0.0	
2	T7	To Patacon (dumping last night trash)	2	12	52	2	37	46	0.0	14.9			132.9	157.8	24.9	14.9	
3	T7	Weighing	2	37	46	2	39	17	14.9	14.9			157.8	159.3	1.5	0.0	
4	T7	Unloading	2	39	17	2	52	15					159.3	172.3	13.0	2.7	
5	T7	To Patacon	2	52	15	3	22	30	14.9	33.6			172.3	202.5	30.3	18.7	
6	T3	Picking up dumpster	3	22	30	3	30	50	33.6	33.6	1		202.5	210.8	8.3	0.0	
7	T3	Traveling	3	30	50	3	34	21	33.6	33.8			210.8	214.4	3.5	0.2	
8	T3	Picking up dumpster	3	34	21	3	45	40	33.8	33.8	2		214.4	225.7	11.3	0.0	
9	T3	Traveling	3	45	40	3	46	50	33.8	33.9			225.7	226.8	1.2	0.1	
10	T3	Picking up dumpster	3	46	50	3	50	0	33.9	33.9	3		226.8	230.0	3.2	0.0	
11	T3	Traveling	3	50	0	3	51	20	33.9	34.1			230.0	231.3	1.3	0.2	
12	T3	Picking up dumpster	3	51	20	3	58	57	34.1	34.1	4		231.3	239.0	7.6	0.0	
13	T3	Traveling	3	58	57	4	1	0	34.1	34.4			239.0	241.0	2.1	0.3	
14	T3	Picking up dumpster	4	1	0	4	1	30	34.4	34.4	5		241.0	241.5	0.5	0.0	
15	T3	Traveling	4	1	30	4	2	43	34.4	34.6			241.5	242.7	1.2	0.2	
16	T3	Picking up dumpster	4	2	43	4	7	40	34.6	34.6	6		242.7	247.7	4.9	0.0	
17	T3	Traveling	4	7	40	4	8	2	34.6	34.7			247.7	248.0	0.4	0.1	
18	T3	Picking up dumpster	4	8	2	4	12	49	34.7	34.7	7		248.0	252.8	4.8	0.0	
19	T3	Traveling	4	12	49	4	13	56	34.7	34.9			252.8	253.9	1.1	0.2	
20	T3	Picking up dumpster	4	13	56	4	18	43	34.9	34.9	8		253.9	258.7	4.8	0.0	
21	T3	Traveling	4	18	43	4	20	40	34.9	35.2			258.7	260.7	2.0	0.3	
22	T3	Picking up dumpster	4	20	40	4	23	25	35.2	35.2	9		260.7	263.4	2.8	0.0	
23	T3	Traveling	4	23	25	4	24	53	35.2	35.3			263.4	264.9	1.5	0.1	
24	T3	Picking up dumpster	4	24	53	4	27	0	35.3	35.3	10		264.9	267.0	2.1	0.0	
25	T3	Traveling	4	27	0	4	27	30	35.3	35.4			267.0	267.5	0.5	0.1	
26	T3	Picking up dumpster	4	27	30	4	29	24	35.4	35.4	11		267.5	269.4	1.9	0.0	
27	T3	Traveling	4	29	24	4	30	46	35.4	35.4			269.4	270.8	1.4	0.0	
28	T3	Picking up dumpster	4	30	46	4	34	55	35.4	35.4	12		270.8	274.9	4.2	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both but more containers

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Aggregated residential area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 4, 2002 (Monday)

Collection area: AD 03-01

Collection route: El Chorrillo

Vehicle number: 239 (2956)

Capacity: 6 to 8 tons

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			H	M	S	H	M	S	Initial Km	Final Km				Initial (min)	Final (min)		
29	T3	Traveling	4	34	55	4	37	2	35.4	36.0			274.9	277.0	2.1	0.6	
30	T3	Picking up dumpster	4	37	2	4	38	58	36.0	36.0	13		277.0	279.0	1.9	0.0	
31	T3	Traveling	4	38	58	4	40	10	36.0	36.1			279.0	280.2	1.2	0.1	
32	T3	Picking up dumpster	4	40	10	4	43	35	36.1	36.1	14		280.2	283.6	3.4	0.0	
33	T3	Traveling	4	43	35	4	44	37	36.1	36.2			283.6	284.6	1.0	0.1	
34	T3	Picking up dumpster	4	44	37	4	53	25	36.2	36.2	15		284.6	293.4	8.8	0.0	
35	T3	Traveling	4	53	25	4	54	40	36.2	36.4			293.4	294.7	1.3	0.2	
36	T3	Loading point-to-point	4	54	40	5	3	30	36.4	36.7	A	3	294.7	303.5	8.8	0.3	
37	T3	Traveling	5	3	30	5	4	40	36.7	36.8			303.5	304.7	1.2	0.1	
38	T3	Loading point-to-point	5	4	40	5	7	53	36.8	36.9	B	3	304.7	307.9	3.2	0.1	
39	T3	Traveling	5	7	53	5	8	30	36.9	37.0			307.9	308.5	0.6	0.1	
40	T3	Picking up dumpster	5	8	30	5	11	40	37.0	37.0	16		308.5	311.7	3.2	0.0	
41	T3	Loading point-to-point	5	11	40	5	14	56	37.0	37.1	C	3	311.7	314.9	3.3	0.1	
42	T3	Traveling	5	14	56	5	16	32	37.1	37.4			314.9	316.5	1.6	0.3	
43	T3	Picking up dumpster	5	16	32	5	18	0	37.4	37.4	17		316.5	318.0	1.5	0.0	
44	T3	Traveling	5	18	0	5	19	13	37.4	37.5			318.0	319.2	1.2	0.1	
45	T3	Picking up dumpster	5	19	13	5	21	33	37.5	37.5	18		319.2	321.6	2.3	0.0	
46	T3	Traveling	5	21	33	5	22	41	37.5	37.7			321.6	322.7	1.1	0.2	
47	T3	Picking up dumpster	5	22	41	5	23	10	37.7	37.7	19		322.7	323.2	0.5	0.0	
48	T3	Stopped for drink of water	5	23	10	5	25	3	37.7	37.7			323.2	325.1	1.9	0.0	
49	T3	Traveling	5	25	3	5	26	15	37.7	37.9			325.1	326.3	1.2	0.2	
50	T3	Loading point-to-point	5	26	15	5	33	27	37.9	38.0	D	3	326.3	333.5	7.2	0.1	
51	T4	To Patacon	5	33	27	6	5	35	38.0	54.0			333.5	365.6	32.1	16.0	
52	T5	Weighing	6	5	35	6	6	58	54.0	54.0		6.3	365.6	367.0	1.4	0.0	
53	T5	Unloading	6	6	58	6	17	39					367.0	377.7	10.7	2.7	
54	T4	To Patacon	6	17	39	6	22	24	54.0	58.1			377.7	382.4	4.8	4.1	
55	T7	Stopped to go to bathroom	6	22	24	6	24	48	58.1	58.1			382.4	384.8	2.4	0.0	
56	T4	To Patacon	6	24	48	6	48	42	58.1	72.5			384.8	408.7	23.9	14.4	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both but more containers

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Aggregated residential area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 4, 2002 (Monday)

Collection area: AD 03-01

Collection route: El Chorrillo

Vehicle number: 239 (2956)

Capacity: 6 to 8 tons

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)				
			Initial			Final			Initial	Final							
			H	M	S	H	M	S	Km	Km							
57	T3	Picking up dumpster	6	48	42	6	51	15	72.5	72.5	20			408.7	411.3	2.6	0.0
58	T3	Traveling	6	51	15	6	52	23	72.5	72.6				411.3	412.4	1.1	0.1
59	T3	Picking up dumpster	6	52	23	6	54	15	72.6	72.6	21			412.4	414.3	1.9	0.0
60	T3	Traveling	6	54	15	6	55	19	72.6	72.7				414.3	415.3	1.1	0.1
61	T3	Loading point-to-point	6	55	19	7	18	35	72.7	73.3	E	7		415.3	438.6	23.3	0.6
62	T3	Traveling	7	18	35	7	19	26	73.3	73.4				438.6	439.4	0.9	0.1
63	T3	Picking up dumpster	7	19	26	7	24	24	73.4	73.4	22			439.4	444.4	5.0	0.0
64	T3	Traveling	7	24	24	7	26	43	73.4	73.7				444.4	446.7	2.3	0.3
65	T3	Picking up dumpster	7	26	43	7	31	55	73.7	73.7	23			446.7	451.9	5.2	0.0
66	T3	Traveling	7	31	55	7	32	13	73.7	73.8				451.9	452.2	0.3	0.0
67	T3	Picking up dumpster	7	32	13	7	35	20	73.8	73.8	24			452.2	455.3	3.1	0.0
68	T3	Traveling	7	35	20	7	36	0	73.8	73.9				455.3	456.0	0.7	0.2
69	T3	Picking up dumpster	7	36	0	7	39	37	73.9	73.9	25			456.0	459.6	3.6	0.0
70	T3	Traveling	7	39	37	7	40	26	73.9	74.0				459.6	460.4	0.8	0.1
71	T3	Picking up dumpster	7	40	26	7	41	0	74.0	74.0	26			460.4	461.0	0.6	0.0
72	T3	Traveling	7	41	0	7	41	43	74.0	74.1				461.0	461.7	0.7	0.1
73	T3	Picking up dumpster	7	41	43	7	41	51	74.1	74.1	27			461.7	461.9	0.1	0.0
74	T3	Traveling	7	41	51	7	43	30	74.1	74.6				461.9	463.5	1.6	0.5
75	T3	Loading point-to-point	7	43	30	7	49	26	74.6	74.8	F	3		463.5	469.4	5.9	0.2
76	T3	Loading point-to-point	7	49	26	7	51	22	74.8	74.9	G	2		469.4	471.4	1.9	0.1
77	T3	Traveling	7	51	22	7	57	54	74.9	74.95				471.4	477.9	6.5	0.0
78	T3	Loading point-to-point	7	57	54	8	27	17	74.95	75.5	H	14		477.9	507.3	29.4	0.5
79	T3	Traveling	8	27	17	8	29	23	75.5	75.8				507.3	509.4	2.1	0.3
80	T3	Loading point-to-point	8	29	23	8	43	10	75.8	76.3	I	6		509.4	523.2	13.8	0.5
81	T4	To Patacon	8	43	10	9	19	20	76.3	92.6				523.2	559.3	36.2	16.3
82	T5	Weighing	9	19	20	9	35	20	92.6	92.6			6.43	559.3	575.3	16.0	0.0
83	T5	Unloading	9	35	20	9	46	54						575.3	586.9	11.6	2.7
84	T6	To Curundu compound	9	46	54	10	6	45	92.6	107.3				586.9	606.8	19.9	14.7

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters, Method or both*): Both but more containers
 Collection shift: Day from 6:00 a.m. to 2:00 p.m.
 Target area: Aggregated residential area of low income
 Vehicle type: Back loading compactor
 Personnel: 4 (driver: 1 collectors: 3)

Date: February 4, 2002 (Monday)
 Collection area: AD 03-01
 Collection route: El Chorrillo
 Vehicle number: 239 (2956)
 Capacity: 6 to 8 tons
 Fuel consumption: 20 gallons

No.	Activity	Accumulated Time			Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Time (min)	Distance (Kms)
		Initial	Final	Initial	Final						
		H	M	S	H	M	S				
	Description of activity										

Note: Truck was repaired during preparation time.
 No cleaning because of low water pressure

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both but more containers

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Aggregated residential area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 5, 2002 (Tuesday)

Collection area: AD 03-01

Collection route: El Chorrillo

Vehicle number: 239 (2956)

Capacity: 6 to 8 tons

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
1	T1	Readiness (waiting for personnel - fueling)	0	0	0	0	18	7	0.0	0.0			0.0	18.1	18.1	0.0	
2	T2	To Patacon	0	18	7	0	25	13	0.0	4.0			4.0	25.2	7.1	4.0	
3	T3	Loading point-to-point	0	25	13	0	35	10	4.0	4.1	A	2	0.1	35.2	10.0	0.1	
4	T7	Damaged vehicle's pulley	0	35	10	0	43	7	4.1	4.1			0.0	35.2	43.1	8.0	
5	T3	Traveling	0	43	7	0	45	6	4.1	4.4			0.3	43.1	45.1	2.0	
6	T3	Picking up dumpster	0	45	6	0	46	52	4.4	4.4	1		0.0	45.1	46.9	1.8	
7	T3	Traveling	0	46	52	0	47	15	4.4	4.5			0.0	46.9	47.3	0.4	
8	T3	Picking up dumpster	0	47	15	0	49	7	4.5	4.5	2		0.0	47.3	49.1	1.9	
9	T3	Traveling	0	49	7	0	51	23	4.5	4.8			0.4	49.1	51.4	2.3	
10	T3	Loading point-to-point	0	51	23	1	2	8	4.8	5.0	B	3	0.2	51.4	62.1	10.8	
11	T3	Traveling	1	2	8	1	4	30	5.0	5.1			0.1	62.1	64.5	2.4	
12	T3	Picking up dumpster	1	4	30	1	4	38	5.1	5.1	3		0.0	64.5	64.6	0.1	
13	T3	Traveling	1	4	38	1	5	20	5.1	5.2			0.1	64.6	65.3	0.7	
14	T3	Loading point-to-point	1	5	20	1	21	35	5.2	5.4	C	6	0.2	65.3	81.6	16.3	
15	T3	Traveling	1	21	35	1	21	52	5.4	5.5			0.1	81.6	81.9	0.3	
16	T3	Picking up dumpster	1	21	52	1	24	7	5.5	5.5	4		0.0	81.9	84.1	2.3	
17	T3	Traveling	1	24	7	1	24	38	5.5	5.6			0.1	84.1	84.6	0.5	
18	T3	Picking up dumpster	1	24	38	1	26	2	5.6	5.6	5		0.0	84.6	86.0	1.4	
19	T3	Traveling	1	26	2	1	26	40	5.6	5.7			0.1	86.0	86.7	0.6	
20	T3	Picking up dumpster	1	26	40	1	28	25	5.7	5.7	6		0.0	86.7	88.4	1.8	
21	T3	Traveling	1	28	25	1	29	22	5.7	5.7			0.0	88.4	89.4	0.9	
22	T3	Picking up dumpster	1	29	22	1	31	12	5.7	5.7	7		0.0	89.4	91.2	1.8	
23	T3	Traveling	1	31	12	1	31	48	5.7	5.8			0.1	91.2	91.8	0.6	
24	T3	Picking up dumpster	1	31	48	1	33	50	5.8	5.8	8		0.0	91.8	93.8	2.0	
25	T3	Traveling	1	33	50	1	34	42	5.8	6.0			0.2	93.8	94.7	0.9	
26	T3	Picking up dumpster	1	34	42	1	36	42	6.0	6.0	9		0.0	94.7	96.7	2.0	
27	T3	Traveling	1	36	42	1	37	35	6.0	6.1			0.0	96.7	97.6	0.9	
28	T3	Picking up dumpster	1	37	35	1	41	57	6.1	6.1	10		0.0	97.6	102.0	4.4	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both but more containers

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Aggregated residential area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 5, 2002 (Tuesday)

Collection area: AD 03-01

Collection route: El Chorrillo

Vehicle number: 239 (2956)

Capacity: 6 to 8 tons

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
29	T3	Traveling	1	41	57	1	43	0	6.1	6.2			102.0	103.0	1.1	0.2	
30	T3	Picking up dumpster	1	43	0	1	47	18	6.2	6.2	11		103.0	107.3	4.3	0.0	
31	T3	Traveling	1	47	18	1	48	40	6.2	6.4			107.3	108.7	1.4	0.2	
32	T3	Picking up dumpster	1	48	40	1	52	56	6.4	6.4	12		108.7	112.9	4.3	0.0	
33	T3	Traveling	1	52	56	1	53	44	6.4	6.5			112.9	113.7	0.8	0.0	
34	T3	Picking up dumpster	1	53	44	1	56	12	6.5	6.5	13		113.7	116.2	2.5	0.0	
35	T3	Traveling	1	56	12	1	57	11	6.5	6.6			116.2	117.2	1.0	0.1	
36	T3	Picking up dumpster	1	57	11	2	2	23	6.6	6.6	14		117.2	122.4	5.2	0.0	
37	T3	Traveling	2	2	23	2	3	20	6.6	6.8			122.4	123.3	0.9	0.2	
38	T3	Picking up dumpster	2	3	20	2	5	49	6.8	6.8	15		123.3	125.8	2.5	0.0	
39	T3	Traveling	2	5	49	2	6	20	6.8	6.9			125.8	126.3	0.5	0.1	
40	T3	Loading point-to-point	2	6	20	2	7	10	6.9	7.0	D	2	126.3	127.2	0.8	0.1	
41	T3	Traveling	2	7	10	2	7	35	7.0	7.1			127.2	127.6	0.4	0.1	
42	T3	Picking up dumpster	2	7	35	2	10	34	7.1	7.1	16		127.6	130.6	3.0	0.0	
43	T3	Traveling	2	10	34	2	13	44	7.1	7.5			130.6	133.7	3.2	0.4	
44	T3	Picking up dumpster	2	13	44	2	21	5	7.5	7.5	17		133.7	141.1	7.4	0.0	
45	T3	Traveling	2	21	5	2	25	5	7.5	7.6			141.1	145.1	4.0	0.1	
46	T3	Picking up dumpster	2	25	5	2	35	52	7.6	7.6	18		145.1	155.9	10.8	0.0	
47	T3	Traveling	2	35	52	2	38	14	7.6	7.8			155.9	158.2	2.4	0.2	
48	T3	Picking up dumpster	2	38	14	2	41	5	7.8	7.8	19		158.2	161.1	2.9	0.0	
49	T3	Traveling	2	41	5	2	42	9	7.8	7.9			161.1	162.2	1.1	0.1	
50	T3	Picking up dumpster	2	42	9	2	50	1	7.9	7.9	20		162.2	170.0	7.9	0.0	
51	T3	Traveling	2	50	1	2	50	51	7.9	8.2			170.0	170.9	0.8	0.3	
52	T3	Picking up dumpster	2	50	51	2	51	17	8.2	8.2	21		170.9	171.3	0.4	0.0	
53	T3	Traveling	2	51	17	2	52	20	8.2	8.4			171.3	172.3	1.1	0.2	
54	T3	Picking up dumpster	2	52	20	2	57	10	8.4	8.4	22		172.3	177.2	4.8	0.0	
55	T3	Traveling	2	57	10	2	57	46	8.4	8.5			177.2	177.8	0.6	0.1	
56	T3	Picking up dumpster	2	57	46	3	2	36	8.5	8.5	23		177.8	182.6	4.8	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both but more containers

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Aggregated residential area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 5, 2002 (Tuesday)

Collection area: AD 03-01

Collection route: El Chorrillo

Vehicle number: 239 (2956)

Capacity: 6 to 8 tons

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
57	T3	Traveling	3	2	36	3	4	0	8.5	8.7	8.7			182.6	184.0	1.4	0.2
58	T3	Picking up dumpster	3	4	0	3	7	27	8.7	8.7	24			184.0	187.5	3.4	0.0
59	T3	Traveling	3	7	27	3	8	16	8.7	8.9				187.5	188.3	0.8	0.2
60	T3	Picking up dumpster	3	8	16	3	10	29	8.9	8.9	25			188.3	190.5	2.2	0.0
61	T3	Traveling	3	10	29	3	12	3	8.9	9.0				190.5	192.1	1.6	0.1
62	T3	Picking up dumpster	3	12	3	3	14	16	9.0	9.0	26			192.1	194.3	2.2	0.0
63	T3	Traveling	3	14	16	3	15	20	9.0	9.1				194.3	195.3	1.1	0.1
64	T3	Picking up dumpster	3	15	20	3	20	1	9.1	9.1	27			195.3	200.0	4.7	0.0
65	T3	To Patacon	3	20	1	3	20	47	9.1	9.2				200.0	200.8	0.8	0.1
66	T3	Picking up dumpster	3	20	47	3	23	2	9.2	9.2	28			200.8	203.0	2.3	0.0
67	T4	To Patacon	3	23	2	3	57	25	9.2	25.7				203.0	237.4	34.4	16.6
68	T5	Weighing	3	57	25	3	59	27	25.7	25.7			6.23	237.4	239.5	2.0	0.0
69	T5	Unloading	3	59	27	4	11	35						239.5	251.6	12.1	2.7
70	T7	Delay at Cerro Patacon's gate	4	11	35	4	15	2	25.7	25.7				251.6	255.0	3.4	0.0
71	T4	To Patacon	4	15	2	4	49	38	25.7	43.0				255.0	289.6	34.6	17.3
72	T3	Picking up dumpster	4	49	38	4	50	21	43.0	43.0	29			289.6	290.4	0.7	0.0
73	T3	Traveling	4	50	21	4	51	35	43.0	43.4				290.4	291.6	1.2	0.4
74	T3	Loading point-to-point	4	51	35	4	54	39	43.4	43.5	E 3			291.6	294.7	3.1	0.1
75	T3	Traveling	4	54	39	4	55	0	43.5	43.6				294.7	295.0	0.4	0.0
76	T3	Picking up dumpster	4	55	0	4	56	58	43.6	43.6	30			295.0	297.0	2.0	0.0
77	T3	Traveling	4	56	58	4	58	16	43.6	43.6				297.0	298.3	1.3	0.1
78	T3	Picking up dumpster	4	58	16	5	2	37	43.6	43.6	31			298.3	302.6	4.4	0.0
79	T3	Traveling	5	2	37	5	4	8	43.6	43.8				302.6	304.1	1.5	0.2
80	T3	Picking up dumpster	5	4	8	5	8	36	43.8	43.80	32			304.1	308.6	4.5	0.0
81	T3	Traveling	5	8	36	5	9	46	43.80	43.90				308.6	309.8	1.2	0.1
82	T3	Picking up dumpster	5	9	46	5	10	2	43.90	43.90	33			309.8	310.0	0.3	0.0
83	T3	Traveling	5	10	2	5	10	35	43.90	44.00				310.0	310.6	0.5	0.1

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters,*

Method *or both*): Both but more containers

Collection shift: Day from 6:00 a.m. to 2:00 p.m.

Target area: Aggregated residential area of low income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: February 5, 2002 (Tuesday)

Collection area: AD 03-01

Collection route: El Chorrillo

Vehicle number: 239 (2956)

Capacity: 6 to 8 tons

Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial		Final		Initial	Final	Initial (min)	Final (min)							
			H	M	S	H	M	S						Km	Km		
84	T3	Picking up dumpster	5	10	35	5	15	5	44.00	44.00	34		310.6	315.1	4.5	0.0	
85	T3	Traveling	5	15	5	5	16	26	44.00	44.10			315.1	316.4	1.4	0.1	
86	T3	Picking up dumpster	5	16	26	5	23	24	44.10	44.10	35		316.4	323.4	7.0	0.0	
87	T3	Traveling	5	23	24	5	25	8	44.10	44.20			323.4	325.1	1.7	0.1	
88	T3	Picking up dumpster	5	25	8	5	31	0	44.20	44.20	36		325.1	331.0	5.9	0.0	
89	T3	Traveling	5	31	0	5	32	18	44.20	44.40			331.0	332.3	1.3	0.2	
90	T3	Picking up dumpster	5	32	18	5	36	40	44.40	44.40	37		332.3	336.7	4.4	0.0	
91	T3	Traveling	5	36	40	5	37	8	44.40	44.50			336.7	337.1	0.5	0.1	
92	T3	Picking up dumpster	5	37	8	5	37	46	44.50	44.50	38		337.1	337.8	0.6	0.0	
93	T3	Traveling	5	37	46	5	38	6	44.50	44.70			337.8	338.1	0.3	0.2	
94	T3	Picking up dumpster	5	38	6	5	38	20	44.70	44.70	39		338.1	338.3	0.2	0.0	
95	T3	Traveling	5	38	20	5	38	49	44.70	44.80			338.3	338.8	0.5	0.1	
96	T3	Picking up dumpster	5	38	49	5	42	32	44.80	44.80	40		338.8	342.5	3.7	0.0	
97	T3	Traveling	5	42	32	5	42	54	44.80	44.90			342.5	342.9	0.4	0.1	
98	T3	Picking up dumpster	5	42	54	5	43	0	44.90	44.90	41		342.9	343.0	0.1	0.0	
99	T3	Traveling	5	43	0	5	43	20	44.90	45.00			343.0	343.3	0.3	0.1	
100	T3	Picking up dumpster	5	43	20	5	45	32	45.00	45.00	42		343.3	345.5	2.2	0.0	
101	T3	Traveling	5	45	32	5	46	7	45.00	45.10			345.5	346.1	0.6	0.1	
102	T3	Picking up dumpster	5	46	7	5	48	59	45.10	45.10	43		346.1	349.0	2.9	0.0	
103	T3	Traveling	5	48	59	5	50	14	45.10	45.40			349.0	350.2	1.3	0.3	
104	T3	Picking up dumpster	5	50	14	5	51	36	45.40	45.40	44		350.2	351.6	1.4	0.0	
105	T7	Stopped to wash hands and a drink of water	5	51	36	5	56	6	45.40	45.40			351.6	356.1	4.5	0.0	
106	T3	Traveling	5	56	6	5	57	24	45.40	45.60			356.1	357.4	1.3	0.2	
107	T3	Picking up dumpster	5	57	24	5	59	58	45.60	45.60	45		357.4	360.0	2.6	0.0	
108	T4	To Patacon	5	59	58	6	33	45	45.60	64.20			360.0	393.8	33.8	18.6	
109	T5	Weighting	6	33	45	6	34	43	64.20	64.20		2.49	393.8	394.7	1.0	0.0	
110	T5	Unloading	6	34	43	6	43	37					394.7	403.6	8.9	2.7	
111	T1a	Cleaning vehicle	6	43	37	6	59	47	64.20	64.20			403.6	419.8	16.2	0.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (*house-to-house, dumpsters, Method or both*): Both but more containers
 Collection shift: Day from 6:00 a.m. to 2:00 p.m.
 Target area: Aggregated residential area of low income
 Vehicle type: Back loading compactor
 Personnel: 4 (driver: 1 collectors: 3)

Date: February 5, 2002 (Tuesday)
 Collection area: AD 03-01
 Collection route: El Chorrillo
 Vehicle number: 239 (2956)
 Capacity: 6 to 8 tons
 Fuel consumption: 20 gallons

No.	Activity	Description of activity	Accumulated Time			Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)		
			Initial	H	M	S	Final				Initial	Final			Initial (min)	Final (min)
112	T6	To Curundu compound	6	59	47	7	30	17			64.20	79.30	419.8	450.3	30.5	15.1

Note: When exiting the gate, vehicle was ordered to return to the compound. After some conversations, the vehicle continued its route

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Aggregated residential area of High Income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 18, 2002 (Friday)

Collection area: BN 01-05

Collection route: Punta Patilla

Vehicle number: 1926

Capacity: 16 yards³

Fuel consumption: 23 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S	Km	Km				(min)	(min)		
1	T1a	Cleaning - readiness - fueling	0	0	0	0	8	36	0.0	0.0			0.0	8.6	8.6	0.0	
2	T2	To Punta Patilla	0	8	36	0	15	36	0.0	2.6			8.6	15.6	7.0	2.6	
3	T3	Loading (Before the South Corridor entrance)	0	15	36	0	16	8	2.6	2.6	1		15.6	16.1	0.5	0.0	
4	T3	Traveling	0	16	8	0	18	25	2.6	3.2			16.1	18.4	2.3	0.6	
5	T3	Loading (Casa de la Carne supermarket)	0	18	25	0	21	24	3.2	3.2	2		18.4	21.4	3.0	0.0	
6	T3	Traveling	0	21	24	0	21	43	3.2	3.3			21.4	21.7	0.3	0.1	
7	T3	Loading (at building)	0	21	43	0	24	5	3.3	3.3	3		21.7	24.1	2.4	0.0	
8	T3	Traveling	0	24	5	0	24	30	3.3	3.4			24.1	24.5	0.4	0.1	
9	T3	Loading	0	24	30	0	27	16	3.4	3.4	4		24.5	27.3	2.8	0.0	
10	T3	Traveling	0	27	16	0	27	59	3.4	3.5			27.3	28.0	0.7	0.1	
11	T3	Loading	0	27	59	0	29	0	3.5	3.5	5		28.0	29.0	1.0	0.0	
12	T3	Traveling	0	29	0	0	30	25	3.5	3.8			29.0	30.4	1.4	0.3	
13	T3	Loading	0	30	25	0	33	16	3.8	3.8	6		30.4	33.3	2.9	0.0	
14	T3	Traveling	0	33	16	0	34	7	3.8	4.0			33.3	34.1	0.9	0.2	
15	T3	Loading	0	34	7	0	35	13	4.0	4.0	7		34.1	35.2	1.1	0.0	
16	T3	Loading/Traveling Door-to-Door (San Sebastian)	0	35	13	0	44	50	4.0	4.9	8		35.2	44.8	9.6	0.9	
17	T3	Traveling	0	44	50	0	45	23	4.9	5.0			44.8	45.4	0.5	0.1	
18	T3	Loading	0	45	23	0	49	7	5.0	5.0	9		45.4	49.1	3.7	0.0	
19	T3	Traveling	0	49	7	0	49	38	5.0	5.2			49.1	49.6	0.5	0.2	
20	T3	Loading	0	49	38	0	50	45	5.2	5.2	10		49.6	50.8	1.1	0.0	
21	T3	Loading door to door (at buildings)	0	50	45	0	54	48	5.2	5.8	A		50.8	54.8	4.1	0.6	
22	T3	Loading door-to-door	0	54	48	1	0	17	5.8	6.7	A	5	54.8	60.3	5.5	0.9	
23	T3	Traveling	1	0	17	1	0	52	6.7	6.9			60.3	60.9	0.6	0.2	
24	T3	Loading	1	0	52	1	1	25	6.9	6.9	12		60.9	61.4	0.5	0.0	
25	T3	Loading door-to-door	1	1	25	1	3	54	7.0	7.2	B	4	61.4	63.9	2.5	0.2	
26	T3	Loading point to point (Via Italia)	1	3	54	1	20	20	7.2	7.5	C	14	63.9	80.3	16.4	0.3	
27	T3	Traveling	1	20	20	1	22	0	7.5	7.6			80.3	82.0	1.7	0.1	
28	T3	Loading point-to-point	1	22	0	1	40	13	7.6	8.6	D	12	82.0	100.2	18.2	1.0	

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Aggregated residential area of High Income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 18, 2002 (Friday)

Collection area: BN 01-05

Collection route: Punta Patilla

Vehicle number: 1926

Capacity: 16 yards³

Fuel consumption: 23 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S	Km	Km				(min)	(min)		
29	T3	Loading point-to-point	1	40	13	1	42	56	8.6	8.7	D	3		100.2	102.9	2.7	0.1
30	T3	Loading (Building)	1	42	56	1	45	50	8.7	8.7	13			102.9	105.8	2.9	0.0
31	T4	To Patacon	1	45	50	2	12	42	8.8	21.7				105.8	132.7	26.9	12.9
32	T5	Weighing	2	12	42	2	13	52	21.7	21.7			4.9	132.7	133.9	1.2	0.0
33	T5	Unloading	2	13	52	2	24	58	21.7	24.4				133.9	145.0	11.1	2.7
34	T4	To Punta Patilla	2	24	58	2	38	30	24.4	32.7				145.0	158.5	13.5	8.3
35	T7	Stopped at convenient store (break)	2	38	30	2	42	34	32.7	32.7				158.5	162.6	4.1	0.0
36	T4	To Punta Patilla	2	42	34	2	52	53	32.7	38.0				162.6	172.9	10.3	5.3
37	T3	load before the Hotel Holiday Inn	2	52	53	2	55	6	38.0	38.0	14			172.9	175.1	2.2	0.0
38	T3	Traveling	2	55	6	2	56	10	38.0	38.2				175.1	176.2	1.1	0.2
39	T3	loading in the Hotel Holiday Inn-container	2	56	10	2	58	49	38.2	38.2	15			176.2	178.8	2.7	0.0
40	T3	Traveling	2	58	49	3	0	0	38.2	38.7				178.8	180.0	1.2	0.5
41	T3	Loading	3	0	0	3	1	20	38.7	38.7	16			180.0	181.3	1.3	0.0
42	T3	Traveling	3	1	20	3	2	40	38.7	38.8				181.3	182.7	1.3	0.1
43	T3	Loading	3	2	40	3	15	7	38.8	39.0	E	7		182.7	195.1	12.5	0.2
44	T3	Traveling	3	15	7	3	17	3	39.0	39.0				195.1	197.1	1.9	0.0
45	T3	Loading	3	17	3	3	18	3	39.0	39.0	17			197.1	198.1	1.0	0.0
46	T3	Traveling	3	18	3	3	20	40	39.0	39.1				198.1	200.7	2.6	0.1
47	T3	Loading	3	20	40	3	56	20	39.1	40.8	F	16		200.7	236.3	35.7	1.7
48	T4	To Patacon	3	56	20	3	58	40	40.8	41.7				236.3	238.7	2.3	0.9
49	T7	Stopped at fuel station	3	58	40	3	59	56	41.7	41.7				238.7	239.9	1.3	0.0
50	T4	To Patacon	3	59	56	4	23	50	41.7	53.0				239.9	263.8	23.9	11.3
51	T5	Weighing	4	23	50	4	25	20	53.0	53.0			4.98	263.8	265.3	1.5	0.0
52	T5	Unloading	4	25	20	4	34	50						265.3	274.8	9.5	2.7
53	T4	To Punta Patilla	4	34	50	4	59	10	53.0	66.0				274.8	299.2	24.3	13.0
54	T3	Loading door-to-door	4	59	10	5	2	12	66.0	66.0	18			299.2	302.2	3.0	0.0
55	T3	Traveling	5	2	12	5	4	10	66.0	66.7				302.2	304.2	2.0	0.7
56	T3	Loading door-to-door	5	4	10	5	15	56	66.7	67.0	G	7		304.2	315.9	11.8	0.3

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Aggregated residential area of High Income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 18, 2002 (Friday)

Collection area: BN 01-05

Collection route: Punta Patilla

Vehicle number: 1926

Capacity: 16 yards³

Fuel consumption: 23 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial			Final			Initial	Final				Initial	Final		
			H	M	S	H	M	S	Km	Km				(min)	(min)		
57	T3	Traveling	5	15	56	5	16	40	67.0	67.2			315.9	316.7	0.7	0.2	
58	T3	Loading door-to-door	5	16	40	5	17	30	67.2	67.3	H	2	316.7	317.5	0.8	0.1	
59	T3	Loading door-to-door	5	17	30	5	19	58	67.3	67.4	I	2	317.5	320.0	2.5	0.1	
60	T3	Traveling	5	19	58	5	21	30	67.4	67.9			320.0	321.5	1.5	0.5	
61	T3	Loading at the Union Club	5	21	30	5	34	58	67.9	67.9	19		321.5	335.0	13.5	0.0	
62	T3	Traveling	5	34	58	5	36	20	67.9	68.5			335.0	336.3	1.4	0.6	
63	T3	Loading at the Bal Halbour mall	5	36	20	6	2	16	68.5	68.5	20		336.3	362.3	25.9	0.0	
64	T3	Traveling	6	2	16	6	3	53	68.5	69.0			362.3	363.9	1.6	0.5	
65	T3	Loading at Mc. Donald's	6	3	53	6	5	46	69.0	69.0	21		363.9	365.8	1.9	0.0	
66	T3	Traveling	6	5	46	6	6	2	69.0	69.2			365.8	366.0	0.3	0.2	
67	T3	Loading	6	6	2	6	8	42	69.2	69.9	J	4	366.0	368.7	2.7	0.7	
68	T4	To Patacon	6	8	42	6	13	30	69.9	71.6			368.7	373.5	4.8	1.7	
69	T7	Unload collectors	6	13	30	6	19	20	71.6	71.6			373.5	379.3	5.8	0.0	
70	T4	To Patacon	6	19	20	6	27	52	71.6	80.7			379.3	387.9	8.5	9.1	
71	T5	Weighing	6	27	52	6	30	0	80.7	80.7		4.4	387.9	390.0	2.1	0.0	
72	T5	Unloading	6	30	0	6	37	12					390.0	397.2	7.2	2.7	
73	T1a	Cleaning vehicle	6	37	12	6	42	10	80.7	80.7			397.2	402.2	5.0	0.0	
74	T6	To Carrasquilla Compound	6	42	10	6	55	40	80.7	91.2			402.2	415.7	13.5	10.5	

Note: While returning from Cerro Patacon, heavy traffic was encountered by the National Stadium but the traffic was moving quite freely

The rounds to Cerro Patacon were the same for the first trip, it varied only when coming back.

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpster,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Aggregated residential area of High Income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 19, 2002 (Saturday)

Collection area: BN 01-05

Collection route: Punta Paitilla

Vehicle number: 1909 and 1929

Capacity: 16 and 18 yards³

Fuel consumption: 10 and 13 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial (min)	Final (min)		
1	T1	Cleaning - readiness - fueling	0	0	0	0	8	50	0.0	0.0				0.0	8.8	8.8	0.0
2	T2	To Punta Paitilla	0	8	50	0	14	50	0.0	2.4				8.8	14.8	6.0	2.4
3	T3	loading before the entrance of South Corridor	0	14	50	0	17	44	2.4	3.0	X1	2		14.8	17.7	2.9	0.6
4	T3	Traveling	0	17	44	0	18	50	3.0	3.2				17.7	18.8	1.1	0.2
5	T3	Loading at Casa de la Carne supermarket	0	18	50	0	22	17	3.2	3.2	X2	5		18.8	22.3	3.5	0.0
6	T3	Loading point-to-point	0	22	17	0	33	14	3.2	3.7	A	5		22.3	33.2	11.0	0.5
7	T3	Traveling	0	33	14	0	34	0	3.7	3.8				33.2	34.0	0.8	0.1
8	T3	Loading	0	34	0	0	38	55	3.8	3.9	X3			34.0	38.9	4.9	0.1
9	T3	Traveling	0	38	55	0	40	50	3.9	4.0				38.9	40.8	1.9	0.1
10	T3	Loading door to door (San Sebastian)	0	40	50	0	55	20	4.0	4.5	B	13		40.8	55.3	14.5	0.5
11	T3	Traveling	0	55	20	0	56	37	4.5	4.6				55.3	56.6	1.3	0.1
12	T3	Loading point-to-point	0	56	37	1	11	18	4.6	5.8	C	11		56.6	71.3	14.7	1.2
13	T3	Traveling	1	11	18	1	12	7	5.8	5.9				71.3	72.1	0.8	0.1
14	T3	Loading door-to-door	1	12	7	1	34	35	5.9	6.6	D	8		72.1	94.6	22.5	0.7
15	T3	Traveling	1	34	35	1	35	55	6.6	6.9				94.6	95.9	1.3	0.3
16	T3	Loading door-to-door	1	35	55	2	16	2	6.9	8.2	E	14		95.9	136.0	40.1	1.3
17	T3	Traveling	2	16	2	2	18	50	8.2	8.9				136.0	138.8	2.8	0.7
18	T3	Pick up dumpster	2	18	50	2	26	0	8.9	8.9	X4			138.8	146.0	7.2	0.0
19	T4	To Patacon	2	26	0	2	51	25	8.9	21.6				146.0	171.4	25.4	12.7
20	T5	Weighing	2	51	25	2	53	26	21.6	21.6				171.4	173.4	2.0	0.0
21	T5	Unloading	2	53	26	3	21	38				5.02		173.4	201.6	28.2	2.7
22	T7	Traveling from patacon to DIMAUD-Carrasquilla	3	21	38	3	38	50	21.6	31.5				201.6	218.8	17.2	9.9
23	T7	Assessing vehicle status and changing vehicle	3	38	50	4	2	0	31.5	31.5				218.8	242.0	23.2	0.0
24	T2	Resume collection with replacement vehicle(1929)	4	2	0	4	6	6	31.5	34.8				242.0	246.1	4.1	3.3
25	T3	Loading point to point- W. Churchill Street	4	6	6	5	11	45	34.8	37.0	F	34		246.1	311.8	65.7	2.2
26	T4	To Patacon	5	11	45	5	43	38	37.0	50.3				311.8	343.6	31.9	13.3
27	T5	Weighing	5	43	38	5	45	55	50.3	50.3				343.6	345.9	2.3	0.0
28	T5	Unloading	5	45	55	5	56	0						345.9	356.0	10.1	2.7
29	T4	To Punta Paitilla	5	56	0	6	17	0	50.3	65.1				356.0	377.0	21.0	14.8
30	T3	Loading at Club Unión	6	17	0	6	29	50	65.1	65.1	X5			377.0	389.8	12.8	0.0

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpster,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Aggregated residential area of High Income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 19, 2002 (Saturday)

Collection area: BN 01-05

Collection route: Punta Paitilla

Vehicle number: 1909 and 1929

Capacity: 16 and 18 yards³

Fuel consumption: 10 and 13 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Time (min)		Distance (Kms)	
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Km	Final Km				Initial	Final		
31	T3	Traveling	6	29	50	6	31	0	65.1	66.0				389.8	391.0	1.2	0.9
32	T3	Picking up dumpsters at commercial center	6	31	0	6	46	55	66.0	66.0	G			391.0	406.9	15.9	0.0
33	T3	Loading at Bal Halbour mall	6	46	55	6	48	58	66.0	66.8	G			406.9	409.0	2.0	0.8
34	T3	Picking up dumpsters at commercial center	6	48	58	6	54	0	66.8	66.8	G			409.0	414.0	5.0	0.0
35	T4	To Patacon	6	54	0	7	13	29	66.8	78.0				414.0	433.5	19.5	11.2
36	T5	Weighing	7	13	29	7	14	50	78.0	78.0				433.5	434.8	1.3	0.0
37	T5	Unloading	7	14	50	7	24	50						434.8	444.8	10.0	2.7
38	T6	To Carrasquilla compound	7	24	50	7	41	18	78.0	88.1				444.8	461.3	16.5	10.1

Note: No truck cleaning.

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Aggregated residential area of High Income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 21, 2002 (Monday)

Collection area: BN 01-05

Collection route: Punta Patilla

Vehicle number: 1940

Capacity: 18 yards³

Fuel consumption: 21 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance			Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial H	Initial M	Initial S	Final H	Final M	Final S	Initial Kin	Final Kin	Initial (min)				Final (min)			
1	T3	Loading point to point (San Sebastian)	0	0	0	0	0	48	3	7	3	7	1		0.0	0.8	0.8	0.0
2	T3	Traveling	0	0	48	0	1	28	3	7	3	8			0.8	1.5	0.7	0.1
3	T3	Loading point	0	1	28	0	6	0	3	8	3	8	2		1.5	6.0	4.5	0.0
4	T3	Traveling	0	6	0	0	6	42	3	8	3	9			6.0	6.7	0.7	0.1
5	T3	Loading door-to-door	0	6	42	0	14	1	3	9	4	3	A	32	6.7	14.0	7.3	0.4
6	T3	Traveling	0	14	1	0	14	48	4	3	4	4			14.0	14.8	0.8	0.0
7	T3	Loading door-to-door	0	14	48	0	19	20	4	4	4	6	B	11	14.8	19.3	4.5	0.3
8	T3	Traveling	0	19	20	0	19	54	4	6	5	0			19.3	19.9	0.6	0.4
9	T3	Loading door-to-door	0	19	54	0	23	0	5	0	5	0	3		19.9	23.0	3.1	0.0
10	T3	Traveling	0	23	0	0	23	23	5	0	5	1			23.0	23.4	0.4	0.1
11	T3	Loading door-to-door	0	23	23	0	29	17	5	1	5	3	C	4	23.4	29.3	5.9	0.2
12	T3	Traveling	0	29	17	0	29	40	5	3	5	4			29.3	29.7	0.4	0.0
13	T3	Loading door-to-door	0	29	40	0	34	0	5	4	5	5	D	8	29.7	34.0	4.3	0.2
14	T3	Traveling	0	34	0	0	34	40	5	5	8	8			34.0	34.7	0.7	0.3
15	T3	Loading at Club Unión	0	34	40	0	37	0	5	8	5	8	4		34.7	37.0	2.3	0.0
16	T3	Traveling	0	37	0	0	38	29	5	8	6	0			37.0	38.5	1.5	0.2
17	T3	Loading point-to-point	0	38	29	0	39	54	6	0	6	1	E	4	38.5	39.9	1.4	0.1
18	T3	Traveling	0	39	54	0	40	19	6	1	6	2			39.9	40.3	0.4	0.1
19	T3	Loading point-to-point	0	40	19	0	41	6	6	2	6	2	5		40.3	41.1	0.8	0.0
20	T3	Traveling	0	41	6	0	41	36	6	2	6	3			41.1	41.6	0.5	0.0
21	T3	Loading point-to-point	0	41	36	0	43	20	6	3	6	3	F	3	41.6	43.3	1.7	0.2
22	T3	Traveling	0	43	20	0	45	48	6	5	6	5			43.3	45.8	2.5	0.0
23	T3	Loading point-to-point	0	45	48	0	55	56	6	5	6	8	G	9	45.8	55.9	10.1	0.3
24	T3	Loading point-to-point	0	55	56	0	57	17	6	8	7	0	H	2	55.9	57.3	1.4	0.2
25	T3	Traveling	0	57	17	0	57	42	7	0	7	1			57.3	57.7	0.4	0.0
26	T3	Loading point-to-point	0	57	42	1	11	56	7	1	7	4	I	10	57.7	71.9	14.2	0.4
27	T4	To Patacon	1	11	56	1	36	24	7	4	19	6			71.9	96.4	24.5	12.2
28	T5	Weighing	1	36	24	1	37	37	19	6	19	6		4.93	96.4	97.6	1.2	0.0

0.0 distances for movements less than 100 mts.

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Aggregated residential area of High Income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 21, 2002 (Monday)

Collection area: BN 01-05

Collection route: Punta Patilla

Vehicle number: 1940

Capacity: 18 yards³

Fuel consumption: 21 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	M	S	H	M	Final	Initial	Final				Initial	Final		
29	T5	Unloading	1	37	37	1	48	27						97.6	108.5	10.8	2.7
30	T4	To Punta Patilla	1	48	27	1	59	35	19.6	28.0				108.5	119.6	11.1	8.4
31	T7	Stopped to check vehicle's engine	1	59	35	2	0	3	28.0	28.0				119.6	120.1	0.5	0.0
32	T4	To Punta Patilla	2	0	3	2	5	36	28.0	31.4				120.1	125.6	5.6	3.4
33	T3	Loading point-to-point	2	5	36	2	7	0	31.4	31.5	J	2		125.6	127.0	1.4	0.1
34	T3	Traveling	2	7	0	2	8	40	31.5	31.6				127.0	128.7	1.7	0.2
35	T3	Loading	2	8	40	2	9	3	31.6	31.6	6			128.7	129.1	0.4	0.0
36	T3	Traveling	2	9	3	2	9	58	31.6	32.6				129.1	130.0	0.9	1.0
37	T3	Loading	2	9	58	2	11	22	32.6	32.6	7			130.0	131.4	1.4	0.0
38	T3	Traveling	2	11	22	2	11	53	32.6	32.7				131.4	131.9	0.5	0.1
39	T3	Loading point-to-point	2	11	53	2	13	48	32.7	32.7	8			131.9	133.8	1.9	0.0
42	T7	Stopped for a drink of water	2	13	48	2	15	28	32.7	32.7				133.8	135.5	1.7	0.0
43	T3	Traveling	2	15	28	2	16	24	32.7	33.1				135.5	136.4	0.9	0.4
44	T3	Loading point-to-point	2	16	24	2	22	38	33.1	33.6	K	7		136.4	142.6	6.2	0.5
45	T3	Traveling	2	22	38	2	22	41	33.6	33.6				142.6	142.7	0.1	0.0
46	T3	Loading point-to-point	2	22	41	2	33	7	33.6	33.9	L	6		142.7	153.1	10.4	0.3
47	T3	Traveling	2	33	7	2	34	5	33.9	34.2				153.1	154.1	1.0	0.3
48	T3	Loading point-to-point	2	34	5	2	38	20	34.2	34.2	M	2		154.1	158.3	4.3	0.0
49	T3	Traveling	2	38	20	2	38	29	34.2	34.3				158.3	158.5	0.1	0.1
50	T3	Loading point-to-point	2	38	29	3	15	5	34.3	35.4	N	16		158.5	195.1	36.6	1.1
51	T4	To Patacon	3	15	5	3	39	38	35.4	48.0				195.1	219.6	24.6	12.6
52	T5	Weighing	3	39	38	3	41	13	48.0	48.0			5.6	219.6	221.2	1.6	0.0
53	T5	Unloading	3	41	13	3	53	50						221.2	233.8	12.6	0.0
54	T4	To Punta Patilla	3	53	50	4	11	15	48.0	60.6				233.8	251.3	17.4	12.6
55	T3	Loading at the Holliday Inn hotel	4	11	15	4	14	20	60.6	60.6	9			251.3	254.3	3.1	0.0
56	T3	Traveling	4	14	20	4	15	30	60.6	61.2				254.3	255.5	1.2	0.6
57	T3	Loading point-to-point	4	15	30	4	16	0	61.2	61.2	10			255.5	256.0	0.5	0.0
58	T3	Traveling	4	16	0	4	16	23	61.2	61.3				256.0	256.4	0.4	0.1

0.0 distances for movements less than 100 mts.

**TIME AND MOVEMENT SURVEY FOR THE COLLECTION OF
SOLID WASTE IN THE PANAMA CITY DISTRICT**

Collection (house-to-house, dumpsters,

Method or both): Both

Collection shift: Night from 6:00 p.m. to 2:00 a.m.

Target area: Aggregated residential area of High Income

Vehicle type: Back loading compactor

Personnel: 4 (driver: 1 collectors: 3)

Date: January 21, 2002 (Monday)

Collection area: BN 01-05

Collection route: Punta Patilla

Vehicle number: 1940

Capacity: 18 yards³

Fuel consumption: 21 gallons

No.	Activity	Description of activity	Accumulated Time						Accum. Distance		Collect Point Number	Collect Points Total	Resid number (ton)	Accumulated Time		Time (min)	Distance (Kms)
			Initial	M	S	H	M	Final	Initial	Final				Initial (min)	Final (min)		
59	T3	Loading point-to-point	4	16	23	4	26	36	4	61.3	61.7	N	7	256.4	266.6	10.2	0.4
60	T3	Traveling	4	26	36	4	27	18	61.7	61.9				266.6	267.3	0.7	0.2
61	T3	Loading point-to-point	4	27	18	4	30	0	61.9	62.0	O	3	267.3	270.0	2.7	0.1	
62	T3	Traveling	4	30	0	4	30	38	62.0	62.3				270.0	270.6	0.6	0.3
63	T3	Loading point-to-point	4	30	38	4	32	50	62.3	62.4	P	2	270.6	272.8	2.2	0.1	
64	T3	Traveling	4	32	50	4	34	48	62.4	62.7				272.8	274.8	2.0	0.3
65	T3	Loading at Club Unión	4	34	48	4	45	11	62.7	62.7	11		274.8	285.2	10.4	0.0	
66	T3	Traveling	4	45	11	4	46	37	62.7	63.1			285.2	286.6	1.4	0.4	
67	T3	Loading point-to-point	4	46	37	4	57	43	63.1	63.1	12		286.6	297.7	11.1	0.0	
68	T3	Traveling	4	57	43	4	59	40	63.1	63.7			297.7	299.7	2.0	0.6	
69	T3	Loading point-to-point	4	59	40	5	2	14	63.7	63.7	13		299.7	302.2	2.6	0.0	
70	T3	Traveling	5	2	14	5	2	50	64.5	64.5			302.2	302.8	0.6	0.0	
71	T3	Loading point-to-point	5	2	50	5	3	20	64.5	64.6	Q	2	302.8	303.3	0.5	0.1	
72	T3	Traveling	5	3	20	5	3	57	64.6	64.7			303.3	304.0	0.6	0.1	
73	T3	Loading at Mac. Donald's	5	3	57	5	4	30	64.7	64.7	14		304.0	304.5	0.6	0.0	
74	T3	Traveling	5	4	30	5	5	0	64.7	65.0			304.5	305.0	0.5	0.3	
75	T3	Loading point-to-point	5	5	0	5	6	10	65.0	65.3		3	305.0	306.2	1.2	0.3	
76	T7	To DIMAUD Carrasquilla compound	5	6	10	5	11	38	65.3	67.6			306.2	311.6	5.5	2.3	
77	T7	Dropping off workers at the Carrasquilla DIMAU	5	11	38	5	13	50	67.6	67.6			311.6	313.8	2.2	0.0	
78	T7	DIMAUD Carrasquilla compound to Patacon	5	13	50	5	30	22	67.6	76.9			313.8	330.4	16.5	9.3	
79	T5	Weighing	5	30	22	5	32	1	76.9	76.9			330.4	332.0	1.6	0.0	
80	T5	Unloading	5	32	1	5	43	40					332.0	343.7	11.7	2.7	
81	T1a	Cleaning vehicle	5	43	40	5	48	25	76.9	76.9			343.7	348.4	4.8	0.0	
82	T6	To Carrasquilla compound	5	48	25	6	4	48	76.9	86.9			348.4	364.8	16.4	10.0	

0.0 distances for movements less than 100 mts.

Data B

Public Opinion Survey

ANNEX B Public Opinion Survey (POS)

1 Results (Residents)

The following are the results of Public Opinion Survey for residents.

0. Nos. of Sample

No.	Corregimiento	Nos. of Sample	Percent
1	San Felipe	5	1%
2	El Chorrillo	14	4%
3	Santa Ana	12	3%
4	Calidonia	12	3%
5	Curundu	10	3%
6	Betania	27	7%
7	Bella Vista	17	4%
8	Pueblo Nuevo	12	3%
9	San Francisco	22	6%
10	Parque Lefevre	22	6%
11	Rio Abajo	17	4%
12	Juan Diaz	45	12%
13	Pedregal	23	6%
14	Tocumen	42	11%
15	Pacora	29	8%
16	San Martin	0	0%
17	Las Cumbres	46	12%
18	Chilibre	22	6%
19	Ancon	7	2%
	Total	384	100%

I. General Questions

Q1. Gender

	Nos. of Ans.	%
(1) Male	108	28%
(2) Female	276	72%
Total	384	100%

Q2. How frequently do you listen to the news on the radio?

	Nos. of Ans.	%
(1) Never	99	26%
(2) Rarely	68	18%
(3) Once or twice a week	42	11%
(4) Everyday	175	46%
Total	384	100%

Q3. How frequently do you watch the news on TV?

	Nos. of Ans.	%
(1) Never	25	7%
(2) Rarely	27	7%
(3) Once or twice a week	40	10%
(4) Everyday	292	76%
Total	384	100%

ANNEX B: Public Opinion Survey

Q4. How frequently do you read the news on newspaper?

	Nos. of Ans.	%
(1) Never	59	15%
(2) Rarely	85	22%
(3) Once or twice a week	68	18%
(4) Everyday	171	45%
Sub-total	383	100%
(5) NA	1	
Total	384	

Q5. How many persons live in your house, including yourself and maids?

Nos. of family member	Nos.
1	16
2	42
3	79
4	83
5	67
6	43
7	29
8	10
9	6
10	4
11	1
12	2
Sub-total	382
Average	4.4 person/household
NA	2
Total	384

Q6. What category is your building?

	Nos. of Ans.	%
(1) Vivienda independiente propia	204	53%
(2) Vivienda independiente hipotecada	91	24%
(3) Apartamento Alquilado	37	10%
(4) Apartamento de propiedad horizontal	7	2%
(5) Propiedad horizontal hipotecada	13	3%
(6) Cuarto de Vecindad	27	7%
(7) cuartos independientes	2	1%
(8) Viviendas independientes cedidas	2	1%
Sub-total	383	100%
NA	1	
Total	384	

Q7. How many square meters of garden does your house have?

	Nos. of Ans.	%
(0) It has no garden	207	55%
(1) Less than 100 m ² (10m X 10m)	133	35%
(2) More than 100 m ² (10m X 10m)	39	10%
Sub-total	379	100%
NA	5	
Total	384	

ANNEX B: Public Opinion Survey

Q8. How many years have you or your family lived in this municipality?

	Nos. of Ans.	%
(1) Less than 1 year	16	4%
(2) Between 1 and 4 years	40	11%
(2) Between 5 and 8 years	43	11%
(3) Between 9 and 12 years	27	7%
(4) Between 13 and 19 years	55	15%
(5) 20 years or more	197	52%
Sub-total	378	100%
(6) NA	6	
Total	384	

Q9. Have you or your family always lived in the same house or have you ever changed your place of residence since you came to live in this municipality?

	Nos. of Ans.	%
(1) Has always lived in the same house	216	57%
(2) Has changed place of residence	162	43%
Sub-total	378	100%
NA	6	
Total	384	

II. Present Situation of Public Services

Q10. What type of water supply services do you have?

	Nos. of Ans.	%
(0) I don't have	6	2%
(1) Connected water supply	369	96%
(2) Public well	5	1%
(3) Water tank truck	3	1%
(4) Others	1	0%
Total	384	100%

Q11. What type of toilet facility do you use in your house?

	Nos. of Ans.	%
(0) No toilet	1	0%
(1) Toilet connected to sewerage pipe	189	49%
(2) Toilet connected to septic tank	142	37%
(3) Latrine	52	14%
Total	384	100%

Q12. Do you have electricity in your house?

	Nos. of Ans.	%
(1) Yes	376	98%
(0) No	8	2%
Total	384	100%

Q13. Can a collection service truck have access to your house?

	Nos. of Ans.	%
(1) Yes, it can	345	90%
(0) No, it cannot.	39	10%
Total	384	100%

ANNEX B: Public Opinion Survey

Q14. What type of pavement does the access road to your house have?

	Nos. of Ans.	%
(0) No pavement	14	4%
(1) Asphalt pavement	254	66%
(2) Gravel, cement or brick pavement	84	22%
(3) Cobblestone	32	8%
Total	384	100%

Q15. How much did you pay for the following public services last month?

(1) House

	Nos. of Ans.	%
\$50 and less	27	18%
between \$51-100	31	21%
between \$101-200	53	36%
between \$201-300	21	14%
more than \$301	15	10%
Sub-total	147	100%
Average	165.72 \$/month	
NA	237	
Total	384	

(2) Electricity

	Nos. of Ans.	%
\$25 and less	183	52%
between \$26-50	123	35%
between \$51-75	30	9%
between \$76-100	6	2%
more than \$101	8	2%
Sub-total	350	100%
Average	32.96 \$/month	
NA	34	
Total	384	

(3) Transport

	Nos. of Ans.	%
\$25 and less	150	50%
between \$26-50	87	29%
between \$51-75	21	7%
between \$76-100	20	7%
more than \$101	21	7%
Sub-total	299	100%
Average	39.95 \$/month	
NA	85	
Total	384	

(4) Foods

	Nos. of Ans.	%
\$100 and less	143	39%
between \$101-200	119	32%
between \$201-300	68	18%
between \$301-500	31	8%
more than \$501	7	2%
Sub-total	368	100%
Average	179.43 \$/month	
NA	16	
Total	384	

ANNEX B: Public Opinion Survey

(5) Daily necessities

	Nos. of Ans.	%
\$25 and less	57	66%
between \$26-50	21	24%
between \$51-75	2	2%
between \$76-100	4	5%
more than \$101	2	2%
Sub-total	86	100%
Average	29.78 \$/month	
NA	298	
Total	384	

(6) Loan

	Nos. of Ans.	%
\$25 and less	12	23%
between \$26-50	12	23%
between \$51-75	12	23%
between \$76-100	3	6%
more than \$101	13	25%
Sub-total	52	100%
Average	96.17 \$/month	
NA	332	
Total	384	

(7) Telephone

	Nos. of Ans.	%
\$25 and less	74	34%
between \$26-50	101	47%
between \$51-75	22	10%
between \$76-100	10	5%
more than \$101	9	4%
Sub-total	216	100%
Average	38.94 \$/month	
NA	168	
Total	384	

(8) Water

\$25 and less	259	88%
between \$26-50	30	10%
between \$51-75	3	1%
between \$76-100	1	0%
more than \$101	1	0%
Sub-total	294	100%
Average	15.62 \$/month	
NA	90	
Total	384	

ANNEX B: Public Opinion Survey

(9) Waste collection

	Nos. of Ans.	%
Not pay	130	42%
\$2.5 and less	10	3%
between \$2.6-5.0	41	13%
between \$5.1-7.5	108	35%
between \$7.6-10	13	4%
more than \$11	5	2%
Sub-total	307	100%
Average	3.85 \$/month	
NA	77	
Total	384	

(10) Medical services

	Nos. of Ans.	%
No expenditure	315	82%
\$25 and less	27	7%
between \$26-50	23	6%
between \$51-75	6	2%
between \$76-100	8	2%
more than \$101	5	1%
Total	384	100%
Average	8.41 \$/month	

(11) Entertainment

	Nos. of Ans.	%
No expenditure	269	70%
\$25 and less	52	14%
between \$26-50	32	8%
between \$51-75	5	1%
between \$76-100	12	3%
more than \$101	14	4%
Total	384	100%
Average	23.57 \$/month	

Q16. What is important for you?

Item	Very important	Important
(1) Water supply	368	7
(2) Sewer pipe network	290	77
(3) Storm water drainage	272	81
(4) Black water collection	262	92
(5) Waste collection	285	83
(6) Electricity supply	327	49
(7) Access road to the house	277	93
(8) Telephone	212	106
(9) Internet	81	54

III. Questions on Waste Discharge in the House

Q17. In your house, how do you dispose of the refuse?

	Nos. of Ans.	%
(1) Through municipality collection service	288	71%
(2) Hand it to private collector	16	4%
(3) Burn it	33	8%
(4) Take it to a container	64	16%
(5) Bury it	6	1%
Sub-total	407	100%
NA	2	
Total	409	

Note: plural answer

Q18. Do you use the following to collect waste generated in your house?

	Yes	No
(1) Plastic bag	365	18
(2) Paper bag	5	379
(3) Carton box	4	379
(4) Metal/plastic/wood container	3	381

Q19. Why do you use such containers?

	Nos. of Ans.	%
(1) It keeps the place clean after the collection work	183	38%
(2) It prevents foul odors	110	23%
(3) It is easy to handle	139	29%
(4) Keeps away pests such as flies	53	11%
Sub-total	485	100%
NA	6	
Total	491	

Note: Plural answer

Q20. Do you suffer from animal scavenging (dogs, cats and/or other animal scatter your refuse)?

	Nos. of Ans.	%
(1) Sometimes	71	18%
(2) Yes, often	111	29%
(0) No	202	53%
Total	384	100%

Q21. Do you have garden waste (such as fallen leaves and branches or grass and weeds)?

	Nos. of Ans.	%
(1) Yes	159	41%
(0) No	225	59%
Total	384	100%

ANNEX B: Public Opinion Survey

Q22. How do you generally discharge your garden wastes?

	Nos. of Ans.	%
(1) Discharge at the collection point with the other waste	79	47%
(2) Call municipality collector	9	5%
(3) Self disposal (open combustion, bury in the backyard, etc.)	65	39%
(4) Composting (produce fertilizer from waste)	8	5%
(5) Hand to private collector	4	2%
(7) Others	3	2%
Total	168	100%

Note: Plural answer

IV. Questions on Refuse Collection Services in the Area

Q23. Do you have refuse collection service in your area?

	Nos. of Ans.	%
(1) Yes	353	92%
(0) No	31	8%
Total	384	100%

Q24. Who collects your refuse?

	Nos. of Ans.	%
(1) Municipal collector	331	94%
(2) Private collector	10	3%
(3) Both	7	2%
(4) Others	5	1%
Sub-total	353	100%
NA	31	
Total	384	

Q25. How is your refuse collected?

	Nos. of Ans.	%
(1) Leaves residue outside the house	242	69%
(2) Carries refuse to a certain collection point (containers)	71	20%
(3) Carries waste directly to refuse collection truck	28	8%
(4) Others	12	3%
Sub-total	353	100%
NA	31	
Total	384	

Q26. How often is your refuse collected?

	Nos. of Ans.	%
(1) Once a week	41	12%
(2) Twice a week	90	25%
(3) Three times a week	40	11%
(4) More than three times a week	148	42%
(5) Menos de una vez por semana	22	6%
(6) I don't know	12	3%
Sub-total	353	100%
NA	31	
Total	384	

ANNEX B: Public Opinion Survey

Q27. Is the refuse collection service done at a fixed time in the day?

	Nos. of Ans.	%
(1) Yes	150	42%
(0) No	199	56%
(6) I don't know	4	1%
Sub-total	353	100%
NA	31	
Total	384	

Q28. Who should take responsibility of SWM in Panama Municipality?

	Nos. of Ans.	%
(1) Central Geverment	20	6%
(2) Junta Comunal	39	11%
(3) Municipality	255	75%
(4) Dischargers	18	5%
(5) Others	8	2%
Sub-total	340	100%
NA	47	
Total	387	

Note: plural answer

Q29. Are you satisfied with the collection service?

	Nos. of Ans.	%
(1) Very satisfied	111	31%
(2) Satisfied	140	39%
(3) Not satisfied	94	26%
(4) Very unsatisfied	10	3%
Sub-total	355	100%
NA	29	
Total	384	

Q30. Why are you unsatisfied with the service?

	Nos. of Ans.	%
(1) Frequency of collection is too few	37	44%
(2) Frequency of collection is irregular	9	11%
(3) Collection time is not appropriate	11	13%
(4) Collection workers don't pick it up	14	16%
(5) Collection point is too far	7	8%
(6) Others	7	8%
Sub-total	85	100%
NA	299	
Total	384	

Q31. Are you satisfied with the tariff of MSWM?

	Nos. of Ans.	%
(1) Yes. Because it is cheap	70	21%
(2) Yes. Because it is appropriate	125	38%
(3) Yes. Cheap and appropriate	2	1%
(4) No. Because it is expensive	99	30%
(5) No. Because it is not fair	22	7%
(6) No. Bad and inefficient service	9	3%
Sub-total	327	100%
NA	57	
Total	384	

ANNEX B: Public Opinion Survey

Q32. Which are the three main problems related to solid waste management to you?

	Very	Fairly
(1) Unreliable refuse collection	60	8
(2) Increase of mice and rats	89	76
(3) Smoke caused by burning refuse in the nearby area	20	23
(4) Offensive odor caused by illegal dumping	86	96
(5) Blockage of drain caused by refuse	21	28
(6) Looks dirty	66	57
(7) Dirty water, smoke, offensive odor, etc. generated by disposal site	23	19

Q33. Supposing that collection services were operating satisfactorily, how much would you consider fair to pay for the service?

US\$/month/family	Nos. of Ans.
0	35
1	25
2	25
3	40
4	25
5	80
6	13
7	21
8	18
9	8
10	36
12	12
13	28
15	10
18	1
20	3
25	4
Total	384
Ave.	6.07

V. Questions on Recycling and Waste Reduction

Q34. If the municipality introduces a separate refuse collection system, would you be willing to separate your wastes into: a) compostable waste such as food, paper and garden waste; b) recyclable waste such as metals and bottles and c) other wastes?

	Nos. of Ans.	%
(1) Yes	323	84%
(0) No	60	16%
Sub-total	383	100%
NA	1	
Total	384	

Q35. If "No", what are the reasons?

	Nos. of Ans.	%
(1) It requires too much effort	33	59%
(2) It requires more containers	8	14%
(3) It is inconvenient	7	13%
(4) It may increase the collection fee	1	2%
(5) Others	7	13%
Sub-total	56	100%
NA	328	
Total	384	

ANNEX B: Public Opinion Survey

Q36. Do you think recycling is necessary in Panama Municipality?

	Nos. of Ans.	%
(1) Yes, it is	327	86%
(0) No, it is not	55	14%
Sub-total	382	100%
NA	2	
Total	384	

Q37. Is there someone who comes around to collect or buy your reusable or recyclable materials?

	Nos. of Ans.	%
(1) Yes	48	13%
(0) No	336	88%
Total	384	100%

Q38. Which materials do they collect or buy from you? [mark everything the interviewee says]

	Yes	No	
(1) Bottles	32	16	47%
(2) Aluminum cans	29	19	49%
(3) Garden waste	1	47	48%
(4) Wood	2	46	48%
(5) Glass	3	45	48%
(6) Steel cans	4	44	48%
(7) Plastic	0	48	50%
(8) Tires	1	47	48%
(9) Cardboard	0	48	50%
(10) Metal	3	45	48%
(11) Clothes, textiles	1	47	48%
(12) Paper	8	40	48%
(13) Food waste	2	46	48%
(14) Leather	0	48	50%
(15) Others	3	45	48%

Q39. Do you sell recyclable materials to shops?

	Nos. of Ans.	%
(1) Yes, I do	22	6%
(0) No, I do not	362	94%
Total	384	100%

Q40. Which materials do you sell to shops?

	Yes	No	
(1) Bottles	14	8	12%
(2) Aluminum cans	13	9	12%
(3) Garden waste	0	22	22%
(4) Wood	1	21	22%
(5) Glass	3	19	22%
(6) Steel cans	2	20	22%
(7) Plastic	0	22	22%
(8) Tires	0	22	22%
(9) Cardboard	0	22	22%
(10) Metal	0	22	22%
(11) Clothes, textiles	0	22	22%
(12) Paper	4	18	22%
(13) Food waste	0	22	22%
(14) Leather	0	22	22%
(15) Others	2	20	22%

ANNEX B: Public Opinion Survey

Q41. If the community in your area were to raise funds through the sale of reusable or recyclable materials, would you cooperate by doing those materials?

	Nos. of Ans.	%
(1) Yes, I would	361	94%
(0) No, I would not	14	4%
(9) I don't know	9	2%
Total	384	100%

Q42. Do you use kitchen and/or garden waste for compost?

	Nos. of Ans.	%
(1) Yes, I do	48	13%
(0) No, I do not	336	88%
Total	384	100%

Q43. Do you dispose of refuse by means of a way other than recycling and composting (such as burning)?

	Nos. of Ans.	%
(1) Yes, I burn it	46	12%
(2) Yes, I bury it	5	1%
(3) Yes, I throw it	194	51%
(0) No, I do not	136	36%
Both (1) and (3)	1	0%
Sub-total	382	100%
NA	2	
Total	384	

Q44. Do you buy environmentally friendly goods?

	Nos. of Ans.	%
(1) Yes, if they are cheaper than the ones currently sold	51	13%
(2) Yes, if they cost the same as the normal	25	7%
(3) Yes, even if they are more expensive than the normal	19	5%
(9) I don't know of the existence of such goods	85	22%
(0) No, I do not	204	53%
Total	384	100%

VI. Tariff System

Q45. Do you accept refuse collection fee is set depending on...? [Plural answer question]

	Yes	No
(1) Land area of property	92	292
(2) Electricity consumed	16	368
(3) Amount of your income	46	338
(4) Amount of waste discharge	165	219
(5) Quantity of water consumed	59	325

Q46. Do you accept...?

	Nos. of Ans.	%
(1) Joint billing w/ income tax (municipality)	6	2%
(2) Joint billing w/ property tax	2	1%
(3) Joint billing w/ water supply	157	43%
(4) Joint billing w/ electricity	9	2%
(5) Independent direct billing (only refuse)	176	48%
(6) Joint billing w/ telephone	5	1%
(7) Others	12	3%
Sub-total	367	100%
NS/NC	17	
Total	384	

ANNEX B: Public Opinion Survey

Q47. How often would you like to pay your bill?

	Nos. of Ans.	%
(1) Monthly	304	80%
(2) Once every 3 months	28	7%
(3) Once every 6 months	6	2%
(4) Annually	24	6%
(5) Never pay	16	4%
Sub-total	378	100%
NA	6	
Total	384	

Q48. How much is the total income of your family per month? [Including exterior remittances]

	Nos. of Ans.	%
Less than \$480	165	43%
Between \$481 - \$2,200	179	47%
More than \$2,200	40	10%
Total	384	100%
Average	920.48	

VIII. PUBLIC COOPERATION

Q49. Have you ever been taught methods of proper refuse handling and discharge?

	Nos. of Ans.	%
(1) Yes	118	31%
(0) No	266	69%
Total	384	100%

Q50. Who taught you such methods?

	Nos. of Ans.	%
(1) Family members	75	60%
(2) At school	29	23%
(3) Municipality	3	2%
(4) Central government	9	7%
(7) Others	9	7%
Sub-total	125	100%
No aplica	266	
Total	391	

Note: plural answer

Q51. Does anyone in your family or your maid clean the road shoulder or adjacent public area in front of your house?

	Nos. of Ans.	%
(1) Yes, almost daily	186	48%
(2) Yes, sometimes	158	41%
(0) No	40	10%
Total	384	100%

Q52. Do you think education for students for maintaining a cleaner city and environment is important at school?

	Nos. of Ans.	%
(1) Yes, it is	378	98%
(0) No, it is not	6	2%
Total	384	100%

ANNEX B: Public Opinion Survey

Q53. It is obviously required that the Municipality endeavors more to improve solid waste management. However, public cooperation is also required. Would you cooperate in maintaining a cleaner city and environment?

	Nos. of Ans.	%
(1) Yes, I would	357	93%
(0) No, I would not	27	7%
Total	384	100%

Q54. Do you think a campaign to raise awareness of people for maintaining a cleaner city and environment is necessary?

	Nos. of Ans.	%
(1) Yes, it is	374	97%
(0) No, it is not	10	3%
Total	384	100%

Q55. Who should take such action?

	Nos. of Ans.
(1) Central government	72
(2) Junta Comunal	97
(3) Municipality	186
(4) Community	61
(5) Schools	46
(6) Family members	49
(7) Private enterprise	40
(8) Others	25

Note: Plural answer

2 Business Establishment

2.1 Markets, Universities, Large Scale Offices and Shops

Q0. Samples

	Nos. of Sample
1 Markets	5
2 Universities	2
3 Large offices	13
4 Hotel	2
5 Restaurants	5
6 Departments	20
Total	47

1. GENERAL QUESTIONS

Q1. What kind of wastes is mainly generated by your institution? [mark everything the interviewee says]

	Yes	No	Total
(1) Paper	32	15	47
(2) Textiles	3	44	47
(3) Plastic	31	16	47
(4) Steel	5	42	47
(5) Leather	3	44	47
(6) Cardboard	36	11	47
(7) Garden waste	6	41	47
(8) Rubber	1	46	47
(9) Aluminum	11	36	47
(10) Dust, ashes	3	44	47
(11) Wood	24	23	47
(12) Food waste	24	23	47
(13) Glass	7	49	56
(14) Other metals	3	44	47
(15) Others	0	0	0

Q2. How many cubic meters of waste are approximately generated per week, including recycled waste?

	Nos. of Ans.
(1) Less than 1 m ³ /week	4
(2) Between 1 m ³ and 5 m ³ /week	10
(3) Between 5 m ³ and 10 m ³ /week	9
(4) More than 10 m ³ /week	13
NA	11

2. WASTE STORAGE, DISCHARGE, COLLECTION AND DISPOSAL

Q3. Where do you storage your waste?

	Nos. of Ans.
(1) In the establishment	23
(2) Outside the establishment	24

ANNEX B: Public Opinion Survey

Q4. What type of container do you use for storing waste? [mark everything the interviewee mentions]

	Yes	No
(1) Plastic bags	30	17
(2) Carton boxes	24	23
(3) Basket	6	41
(4) Paper bags	1	46
(5) Metal/ plastic/ wood containers	6	41
(6) Metal cage	1	46

Q5. Who collects your waste?

	Nos. of Ans.
(1) Municipal waste collector	22
(2) Private collector	3
(3) Both municipal and private waste collector	17
(4) We take it to a specific place	3
(7) Others	1
NA	1
Total	47

Q6. Why do you not use the municipal collection services?

	Nos. of Ans.
(1) Because waste generated is much more than capacity of municipal vehicles	0
(2) Because collection frequency is insufficient	8
(3) Type of waste is not suitable for municipal vehicle	0
(4) Other	0
NA	39

Q7. How is your refuse collected?

	Nos. of Ans.
(1) refuse collection workers come into establishment to fetch the refuse	7
(2) we put refuse in front of our institution	12
(3) we carry refuse to a certain refuse collection point	25
(4) we directly carry refuse to a refuse collection truck	0
(7) Others	1
NA	2
Total	47

Q8. How often is your refuse collected?

	Nos. of Ans.
(1) Once a week	4
(2) Twice a week	2
(3) Three times a week	10
(4) More than three times	30
(7) Others	0
NA	1
Total	47

Q9. Is the refuse collection service done at a fixed time in the day?

	Nos. of Ans.
(1) Yes	22
(0) No	25
Total	47

ANNEX B: Public Opinion Survey

Q10. How satisfied are you with the collection service?

	Nos. of Ans.
(3) Very satisfied	24
(2) Somehow satisfied	14
(1) Poorly satisfied	2
(0) Unsatisfied	7
Total	47

Q11. Why aren't you completely satisfied with the collection service?

	Nos. of Ans.
(1) Frequency of refuse collection service is too few	7
(2) Frequency of refuse collection is irregular	7
(3) Refuse collection time is not appropriate	6
(4) Collection workers don't pick up refuse	3
(5) Refuse collection fee is too expensive	1
(6) Refuse collection point is too far	0
(7) Others	4

Note: plural answer

Q12. Why do you directly carry your refuse?

	Nos. of Ans.
(1) Because we don't have the municipal refuse collection service	0
(2) Because the municipal refuse collection service does not satisfy our demands	5
(3) Because it is the cheapest choice for us	0
(7) Other	0
NA	42
Total	47

Q13. Do you know where your waste is disposed of?

	Nos. of Ans.
(1) Municipal land field	43
(2) Land which you own	1
(3) Private lands	0
(7) Other	0
(9) Doesn't know	1
NA	2
Total	47

Q14. What do you think that refuse collection service should be in the future (about in 10years)

	Nos. of Ans.
(1) Municipality should continue executing the service	24
(2) The refuse collection service should be privatized	20
(7) Other	3

3. RECYCLING AND WASTE REDUCTION

Q15. Do you separate your waste so that it can be collected for recycling?

	Nos. of Ans.
(1) yes	16
(2) Sometimes	9
(0) No	22
Total	47

ANNEX B: Public Opinion Survey

Q16. Why do you separate waste? [mark everything the interviewee mentions]

	Yes	No	Total
(1) For selling it to manufactures	7	18	25
(2) For reducing waste volume to minimize collection fee	5	20	25
(3) For selling it to local peddlers	5	20	25
(4) For reducing waste volume to minimize adverse impact on environment	9	16	25
(5) Other	4	21	25

Q17. How many cubic meters of waste do you normally recycle per week?

	Nos. of Ans.
(1) Less than 0.5 m3/per week	1
(2) Between 0.5 m3 and 1 m3/per week	2
(3) Between 1 m3 and 5 m3/per week	6
(4) Between 5 m3 and 10 m3/per week	3
(5) More than 10 m3/per week	3
NA	32

Q18. Which type of waste do you separate? [mark everything the interviewee mentions]

	Yes	No	Total	
(1) Paper	15	10	25	
(2) Plastic bottles	1	24	25	
(3) Glass bottles	1	24	25	
(4) Steel	0	25	25	
(5) Leather	0	25	25	
(6) Cardboard	15	10	25	
(7) Plastic	8	17	25	
(8) Other glass	1	24	25	
(9) Aluminum	3	22	25	
(10) Tires	0	25	25	
(11) Wood	3	22	25	
(12) Textiles	0	25	25	
(13) Food waste	4	21	25	
(14) Other metals	1	24	25	
(15) Toxic waste	0	25	25	
(16) Others	1	24	25	

Q19. Why do not you separate your waste?

	Nos. of Ans.
(1) There is no reason to separate it	12
(2) It is troublesome to separate it	8
(3) The waste collectors separate them	1
(4) It increases the costs	3
(7) Other	1
NA	22
Total	47

Q20. Do you think recycling is necessary for Panama District?

	Nos. of Ans.
(1) Yes, it is necessary right now	42
(2) No, it is not necessary right now, but it should be introduced in 5 years	5
(3) No, it is not necessary right now, but it should be introduced in 10 years	0
(4) No, it is not necessary right now and in the future	0
Total	47

5. PUBLIC COOPERATION

Q21. Does anyone of your employee staff clean the road shoulder or adjacent public area in front of your establishment?

	Nos. of Ans.
(1) Yes, almost everyday	32
(2) Yes, sometimes	4
(0) No	11
Total	47

Q22. It is obviously required that the municipality endeavor more to improve solid waste management. However, public cooperation is also required. Would you cooperate in maintaining a cleaner city and environment?

	Nos. of Ans.
(1) Would participate	46
(0) Would not participate	0
NA	1
Total	47

Q23. Do you think a campaign to raise awareness of people for maintaining the cleaner city and environment is necessary?

	Nos. of Ans.
(1) Yes, is necessary	47
(0) No, it is not necessary	0
Total	47

Q24. Who should take such action?

	Nos. of Ans.
(1) Central government	35
(2) Municipality	37
(3) Junta Comunal	21
(4) Community	25

Note: plural answer

6. PRIORITY PROBLEMS RELATED TO SOLID WASTE MANAGEMENT

Q25. What is the concerned problems related solid waste management for you? [select the top three]

	Very related	Fairly	A little
(1) Unreliable refuse collection	11	2	2
(2) Increase of mice and rats	5	6	7
(3) Smoke caused by burning refuse the nearby area	4	1	3
(4) Offensive odor caused by illegal dumping	13	12	8
(5) Blockage of drain caused by refuse	7	10	8
(6) Looks dirty	3	6	6
(7) Dirty water, smoke, offensive odor, etc. generated by disposal site.	3	9	10

QUESTIONS FOR ADMINISTRATIVE STAFF

Q26. What is your business?

	Nos. of Ans.
(1) Municipal market	0
(2) Supermarket	5
(3) Government /municipal office	4
(4) Hotel	3
(5) Restaurant	5
(6) Shop	18
(7) Other	12
Total	47

Q27. How many employees do you have?

	Nos. of Ans.
(1) Less than 10	1
(2) between 10 and 19	7
(3) Between 20 and 49	15
(4) Between 50 and 99	9
(5) 100 or more	15
(9) Doesn't know / doesn't answer	0
Total	47

Q28. How much are the annual sales?

	Nos. of Ans.
(1) Less than B/100,000 per year	4
(2) Between B/100,00 and B/250,000	2
(3) Between B/250,001 and 3,000,000 per year	5
(4) More than B/3,000,001	3
NA	33
Total	47

Q29. How large is your business total floor area?

	Nos. of Ans.
(1) Less than 50 m2	0
(2) Between 50 m2 and 99 m2	3
(3) Between 100 m2 and 199 m2	1
(4) Between 200 m2 and 499 m2	5
(5) Between 500 m2 and 999 m2	7
(6) 1,000 m2 or more	29
NA	2
Total	47

Q30. How many years have you been running your business here?

	Nos. of Ans.
(1) Less than 5 years	5
(2) Between 5 and 9 years	17
(3) Between 10 and 19 years	10
(4) 20 years or more	14
(9) Doesn't answer/doesn't know	1
Total	47

ANNEX B: Public Opinion Survey

Q31. How much do you consider it would be fair to pay for the collection service if the fee increase due to the implementation of a recycling program in Panama Municipality?

	Nos. of Ans.
(0) Fee should not increase	39
(1) Up to 10% more	5
(2) Up to 50% more	1
(3) More than 50%	0
NA	2
Total	47

4. COLLECTION FEE AND FINANCIAL MATTERS

Q32. How much do you pay for the collection service per month?

	Nos. of Ans.
B167-4,700/month	4
NA	43
Total	47

Q33. Who do you pay it to?

	Nos. of Ans.
(1) Municipality	23
(2) Private collector	8
(7) Other	0
NA	16
Total	47

Q34. What do you think about the amount of refuse collection fee

	Nos. of Ans.
(1) It is too high	12
(2) It is appropriate	17
(3) It is cheap	0
NA	18
Total	47

Q35. Supposing that collection services were operating satisfactory, how much do you think that your household would be willing to pay for the refuse collection service?

	Nos. of Ans.
B5-3,000/month	17
NA	30
Total	47

Q36. Do you accept waste collection fee which is set depending on: [mark everything the interviewee mentions]

	Yes	No	Total	
(1) Annual sales		11	36	47
(2) Amount of waste		19	28	47
(3) Number of seats		1	46	47
(4) Total floor area		1	46	47
(5) Electricity consumption		0	47	47
(6) Number of rooms		1	46	47
(7) Number of employees		1	46	47
(8) Water supply consumption		4	43	47

ANNEX B: Public Opinion Survey

Q37. How often would you like to pay your bill?

	Nos. of Ans.
(1) Monthly	35
(2) Once every three months	3
(3) Once every six months	1
(4) Once a year	3
(7) Other	0
NA	5
Total	47

Q38. How much do you pay monthly for ...

(1) Electricity service

	Nos. of Ans.
\$1,000 and less	8
Between \$1,000 - 2,500	4
More than \$2,500	3
NA	32
Total	47

(2) Water supply service

	Nos. of Ans.
\$500 and less	12
More than \$500	4
NA	31
Total	47

(3) Income tax

	Nos. of Ans.
\$500 and less	10
Between \$501 - \$1,000	1
More than \$1,000	2
NA	34
Total	47

2.2 Factories

I. WASTE GENERATED IN THE FACTORY

Q1. What is your business?

	Nos. of Ans.
botas y zapatos industriales	1
Cofección de puertas	1
ebanistería,tapicería,piñatas,costura	1
Elaboración de empanadas	1
Elaboración de paletas de frutas natu.	1
Elaboran cremas y hojuelas	1
Embutidos	1
Materiales de construcción. acero, pbc, plásticos	1
Papeles sanitarios	1
Productos de papel	1
Total	10

Q2. How many employees do you have?

	Nos. of Ans.
(1) Less than 10	0
(2) Between 10 and 19	2
(3) Between 20 and 49	3
(4) Between 50 and 99	2
(5) 100 or more	3
(9) Doesn't know / doesn't answer	0
Total	10

Q3. How much are the annual sales?

	Nos. of Ans.
(1) Less than B/50,000 per year	0
(2) Between B/50,000 and B/100,000 per year	0
(3) Between B/100,001 and B/500,000 per year	1
(4) Between B/500,001 and B/1,000,000 per year	0
(5) Between B/1,000,001 and B/5,000,000 per year	0
(6) More than B/5,000,000 per year	2
(9) Doesn't know / doesn't answer	7
Total	10

Q4. How large is your business total floor area?

	Nos. of Ans.
(1) Less than 50 m2	0
(2) Between 50 m2 and 99 m2	1
(3) Between 100 m2 and 199 m2	2
(4) Between 200 m2 and 499 m2	2
(5) Between 500 m2 and 999 m2	2
(6) 1,000 m2 or more	3
Total	10

Q5. How many years have you been running your business here?

	Nos. of Ans.
(1) Less than 5 years	3
(2) Between 5 and 9 years	0
(3) Between 10 and 19 years	0
(4) 20 years or more	6
(9) Doesn't answer/doesn't know	1
Total	10

ANNEX B: Public Opinion Survey

Q6. What kind of wastes is mainly generated by your institution? [mark everything the interviewee says]

Using the Sheet 1, please tick whatever of waste you generate in the column of "Generation Amount."

Q7. How much of waste are approximately generated per year, including recycled waste?

Using the Sheet 1, please fill the generation of waste in ton/year in the column of "Generation Amount."

Q8. What is nature of waste generated in your factory?

Using the Sheet 1, please tick "Nature of Waste (Solid, Liquid, Semi-dry and/or Gas)"

Q9. What is characteristic of waste generated in your factory?

Using the Sheet 1, please tick "Characteristic of Waste (Organic, Inorganic, Corrosive, Explosive, Reactive, Toxic, Pursuable and/or Non-biodegradable)"

II. WASTE STORAGE, DISCHARGE, COLLECTION AND DISPOSAL

Q10. Where do you storage your waste?

Using the Sheet 1, please tick

"Temporary storage method (Garbage bag, Dust bin, Tank, Drum, Pit, Lagoon and/or others, please specify)"

Q11. How often do you empty the temporary storage?

Using the Sheet 1, please tick

"Emptied Frequency" of temporary storage in your factory (Daily, Weekly, Monthly and/or Annually)"

Q12. How do you treat your waste?

Using the Sheet 2, please tick

"Treatment Method" of waste in your factory (Burn, Crushing, Compaction, Dehydration, Neutralization, Bio-decomposition and/or Others, please specify if you tick Others)"

Q13. How do you dispose of your waste?

Using the Sheet 2, please tick

"Disposal Method" of waste in your factory (Landfill within the factory premises, Recycle within your factory, Unknown, Sold to others, Discharge to sewer, Municipal landfill, Discharge into environment and/or Others, please specify if you tick Others)"

Q14. How much of waste do you dispose of?

Using the Sheet 2, please state the

disposal amount (ton per year)

Q15. Who transport of your waste?

Using the Sheet 2, please tick

"Transportation method (by Municipality collection service, Private contractor and/or by Own means)"

Sheet 1

Item	Generation amount (ton/year)	Nature				Characteristic										Temporary storage method							Emptied frequency						
		Solid	Liquid	Semi-dry	Gas	NA	Organic	Inorganic	Corrosive	Explosive	Reactive	Toxic	Putrescible	Non-biodegradable	NA	Garbage bag	Dust bin	Tank	Drum	Pit	Lagoon	Open air	Others	NA	Daily	Weekly	Monthly	Annually	NA
1 Ash, combustion residue	3 90t more	3				1	1									1									3				
2 Dust	3 10t more	3				2	1									2									3				
3 Slag from melting	-															1													
4 Sludge	1 3million ton more	1														1	1								1				
5 Asbestos	-																												
6 Acid	2 NA	1				1	1	1									1								1				
7 Alkalis	-																												
8 Oily waste	-																												
9 Chemical residue	2 NA	2						1								1									1				
10 Waste from food production	4 2.54t more	3	1			1	3									1									3	1			
11 Waste similar to domestic waste	2 3.2t more	2					1									1	1								2				
12 Animal manure	-																												
13 Carcasses	-																												
14 Glass and ceramics	1 NA	1																							1				
15 Metal and scrap	4 NA	4						2	1								2								2	1			
16 Paper and cardboard	7 1411.8t more	7					1									6	3	4							7				
17 Plastics	7 170.5t more	7					4									1	2	4							5	2			
18 Rubber	4 169.5t more	4					1	1								1	1	1							3	1			
19 Textiles	1 NA	1					1										1								1				
20 Leather	1 1.5t more	1					1										1								1				
21 Wood	4 20t more	4					4										2								1				
22 Construction and demolition waste	1 NA	1																							1				
23 Wastewater	3 36.2 million ton more	1	2				1									1	1								3	1			
24 Others (specify)	-																												

Sheet 2

Item	Type of waste	Generation amount (ton/year)	Treatment						Disposal						Transport										
			Burn	Crushing	Compaction	Dehydration	Neutralization	Bio-decomp	Others	No	NA	Landfill	Recycle	Unknown	Sold to	Discharge to Municipal	Discharge to Others	Disposal amount (ton/year)	Municipal	Private	Own means	NA			
1	Ash, combustion residue	3													1			1			2		1		
2	Dust	3												3				1			1		1		
3	Slag from melting	-																							
4	Sludge	1													1									1	
5	Asbestos	-																							
6	Acid	2												1								1			
7	Alkalies	-																							
8	Oily waste	-																							
9	Chemical residue	2													2										2
10	Waste from food production	4													4										
11	Waste similar to domestic waste	2													2										
12	Animal manure	-																							
13	Carcasses	-																							
14	Glass and ceramics	1																							
15	Metal and scrap	4																				1			
16	Paper and cardboard	7																							
17	Plastics	7																							
18	Rubber	4																							
19	Textiles	1																							
20	Leather	1																							
21	Wood	4																							
22	Construction and demolition waste	1																							
23	Wastewater	3																							
24	Others (specify)	-																							

ANNEX B: Public Opinion Survey

Q16. Why do you directly carry your refuse?

	Nos. of Ans.
(1) Because we generate more waste than capacity of municipal collection service	2
(2) Because frequency of the municipal refuse collection service is insufficient	
(3) Because type of waste we generate does not suit to municipal collection vehicles	
(4) Other	3
(5) NA	5

Q17. Do you know where your waste is disposed of?

	Nos. of Ans.
(1) Municipal landfill	7
(2) Land which you own	1
(3) Private lands	0
(4) Other	0
(5) NA	2

Q18. What do you think that refuse collection service should be in the future (about in 10years) [read options]

	Nos. of Ans.
(1) Municipality should continue executing the service	5
(2) The refuse collection service should be privatized	4
(7) Other	1

III. RECYCLING, WASTE REDUCTION and POLLUTANT MANAGEMENT

Q19. Do you separate your waste so that it can be collected for recycling?

	Nos. of Ans.
(1) yes	3
(2) Sometimes	1
(0) No	6

Q20. Why do you separate waste? [mark everything the interviewee mentions]

	Nos. of Ans.
(1) For selling it to manufactures	2
(2) For selling it to local peddlers	2
(3) For reducing waste volume to minimize collection fee	2
(4) For reducing waste volume to minimize adverse impact on environment	1
(5) Other	1

Q21. How many cubic meters of waste do you normally recycle per week?

	Nos. of Ans.
(1) Less than 0.5 m ³ /per week	0
(2) Between 0.5 m ³ and 1 m ³ /per week	0
(3) Between 1 m ³ and 5 m ³ /per week	1
(4) Between 5 m ³ and 10 m ³ /per week	0
(5) More than 10 m ³ /per week	1
(6) NA	8

Q22. Why do not you separate your waste?

	Nos. of Ans.
(1) There is no reason to separate it	7
(2) It is troublesome to separate it	1
(3) The waste collectors separate them	0
(4) It increases the costs	0

ANNEX B: Public Opinion Survey

(5) Other	0
(6) NA	2

Q23. Do you think recycling is necessary for Panama Municipality?

	Nos. of Ans.
(1) Yes, it is necessary right now	10
(2) No, it is not necessary right now, but it should be introduced in 5 years	0
(3) No, it is not necessary right now, but it should be introduced in 10 years	0
(4) No, it is not necessary right now and in the future	0

Q24. Do you register amount of chemicals received from outside your factory?

	Nos. of Ans.
(1) Yes, almost everyday	4
(2) Yes, sometimes	0
(0) No	6

Q25. Do you register amount of chemicals discharged or moved to outside your factory?

	Nos. of Ans.
(1) Yes, almost everyday	1
(2) Yes, sometimes	0
(0) No	0
(3) NA	8

Q26. Do you inform an agency of the amount of chemicals outgoing and/or receiving in your factory?

	Nos. of Ans.
(1) Yes	1
(0) No	9

Q27. If you answered "yes" to the above question, which agency do you inform of it? Please specify Aduanas, boms. y ACOTEPAC

IV. COLLECTION FEE AND FINANCIAL MATTERS

Q28. How much do you pay for the collection service per month?

	Nos. of Ans.
(1) Dollars/month to Municipality	2 companies, \$200-300
(2) Dollars/month to a private collector	7companies, \$13-700
(00) Doesn't pay	0
(99) Doesn't know	1

Q29. What do you think about the amount of refuse collection fee?

	Nos. of Ans.
(1) It is too high	3
(2)It is appropriate	5
(3) It is cheap	0
(4) NA	2

Q30. Supposing that collection services were operating satisfactory, how much do you think that your household would be willing to pay for the refuse collection service?

7 companies, \$20-700

Q31. Do you accept waste collection fee which is set depending on: [mark everything the interviewee mentions]

	Nos. of Ans.
(1) Annual sales	0

ANNEX B: Public Opinion Survey

(2) Amount of waste	10
(3) Number of seats	0
(4) Total floor area	0
(5) Electricity consumption	0
(6) Number of rooms	0
(7) Number of employees	0
(8) Water supply consumption	0
(9) Others	0

Q32. Do you accept...?

	Nos. of Ans.
(1) Joint billing w/ income tax (municipality)	1
(2) Joint billing w/ property tax	0
(3) Joint billing w/ water supply	2
(4) Joint billing w/ electricity	1
(5) Joint billing w/ telephone	0
(6) Independent direct billing (only refuse)	6

Q33. How often would you like to pay your bill?

	Nos. of Ans.
(1) Monthly	9
(2) Once every three months	0
(3) Once every six months	0
(4) Once a year	0
(7) Other	1

Q34 How much do you pay monthly for ...

(1) Electricity service	\$170-35,750 (7 companies answered)
(2) Water supply service	\$35-1,800 (5 companies answered)
(3) Income tax	\$25-100 (2 companies answered)

Q35. How much do you consider it would be fair to pay for the collection service if the fee increase due to the implementation of a recycling program in Panama?

	Nos. of Ans.
(0) Fee should not increase	5
(1) Up to 10% more	3
(2) Up to 50% more	0
(3) More than 50%	0
(4) NA	2

V. PUBLIC COOPERATION

Q36. Does anyone of your employee staff clean the road shoulder or adjacent public area in front of your establishment?

	Nos. of Ans.
(1) Yes, sometimes	0
(2) Yes, almost everyday	9
(0) No	1

Q37. It is obviously required that the municipality endeavor more to improve solid waste management. However, public cooperation is also required. Would you cooperate in maintaining a cleaner city and environment?

	Nos. of Ans.
(1) Would participate	10
(0) Would not participate	0

ANNEX B: Public Opinion Survey

Q38. Do you think a campaign to raise awareness of people for maintaining the cleaner city and environment is necessary?

	Nos. of Ans.
(1) Yes, is necessary	10
(0) No, it is not necessary	0

Q39. Who should take such action?

	Nos. of Ans.
(1) Central government	3
(2) Junta Comunal	0
(3) Municipality	6
(4) Community	0
(5) School	3
(6) Family	1
(7) Private companies	3
(8) Other	0

VI. PRIORITY PROBLEMS RELATED TO SOLID WASTE MANAGEMENT

Q40. What is the concerned problems related solid waste management for you?

	Very A little	No	NA	
(1) Unreliable refuse collection	4	0	2	4
(2) Increase of mice and rats	2	4	0	4
(3) Smoke caused by burning refuse the nearby area+B84	0	0	0	10
(4) Offensive odor caused by illegal dumping	3	0	2	4
(5) Blockage of drain caused by refuse	1	2	1	6
(6) Looks dirty	0	1	1	8
(7) Dirty water, smoke, offensive odor, etc. generated by disposal site.	0	2	2	6

2.3 Hospital

Samples Nos. of hospitals 3

I. General Information of Interviewee

Q.1. What is your position within the medical institution?

Q.2. What is the number of employee? 3,000, 749 and 33 persons respectively

Q.3. Type of institution:

- 1. Public 1
- 2. Private 2

Q.4. Outline of institution:

- 1. Number of beds : 900, 173 and 33 beds respectively
- 2. Yearly occupancy : 720, 167 and NA 1 beds occupied
- 3. Total floor area : No answer obtained
- 4. Consultations per year : No answer obtained

II. Evaluation of the Present System

Q.5. Which of the following phrases best represents the present management of solid waste in your institution?

[3] 1. Generally there are no problems with the present management

[0] 2. The present system potentially poses a risk for the employees of the area of waste management

[0] 3. The present system potentially poses a risk for the employees and patients

[0] 4. The present management is satisfactory from the internal view point, but constitutes an unacceptable risk for the external environment.

[0] 5. The present system potentially poses a risk for the public

[0] 6. I don't know

Q.6. How much responsibility has each of the following aspects in the present situation of the solid wastes? (please tick appropriate boxes)

Aspect \ Responsibility	Great responsibility	Considerable responsibility	Low responsibility	No responsibility	I don't know
Lack of legislation and regulations	1	2			
Lack of guidelines for the present management	2	1			
Lack of supervision and control by the authorities	2	1			
Lack of funds to carry out an appropriate management			2		1
Lack of obedience to internal instructions	1	1			1
Lack of training of the equipment	1	1			1

III. Solid Waste Management

Definition of waste

Medical wastes include following types of waste from medical care in this questionnaire.

- Blood
- Infectious agent, cultures, fungi
- Non anatomic waste that comes from the medical attention of patients and laboratories
- Pathological waste
- Sharp material (needles, surgical knives, etc.)
- Hazardous waste (chemicals, medicines)
- Radioactive waste

General wastes mean wastes similar to domestic waste (garbage, paper waste, etc.) in this questionnaire.

a. Medical Waste Management

a.1. Training and Instructions

Q.7. Is there some written instruction to separate and manage medical solid wastes in the institution?

[3] 1. Yes

[0] 2. No

Q.8. If the answer is "Yes" in the previous question Q7, are there contaminated or hazardous wastes identified and special cautions given?

[3] 1. Yes

[0] 2. No

Q.9. How often the staff of waste management is trained as a caution against contaminated or hazardous waste?

[1] 1. Only at the start of the job

[0] 2. Once a year

[2] 3. Very often, every 6 months

[0] 4. Never

a.2. Storage

Q.10. How do you store general wastes and medical wastes?

[0] 1. We mix them all together.

[3] 2. We store them separately. (Go to Q12)

Q.11. Why don't you separate medical wastes ?

[0] 1. There is no reason to separate them.

[0] 2. It is troublesome to separate them.

[0] 3. The waste collectors separate them.

[0] 4. Others (specify : _____)

[3] 5. NA

Q.12. How many categories separated?

[0] 1. One category

[3] 2. More than two

ANNEX B: Public Opinion Survey

Q.13. Referring to an example given below, please tick appropriate boxes on the answer table to indicate your separation manner of medical wastes.

Answer Table		
Type of waste	separate storage	mixed storage
Blood	2	1
Infectious agent, cultures, fungi	2	1
Non anatomic waste that comes from the medical attention of patients and laboratories	2	1
Pathological waste	3	0
Sharp material (needles, surgical knives, etc.)	3	0
Hazardous waste (chemicals, medicine)	3	0
Radioactive waste	3	0

a.3. Waste Generation Amount

Q.14. How many kilograms of waste **generated** per week? [1,000]kg/week

Note: only one sample's answer

Q.15. Proportion of generated waste

Answer Table	
Type of waste	Proportion (%)
Blood	3
Infectious agent, cultures, fungi	3
Non anatomic waste that comes from the medical attention of patients and laboratories	55
Pathological waste	4
Sharp material (needles, surgical knives, etc.)	10
Hazardous waste (chemicals, medicine)	20
Radioactive waste	5
Mixed waste	0
Total	100

Note: only one sample's answer

a.4. Waste Treatment

Q.16. Are the waste treated? (please tick appropriate boxes)

[2] 1. Yes

[1] 2. No

ANNEX B: Public Opinion Survey

Q.17. How are they treated?(please tick appropriate boxes)

Answer Table							
Treatment method Type of waste	Treatment method						
	1	2	3	4	5	6	7
	Incineration with gas cleaning	Incineration without gas cleaning	Open burning	Chemical disinfections	Autoclave disinfections	I don't know	Others
Blood	1			1	2		
Infectious agent, cultures, fungi	1			1	2		
Non anatomic waste that comes from the medical attention of patients and laboratories	1						
Pathological waste	1			1	1		
Sharp material (needles, surgical knives, etc.)	1						
Hazardous waste (chemicals, medicine)	2						
Radioactive waste							2
Mixed waste	1						

Note: plural answer

Q.18. If some of wastes are burned or incineration, what do you do with the remained ash?

- 1. We discharge it together with other wastes.
- 2. We bring it to a specific place. (specify where: _____)
- 3. Other (specify: _____)
- 4. NA (no answer/no applicable)

a.4. Waste Discharge

Q.19. How do you discharge medical wastes?

- 1. We separate store but mix discharge.
- 2. We separate store and separate discharge.
- 3. We mix store and mix discharge.

Q.20. In case of “separate store but mix discharge”, who is mix them.

- 1. Collector
- 2. Our employee
- 3. Others (specify: _____)
- 4. NA (no answer/no applicable)

ANNEX B: Public Opinion Survey

Q.21. Referring to an example given below, please tick appropriate boxes on the answer table to indicate your discharge manner of medical wastes.

Answer Table		
Type of waste	separated discharge	mixed discharge
Blood	3	
Infectious agent, cultures, fungi	3	
Non anatomic waste that comes from the medical attention of patients and laboratories	2	1
Pathological waste	3	
Sharp material (needles, surgical knives, etc.)	3	
Hazardous waste (chemicals, medicine)	3	
Radioactive waste	3	

Q.22. How many kilograms of waste **discharged** per week? [1,000]kg/week

Note: only one sample's answer

Q.23. Proportion of discharged waste

Answer Table	
Type of waste	Proportion (%)
Blood	3
Infectious agent, cultures, fungi	3
Non anatomic waste that comes from the medical attention of patients and laboratories	55
Pathological waste	4
Sharp material (needles, surgical knives, etc.)	10
Hazardous waste (chemicals, medicine)	20
Radioactive waste	5
Mixed waste	-
Total	100

Note: only one sample's answer

a.5. Collection

Q.24. Whom are collected?

- [0] 1. Private company contracted by us
- [1] 2. Private company contracted by municipality
- [3] 3. Municipality
- [0] 4. Others (specify : _____)
- [0] 5. No collection service

Note: plural answer

ANNEX B: Public Opinion Survey

Q.25. How are collected.

- 1. Door to door collection (We hand waste to the collectors who visit my institution.)
- 2. Curb side collection (We leave wastes in front of my institution and the collectors takes them.)
- 3. Bell collection (We bring wastes when the collectors come nearby with ringing a bell.)
- 4. Station collection
(We leave wastes at a specific point outside of my institutions and the collectors take them.)
- 5. Others

Q.26. How many times per week are they collected? Choose one of the following.

- 1. 3 times or less
- 2. 4 or 5 times
- 3. More than 5 times
- 4. Irregular

Q.27. Do the waste collectors come at fixed time on specific days of the week?

- 1. Yes.
- 2. No.
- 3. I don't know.

Q.28. How are the wastes finally disposed of? Choose one of the following.

- 1. We dispose of in our property.
- 2. We throw at public places.
- 3. They are disposed of at the landfill sites for municipal solid wastes.
- 4. I don't know.
- 5. Others (specify : _____)

a.6. In House collection System

Q.29. Specify the present medical waste collection system in your institution. (please tick appropriate boxes)

Answer Table			
Type of waste	In house collection system		
	1	2	3
	We use a standard system with containers with colored bags with labels.	We use different types of labeled containers.	Others
Blood	3		
Infectious agent, cultures, fungi	3		
Non anatomic waste that comes from the medical attention of patients and laboratories	3		
Pathological waste	3		
Sharp material (needles, surgical knives, etc.)	2	1	
Hazardous waste (chemicals, medicine)			1
Radioactive waste	1	1	1
Mixed waste	2		

ANNEX B: Public Opinion Survey

Q.30. Describe the present container for collection of medical waste in your institution. (please tick appropriate boxes)

Answer Table								
Type of Waste	Container	1	2	3	4	5	6	7
		We use strong containers of plastic with a plastic sheathing with cover	We use strong containers of plastic with a plastic sheathing without cover	We use strong containers of plastic without a plastic sheathing with cover	We use strong containers of plastic without a plastic sheathing without cover	We use cardboard boxes with sheathing	We use bags	Others
Blood		1					1	
Infectious agent, cultures, fungi		2					1	
Non anatomic waste that comes from the medical attention of patients and laboratories		2					1	
Pathological waste		2					1	
Sharp material (needles, surgical knives, etc.)		2				1		
Hazardous waste (chemicals, medicine)		2				1		
Radioactive waste		1				1		1
Mixed waste		1					1	

Q.31. Specify the collection frequency of the medical waste (of the department) in your institution. (please tick appropriate boxes)

Answer Table			
Type of waste	In house collection frequency		
	1	2	3
	Tow times per day	Once per day	Others
Blood	2		
Infectious agent, cultures, fungi	2		
Non anatomic waste that comes from the medical attention of patients and laboratories	2		
Pathological waste	2		
Sharp material (needles, surgical knives, etc.)	2		
Hazardous waste (chemicals, medicine)	2		
Radioactive waste	1		
Mixed waste			

Q.32. Are there cool storage points for pathological wastes in your institution?

- [1] 1. Yes.
[2] 2. No.

ANNEX B: Public Opinion Survey

- Q.33. Are there (a) central waste collection point(s) in your institution?
[2] 1. Yes, there is one waste collection point.
[0] 2. Yes, there are more than one waste collection points.
[1] 3. No, the waste is collected only within the departments (i.e. source of generation) and sent for treatment and/or disposal
- Q.34. How is (are) this (these) central collection point(s) located? Are they (is it) (an) specially dedicated area(s) (i.e. separated from the other buildings)?
[2] 1. Yes.
[1] 2. No.
- Q.35. How often are (is) the collection point(s) disinfected ?
[0] 1. Once a week.
[0] 2. Once a month.
[0] 3. Two times per month.
[0] 4. Every 2-3 months.
[0] 5. Twice per year.
[0] 6. With less frequency.
[0] 7. When it is considered necessary.
[0] 8. Never.
[3] 9. Others (specify: once a day at two hospitals, and twice a day at a hospital)
- Q.36. Are they (is it) enclosed with fence and locked?
[2] 1. Yes, but only for contaminated waste.
[0] 2. The all collection points are closed with fence and locked.
[0] 3. Enclosed with fence but not locked.
[1] 4. Neither enclosed with fence nor locked.
[0] 5. Others
- Q.37. Describe the access to the collection point for the collection vehicles (trucks) and the procedure of waste loading.
[1] 1. There is a free access for the vehicles. The containers are emptied by haul-up (large containers) or by lift (medium-size containers).
[0] 2. There is a free access for the vehicles. The containers are emptied by lift.
[2] 3. There is a free access for the vehicles. The waste is loaded manually.
[0] 4. There is no direct access for vehicles. The waste is carried and loaded manually.
[0] 5. Others
- Q.38. Specify the area of storage for hazardous waste (chemicals, medicines).
[1] 1. We do not have an area exclusively dedicated for hazardous waste.
[2] 2. We have an area dedicated for the storage of hazardous waste.
- Q.39. Tick any of 1. to 3. if appropriate.
[0] 1. The area has fence and is locked.
[0] 2. The area is well ventilated (i.e. it is not a closed room without ventilation).
[1] 3. The area has a separated system of drainage.
[2] 4. NA (no answer/not applicable)
- Q.40. Is there any structure for the storage of radioactive wastes?
[1] 1. Yes - for short periods of storage only.
[1] 2. Yes - the waste is stored until the radiation has decreased.
[0] 3. No, because we do not generate radioactive wastes.
[0] 4. No, although we generate radioactive wastes.
[1] 5. NA (no answer/not applicable)

b. Management of General Wastes

b.1. Storage

Q.41. How do you store general waste?

[2] 1. We mix them all together.

[1] 2. We store them separately.

Q.42. Why don't you separate general wastes ?

[2] 1. There is no reason to separate them.

[0] 2. It is troublesome to separate them.

[1] 3. The waste collectors separate them.

[0] 4. Others

Q.43. How many categories separated?

[0] 1. One category

[1] 2. More than two

[2] 4. NA (no answer/not applicable)

Q.44. Referring to an example given below, please tick appropriate boxes on the answer table to indicate your separation manner of medical wastes.

Answer Table		
Type of waste	separate storage	mixed storage
Kitchen waste	2	
Recyclable papers (newspaper, magazines, etc.)	1	1
Waste paper		2
Textile		1
Grass and wood	1	1
Plastic		1
Rubber, leather		1
Metals	1	
Bottles, glasses	1	
Ceramics, soil		1
Others		

b.2. Waste Generation

Q.45. How many kilograms of waste **generated** per week? [157,500]kg/week

Note: only one sample's answer

ANNEX B: Public Opinion Survey

Q.46. Proportion of generated waste

Answer Table	
Type of waste	Proportion (%)
Kitchen waste	15
Recyclable papers (newspaper, magazines, etc.)	17
Waste paper	17
Textile	10
Grass and wood	5
Plastic	7
Rubber, leather	7
Metals	7
Bottles, glasses	10
Ceramics, soil	5
Others	-
Total	100

Note: only one sample's answer

b.3 Waste Treatment

Q.47. Do you treat wastes in some ways before discharging?

- 1. Yes.
- 2. No.
- 3. NA (no answer/not applicable)

Q.48. How are they treated?(please tick appropriate boxes)

NA (no answer/not applicable)

Answer Table		Treatment method						
Treatment method	Type of waste	1	2	3	4	5	6	7
		Incineration with gas cleaning	Incineration without gas cleaning	Open burning	Compaction	Break into pieces	I don't know	Others
	Kitchen waste							
	Recyclable papers (newspaper, magazines, etc.)							
	Waste paper							
	Textile							
	Grass and wood							
	Plastic							
	Rubber, leather							
	Metals							
	Bottles, glasses							
	Ceramics, soil							
	Others							

ANNEX B: Public Opinion Survey

- Q.49. If some of wastes are burned or incineration, what do you do with the remained ash?
- 1. We discharge it together with other wastes.
 - 2. We bury it within our premises.
 - 3. We bring it to a specific place. (specify where: _____)
 - 4. Other (specify: _____)
 - 5. NA (no answer/not applicable)

b.4 Waste Discharge

- Q.50. How many kilograms of waste **discharged** per week? [157,500]kg/week
Note: only one sample's answer

- Q.51. Proportion of discharged waste

Answer Table	
Type of waste	Proportion (%)
Kitchen waste	15
Recyclable papers (newspaper, magazines, etc.)	17
Waste paper	17
Textile	10
Grass and wood	5
Plastic	7
Rubber, leather	7
Metals	7
Bottles, glasses	10
Ceramics, soil	5
Others	-
Total	100

Note: only one sample's answer

- Q.52. What do you usually use when you discharge general wastes?
- 1. Big plastic bags.
 - 2. Dust bins.
 - 3. Others

- Q.53. Whom are collected?
- 1. Private company contracted by us
 - 2. Private company contracted by municipality
 - 3. Municipality
 - 4. Others
 - 5. No collection service

ANNEX B: Public Opinion Survey

Q.54. How are collected.

- 1. Door to door collection (We hand waste to the collectors who visit my institution.)
- 2. Curb side collection (We leave wastes in front of my institution and the collectors takes them.)
- 3. Bell collection (We bring wastes when the collectors come nearby with ringing a bell.)
- 4. Station collection
(We leave wastes at a specific point outside of my premises and the collectors take them.)
- 5. Others

Q.55. How many times per week are they collected? Choose one of the following.

- 1. 3 times or less
- 2. 4 or 5 times
- 3. More than 5 times
- 4. Irregular

Q.56. Do the waste collectors come at fixed time on specific days of the week?

- 1. Yes.
- 2. No.

Q.57. How are the wastes finally disposed of? Choose one of the following.

- 1. We dispose of in our property.
- 2. We throw at public places.
- 3. They are disposed of at the landfill sites for municipal solid wastes.
- 4. I don't know.
- 5. Others

IV. Financial Matter

Q.58. How much do you pay for medical waste collection services per month?

NA (no answer/not applicable)

Answer Table	
Type of waste	Collection fee (colones/month)
Blood	
Infectious agent, cultures, fungi	
Non anatomic waste that comes from the medical attention of patients and laboratories	
Pathological waste	
Sharp material (needles, surgical knives, etc.)	
Hazardous waste (chemicals, medicine)	
Radioactive waste	
Mixed waste	

ANNEX B: Public Opinion Survey

Q.59. How much do you pay for general waste collection services per month?

NA (no answer/not applicable)

Answer Table	
Type of waste	Collection fee (colones/month)
Kitchen waste	
Recyclable papers (newspaper, magazines, etc.)	
Waste paper	
Textile	
Grass and wood	
Plastic	
Rubber, leather	
Metals	
Bottles, glasses	
Ceramics, soil	
Others	
Mixed waste	

Q.60. If the market price of waste collection rose, how much, at maximum, could you afford to pay per month?

NA (no answer/not applicable)

Answer Table for medical waste	
Type of waste	Collection fee (colones/month)
Blood	
Infectious agent, cultures, fungi	
Non anatomic waste that comes from the medical attention of patients and laboratories	
Pathological waste	
Sharp material (needles, surgical knives, etc.)	
Hazardous waste (chemicals, medicine)	
Radioactive waste	
Others	

Answer Table for general waste	
Type of waste	Collection fee (colones/month)
Kitchen waste	
Recyclable papers (newspaper, magazines, etc.)	
Waste paper	
Textile	
Grass and wood	
Plastic	
Rubber, leather	
Metals	
Bottles, glasses	
Ceramics, soil	
Others	
Mixed waste	

ANNEX B: Public Opinion Survey

Q.61. Is there someone who comes around to collect or buy your reusable or recyclable materials?
[0] 1. Yes.
[3] 2. No.

Q.62. Which materials do they collect or buy from you? (Not applicable)

1. Bottle
2. Glass
3. Cardboard
4. Paper
5. Aluminum can
6. Steel can
7. Metal
8. Kitchen waste
9. Garden waste
10. Plastic
11. Textile, clothes
12. Leathers
13. Wood / timber
14. Tire
15. Others

Q.63. How much do you pay for water supply per month?
NA (no answer/not applicable)

Q.64. How much do you pay for electricity per month?
NA (no answer/not applicable)

V. Cooperation for Waste Management

Q.65. Coping with wastes requires efforts of not only the municipality but also the general public. Do you think there is something which your institution can do for good waste management?
[3] 1. Yes.
[0] 2. No.
[0] 3. I don't know.
[0] 4. Others

Q.66. What do you think your institution can do? (plural answer question)

- [0] 1. Discharging wastes neatly.
- [0] 2. Minimizing waste generation.
- [0] 3. Reusing wastes.
- [0] 4. Recycling wastes.
- [0] 5. Treating toxic/infectious wastes appropriately.
- [2] 6. Raising the environmental awareness of the public.
- [2] 7. Providing information to the public.
- [1] 8. Researching activities.
- [0] 9. Others

Q.67. Do you think the medical institutions should cooperate with the country and/or municipality in managing wastes?
[3] 1. Yes.
[0] 2. No.

ANNEX B: Public Opinion Survey

Q.68. How is the trend of your cost for waste management?

- 1] 1. It is getting significantly higher.
- 1] 2. It is getting higher.
- 0] 3. It is relatively stable.
- 0] 4. It is getting lower.
- 0] 5. Others
- 0] 6. NA (no answer/not applicable)

Q.69. How do you give the priority on the management of your wastes?

- 3] 1. We give very high priority.
- 0] 2. We give moderate priority.
- 0] 3. We give little priority.
- 0] 4. Others

Q.70. Do you feel you need a support from the government or municipality or any other relevant organizations for the management of your waste? (plural answer question)

- 0] 1. Yes, we need financial support.
- 2] 2. Yes, we need technical support.
- 0] 3. Yes, we need support of other kinds (specify: _____)
- 1] 4. No, we don't.

Data C

Recycle Market Survey

Asociación para la Promoción de Nuevas Alternativas de Desarrollo

THE RECYCLE MARKET SURVEY IN PANAMA

Preliminary Version

**Lic. Francisco Rivas R., Consultant
Guadalupe Guardia, Assistant of Investigation**

Panamá, January - February, 2001

INTRODUCTION

The intention of the present study is to know the tendencies and scale of the market of recycling of materials in the Capital District of Panama.

The information available until now indicates that in Panama every types of materials is recover: aluminum tins, aluminum radiators, radiators of a mixture of metals, bronze radiators, aluminum iron scrap, copper, bronze, batteries, cardboard, paper (white and colored), newspapers, plastic, glass, fabric and other materials that can be repaired and be sold. Nevertheless, precise data did not exist on the magnitude of this activity.

The analysis of the national accounts, of the Republic's General Controller Office, now allows us to have a better understanding of the scale of the recycling activity in Panama. Between 1996 and September of 2001 the value of the exports of remainders (and finished products) of metals, paper and plastic ascended to \$USA 61,2 million (F.O.B. value), in the following form:

Table N° 1
F.O.B. Value of the exports of remainders and recycled products
1996–Sept. 2001. In \$USA millions

Material	\$ USA
Metals	48,6
Paper	10,9
Plastic	1,7
Total	61,2

Source: Own processing, Data taken from: General Controller Office, Direction of Statistic and Census, Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, September of 2001.

In order to make the study two types of main sources have been used:

1. Secondary Sources:

We have used widely the study of Mollie Brown: “Reciclaje de Panamá”, made in the first semester of 1998, for Autoridad de la Región Interoceánica (ARI), as a Consultant for Developing of the Free Trade (Free Market Development Advisors Program), working for the United States Agency for International Development, Panama (USAID- PANAMA). It is a publication of obligatory consultation for those interested in knowing the characteristics of the recycling activity in Panama. It's study allowed us to correct the deficiency of information in the sectors of plastics and paper, facing the refusal of the industrialists to respond questions of the questionnaire.

Two additional studies, but with not very recent data, also were useful for this report: Práxedes Castro, Perspective of the recycling in Panama within the context of the environmental cleaning. (Editorial USMA, Panama, 1994) and Yolanda Castillo and Mylene Ortega, Diagnosis of the Process of the Sweepings in the Metropolitan Area: Period of 1903 – 1997. 1998. (Graduation Work, Panama University).

2. Primary sources:

Two types of primary sources have been used:

Statistic of the National Accounts, the Republic's General Controller Office. Since up to now other researchers have not used this information, it was necessary to make an arduous work for this processing. This constitutes the main content of the study.

Interviews to industrialists. Difficulties existed mainly for the industrialists to respond the interview questionnaire, because of the distrust that some questions caused (purchasing and boarding prices). However, in these cases the data was obtained from alternative sources: the national accounts (purchasing prices) and data included in Mollie Brown's study. In this context, the questionnaire had a relative importance.

The information has been organized in three chapters: the First Chapter is a qualitative character and tries to describe the cycle of the recycling, identifying the actors who participate and the form in which they are related; the Second Chapter presents in a graphical form the tendencies of the recycling market of the following materials: paper, iron and metals, glass and plastics. Other materials have not been considered because they occupy a residual place within the sector. The Third Chapter displays the conclusions and recommendations, from the possible future scenes.

CHAPTER I

THE CYCLE OF THE RECYCLING IN THE DISTRICT OF PANAMA

The “cycle” of recycling of the solid remainders consists of 3 stages clearly defined:

- 1) the material must be recovered from the current in which the solid remainders are mixed;
- 2) the recovered material must be used by the manufacturers in its processes of production;
- 3) the consumers must buy the final product/item that contains the recycled material.

These stages are developed in the City of Panama in the following way:

I. THE RECOVERY OF THE MATERIALS

In Panama an ample variety of materials are recovered: aluminum tins, aluminum radiators, radiators of a metal mixture, bronze radiators, aluminum scrap, copper, bronze, batteries, cardboard, paper (of colors and target), newspapers, plastic, glass, fabric, and other remainders that can be repaired and be sold or to sell them so as they are to salesmen of used objects. The recovery of these materials is made of the following form:

1. Public recovery in sites and channels

a) The workers of the street

The workers of the street, commonly called “piedreros”, make their work bursting the bags of remainders deposited on the sidewalks that are gathered by the DIMAUD; also, they extract materials from temporary storage (tanks and containers) or collect aluminum tins and glass bottles that are discarded in streets and sidewalks. Official data do not exist about the amount of workers of the street dedicated to this activity nor their contribution to the recovery of materials, but it must be assume that the contribution is significant. The workers of the street sell the materials to the nearest purchasing point, within the City.

Vicente González, a worker of the street with many years of experience, recovers clear, bottles, aluminum cans, newspaper and cardboard. In average he recovers 5 bottles daily, 12 pounds of aluminum and 20 pounds of paper. On the other hand, Inocente, in addition to the mentioned materials, also recovers textiles; the daily averages of recovery are similar to those of Vicente: 6 bottles of different kind, 7 pounds of aluminum, 20 pounds of paper and 20 pounds of textiles. These two workers of the street share the same limitations: little capacity to transport high volume of remainders, thus has suggested aid in order to increase the purchasing points, and manual vehicles.

According to the data obtained, a worker of the street could generate a monthly income (26 days of work) between \$ 120.00 and \$ 170.00 (\$USA).

Table N° 2
Daily recovery of Recyclable Materials by Worker of the Street

Material	Units or pounds	Amount (\$USA)
Glass	5- 10 units	0.25 – 0.50
Aluminum tins	12 - 15 pd.	2.40 – 3.00
Paper	20 – 25 pd.	1 – 1.50
Other (textile, etc.)	20-30 pd.	1 – 1.50
Totals		4.65 – 6.50

Source: Own processing, based on interviews to Workers of the Street, January of 2002

b) DIMAUD, REVISALUD and CREDESOL workers

The employees of DIMAUD (Capital City), REVISALUD (San Miguelito) and CREDESOL (Arraiján), also comprise of the recycling chain, since they separate and they keep materials for recycling that are find between the remainders that they gather throughout their routes: mainly clear and black bottles, cans, copper, bronze, newspaper and cardboard. The workers of the DIMAUD, REVISALUD and CREDESOL sell the located materials at purchasing points on their collecting route, but mainly to points settled at Cerro Patacón. The workers take care of not opening the red bags in which there are hospitalary remainders deposited.

For workers this activity is very profitable, because the operation costs are covered by the municipalities or companies that contract them, including their wages. Therefore, the sale of recyclable material means for them an additional net income. In addition, as they make the recovery during the collecting stage, they have the opportunity to take control of the best materials, before they arrive at Cerro Patacón. Taking into account these circumstances, the workers can assimilate in better conditions the losses in the prices of purchase. According to the information provided by a supervisor of the DIMAUD, a compacting truck would be generating monthly (26 days of work), between \$255.00 and \$382.00, which is approximately equivalent to the minimum wage of a municipal recollect.

Table N°3
Daily recovery of Recyclable Materials by Compacting Truck

Material	Units or pounds	Amount (\$USA)
Glass	10 – 15 units	0.50 – 0.75
Aluminum	20 – 30 pd.	4 - 6
Copper/Bronze	10 – 15 pd.	1.50 – 2.25
Paper	20 – 30 pd.	1 – 1.50
Soft Plastic	20-30 pd.	2.80 – 4.20
Total		9.80 – 14.70

Source: Own processing, based on interview to Supervisor of DIMAUD, January 25th, 2002.

2. Recovery on final disposition site by “pepenadores” at Cerro Patacón

The remainders collected by the DIMAUD and other such companies of the west of Panama City and San Miguelito, are spilled in Cerro Patacón’s sanitary landfill, where “pepenadores” do the recovery work. The recovered material are sold to representatives of the recycling companies; but mainly to the owners of small factories (“bunker”), located in an area near Cerro Patacón named “Mocambito”. The amount of “pepenadores” in Cerro Patacón varies, between 300 and 1,000 persons, including children.

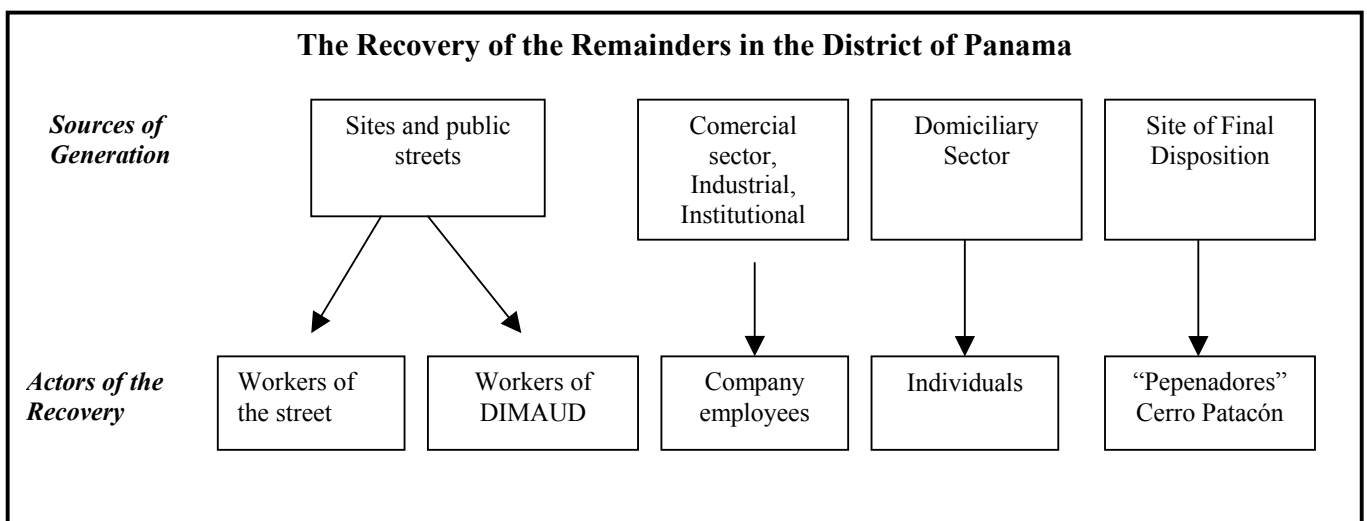
3. Recovery at the source by employees of private companies and government institutions

Different companies from the banking, commercial and industrial sector make the recovery and sale their remainders or authorize their employees to do this work. The remainders are stored in a determined area awaiting the pass of the vehicles of the recycling companies to come and undertake the corresponding transaction. Generally, the income generated in this activity is shared or given in it’s totality to the workers who do the recovery work; also it is destined to financing social activities for the employees. Some educative centers and communitarian organizations, periodically, make activities to recover and sell recyclable material, mainly paper.



COVISA S.A. is a small company created in 1991 that produces glass windows and has 12 employees. The remainders of the aluminum moldings (20 kilos monthly) are sold to INDRESA to \$0.35 the kilogram. Possibly the material, that will be finally recycled in the United States, will return to COVISA as imported raw material.

Additionally, an undetermined number of people recover materials at their homes and in urbanized areas, who sell occasionally to purchasing points or directly to the recycling industries.



II. STORING AND RECYCLING

After recovered, the material go through an intermediation structure until arriving at the final consumer.

1. The direct purchase

The recycling companies make the direct purchase of reciclable material to private companies and institutions, sending for such effect, their own vehicles. However, as the separation in the source is made in small scale, the direct purchase does not contribute significant volumes of materials. In addition, when the recycling company makes the direct purchase, the price of purchase will be the lowest of the market, which is not a stimulus to those who recover directly in the source.

An example of this is Fundidora Istmeña, S.A., a company created in 1990 that at the present time has 16 employees. This company produces tablets and also industrial aluminum pieces, copper and bronze, which are sold to government institutions. The company purchase directly from individual suppliers clean, dirty and soft aluminum, bronze and copper.

2. Purchasing Points



There are two kinds of purchasing points: those that are establish by the recycling industries, and those that are property of small retailers; they are located in Panama District but the main ones are in Cerro Patacón. The suppliers for the purchasing points located in the city are the workers of the street and the employees of the DIMAUD; the material is given, generally, in bags and it's preclassified, not very clean and somewhat mixed. After it is weighed, the material is paid in cash. The points of purchase in the capital city are not permanent, they are opened and closed periodically; some

specialize in the purchase of certain material, but the majority accepts all type of recyclable material. The required investments are minimum: a physical space not very big, the **weight** and, mainly, availability of cash, since it has to do with retail trade.

The more important purchasing points are located in Cerro Patacón. In this place the material recovered by the "pepenadores" and workers of the municipality of Panama, San Miguelito and the west of Panama City are directly sold to representatives of the recycling companies that come to the sanitary landfill, but specially to the owners of small factories or "bunkers" (close to 30), located in an area near Patacón denominated Mocambito. The main commercialized materials are white paper, newspaper, aluminum cans and wood. The white paper, one of the main materials of buy / sale, is separated and packed in plastic bags by workers who earn a wage of \$5

per day, to have it directly available for the owners of the recycling factories or to the companies of recycling that arrive with their trucks to Cerro Patacón.

3. The Recycling Factories

The purchase points (with exception of that they are property of the recicladora industry) sell the materials gathered together to the factories of recyclings in where the workings of cleaning, classification, crushing and packing are made. The workers of these factories are in charge of which the material reuna the requirements demanded by the recicladora industry, specially in terms of its purity. Once classified, the material is crushed or compacted, ready for the sale.

The proprietors of these factories must make investments of certain spread, because the costs include payment of wages to the workers, acquisition of machinery for the packing workings and crushing and payment of taxes. Such they consider that the recicladora industry does not have



capacity to make its work, because this phase of the process is not to him profitable economically. On the other hand, some of these strategic proprietors have established alianzas with the purchase points or bunker. of Patacón Hill: sometimes they advance cash to them so that they can conserve the capacity of purchase to pepenadores. and municipal recolectores, and of this form the supplying of raw material is not interrupted. In addition, they must pay a municipal tax that depending on the type of business oscillates between 300,00 B / and B / 500,00 monthly ones so that

they can operate in Patacón Hill; this authorization is extended to the proprietors of bunker., providing legal cover to them to its operations.

PROCESOS AMBIENTALES (Environmental Processes) is an excellent example. This company occupies a central position in the cycle of recycling: it buys white, periodic paper, glass, cardboard and plastic directly to the recuperators; these materials are classified, cleaned, crushed and empaçados and resold the recicladoras industries. Also it exports part of the plastic directly to the United States and Costa Rica.

Another case is the one of **INDRESA**, a company that buys aluminum tins, aluminum scrap iron, glass lead, bottles, bronze, copper, batteries, paper and plastic. **INDRESA** obtains their materials Patacón Hill and has a point of purchase in their own facilities. The plastic sells it to Eco-Platics. The bottles that can be reused are given back to the manufacturers. The glass is sold to Panamefios Glasses. The metal products are exported.

4. The recycling industry Material

The classified and without impurities, compacted and empaçado is sold by the factories of recycling the you train to be put to under different material industrialist processes depending on

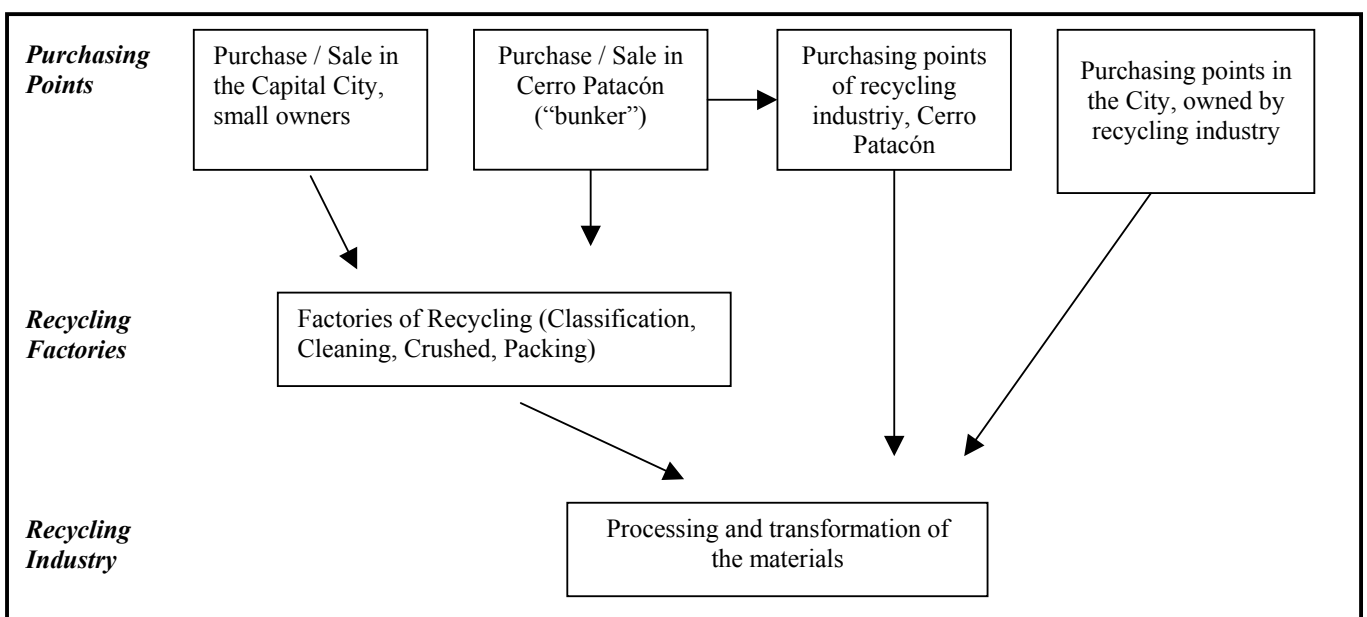
the type of. Between the factories of recycling and the industrialists to complicated relation exists: in some you marry, ace it happens with the recycling of the to paper, the industrialists assign to factories one quota monthly minim of 200 tons of remainders, because below this volume the factories would operate with losses. But the most conflicting subject is the related one to the prices of the material, which very is determined by the tendencies of the international market. Although the recycling factories successively to transfer the losses in the leaves prices to the purchase points and asi until arriving AT the last Link of the chain: the workers of the street, pepenadores. and the workers of the harvesting.

An example of recycling industry is Vidrios Panameños S.A.. This company initiated operations in 1979 and has 350 workers at the moment. It is the only company that makes glass bottles in Panama; their clients are the embotelladoras companies of drinks and foods, in the national and



international scope. He produces bottles of brown color, used generally by the companies of beer, those of clear color by the food and gaseous drink companies, and those of green color for other gaseous drink companies. Also he produces recorded flat glasses. 480 Panamanian glasses ton/mes of glass remainders buys to Environmental Processes, which means 10% of the used raw material. 60% of the production are destined to the international market (Central America, the United States, Canada and Spain).

Acopio y Reciclaje de Residuos Solidos en el Distrito Capital, Panama



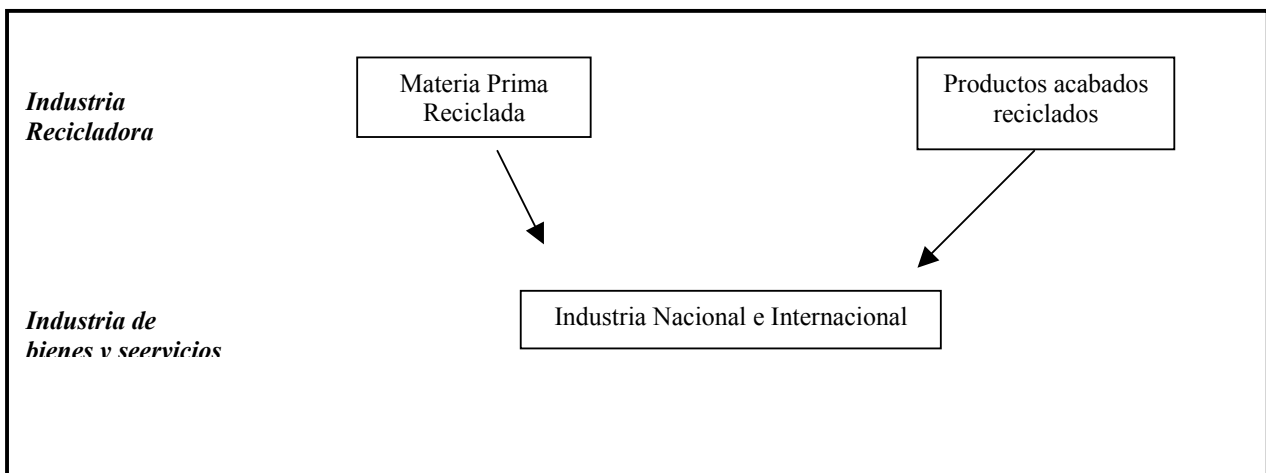
III. FINAL CONSUMPTION OF RECYCLED PRODUCTS

The recycling industry produces raw material for industries national and international and products also finished for the final consumption. The fundidoras recycle the metal remainders and they sell it in ingots to small industries that make tablets, boards and other articles; whereas an important part of the fused material is exported in ingots. The glass industry finds the material provided by the recycling factories and it uses as raw material to produce glass packages that soon are sold in the national and international market. The industry wastebasket turns the remainders into an ample variety of products for the national and international market: also it supplies to national industries that produce paper bags.

An example is Bolsas y Cartuchos de Papel, S.A., which was created in 1950 and at the moment it has 60 employees. This company buys in average 4 tons to him annual of recycled paper to IPEL, S.A. As well, one of its main buyers is the chain of McDonald's restaurants, which uses the bags of recycled paper for the packing of the fast food.



Final consumption of the Remainders Recycled in the District of Panama, Panama

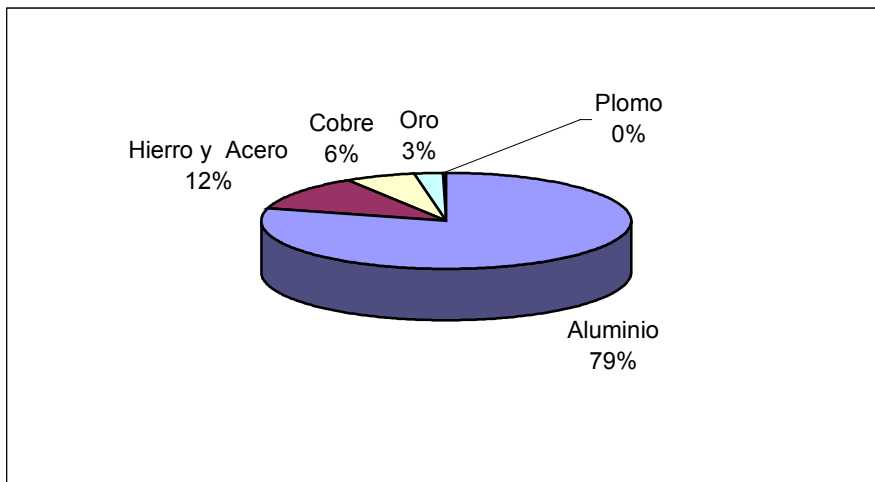


CHAPTER II
THE RECYCLING OF THE REMAINDERS IN THE DISTRICT OF PANAMA SEGUN
TYPE OF MATERIALS

I. METAL

Between 1996 and September of 2001, the F.O.B. value of the exports of metal remainders ascended to \$USA 48.6 million. The greater percentage corresponded to the remainders of aluminum (79%) and in minor proportion iron and steel, copper, gold and lead as it is observed in the following graph:

Graph N° 1
Distribution of the exports of metal remainders, 1996 - Sept. 2001
By type of material and F.O.B. value (\$USA)

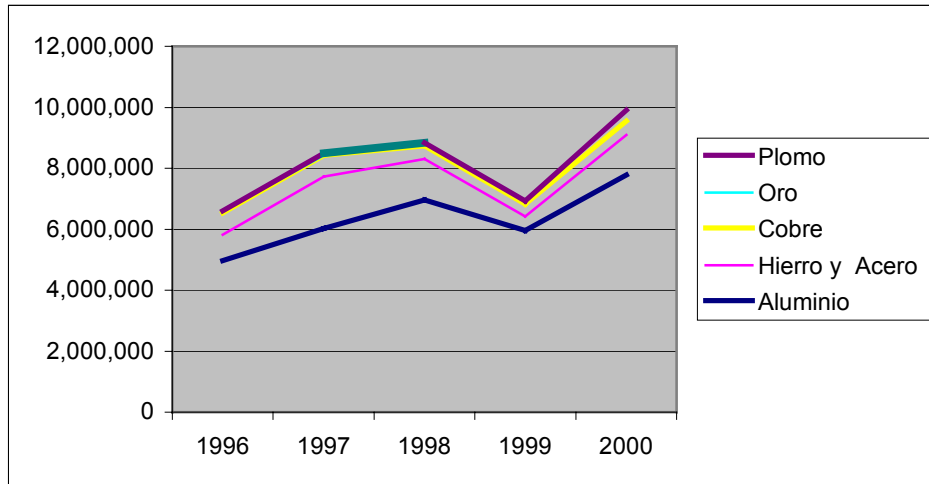


Material	F.O.B. Value (\$USA)
Aluminum	38,429,015
Iron and steel	5,817,782
Copper	3,061,028
Gold	1,233,656
Lead	80,113
Total	48,621,594

Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

Graph N° 2
Evolution of the exports of metal remainders, 1996-2000
By type of material and F.O.B. value (\$USA)

The exports indicate a clear ascending tendency as it indicates the following graph:

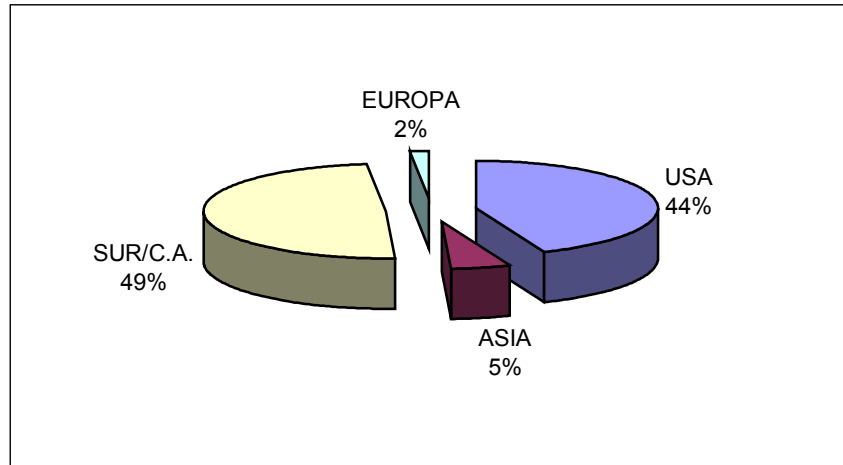


	1996	1997	1998	1999	2000
Aluminum	4,972,327	6,032,543	6,956,279	5,951,973	7,777,606
Iron and steel	841888	1700171	1342279	467723	1310431
Koper	718,961	686,928	428,563	409,373	469,301
Gold	78025	11500	107375	96750	339360
Lead		65368			14745

Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

The exports go mainly to the United States and Central and South America, although in the last years the countries of Asia are acquiring a greater importance in the purchase of metal remainders.

Graph N° 3
Destins of the exports of metal remainders, 1996–Sept. 2001
F.O.B. Value (\$USA)



	Total	Aluminum	Iron/Steel	Copper	Gold	Lead
USA	48620979	33989896	13485664	782133	284,173	79113
ASIA	5825829	2991055	682378	2152396		
SOUTH/C.A.	54391220	322765	53970276	98179		
EUROPA	1703435	122460	1539000	20975	20,000	1,000

Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

1. Aluminum

Three sources of aluminum remainders exist in Panama:

- ♦ The “old” iron scrap retailers: aluminum products that have been used and later collected to recycle. This includes pieces of automobiles, signals, radiators, doors and windows.
- ♦ The industrialists who sell the leftovers of the production (chatarra new.); and
- ♦ The recolectores of drink tins.

The recycling factories maintain aluminum tins separated from scrap of iron, although both products are compressed, packed and numbered for the sale. 95% of aluminum tins from softdrinks recovered is used for the preparation of aluminum plate, from which new tins will be made; process that is made outside the country. The rest is fused and turned into ingots. The prices of the aluminum remainders in the national market have stayed relatively stable:

Table N° 4
Prices purchase of aluminum remainders, 2002
(In \$USA/pound)

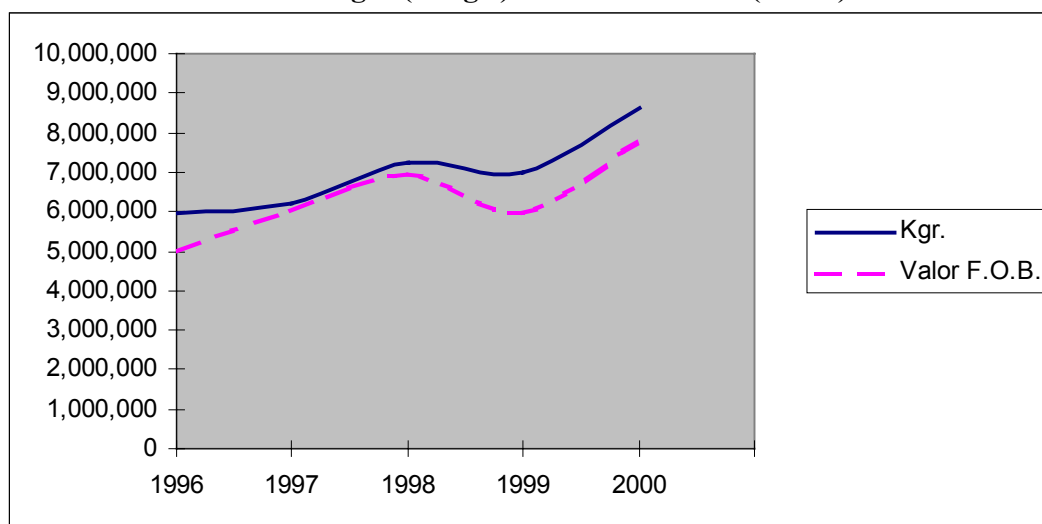
Product	\$USA/Pound
Aluminum Radiators	0.20
Aluminum Scrap	0.24
Aluminum Tins	0.20

Source: Own processing,

The aluminum remainders have become one of the key factors of the recycling industry in Panama. This could obey to two fundamental factors: a) an abundant offer of aluminum tin remainders, specially as result of the high indexes of beer consumption. Indeed, the consumption per capita in Panama is of 47 liters annually, whereas in the rest of Central America it is 18,5 liters; b) on the other hand, there is an increasing demand of this material on international plateau. A report from Merrill Lynch, indicates that the aluminum continues positioning itself as one of most solid of the metal sector, as a result of the reduction of the inventories and a firm demand.

This is reflected in the tendency to the rise of the exports of aluminum remainders in Panama, with relatively stable F.O.B. prices, oscillating between \$0.83/kgr. and \$0.97kgr. as seen as follows.

Graph N° 4
Exports of aluminum remainders, 1996–2000
Gross weight (in kgr.) and F.O.B. value (\$USA)



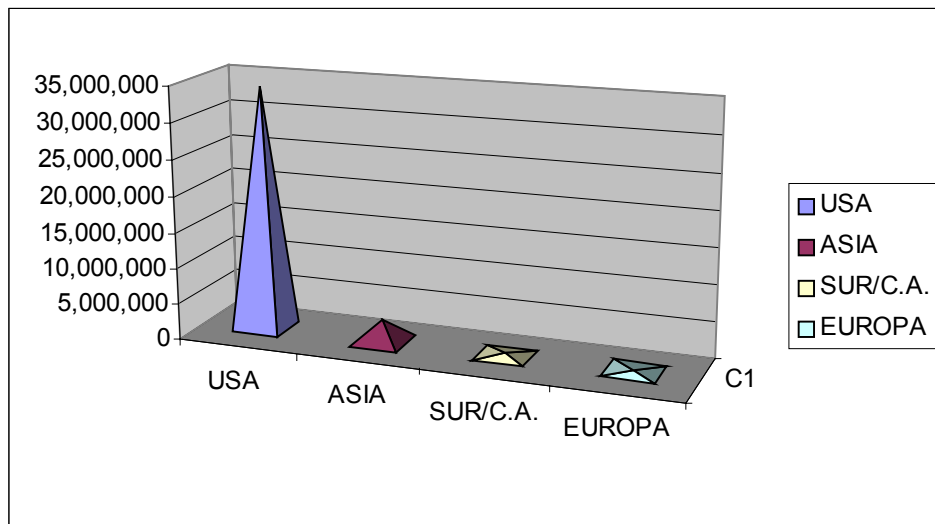
	1996	1997	1998	1999	2000	2201
Gross weight (Kgr.)	5,970,062	6,196,057	7,227,433	6,977,222	8,634,061	6,738,287
F.O.B. Value	4,972,327	6,032,543	6,956,279	5,951,973	7,777,606	6,740,488
Kgr./\$USA	0.83	0.97	0.96	0.85	0.90	0.85

Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

The exports of aluminum remainders go mainly to the United States, although several Asiatic countries are becoming important buyers (Popular China, Taiwan, Japan, South Korea and Hong

Kong). The Latin American market occupies a marginal position. According to information provided by owners of recycling factories, a part of the aluminum remainders sent to the United States is re-exported to Asian countries.

Graph N°5
Destiny of the Exports, F.O.B Value (USA), 1996 – Sept. 2001



Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

2. Iron And Steel

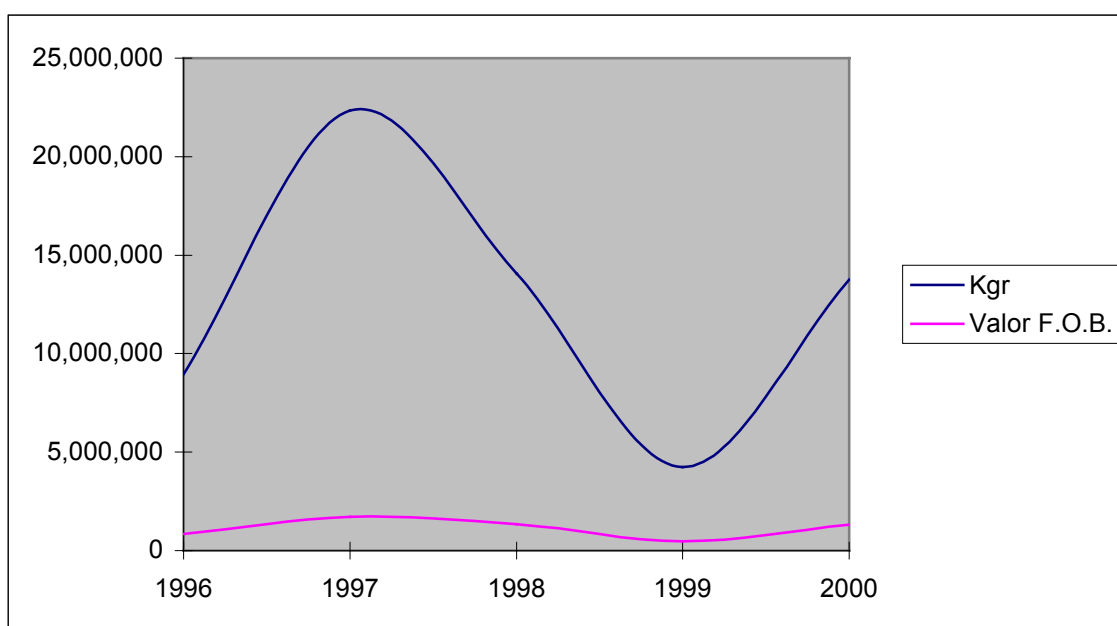
The remainders of iron and steel that Panama exports are of two types:

- ♦ *Fast industrial iron scrap*: This iron scrap is the remainder of the production process that takes place in the factories that process steel products. Some manufacturers export the industrial iron scrap directly.
- ♦ *Obsolete iron scrap*: it comes from steel products that already rendered their life utility like old cars, household-electric, covers, kitchen sinks, railway equipment, etc. These articles are collected, classified and process. The processing level depends on the necessities of the buyer. Some articles are only put under classification and returned to load. In other occasions, the processing includes cutting, shearing, packing or crushing.

Like all the metals, the exports of iron and steel remainders reflect a tendency to the rise, in spite of a strong reduction in 1999.

Graph N° 6
Exports of remainders of Iron and Steel, 1996. 2000

Gross weight (in kgr.) and F.O.B. value (\$USA)

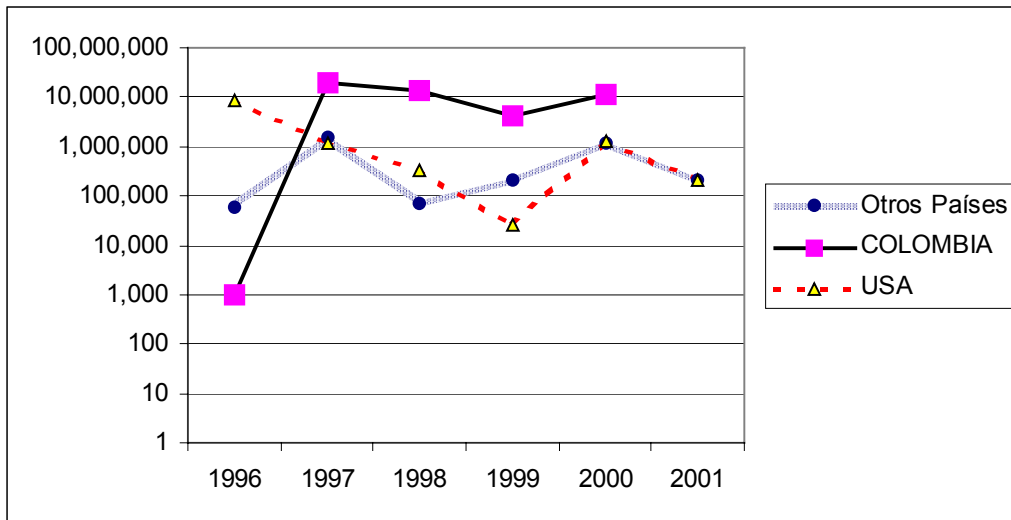


	1996	1997	1998	1999	2000
Kgr.	8,968	22,340,745	14,065,520	4,249,860	13,760,345
F.O.B. Value	841,888	1,700,171	1,342,279	467,723	1,310,431
Kgr./\$USA	0.09	0.08	0.09	0.11	0.09

Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

The exports are concentrated more recently in the United States and in Colombia. In the last two years it has happened an increasing presence of Colombian industrialists in the sector of the solid remainders of Panama. The scrap iron harvesting and export from steel to its country of origin have given to a fort impulse to the exports of metal remainders.

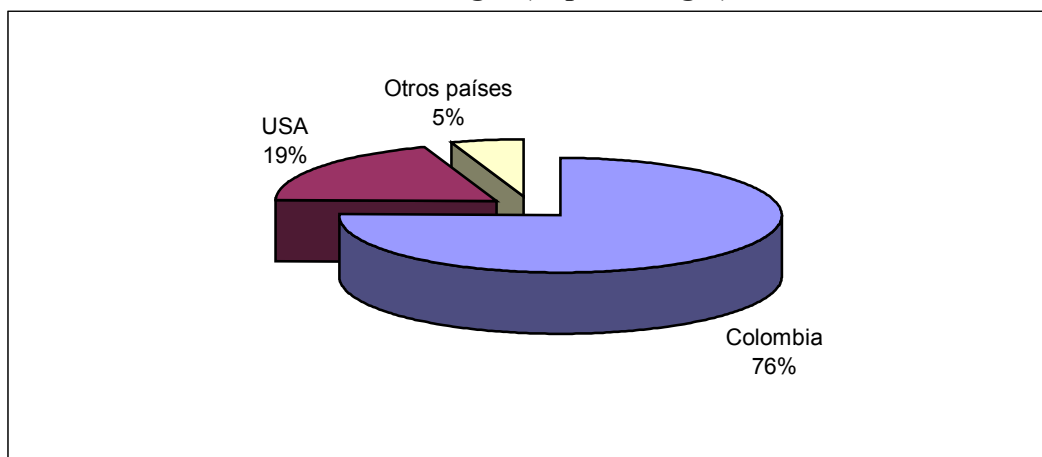
Graph N° 7
Exports of remainders of Iron and Steel to the United States,
Colombia and Other Countries, 1996–Sept. 2001
Gross weight (in kgr.) and F.O.B. value (\$USA)



Exports in Gross weight (Kgr.)							
	1996	1997	1998	1999	2000	2001	Totales
Other countries	59,531	1,543,125	69,500	201,280	1,225,595	200,257	3,299,288
COLOMBIA	1,000	19,585,620	13,733,430	4,022,580	11,247,780		48,590,410
USA	8,907,800	1,212,000	330,090	26,000	1,286,970	207,090	11,969,950

Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

Graph N° 8
Participation Colombia, the United States and Other Countries in the exports of
remainders of iron and steel, 1996–sept. 2001
Gross Weight (in percentages)



Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

3. Copper and Bronze

The copper remainders that recover in Panama are of 3 types:

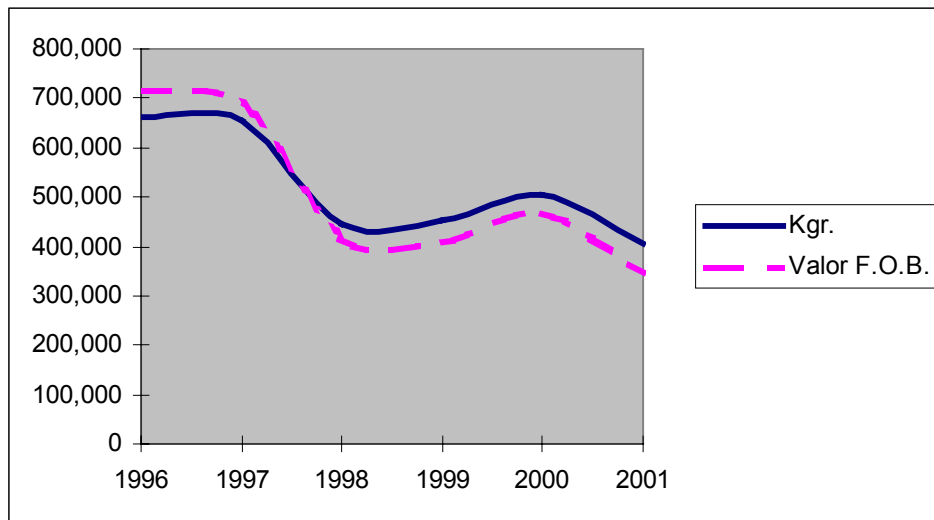
No. 1 Copper: of little use, an almost virgin metal, since it is obtained from the electrical layings, in pipes or laminae.

Copper No. 2: of little use, but its resistance is weaker.

Copper No. 3: it is properly the copper remainder. It is mainly copper radiators. They are of gray color on the outside and on the inside they have copper pipes, they are obtained from air conditioners, cold rooms, in the ends have iron layers that are taken off in order to pack them, they are in all of the sizes. Also it includes “Burning”, all material of the electrical communications layings, which are burned thus to obtain copper.

The exports of copper remainders register a tendency to the loss. This could respond to a loss of the international price as a result of the growth of the Chilean production of 8% as of 1998, a greater production of the German refineries and the discovery of important deposits in Canada.

Graph N° 9
Exports of copper remainders, 1996–Sept. 2001
Gross weigh (in kgr.) and F.O.B. value (\$USA)

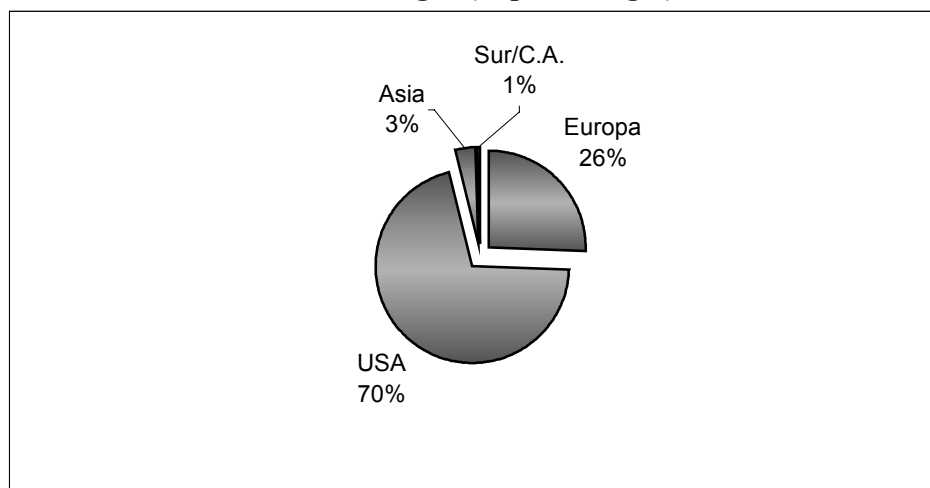


	1996	1997	1998	1999	2000	2001	Totales
Kgr.	660,896	653,999	443,664	454,729	504,924	406,720	3,124,932
F.O.B. Value	718,961	689,001	419,145	409,373	469,301	347,902	3,053,683
\$USA/Kgr.	1.08	1.05	0.97	0.90	0.93	0.85	

Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

The exports go mainly to the United States, although the European market is important.

Graph N° 10
Percentage of participation of Colombia, the United States and Other Countries in the
exports of remainders of iron and steel, 1996–Sept. 2001,
Gross Weight (in percentages)



Europe	782,133
USA	2152396
Asia	98,179
South and Central America.	20,975

Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

The situation in the international market has caused a reduction in the prices in the national market.

Table N° 5
Comparison of buy/sale prices of copper remainders, 1997–2002 REMISA, S.A.
(In \$USA/Pound)

Material	Buy Price		Shipping Price	
	1997	2002	1997	2002
Copper	B/.0.50	0.30	B/.0.65	0.40
Copper Radiador	B/.0.25	0.20		

Source: Own processing. The 1997 data were taken from: CASTILLO, YOLANDA ESTHER & TAYLOR ORTEGA, Mylene. 1998. Diagnosis of the Process of the Sweepings in the Metropolitan Area: Period of 1903–1997, 1998, Graduation Work, University of Panama.

The **bronze** remainders come from different types from articles:

- ♦ *Yellow Bronze.* It is used more, it is obtained from the kitchen sinks, ironworks products
- ♦ *Red Bronze.* Resistant, used in great pipes and water passage keys
- ♦ *Key.* Better known as faucets for the water

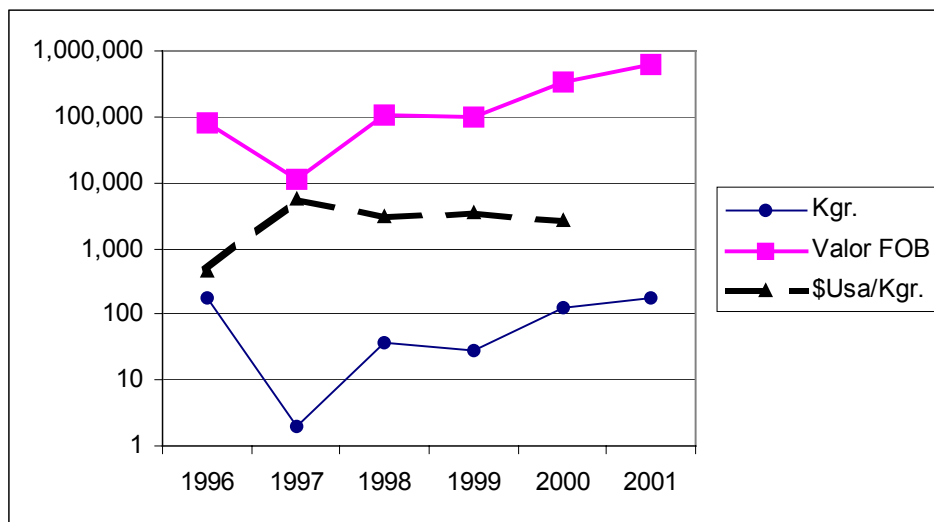
- ♦ *70/30*. It is the most resistant, used in nipples, pressure gauges, valves for oxygen and gas tanks
- ♦ *Sockets*. It is the part that remains when a bullet goes off
- ♦ *Special Red*. Is used in special industrial and commercial pieces.
- ♦ *Bronze Radiators*. They are of a brown color. They are obtained from the automobiles, used to refresh the motor, the ends are completely bronze. The prices for the bronze remainders, in the national market, are similar to those of copper: \$USA 0.30 the pound.

4. Gold

The national accounts also register exports of gold remainders. They appear under the numeral 7112,10,0 as “waste and remainders of gold or plated gold, with exclusion of the ashes of orphebrery that contain precious metals”; also numeral 7112,90,00 talks about to “the other waste and remainders of precious metals or of plated precious metals”. The values in this last case are insignificant.

From 1996 to September of 2001, a total of 553 Kgr. was exported with a F.O.B. value of \$USA 1,233,656. A clear increasing tendency of the exports of this material exists as it is observed next:

Graph N° 11
Exports of gold remainders, 1996 – sept. 2001
Gross weight (in kgr.) and F.O.B. value (\$USA)



	1996	1997	1998	1999	2000	2001	Totales
Kgr.	171	2	36	28	124	174	535
FOB Value	78,025	11,500	107,375	96,750	339,360	600,646	1,233,656
\$Usa/Kgr.	456.28	5,750	2,982.63	3,455.53	2,736.77	3,451.98	

Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

The exports have as main destiny the United States, and only in 1997, 2 kgr. were exported to Greece with a value F.O.B. of \$USA 11,500

5. Lead

The lead is a remainder that is usually generated in underground telecommunications works. Small amounts of lead remainders were exported to Costa Rica (22,294 kgr.) and the United States (170,887 kgr.), in 1997 and 2000. It is a material that occupies a marginal position in the assembly of recyclable metals. Although the price of the kgr. was practically duplicated. The price of purchase of the lead remainders in the national market is of \$USA 0.20 the pound.

Table N° 6
Exports of remainders from lead to the United States and Costa Rica, 1997 and 2000
Gross weight (in kgr.) and F.O.B. value (\$USA)

	1997		2000	
	(Kgr.)	(\$USA)	(Kgr.)	(\$USA)
United States	150,887	64,368	22,294	14,745
Costa Rica	20,000	1,000		
Kgr/\$USA	0.38		0.66	
Totals	170,887	65,368	22,294	14,745

Source: Own processing, Data taken from: General Controller, Direction of Statistics and Census. Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000, Sept. 2001.

6. The Companies of the Sector

Unlike the recycling of the paper, controlled by two great companies, in the sector of metal recycling there is a greater number of recycling factories, that are divided in two sectors:

- a) Companies that do the cleaning, packaging and exporting of industrial metal iron scrap, where Reciclajes del Istmo, S.A. and Acero Panamá, S.A. excel.
- b) Companies that clean, package and export remainders of all type of metal: tins of aluminum, aluminum scrap, iron, tin plate, steel, copper, bronze and lead. In this group, Forjas Técnicas de Panamá (FORJATEC), Industrias de Reciclaje, S.A. (INDRESA), Reciclajes de Metales, S.A. (REIMSA), and Metal Group S.A. excel.



REIMSA S.A. is a leading company of the sector. Created in 1997, at the moment it has 30 workers, it exports 560 tons of aluminum and 880 tons of copper and bronze annually and its sales ascend to \$USA 1 million. The material arrives at the company, from the purchasing points, in black, transparent or white bags, containing material such as: copper, aluminum bronze, aluminum tins, lead, bronze radiators, etc.

Table N° 7
REIMSA S.A: Exports of aluminum remainders, copper and bronze, 2001
In tons, price of purchase and price of boarding (\$USA)

	Ton.	Price of boarding		Price of purchase
		Ton.	Kgr.	Kgr.
Aluminum	560	\$USA 850	\$USA 0.85	\$USA 0.20 - 0.25
Koper/Bronze	280	\$USA 880	\$USA 0.88	\$USA 0.30

Source: Own processing. Data provided by Mr. Rubén Nieto, Administrative Manager. REIMSA, S.A.

All the metals are distributed to their different sections, for all the process of recycling. The aluminum tins go through a transporting machine that consists of a pulley staggered with a magnetic roll at the end so that the iron tins are rejected, and other materials like tins from softdrinks are removed at another point. The tins are compacted in machines with a weight from 1,200 to 1,600 lbs. of pressure by inch, producing 45 to 70 lbs bulks. The copper is packed in tanks of 55 gallons or in packaging machines with more than 2 thousand pounds of pressure, producing bulks which weigh 1,500 to 5,000 pounds.

REIMSA eliminated the practice of retail purchasing of materials because of fiscal reasons: the Ministry of Economy and Finances (Ministerio de Economía y Finanzas) demands that all movement of buy/sale must be registered properly in invoices. Being it, basically an informal activity, the purchasing point, it was not feasible in administrative and financial terms. Therefore REIMSA buys from the established purchasing points.

In the opinion of the REIMSA's representative, in spite of the economic crisis that affects Panama, the recycling market is in expansion and new companies are arising. Nevertheless, he considers that the recycling of paper is more profitable.

He considers that the Asian market cannot be accessed because the Panamanian companies are not in capacity to cover demands of materials. In order to increase the volume of the exports in the future the fusion of companies of aluminum recycling could take place.



Metal Group S.A., represents a recycling factory of recent constitution. It was created in year 2000, it has 12 workers, processes and exports 80 tons of aluminum and copper/bronze and registers annual sales of \$USA 65,000.

Forjas Técnicas de Panamá S.A. (FORJATEC), was founded in 1995, has 40 workers and processes bronze remainders, copper, aluminum iron scrap, stainless steel, tin plate and lead. The annual sales ascend to \$USA 1,5 million.

Everything is exported, mainly to the United States.

INDRESA deals iron scrap and aluminum tins, copper, bronze and lead. Besides dealing with metals, it deals with plastic and paper. INDRESA uses workers who directly buy materials from the collectors of sweepings in Cerro Patacón and from the factories at Mocambito.

II. PAPER

In Panama a strong demand of remainders of paper and cardboard for the recycling exists, because he is but profitable that the pulp of virgin paper. The products that are recycle include cuts of paper (leftover of the process of production in plant and printers), paper of used office, newspapers, portafolios of Manila, cardboard, mixture of paper of remainders like lottery tickets, etc.

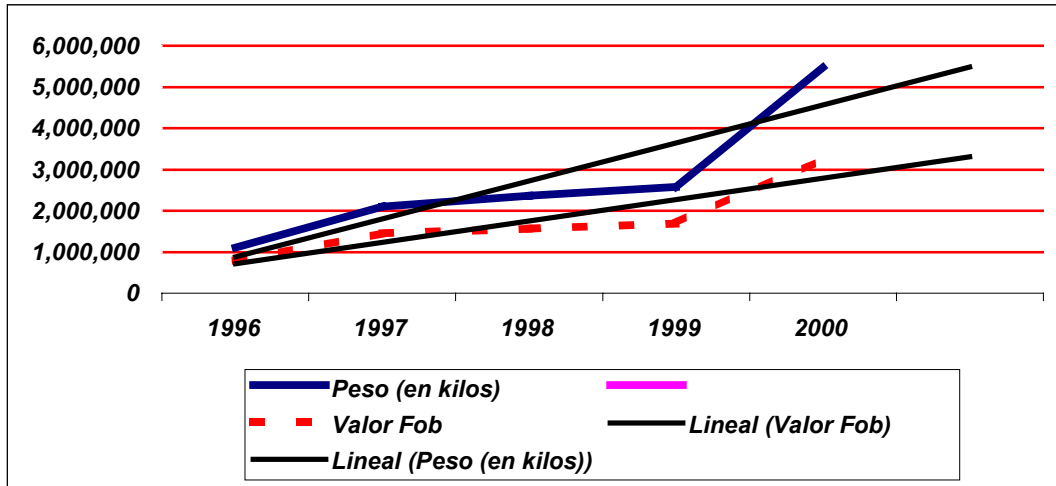
1. The international market

Moldeados Panamenos, S.A. (MOLPASA) located in Via Tocumen, is the only Panamanian company that recycle newspaper and their main product is the cardboard packages for eggs. This company is subsidiary of the company Andean Moldeados C.A. (MOLANCA) of Venezuela, company that is partner of Carvajal S.A.. was constituted under the laws of the Republic of Panama. It initiated operations in 1993 and its main activity is the production and sale of packages for the bird-raising industry in the lines of separators and cases.

MOLPASA received the Exporting..Empresa prize of Year 2000., in recognition to its enterprise vision, its strategy of trade and growth. MOLPASA uses clean and dry newspaper, and paper for their process of production. The paper is placed in a great tank in which it is crushed and mixed with chemistries and water. This mixture happens soon through a cleaning processing to make sure that it does not have polluting agents. Next, the pulp is used to produce the end item, or are dispensadores for eggs or containers of glasses.

The egg packages are exported mainly to Central America as it is observed in the Graph No. En year 2001 was constituted in República Dominicana Moldeados Dominicano S.A. (MOLDOSA), with an investment of more of US\$2 million, a subsidiary company of MOLANCA that works under the regime of special frank zone and that is dedicated to the egg cardboard manufacture. Obvious, the Dominican market will be supplied in the future by MOLDOSA. To a great extent the strength of the sector is in the growth of the exports of Molded Pulp Packages To carry Eggs, so and as obseva in the following graph:

Graph No. 12
Exports of molded pulp packages to carry eggs, 1996 2000
Considered in weight (Gross) and F.O.B. Value

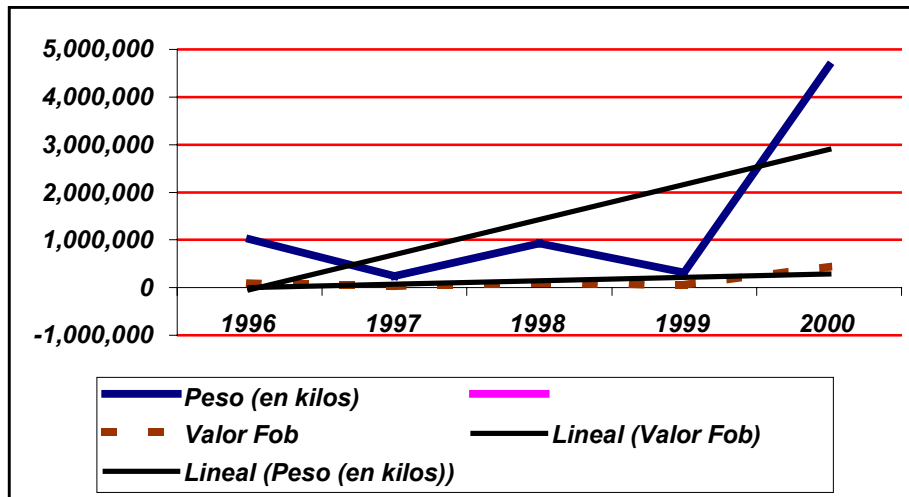


Source: Own processing, Data taken from: General Controller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

The exports went from 1.106 tons in 1996 to 5.470 in 2000, experiencing a growth of 400% in 5 years. Whereas the value (F.O.B.) of the exports, in the same period, went from \$USA 794,355 to \$USA 3,265,395, an increase of 300%.

However, the exports of paper remainders and crude and corrugated Kraft cardboard; as well as newspaper and similar forms, between the years 1996 and 2001 have been characterized by an irregular behavior. In 1996, 1,010,876 Kgr. were exported with a value F.O.B. of \$USA 97.306, but as it is observed in Graph No. 2, in 1995 a drastic drop took place, because only 245,638 Kgr. was exported. After a recovery in 1998, another fall in 1999 to take place, although a recovery was 2000 is observed that continued in 2001, because to September 4,488,893 Kgr. had been exported with a value F.O.B. of \$USA 354,596.

Graph N°13
Exports of remainders of paper and Kraft cardboard crude and corrugated, newspaper and similar forms, 1996 2000
Considered in weight (Gross) and F.O.B. Value



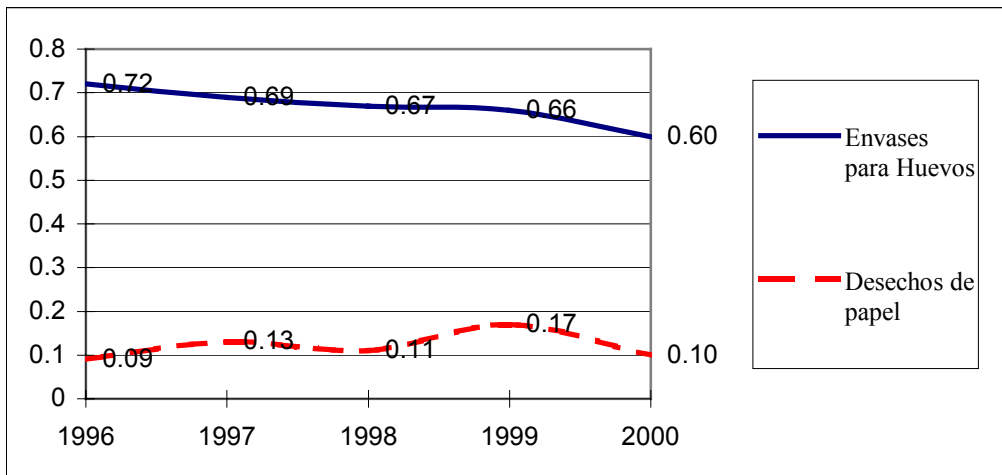
	1996	1997	1998	1999	2000
Peso Bruto (en kilos)	1,010,876	245,638	923,324	318,112	4,650,189
Valor F.O.B.(\$USA)	97,306	32,580	97,743	52,970	447,746

Source: Own processing, Data taken from: General Controller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

The international price of the cardboard packages for eggs has experienced a not so hard fall, going successively from \$USA 0.72 Kgr. in 1996, to \$USA 0.69 in 1997, \$USA 0.67 in 1998, \$USA 0.66 in 1999 and \$USA 0.60 in 2000. The price of the remainders of paper in the same period had rises and losses, with the highest price of the period standing out in 1999 (\$USA 0.17/Kgr.) with an abrupt fall in 2000, to arrive at \$USA 0.10/Kgr.

Graph N°14

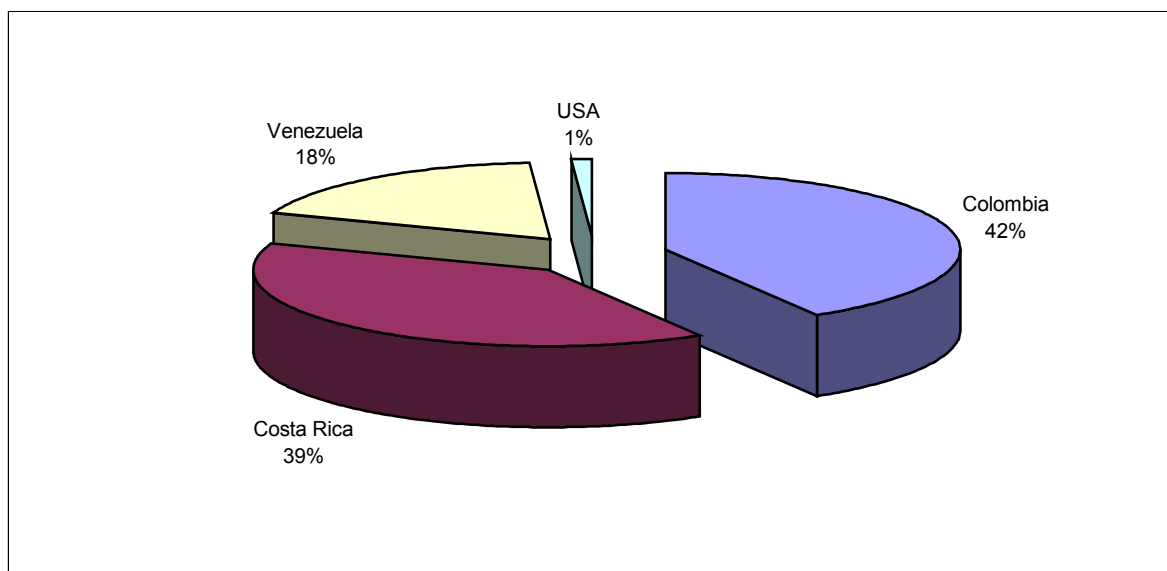
Evolution of the Price of Exports of Molded Pulp Packages to carry Eggs and Reminders of Paper and Crude and Corrugated Kraft Cardboard, Newspaper and Similar Forms, in \$USA/Kgr. 1996 – 2000



Source: Own processing, Data taken from: General Controller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

The exports of paper remainders went mainly to 4 countries: Colombia, Costa Rica, Venezuela and the United States. Between 1996 and September of 2001, 10,575,252 Kgr. were exported, distributed as follows: Colombia, 4,373,210 Kgr.; Costa Rica, 4,122,015 Kgr.; Venezuela, 1,257,936 Kgr., and the United States, 115.190 Kgr. A marginal export is registered to Ecuador (19.190 Kgr.) and Peru (22.000 Kgr.).1996 2000.

Graph N° 15
Countries destiny of the Exports of the Reminders of Paper, 1996. 2000
Percentage of participation



Source: Own processing, Data taken from: General Comptroller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

On the other hand, in the same period, 15.317.536 of kilograms molded pulp packages to carry eggs were exported to seven countries: Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua and Dominican Republic.

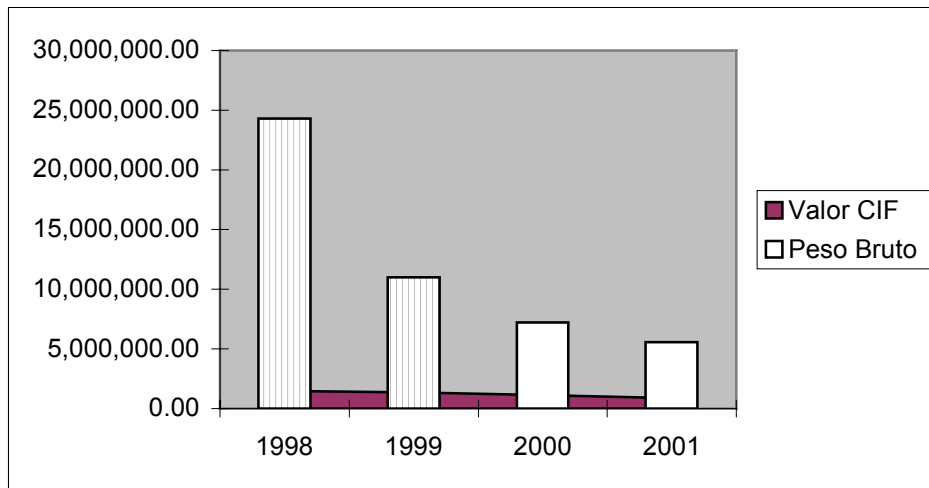
Table N°8
Destin of the Exports of Molded Pulp Packages to carry Eggs
1996–2000 in Kgr. (Gross Weight)

	1,996	1997	1998	1999	2,000	TOTALS
TOTALS	1,106,034	2,102,045	2,358,856	2,581,635	5,470,894	15,317,536
Costa Rica	185,025	310,438	598,390	648,292	3,420,207	5,693,496
Ecuador		8,740				8,740
El Salvador	165,748	277,170	159,914	421,377	518,661	1,717,377
Guatemala	469,312	702,683	692,262	706,034	951,961	4,427,650
Honduras	1,587	17,780	35,560	22,767	41,560	149,610
Nicaragua	32,420	70,658	53,178	62,229	140,911	400,885
Dominican Republic			819,552	720,936	397,594	1,953,260

Source: Own processing, Data taken from: General Comptroller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

Meanwhile, the volume of the imports of paper remainders and cardboard mainly show a decreasing tendency, because the price is possibly significantly higher, mainly because the recovery of these materials within the country has been increased.

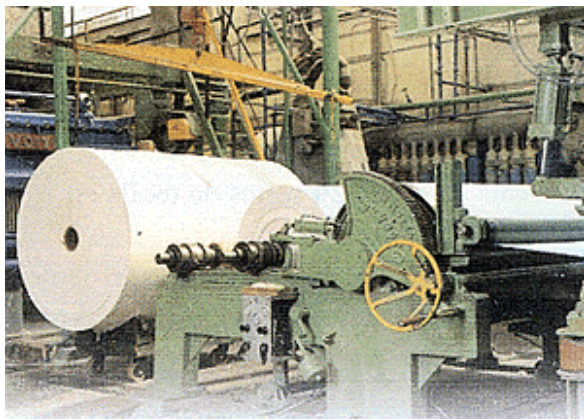
Graph N°16
Imports of remainders of paper and cardboard, 1998–nov. 2001
Gross Weigth (in Kgr.) and CIF Value in \$USA



	CIF Value	Gross Weight
1998	1,460,242.71	24,325,558.87
1999	1,353,552.79	11,012,351.67
2000	1,115,680.28	7,226,848.92
2001	867,583.44	5,583,848.00

Source: Own processing, Data taken from: General Controller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

Other important products of export that include paper recycled componentes are the toilet paper, napkins and towels, produced mainly by Papelera Istmeña S.A..



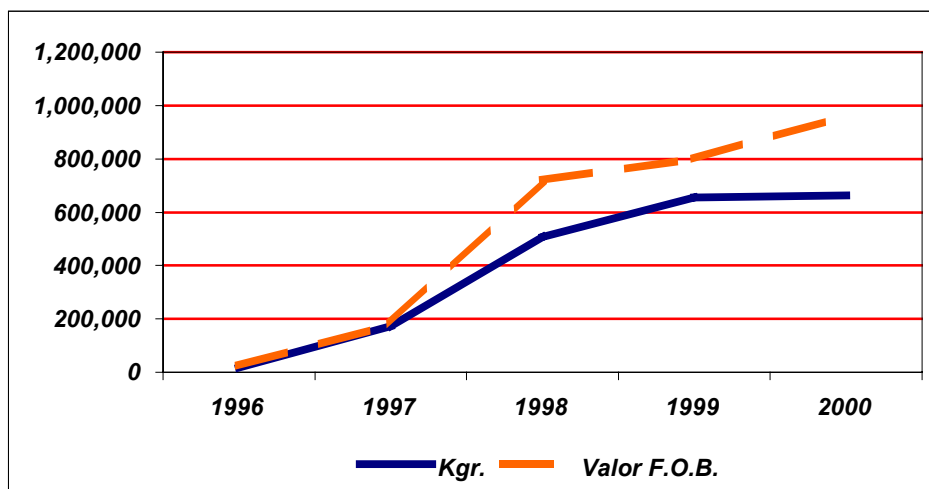
In agreement with the official version of the company, Papelera Istmeña, S.A., founded in 1958, for the manufacture of toilet paper and napkins, with the conversion of great coils of imported paper. Soon, the manufacture of paper towel is added, and recently, face handkerchiefs. As a result of the increase of the volume of production, in 1967 new installations were acquired. In 1969 it established a strategic alliance with Molino Panameños de Papel, S.A.(MOLPASA), which supplies Papelera Istmeña with huge coils of paper, with an

approximated weight of 1,800 pounds for its later conversion. The production process begins, placing products of paper in a great tank to which soap, water and chlorine is added; this mixture "is beaten" until obtaining a semifluid consistency. Aside from the paper remainder, around 10% of virgin Kraft paper is added to the mixture. Different remainder from paper is used, according to the type of product that is going to be made. For example, for the panamanian and ecuadorian markets, only white paper is used, since there is no market for colored toilet paper in these countries. Nevertheless, it is possible to mix certain amount of paper of color and newspaper if the final items are destined to other Central American markets.

Next, the mixture is put under a process of ink elimination. In this stage, a foam takes place in which the ink floats, whereas the heaviest fiber sinks to the bottom of the tank. The mixture goes through soon through several "cleaning" tanks to eliminate the impurities and any polluting agents that have been able to mix themselves with the paper remainders of later consumption. The last impurities are finally "slipped" and the fiber is processed until becoming paper products for consumption.

The behavior of the exports of press paper in coils (rolls) without printing, between 1996 - 2000 was the following:

Graph N°17
Exports of toilet paper, napkins and paper towel, 1996 - 2000
In Kgr. (Gross Weight) and F.O.B. Value (\$USA)

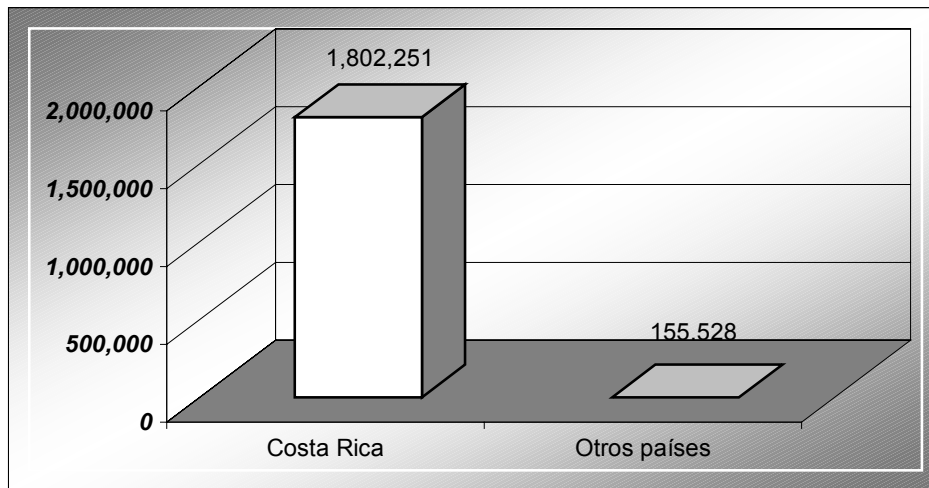


	1996	1997	1998	1999	2000
Kgr.	18,048	173,332	508,483	655,863	663,099
F.O.B. Value	25,500	181,116	722,010	801,810	964,902

Source: Own processing, Data taken from: General Controller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

Nevertheless, the exports show a clear dependency of the Costa Rican market as it is seen in the following graph:

Graph N° 18
Countries Destiny of the Exports of Toilet Paper, Napkins and Paper Towel,
1996 - 2000 In Kgr (Gross Weight)



	1996	1997	1998	1999	2000	Totals
Costa Rica	18,048	134,470	492,738	611,332	545,663	1,802,251
Honduras					34,890	34890
Dominican Republic				2,683	25,398	28081
Haiti		1,390				1390
El Salvador			26207	7,200		33407
Colombia				18,580	26,650	45230
Cuba					12530	12530

2. National market

Some recycling factories specialize in the recovery, classification and packing of white paper, newspaper and magazines to be sold to the paper industry. According to the owner of Reciclados de Panamá, S.A., the specialization in this material obeys to the fact that cardboard requires of greater physical space and the sale is made in a slower way.

Reciclados de Panamá, S.A., can be consider a typical paper recycling factory. It initiated operations in 1997, it has 10 permanent workers and their annual sales ascend to \$USA 360,000. Annually it commercializes (it buys and it sells) 2,400 tons of materials. In the opinion of the owner, it requires to commercialize a minimum of 200 tons monthly in order to maintain a profit yield of his company.

This small company is in a highly competitive sector, controlled in its industrial stage by MOLPASA and Papelera Istmeña. On the one hand, it must guarantee it's "cuota" of purchase of 200 ton/monthly as a minimum, with stable prices; and by another, it must procure the uninterrupted supplying on the part of the recuperators. In order to increase the volumes of storing, Reciclados de Panamá, tried to establish purchasing points in the city, but without



success, due to the difficulties to control the handling of daily cash and the weighing one of the material.

The main source of supply of materials is in Cerro Patacón, where a complex system of recovery and buy/sale of materials, that operates in the informality has been consolidated. The workers of the DIMAUD and other recollecting companies and the hundreds of “pepenadores”, daily extract hundreds of tons of remainders of cardboard and paper that are sold to the purchasing points of

Mocambito or directly from the representatives of the recycling factories of Panama City.

The decision of the Municipality of Panama to establish a tax to the recycling factories that operate in Cerro Patacón (between \$300 and \$500 monthly), has forced them to modify their modus operandi. Now they act with “representatives” within the Sanitary Landfill -generally the owners of “bunkers”-, to whom they facilitate financial resources for the development of thier operations of buy/sale. This modality is not free of risks, because fraude cases and robbery, until by amounts of 4,000 \$\$USA, have occurred.

Table N° 9
Buy/sale prices of paper remainders in \$USA/pound

Product	Price paid to recovery workers	Sale price to recycling industries
Newspaper	\$ 0.03	\$ 0.05
White paper not printed	\$ 0.10	\$ 0.12
White paper printed	\$ 0.08	\$ 0.10
Colored paper	\$ 0.02	\$ 0.03

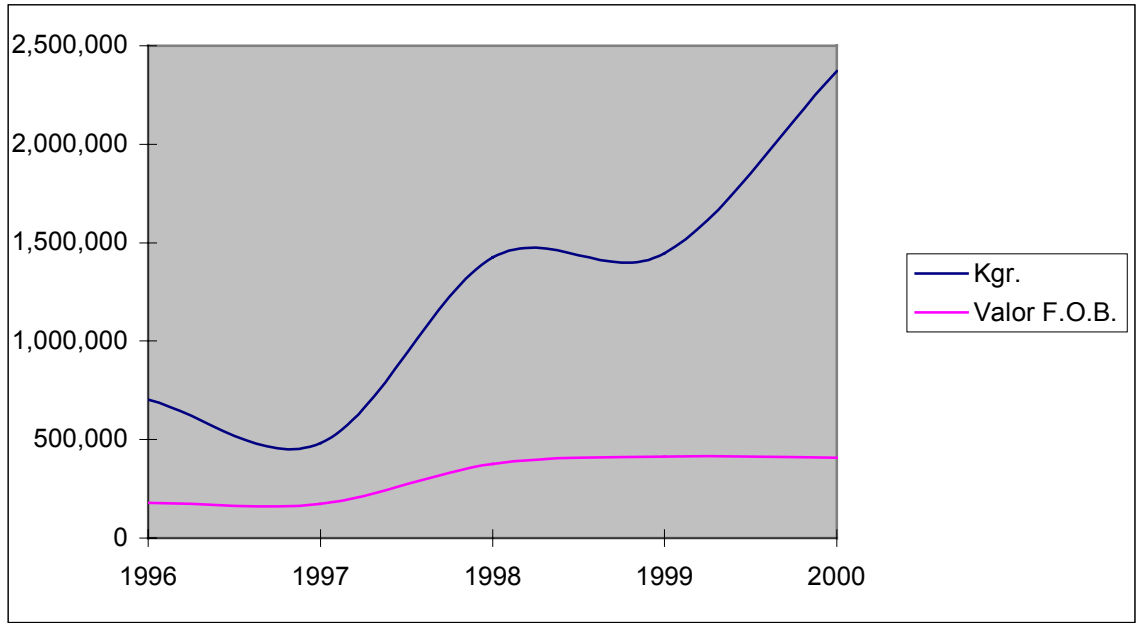
Source: Own processing, Data taken from information given by Reciclados de Panamá, S.A.

The increasing activity of recovery of paper remainders in the banking and commercial sector of the capital is perceived like a factor of competition for several reasons: first, the material can be offered to a lower price, than taht of the market, and second, stimulates the development – in the industry – of the operations of cleaning and classification, own by the recycling factories, which could reinforce the monopolistic structure of this sector.

III. PLASTIC

Between 1996 and September of 2001, Panama exported 7,799,633 kgr. (gross weight) of plastic remainders with a F.O.B. value of \$USA 1,728,367. Although the exported volume has increased substantially, the international prices have experienced a pronounced fall as of year 2000.

Graph N°19
Exports of plastic remainders, 1996–2000
Gross Peso (in kgr.) and value F.O.B. (\$\$USA)

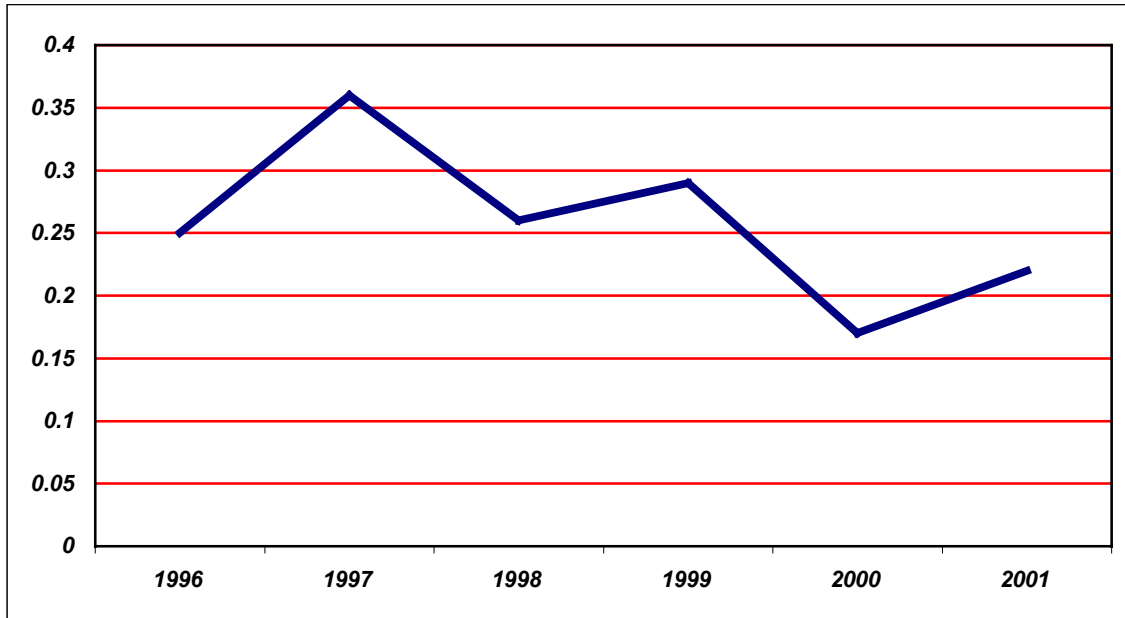


	1996	1997	1998	1999	2000	2001	Totales
Kgr.	702,968	481,869	1,425,837	1,444,987	2,372,023	1,371,949	7,799,633
F.O.B. Value	179,987	173,615	375,894	414,505	408,920	175,446	1,728,367

Source: Own processing, Data taken from: General Comptroller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

According to the **PLASTIC** Magazine (<http://www.plastico.com>), the international prices of the plastic, are characterized by short cycles of 3 years of rises and losses. From 1997 to 1999 a tendency to the rise was experienced; but from the 2000 the cycle of low prices began.

Graph N°20
Prices of export of the plastic remainders, 1996–2000
By type of material, and \$USA/Kgr. (F.O.B. value)



1996	1997	1998	1999	2000	2001
0.25	0.36	0.26	0.29	0.17	0.22

Source: Own processing, Data taken from: General Comptroller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

Nevertheless, one hopes that the industry of plastic retakes the increasing footpath from middle of year 2002 when the main clients of the sector, such as the manufacturing industry, the construction and the commerce of massive products recover, laid out on the one hand by the internal demand, but specially by the exports.

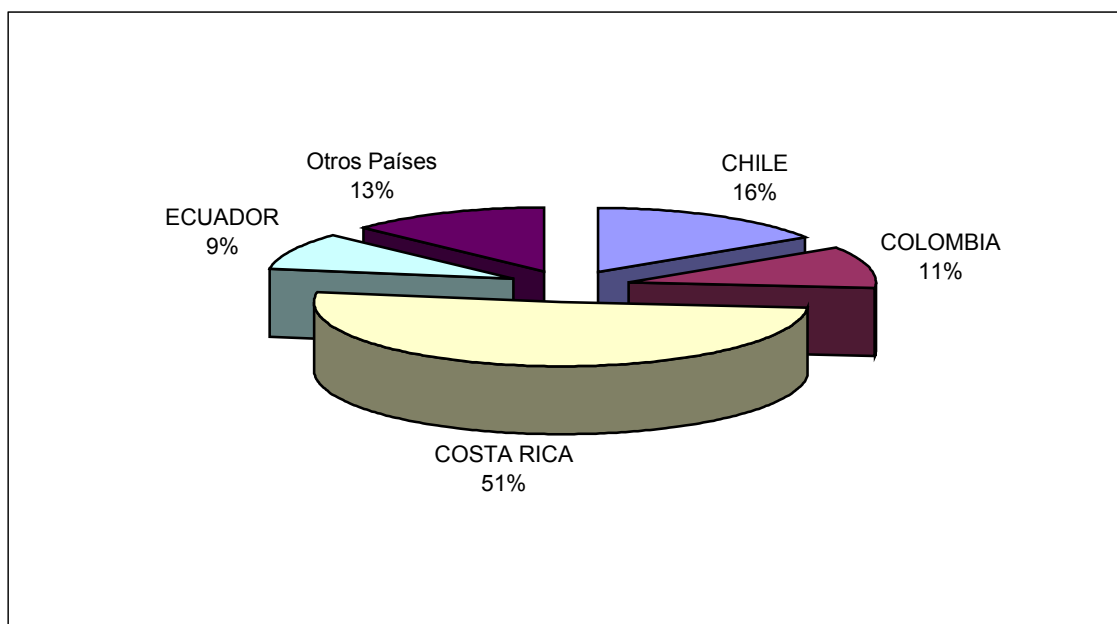
Additionally, the international market of the plastic will be favored by two recent tendencies:

- a) The use of remainders of mixed plastic materials, not easily separable, like raw material of manufacture of a great variety of products of high performance and duration (planks of floors, boards for different uses, posts, container rammers, boxes, canals and even paving stones for floors). At short term all the plastic wastes will be susceptible to recovery and to be used in various product form of high added value, by means of different methods of recycling. The **PLASTIC** Magazine adds: for example, a paving stone can weigh around 1.5 k and approximately 27 paving stones are required to cover a floor with a square meter; this is, 100 square meters of a paved channel for vehicular or peatonal use requires near four tons of plastic wastes.
- b) The PET will be used in the production of beer bottles, which will substantially increase the consumption of this material. Luckily, the PET offers an important list of qualities that assure the existence in the future of several effective options of recycling, among others:

- ◆ The PET is a condensation resin and therefore, its cost is greater than the one of resins of massive consumption. Also, each kilo of recovered PET has a greater value in the recycling market.
- ◆ The PET can be recycled with mechanical properties that are superior to those of the rejected material as waste. The uses of the recovered PET are led at the moment by fibers. As he is observed in figure 2, more than 50% of the recycled material the fiber manufacturers for carpets and textiles use. Nevertheless, ***the great market of recycling must be in the future, the sector of the bottles, since the quality of the recycled bottles can be controlled satisfactorily by the processes already mentioned.***

The exports mainly go to Central and South America. Costa Rica is the main buyer: during the period of study it acquired 3,989,052 kgr. a F.O.B. value of \$USA 749,323.

Graph N° 21
Destinies of the export of the plastic remainders, 1996–2001
Gross Weight in / Kgr. and percentage



Source: Own processing, Data taken from: General Comptroller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

Table N° 10
Destinies of the export of the plastic remainders, 1996–2001
Gross Weight in / Kgr. and percentage

COUNTRY	Kgr.	F.O.B. (\$USA) VALUE
ARGENTINA	65000	16250
CHINA (Continental)	46000	5060
CUBA	14968	5940
CHILE	1239031	333687
COLOMBIA	823400.4	235196
COSTA RICA	3989052	749323
ECUADOR	739945	161800
UNITED STATES	142981	32708
HONDURAS	150009	33897
NICARAGUA	170245	32456
PERU	98967	24232
EL SALVADOR	97750	13212
ISRAEL	184200	54000
VENEZUELA	24000	6000
MEXICO	440	100
ITALY	13645	3000

Source: Own processing, Data taken from: General Comptroller, Direction of Statistic and Census, "Exports According to Tariff Description and Country of Destiny, 1996, 1997, 1998, 1999, 2000.

Taking into account the enumerated factors, it is feasible to consider a recovery of the exports of remainders plastic in the short term.

A few companies are dedicated to the recovery and plastic recycling in Panama.

PLASTIGLAS S.A., initiated operations in 1976. The company produces a complete line of plastic packages, including packages for oil of motor, packages for food, packages for pharmaceutical, packages for cosmetics, packages for agricultural and chemical products and packages for cleaning products. The packages are made with different types of plastic, being polyethylene the most common used plastic.

The recovered plastics are first cleaned to eliminate all the polluting agents. Next, they are sent to the process that melts them and turns them into grains. PLASTIGLAS uses originating recycled plastic grains from plastic packages of different colors from its own line of production to make the packages for motor oil. In another line of production, they are concentrated in producing white plastic grains, that are used to produce plastic bottles of clearer colors of their plant. Also they export grains to the plant they have in San Salvador.

The ECO-PLASTICS Division has capacity to process 400 tons of plastic per month. The amount processed until April of 1998 was of 3,5 tons per month. The material for the recycling line comes from different sources. Internally, the packages that do not reunite the quality norms are removed from the regular process of production and goes to the line of recycling. This source

is considered a clean source since it comes directly from the plant and is not contaminated. Another portion comes from material recovering companies in Panama, which collect an ample variety of materials to recycle and they resell locally or internationally. These packages come contaminated, or with remainder of the product that contain either, dust, dirt or other polluting agents. The third source for plastic comes from another local manufacturer of plastic packages. The company gives ECO-PLASTICS its packages that have not approved the norms of quality control.

RECIPLAS is a subsidiary of Procesos Ambientales. RECIPLAS produces plastic bags for sweepings with plastic packages of polyethylene of low density and with plastic bags. RECIPLAS sells the sweeping bags with recycled content to by greater locally. The raw material is obtained from the first company, Procesos Ambientales, that pays between \$0.02 and \$0.04 by pound for the bags and plastic packages, which it uses in it's production process, according to the amount and if they are given or no.

Table N° 11
Prices Paid for Plastic Packages and Boarding Prices, 1998–2001
\$USA per Pound

Products	1998		2001	
	Price of Purchase *	Boarding Price	Price of Purchase	Boarding Price
Plastic packages of Later Consumption and Defects of Factory	\$ 0.05 - \$0.07	0.26	0.02	0.22
Plastic ready for export				

*Source: * Data provided by Compañía Eco-plásticos to Molly Brown. The remaining information was processed by consultant from the data provided by Procesos Ambientales S.A..*

IV. GLASS

In Panama the glass bottles of all forms and sizes are the only class of this material that is recycle, due mainly to the fact that this material is 100% apt for recycling, which means that losses of quality does not exist during the reprocessing stage. Other glasses, like centers pieces for lights, glass for windows and mirrors, cannot be recycle and are considered polluting agents in the process of recycling glass. The energy savings and a smaller depreciation of the machinery is the economic factors that stimulate glass recycling, because the remainders of this material are melted at a much lower temperature. In addition, the glass recovered locally has a lower price than the imported glass.



The workers of the street, “pepenadores” and workers of the waste company recover the bottles and sell them to purchasing points in the city and bunker at Cerro Patacón at prices that oscillate between \$ 0.07 and \$ 0.10 each bottle. The purchasing points gather together the bottles and classify them according to the color and sell to the recycling factories (mainly, INDRESA and of Procesos Ambientales) at an

average price of \$ 40/ton. (\$ 0,04 / Kgr). Procesos Ambientales cleans and crushes the bottles and delivers the material packed and classified according to color to Vidrios Panameños at a price of \$0.22/kg.(\$ 220/Ton.).

Other glass bottles, of licor, beer and softdrinks are collected and sold to the manufacturers for them to be reused (\$0,05 each bottle). In such case, it is demanded that the containers maintain remainders of the original liquid and the label. Those that were reused by the consumer are rejected.

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