

## REFERENCES

- Anderson, R.L. 1987. Practical statistics for analytical chemists. USA: Van Nostrand Reinhold Company Inc.
- APHA, AWWA and WPCF. 1986. Standard method for the examination of water and wastewater. 16th ed. Washington D.C.: APHA.
- BMA. 1987. Clean Bangkok. BMA: Dept.of Public Cleansing. Bangkok. (in Thai)
- Borden, R.C. and Yanoschak, T.M. 1990. Ground and surface water quality impacts of N.Calorina sanitary land fills. Water resources bulletin. 26(2): 269-277.
- Campbell, R.C. 1981. Statistics for biologists. 2nd ed. Great Britain: University Press, Cambridge.
- Chaitiamwong, S. 1988. Analytical chemistry handbook. 2nd ed. Bangkok:Chulalongkorn University Publishing Co. (in Thai)
- Changpiyarat W. 1993. The contamination of mercury, cadmium and manganese in sediment near solid waste disposal sites of Bangkok Metropolitan Administration. Master's Thesis, Chulalongkorn University. (in Thai)
- Chang Tung-Nien. 1988. Color removal from On-nuch's leachate by chemical treatment. Master's Thesis, Asian Institute of Technology.
- Considine, D.M., ed. 1976. Van Nostrand's scientific encyclopedia. 5th ed. USA: Van Nostrand Reinhold Co.

- De Kruijf, H.A.M., ed. 1988. Manual on aquatic ecotoxicology. New Delhi, India: Allied Publishers Private Ltd.
- D'Itri, P.A. and D'Itri, F.M. 1977. Mercury contamination: A human tragedy. USA: Wiley Interscience publication.
- Doull, J. Klaassen, C.D. and Amdur, M.O. eds. 1980. Toxicology 2nd ed. USA: Macmillan Publishing Co., Inc.
- Friberg, L. and Vostal, D. 1976. Mercury in the environment. 3rd ed. Ohio: CRC Press.
- Friberg, L. et al. 1976. Cadmium in the environment. 2nd ed. Ohio: CRC Press.
- Goldman, C.R. and Horne, A.J. 1983. Limnology. Japan: McGraw-Hill Book Co.
- Golterman, H.L. Clymo, R.S. and Ohnstad, M.A.M. 1978. Method for physical and chemical analysis of fresh waters. 2nd ed. Great Britain: Billing & Sons Ltd.
- Hutchinson, T.C. and Meema, K.M., eds. 1987. Lead, Mercury, Cadmium and Arsenic in the environment: John Wiley & Sons Inc.
- JICA. 1982. The Bangkok solid waste management study, final report. Bangkok.
- \_\_\_\_\_. 1982. The Bangkok solid waste management study, final report (appendices). Bangkok.
- Jujun, K. 1990. Adsorption and desorption of Cd, Ni and Zn by top soils. Master's Thesis, Chulalongkorn University.

- Karnchanawong, S., Ikeguchi, T. and Koottatep, S. 1990. Shallow well water quality nearby Mae-Hia solid waste disposal site. Proceeding 3rd National symposium on environmental technology and management: theme solid waste disposal and nightsoil treatment. Nov. 8-9, Chiangmai Orchid Hotel.
- Kemmitt, R.D.W. 1975. The chemistry of manganese. vol.22: Pergamon Texts in inorganic chemistry. Great Britain: Pergamon Press.
- Khaodhian, S., Tuntunwate, M. and Tavonvong, K. 1989. Colour removal from leachate at Nhong-Kham dumping site by a chemical process. J. of environmental research. 11:1-5. (in Thai)
- Laws, E.A. 1981. Aquatic pollution. USA: John Wiley & Sons Inc.
- Lenihan, J. and Fletcher, W.W., eds. 1977. The chemical environment. vol. 6: Environment and man. London: Blackie & Sons Ltd.
- Medej, T. 1985. Total and organic mercury in water of the lower Chao Phraya river. Master's Thesis, Chulalongkorn University. (in Thai)
- National Environment Board (NEB). 1988 a. Preliminary water quality management of Bangpakong, Nakorn Nayok and Prachinburi river during 1986-1988. Bangkok.
- NEB. 1988 b. Ta Chin river water quality during 1984-1987 report. Bangkok. (in Thai)
- \_\_\_\_\_. 1989 c. Mae Klong River's water quality during 1986-1988 report. Bangkok. (in Thai)



- \_\_\_\_\_. 1989 d. Law and standards on pollution control in Thailand. 2nd ed. Bangkok.
- \_\_\_\_\_. 1991 e. Mae Klong river water quality during 1989-1990 report. Bangkok. (in Thai)
- \_\_\_\_\_. 1991 f. Report of the Chao Phraya river water quality and its deterioration during 1981-1988. Bangkok.
- Nriagu, J.O. and Lakshminarayana, J.S.S., eds. 1989. Aquatic toxicology and water quality management. USA: John Wiley & Sons Inc.
- Onodera, S. 1985. A case study on water quality evaluation of the lower Chao Phraya river and klongs along the river. Bangkok: Office of the National Environment Board.
- Pannasawad, T., ed. 1982. The effluent analysis handbook. Bangkok: Chulalongkorn University Publishing Co. (in Thai)
- Pattamapirat, W. 1982. A study of leachate characteristics from soi On-noot dumping site and its biological treatment. J. of environmental research. 11:6-23. (in Thai)
- Penroj, A. 1986. Behavior of iron and manganese in the Bangpakong estuary. Mater's Thesis, Chulalongkorn University. (in Thai)
- Rojarayanont, S. 1983. Our environment: Environmental pollution. Bangkok. (in Thai)

- Rossi, P.H., Wright, J.D. and Anderson, A.B. eds. 1983. Handbook of survey research.USA: Academic Press Inc.
- Sawyer, C.N. and McCarty, P.L. 1985. Chemistry for the environmental engineering. Singapore: McGraw-Hill Book Co.
- Sheu Jenn-Hung. 1988. Treatment of municipal solid waste leachate using soil column process. Master's Thesis, Asian Institute of Technology.
- Surapreug, N. 1985. The base data and evaluation of the Rayong river water quality. Master's Thesis, Chulalongkorn University. (in Thai)
- Tchobanoglous, G., Theisen, H. and Eliassen, R. 1977. Solid wastes:Engineering principles and management issues. USA: McGraw-Hill.
- World Health Organization. 1981. Manganese. vol.17: Environmental Health Criteria. Finland.

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



APPENDIX A

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



## Appendix A-1

Summarized data obtained from On-much disposal site in May 1992.

PARAMETER	STAT. ANALYSIS	STATION									
		1	2	3	4	5	6	7	8	9	10
TEMP. (CELCIUS)	MIN.	28.5	28.6	29.7	29.8	29.6	28.9	28.8	29.4	30.6	30.4
	MAX.	30.5	32.3	32.2	32.1	32.2	32.3	33.4	32.6	32.7	32.5
	MEAN	29.7	30.9	31.2	31.1	31.2	31	31.4	31.6	31.8	31.7
	MEDIAN	29.7	31.3	31.4	31.5	31.5	31.5	31.7	31.9	31.8	31.8
	STD. DEVIATION	0.508	1.143	0.826	0.787	0.922	1.122	1.215	0.894	0.641	0.636
	STD. ERROR	0.177	0.345	0.275	0.249	0.278	0.338	0.366	0.269	0.193	0.192
pH (pH UNIT)	MIN.	7.5	6.5	6.5	6.5	6.6	6.5	6.5	6.5	6.5	6.5
	MAX.	8.5	7.9	8	8	8	7.8	8	7.8	7.8	7.8
	MEAN	8.02	7.15	7.16	7.2	7.23	7.15	7.15	7.17	7.15	7.15
	MEDIAN	7.9	7.3	7.2	7.2	7.2	7.3	7.1	7.1	7.2	7.2
	STD. DEVIATION	0.39	0.5	0.47	0.51	0.51	0.5	0.5	0.47	0.45	0.49
	STD. ERROR	0.12	0.15	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.15
DO. (mg/L)	MIN.	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0	0.1
	MAX.	0.5	3.4	3	3.6	2.5	3.6	3.6	3.4	4.2	3.4
	MEAN	0.27	0.88	1.11	1.63	1.13	1.42	1.13	1.07	1.58	1.26
	MEDIAN	0.3	0.5	0.8	1.5	0.5	1.1	0.8	0.6	1.2	0.95
	STD. DEVIATION	0.09	1.06	1.02	1.43	1.08	1.27	1.18	1.09	1.61	1.19
	STD. ERROR	0.03	0.35	0.39	0.48	0.36	0.38	0.37	0.34	0.51	0.38
CONDUCT. (umhos/cm)	MIN.	21500	2150	2200	2150	2200	2150	1900	1700	1700	1650
	MAX.	28000	3700	4450	4500	4400	3350	3300	3500	3550	3600
	MEAN	25503	2844	3067	3024	2976	2821	2711	2745	2755	2721
	MEDIAN	26500	2800	3000	3000	2850	2800	2900	2950	3100	2900
	STD. DEVIATION	2038	545	398	669	646	370	551	663	633	719
	STD. ERROR	614	164	233	212	195	112	166	200	191	217
SALINITY (ppt.)	MIN.	12	0.2	0.2	0.2	0.3	0.2	0.5	0	0	0
	MAX.	14.8	1	1.9	1.5	1.5	1	1	1.1	1.1	1.1
	MEAN	13.69	0.84	0.9	0.98	0.94	0.88	0.89	0.75	0.76	0.71
	MEDIAN	14	1	1	1	1	1	1	1	1	1
	STD. DEVIATION	0.94	0.29	0.48	0.34	0.38	0.26	0.2	0.41	0.39	0.43
	STD. ERROR	0.28	0.09	0.16	0.11	0.11	0.08	0.06	0.12	0.12	0.13
ALKALINITY (mg/L)	MIN.	410	13.7	14	14	13.9	14.5	12.6	12.9	12.3	13.1
	MAX.	850	22.5	25.2	25.1	22.65	20.9	22	21.5	21.3	21.4
	MEAN	587	18.52	20.43	20.5	18.89	17.64	17.16	17	16.88	17.22
	MEDIAN	480	20.9	21.25	21.45	20.2	17.45	15	15.1	15.5	15.7
	STD. DEVIATION	211.41	3.77	4.68	4.66	3.74	3.17	4.5	3.97	3.98	3.76
	STD. ERROR	94.55	1.69	2.34	2.33	1.67	1.42	2.01	1.77	1.78	1.68
BOD. (mg/L)	MIN.	255	15	17.5	20	2.5	12.5	24.25	2.5	2.5	7.5
	MAX.	285	35	65.25	50.25	22.75	20.75	37.5	41	21.25	38.25
	MEAN	267.5	25.42	40.72	33.08	13.08	16.08	28.92	20.92	11.58	27.92
	MEDIAN	262.5	26.25	39.4	29	14	15	25	19.25	11	38
	STD. DEVIATION	15.61	10.03	23.9	15.53	10.16	4.23	7.44	19.3	9.39	17.68
	STD. ERROR	9.01	5.79	13.8	8.97	5.86	2.44	4.3	11.15	5.42	10.21
COD. (mg/L)	MIN.	4960	134	112	82	104	52	50	108	80	72
	MAX.	8160	154	342	314	230	168	152	188	144	202
	MEAN	6380	142	182.5	173	157	111.5	106.5	138	120.5	122.5
	MEDIAN	5160	140	130	148	147	113	112	128	129	188
	STD. DEVIATION	149.06	8.49	108.04	100.35	55.96	58.98	43.25	38.3	30.48	55.75
	STD. ERROR	745.03	4.24	54.02	50.18	27.98	29.49	21.62	19.15	15.24	27.87

## Appendix A-1 (cont)

PARAMETER	STAT. ANALYSIS	STATION									
		1	2	3	4	5	6	7	8	9	10
SS. (mg/L)	MIN.	102.9	37	29.2	18.6	35.4	30.9	21.2	18.5	10.3	8.7
	MAX.	239	106.1	61.9	113.5	92	99.8	117.1	40.2	32.5	32.7
	MEAN	173.88	62.55	49.4	63.06	51.98	71.54	48.08	27.16	21.96	21.82
	MEDIAN	169	53.55	35.25	72.1	44.8	81.4	27	28.8	20.5	27.1
	STD. DEVIATION	50.45	31.63	14.82	38.38	23.13	25.4	46.2	9.05	8.68	19.51
	STD. ERROR	22.56	15.82	7.41	17.16	10.35	11.81	23.1	4.05	3.88	4.7
DS. (mg/L)	MIN.	12000	500	1363.5	1200	1000	1300	1300	1150	1150	1300
	MAX.	12700	1465	2000	2000	1750	1650	1900	1800	1750	2200
	MEAN	12425	1113	1728.38	1508.1	1341.6	1472.5	1550.6	1525.1	1504.9	1593.7
	MEDIAN	12500	1250	1775	1490.5	1350	1500	1500	1700	1624.5	1360.5
	STD. DEVIATION	298.61	396.04	272.34	336.25	288.80	145.88	223.28	301.12	247.68	358.26
	STD. ERROR	149.3	177.11	136.17	150.38	129.19	65.24	99.85	134.67	110.77	168.22
TS. (mg/L)	MIN.	12159	565.6	1392.7	1231.3	1052.2	1361.9	1323.3	1190.2	1170.5	1328
	MAX.	12862.9	1846.1	2038.3	2072.1	1842	1731.4	1930.7	1829.7	1778.2	2232.7
	MEAN	12582.6	1252.26	1768.78	1571.16	1393.98	1544.04	1655.42	1552.26	1526.86	1615.52
	MEDIAN	12684.25	1291.5	1822.05	1509.1	1394.8	1583.7	1717.1	1728.8	1634.8	1512.6
	STD. DEVIATION	288.16	481.28	280.42	339.8	304.69	142.45	251.91	298.56	250.59	364.38
	STD. ERROR	144.08	215.24	140.21	151.96	136.26	63.71	112.66	133.52	112.07	162.96
MERCURY (ppb.)	MIN.	9.21	0.53	0.68	0.74	0.44	0.79	0.56	0.48	0.62	0.48
	MAX.	39.13	2.55	1.91	2.47	3.35	2.35	1.87	3.88	2.7	2.72
	MEAN	20.713	1.28	1.16	1.47	1.48	1.34	1.09	1.63	1.34	1.37
	MEDIAN	19.56	0.94	1.15	1.255	1.29	1.26	1.04	1.36	0.91	1.32
	STD. DEVIATION	9.58	0.64	0.46	0.62	0.84	0.5	0.47	1.16	0.8	0.62
	STD. ERROR	3.03	0.19	0.15	0.2	0.25	0.15	0.14	0.35	0.25	0.19
CADMIUM (ppm.)	-----NON DETECTABLE-----										
MANGANESE (ppm.)	MIN.	0.44	0.44	0.34	0.32	0.32	0.38	0.33	0.01	0.28	0.25
	MAX.	0.8	1.04	1.24	1.23	1.12	1.09	1.06	0.93	1.05	1.08
	MEAN	0.68	0.73	0.54	0.56	0.68	0.62	0.57	0.48	0.53	0.55
	MEDIAN	0.71	0.58	0.47	0.44	0.47	0.58	0.41	0.4	0.42	0.42
	STD. DEVIATION	0.11	0.42	0.28	0.31	0.32	0.25	0.27	0.25	0.27	0.29
	STD. ERROR	0.04	0.13	0.09	0.1	0.1	0.07	0.08	0.08	0.08	0.09

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## Appendix A-2

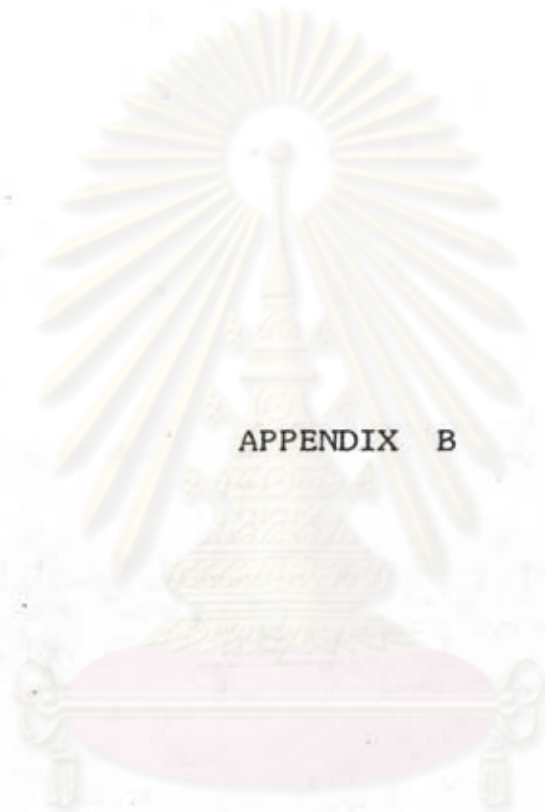
Summarized data obtained from On-nuch disposal site in July 1992.

PARAMETER	STAT. ANALYSIS	STATION									
		1	2	3	4	5	6	7	8	9	10
TEMP. (CELCIUS)	MIN.	28.3	28.9	28.1	28.4	28.6	28.5	28.5	30.2	30.1	30.1
	MAX.	33.6	31.1	30.3	30.6	30.3	31.8	31.7	32.1	32	32.3
	MEAN	30.71	30	29.58	29.55	29.43	29.82	30.43	30.81	30.74	30.77
	MEDIAN	30.1	30.1	29.65	29.5	29.3	30	30.2	30.6	30.5	30.7
	STD. DEVIATION	1.797	0.653	0.598	0.56	0.524	1.054	0.789	0.558	0.571	0.634
	STD. ERROR	0.542	0.197	0.189	0.177	0.158	0.318	0.238	0.168	0.172	0.191
pH (pH UNIT)	MIN.	8	7.2	7.1	7.2	7.1	7.1	7.1	7	7	7
	MAX.	8.2	7.7	7.4	7.8	7.7	7.6	7.4	7.4	7.4	7.5
	MEAN	8.06	7.35	7.27	7.38	7.32	7.3	7.24	7.24	7.19	7.23
	MEDIAN	8.1	7.3	7.25	7.35	7.3	7.3	7.2	7.2	7.2	7.2
	STD. DEVIATION	0.07	0.15	0.13	0.19	0.18	0.17	0.09	1.13	0.13	0.13
	STD. ERROR	0.02	0.05	0.04	0.06	0.06	0.05	0.03	0.04	0.04	0.04
DO. (mg/L)	MIN.	0	0.1	0	0	0	0	0.2	0.6	0.4	0.4
	MAX.	0.3	3.7	2.1	2.6	3.5	3.6	3.8	3.4	3.8	3.5
	MEAN	0.05	1.9	0.91	1.06	1.22	1.75	1.64	2.2	2.19	1.98
	MEDIAN	0.1	2.1	0.75	1	0.9	1.9	1.6	2.3	2.25	2
	STD. DEVIATION	0.09	1.39	0.79	0.88	1.21	1.34	1.04	0.94	1.12	1.05
	STD. ERROR	0.03	0.47	0.25	0.28	0.37	0.4	0.31	0.28	0.36	0.32
CONDUCT. (umhos/cm)	MIN.	15000	1200	1400	1850	1200	1210	1100	1100	1050	1100
	MAX.	25000	2220	4500	4100	3300	2350	2150	2110	2150	2250
	MEAN	19086	1735	2979	2652	2242	1677	1507	1480	1536	1607
	MEDIAN	19790	1750	3200	2455	2300	1600	1300	1300	1300	1650
	STD. DEVIATION	3428	391	1029	882	814	449	440	423	521	463
	STD. ERROR	1295	160	389	360	332	183	166	160	197	175
SALINITY (ppt.)	MIN.	8	0	0	0	0	0	0	0	0	0
	MAX.	12	2	2	2.5	2	2	1	0.5	0.5	0.5
	MEAN	9.96	0.71	1.03	1	0.71	0.5	0.24	0.21	0.21	0.07
	MEDIAN	10.5	1	1	1	1	0	0	0	0	0
	STD. DEVIATION	1.57	0.76	0.62	0.96	0.76	0.76	0.38	0.27	0.27	0.19
	STD. ERROR	0.6	0.29	0.23	0.36	0.29	0.29	0.14	0.1	0.1	0.07
ALKALINITY (mg/L)	MIN.	450	26.4	22.4	32.8	27.6	22.4	21.2	20.4	21.2	23.2
	MAX.	610	40.8	42	41.6	45.6	43.2	25.6	24.8	23.2	26.8
	MEAN	522.5	31.9	35.35	37.75	34.6	30.4	23.7	23.1	22.2	24.5
	MEDIAN	515	30.2	30.5	30.3	29	28	24	23.6	22.2	24
	STD. DEVIATION	65.891	6.302	9.147	3.8	7.909	9.027	1.943	1.915	0.952	1.612
	STD. ERROR	32.946	3.151	4.573	1.9	3.955	4.514	0.971	0.957	0.476	0.806
BOD. (mg/L)	MIN.	485	25	13.5	29	33	24	15.5	14	13.5	17
	MAX.	500	44.5	31	62.5	59.5	45.5	50.5	20.5	20	24
	MEAN	493.33	34.5	22.25	45.75	42.67	33.83	28	17.17	17.83	20.5
	MEDIAN	495	34	22.25	45.75	35.5	32	18	17	20	20.5
	STD. DEVIATION	7.64	9.76	12.37	23.69	14.63	10.87	19.53	3.25	3.75	3.5
	STD. ERROR	4.41	5.63	8.75	16.75	8.45	6.27	11.27	1.88	2.17	2.02
COD. (mg/L)	MIN.	3564	64	151.2	176	96	48	32	32	32	55.8
	MAX.	4572	547.2	619.2	626.4	482.4	608	384	177	149	168
	MEAN	4046.8	177.84	310.6	419.4	283.2	235.1	199.4	77.08	71.84	98.6
	MEDIAN	3978	80	236	437.6	277.2	142.2	190.8	57.6	72	93.6
	STD. DEVIATION	365.38	208.12	215.23	295.57	179.4	257.2	173.7	57.41	44.47	44.83
	STD. ERROR	163.4	93.08	107.62	102.79	89.7	128.6	86.8	25.67	19.89	20.05

## Appendix A-2 (cont)

PARAMETER	STAT. ANALYSIS	STATION									
		1	2	3	4	5	6	7	8	9	10
SS. (mg/L)	MIN.	115	27	39.3	42.4	30.4	34.4	14.4	13.5	14.9	13.3
	MAX.	287.4	80.7	183.2	68.2	117.4	43.5	34.6	62.1	62.5	38.5
	MEAN	187.48	50.4	81.98	54.55	64.94	38.66	25.58	30.88	27.28	21.48
	MEDIAN	184.8	50.4	49.7	53.8	59.2	38.6	25.7	23.8	19.4	15.9
	STD. DEVIATION	70.69	20.66	60.96	11.24	36.05	3.9	8.13	19.28	19.84	10.56
	STD. ERROR	31.61	9.24	27.26	5.62	16.12	1.75	3.64	8.62	8.87	4.72
DS. (mg/L)	MIN.	11450	700	750	750	950	550	550	450	400	500
	MAX.	13100	1350	2700	2300	1850	1000	1100	1100	1150	1300
	MEAN	12110	1010	1730	1550	1387.5	760	860	830	780	880
	MEDIAN	11800	1050	1900	1300	1375	850	800	850	850	800
	STD. DEVIATION	709.22	281.51	781.5	691.92	394.49	201.25	221.92	251.5	208.53	305.37
	STD. ERROR	317.10	125.9	349.5	309.43	197.25	90	99.25	112.47	129.03	136.57
TS. (mg/L)	MIN.	11578	727	789.3	792.4	380.4	488.6	574.6	469.2	418	515.9
	MAX.	13322.2	1407.4	2883.2	2455.1	1909.2	1041.5	1121.3	1123.8	1171.6	1325
	MEAN	12297.48	1060.4	1811.98	1634.66	1244.94	778.66	885.58	860.88	807.28	901.48
	MEDIAN	11915	1086.5	1995.4	1368.2	1292.8	885.3	831.9	863.5	864.9	814.7
	STD. DEVIATION	727.95	295.12	830.87	732.39	599.21	232.12	218.89	259.17	283.34	305.99
	STD. ERROR	325.55	131.98	371.58	327.53	267.97	103.81	97.53	115.9	126.71	136.84
MERCURY (ppb.)	MIN.	2.47	0.27	0.41	0.72	0.55	0.41	0.29	0.19	0.25	0.34
	MAX.	7.02	3	1.49	1.64	4.28	2.67	1.84	1.99	1.95	2.88
	MEAN	3.73	1.31	0.9	1.21	1.48	0.97	0.81	0.82	0.89	1.12
	MEDIAN	3.44	1.07	0.875	1.26	0.99	0.79	0.65	0.81	0.72	0.83
	STD. DEVIATION	1.28	0.75	0.34	0.31	1.27	0.64	0.47	0.45	0.5	0.86
	STD. ERROR	0.39	0.23	0.11	0.1	0.38	0.19	0.14	0.13	0.15	0.26
CADMIUM (ppm.)	-----NON DETECTABLE-----										
MANGANESE (ppm.)	MIN.	0.62	0.39	0.47	0.38	0.4	0.24	0.36	0.33	0.36	0.37
	MAX.	1.05	2.88	0.83	0.85	0.86	1.61	0.96	0.87	0.87	0.86
	MEAN	0.83	0.81	0.71	0.66	0.64	0.68	0.59	0.58	0.62	0.62
	MEDIAN	0.79	0.6	0.74	0.665	0.6	0.58	0.61	0.59	0.61	0.69
	STD. DEVIATION	0.13	0.7	0.12	0.12	0.14	0.36	0.2	0.19	0.18	0.18
	STD. ERROR	0.04	0.21	0.04	0.04	0.04	0.11	0.06	0.06	0.05	0.05

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APPENDIX B

ศูนย์วิทยทรัพยากร  
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Appendix B-1 Summarized data obtained from Mong Khan in June 1992.

PARAMETER	STAT. ANALYSIS	STATION						
		1	2	3	4	5	6	7
TEMP. (CELCIUS)	MIN.	27.4	28.7	29.7	27.7	28.6	28.9	28.9
	MAX.	30.2	35.3	31.5	31.1	32.4	30.6	30.8
	MEAN	28.68	30.06	30.34	28.87	30.1	29.78	29.93
	MEDIAN	28.3	29.3	30.2	28.45	30	29.7	30
	STD. DEVIATION	1.005	1.03	0.532	1.081	1.073	0.632	0.597
	STD. ERROR	0.303	0.552	0.180	0.342	0.324	0.223	0.211
pH (pH UNIT)	MIN.	6.4	7.5	7.25	6.6	6.4	6.4	6.5
	MAX.	6.85	8.6	7.7	7.5	8	7.1	7.3
	MEAN	6.69	7.97	7.56	6.93	7.14	6.97	7.03
	MEDIAN	6.7	7.9	7.6	6.85	7.1	7.1	7.1
	STD. DEVIATION	0.13	0.35	0.17	0.27	0.45	0.26	0.26
	STD. ERROR	0.04	0.12	0.06	0.09	0.15	0.1	0.1
DO. (mg/L)	MIN.	0.2	0	0.1	0.1	0.1	0.1	0.5
	MAX.	0.7	0.2	2.4	0.7	1	3	2
	MEAN	0.33	0.12	0.66	0.38	0.46	1.23	0.91
	MEDIAN	0.3	0.1	0.45	0.4	0.4	0.7	0.8
	STD. DEVIATION	0.16	0.06	0.73	0.25	0.32	1.07	0.51
	STD. ERROR	0.05	0.02	0.26	0.08	0.1	0.4	0.19
CONDUCT. (umhos/cm)	MIN.	1200	12000	3700	1000	980	1100	1200
	MAX.	4200	26500	4000	2400	2250	2300	2300
	MEAN	2526	20409	3810	1529	1543	1725	1769
	MEDIAN	2030	21000	3800	1550	1610	1625	1750
	STD. DEVIATION	1907	3860	84	421	400	409	420
	STD. ERROR	303	1164	30	133	120	145	148
SALINITY (ppt.)	MIN.	0	0.2	1	0	0	0	0
	MAX.	2	15	2	0.5	0.5	0.8	0.8
	MEAN	0.72	11.52	1.28	0.16	0.18	0.33	0.26
	MEDIAN	0.5	12	1.1	0.1	0	0.25	0
	STD. DEVIATION	0.637	2.283	0.365	0.201	0.252	0.365	0.374
	STD. ERROR	0.192	0.688	0.129	0.064	0.076	0.129	0.132
ALKALINITY (mg/L)	MIN.	18.4	100	42	15.6	11.3	18	23.6
	MAX.	27.6	200	70.4	28.8	38.8	30	43.7
	MEAN	21.8	166.9	59.73	21.3	24.5	24.27	30.57
	MEDIAN	20.2	180	66.8	20.4	21.6	24.8	24.4
	STD. DEVIATION	3.8	40.47	15.46	5.64	10.91	6.02	11.38
	STD. ERROR	1.699	18.1	8.927	2.821	4.878	3.474	6.571
BOD. (mg/L)	MIN.	17	150	30.5	62	21.5	24.5	25
	MAX.	26	265	170	115	27	25	28.5
	MEAN	23	215.8	87.3	86.5	24.7	24.8	26.8
	MEDIAN	26	232.5	61.5	82.5	25.5	24.8	26.8
	STD. DEVIATION	5.2	59.3	73.25	26.73	2.84	0.35	2.48
	STD. ERROR	3	34.23	42.29	15.43	1.64	0.25	1.75
COD. (mg/L)	MIN.	72	780	240	64	104	64	40
	MAX.	320	5360	860	560	320	320	720
	MEAN	195.3	2692.5	500	232.6	212.5	182.7	334
	MEDIAN	190	2460	400	200	200	176	288
	STD. DEVIATION	98.6	1657.09	260.77	176.43	88.66	110.67	323.2
	STD. ERROR	40.3	585.87	116.62	66.68	31.35	45.18	161.6

## Appendix B-1 (cont)

PARAMETER	STAT. ANALYSIS	STATION						
		1	2	3	4	5	6	7
SS. (ng/L)	MIN.	10.6	80.1	19.6	9.9	18.3	11.6	10.7
	MAX.	31.5	134.1	53.2	41.4	44.5	67.6	60.8
	MEAN	17.42	105.5	30.48	23.05	25.4	40.9	24.22
	MEDIAN	14.4	105.25	25.4	23.1	21.1	36.1	13.9
	STD. DEVIATION	7.96	24.19	13.24	11.00	10.83	25.45	21.09
	STD. ERROR	3.25	9.88	5.92	4.52	4.84	11.38	9.43
DS. (ng/L)	MIN.	750	5500	1250	650	750	200	500
	MAX.	2400	10200	2300	1150	2300	1000	1150
	MEAN	1416.67	8680	1940	889	1260	700	770
	MEDIAN	1225	8900	2100	995	1100	850	650
	STD. DEVIATION	560.04	1894.27	432.15	226.89	601.46	340.96	309.44
	STD. ERROR	231.9	847.14	193.26	191.47	268.98	152.48	138.38
TS. (ng/L)	MIN.	761.7	5580	1853.2	659.9	794.5	266.3	513.9
	MAX.	2415	10326.4	2330.1	1166	2502.4	1022.6	1161.9
	MEAN	1434.08	8779.76	2150.48	909.34	1321.24	740.84	794.22
	MEDIAN	1246.05	8982	2174.1	1015.3	1118.3	861.6	710.8
	STD. DEVIATION	560.65	1191.12	184.4	228.19	675.79	330.79	302.02
	STD. ERROR	232.15	854.68	82.47	102.05	302.22	147.93	135.07
MERCURY (ppb.)	MIN.	0.18	1.13	0	0	0	0.83	0.27
	MAX.	1.61	3.65	1.18	2.39	2.4	2.08	2.8
	MEAN	0.8	2.05	0.81	0.99	1.16	1.45	1.28
	MEDIAN	0.78	1.91	0.93	0.78	1.14	1.39	1.06
	STD. DEVIATION	0.413	0.614	0.391	0.789	0.699	0.412	0.817
	STD. ERROR	0.125	0.185	0.138	0.25	0.211	0.146	0.289
CADMIUM (ppm.)	----- NON DETECTABLE -----							
MANGANESE (ppm.)	MIN.	0.41	0.28	0.67	0.28	0.35	0.37	0.3
	MAX.	1.22	2.02	1.13	2.01	0.82	1.09	0.49
	MEAN	0.72	0.74	1.01	0.87	0.51	0.62	0.41
	MEDIAN	0.58	0.67	1.07	0.925	0.45	0.51	0.415
	STD. DEVIATION	0.3	0.465	0.151	0.69	0.151	0.266	0.065
	STD. ERROR	0.09	0.14	0.053	0.155	0.045	0.094	0.023

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Appendix B-2 Summarized data observed from Mong Khan disposal site in August 1992.

PARAMETER	STAT. ANALYSIS	STATION						
		1	2	3	4	5	6	7
TEMP. (CELCIUS)	MIN.	26.6	29.8	29.1	27	28.9	28.6	28.5
	MAX.	28.4	35.5	31	27.8	31.1	31.2	31.5
	MEAN	27.36	31.26	30.16	27.29	29.86	29.6	29.74
	MEDIAN	27.2	30.5	30.5	27.2	29.8	29.5	29.7
	STD. DEVIATION	0.659	1.697	0.652	0.226	0.886	0.871	0.852
	STD. ERROR	0.199	0.512	0.196	0.068	0.267	0.263	0.257
pH (pH UNIT)	MIN.	6.8	7.8	7.3	6.7	6.7	7	7
	MAX.	7.3	8	8	7.2	7.5	7.5	7.4
	MEAN	6.98	7.88	7.72	6.96	7.09	7.16	7.17
	MEDIAN	6.9	7.9	7.7	6.9	7	7.1	7.2
	STD. DEVIATION	0.15	0.06	0.19	0.16	0.26	0.17	0.12
	STD. ERROR	0.04	0.02	0.06	0.05	0.08	0.05	0.04
DO. (mg/L)	MIN.	0	0	0.3	0.1	0	0.2	0.4
	MAX.	0.8	0.1	3.9	0.4	0.9	3	2.8
	MEAN	0.25	0.02	1.95	0.27	0.29	1.38	1.38
	MEDIAN	0.2	0	1.5	0.3	0.3	1.5	1.3
	STD. DEVIATION	0.23	0.04	1.24	0.08	0.27	0.92	0.82
	STD. ERROR	0.07	0.01	0.37	0.02	0.09	0.28	0.26
CONDUCT. (umhos/cm)	MIN.	2050	25000	3150	1600	1300	1200	1100
	MAX.	2800	31000	3800	2300	1750	2200	2080
	MEAN	2479	28167	2407	1864	1421	1708	1563
	MEDIAN	2650	28000	3350	1800	1300	1750	1540
	STD. DEVIATION	304	2160	241	233	173	380	363
	STD. ERROR	115	882	91	84	65	155	148
SALINITY (ppt.)	MIN.	0	15	1	0	0	0	0
	MAX.	1	17.5	1.5	0.5	0.3	0.5	0
	MEAN	0.61	15.8	1.14	0.43	0.04	0.17	0
	MEDIAN	0.5	15.25	1	0.5	0	0	0
	STD. DEVIATION	0.35	1.09	0.2	0.19	0.11	0.26	0
	STD. ERROR	0.13	0.44	0.08	0.07	0.04	0.11	0
ALKALINITY (mg/L)	MIN.	28	146	60	21.6	20.6	19.6	16.8
	MAX.	36.4	1045	65.6	32	24.4	27.6	28.8
	MEAN	33.2	670.2	62.9	27.2	21.8	23.4	24.08
	MEDIAN	33.8	860	62.8	28.4	21.2	23.8	24.4
	STD. DEVIATION	3.47	393.8	1.99	4.6	1.55	3.73	4.56
	STD. ERROR	1.55	176.11	0.89	2.06	0.69	1.67	2.04
BOD. (mg/L)	MIN.	15.5	97.5	67.5	41	25.5	14.25	19.3
	MAX.	23	665	75	63	27	28	26
	MEAN	18.83	375.83	70.42	54.33	26.17	21.92	21.77
	MEDIAN	18	365	67.5	59	26	23.5	20
	STD. DEVIATION	3.82	283.91	4.02	11.72	0.76	7.01	3.68
	STD. ERROR	2.21	163.91	2.32	6.77	0.44	4.05	2.13
COD. (mg/L)	MIN.	112	2096	70	48	36	32	68
	MAX.	224	5893	448	296	312	344	364
	MEAN	167.3	4396.8	318.3	116.7	118	128.7	143.3
	MEDIAN	164	4960	340	86	82	96	102
	STD. DEVIATION	45	1490.42	134.93	89.74	99.56	109.88	110.43
	STD. ERROR	18.37	666.54	55.08	36.64	40.65	44.86	45.08



## Appendix B-2 (cont)

PARAMETER	STAT. ANALYSIS	STATION						
		1	2	3	4	5	6	7
SS. (mg/L)	MIN.	7	29	23	14	11	19	14
	MAX.	19	181	56	32	27	23	19
	MEAN	11.75	115.5	40	21.25	18.3	21.25	15.5
	MEDIAN	10.5	126	40.5	19.5	17	21.5	14.5
	STD. DEVIATION	5.5	63.31	14.49	8.46	8.08	1.71	2.38
	STD. ERROR	2.75	31.66	7.25	4.23	4.67	0.85	1.19
DS. (mg/L)	MIN.	1750	9800	700	400	180	415	330
	MAX.	2850	13690	2750	950	650	1300	1500
	MEAN	2187.5	12980	1887.5	668.75	440	830	1092.5
	MEDIAN	2075	12750	2050	662.5	465	802.5	1090
	STD. DEVIATION	467.93	2029.7	968.14	251.14	194.42	362.7	532.38
	STD. ERROR	233.97	1171.85	484.07	125.57	97.21	181.35	266.19
TS. (mg/L)	MIN.	1758	9922	734	415	197	438	345
	MAX.	2869	13871	2797	974	816	1321	1514
	MEAN	2199.25	12224.3	1927.5	690	545.25	851.25	1018
	MEDIAN	2085	12880	2089.5	685.5	584	823	1106.5
	STD. DEVIATION	472.91	2054.53	978.91	257.71	267.64	361.96	531.42
	STD. ERROR	236.46	1106.18	489.46	128.86	133.82	180.98	265.71
MERCURY (ppb.)	MIN.	0.32	1.63	0.45	0.43	0.48	0.63	0.66
	MAX.	3.35	3.74	2.46	0.86	1.51	3.68	1.93
	MEAN	0.85	2.63	0.82	0.65	0.98	1.24	0.95
	MEDIAN	0.67	2.42	0.6	0.7	0.98	0.84	0.86
	STD. DEVIATION	0.852	0.75	0.569	0.155	0.383	0.926	0.358
	STD. ERROR	0.257	0.24	0.172	0.047	0.115	0.279	0.108
CADMIUM (ppm.)	----- NON DETECTABLE -----							
MANGANESE (ppm.)	MIN.	0.67	0.3	0.35	0.27	0.56	0.57	0.5
	MAX.	2.56	2.28	1.31	1.06	1.03	0.87	0.91
	MEAN	1.279	0.77	1.082	0.836	0.762	0.735	0.731
	MEDIAN	1.26	0.51	1.12	0.92	0.77	0.75	0.73
	STD. DEVIATION	0.484	0.645	0.27	0.227	0.127	0.102	0.128
	STD. ERROR	0.146	0.195	0.081	0.069	0.038	0.031	0.039

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