CHAPTER 3

ENVIRONMENTAL SURVEY

3.1 WATER QUALITY ANALYSIS

Table 3.1.1 Results of Groundwater Analysis in Almaty

Name of Indices under study	Date of sampling	Places of Groundwater Sampling											
		Compost Plant Well at the Weighing Station	Illegal Dumpsites						Transfer Station Well	Settl. Ozet			
			D.Zetysu Place. Cluster well N.3	D.Zetysu Place. Cluster well N.4	B. Place. Well in ADK Village	Other. Cluster well N.19	Other. Cluster well N.21	Other. Cluster well N.41		Well N.3	New well	Well N.2	Well N.1
		G2*9	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13
NO_3, mg/dm^3	24/3/99	2.9*1	20.2	18.8	3.3	3.3	22.0	8.5	2.3*1	1.6	3.6	1.8	2.0
	29/3/99	3.6*2	29.5	17.6	3.6	4.4	24.8	5.2	2.8*2	2.7	3.2	2.4	2.7
	27/7/99	4.1*3	32.8	21.0	1.95	2.80	4.40	2.80	N.A.*6	4.25	N.A.	3.30	2.25
	30/7/99	4.0*4	30.4	19.2	3.65	4.25	21.6	4.10	N.A.	2.7	N.A.	2.4	2.7
Average		3.7	28.2	19.2	3.1	3.7	18.2	5.2	2.6	2.8	3.4	2.5	2.4
NO_2, mg/dm^3	24/3/99	<0.01*1	<0.01*5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*1	<0.01	<0.01	<0.01	<0.01
	29/3/99	<0.01*2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*2	<0.01	<0.01	<0.01	<0.01
	27/7/99	<0.01*3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N.A.	<0.01	N.A.	<0.01	<0.01
	30/7/99	<0.01*4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N.A.	<0.01	N.A.	<0.01	<0.01
Average		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cl, mg/dm^3	24/3/99	7.0*1	17.75	17.75	5.33	7.10	39.05	14.20	7.10*1	7.10	7.10	5.33	5.33
	29/3/99	7.10*2	17.75	17.75	5.33	7.10	39.05	14.20	7.10*2	7.10	7.10	5.33	5.33
	27/7/99	7.1*3	17.75	24.85	7.10	7.105	39.05	17.75	N.A.	7.10	N.A.	7.10	7.10
	30/7/99	5.33*4	17.75	24.85	8.88	7.10	39.05	17.75	N.A.	7.10	N.A.	7.10	7.10
Average		6.6	17.75	21.3	6.7	7.1	39.05	16.0	7.1	7.1	7.1	6.2	6.2
Coliform Group Number	24/3/99	<3*1	<3	<3	<3	<3	<3	<3	9*1	<3	<3	<3	<3
	29/3/99	<3*2	<3	<3	<3	<3	<3	<3	<3*2	<3	<3	<3	<3
	27/7/99	<3*3	<3	15	>1100	<3	<3	43	N.A.	<3	N.A.	<3	<3
	30/9/99	23*4	4	43	43	43	1100	4	N.A.	23	N.A.	<3	<3
Average													

Name of Indices	Date	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13
General Bacterial Population	24/3/99	18*1	<10	<10	<10	12	<10	12	19*1	<10	<10	<10	<10
	29/3/99	<10*2	<10	<10	<10	<10	<10	<10	<10*2	<10	<10	<10	<10
	27/7/99	<10*3	<10	<10	80	<10	<10	25	N.A.	<10	N.A.	<10	<10
	30/7/99	<10*4	<10	<10	<10	<10	<10	<10	N.A.	<10	N.A.	<10	<10
Average													
CN, mg/dm^3	24/3/99	N/D*1	N/D*7	N/D	N/D	N/D	N/D	N/D	N/D*1	N/D	N/D	N/D	N/D
	29/3/99	N/D*2	N/D	N/D	N/D	N/D	N/D	N/D	N/D*2	N/D	N/D	N/D	N/D
	27/7/99	N/D*3	N/D	N/D	N/D	N/D	N/D	N/D	N.A.	N/D	N.A.	N/D	N/D
	30/7/99	N/D*4	N/D	N/D	N/D	N/D	N/D	N/D	N.A.	N/D	N.A.	N/D	N/D
Average		N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Hg, mg/dm^3	24/3/99	<0.0001*1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001*1	<0.01	<0.0001	<0.0001	<0.0001
	29/3/99	<0.0001*2	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001*2	<0.01	<0.0001	<0.0001	<0.0001
	27/7/99	<0.0001*3	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	N.A.	<0.01	N.A.	<0.0001	<0.0001
	30/7/99	<0.0001*4	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	N.A.	<0.01	N.A.	<0.0001	<0.0001
Average		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.01	<0.0001	<0.0001	<0.0001
Cu, mg/dm^3	24/3/99	<0.002*1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002*1	<0.02	<0.002	<0.002	<0.002
	29/3/99	<0.002*2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002*2	<0.02	<0.002	<0.002	<0.002
	27/7/99	<0.002*3	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N.A.	<0.02	N.A.	<0.002	<0.002
	30/7/99	<0.002*4	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N.A.	<0.02	N.A.	<0.002	<0.002
Average		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.002	<0.002
Fe, mg/dm^3	24/3/99	<0.01*1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*1	<0.01	<0.01	<0.01	<0.01
	29/3/99	<0.01*2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*2	<0.01	<0.01	<0.01	<0.01
	27/7/99	0.01*3	0.01	0.01	0.01	0.02	0.02	0.01	N.A.	0.03	N.A.	<0.01	<0.02
	30/7/99	<0.02*4	<0.01	<0.01	<0.01	<0.02	<0.03	<0.01	N.A.	<0.04	N.A.	<0.01	<0.04
Average													
Mn, mg/dm^3	24/3/99	<0.01*1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*1	<0.01	<0.01	<0.01	<0.01
	29/3/99	<0.01*2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*2	<0.01	<0.01	<0.01	<0.01
	27/7/99	<0.01*3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N.A.	<0.01	N.A.	<0.01	<0.01
	30/7/99	<0.01*4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N.A.	<0.01	N.A.	<0.01	<0.01
Average		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Name of Indices	Date	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13
Zn, mg/dm^3	24/3/99	<0.002*1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002*1	<0.02	<0.002	<0.002	<0.002
	29/3/99	<0.002*2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002*2	<0.02	<0.002	<0.002	<0.002
	27/7/99	<0.002*3	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N.A.	<0.002	N.A.	<0.002	<0.002
	30/7/99	<0.002*4	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N.A.	<0.02	N.A.	<0.002	<0.002
Average		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	<0.002	<0.002
Pb, mg/dm^3	24/3/99	<0.005*1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005*1	<0.005	<0.005	<0.005	<0.005
	29/3/99	<0.005*2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005*2	<0.005	<0.005	<0.005	<0.005
	27/7/99	<0.005*3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	N.A.	<0.005	N.A.	<0.005	<0.005
	30/7/99	<0.005*4	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	N.A.	<0.005	N.A.	<0.005	<0.005
Average		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cr^{6+}, mg/dm^3	24/3/99	<0.01*1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*1	<0.01	<0.01	<0.01	<0.01
	29/3/99	<0.01*2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*2	<0.01	<0.01	<0.01	<0.01
	27/7/99	<0.01*3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N.A.	<0.01	N.A.	<0.01	<0.01
	30/7/99	<0.01*4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N.A.	<0.01	N.A.	<0.01	<0.01
Average		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cd, mg/dm^3	24/3/99	<0.002*1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002*1	<0.02	<0.002	<0.002	<0.002
	29/3/99	<0.002*2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002*2	<0.02	<0.002	<0.002	<0.002
	27/7/99	<0.002*3	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N.A.	<0.02	N.A.	<0.002	<0.002
	30/7/99	<0.002*4	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N.A.	<0.02	N.A.	<0.002	<0.002
Average		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.002	<0.002
As, mg/dm^3	24/3/99	<0.005*1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005*1	<0.005	<0.005	<0.005	<0.005
	29/3/99	<0.005*2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005*2	<0.005	<0.005	<0.005	<0.005
	27/7/99	<0.005*3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	N.A.	<0.005	N.A.	<0.005	<0.005
	30/7/99	<0.005*4	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	N.A.	<0.005	N.A.	<0.005	<0.005
Average		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
F, mg/dm^3	24/3/99	0.54*1	0.48	0.68	0.80	0.72	0.54	0.66	0.74*1	0.74	0.54	0.74	0.74
	29/3/99	0.54*2	0.45	0.62	0.74	0.66	0.48	0.68	0.62*2	0.68	0.48	0.68	0.68
	27/7/99	0.8*3	0.52	1.02	1.02	0.82	0.64	1.0	N.A.	0.82	N.A.	1.0	0.8
	30/7/99	0.74*4	0.60	0.80	0.74	0.48	0.66	0.68	N.A.	0.68	N.A.	0.68	0.68
Average		0.66	0.51	0.78	0.83	0.67	0.58	0.76	0.68	0.73	0.51	0.78	0.73

Name of Indices	Date	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13
Ca, mg/dm^3	24/3/99	28.06*1	92.18	66.13	26.05	28.06	102.20	30.06	26.05*1	24.05	26.05	26.05	22.04
	29/3/99	28.06*2	90.18	64.13	26.05	28.06	90.18	28.06	24.65*2	26.05	28.06	26.05	22.04
	27/7/99	28.06*3	92.18	56.11	26.05	28.06	104.21	26.05	N.A.	24.05	N.A.	26.05	24.05
	30/7/99	30.06*4	92.18	60.12	26.05	28.06	90.18	28.06	N.A.	26.05	N.A.	26.05	22.04
Average		28.56	91.68	61.62	26.05	28.06	96.69	28.06	25.35	25.05	27.06	26.05	22.54
Mg, mg/dm^3	24/3/99	3.65*1	12.16	14.59	4.86	6.08	25.54	9.73	2.43*1	3.65	4.86	4.86	3.65
	29/3/99	4.86*2	13.38	14.59	4.86	6.08	36.48	10.94	3.65*2	3.65	4.86	4.86	4.86
	27/7/99	3.65*3	14.59	20.67	7.30	7.30	25.54	13.38	N.A.	4.86	N.A.	6.08	3.65
	30/7/99	4.86*4	14.59	18.24	4.86	6.08	36.48	10.94	N.A.	3.65	N.A.	4.86	4.86
Average		4.26	13.68	17.02	5.47	6.39	31.01	11.25	3.04	3.95	4.86	5.17	4.26
Total hardness, mg/eq.	24/3/99	1.70*1	5.60	4.50	1.70	1.90	7.20	2.90	1.50*1	1.50	1.70	1.70	1.40
	29/3/99	1.80*2	5.60	4.40	1.70	1.90	7.50	2.30	1.50*2	1.60	1.80	1.70	1.50
	27/7/99	1.70*3	5.80	4.50	1.90	2.00	7.30	2.40	N.A.	1.60	N.A.	1.80	1.50
	30/7/99	1.90*4	5.80	4.50	1.70	1.90	7.50	2.30	N.A.	1.60	N.A.	1.70	1.50
Average		1.78	5.70	4.48	1.75	1.93	7.38	2.48	1.5	1.58	1.75	1.73	1.48
Distillation residues, mg/dm^3	24/3/99	119.0*1	370.0	329.0	103.0	130.0	683.0	234.0	134.0*1	108.0	114.0	107.0	84.0
	29/3/99	101.0*2	332.0	327.0	91.0	129.0	672. 0	217.0	126.0*2	101.0	107.0	123.0	107.0
	27/7/99	191.0*3	460.0	397.0	113.0	148.0	642.0	288.0	N.A.	145.0	N.A.	187.0	125.0
	30/7/99	151.0*4	404.0	383.0	110.0	137.0	612.0	245.0	N.A.	135.0	N.A.	130.0	113.0
Average		141	392	359	104	136	652	246	130	122	111	137	107
Phenol, mg/dm^3	24/3/99	N/D*1	N/D	N/D	N/D	N/D	N/D	N/D	N/D*1	N/D	N/D	N/D	N/D
	29/3/99	N/D*2	N/D	N/D	N/D	0.004	0.005	N/D	0.005*2	N/D	0.002	N/D	0.005
	27/7/99	N/D*3	N/D	<0.01	N/D	N/D	N/D	N/D	N.A.	N/D	N.A.	N/D	N/D
	30/7/99	N/D*4	N/D	N/D	N/D	0.005	0.004	N/D	N.A.	N/D	N.A.	N/D	0.005
Average													
NH_4, mg/dm^3	24/3/99	<0.01*1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*1	<0.01	<0.01	<0.01	<0.01
	29/3/99	<0.01*2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*2	<0.01	<0.01	<0.01	<0.01
	27/7/99	<0.01*3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N.A.	<0.01	N.A.	<0.01	<0.01
	30/7/99	<0.01*4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N.A.	<0.01	N.A.	<0.01	<0.01
Average		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
pH	24/3/99	7.85*1	7.88	7.92	7.82	7.84	7.96	7.75	7.75*1	7.80	7.82	7.88	7.85
	29/3/99	7.85*2	7.75	7.95	7.82	7.80	8.00	7.85	7.81*2	7.80	7.80	7.85	7.90
	27/7/99	7.90*3	7.85	8.0	8.25	8.27	7.87	8.20	N.A.	8.29	N.A.	8.25	8.30
	30/7/99	8.36*4	7.76	7.88	8.30	8.20	7.71	8.28	N.A.	8.20	N.A.	8.20	8.26
Average		7.99	7.81	7.94	8.05	8.03	7.89	8.02	7.78	8.02	7.81	8.05	8.08

Name of Indices	Date	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13
Taste	24/3/99	no taste*1	no taste	no taste	no taste	no taste	no taste	no taste	no taste*1	no taste	no taste	no taste	no taste
	29/3/99	no taste*2	no taste	no taste	no taste	no taste	no taste	no taste	no taste*2	no taste	no taste	no taste	no taste
	27/7/99	no taste*3	no taste	no taste	no taste	no taste	no taste	no taste	N.A.	no taste	N.A.	no taste	no taste
	30/7/99	no taste*4	no taste	no taste	no taste	no taste	no taste	no taste	N.A.	no taste	N.A.	no taste	no taste
Average		no taste	no taste	no taste	no taste	no taste	no taste	no taste	no taste	no taste	no taste	no taste	no taste
Aroma	24/3/99	no aroma*1	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma*1	no aroma	no aroma	no aroma	No aroma
	29/3/99	no aroma*2	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma*2	no aroma	no aroma	no aroma	No aroma
	27/7/99	no aroma*3	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma	N.A.	no aroma	N.A.	no aroma	No aroma
	30/7/99	no aroma*4	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma	N.A.	no aroma	N.A.	no aroma	No aroma
Average		no aroma	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma	no aroma	No aroma
Color	24/3/99	colorless*1	colorless	colorless	colorless	colorless	colorless	colorless	colorless*1	colorless	colorless	colorless	colorless
	29/3/99	colorless*2	colorless	colorless	colorless	colorless	colorless	colorless	colorless*2	colorless	colorless	colorless	colorless
	27/7/99	colorless*3	colorless	colorless	colorless	colorless	colorless	colorless	N.A.	colorless	N.A.	colorless	colorless
	30/7/99	colorless*4	colorless	colorless	colorless	colorless	colorless	colorless	N.A.	colorless	N.A.	colorless	colorless
Average		colorless	colorless	colorless	colorless	colorless	colorless	colorless	colorless	colorless	colorless	colorless	colorless
Turbidity	24/3/99	N/D*1	N/D	N/D	N/D	N/D	N/D	N/D	N/D*1	N/D	N/D	N/D	N/D
	29/3/99	N/D*2	N/D	N/D	N/D	N/D	N/D	N/D	N/D*2	N/D	N/D	N/D	N/D
	27/7/99	N/D*3	N/D	N/D	N/D	N/D	N/D	N/D	N.A.	N/D	N.A.	N/D	N/D
	30/7/99	N/D*4	N/D	N/D	N/D	N/D	N/D	N/D	N.A.	N/D	N.A.	N/D	N/D
Average		N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Sulfides, mg/dm^3	24/3/99	N/D*1	N/D	N/D	N/D	N/D	N/D	N/D	N/D*1	N/D	N/D	N/D	N/D
	29/3/99	N/D*2	N/D	N/D	N/D	N/D	N/D	N/D	N/D*2	N/D	N/D	N/D	N/D
	27/7/99	N/D*3	N/D	N/D	N/D	N/D	N/D	N/D	N.A.	N/D	N.A.	N/D	N/D
	30/7/99	N/D*4	N/D	N/D	N/D	N/D	N/D	N/D	N.A.	N/D	N.A.	N/D	N/D
Average		N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
SO_4^2mg/dm^3	24/3/99	7.82*1	30.45	35.39	9.05	11.11	202.05	54.32	7.41*1	8.23	10.29	8.23	8.64
	29/3/99	9.88*2	34.15	40.33	9.88	13.58	199.58	52.67	17.76*2	9.05	9.88	9.46	7.82
	27/7/99	7.0*3	34.15	42.38	9.05	12.76	169.54	55.55	N.A.	1.65	N.A.	9.46	6.58
	30/7/99	5.76*4	32.92	40.74	10.29	13.17	158.43	53.50	N.A.	8.64	N.A.	9.05	7.41
Average		7.62	32.92	39.71	9.57	12.66	188.40	54.01	12.59	6.89	10.09	9.05	7.61
COD, O_2 mg/dm^3	24/3/99	0.42*1	0.64	1.06	0.50	0.50	0.1	0.64	1.06*1	0.21	0.21	0.64	1.06
	29/3/99	0.61*2	0.81	1.22	0.41	0.41	0.10	0.82	0.82*2	0.41	0.10	0.82	0.82
	27/7/99	0.35*3	1.07	0.86	0.65	0.41	0.1	0.41	N.A.	0.35	N.A.	0.64	0.86
	30/7/99	0.41*4	0.86	0.64	0.43	0.50	0.1	0.50	N.A.	0.21	N.A.	0.50	1.06
Average		0.45	0.85	0.95	0.50	0.46	0.1	0.59	0.94	0.30	0.16	0.65	0.95

Name of Indices	Date	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13
BOD, O_2 mg/dm^3	24/3/99	0.31*1	0.42	0.82	0.31	0.0	0.25	0.42	0.76*1	0.10	0.10	0.50	0.88
	29/3/99	0.4*2	0.66	0.98	0.25	0.0	0.31	0.55	0.61*2	0.31	0.0	0.55	0.61
	27/7/99	0.24*3	0.88	0.72	0.50	0.21	0	0.24	N.A.	0.24	N.A.	0.41	0.65
	30/7/99	0.24*4	0.65	0.41	0.35	0.35	0	0.35	N.A.	0.1	N.A.	0.24	0.86
Average		0.30	0.65	0.73	0.35	0.1	0.1	0.39	0.69	0.19	0.05	0.43	0.75
Suspended Solids, mg/dm^3	24/3/99	N/D*1	N/D	N/D	N/D	N/D	N/D	N/D	N/D*1	N/D	N/D	N/D	N/D
	29/3/99	N/D*2	N/D	N/D	N/D	N/D	N/D	N/D	N/D*2	N/D	N/D	N/D	N/D
	27/7/99	N/D*3	N/D	N/D	N/D	N/D	N/D	N/D	N.A.	N/D	N.A.	N/D	N/D
	30/7/99	N/D*4	N/D	N/D	N/D	N/D	N/D	N/D	N.A.	N/D	N.A.	N/D	N/D
Average		N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Electric Conductivity, mCm cm^{-1}*8	24/3/99	0.16*1	0.48	0.42	0.16	0.18	0.81	0.31	0.15*1	0.14	0.16	0.16	0.15
	29/3/99	0.15*2	0.50	0.44	0.16	0.23	0.82	0.34	0.16*2	0.18	0.17	0.16	0.16
	27/7/99	0.17*3	0.46	0.42	0.16	0.18	0.73	0.30	N.A.	0.14	N.A.	0.16	0.15
	30/7/99	0.16*4	0.44	0.41	0.16	0.17	0.67	0.15	N.A.	0.14	N.A.	0.14	0.13
Average		0.16	0.47	0.42	0.16	0.19	0.78	0.28	0.16	0.15	0.17	0.16	0.15
Oxidation-Reduction Potential, mV	24/3/99	265*1	228	222	270	267	201	230	268*1	272	265	266	267
	29/3/99	260*2	220	215	260	260	196	226	262*2	260	260	270	270
	27/7/99	258*3	235	227	270	275	210	240	N.A.	279	N.A.	280	283
	30/7/99	265*4	230	283	231	266	207	271	N.A.	271	N.A.	273	276
Average		262	228	237	258	267	204	242	265	271	263	272	274

Note:

*1 This sample was measured in 25/3/99.

*2 This sample was measured in 30/3/99.

*3 This sample was measured in 28/7/99.

*4 This sample was measured in 3/8/99.

*5 < means that something is not detected or less than the specified value.

*6 N.A. means «not applicable» because the wells were no longer in use.

*7 N/D means «not detected»

*8 mC m cm^{-1} means Ω^{-1} cm^{-1} 10^{-3}

*9 G2, G3, ... indicates site location as shown in Figure 3.3.1, Section E of Supporting Report.

Table 3.1.2 Results of Surface Water Analysis in Almaty

No	Places of surface water sampling	Date of sampling	Temperature Water/ Air °C	Color	Turbidity mg/dm³ SiO_2	pH	Electric Conductivity mCm/cm⁻¹	Coliform Group Number	Dissolved oxygen	COD O_2 mg/dm³	BOD O_2 mg/dm³	Suspended solids mg/dm³	Total content of nitrogen mg/dm³	Total content of phosphorus mg/dm³
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
S1*2	Compost plant Vesnovka River (upstream of the refuse dump)	25/3/99	4.4	colorless	47.0	8.18	0.42	23800	10.14	6.34	5.96	32.20	3.13	<0.01*1
		30/3/99	6.4	colorless	77.0	7.90	0.40	28000	9.97	7.14	5.86	44.6	2.72	<0.01
		28/7/99	13.4 26.0	colorless	450.0	7.80	0.16	>23800	9.39	4.76	3.86	451.8	1.56	<0.01
		3/8/99	12.2 24.2	colorless	330.0	8.27	0.16	>28000	9.12	6.53	5.64	525.95	1.41	<0.01
Average					226	8.04	0.29		9.66	6.19	5.33	263.6	2.21	<0.01
S2	Compost plant Vesnovka River (downstream of the refuse dump)	25/3/99	3.2	colorless	51.0	8.20	0.84	23800	10.28	11.62	10.15	40.95	3.18	<0.01
		30/3/99	5.6	colorless	83.0	7.90	0.42	23800	10.14	5.10	3.76	72.85	2.32	<0.01
		28/7/99	13.6 22.8	colorless	500.0	7.85	0.17	>23800	9.12	6.34	5.68	434.6	1.63	<0.01
		3/8/99	12.6 22.2	colorless	430.0	8.35	0.17	>23800	9.12	7.17	6.75	415.15	1.35	<0.01
Average					266	8.08	0.40		9.67	7.56	6.59	240.9	2.12	<0.01
S3	Ex. Disposal Site Pond (below setting basin)	25/3/99	9.2	daffodil	53.0	7.70	13.5	90	3.47	26.40	23.84	41.10	0.87	<0.01
		30/3/99	5.5	daffodil	60.0	7.75	13.1	23800	3.20	25.50	21.34	69.30	1.56	<0.01
		28/7/99	25.8 28.8	daffodil	76.0	8.11	12.0	>23800	3.05	7.70	6.07	72.45	1.26	<0.01
		3/8/99	24.0 28.7	daffodil	62.0	8.15	13.0	>23800	3.35	8.06	6.27	56.80	0.74	<0.01
Average					62.8	7.93	12.9		3.27	16.9	14.4	59.91	1.11	<0.01
S4	Ex. Disposal Site Setting basin.	25/3/99	10.4	faintly yallow	63.0	7.97	7.5	90	5.08	39.60	33.70	42.80	38.77	<0.01
		30/3/99	5.6	-ditto-	96.0	7.78	9.2	23000	5.43	39.78	33.41	72.95	44.28	<0.01
		28/7/99	27.6 28.8	-ditto-	83.0	8.23	16.0	>23800	4.31	47.25	43.56	46.75	101.21	<0.01
		3/8/99	26.4 28.7	-ditto-	83.0	8.40	16.0	>23000	4.17	57.43	52.34	43.35	111.60	<0.01
Average					81.3	8.10	12.2		4.75	46.02	40.75	51.46	73.97	<0.01

No	1	2	3	4	5	6	7	8	9	10	11	12	13	14
S5	Illegal dumpsite Place A (Ostroumov st.) Karasu River (upstream of the refuse dump)	23/3/99	5.4	colorless	191.0	8.28	0.55	>1100000	8.63	13.01	10.85	160.20	5.60	<0.01
		26/3/99	7.0	colorless	64.0	8.10	0.70	23800	8.05	5.10	3.85	54.20	5.84	<0.01
		26/7/99	15.4	colorless	20.0	8.40	0.63	>23800	8.14	11.29	9.03	35.30	2.83	<0.01
			23.5											
		29/7/99	15.6	colorless	50.0	8.35	0.64	>23800	8.32	10.61	8.11	44.40	7.24	<0.01
			22.4											
Average					81.3	8.28	0.63		8.29	10.0	7.96	73.53	5.38	<0.01
S6	Illegal dumpsite Place A (Ostroumov st.) Karasu River (downstream of the refuse dump)	23/3/99	5.1	colorless	420.0	8.35	0.52	>1100000	9.71	11.92	9.18	456.60	5.59	<0.01
		26/3/99	6.0	colorless	69.0	8.15	0.62	23800	10.14	5.10	4.17	68.35	5.48	<0.01
		26/7/99	15.7	colorless	1000.0	8.50	0.30	>23800	8.07	12.37	9.84	824.50	1.74	<0.01
			25.6											
		29/7/99	15.8	colorless	1000.0	8.30	0.39	>238000	7.98	11.75	9.38	518.65	3.77	<0.01
			23.8											
Average					622	8.33	0.46		8.98	10.29	8.14	467.0	4.15	<0.01
S7	Illegal dumpsite Place B (ADK) Unknown rivulet (upstream of the refuse dump)	23/3/99	4.0	colorless	112.0	8.30	0.60	>1100000	9.46	8.67	7.25	93.50	10.30	<0.01
		26/3/99	7.4	colorless	25.0	8.05	0.60	23000	9.20	4.59	3.26	13.00	8.24	<0.01
		26/7/99	14.2	colorless	59.0	8.35	0.20	>23800	8.85	6.29	5.37	43.90	2.06	<0.01
			25.1											
		29/7/99	14.3	colorless	53.0	7.82	0.19	>238000	8.61	4.81	3.55	23.75	2.31	<0.01
			23.0											
Average					62.3	8.13	0.40		9.03	6.09	4.86	43.54	5.73	<0.01
S8	Illegal dumpsite Place B (ADK) Unknown rivulet (downstream of the refuse dump)	23/3/99	5.3	colorless	82.0	8.18	0.58	>1100000	9.74	7.59	6.53	69.95	9.71	<0.01
		26/3/99	11.2	colorless	27.0	8.03	0.59	23000	9.35	3.06	1.87	20.70	7.42	<0.01
		26/7/99	14.6	colorless	350.0	8.45	0.22	>23800	8.63	6.08	5.49	232.40	1.96	<0.01
			23.9											
		29/7/99	14.8	colorless	210.0	7.90	0.24	>238000	8.36	4.59	3.68	42.65	3.21	<0.01
			26.0											
Average					167	8.14	0.41		9.02	5.33	4.39	91.43	5.58	<0.01
S9	Illegal dumpsite Place C (Horse race field). Sultanka River (upstream of the refuse dump)	23/3/99	8.5	colorless	36.0	8.16	0.65	24000	8.65	4.34	3.99	25.75	5.00	<0.01
		26/3/99	9.8	colorless	23.0	8.17	0.69	1300	8.90	3.06	2.12	16.10	5.25	<0.01
		26/7/99	17.8	colorless	56.0	8.50	0.58	>23800	8.25	2.87	2.05	48.55	2.39	<0.01
			24.0											
		29/7/99	17.2	colorless	63.0	8.00	0.59	>238000	8.07	3.11	2.59	38.80	4.84	<0.01
			21.0											
Average					44.5	8.21	0.63		8.47	3.35	2.69	32.3	4.37	<0.01

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
S10	Illegal dumpsite Place C (Horse race field). Sultanka River (downstream of the refuse dump)	23/3/99	8.8	colorless	53.0	8.10	0.68	110000	8.91	4.34	3.57	41.90	5.66	<0.01
		26/3/99	10.0	colorless	12.0	8.06	0.70	1300	9.18	3.06	2.28	11.20	5.22	<0.01
		26/7/99	18.2 25.5	colorless	53.0	8.55	0.58	>23800	8.07	2.95	2.01	52.40	1.51	<0.01
		29/7/99	17.4 24.2	colorless	56.0	8.07	0.60	>238000	7.84	2.95	2.43	29.90	5.41	<0.01
Average					43.5	8.20	0.64		8.50	3.33	2.57	33.85	4.45	<0.01
S11	Illegal dumpsite Place E (Al-Farabi st.) Unknown brook (upstream of the refuse dump)	23/3/99	3.5	colorless	68.0	8.20	0.54	>1100000	9.84	8.67	7.48	72.95	4.74	<0.01
		26/3/99	8.5	colorless	96.0	8.00	0.74	23800	9.75	5.10	4.68	118.85	6.45	<0.01
		26/7/99	15.4 20.7	colorless	150.0	8.67	0.34	>23800	8.31	10.73	9.25	116.55	2.09	<0.01
		29/7/99	15.6 22.6	colorless	200.0	8.45	0.34	>238000	8.24	8.35	6.97	80.955	2.65	<0.01
Average					128	8.33	0.49		9.04	8.21	7.10	97.33	3.98	<0.01
S12	Illegal dumpsite Place E (Al-Farabi st.) Unknown brook (downstream of the refuse dump)	23/3/99	3.2	colorless	480.0	8.06	0.54	>1100000	10.05	7.59	7.03	365.55	4.65	<0.01
		26/3/99	1.6	colorless	520.0	8.18	0.63	23800	10.05	5.10	4.35	427.0	2.17	<0.01
		26/7/99	15.6 20.8	colorless	125.0	8.65	0.35	>23800	8.07	10.54	9.43	125.35	2.16	<0.01
		29/7/99	15.8 22.8	colorless	150.0	8.44	0.34	>238000	8.07	9.65	7.11	84.40	2.56	<0.01
Average					318.8	8.33	0.47		9.06	8.22	6.98	250.6	2.89	<0.01
S13	Illegal dumpsite Place E (Al-Farabi st.) Brook along the road	23/3/99	0.2	daffodil	6050.0	7.60	0.74	-	6.30	-	-	7112.50	4.07	<0.01
		30/3/99	7.8	colorless	67.0	7.90	0.64	9200	9.18	3.08	2.70	44.70	9.80	<0.01
Average					3059	7.75	0.69		7.74			3579	6.94	<0.01

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
S14	Transfer station. Terenkara River (upstream of the refuse dump)	23/3/99	6.4	colorless	56.0	8.10	0.58	23800	8.93	7.39	6.27	48.35	8.35	<0.01
		30/3/99	7.8	colorless	67.0	7.90	0.64	9200	9.18	3.08	2.70	44.70	9.80	<0.01
		28/7/99	17.4 22.2	colorless	62.0	8.20	0.54	>23800	8.07	6.29	4.97	52.20	9.49	<0.01
		3/8/99	18.9 22.8	colorless	59.0	8.55	0.54	>238000	7.91	9.53	7.88	13.35	5.88	<0.01
Average					61.0	8.19	0.58		8.52	6.57	5.46	39.65	8.38	<0.01
S15	Transfer station. Terenkara River (downstream of the refuse dump)	23/3/99	4.0	colorless	50.0	8.10	0.60	23800	9.36	8.45	6.53	39.75	8.57	<0.01
		30/3/99	6.6	colorless	71.0	7.85	0.60	2300	9.27	7.65	6.04	38.00	9.22	<0.01
		28/7/99	18.1 22.6	colorless	56.0	8.16	0.54	>23800	8.25	7.18	5.38	31.90	8.96	<0.01
		3/8/99	19.4 23.0	colorless	53.0	8.47	0.54	>238000	7.80	9.98	7.70	12.95	6.45	<0.01
Average					57.5	8.15	0.57		8.67	8.32	6.41	30.65	8.30	<0.01

Note:

*1 < means that something is not detected or less than the specified value

*2 S1, S2, ... indicates site location as shown in Figure 3.3.1.

Table 3.1.3 Depth of Surveyed Wells

Well location	Well depth, m
Compost Pant	
Well at the Weighing Station	160
Illegal Dumpsites	
Place D (Zhetysu)	165
Cluster water intake N.3 (well N.4)	165
Cluster water intake N.4 (well N.6)	
Place B	
Well in settl. ADK	not available
Others	
Cluster water intake N.19 (well N.5)	215
Cluster water intake N.21 (well N.9)	163
Cluster water intake N.41 (well N.1)	500
Transfer Station	
Well	165
Settl. Ozet	
Well N.1	160
Well N.2	200
Well N.3	300
New well	not available

Table 3.1.4 Discharge of Surface Watercourse Flows

Watercourse name		Sample date	Discharge of Flow, m^3/sec
Illegal Dumpsites			
Place A (Ostroumov St.), Karasu River*		23.03.99	2.324
		26.03.99	0.458
		26.07.99	0.26
		29.07.99	0.20
Place B (ADK), unknown brook*		23.03.99	0.030
		26.03.99	0.017
		26.07.99	0.061
		29.07.99	0.059
Place C (Horse race field), Sultanka River*		23.03.99	0.714
		26.03.99	0.264
		26.07.99	0.21
		29.07.99	0.15
Place E, (Al-Farabi St.)	Upstream of the refuse dump*	23.03.99	0.039
	Upstream of the refuse dump	26.03.99	0.011
	Downstream of the refuse dump	26.03.99	0.084
		26.07.99	0.093
		29.07.99	0.087
Transfer Station			
Terenkara River:	Upstream of the refuse dump	25.03.99	0.359
	Downstream of the refuse dump	25.03.99	0.245
	Upstream of the refuse dump	30.03.99	0.297
	Downstream of the refuse dump	30.03.99	0.359
		28.07.99	0.27
		03.08.99	0.24
Compost Plant			
Vesnovka River:	Upstream of the refuse dump	25.03.99	0.577
	Downstream of the refuse dump	25.03.99	0.961
	Upstream of the refuse dump	30.03.99	0.889
	Downstream of the refuse dump	30.03.99	1.049
		28.07.99	4.6
		03.08.99	4.4

Note:* Observation shows that watercourse discharge of the upstream of the dumpsite is equal to that of the downstream.

3.2 TYPICAL COMPOSITION OF LEACHATE IN JAPAN AND UK

1) Japan

Planning and Designing Guidelines for Final Disposal of Solid Waste issued by the Japan Waste Management Association in March 1989 shows typical composition of leachate in Japan. The composition has two types, which are categorized into non-combustible waste or incineration residue and combustible waste, as shown in Table 3.2.1.

Table 3.2.1 Typical Composition of Leachate in Japan

Item	Main Component	
	Combustible Waste	Non-combustible or Incineration Residue
BOD*	1,200 mg/l	250 mg/l
SS*	300 mg/l	300 mg/l
COD*	480 mg/l	100 mg/l
NH_4^+-N (T-N)	480 mg/l	100 mg/l
pH	If perishable organic matter is dominant, leachate is acid.	If the ignition loss of ashes is low, leachate is alkaline.
TDS*	Sometimes it will be the order of 10^3 to 10^4 mg/l.	
Coliform Group Number	Sometimes more than 3,000	
Fe^{2+}	Usually 10 mg/l	
Mn^{2+}	Usually only traced	
Other heavy metal	Usually not detected	
Color	Brown to light yellow	

Source: Japan Waste Management Association, "*Planning and Designing Guidelines for Final Disposal of Solid Waste,*" March 1989, p.147.

Note: *These acronyms stand for the following:
1) BOD: Biochemical Oxygen Demand
2) SS: Suspended Solids
3) COD: Chemical Oxygen Demand
4) TDS: total dissolved solids

Conditions of landfill are assumed to be the following:
1) Aerobic landfill type is applied.
2) Length of operation is 5 years.
3) Thickness of landfill is 4 m.
4) Ignition loss of ashes is 8%.

2) UK

Department of the Environment in UK made a technical paper whose name is *Waste Management Paper No 26* in 1986. This paper represents typical composition of leachate as shown in Table 3.2.2.

Table 3.2.2 Typical Composition of Leachate in UK

Item	Leachate from recent waste	Leachate from aged waste
pH	6.2	7.5
COD	23,800	1,160
BOD	11,900	260
TOC*	8,000	465
Fatty acid	5,688	5
NH_4^+–N	790	370
NO	3	1
PO_4^{3-}	0.73	1.4
Chloride	1,315	2,080
Na	960	1,300
Mg	252	185
K	780	590
Ca	1,820	250
Mn	27	2.1
Fe	540	23
Ni	0.6	0.1
Cu	0.12	0.3
Zn	21.5	0.4
Pb	8.4	0.14

Source: Department of the Environment, "*Waste Management Paper No 26,*" 1986, p.25.
Note: *TOC stands for Total Organic Carbon.
All figures in mg/l except pH.

CHAPTER 4

INITIAL ENVIRONMENTAL EXAMINATION

Table 4.1.1 Site Description for the Construction of Transfer Station near the HES-#2

Item		Description
Project Name		Construction of Transfer Station near the HES-#2
Social Environment	Inhabitants: (residents / indigenous people / their views on the project, etc.)	The residents living nearest in the site are people in Kainar village, which is located 1.6 km south-east of the site. There is a heat-and-electric-supply station (HES) 1 km west of the site. Except these areas, no residents live within 2 km.
	Land Use: (urban area / farmlands / historic site / scenic spot / hospitals, etc.)	The site is a suburb and used for cultivation of rye or wheat. A cemetery is located at 1 km north of the site. There is no other land use around the site.
	Economy / Transport: (commerce, agriculture, forestry / bus terminals, etc.)	There is no commercial area around the site. A place to store the construction materials is located at approximately 500 m south of the site. Several large trailer truck are therefore coming in and out of this place. The access road to the site is 5-6 m in width that is just capable for vehicles to pass through each other.
Natural Environment	Topography, Geology: (steep slopes / soft ground / wetlands / faults, etc.)	The site is located on a sloping mountain plain of the northern hillside of the Zailiisky Alatay. The geological structure is formed by Neogenic and Quaternary rocks. The lithological composition is characterized by sand and clay deposits. The site is confined to an outlayer formed by Early Quaternary deposits represented by low-filtration loam 110 m in thick. The loam in this interval is unsaturated. The groundwater is leveled at 15.0 m in depth whose variation range is 2.17-3.32 m. The groundwater level rises in the period from September to April.
	Fauna and Flora, and Their Habitats: (national parks / habitats of rare species, etc.)	It seems that the site does not have any habitats of rare species.
Pollution	Complaints: (pollution of the utmost concern, etc.)	There is lack of information regarding complaints by the residents or anyone else.
	Measures taken: (industrial measures / compensation, etc.)	No information.
Others		

Source: Ministry of Natural Resources and Environmental Protection, *"Report of State Ecological Examination, A System for Processing of Solid Domestic Waste for Almaty City (Waste Transfer Station),"* January 4, 1997.

Note: This description was filled in on the basis of the available existing data and information.

Table 4.1.2 Site Description for the Construction of Transfer Station near the Horse Race Field

Item		Description
Project Name		Construction of Transfer Station near the Horse Race Field
Social Environment	Inhabitants: (residents / indigenous people / their views on the project, etc.)	The site is located along Sultanka River and in north side of Kulagher residential area. There are many houses along the river and at least 20-30 detached houses exist 50-100 m close to the site.
	Land Use: (urban area / farmlands / historic site / scenic spot / hospitals, etc.)	The site used to be a temporary transfer station. There are some amount of construction debris and old waste still remaining on the site. The upstream of the site, south-west of the site, is a vacant lot where the waste were dumped.
	Economy / Transport: (commerce, agriculture, forestry / bus terminals, etc.)	There is no commercial area around the site. Industrial facilities exist in the opposite bank of the river. The access road to the site will be passing through Zhansugirov Street, which is one of the main roads laying from north to south.
Natural Environment	Topography, Geology: (steep slopes / soft ground / wetlands / faults, etc.)	The site is a flat land which is sandwiched between Sultanka River and its tributary. It seems that the alluvial soil are deposits while there is no information associated with geology and hydrogeology of the site.
	Fauna and Flora, and Their Habitats: (national parks / habitats of rare species, etc.)	It seems that the site does not have any habitats of rare species. There are silver birches vegetating along the river.
Pollution	Complaints: (pollution of the utmost concern, etc.)	The site is very closely situated to a residential area and might require a good view from the residents. However, there is lack of information regarding complaints by the residents or anyone else.
	Measures taken: (industrial measures / compensation, etc.)	No information.
Others		

Note: This description was filled in on the basis of the available existing data and information.

Table 4.1.3 Site Description for the Improvement of Final Disposal Site at NIKA

Item		Description
Project Name		Improvement of Final Disposal Site at NIKA
Social Environment	Inhabitants: (residents / indigenous people / their views on the project, etc.)	The place is located at 3 km west from the city boundary and about 4 km north from a highway to Kaskelen. There is Aksai River 800 m to west. Algabas and Put Ilicha villages are located at 1 km south and 2 km south west of the site, respectively. There is a heat-and-electric-supply station (HES) 2 km north-east of the site.
	Land Use: (urban area / farmlands / historic site / scenic spot / hospitals, etc.)	The northern to western side of the site is used for cultivation of rye or wheat. There is no other land use around the site. Here is on-going dumping site.
	Economy / Transport: (commerce, agriculture, forestry / bus terminals, etc.)	There is no commercial area around the site.
Natural Environment	Topography, Geology: (steep slopes / soft ground / wetlands / faults, etc.)	The area topography is a V-shaped ravine laying from the Aksai River in west to east. The depth and width of the ravine decreases to east and gradually comes to zero. The difference of elevation between the site and the west high ground is about 7-8 m. The ground is made of layers of sand and sandy loam with gravels and pebbles. The groundwater level is 10 m deep.
	Fauna and Flora, and Their Habitats: (national parks / habitats of rare species, etc.)	It seems that the site does not have any habitats of rare species.
Pollution	Complaints: (pollution of the utmost concern, etc.)	The site is located at 1km from the nearest village and might require a good view from the residents. There are smoke and offensive odor already generated in the site. These may make the residents unpleasant because of the direction of the wind. However, there is lack of information regarding complaints by the residents or anyone else.
	Measures taken: (industrial measures / compensation, etc.)	No information, but it seems that there is nothing to take any measures at all on the site.
Others		The site is approved as a final disposal site by the State Ecological Examination, Certificate No. 3-1127 dated 2 October 1998.

Source: Ministry of Natural Resources and Environmental Protection, *"Report of State Ecological Examination, The Dumpsite for Solid Waste Disposal by NIKA Company in Oktybar Selsky Okrug, Karasai Rayon of Almaty Oblast,"* October 2, 1998.

Note: This description was filled in on the basis of the available existing data and information.

Table 4.1.4 Site Description for the Improvement of Final Disposal Site at BARYS

Item		Description
Project Name		Improvement of Final Disposal Site at BARYS
Social Environment	Inhabitants: (residents / indigenous people / their views on the project, etc.)	The place is located at 10 km west from the city boundary and approximately 3.5 km north from a highway to Kaskelen. The area is situated in the land of Kazakhstan Agricultural Institute (KIZ) at a distance of 1.3 km north-east of Poliotdel village of Karasai Rayon. There is the Zhalpasai water reservoir 400 m further to the east. Behind the reservoir, 1 km from the site, holiday cottages are located.
	Land Use: (urban area / farmlands / historic site / scenic spot / hospitals, etc.)	The site is actually situated from north to south. The eastern to western side of the site is used for cultivation of rye or wheat. The site is a suburb and used for cultivation of rye or wheat. A cemetery is located at 300-400 m west of the site. The training station of the Ministry of Internal Affairs is located 300 m north-east. Here is on-going dumping site.
	Economy / Transport: (commerce, agriculture, forestry / bus terminals, etc.)	There is no commercial area around the site.
Natural Environment	Topography, Geology: (steep slopes / soft ground / wetlands / faults, etc.)	The area is a natural shoe-like ravine extending from the south to the north and intersected by the existing approach road. The depth of the ravine is 5-6 m on the average, and the average width is 20-25 m. The bottom of the ravine slopes to the north. The ground is medium and heavy loam and underlying semigravel. The groundwater is at the depth of 4.5-5.0 m from the bottom of the ravine. There is a pond where wastewater from surrounding residence is flowing into at 400-500 m far from the road.
	Fauna and Flora, and Their Habitats: (national parks / habitats of rare species, etc.)	It seems that the site does not have any habitats of rare species.
Pollution	Complaints: (pollution of the utmost concern, etc.)	The site is located at 1.3 km from the nearest village and might require a good view from the residents. There are smoke and offensive odor already generated in the site. These may make the residents unpleasant because of the direction of the wind. However, there is lack of information regarding complaints by the residents or anyone else.
	Measures taken: (industrial measures / compensation, etc.)	No information, but it seems that there is nothing to take any measures at all on the site.
Others		The site is approved as a final disposal site by the State Ecological Examination, Certificate No. 3-84 dated 28 January 1999.

Source: Ministry of Natural Resources and Environmental Protection, *"Report of State Ecological Examination, The Dumpsite for Solid Waste Disposal by BARYS Company in Oktybar Selsky Okrug, Karasai Rayon of Almaty Oblast,"* January 28, 1999.

Note: This description was filled in on the basis of the available existing data and information.

Table 4.1.5 Site Description for the Improvement of Final Disposal Site at ENBEK

Item		Description
Project Name		Improvement of Final Disposal Site at ENBEK
Social Environment	Inhabitants: (residents / indigenous people / their views on the project, etc.)	The place is located at 21 km north of the city boundary, along the highway to Kapchagai, Illi Rayon. There are about 20 houses at approximately 1 km south of the site. Another 20 houses are located in the opposite side of the highway.
	Land Use: (urban area / farmlands / historic site / scenic spot / hospitals, etc.)	The site is a suburb and actually does not like to be used for any specific purposes. The reservoir that may be a tributary of Malaya Almantika River exists 1.5 km south of the site. There is a raido station beside the reservoir. Here is on-going dumping site.
	Economy / Transport: (commerce, agriculture, forestry / bus terminals, etc.)	There is no commercial area around the site.
Natural Environment	Topography, Geology: (steep slopes / soft ground / wetlands / faults, etc.)	The area is used for one of three or four natural ravines extending from the east to the wast. The depth of the ravine is 2-4 m on the average, and the average width is 5-15 m. The north side of the site is a hilly area. There is no geological nor hydrogeological data.
	Fauna and Flora, and Their Habitats: (national parks / habitats of rare species, etc.)	It seems that the site does not have any habitats of rare species. It looks like 4-5 eagles living in the site although it cannot be judged whether or not these are rare species.
Pollution	Complaints: (pollution of the utmost concern, etc.)	The site is located at about 1 km from the nearest village and might require a good view from the residents. There are smoke and offensive odor already generated in the site. These may make the residents unpleasant because of the direction of the wind. However, there is lack of information regarding complaints by the residents or anyone else.
	Measures taken: (industrial measures / compensation, etc.)	No information, but it seems that there is nothing to take any measures at all on the site.
Others		

Note: This description was filled in on the basis of the available existing data and information.

Table 4.2.1 Evaluation Result for Screening of the Construction of Transfer Station near the HES-#2

No.	Environmental Item	Description	Evaluation	Remarks (Reason)
Social Environment				
1.	Resettlement	Resettlement due to land occupancy (transfer of rights of residence/land ownership)	?	The land owner is unknown.
2.	Economic Activities	Loss of bases of economic activities, such as land, and change of economic structure	Y	The site is used for cultivation of rye or wheat.
3.	Traffic and Public Facilities	Impacts on schools, hospitals and present traffic conditions, such as the increase of traffic congestion and accidents	?	Impacts on traffic conditions of the access road are unknown.
4.	Split of Communities	Community splits due to interruption of area traffic	N	The site is a suburb of the city.
5.	Cultural Property	Damage to or loss of value of churches, temples, shrines, archaeological remains or other cultural assets	N	No cultural property exists near the site.
6.	Water Rights and Rights of Common	Obstruction of fishing rights, water rights, rights of common	N	There is no mountains nor rivers near the site.
7.	Public Health Condition	Deterioration of public health and sanitary conditions due to generation of garbage and the increase of vermin	Y	A large amount of garbage will be gathered.
8.	Waste	Generation of construction waste, debris and ash	N	These waste will not be produced so much.
9.	Hazards (Risk)	Increase in danger of landslides, cave-ins, etc.	N	No large scale of construction work will be done.
Natural Environment				
10.	Topography and Geology	Changes of valuable topography and geology due to excavation or filling work	N	No large scale of construction work will be done.
11.	Soil Erosion	Topsoil erosion by rainfall after reclamation and deforestation	N	No large scale of construction work will be done.
12.	Groundwater	Pollution by leachate	?	Leachate will be generated, but the amount will be very few.
13.	Hydrological Situation	Changes of river discharge and riverbed condition due to landfill and drainage inflow	N	No large scale of construction work will be done.
14.	Coastal Zone	Coastal erosion and change of vegetation due to coastal reclamation and coastal changes	N	There is no coastal area.
15.	Fauna and Flora	Obstruction of breeding and extinction of species due to changes of habitual conditions	Y	Some of insects and rodents will appear.
16.	Meteorology	Changes of temperature, precipitation, wind, etc. due to large-scale land reclamation and building construction	N	No large scale of construction work will be done.
17.	Landscape	Changes of topography and vegetation due to reclamation, deterioration of aesthetic harmony by structures	Y	Existing site area is hilly land and has no strucutures around it.
Pollution				
18.	Air Pollution	Pollution caused by exhaust gas or toxic gas from vehicles and factories	Y	The number of collection vehicles will come to the site.
19.	Water Pollution	Pollution caused by inflow of silt, sand and drainage from treatment plants into rivers and groundwater	?	Leachate will be generated, but the amount will be very few.
20.	Soil Contamination	Contamination of soil be leakage and diffusion of ash and incombustible refuse	?	Existence of hazardous and toxic waste is unknown.
21.	Noise and Vibration	Noise and vibration generated by collection cars and treatment plants	Y	Collection vehicles will visit to the site.
22.	Land Subsidence	Deformation of land and land subsidence due to lowering of groundwater table	N	There is no plan to use the large volume of groudwater at the site.
23.	Offensive Odor	Generation of exhaust gas and offensive odor from treatment plants and dumped waste	Y	Offensive odor will be generated from the garbage.
Overall Evaluation Either IEE or EIA is necessary for the project implementation?			Yes	Many influence items.

Legend Y: There is some influence on the environmental item. N: There is no influence on the environmental item.

?: The influence cannot be evaluated.

Table 4.2.2 Evaluation Result for Screening of the Construction of Transfer Station near the Horse Race Field

No.	Environmental Item	Description	Evaluation	Remarks (Reason)
Social Environment				
1.	Resettlement	Resettlement due to land occupancy (transfer of rights of residence/land ownership)	?	The land owner is unknown.
2.	Economic Activities	Loss of bases of economic activities, such as land, and change of economic structure	N	There is no economic activities on the site.
3.	Traffic and Public Facilities	Impacts on schools, hospitals and present traffic conditions, such as the increase of traffic congestion and accidents	?	Impacts on traffic conditions of the access road are unknown.
4.	Split of Communities	Community splits due to interruption of area traffic	N	The site is a suburb of the city.
5.	Cultural Property	Damage to or loss of value of churches, temples, shrines, archaeological remains or other cultural assets	N	No cultural property exists near the site.
6.	Water Rights and Rights of Common	Obstruction of fishing rights, water rights, rights of common	Y	There are rivers near the site.
7.	Public Health Condition	Deterioration of public health and sanitary conditions due to generation of garbage and the increase of vermin	Y	A large amount of garbage will be gathered.
8.	Waste	Generation of construction waste, debris and ash	N	These waste will not be produced so much.
9.	Hazards (Risk)	Increase in danger of landslides, cave-ins, etc.	N	No large scale of construction work will be done.
Natural Environment				
10.	Topography and Geology	Changes of valuable topography and geology due to excavation or filling work	N	No large scale of construction work will be done.
11.	Soil Erosion	Topsoil erosion by rainfall after reclamation and deforestation	N	No large scale of construction work will be done.
12.	Groundwater	Pollution by leachate	?	Leachate will be generated, but the amount will be very few.
13.	Hydrological Situation	Changes of river discharge and riverbed condition due to landfill and drainage inflow	N	No large scale of construction work will be done.
14.	Coastal Zone	Coastal erosion and change of vegetation due to coastal reclamation and coastal changes	N	There is no coastal area.
15.	Fauna and Flora	Obstruction of breeding and extinction of species due to changes of habitual conditions	Y	Some of insects and rodents will appear.
16.	Meteorology	Changes of temperature, precipitation, wind, etc. due to large-scale land reclamation and building construction	N	No large scale of construction work will be done.
17.	Landscape	Changes of topography and vegetation due to reclamation, deterioration of aesthetic harmony by structures	Y	Existing site area is flat land and has no strucutures around it.
Pollution				
18.	Air Pollution	Pollution caused by exhaust gas or toxic gas from vehicles and factories	Y	The number of collection vehicles will come to the site.
19.	Water Pollution	Pollution caused by inflow of silt, sand and drainage from treatment plants into rivers and groundwater	?	Leachate will be generated, but the amount will be very few.
20.	Soil Contamination	Contamination of soil be leakage and diffusion of ash and incombustible refuse	?	Existence of hazardous and toxic waste is unknown.
21.	Noise and Vibration	Noise and vibration generated by collection cars and treatment plants	Y	Collection vehicles will visit to the site.
22.	Land Subsidence	Deformation of land and land subsidence due to lowering of groundwater table	N	There is no plan to use the large volume of groudwater at the site.
23.	Offensive Odor	Generation of exhaust gas and offensive odor from treatment plants and dumped waste	Y	Offensive odor will be generated from the garbage.
Overall Evaluation Either IEE or EIA is necessary for the project implementation?			Yes	Many influence items.

Legend Y: There is some influence on the environmental item. N: There is no influence on the environmental item.
?: The influence cannot be evaluated.

Table 4.2.3 Evaluation Result for Screening of the Improvement of Final Disposal Site at NIKA

No.	Environmental Item	Description	Evaluation	Remarks (Reason)
Social Environment				
1.	Resettlement	Resettlement due to land occupancy (transfer of rights of residence/land ownership)	Y	Until year 2001, NIKA rent the land from Rayon.
2.	Economic Activities	Loss of bases of economic activities, such as land, and change of economic structure	N	Very few economic activities like recycling in the site.
3.	Traffic and Public Facilities	Impacts on schools, hospitals and present traffic conditions, such as the increase of traffic congestion and accidents	N	Thereis no public facilities near the site.
4.	Split of Communities	Community splits due to interruption of area traffic	N	The site is a suburb of the city.
5.	Cultural Property	Damage to or loss of value of churches, temples, shrines, archaeological remains or other cultural assets	N	No cultural property exists near the site.
6.	Water Rights and Rights of Common	Obstruction of fishing rights, water rights, rights of common	N	There is no mountains nor rivers near the site.
7.	Public Health Condition	Deterioration of public health and sanitary conditions due to generation of garbage and the increase of vermin	Y	A large amount of garbage will be gathered.
8.	Waste	Generation of construction waste, debris and ash	N	These waste will not be produced.
9.	Hazards (Risk)	Increase in danger of landslides, cave-ins, etc.	N	No large scale of construction work will be done.
Natural Environment				
10.	Topography and Geology	Changes of valuable topography and geology due to excavation or filling work	N	No large scale of construction work will be done.
11.	Soil Erosion	Topsoil erosion by rainfall after reclamation and deforestation	N	No large scale of construction work will be done.
12.	Groundwater	Pollution by leachate	Y	Leachate will be generated.
13.	Hydrological Situation	Changes of river discharge and riverbed condition due to landfill and drainage inflow	N	No large scale of construction work will be done.
14.	Coastal Zone	Coastal erosion and change of vegetation due to coastal reclamation and coastal changes	N	There is no coastal area.
15.	Fauna and Flora	Obstruction of breeding and extinction of species due to changes of habitual conditions	Y	Some of insects and rodents will appear.
16.	Meteorology	Changes of temperature, precipitation, wind, etc. due to large-scale land reclamation and building construction	N	No large scale of construction work will be done.
17.	Landscape	Changes of topography and vegetation due to reclamation, deterioration of aesthetic harmony by structures	Y	A large amount of garbage will be gathered.
Pollution				
18.	Air Pollution	Pollution caused by exhaust gas or toxic gas from vehicles and factories	Y	The number of collection vehicles will increase.
19.	Water Pollution	Pollution caused by inflow of silt, sand and drainage from treatment plants into rivers and groundwater	Y	Leachate will be generated.
20.	Soil Contamination	Contamination of soil be leakage and diffusion of ash and incombustible refuse	?	Existence of hazardous and toxic waste is unknown.
21.	Noise and Vibration	Noise and vibration generated by collection cars and treatment plants	Y	Collection vehicles and heavy machine will work in the site.
22.	Land Subsidence	Deformation of land and land subsidence due to lowering of groundwater table	N	There is no plan to use the large volume of groudwater at the site.
23.	Offensive Odor	Generation of exhaust gas and offensive odor from treatment plants and dumped waste	Y	Offensive odor will be generated from the garbage.
Overall Evaluation Either IEE or EIA is necessary for the project implementation?			Yes	Many influence items.

Legend Y: Thereis some influence on the environmental item. N: Thereis no influence on the environmental item
?: The influence cannot be evaluated.

Table 4.2.4 Evaluation Result for Screening of the Improvement of Final Disposal Site at BARYS

No.	Environmental Item	Description	Evaluation	Remarks (Reason)
Social Environment				
1.	Resettlement	Resettlement due to land occupancy (transfer of rights of residence/land ownership)	Y	Until year 2001, BARYS rent the land from Rayon.
2.	Economic Activities	Loss of bases of economic activities, such as land, and change of economic structure	N	Very few ecoonomic activities like recycling in the site.
3.	Traffic and Public Facilities	Impacts on schools, hospitals and present traffic conditions, such as the increase of traffic congestion and accidents	N	Thereis no public facilities near the site.
4.	Split of Communities	Community splits due to interruption of area traffic	N	The site is a suburb of the city.
5.	Cultural Property	Damage to or loss of value of churches, temples, shrines, archaeological remains or other cultural assets	N	No cultural property exists near the site.
6.	Water Rights and Rights of Common	Obstruction of fishing rights, water rights, rights of common	?	There is a pumping station for water supply near the site.
7.	Public Health Condition	Deterioration of public health and sanitary conditions due to generation of garbage and the increase of vermin	Y	A large amount of garbage will be gathered.
8.	Waste	Generation of construction waste, debris and ash	N	These waste will not be produced.
9.	Hazards (Risk)	Increase in danger of landslides, cave-ins, etc.	N	No large scale of construction work will be done.
Natural Environment				
10.	Topography and Geology	Changes of valuable topography and geology due to excavation or filling work	N	No large scale of construction work will be done.
11.	Soil Erosion	Topsoil erosion by rainfall after reclamation and deforestation	N	No large scale of construction work will be done.
12.	Groundwater	Pollution by leachate	Y	Leachate will be generated.
13.	Hydrological Situation	Changes of river discharge and riverbed condition due to landfill and drainage inflow	?	Influence on the dried up river is unknown.
14.	Coastal Zone	Coastal erosion and change of vegetation due to coastal reclamation and coastal changes	N	There is no coastal area.
15.	Fauna and Flora	Obstruction of breeding and extinction of species due to changes of habitual conditions	Y	Some of insects and rodents will appear.
16.	Meteorology	Changes of temperature, precipitation, wind, etc. due to large-scale land reclamation and building construction	N	No large scale of construction work will be done.
17.	Landscape	Changes of topography and vegetation due to reclamation, deterioration of aesthetic harmony by structures	Y	A large amount of garbage will be gathered.
Pollution				
18.	Air Pollution	Pollution caused by exhaust gas or toxic gas from vehicles and factories	Y	The number of collection vehicles will increase.
19.	Water Pollution	Pollution caused by inflow of silt, sand and drainage from treatment plants into rivers and groundwater	Y	Leachate will be generated.
20.	Soil Contamination	Contamination of soil be leakage and diffusion of ash and incombustible refuse	?	Existence of hazardous and toxic waste is unknown.
21.	Noise and Vibration	Noise and vibration generated by collection cars and treatment plants	Y	Collection vehicles and heavy machine will work in the site.
22.	Land Subsidence	Deformation of land and land subsidence due to lowering of groundwater table	N	There is no plan to use the large volume of groudwater at the site.
23.	Offensive Odor	Generation of exhaust gas and offensive odor from treatment plants and dumped waste	Y	Offensive odor will be generated from the garbage.
Overall Evaluation Either IEE or EIA is necessary for the project implementation?			Yes	Many influence items.

Legend Y: Thereis some influence on the environmental item N: Thereis no influence on the environmental item.
?: The influence cannot be evaluated.

Table 4.2.5 Evaluation Result for Screening of the Improvement of Final Disposal Site at ENBEK

No.	Environmental Item	Description	Evaluation	Remarks (Reason)
Social Environment				
1.	Resettlement	Resettlement due to land occupancy (transfer of rights of residence/land ownership)	?	The land owner is unknown.
2.	Economic Activities	Loss of bases of economic activities, such as land, and change of economic structure	N	Very few economic activities like recycling in the site.
3.	Traffic and Public Facilities	Impacts on schools, hospitals and present traffic conditions, such as the increase of traffic congestion and accidents	N	There is no public facilities near the site.
4.	Split of Communities	Community splits due to interruption of area traffic	N	The site is a suburb of the city.
5.	Cultural Property	Damage to or loss of value of churches, temples, shrines, archaeological remains or other cultural assets	N	No cultural property exists near the site.
6.	Water Rights and Rights of Common	Obstruction of fishing rights, water rights, rights of common	?	There is a river approx. 2 km south of the site.
7.	Public Health Condition	Deterioration of public health and sanitary conditions due to generation of garbage and the increase of vermin	Y	A large amount of garbage will be gathered.
8.	Waste	Generation of construction waste, debris and ash	N	These waste will not be produced.
9.	Hazards (Risk)	Increase in danger of landslides, cave-ins, etc.	N	No large scale of construction work will be done.
Natural Environment				
10.	Topography and Geology	Changes of valuable topography and geology due to excavation or filling work	N	No large scale of construction work will be done.
11.	Soil Erosion	Topsoil erosion by rainfall after reclamation and deforestation	N	No large scale of construction work will be done.
12.	Groundwater	Pollution by leachate	Y	Leachate will be generated.
13.	Hydrological Situation	Changes of river discharge and riverbed condition due to landfill and drainage inflow	?	There is a river approx. 2 km south of the site.
14.	Coastal Zone	Coastal erosion and change of vegetation due to coastal reclamation and coastal changes	N	There is no coastal area.
15.	Fauna and Flora	Obstruction of breeding and extinction of species due to changes of habitual conditions	Y	Some of insects and rodents will appear.
16.	Meteorology	Changes of temperature, precipitation, wind, etc. due to large-scale land reclamation and building construction	N	No large scale of construction work will be done.
17.	Landscape	Changes of topography and vegetation due to reclamation, deterioration of aesthetic harmony by structures	Y	A large amount of garbage will be gathered.
Pollution				
18.	Air Pollution	Pollution caused by exhaust gas or toxic gas from vehicles and factories	Y	The number of collection vehicles will increase.
19.	Water Pollution	Pollution caused by inflow of silt, sand and drainage from treatment plants into rivers and groundwater	Y	Leachate will be generated.
20.	Soil Contamination	Contamination of soil be leakage and diffusion of ash and incombustible refuse	?	Existence of hazardous and toxic waste is unknown.
21.	Noise and Vibration	Noise and vibration generated by collection cars and treatment plants	Y	Collection vehicles and heavy machine will work in the site.
22.	Land Subsidence	Deformation of land and land subsidence due to lowering of groundwater table	N	There is no plan to use the large volume of groudwater at the site.
23.	Offensive Odor	Generation of exhaust gas and offensive odor from treatment plants and dumped waste	Y	Offensive odor will be generated from the garbage.
Overall Evaluation Either IEE or EIA is necessary for the project implementation?			Yes	Many influence items.

Legend Y: There is some influence on the environmental item. N: There is no influence on the environmental item.

?: The influence cannot be evaluated.

Table 4.3.1 Evaluation Result for Scoping of the Construction of Transfer Station near the HES-#2

No.	Environmental Item	Evaluation	Remarks (Reason)
Social Environment			
1.	Resettlement	C	Although there is no resident in the site, the land owner is unknown.
2.	Economic Activities	B	The site is used for cultivation of rye or wheat.
3.	Traffic and Public Facilities	C	Thereis no public facilities near the site. However, some impact is expected in traffic condition on the access roads.
4.	Split of Communities	D	The site is a suburb of the city.
5.	Cultural Property	D	No cultural property exists near the site.
6.	Water Rights and Rights of Common	D	There is no mountains nor rivers near the site.
7.	Public Health Condition	B	A large amount of garbage will be gathered and will affect to health of the site workers/operators and residents near the site.
8.	Waste	D	The waste will not be produced so much since incinerators or other facilities that may produce the waste like ash are not designed.
9.	Hazards (Risk)	D	No large scale of construction work will be done.
Natural Environment			
10.	Topography and Geology	D	No large scale of construction work will be done.
11.	Soil Erosion	D	No large scale of construction work will be done.
12.	Groundwater	C	Leachate will be generated, but the amount will be very few.
13.	Hydrological Situation	D	No large scale of construction work will be done.
14.	Coastal Zone	D	There is no coastal area.
15.	Fauna and Flora	B	Some of insects and rodents will appear.
16.	Meteorology	D	No large scale of construction work will be done.
17.	Landscape	B	Existing site area is flat land and has no strucutures around it.
Pollution			
18.	Air Pollution	B	The number of collection vehicles will come to the site.
19.	Water Pollution	C	Leachate will be generated, but the amount will be very few.
20.	Soil Contamination	C	Existence of hazardous and toxic waste is unknown.
21.	Noise and Vibration	B	Collection vehicles will visit to the site.
22.	Land Subsidence	D	There is no plan to use the large volume of groudwater at the site.
23.	Offensive Odor	B	Offensive odor will be generated from the garbage.

Legend A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progress.).
D: No impact is expected. EIA is not necessary.

Table 4.3.2 Evaluation Result for Scoping of the Construction of Transfer Station near the Horse Race Field

No.	Environmental Item	Evaluation	Remarks (Reason)
Social Environment			
1.	Resettlement	C	Although there is no resident in the site, the land owner is unknown.
2.	Economic Activities	D	There is no economic activities on the site.
3.	Traffic and Public Facilities	C	Thereis no public facilities near the site. However, some impact is expected in traffic condition on the access roads.
4.	Split of Communities	D	The site is a suburb of the city.
5.	Cultural Property	D	No cultural property exists near the site.
6.	Water Rights and Rights of Common	B	There are rivers near the site. The area is sandwiched between the two rivers.
7.	Public Health Condition	B	A large amount of garbage will be gathered and will affect to health of the site workers/operators and residents near the site.
8.	Waste	D	The waste will not be produced so much since incinerators or other facilities that may produce the waste like ash are not designed.
9.	Hazards (Risk)	D	No large scale of construction work will be done.
Natural Environment			
10.	Topography and Geology	D	No large scale of construction work will be done.
11.	Soil Erosion	D	No large scale of construction work will be done.
12.	Groundwater	C	Leachate will be generated, but the amount will be very few.
13.	Hydrological Situation	D	No large scale of construction work will be done.
14.	Coastal Zone	D	There is no coastal area.
15.	Fauna and Flora	B	Some of insects and rodents will appear.
16.	Meteorology	D	No large scale of construction work will be done.
17.	Landscape	B	Existing site area is flat land and has no strucutures around it.
Pollution			
18.	Air Pollution	B	The number of collection vehicles will come to the site.
19.	Water Pollution	C	Leachate will be generated, but the amount will be very few.
20.	Soil Contamination	C	Existence of hazardous and toxic waste is unknown.
21.	Noise and Vibration	B	Collection vehicles will visit to the site.
22.	Land Subsidence	D	There is no plan to use the large volume of groudwater at the site.
23.	Offensive Odor	B	Offensive odor will be generated from the garbage.

Legend A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progress.).
D: No impact is expected. EIA is not necessary.

Table 4.3.3 Evaluation Result for Scoping of the Improvement of Final Disposal Site at NIKA

No.	Environmental Item	Evaluation	Remarks (Reason)
Social Environment			
1.	Resettlement	B	Until year 2001, NIKA rent the land from Rayon. If the site is used for an official disposal site, issues concerning land occupancy will arise.
2.	Economic Activities	D	Very few economic activities like recycling in the site.
3.	Traffic and Public Facilities	D	Thereis no public facilities near the site.
4.	Split of Communities	D	The site is a suburb of the city.
5.	Cultural Property	D	No cultural property exists near the site.
6.	Water Rights and Rights of Common	D	There is no mountains nor rivers near the site.
7.	Public Health Condition	B	A large amount of garbage will be gathered and will affect to health of the site workers/operators and residents near the site.
8.	Waste	D	The waste will not be produced so much since incinerators or other facilities that may produce the waste like ash are not designed.
9.	Hazards (Risk)	D	No large scale of construction work will be done.
Natural Environment			
10.	Topography and Geology	D	No large scale of construction work will be done.
11.	Soil Erosion	D	No large scale of construction work will be done.
12.	Groundwater	B	Leachate will be generated.
13.	Hydrological Situation	D	No large scale of construction work will be done.
14.	Coastal Zone	D	There is no coastal area.
15.	Fauna and Flora	B	Some of insects and rodents will appear.
16.	Meteorology	D	No large scale of construction work will be done.
17.	Landscape	B	A large amount of garbage will be gathered.
Pollution			
18.	Air Pollution	B	The number of collection vehicles will increase.
19.	Water Pollution	A	Leachate will be generated.
20.	Soil Contamination	C	Existence of hazardous and toxic waste is unknown.
21.	Noise and Vibration	B	Collection vehicles and heavy machine will work in the site.
22.	Land Subsidence	D	There is no plan to use the large volume of groudwater at the site.
23.	Offensive Odor	A	Offensive odor will be generated from the garbage.

Legend A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progress.).
D: No impact is expected. EIA is not necessary.

Table 4.3.4 Evaluation Result for Scoping of the Improvement of Final Disposal Site at BARYS

No.	Environmental Item	Evaluation	Remarks (Reason)
Social Environment			
1.	Resettlement	B	Until year 2001, BARYS rent the land from Rayon. If the site is used for an official disposal site, issues concerning land occupancy will arise.
2.	Economic Activities	D	Very few economic activities like recycling in the site.
3.	Traffic and Public Facilities	D	Thereis no public facilities near the site.
4.	Split of Communities	D	The site is a suburb of the city.
5.	Cultural Property	D	No cultural property exists near the site.
6.	Water Rights and Rights of Common	C	There is a pumping station for water supply near the site.
7.	Public Health Condition	B	A large amount of garbage will be gathered and will affect to health of the site workers/operators and residents near the site.
8.	Waste	D	The waste will not be produced so much since incinerators or other facilities that may produce the waste like ash are not designed.
9.	Hazards (Risk)	D	No large scale of construction work will be done.
Natural Environment			
10.	Topography and Geology	B	Existing site seems to be built in a dried up river.
11.	Soil Erosion	D	No large scale of construction work will be done.
12.	Groundwater	B	Leachate will be generated.
13.	Hydrological Situation	C	Influence on the dried up river is unknown.
14.	Coastal Zone	D	There is no coastal area.
15.	Fauna and Flora	B	Some of insects and rodents will appear.
16.	Meteorology	D	No large scale of construction work will be done.
17.	Landscape	B	A large amount of garbage will be gathered.
Pollution			
18.	Air Pollution	B	The number of collection vehicles will increase.
19.	Water Pollution	A	Leachate will be generated.
20.	Soil Contamination	C	Existence of hazardous and toxic waste is unknown.
21.	Noise and Vibration	B	Collection vehicles and heavy machine will work in the site.
22.	Land Subsidence	D	There is no plan to use the large volume of groudwater at the site.
23.	Offensive Odor	A	Offensive odor will be generated from the garbage.

Legend A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progress.).
D: No impact is expected. EIA is not necessary.

Table 4.3.5 Evaluation Result for Scoping of the Improvement of Final Disposal Site at ENBEK

No.	Environmental Item	Evaluation	Remarks (Reason)
Social Environment			
1.	Resettlement	C	Although there is no resident in the site, the land owner is unknown.
2.	Economic Activities	D	Very few economic activities like recycling in the site.
3.	Traffic and Public Facilities	D	Thereis no public facilities near the site.
4.	Split of Communities	D	The site is a suburb of the city.
5.	Cultural Property	D	No cultural property exists near the site.
6.	Water Rights and Rights of Common	C	There is a river approx. 2 km south of the site.
7.	Public Health Condition	B	A large amount of garbage will be gathered and will affect to health of the site workers/operators and residents near the site.
8.	Waste	D	The waste will not be produced so much since incinerators or other facilities that may produce the waste like ash are not designed.
9.	Hazards (Risk)	D	No large scale of construction work will be done.
Natural Environment			
10.	Topography and Geology	D	No large scale of construction work will be done.
11.	Soil Erosion	D	No large scale of construction work will be done.
12.	Groundwater	B	Leachate will be generated.
13.	Hydrological Situation	C	There is a river approx. 2 km south of the site.
14.	Coastal Zone	D	There is no coastal area.
15.	Fauna and Flora	B	Some of insects and rodents will appear.
16.	Meteorology	D	No large scale of construction work will be done.
17.	Landscape	B	A large amount of garbage will be gathered.
Pollution			
18.	Air Pollution	B	The number of collection vehicles will increase.
19.	Water Pollution	A	Leachate will be generated.
20.	Soil Contamination	C	Existence of hazardous and toxic waste is unknown.
21.	Noise and Vibration	B	Collection vehicles and heavy machine will work in the site.
22.	Land Subsidence	D	There is no plan to use the large volume of groudwater at the site.
23.	Offensive Odor	A	Offensive odor will be generated from the garbage.

Legend A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progress.).
D: No impact is expected. EIA is not necessary.

Table 4.4.1 Overall Evaluation Results of IEE for the Construction of Transfer Station near the HES-#2

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Resettlement	C	1. Friction between the landowner and the contractor or user in terms of the conditions of agreements	1. Mutual understanding through good communication each other 2. Identification and clarification of the contents of agreements	1. Confirmation of the ownership and its status	The site had been considered as a new transfer station and got an approval by the government.
Economic Activities	B	1. Loss of opportunities for economic activity by rye or wheat cultivation	1. Resettlement site for a substitute 2. Compensation	1. Findings of resettlement site 2. Present financial situation of the farmers	
Traffic and Public Facilities	C	1. Traffic congestion on narrow roads and an increased risk of accidents caused by traffic concentration around the site	1. Improvement of roads around the site 2. Installation of turnouts in front of the site 3. Proper arrangement of collection vehicles and routes to average peak hours 4. Rearrangement of traffic system 5. Installation of traffic safety facilities	1. Land use and traffic conditions 2. Future land use and transportation plan 3. Regional development plan	City planning section has been conducting the study on general development plan for Almaty City up to year 2020, including a plan for transportation system.
Public Health Condition	B	1. Animals and insects which gather on wastes would become vectors of disease. 2. Health hazards of workers and residents near the site may occur if the transportation work is conducted inadequately.	1. Reexamination of the site location 2. Installation of treatment facilities for effluent and exhaust 3. Prevention of vermin by pesticides 4. Examination of transportation methods 5. Public education on sanitation for the inhabitants and workers to avoid infection	1. Public health condition of the area 2. Habitation and propagation of rodents and insects 3. Meteorological data, such as precipitation, humidity, and wind speed and direction 4. Topography and geology of the area	

Table 4.4.1 Overall Evaluation Results of IEE for the Construction of Transfer Station near the HES-#2 (cont'd)

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Groundwater	C	1. Groundwater polluted by penetration of leachate and hazardous substances would affect the health of inhabitants who use the water for drinking.	1. Reexamination of the site location 2. Placement of concrete for the ground and proper drainage system 3. Substitutional water supply 4. Installation of wastewater treatment plant	1. Condition of groundwater 2. Topography and geology of the area 3. Water use around and downstream of the site	
Fauna and Flora	B	1. Outbreak of flies, birds and rats that may obstruct the breeding of other species and would affect public health condition.	1. Reexamination of the site location 2. Relocation of plants and animals 3. Prevention of vermin by pesticides 4. Examination of transportation methods	1. Fauna and flora 2. Ecological system 3. Food chain	
Landscape	B	1. Valuable scenery in the region would be destroyed or deteriorated by land reclamation, vegetation change and construction of the facility.	1. Reexamination of the site location 2. Careful consideration of the facility design 3. Public hearings and provision of necessary information for the residents	1. Public awareness survey 2. Future land use plan	
Air Pollution	B	1. Health hazards, such as asthma, due to vehicular emission and dust 2. Obstruction to growth of plants	1. Reexamination of the site location 2. Installation of treatment facilities for effluent and exhaust 3. Careful consideration of construction planning and management	1. Meteorological data, such as wind speed and direction, air temperature distribution 2. Topography of the area	

Table 4.4.1 Overall Evaluation Results of IEE for the Construction of Transfer Station near the HES-#2 (cont'd)

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Water Pollution	C	1. Water use, fishery, landscape and recreation in the downstream would be affected by pollution of rivers and lakes. 2. Obstruction to growth of aquatic life due to water quality aggravation by inflow of polluted water	1. Reexamination of the site location 2. Installation of wastewater treatment plant 3. Proper drainage system 4. Careful consideration of construction planning and management	1. Meteorological data 2. Hydrological data 3. Topography of the area 4. Water use	
Soil Contamination	C	1. Contaminants in surrounding farmland would be absorbed by crops and affect human health.	1. Reexamination of the site location 2. Placement of concrete for the ground 3. Separation of waste that may bring elution of toxic substances	1. Topography and geology of the area 2. Water use	
Noise and Vibration	B	1. Inhabitants along the route would be affected by noise. 2. Cracks in buildings on soft ground caused by vibration 3. Obstruction to breeding of cattle and habitats of wildlife	1. Reexamination of the site location 2. Installation of acoustic walls and buffer zone 3. Examination of construction hours	1. Land use 2. Distribution of schools, hospitals and inhabitants 3. Living condition of inhabitants 4. Topography and geology of the area	
Offensive Odor	B	1. Inhabitants near the site would complain about the odor. 2. Land use demand in the vicinity would decrease thereby decreasing the land value.	1. Reexamination of the site location 2. Installation of treatment facilities for effluent and exhaust 3. Examination of transportation methods	1. Meteorological data, such as wind speed and direction, air temperature distribution 2. Topography of the area	

Legend A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progress.).
D: No impact is expected. EIA is not necessary.

Table 4.4.2 Overall Evaluation Results of IEE for the Construction of Transfer Station near the Horse Race Field

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Resettlement	C	1. Friction between the landowner and the contractor or user in terms of the conditions of agreements	1. Mutual understanding through good communication each other 2. Identification and clarification of the contents of agreements	1. Confirmation of the ownership and its status	The site use to be a transfer station temporarily.
Traffic and Public Facilities	C	1. Traffic congestion on narrow roads and an increased risk of accidents caused by traffic concentration around the site	1. Improvement of roads around the site 2. Installation of turnouts in front of the site 3. Proper arrangement of collection vehicles and routes to average peak hours 4. Rearrangement of traffic system 5. Installation of traffic safety facilities	1. Land use and traffic conditions 2. Future land use and transportation plan 3. Regional development plan	City planning section has been conducting the study on general development plan for Almaty City up to year 2020, including a plan for transportation system.
Water Rights and Rights of Common	B	1. Pollution of river water may affect the water use of the downstream.	1. Reexamination of the site location 2. Installation of treatment facilities for wastewater 3. Proper drainage system	1. Water use and the rights	
Public Health Condition	B	1. Animals and insects which gather on wastes would become vectors of disease. 2. Health hazards of workers and residents near the site may occur if the transportation work is conducted inadequately.	1. Reexamination of the site location 2. Installation of treatment facilities for effluent and exhaust 3. Prevention of vermin by pesticides 4. Examination of transportation methods 5. Public education on sanitation for the inhabitants and workers to avoid infection	1. Public health condition of the area 2. Habitation and propagation of rodents and insects 3. Meteorological data, such as precipitation, humidity, and wind speed and direction 4. Topography and geology of the area	

Table 4.4.2 Overall Evaluation Results of IEE for the Construction of Transfer Station near the Horse Race Field (cont'd)

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Groundwater	C	1. Groundwater polluted by penetration of leachate and hazardous substances would affect the health of inhabitants who use the water for drinking.	1. Reexamination of the site location 2. Placement of concrete for the ground and proper drainage system 3. Substitutional water supply 4. Installation of wastewater treatment plant	1. Condition of groundwater 2. Topography and geology of the area 3. Water use around and downstream of the site	
Fauna and Flora	B	1. Outbreak of flies, birds and rats that may obstruct the breeding of other species and would affect public health condition.	1. Reexamination of the site location 2. Relocation of plants and animals 3. Prevention of vermin by pesticides 4. Examination of transportation methods	1. Fauna and flora 2. Ecological system 3. Food chain	
Landscape	B	1. Valuable scenery in the region would be destroyed or deteriorated by land reclamation, vegetation change and construction of the facility.	1. Reexamination of the site location 2. Careful consideration of the facility design 3. Public hearings and provision of necessary information for the residents	1. Public awareness survey 2. Future land use plan	
Air Pollution	B	1. Health hazards, such as asthma, due to vehicular emission and dust 2. Obstruction to growth of plants	1. Reexamination of the site location 2. Installation of treatment facilities for effluent and exhaust 3. Careful consideration of construction planning and management	1. Meteorological data, such as wind speed and direction, air temperature distribution 2. Topography of the area	

Table 4.4.2 Overall Evaluation Results of IEE for the Construction of Transfer Station near the Horse Race Field (cont'd)

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Water Pollution	C	1. Water use, fishery, landscape and recreation in the downstream would be affected by pollution of rivers and lakes. 2. Obstruction to growth of aquatic life due to water quality aggravation by inflow of polluted water	1. Reexamination of the site location 2. Installation of wastewater treatment plant 3. Proper drainage system 4. Careful consideration of construction planning and management	1. Meteorological data 2. Hydrological data 3. Topography of the area 4. Water use	
Soil Contamination	C	1. Contaminants in surrounding soil would elute to the nearest rivers and affect the downstream conditions.	1. Reexamination of the site location 2. Placement of concrete for the ground 3. Separation of waste that may bring elution of toxic substances	1. Topography and geology of the area 2. Water use	
Noise and Vibration	B	1. Inhabitants along the route would be affected by noise. 2. Cracks in buildings on soft ground caused by vibration 3. Obstruction to breeding of cattle and habitats of wildlife	1. Reexamination of the site location 2. Installation of acoustic walls and buffer zone 3. Examination of construction hours	1. Land use 2. Distribution of schools, hospitals and inhabitants 3. Living condition of inhabitants 4. Topography and geology of the area	
Offensive Odor	B	1. Inhabitants near the site would complain about the odor. 2. Land use demand in the vicinity would decrease thereby decreasing the land value.	1. Reexamination of the site location 2. Installation of treatment facilities for effluent and exhaust 3. Examination of transportation methods	1. Meteorological data, such as wind speed and direction, air temperature distribution 2. Topography of the area	

Legend A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progress.).
D: No impact is expected. EIA is not necessary.

Table 4.4.3 Overall Evaluation Results of IEE for the Improvement of Final Disposal Site at NIKA

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Resettlement	B	1. Friction between the landowner and the contractor or user in terms of the conditions of agreements	1. Mutual understanding through good communication each other 2. Identification and clarification of the contents of agreements	1. Confirmation of the ownership and its status	Until year 2001, NIKA will rent the land from Rayon.
Public Health Condition	B	1. Animals and insects which gather on wastes would become vectors of disease. 2. Health hazards of workers and residents near the site may occur if the landfill work is conducted inadequately.	1. Reexamination of the site location 2. Introduction of sanitary landfill, eg. covering soil 3. Prevention of vermin by pesticides 4. Public education on sanitation for the inhabitants and workers to avoid infection	1. Public health condition of the area 2. Habitation and propagation of rodents and insects 3. Meteorological data, such as precipitation, humidity, and wind speed and direction 4. Topography and geology of the area	
Groundwater	B	1. Groundwater polluted by penetration of leachate and hazardous substances would affect the health of inhabitants who use the water for drinking.	1. Reexamination of the site location 2. Placement of impermeable layer, such as clay for the foundation 3. Proper drainage system 4. Substitutional water supply	1. Condition of groundwater 2. Topography and geology of the area 3. Water use around and downstream of the site	
Fauna and Flora	B	1. Outbreak of flies, birds and rats that may obstruct the breeding of other species and would affect public health condition.	1. Reexamination of the site location 2. Relocation of plants and animals 3. Prevention of vermin by pesticides 4. Introduction of sanitary landfill, eg. covering soil	1. Fauna and flora 2. Ecological system 3. Food chain	

Table 4.4.3 Overall Evaluation Results of IEE for the Improvement of Final Disposal Site at NIKA (cont'd)

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Landscape	B	1. Valuable scenery in the region would be destroyed or deteriorated by land reclamation, vegetation change and construction of the landfill site.	1. Reexamination of the site location 2. Careful consideration of the landfill design 3. Public hearings and provision of necessary information for the residents	1. Public awareness survey 2. Future land use plan	
Air Pollution	B	1. Health hazards, such as asthma, due to emission of smoke and dust 2. Obstruction to growth of plants	1. Reexamination of the site location 2. Introduction of sanitary landfill, eg. covering soil 3. Careful consideration of construction planning and management, as well as daily operation	1. Meteorological data, such as wind speed and direction, air temperature distribution 2. Topography of the area	
Water Pollution	A	1. Water use, fishery, landscape and recreation in the downstream would be affected by pollution of rivers and lakes. 2. Obstruction to growth of aquatic life due to water quality aggravation by inflow of polluted water	1. Reexamination of the site location 2. Installation of leachate treatment plant 3. Proper drainage system 4. Careful consideration of construction planning and management, as well as daily operation	1. Meteorological data 2. Hydrological data 3. Topography of the area 4. Water use	
Soil Contamination	C	1. Contaminants in surrounding soil would elute to the nearest rivers and affect the downstream conditions.	1. Reexamination of the site location 2. Placement of impermeable layer, such as clay for the foundation 3. Separation of waste that may bring elution of toxic substances	1. Topography and geology of the area 2. Water use	

Table 4.4.3 Overall Evaluation Results of IEE for the Improvement of Final Disposal Site at NIKA (cont'd)

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Noise and Vibration	B	1. Inhabitants along the route would be affected by noise. 2. Obstruction to breeding of cattle and habitats of wildlife	1. Reexamination of the site location 2. Installation of acoustic walls and buffer zone 3. Examination of construction hours	1. Land use 2. Distribution of schools, hospitals and inhabitants 3. Living condition of inhabitants	
Offensive Odor	A	1. Inhabitants near the site would complain about the odor. 2. Land use demand in the vicinity would decrease thereby decreasing the land value.	1. Reexamination of the site location 2. Introduction of sanitary landfill, eg. covering soil 3. Careful consideration of daily operation and management	1. Meteorological data, such as wind speed and direction, air temperature distribution 2. Topography of the area	

Legend A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed: Impacts may become clear as study progress.).
D: No impact is expected. EIA is not necessary.

Table 4.4.4 Overall Evaluation Results of IEE for the Improvement of Final Disposal Site at BARYS

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Resettlement	B	1. Friction between the landowner and the contractor or user in terms of the conditions of agreements	1. Mutual understanding through good communication each other 2. Identification and clarification of the contents of agreements	1. Confirmation of the ownership and its status	Until year 2001, BARYS will rent the land from Rayon.
Water Rights and Rights of Common	C	1. Pollution of groundwater may affect the water use of the nearest pumping station.	1. Reexamination of the site location 2. Installation of treatment facilities for leachate 3. Placement of impermeable layer, such as clay for the foundation 4. Proper drainage system	1. Water use and the rights	
Public Health Condition	B	1. Animals and insects which gather on wastes would become vectors of disease. 2. Health hazards of workers and residents near the site may occur if the landfill work is conducted inadequately.	1. Reexamination of the site location 2. Introduction of sanitary landfill, eg. covering soil 3. Prevention of vermin by pesticides 4. Public education on sanitation for the inhabitants and workers to avoid infection	1. Public health condition of the area 2. Habitation and propagation of rodents and insects 3. Meteorological data, such as precipitation, humidity, and wind speed and direction 4. Topography and geology of the area	
Groundwater	B	1. Groundwater polluted by penetration of leachate and hazardous substances would affect the health of inhabitants who use the water for drinking.	1. Reexamination of the site location 2. Placement of impermeable layer, such as clay for the foundation 3. Proper drainage system 4. Substitutional water supply	1. Condition of groundwater 2. Topography and geology of the area 3. Water use around and downstream of the site	

Table 4.4.4 Overall Evaluation Results of IEE for the Improvement of Final Disposal Site at BARYS (cont'd)

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Hydrological Situation	C	1. Change in regime of rivers by filling up the dry ravine would damage plants, animals and other use of the water.	1. Reexamination of the site location 2. Proper drainage system 3. Substitutional water supply	1. Water use around and downstream of the site 2. Topography and geology of the area	
Fauna and Flora	B	1. Outbreak of flies, birds and rats that may obstruct the breeding of other species and would affect public health condition.	1. Reexamination of the site location 2. Relocation of plants and animals 3. Prevention of vermin by pesticides 4. Introduction of sanitary landfill, eg. covering soil	1. Fauna and flora 2. Ecological system 3. Food chain	
Landscape	B	1. Valuable scenery in the region would be destroyed or deteriorated by land reclamation, vegetation change and construction of the landfill site.	1. Reexamination of the site location 2. Careful consideration of the landfill design 3. Public hearings and provision of necessary information for the residents	1. Public awareness survey 2. Future land use plan	
Air Pollution	B	1. Health hazards, such as asthma, due to emission of smoke and dust 2. Obstruction to growth of plants	1. Reexamination of the site location 2. Introduction of sanitary landfill, eg. covering soil 3. Careful consideration of construction planning and management, as well as daily operation	1. Meteorological data, such as wind speed and direction, air temperature distribution 2. Topography of the area	

Table 4.4.4 Overall Evaluation Results of IEE for the Improvement of Final Disposal Site at BARYS (cont'd)

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Water Pollution	A	1. Water use, fishery, landscape and recreation in the downstream would be affected by pollution of rivers and lakes. 2. Obstruction to growth of aquatic life due to water quality aggravation by inflow of polluted water	1. Reexamination of the site location 2. Installation of leachate treatment plant 3. Proper drainage system 4. Careful consideration of construction planning and management, as well as daily operation	1. Meteorological data 2. Hydrological data 3. Topography of the area 4. Water use	
Soil Contamination	C	1. Contaminants in surrounding soil would elute to the nearest rivers and affect the downstream conditions.	1. Reexamination of the site location 2. Placement of impermeable layer, such as clay for the foundation 3. Separation of waste that may bring elution of toxic substances	1. Topography and geology of the area 2. Water use	
Noise and Vibration	B	1. Inhabitants along the route would be affected by noise. 2. Obstruction to breeding of cattle and habitats of wildlife	1. Reexamination of the site location 2. Installation of acoustic walls and buffer zone 3. Examination of construction hours	1. Land use 2. Distribution of schools, hospitals and inhabitants 3. Living condition of inhabitants	
Offensive Odor	A	1. Inhabitants near the site would complain about the odor. 2. Land use demand in the vicinity would decrease thereby decreasing the land value.	1. Reexamination of the site location 2. Introduction of sanitary landfill, eg. covering soil 3. Careful consideration of daily operation and management	1. Meteorological data, such as wind speed and direction, air temperature distribution 2. Topography of the area	

Legend A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progress.).
D: No impact is expected. EIA is not necessary.

Table 4.4.5 Overall Evaluation Results of IEE for the Improvement of Final Disposal Site at ENBEK

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Resettlement	C	1. Friction between the landowner and the contractor or user in terms of the conditions of agreements	1. Mutual understanding through good communication each other 2. Identification and clarification of the contents of agreements	1. Confirmation of the ownership and its status	
Water Rights and Rights of Common	C	1. Pollution of the nearest river may affect the water use of the downstream.	1. Reexamination of the site location 2. Installation of treatment facilities for leachate 3. Placement of impermeable layer, such as clay for the foundation 4. Proper drainage system	1. Water use and the rights	
Public Health Condition	B	1. Animals and insects which gather on wastes would become vectors of disease. 2. Health hazards of workers and residents near the site may occur if the landfill work is conducted inadequately.	1. Reexamination of the site location 2. Introduction of sanitary landfill, eg. covering soil 3. Prevention of vermin by pesticides 4. Public education on sanitation for the inhabitants and workers to avoid infection	1. Public health condition of the area 2. Habitation and propagation of rodents and insects 3. Meteorological data, such as precipitation, humidity, and wind speed and direction 4. Topography and geology of the area	
Groundwater	B	1. Groundwater polluted by penetration of leachate and hazardous substances would affect the health of inhabitants who use the water for drinking.	1. Reexamination of the site location 2. Placement of impermeable layer, such as clay for the foundation 3. Proper drainage system 4. Substitutional water supply	1. Condition of groundwater 2. Topography and geology of the area 3. Water use around and downstream of the site	

Table 4.4.5 Overall Evaluation Results of IEE for the Improvement of Final Disposal Site at ENBEK (cont'd)

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Hydrological Situation	C	1. Change in regime of rivers by filling up the dry ravine would damage plants, animals and other use of the water.	1. Reexamination of the site location 2. Proper drainage system 3. Substitutional water supply	1. Water use around and downstream of the site 2. Topography and geology of the area	
Fauna and Flora	B	1. Outbreak of flies, birds and rats that may obstruct the breeding of other species and would affect public health condition.	1. Reexamination of the site location 2. Relocation of plants and animals 3. Prevention of vermin by pesticides 4. Introduction of sanitary landfill, eg. covering soil	1. Fauna and flora 2. Ecological system 3. Food chain	
Landscape	B	1. Valuable scenery in the region would be destroyed or deteriorated by land reclamation, vegetation change and construction of the landfill site.	1. Reexamination of the site location 2. Careful consideration of the landfill design 3. Public hearings and provision of necessary information for the residents	1. Public awareness survey 2. Future land use plan	
Air Pollution	B	1. Health hazards, such as asthma, due to emission of smoke and dust 2. Obstruction to growth of plants	1. Reexamination of the site location 2. Introduction of sanitary landfill, eg. covering soil 3. Careful consideration of construction planning and management, as well as daily operation	1. Meteorological data, such as wind speed and direction, air temperature distribution 2. Topography of the area	

Table 4.4.5 Overall Evaluation Results of IEE for the Improvement of Final Disposal Site at ENBEK (cont'd)

Environmental Item	Evaluation	Possible Environmental Impacts	Possible Measures	Related Study Subjects	Remarks
Water Pollution	A	1. Water use, fishery, landscape and recreation in the downstream would be affected by pollution of rivers and lakes. 2. Obstruction to growth of aquatic life due to water quality aggravation by inflow of polluted water	1. Reexamination of the site location 2. Installation of leachate treatment plant 3. Proper drainage system 4. Careful consideration of construction planning and management, as well as daily operation	1. Meteorological data 2. Hydrological data 3. Topography of the area 4. Water use	
Soil Contamination	C	1. Contaminants in surrounding soil would elute to the nearest rivers and affect the downstream conditions.	1. Reexamination of the site location 2. Placement of impermeable layer, such as clay for the foundation 3. Separation of waste that may bring elution of toxic substances	1. Topography and geology of the area 2. Water use	
Noise and Vibration	B	1. Inhabitants along the route would be affected by noise. 2. Obstruction to breeding of cattle and habitats of wildlife	1. Reexamination of the site location 2. Installation of acoustic walls and buffer zone 3. Examination of construction hours	1. Land use 2. Distribution of schools, hospitals and inhabitants 3. Living condition of inhabitants	
Offensive Odor	A	1. Inhabitants near the site would complain about the odor. 2. Land use demand in the vicinity would decrease thereby decreasing the land value.	1. Reexamination of the site location 2. Introduction of sanitary landfill, eg. covering soil 3. Careful consideration of daily operation and management	1. Meteorological data, such as wind speed and direction, air temperature distribution 3. Topography of the area	

Legend A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progress.).
D: No impact is expected. EIA is not necessary.