

Table 1.4.5 Waste Composition Analysis Results (Winter)

No.	No.	Type	Paper	Textile	Plastic	Lather	Leaves	Food	Sub to	Metal	Glass	Cerami	Sand	Sub to	Total	Densit	Mositu	Ash	Calory
4	4a	c	67.50	1.39	4.86	0.00	0.00	19.44	93.19	5.42	1.39	0.00	0.00	6.81	100.00	0.18	24.16	11.51	2.607
9	9a	c	55.56	0.00	3.97	0.00	0.00	35.71	95.24	4.76	0.00	0.00	0.00	4.76	100.00	0.17	33.85	9.50	2.332
14	14t	c	5.28	1.68	9.99	5.78	0.52	68.35	91.60	2.36	0.79	0.90	5.25	8.40	100.00	0.35	51.37	13.01	1.571
19	19t	c	13.21	1.13	9.00	1.32	0.66	54.14	95.46	1.58	0.65	2.31	0.00	4.54	100.00	0.24	43.60	8.84	1.965
24	24b	c	42.12	0.00	4.11	0.00	0.00	31.67	77.90	3.16	1.83	0.00	0.00	22.10	100.00	0.16	29.13	25.85	1.888
29	29b	c	43.28	0.00	2.28	0.00	0.00	22.78	70.04	4.33	2.56	0.00	0.00	29.96	100.00	0.20	22.86	33.30	1.805
1	1a	d1	17.86	1.43	17.86	0.00	0.71	51.43	89.29	3.57	7.14	0.00	0.00	10.71	100.00	0.24	41.56	15.36	1.895
6	6a	d1	16.30	2.89	10.92	0.00	0.00	49.62	83.92	3.97	5.52	1.59	5.00	16.08	100.00	0.25	40.22	20.02	1.708
11	11t	d1	16.86	5.02	9.13	0.00	0.00	63.06	94.07	2.74	0.00	3.13	0.00	5.93	100.00	0.26	49.00	10.46	1.736
16	16t	d1	42.41	0.00	12.68	0.00	0.00	18.00	73.09	2.17	2.74	0.00	3.00	26.91	100.00	0.31	20.34	30.72	2.135
21	21b	d1	16.88	2.08	8.91	0.00	0.00	66.26	94.13	4.45	1.42	0.00	0.00	5.87	100.00	0.26	50.96	10.45	1.653
26	26b	d1	18.74	1.46	11.66	4.96	0.00	54.14	90.96	3.21	5.93	0.00	0.00	9.04	100.00	0.23	43.11	13.76	1.898
2	2a	d2	9.66	6.93	13.33	0.00	0.00	53.14	83.26	4.83	10.46	1.45	0.00	16.74	100.00	0.27	41.60	20.77	1.677
7	7a	d2	10.97	1.71	9.96	0.08	2.42	55.76	80.90	4.78	8.14	2.20	3.98	19.10	100.00	0.26	43.25	22.92	1.410
12	12t	d2	35.54	0.38	13.69	0.00	0.00	38.48	91.80	0.55	1.11	0.00	6.54	8.20	100.00	0.19	34.91	12.84	2.215
17	17t	d2	23.16	2.11	20.61	0.00	0.00	47.02	92.90	1.84	5.26	0.00	0.00	7.10	100.00	0.28	39.37	12.08	2.167
22	22b	d2	10.88	0.73	11.62	0.00	0.36	58.09	81.68	4.51	10.91	1.59	1.31	18.32	100.00	0.22	44.53	22.34	1.441
27	27b	d2	12.68	3.58	10.23	0.51	5.62	56.38	89.00	3.84	7.16	0.00	0.00	11.00	100.00	0.26	44.85	15.10	1.675
3	3a	d3	5.02	0.75	8.04	0.00	0.00	55.23	69.09	1.51	7.54	1.76	20.10	30.91	100.00	0.51	41.31	34.09	1.106
8	8a	d3	6.40	0.63	4.52	0.00	0.00	59.56	71.11	3.45	3.76	6.00	15.68	28.99	100.00	0.52	44.15	32.09	1.035
13	13t	d3	5.67	0.00	15.02	0.00	3.87	22.00	95.66	0.34	1.36	0.41	2.23	4.34	100.00	0.21	25.97	9.35	2.745
18	18t	d3	8.51	1.16	13.93	0.00	0.00	58.05	81.65	2.48	1.32	0.00	1.55	18.35	100.00	0.27	44.39	22.43	1.501
23	23b	d3	5.63	0.71	10.81	0.00	0.00	46.95	64.10	2.58	0.46	0.00	32.86	35.90	100.00	0.51	35.78	38.90	1.165
28	28b	d3	4.12	1.44	12.36	0.00	0.00	61.81	79.73	2.96	7.01	1.44	8.86	20.27	100.00	0.52	46.33	24.16	1.342
5	5a	m	32.57	0.00	5.83	0.00	0.00	60.67	99.07	0.19	0.74	0.00	0.00	0.93	100.00	0.25	48.64	5.79	1.921
10	10a	m	20.09	1.61	4.84	1.01	0.21	66.67	94.43	0.73	2.82	0.00	2.02	5.57	100.00	0.22	51.34	10.07	1.542
15	15t	m	13.08	2.94	14.38	0.00	0.00	52.28	82.68	2.84	7.52	1.96	0.00	17.32	100.00	0.29	41.13	21.48	1.672
20	20t	m	23.44	0.39	5.43	0.09	0.00	54.19	83.54	1.73	10.86	0.00	3.87	16.46	100.00	0.23	42.76	20.43	1.498
25	25b	m	32.71	0.69	6.93	0.00	1.38	50.43	92.14	0.46	7.40	0.00	0.00	7.86	100.00	0.21	41.84	12.33	1.883
30	30t	b	20.06	0.00	9.12	0.00	3.34	54.71	87.23	6.99	3.96	0.00	1.82	12.77	100.00	0.22	43.69	16.94	1.700
Commercial			37.83	3.37	5.70	1.47	0.20	38.68	87.24	3.60	7.90	0.39	0.88	12.76	100.00	0.22	34.16	17.00	2.028
Block			21.51	2.15	11.86	0.83	0.82	50.42	87.58	3.35	6.94	0.80	1.33	12.42	100.00	0.26	40.87	16.80	1.838
2story			17.15	2.57	13.27	0.10	2.02	51.48	86.59	3.39	7.17	0.87	1.97	13.41	100.00	0.25	41.42	17.68	1.764
Individual			14.08	0.78	10.78	0.00	0.65	50.61	76.89	2.22	5.74	1.60	13.55	23.11	100.00	0.42	39.66	26.84	1.482
Domestic			17.58	1.83	11.97	0.31	1.16	50.84	83.69	2.95	6.62	1.09	5.62	16.31	100.00	0.31	40.65	20.44	1.695
Market			23.66	0.94	7.76	0.18	0.82	56.49	89.85	2.99	5.55	0.33	1.29	10.15	100.00	0.24	44.90	14.51	1.703
Average			22.84	1.96	9.87	0.52	0.90	49.54	85.63	3.11	6.66	0.80	3.80	14.37	100.00	0.28	40.20	18.56	1.763

Table 1.4.4 Other Waste Types Field Survey Results (Summer) (2/2)

Street sweeping	Cod	Lengt m	Swept lengthy	Weight kg	Volume l	Densit kg/l	Road L./km		Swept L./km		
							kg	l	kg	l	
Street sweeping	Almlinskii	1	2,820	160	63.3	231.1	0.274	3.21	11.71	56.52	206.34
		2	6,650	135	58.7	237.2	0.247	1.26	5.10	62.12	251.01
		3	170	170	115.7	229.5	0.504	97.23	192.86	97.23	192.86
	Bostandukski	1	1,750	180	38.9	257.4	0.151	3.18	21.01	30.87	204.29
		2	2,320	100	104.4	259.7	0.402	6.43	15.99	149.14	371.00
		3	2,850	130	65.0	411.8	0.158	3.26	20.64	71.43	452.53
	Turksibskii	1	11,400	200	301.7	980.8	0.308	3.78	12.29	215.50	700.57
		2	460	200	91.5	308.0	0.297	28.42	95.65	65.36	220.00
		3	110	110	64.5	224.2	0.288	83.77	291.17	83.77	291.17
Sub total		28,530	1385	903.7	3,139.7	0.288	4.53	15.72	93.21	323.85	

Table 1.4.5 Waste Composition Analysis Results (Winter)

No.	No.	Type	Paper	Textile	Plastic	Lether	Leaves	Food	Sub to Metal	Glass	Cerami	Sand	Sub to Total	Densit	Mositu	Ash	Calory		
4	14a	c	67.50	1.39	4.86	0.00	0.00	19.44	93.19	5.42	1.39	0.00	6.81	100.00	0.18	24.16	11.51	2.607	
9	19a	c	55.56	0.00	3.97	0.00	0.00	35.71	95.24	4.76	0.00	0.00	4.76	100.00	0.17	33.85	9.50	2.332	
14	14t	c	5.28	1.68	9.99	5.78	0.52	68.35	91.60	2.36	0.79	0.00	5.25	8.40	100.00	0.35	51.37	13.01	1.571
19	19t	c	13.21	17.13	9.00	1.32	0.66	54.14	95.46	1.58	0.65	2.31	0.00	4.54	100.00	0.24	43.60	8.84	1.965
24	14b	c	42.12	0.00	4.11	0.00	0.00	31.67	77.90	3.16	18.94	0.00	22.10	100.00	0.16	29.13	25.85	1.888	
29	18b	c	43.28	0.00	2.28	1.70	0.00	22.78	70.04	4.33	25.63	0.00	29.96	100.00	0.20	22.86	33.30	1.805	
11	11a	d1	17.86	1.43	17.86	0.00	0.71	51.43	89.29	3.57	5.52	1.59	5.00	16.08	100.00	0.25	40.22	20.02	1.708
6	16a	d1	16.30	2.89	10.92	0.00	4.19	49.62	83.92	3.97	0.00	3.19	0.00	5.93	100.00	0.26	49.00	10.46	1.736
11	11t	d1	16.86	5.02	9.13	0.00	0.00	63.06	94.07	2.74	0.00	2.74	0.00	26.91	100.00	0.31	20.34	30.72	2.135
16	16t	d1	42.41	0.00	12.68	0.00	0.00	18.00	73.09	2.17	2.74	0.00	3.00	5.87	100.00	0.26	50.96	10.45	1.653
21	11b	d1	16.88	2.08	8.91	0.00	0.00	66.26	94.13	4.45	1.42	0.00	0.00	9.04	100.00	0.23	43.11	13.76	1.898
26	16b	d1	18.74	1.46	11.66	4.96	0.00	54.14	90.96	3.21	5.83	0.00	0.00	16.74	100.00	0.27	41.60	20.77	1.677
2	2a	d2	9.66	6.93	13.53	0.00	0.00	53.14	83.26	4.83	10.46	1.45	0.00	6.74	100.00	0.26	43.25	22.92	1.410
7	17a	d2	10.97	1.71	9.96	0.08	2.42	55.76	80.90	4.78	8.14	2.20	3.98	19.10	100.00	0.26	43.25	22.92	1.410
12	12t	d2	35.54	0.38	13.69	0.00	0.00	38.48	91.80	0.55	1.11	0.00	6.54	8.20	100.00	0.19	34.91	12.84	2.215
17	17t	d2	23.16	2.11	20.61	0.00	0.00	47.02	92.90	1.84	5.26	0.00	0.00	7.10	100.00	0.28	39.37	12.08	2.167
22	22b	d2	10.88	0.73	11.62	0.00	0.36	58.09	81.68	4.51	10.91	1.59	1.31	18.32	100.00	0.22	44.53	22.34	1.441
27	17b	d2	12.68	3.58	10.23	0.51	5.62	56.38	89.00	3.84	7.16	0.00	0.00	11.00	100.00	0.26	44.85	15.10	1.675
3	3a	d3	5.02	0.75	8.04	0.00	0.00	55.28	69.09	1.51	7.54	1.76	20.10	30.91	100.00	0.51	41.31	34.09	1.106
8	18a	d3	6.40	0.63	4.52	0.00	0.00	59.56	71.11	3.45	3.76	6.00	5.68	28.89	100.00	0.52	44.15	32.09	1.035
13	13t	d3	54.77	0.00	15.02	0.00	3.87	22.00	95.66	0.34	1.36	0.41	2.23	4.34	100.00	0.21	25.97	9.35	2.745
18	18t	d3	8.51	1.16	13.93	0.00	0.00	58.05	81.65	2.48	14.32	0.00	1.55	18.35	100.00	0.27	44.39	22.43	1.501
23	3b	d3	5.63	0.71	10.81	0.00	0.00	46.95	64.10	2.58	0.46	0.00	32.86	35.90	100.00	0.51	35.78	38.90	1.165
28	18b	d3	4.12	1.44	12.36	0.00	0.00	61.81	79.73	2.96	7.01	1.44	8.86	20.27	100.00	0.52	46.33	24.16	1.342
5	15a	m	32.57	0.00	5.83	0.00	0.00	60.67	99.07	0.19	0.74	0.00	0.93	100.00	0.25	48.64	5.79	1.921	
10	10a	m	20.09	1.61	4.84	1.01	0.21	66.67	94.43	0.73	2.82	0.00	2.02	5.57	100.00	0.22	51.34	10.07	1.542
15	15t	m	13.08	2.94	14.38	0.00	0.00	52.28	82.68	7.84	7.52	1.96	0.00	17.32	100.00	0.29	41.13	21.48	1.672
20	10t	m	23.44	0.39	5.43	0.09	0.00	54.19	83.54	1.73	10.86	0.00	3.87	16.46	100.00	0.23	42.76	20.43	1.498
25	15b	m	32.71	0.69	6.93	0.00	1.38	50.43	92.14	0.46	7.40	0.00	7.86	100.00	0.21	41.84	12.33	1.883	
30	10b	m	20.06	0.00	9.12	0.00	3.34	54.71	87.23	6.99	3.96	0.00	1.82	12.77	100.00	0.22	43.69	16.94	1.700
Commercial			37.83	3.37	5.70	1.47	0.20	38.68	87.24	3.60	7.90	0.39	0.88	12.76	100.00	0.22	34.16	17.00	2.028
Block			21.51	2.15	11.86	0.83	0.82	50.42	87.58	3.35	6.94	0.80	1.33	12.42	100.00	0.26	40.87	16.80	1.838
2-story			17.15	2.57	13.27	0.10	2.02	51.48	86.59	3.39	7.17	0.87	1.97	13.41	100.00	0.25	41.42	17.68	1.764
Individual			14.08	0.78	10.78	0.00	0.65	50.61	76.89	2.22	5.74	1.60	13.55	23.11	100.00	0.42	39.66	26.84	1.482
Domestic			17.58	1.83	11.97	0.31	1.16	50.84	83.69	2.99	6.62	1.09	5.62	16.31	100.00	0.31	40.65	20.44	1.695
Market			23.66	0.94	7.76	0.18	0.82	56.49	89.85	2.99	5.55	0.33	1.29	10.15	100.00	0.24	44.90	14.51	1.703
Average			22.84	1.96	9.87	0.52	0.90	49.54	85.63	3.11	6.66	0.80	3.80	14.37	100.00	0.28	40.20	18.56	1.763

Table 1.4.6 Waste Composition Analysis Results (Summer)

No.	NO.	Type	Paper	Textile	Plastic	Lether	Leaves	Food	Sub total	Metal	Glass	Ceramic	Sand	Sub total	Total	Density	Moisture	Ash	Calory
41a	c		21.05	4.21	21.05	0.00	4.21	36.84	87.36	4.21	2.11	6.32	0.00	12.64	100.00	0.11	32.97	17.16	2,161
91a	c		38.40	0.80	6.40	0.00	0.00	48.80	94.40	2.40	3.20	0.00	0.00	5.60	100.00	0.18	41.13	10.26	1,928
141t	c		20.10	1.91	5.74	0.00	6.70	43.06	77.51	1.44	4.31	0.00	16.75	22.50	100.01	0.34	36.00	25.83	1,549
191t	c		14.73	3.49	12.40	1.55	1.16	63.18	96.51	1.94	1.55	0.00	0.00	3.49	100.00	0.33	49.32	8.29	1,788
241b	c		71.67	0.00	18.33	0.00	0.00	10.00	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.16	19.31	5.61	3,082
291b	c		34.44	0.00	2.78	0.00	0.00	55.56	92.78	1.11	6.11	0.00	0.00	7.22	100.00	0.19	44.93	11.63	1,686
111a	d1		23.65	3.38	15.54	2.03	0.00	47.30	91.90	2.03	6.08	0.00	0.00	8.11	100.01	0.29	39.35	12.90	2,035
61a	d1		15.10	1.22	4.08	0.82	0.00	74.29	95.51	0.82	3.67	0.00	0.00	4.49	100.00	0.33	55.89	9.00	1,394
111t	d1		8.13	7.32	6.50	3.25	4.07	61.79	91.06	6.10	2.85	0.00	0.00	8.95	100.01	0.31	47.89	13.07	1,644
161t	d1		52.54	0.00	21.19	0.00	5.08	3.39	82.20	0.85	12.71	0.00	4.24	17.80	100.00	0.21	13.32	22.27	2,725
211b	d1		18.10	1.43	7.14	0.00	2.86	69.52	99.05	0.95	0.00	0.00	0.00	0.95	100.00	0.41	53.81	5.64	1,634
261b	d1		9.55	1.36	3.64	0.00	0.00	81.36	95.91	2.73	1.36	0.00	0.00	4.09	100.00	0.38	60.07	8.54	1,230
212a	d2		11.91	0.85	5.96	0.43	1.28	74.47	94.90	1.70	3.40	0.00	0.00	5.10	100.00	0.35	55.98	9.58	1,386
71a	d2		7.73	0.43	8.58	0.00	1.72	74.68	93.14	0.86	6.01	0.00	0.00	6.87	100.01	0.37	55.85	11.30	1,347
121t	d2		33.96	0.00	14.15	0.00	18.87	25.47	92.45	0.00	2.83	0.00	4.72	7.55	100.00	0.24	28.63	11.67	2,519
171t	d2		26.52	8.84	11.05	1.10	1.66	34.25	83.42	5.52	6.63	4.42	0.00	16.57	99.99	0.30	30.84	20.58	2,020
221b	d2		9.29	6.43	11.43	0.71	1.79	66.43	96.08	1.07	2.86	0.00	0.00	3.93	100.01	0.36	51.17	8.51	1,689
271b	d2		13.02	1.40	3.72	0.47	0.00	76.28	94.89	0.93	4.19	0.00	0.00	5.12	100.01	0.39	56.98	9.55	1,320
31a	d3		13.14	0.57	12.00	0.00	8.57	57.14	91.42	1.71	6.86	0.00	0.00	8.57	99.99	0.38	45.94	12.81	1,739
81a	d3		7.19	0.63	4.06	0.00	2.81	81.56	96.25	0.63	2.19	0.94	0.00	3.76	100.01	0.46	60.45	8.13	1,246
131t	d3		32.81	0.00	14.06	0.00	7.81	32.81	87.49	4.69	7.81	0.00	0.00	12.50	99.99	0.18	31.34	16.77	2,172
181t	d3		23.93	7.36	15.34	6.75	4.91	33.13	91.42	3.07	5.52	0.00	0.00	8.59	100.01	0.34	31.00	13.24	2,455
231b	d3		7.03	0.54	15.14	7.03	0.00	65.41	95.15	1.62	3.24	0.00	0.00	4.86	100.01	0.31	49.89	9.96	1,821
281b	d3		10.21	3.40	4.68	2.98	0.85	69.79	91.91	5.11	2.98	0.00	0.00	8.09	100.00	0.42	52.59	12.40	1,443
51a	m		14.19	0.00	12.16	0.00	10.81	58.11	95.27	2.03	2.70	0.00	0.00	4.73	100.00	0.29	47.20	9.11	1,842
1010a	m		19.33	0.00	6.33	0.00	22.67	33.67	82.00	1.67	2.00	0.00	14.33	18.00	100.00	0.60	32.43	21.04	1,941
151t	m		25.49	3.43	8.82	0.00	1.47	54.90	94.11	2.45	3.43	0.00	0.00	5.88	99.99	0.29	44.52	10.42	1,826
2010t	m		15.63	0.00	12.81	0.00	17.50	14.06	60.00	3.75	7.81	0.00	28.44	40.00	100.00	0.55	17.57	42.29	1,750
251b	m		21.79	0.00	1.79	0.00	10.71	57.86	92.15	0.00	0.00	0.00	7.86	7.86	100.01	0.54	46.99	11.73	1,636
3010b	m		13.56	0.00	5.51	0.00	2.97	77.12	99.16	0.85	0.00	0.00	0.00	0.85	100.01	0.40	58.30	5.48	1,447
Commercial			33.40	1.74	11.12	0.26	2.01	42.91	91.43	1.85	2.88	1.05	2.79	8.58	100.00	0.22	37.28	13.13	2,032
Block			21.18	2.45	9.68	1.02	2.00	56.28	92.61	2.25	4.45	0.00	0.71	7.40	100.00	0.32	45.06	11.90	1,777
2story			17.07	2.99	9.15	0.45	4.22	58.60	92.48	1.68	4.32	0.74	0.79	7.52	100.00	0.34	46.58	11.87	1,714
Individual			15.72	2.08	10.88	2.79	4.16	56.64	92.27	2.81	4.77	0.16	0.00	7.73	100.00	0.35	45.20	12.22	1,813
Domestic			17.99	2.51	9.90	1.42	3.46	57.17	92.45	2.24	4.51	0.30	0.50	7.55	100.00	0.34	45.61	12.00	1,768
Market			18.33	0.57	7.90	0.00	11.02	49.29	87.12	1.79	2.66	0.00	8.44	12.89	100.00	0.45	41.17	16.68	1,740
Average			21.14	1.97	9.75	0.90	4.68	52.74	91.18	2.07	3.81	0.39	2.54	8.82	100.00	0.33	43.06	13.16	1,815

Table 1.4.7 Waste Amount Survey at SWM Facilities (Winter)

Table 1.4.7 Waste Amount Survey at SWM Facilities (Winter)

Survey Site	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Average
1. Karasai Dump Site	464.0	528.9	466.1	466.1	417.8	178.1	435.1	422.3
- Transfer haul	0.0	213.9	230.7	191.7	116.6	0.0	140.8	127.7
- Direct haul	464.0	315.0	235.4	274.4	301.2	178.1	294.3	294.6
2. Compost plant	0.0	235.2	242.8	196.9	124.9	0.0	165.4	137.9
3. Nika	3.3	0.0	1.3	0.0	0.0	0.0	0.0	0.7
4. Barys	2.9	2.9	0.0	0.0	0.0	0.0	0.0	0.8
5. Enbek	6.0	7.0	5.0	8.6	10.0	0.0	0.0	5.2
6. Remiskova South	12.4	23.1	7.0	46.0	8.0	0.0	8.0	14.9
7. Ostroumov Mltr. Cam	8.0	11.3	3.9	0.0	0.0	2.0	4.0	4.2
8. Zhetysu West	2.6	18.0	8.0	22.0	10.0	2.0	27.9	12.9
9. Ryskulov North	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
10. Spasskaya	93.3	115.6	80.4	49.8	79.0	6.4	89.1	73.4
11. Race Course	3.3	17.2	0.0	1.3	18.0	1.3	9.8	7.3
Total	595.8	724.0	571.7	593.8	542.8	189.8	573.9	541.7

Table 1.4.8 Waste Amount Survey at SWM Facilities (Summer)

Table 1.4.8 Waste Amount Survey at SWM Facilities (Summer)

Survey Site	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Average
1. Karasai Dump Site	284.3	392.1	318.1	309.4	394.8	269.4	237.5	315.1
- Transfer haul								
Compost plant	160.3	167.7	142.1	112.2	191.9	100.8	74.0	135.6
Transfer station	42.9	66.4	65.9	22.8	64.7	53.1	50.3	52.3
- Direct haul	81.1	158.0	110.1	174.4	138.2	115.5	113.2	127.2
2. Compost plant	225.8	186.0	167.8	133.4	207.4	116.0	99.6	162.3
3. Transfer Station	57.4	47.5	39.8	70.0	36.0	35.1	31.6	45.3
4. Spasskaya	107.2	114.3	138.5	171.5	149.8	73.0	13.0	109.6
5. Central Cemetary	21.8	13.5	18.4	11.4	15.1	8.8	6.6	13.7
6. Alatau	24.0	32.0	26.2	29.3	24.0	24.0	24.0	26.2
7. Zolootval	4.5	2.4	4.6	6.9	4.5	0.5	0.0	3.3
8. Kylagyer	6.5	4.3	0.0	0.0	4.3	2.2	2.1	2.8
Total	528.3	558.0	505.4	596.9	579.3	375.1	290.1	490.4

2. PUBLIC AWARENESS SURVEY

2.1 OBJECTIVE

The main objectives of the Survey was to obtain information on the solid waste management in the city of Almaty and identify the citizens' existing practices and their perceptions of the services provided. The survey provided basic information which will be referred to in preparing the master plan and feasibility study.

2.2 METHODOLOGY

The Survey implementation was sub-contracted to the local firm of Bilesim – International Kazakhstan Research Center Ltd. The survey was carried out by the method of face-to-face interviews at the residential households and offices of organizations surveyed using the questionnaire developed. A total of 2,200 interviews were conducted; 2,100 for households, 90 for organizations and 10 for medical institutions.

The sample distribution for the households was as follows:

Rayon	Population (thousand)	Sample size
Almalinskii	202.8	401
Auezovskii	256.0	506
Bostandyskii	229.7	454
Medeuskii	137.9	273
Turksibskii	114.5	227
Total Almaty City	1,061.4	2,100

The city was divided into squares which were selected at random based on the above population distribution in each district. Each square was assigned a number of households which were randomly selected.

On the other hand organizations were selected based on the statistical data of the city. These included governmental institutions (4 number), schools (9), universities and scientific institutions (3), company offices (10), banks (2), shops (26), eateries and drinking places (14), hotels (6), sports complexes and bath houses (4), hairdressers (6), car repair shops (4), and markets (2).

The 10 medical institutions were selected based on the recommendations of the Kazakh counterpart team. Results of the medical institutions survey are reviewed in Section 3.5 of this report and will not be referred to here. All interviews were carried out in Russian language.

2.3 RESULTS

Many of the survey results have been presented in Chapter 2, section 2 of the Main Report while discussing the waste collection and transport system. However some major results not discussed in that chapter will be presented here.

1) Basic Conclusions

This survey was implemented by “Bilesim International Kazakhstan”. The “Basic Conclusions” submitted in their final report clearly explain the survey results and it is worthwhile to summarize parts of them here.

The households were classified by the dominant six types of dwellings that can be found in the city. For the whole sample size these were as follows;

- [1] Detached single story (25% of total sample)
- [2] Detached multi story (1%)
- [3] Flat in multi story building (45%)
- [4] Flat in block building (25%)
- [5] Dormitory or company flat (1%)
- [6] Flat in single story multi flat building (4%)

These six dwelling types were consolidated into three groups based on the similarities of the responses and the results are summarized in the following table.

Survey item	Group A [1] & [2]	Group B [3] & [4]	Group C [5] & [6]
• Availability of services	Lack water supply and heated water	Services all available	Services all available
• Income levels	Comparatively low income levels	Higher income levels	Lowest income levels
• Waste containers in the house	Different container types	Plastic bins	Different container types
• Plastic liners inside house containers	Liners and covers hardly used	Liners used and most containers have covers	No liners and covers
• Waste discharge frequency	1 – 2 days/week	Mostly daily discharge	Mostly daily discharge
• Waste separation at source	More separation than Group B	Low rates of separation	Much waste separation for purpose of selling
• Discharge location	Mostly in front of their houses or to open collection point	To containers located at collection points	To collection points, mostly without containers
• Self disposal of waste	Many dispose of their waste by burning	Hardly any self disposal	Some self disposal
• Satisfaction with the collection service	Higher degree of satisfaction	Medium to low degree of satisfaction	Least satisfied with the service
• Willing to pay	Medium to low	Medium to high	Highest

The Study team comments on the above data are as follows:

2) Group A

- Responses are in line with the low income conditions of these residents, their large dwellings with yards and the strong community spirit in the area.
- Any available containers in the house are used and money is not spent in purchasing specific container, cover or plastic liners.

- Residents separate the recyclable materials from their wastes mostly for economic purposes.
- Residents express higher degree of satisfaction with the collection service even though the collection frequency is 1-2 days/week.
- This Group enjoys more community spirit, residents know their limited neighbors and all suffer similar problems of lack of services and low incomes. Obviously it will be easier to implement collection improvement with this group through decrease of collection frequency and source separation for recycling, but more efforts will be needed to convince them to use plastic bags for waste discharge to open stations and pay the collection fees. Unfortunately this group represents only about 25% of total Almaty population.

3) Group B

- Availability of specific containers for waste storage within the house equipped with covers and plastic liners reflect the higher income levels of this group.
- Residents have little patience with separating or storing waste within their flats (which are mostly small in area).
- Dissatisfaction with the collection services results from the poor conditions at the collection points. However this did not stop the residents from discharging their wastes daily.
- Residents are willing to pay for the service.
- Relatively higher incomes, smaller houses and comparatively lower community spirit generated by high density block housing dominate the waste discharge practices of this Group. Residents are accustomed to discharge their waste daily and a strong educational campaign will be necessary to convince them to store their wastes inside their houses for 2-3 days in the case of introduction of lesser collection frequency and source separation.

In the case of organizations they have been divided into three groups as follows:

- Group A: Organizations such as governmental institutions, offices or companies where office waste prevails and there is little or no organic waste. Mostly use of plastic bins without covers. Waste is discharged every day without separation.
- Group B: Organizations such as eateries, services and public catering establishments where food and special wastes are dominant. Waste is separated, stored outside the establishment and collected 2 to 3 days per week.
- Majority of organizations contract for the waste collection services with juridical persons.
- Organizations showed more willingness to pay and participate in source recycling than the households.

Finally majority of respondents in both the households and organizations expressed their dissatisfaction with the existing levels of waste collection and maintenance of cleanliness conditions in the city of Almaty.

4) Payment for the waste collection service

a. Households

- Overwhelming majority of the households pay for collection service (96.6%).
- Average payment per household was 96.1 T (or 30.0 T/person).

- 85% pay directly to the KSK.
 - Over 2/3rd of respondents definitely confirmed no increase in the tariff levels in recent years.
- b. Organizations
- 92.2% of respondents pay collection fees.
 - Correlation between payment amounts and floor areas of the organizations are shown in the following table.
 - In terms of waste volumes, 44.6% of organizations pay 335 T/m³, 10.2% pay 303 T/m³, and 6% pay 303 T/m³. Payments of remaining 40% are scattered.

5) Satisfaction with the Collection Service

a. Households

As a whole majority of the households expressed satisfaction with the collection service (55%). However this varied by dwelling type and district. Degree of satisfaction of residents of detached houses was higher at 65%, while for block and multi story housing the level was just above half at 51%.

By district residents of Almalinskii were the least satisfied (42%), while those of Turksibskii, where detached housing is dominant, satisfaction level was the highest at 72%. Auezovskii and Bostandyskii districts followed with 54% of their respective respondents satisfied. Majority of Zhetysuskii district respondents were not satisfied with less than half only (49%) answering that they were satisfied.

Main reasons for those respondents not satisfied with the collection services were as follows;

- [1] Waste collection frequency insufficient (31.2% of total households not satisfied)
- [2] Poor sanitary conditions at the collection points (20.7%)
- [3] Containers in poor condition (8.7%)
- [4] Waste is burnt in inside the containers (4%)

b. Organizations

Of the 90 organizations interviewed 86 voiced their satisfaction with the collection services provided. Three of the four dissatisfied organizations were eateries. Their complaints covered irregular waste collection, poor state of containers, necessity of additional payments for the service and incorrect information received by the ecology control services.

6) Minimum acceptable service levels

Interviews included questions to measure the acceptance of some measures that will have improve the solid waste management service by making it more efficient and wide spread throughout the city. These measures included:

- Decrease in collection frequency
- Separation of the waste before discharge (source separation)
- Use of plastic bags to discharge the waste

Answers are analyzed as follows.

a. Households	b. Organizations
<i>Decrease in collection frequency</i>	
<ul style="list-style-type: none"> Majority (55%) disagree. By district, Almalinskii where satisfaction with present service was the least, 66% agreed to accept lesser frequency. The opposite is Turksibskii where 65% opposed the decrease. 	<ul style="list-style-type: none"> Only 22% agreed Hotels and offices of companies all disagreed.
<i>Separation of the waste before discharge (source separation)</i>	
<ul style="list-style-type: none"> Large majority (71%) agree, with 47% willing to do this without incentive. By district, the percentages for all six were between 65% to 75% which indicates a consensus. 	<ul style="list-style-type: none"> Just over 1/3rd of the organizations agreed, however the figure rose to 69% if incentives are provided.
<i>Use of plastic bags to discharge the waste</i>	
<ul style="list-style-type: none"> A slight majority (52%) agree. Of those disagreeing, 48% objected because of the price while 22% said they would use bags already available to them. 	<ul style="list-style-type: none"> A draw, 50% agreeing and 50% disagreeing High price was explained as the first reason for those disagreeing

The answers reflect the need to explain more and educate the general public on the important issues related to solid waste management such as the high costs involved in providing the service, the various activities related to the service whose costs need to be covered such as sanitary landfill, and the aspects in which the general public can cooperate in order to achieve a service that covers the whole city. Obviously introduction of any of the above measures must be coupled with an aggressive public campaign.

7) Willingness to pay

a. Households

Eighty-four percent (84%) of the respondents are willing to pay for receiving the collection service. In terms of the amount they are willing to pay; 36% said they were willing to pay up to 50 T/households/month, 57% said 51 – 200 T, and 7% stated over 200 T.

Those not willing to pay anything distributed by dwelling type are 19% of residents of detached housing and 15% of those of block housing.

b. Organizations

Eighty-five percent (85%) of the respondents are willing to pay for the services, and the price quoted most often (35% of the respondents) was 335 T/m³.

8) Environmental Conditions

Respondents were asked as to their opinion on the environmental conditions within their neighborhood and the city at large. The results are described hereafter.

a. Households

Neighbourhood area	Almaty city	
[1] Services requiring priority improvement	[2] Degree of non-satisfaction with services	Respondents not satisfied (%)
1. Waste collection	1. Street network	91.0
2. Street network	2. Storm water drainage	83.2
3. Street sweeping	3. Waste collection	79.5
4. Potable water supply	4. Street sweeping	78.1
5. Sanitary drainage	5. Green and open spaces	74.9
5". Storm water drainage	6. Sanitary drainage	70.5
7. Medical institutions	7. Medical institutions	61.6
8. Electric power supply	8. Transport system	34.9
9. Transport system	9. Electric power supply	18.5
10. Green and open spaces	10. Potable water supply	18.5

Dissatisfaction with waste collection service within the surrounding neighborhood and the city at large is noted. Respondents may have picked up on the theme of the interview to an extent but this does not diminish the importance of their response. It is worthwhile to note that although majority of respondents were satisfied with the collection service (discussed in item (3) above). While many residents may be satisfied with the service extended up to their door or nearest collection point they have some complaints about the service extended to their neighborhood as a whole and to the entire city.

Street network is highly featured as a priority both in the neighborhood and the city at large. This problem is probably due more to the poor conditions of some streets and requirements for maintenance works, than for the lack of streets.

a. Households	b. Organizations
<i>Decrease in collection frequency</i>	
<ul style="list-style-type: none"> Majority (55%) disagree. By district, Almalinskii where satisfaction with present service was the least, 66% agreed to accept lesser frequency. The opposite is Turksibskii where 65% opposed the decrease. 	<ul style="list-style-type: none"> Only 22% agreed Hotels and offices of companies all disagreed.
<i>Separation of the waste before discharge (source separation)</i>	
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Street network is highly featured as a priority both in the neighborhood and the city at large. This problem is probably due more to the poor conditions of some streets and requirements for maintenance works, than for the lack of streets.

SECTION J
PUBLIC AWARENESS
AND EDUCATION

SECTION J: PUBLIC AWARENESS AND EDUCATION

This section of the Supporting Report briefly outlines the objectives and methodology of the public awareness campaign based on the Study Team's experience in other cities in developing countries.

1. THE NEED FOR PUBLIC EDUCATION

1.1 ROLE OF EDUCATION IN SWM IMPROVEMENT

Public education is a set of activities which are needed for improving SWM. There are several levels of public education as follows:

- Regular actions for cleansing neighbourhood sites through co-operation between the citizens and the local authorities and KSK's or KDK's, such as cleaning of open dump sites and street sweeping
- Permanent action for the improvement of communication on SWM between residents and KSK's or KDK's with the Waste Authority on the one hand, and collection service companies on the other. The Waste Authority should take the lead in this action.
- Establishment of environmental education activities at schools, taking benefit of the know-how of teachers, co-ordinators from the Ministry of Environment and ACDEP, and Waste Authority and private collection service companies representatives.
- Specific and well targeted actions to accompany other measures of SWM improvement. These actions would target specific issues such as gaining the public support and understanding of innovative measures in a newly introduced collection system, or simpler issues such as getting their co-operation against street littering. The KSK's or KDK's should take the lead in this activity under the guidance of the Waste Authority.

The objective of information and communication cannot be achieved by the sole means of awareness campaigns. Institutionalization of these activities to ensure their continuity and innovation is necessary. SWM education at the school level should become a part of the curriculum. Public awareness should be included in the responsibilities of KSK's or KDK's, and the private collection companies should be contractually obliged to support and as necessary initiate such campaigns.

1.2 ROLE OF EDUCATION IN SOLID WASTE COLLECTION

The quality of the waste collection service is largely determined by the level of cooperation between the citizens and the waste workers, and the time schedule for waste discharge and the collection trucks. Enhanced public awareness and education could help in solving the following problems:

- In individual housing areas take care of waste bins and packed waste at open stations until the collection truck arrives

- Take care of the cleanliness of the containers in the block housing areas and the open stations
- Avoid deposit of wastes in open spaces and reduce open dumping
- Avoid discharge of the waste at times other than those designated for discharge
- Avoid sorting of the waste at the pick up points
- Promote source separation (waste sorting at the house)

The following issues, which will have a significant bearing on the ease and improvement of collection service efficiency can be promoted in public education campaigns:

- Education of workers in the SWM sector: Workers should be discouraged from such practices as separating waste during the collection work to use their time more efficiently.
- Education of the inhabitants: People must be educated to accept that collection service could be reduced to 3 times per week, or to accept more use of plastic bags (in individual housing areas).
- Education of street waste pickers: This problem is strongly related to the economic conditions in the city, however observance of discharge time by the public and collection time by the collection companies will not give the street waste pickers much time to sort the waste.

1.3 ROLE OF EDUCATION IN SOLID WASTE MANAGEMENT FACILITIES

Main aspects of public education pertaining to the SWM facilities are as follows:

- To inform the people in general, and those living around SWM facilities, such as transfer stations and disposal sites, about health and environmental risks associated with improper management of waste. Such facilities are important for the environment but they have to be constructed with the proper countermeasures and operated in a sound manner. Increased public understanding will force the facility planners to provide such countermeasures at the plan and design stages, and properly manage the operation of these facilities.
- To make responsible government officials in the field of SWM and public representatives aware of the need for environmentally sound management of the SWM facilities. The Waste Authority would be more careful when contracting out the design and operation of such facilities to qualified contractors only.
- To improve the public acceptance of such facilities.

2. ESTABLISHMENT OF AWARENESS CAMPAIGNS

2.1 BASIC PRINCIPALS FOR STARTING AWARENESS CAMPAIGNS

The following set of principles should be determined when developing the public awareness campaigns.

1) Best use of resources

The lack of budget or educational tools for the public awareness purpose is a limiting factor when organizing awareness campaigns. This factor should be taken into account in a positive manner when selecting educational means, as follows:

- Efficient use of the existing local human resources for involvement of the public, planning, conception and creation of materials
- Using existing educational materials and equipment already existing and made available by concerned agencies such as the Ministry of Education, or the example of Kobe City in Japan explained by the JICA Advisory Committee Chairman for this Study, Mr. Miyanojara in the second seminar held in Almaty City in November 1999.
- Exchanging information between regions within the country, of the FSU, and other nations.
- Involving as many citizens within these activities
- Involving civic groups and NGO's who are willing to volunteer their time and know-how

2) Improvement of Communication

To be successful the act of making recommendations to the citizens about waste manners already presupposes a high level of awareness for general interest and civic duties and a sense of collective responsibility. Such awareness becomes possible only within the framework of the relation between the resident and the authorities through dialogue and advanced communication.

The idea of an awareness campaign is then to begin the development of better conditions for such a dialogue. Developing a policy for social communication between residents and the local authorities (Waste Authority, KSK's and KDK's) is an important objective, which depends both on the authority's initiative and on the capacity and will of the people to participate in the finding of solutions. Some issues in communication improvement are as follows:

- Communication should be done in an interactive way, between the authorities and the residents. For example if authorities organize cleansing campaigns they should inform the residents of the campaign results, and perhaps participate together in evaluating these results in order to reflect the public's opinions and participation in design of campaigns as well.
- Physical presence of a person dedicated to communication at the Waste Authority, KSK's and KDK's levels. Such a person should be associated with the operation of SWM technical services.

3) Coordination with Environmental Objectives

There is a need to integrate the awareness of the public on SWM within their overall understanding and appreciation of environmental issues. Furthermore coordination of public awareness campaigns with national environmental objectives in the field of SWM is necessary.

4) Personalizing the Campaign

The use of local resources, officials and well known personalities is one way to personalize messages and educational materials and have a strong influence on the public.

5) Continuity and Evaluation of the Actions

Both continuity and evaluation of public awareness campaigns are very important for the realization of the objectives. The requirements to ensure both actions should be considered at the planning and execution stages of the campaigns.

2.2 COMMUNICATION TARGET GROUPS

The target groups for the public awareness campaigns are described as follows.

1) Primary Target Group

These constitute the primary group of priority targets within the scope of public awareness for SWM improvement. They are as follows:

- KSK's and KDK's
- Collection Service Companies
- Waste Authority inspectors
- Public health inspectors

2) Intermediate Target Groups

This group includes the persons in a position to transmit the messages to the final groups and examples of members of that group are as follows:

- Teachers at schools
- Youth cultural centers
- Civic organizations
- Places of worship (mosques, churches, etc.)

3) Final Target Group

This is the group to which the message is being delivered. Members different according to the message but are mainly as follows:

- The general public
- Women
- Children
- Workers in the SWM sector

4) School Target Group

This group which is composed of teachers and students needs special consideration. Teachers can include specific educational objectives within the current courses or promote activities in school clubs or school cooperatives.

The importance of this group is summarized as follows:

- Basically it has a long term objective, namely the development of an environmentally aware society.
- Awareness messages and educational tools must be prepared taking into consideration different scholastic levels.
- Messages should enhance awareness of both national policies as well as local ones in the environmental field.

2.3 AWARENESS MESSAGES

The message of the public awareness campaigns and education has to be broad enough to cover both environmental quality as well as SWM. Following are examples of some general messages addressed to different target groups:

- The effects of the unsanitary disposal of solid waste on public health and the environment
- The increasing quantity of solid waste in general and the risks induced
- The cost and benefits of proper SWM
- The risks to which people engaged in SWM sector are exposed to
- The advantage of a clean neighborhood in increasing the advantages of amenities
- The importance of sound waste discharge practices in line with the applied collection system

2.4 SELECTION OF AWARENESS TOOLS

Awareness tools like round tables and regular meetings with the public have a big advantage, which is direct contact with the people and exchange of views. Regularity of information delivered to the people is an essential aspect for development of communication and continuity. The following communication tools must be given priority in the short term:

- Information letters and leaflets
- Information meetings
- Evaluation studies
- Practical awareness brochures or leaflets with basic information on waste recommendations given to the people
- Mass media utilization such as newspapers, radio and television

3. PLANNING AND INFORMATION ACTIVITIES

Important activities linked to the launching of public awareness campaigns are the planning, preparation of educational materials and evaluation. Setting up of an effective planning system and collection of relevant information to the campaign are therefore very important.

3.1 EXAMPLES OF ACTIVITIES PERTAINING TO PLANNING

Planning should be prepared at the authority level, either by the district or the Waste Authority and should involve several target groups. Examples of the activities are as follows:

- Establishing a committee for planning actions, with regular meetings with concerned service providers
- Visiting places where education and awareness campaigns are already set up and SWM facilities
- Defining the possible contribution of civic groups and establishing contact with potential groups
- Establishing direct contact with schools

3.2 EXAMPLES OF ACTIVITIES PERTAINING TO INFORMATION

1) Information for Planning

- Interviews and hearing surveys
- Information on precedent campaigns and opinion surveys
- Information on technical aspects of SWM sector
- Information on social aspects in targeted areas
- Information on SWM operation aspects
- Information on municipal or local ordinances on SWM

2) Information for Evaluation

- Preparation of periodic information documents
- Dissemination of information to local authorities, citizens, schools and collection service companies

4. EXECUTION ACTIVITIES

4.1 SHORT TERM ACTIVITIES

In the short term activities, such as those described hereafter should be determined.

- To consider the information required to be delivered to the public concerning SWM
- To involve NGO's in the establishment of educational activities from the planning stage to the execution and evaluation stages.
- To start awareness heightening of teachers at schools
- To define a feasible educational program
- To start exchange of information with other districts and cities

4.2 MEDIUM TERM ACTIVITIES

The medium term activities may include the following:

- To establish an environmental educational program at schools
- To start the exchange of information on the international level
- To set up a communication mechanism for provision of regular information to involved parties
- To establish a system for collection and evaluation of public opinion

4.3 LONG TERM ACTIVITIES

Potential long term objectives are as follows:

- To get full participation of residents and set up partnerships with NGO's
- To involve SWM service operators in the awareness and educational campaigns

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