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APPENDIX A

Table 20 Iron Concentration in Ground Water in Thailand  
from Division of Ground Water, Department of  
Mineral Resources, Ministry of National Development.

City	Well number	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
<u>Loei</u>						
A. Chiengkan	J 27	125	3.5	20.0	7.2	300
A. Chiengkan	C 55	107	1.5	18.0	7.2	108
A. Talee	J 17	160	36.0	26.0	7.4	264
A. Talee	J 18	100	29.0	46.0	7.2	796
A. Maung	J 3	147	17.0	48.0	6.9	1334
A. Wangsapung	C 43	191	10.0	14.0	7.7	300
A. Sri-than	B102	112	21.0	79.0	7.0	350
<u>Udorn</u>						
A. Banpae	E156	100	23.0	3.0	7.2	2212
A. Nongbua	A109	255	14.0	14.0	7.6	220
-lampu						
A. Noansang	A116	175	16.0	40.0	7.3	300
A. Kumpwapee	A 77	250	6.5	15.0	6.7	2155
A. Maung	A 99	515	0.8	9.0	7.1	9674
A. Pen	A138	125	11.0	3.0	7.4	2370
A. Bandung	E160	105	11.0	3.0	8.4	88



City	Well number	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
<u>Khon Kaen</u>						
A. Chumpae	B104	158	5.0	4.0	8.1	130
A. Chumpae	F126	110	8.0	43.0	7.4	464
A. Phuwieng	F139	109	6.0	2.0	8.2	220
A. Arjsamarch	B 90	140	6.9	4.3	7.9	552
A. Nongrae	F173	330	7.0	17.0	7.6	160
A. Nampong	A 76	255	15.0	47.0	7.0	200
A. Kranuan	A 72	255	7.5	6.0	7.9	100
A. Maung	C 60	351	3.5	4.0	8.1	500
A. Banphai	C 24	244	1.0	7.0	7.8	799
A. Pol	F 52	253	17.0	1.0	8.4	122
<u>Chaiyapum</u>						
A. Kaset - -somboon	B 94	110	5.5	16.0	7.5	1120
A. Phukhiew	B100	345	10.0	14.0	7.2	1645
A. Kaengkraw	P 53	120	7.6	117.0	6.8	224
A. Konswan	D 89	200	2.0	10.0	7.4	420
A. Maung	P 40	135	2.0	8.0	7.3	250
A. Saturus	C 78	400	5.5	53.0	7.0	1002
A. Bamned - - narong	G 42	110	2.5	52.0	6.9	405
A. Bamned- - narong	G 38	645	2.8	32.0	7.1	240
A. Bankhuaw	C 81	191	4.5	22.0	7.5	200

City	Well number	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
<u>Sakonnakorn</u>						
Ban Khok - -Si School	A 88	200	8.0	17.0	7.1	1680
Wat Ban Khok -Si	A 87	480	3.2	29.0	7.1	803
A. Uthum -Phonpisai	B 28	346	5.0	60.0	7.1	476
Ban Sai Mun School	B 137	50	6.0	31.0	7.4	1010
Wat Thep -Wong Saram	B 113	70	10.0	6.0	6.9	241
Ban Na Muang	F 31	100	2.0	2.0	7.6	50
A. Wanonniwat	A 52	250	13.0	88.0	6.4	483
A. Punnanikom	F 19	119	4.0	4.0	7.3	538
Ban Sang Kho	F 7	775	2.8	0	8.5	90
Wat Ban Nong -Krabok	B 130	110	1.2	7	7.1	70
Ban Phom -Yai School	B 127	110	5.0	66.0	6.9	210
Wat Ban Khok -Sung	B 208	100	23.0	7.0	7.6	380
Ban N. Ramai	G 8	250	8.0	60.0	6.9	270
Ban A-Kat Public Area	B 118	100	3.0	21.0	6.8	91
Ban Phon Ngam	B 153	75	4.0	4.0	7.5	460
A. Wanonniwat	A 56	260	11.4	22.0	5.9	4445
Banchampa Dong Public Area	B 116	75	6.0	21.0	5.9	52



City	Well No.	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
<u>Nakornpanom</u>						
Ban Sam Kha	G 24	75	8.0	15.0	6.6	60
Ta Lad Kae/ Highway Sect.	C 10	845	11.0	12.0	7.2	3414
Ban Dong Sawang	B186	105	28.0	28.0	7.0	160.0
A. Maung	C109	65	4.0	48.0	6.1	40
Wat Ban Chieng -Su	B128	150	1.0	34.0	7.0	298
Wat Ban Phiman	B158	95	1.0	9.0	7.1	120
Ban Phon Tum Public Area	C122	85	2.0	84.0	5.8	357
500 m.S.E. of B. 16ONP. 18	B160	150	70.0	13.0	7.4	140
A. Thapanom	G 20	95	12.0	72.0	6.5	170
A. Mukdaharn	G 28	85	1.4	7.0	7.9	310
A. Kham-Cha-I	B175	135	15.0	3.0	8.2	64
<u>Kalasin</u>						
Ban Hin Lat School	K 9	105	12.0	82.0	6.8	180
Huai Phung Self-Help Settlement	K 24	105	6.0	31.0	7.2	238

City	Well No.	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
<u>Roi-ed</u>						
A. Pontong	D136	200	1.0	45.0	6.7	346
A. Archsamat	D113	255	2.0	16.0	7.3	540
A. Salapume	D 21	111	2.8	7.0	7.5	986
A. Salapume	D139	90	4.8	92.0	5.8	48
A. Suwannapume	D110	150	4.0	6.0	6.7	160
A. Jaturapuk	D 11	300	4.0	124.0	6.4	153
- piman						
A. Jaturapuk	D107	100	5.0	13.0	7.2	448
- piman						
A. Maung	D104	200	4.4	17.0	7.4	136
A. Maung	D105	200	7.0	9.0	6.9	70
A. Tawachaburi	D130	200	5.0	7.0	7.0	4439
<u>Mahasarakam</u>						
A. Maung	D 27	129	10.0	13.0	7.3	420
A. Maung	D 99	200	20.0	7.0	7.9	200
A. Wape Patum	D 50	198	3.5	23.0	7.2	920
A. Payakka	C 96	150	11.0	9.0	7.6	308
- pumpisai						
A. Chieng Yaen	G 49	200	8.7	215.0	6.1	852
Wat Ban kho	G 54	150	4.0	2.0	8.6	90
A. Kosumpisai	D 70	205	12.0	2.0	8.4	90
A. Kosumpisai	D 98	200	14.0	58.0	7.1	110
Wat Ban Nong	C 94	300	11.0	4.0	7.4	495
-Bua Santu						



City	Well No.	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
Ban Don Hua -Kha	K 16	100	6.8	37.0	7.3	252
Ban Nong -Saeng Public Area	D122	90	18.0	7.0	7.1	70
A. Sahatkhun	D 46	526	10.0	22.0	5.5	24
Ban Nong -Pha Om	D 45	129	4.9	10.0	7.6	202
Wat Ban Nong - So	C100	100	12.0	60.0	6.9	260
Ban Khok Si	D 37	128	4.4	19.0	7.5	210
A. Kamalasai	E 59	100	29.0	0.0	5.7	157
Wat Ban Kabak	K 52	60	8.2	24.0	7.0	342
Ban Kaeng-Am Highway Sect.	F 6	510	18.0	124.0	5.5	86
Huai Phung Self Help	K 27	100	31.0	86.0	6.6	176
Ban Phon Thong	D 43	165	16.0	12.0	6.6	20
Kalasin Govt. Off	D 39	118	11.0	1.2	7.9	46
A. Kalasin	G 58	230	41.0	8.0	5.2	50
Ban Nong Saeng Public Area	D122	90	18.0	7.0	7.1	70

City	Well No.	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
<u>Nong Khai</u>						
A. Srichieng - Mai	A163	130	5.0	48.0	6.3	12
A. Srichieng - Mai	A160	110	12.0	12.0	5.2	0
A. Srichieng - Mai	A 68	100	1.2	10.0	7.7	300
A. Thabo	A177	115	5.0	44.0	7.0	296
A. Thabo	E142	155	6.8	60.0	5.8	38
A. Maung	A154	105	12.0	33.0	6.8	560
A. Maung	E 20	160	9.8	44.0	6.9	312
A. Maung	F 65	100	14.0	0.0	8.1	1164
A. Maung	F 69	100	10.0	134.0	6.7	320
A. Srichieng - Mai	A155	100	4.0	1.0	7.8	60
Ban Don Va Nang	A132	300	21.0	3.0	7.8	720
<u>Surin</u>						
A. Nongtum	A 18	301	2.0	36.0	7.5	1290
A. Rattana -buri	C148	500	15.0	7.0	7.9	176
A. Rattana -buri	C149	80	6.2	36.0	6.4	56
Ban Tha Sila School	A 17	438	16.0	0.0	8.2	192



City	Well No.	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
A. Jom Phra	A 17	142	5.6	7.0	7.8	842
A. Maung	A 4	405	18.3	21.0	7.0	594
A. Samrongtab	C166	100	9.0	0.0	8.5	2800
A. Sangkha	C157	120	7.0	12.0	7.7	212
A. Prasat	C125	150	4.0	29.0	7.2	55
<u>Burirum</u>						
A. Pakonchai	B 18	120	4.8	36.0	6.8	196
A. Pakonchai	B 15	101	16.0	19.0	7.4	94
A. Nangrong	B 20	105	3.0	15.0	8.0	72
A. Nangrong	B 21	255	4.0	52.0	7.0	408
A. Maung	B 24	513	6.3	3.3	7.5	50
A. Krasang	B 26	271	3.5	44.0	7.3	696
A. Satuk	B 25	1015	10.0	60.0	6.1	576
A. Krasang	B 27	94	4.2	6.0	7.4	461
<u>Srisaket</u>						
A. Utumpornpi -sai	B 31	301	4.0	4.4	7.5	1860
A. Rasisai	C198	130	6.0	24.0	6.3	2386
A. Prangku	C170	100	0.5	5.0	7.8	1115
A. Khukhun	C198	130	6.0	24.0	6.3	2386
A. Kanthara -lak	B 38	125	10.0	3.8	7.0	1950

City	Well No.	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
A. Kanthara-lak	C196	130	14.0	1.0	8.1	72
A. Khukhun	C182	100	6.6	10.0	7.8	160
<u>Nakorn-Rachasima</u>						
A. Buayai	E 45	55	24.0	54.0	7.0	4900
A. Pratai	C 17	375	10.0	67.0	7.0	3600
A. Chumpuang	D 77	405	1.2	53.0	6.9	2700
A. Jakaraj	G114	300	16.0	12.0	7.4	228
A. Maung	H 11	245	8.5	16.0	7.3	348
A. Maung	H 4	145	2.0	3.0	8.2	100
A. Pakthongchai	D156	190	1.0	31.0	7.1	400
<u>Nakorn-Rachasima</u>						
A. Pakthongchai	G121	298	1.0	44.0	6.4	2814
A. Pakchong	P 10	75	4.5	52.0	7.1	684
A. Pakchong	p 22	150	7.0	300.0	6.5	390
A. Sekeui	P 12	800	7.0	4.0	8.1	180
A. Sungnern	A 65	170	5.9	520	7.2	222
A. Dankhuntut	F 44	100	116.0	7.0	7.3	1202
A. Noanthai	G 1	1465	7.7	26.0	7.3	1100



City	Well No.	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
<u>Ubol</u>						
A. Laeng -Nokta	B75	300	4.0	31.0	7.2	158
A. Khemraj	A50	310	3.5	22.0	6.6	370
A. Khong Jeam	L12	165	14.0	12.0	8.4	48
A. Dej-Udom	G65	125	1.0	5.0	7.6	90
A. Warin -Chamrap	G61	65	4.4	63.0	6.4	16
A. Khaengnai	A35	435	6.5	15.0	6.5	40
A. Kam Khaen -Keo	A38	105	6.0	14.0	6.4	53
A. Yasotorn	A44	1010	5.0	156.0	6.0	98
A. Amnaj -chareon	F79	100	7.5	235.0	6.1	240
<u>Song Khla</u>						
A. Had Yai	H42	-	2.0	12.0	6.1	40
Thai Marine -Food Co.	H45	200	90.0	15.0	5.8	12
Songkhla Dept. of Trans.	H48	200	8.0	12.0	7.2	144
Kho Neng A. Muang	H49	50	5.0	5.0	8.0	104

City	Well No.	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l
4th Mineral Resource Centre	H50	170	17.0	6.0	6.4	1072
A. Ranot	H51	240	63.0	30.0	7.3	374
A. Ranot	H52	410	13.0	30.0	7.2	276
<u>Uttaradit</u>						
A. Nam Pat	K33	250	39.0	2.0	8.1	104
A. Nam Pat	K34	50	9.0	25.0	6.8	92
Ban Pha Luat	G70	150	130.0	3.0	7.9	76
Ban Wang Hua Doi	G69	100	40.0	2.0	7.9	82
<u>Prachinburi</u>						
Klong Nam Sai Self Help Settlement	Q 8	150	7.0	35.0	7.4	120
Ban Nong Phu	Q11	80	2.2	40.0	7.3	396
A. Taphraya	Q15	150	2.8	107.0	7.0	264
A. Aranyapra -thet	Q20	88	2.8	5.0	8.0	200
Chakkraphong Army Camp	Q25	95	1.8	3.0	7.0	24
Wat Phrom Senaram	Q36	150	6.0	17.0	7.4	352



City	Well No.	Depth ft.	Total Fe mg/l	CO <sub>2</sub> mg/l	pH	Total hardness as CaCO <sub>3</sub> mg/l <sup>3</sup>
<u>Nakorn Nayok</u>						
Ban Na Police Station	Q 38	125	6.5	0.0	8.9	28
Ban Koka To	Q 42	250	9.0	7.0	7.3	220
A. Pakphli	A 43	110	8.0	23.0	6.5	2320
<u>Saraburi</u>						
A. Phraputabat	F137	150	2.0	10.0	7.7	260
A. Phraputabat	F137	100	42.0	22.0	7.3	50
A. Maung	P 64	120	1.0	2.0	8.5	12
A. Nong Kae	-	113	1.0	-	6.5	960
<u>Petchaboon</u>						
A. Maung	E 83	113	20.0	3.0	8.2	153
A. Maung	E 81	140	21.0	17.0	7.2	130
A. Nong Phai	E 73	152	8.0	34.0	7.1	269
A. Wichienburi	E 66	113	5.5	19.0	7.6	618
A. Wichienburi	E 88	308	5.0	118.0	6.6	47
A. Chondaen	-	157	2.0	-	7.1	2200

APPENDIX B

Table 21 Iron Concentration in Ground Water of Thailand  
from Department of Public and Municipal Works,  
Ministry of Interior.

City	Well No.	Depth ft.	total Fe mg/l	pH	Total hardness mg/l CaCO <sub>3</sub>
<u>Sukho-thai</u>					
A. Sawankaloke	178/2-08	98	2.3	7.3	248
A. Srisatchana	128/2-07	60	1.8	6.6	482
<u>-lai</u>					
A. Maung	147/21-07	169	1.3	7.2	126
A. Maung	136/6-07	145	3.3	7.7	85
<u>Phitsanuloke</u>					
A. Maung	208/32-08	188	1.8	7.2	320
A. Maung	221/45-08	185	5.8	6.8	98
A. Bangkatum	191/15-07	270	5.3	6.8	208
<u>Nakhorn Sawan</u>					
A. Maung	168/42-07	287	6.5	6.6	132
A. Maung	K32	95	12.0	8.1	116
A. Banpotwisai	207/31-08	241	8.2	-	-
A. Banpotwisai	216/40-08	267	4.4	-	-
<u>Sing-buri</u>					
A. Maung	14/13-03	170	1.0	8.0	321
A. Bangrajun	283/7-10	312	0.2	7.2	216
A. Tachang	283/9-10	354	0.4	8.3	220



City	Well No.	Depth ft.	Total mg/l	pH	Total hardness mg/l CaCO <sub>3</sub>
<u>Kanchana-buri</u>					
A. Tamaung	55/12-03	193	2.5	7.3	164
A. Panomtaun	139/12-07	150	2.8	8.4	80
<u>Supanburi</u>					
A. Songpenong	87/44-05	187	1.4	8.1	136
A. Utong	17/16-03	152	2.5	6.6	2100
A. Utong	230/9-09	144	5.0	7.6	850
<u>Ayudhaya</u>					
A. Maung	30/7-04	123	0.3	7.1	158
A. Bang Pa-Hun	293/17-10	300	1.0	7.3	220
A. Tarae	24/1-04	167	1.0	7.4	2140
A. Tarae	26/3-04	167	0.3	7.2	1220
<u>Pathum-thani</u>					
A. Maung	311/35-10	248	0.8	7.5	542
A. Thunga-buri	279/3-10	364	0.4	8.7	32
A. Klong-luang	286/10-10	248	0.4	8.1	102
<u>Ratburi</u>					
A. Maung	211/35-08	131	0.2	7.3	325
A. Potharam	206/30-08	660	0.8	7.0	267
A. Paktho	139/13-07	300	1.8	6.9	350
A. Damnernsaduak	155/29-07	213	1.3	7.4	1100

City	Well No.	Depth ft.	Total Fe mg/l	pH	Total hardness mg/l CaCO <sub>3</sub>
<u>Angthong</u>					
A. Swanng-ha	307/30-10	112	0.2	-	-
A. Chaiyo	325/49-10	174	0.1	-	-
<u>Samutprakan</u>					
A. Maung	H 29	903	11.0	6.9	312
A. Prapadaeng	H 31	403	5.0	8.1	280
A. Prapadaeng			4.3	7.9	2350
<u>Cholburi</u>					
A. Banglamung	125/2-06	141	1.0	8.5	72
A. Banglamung	103/5-06	136	2.4	7.7	280
A. Panthong	131/5-07	160	1.3	7.4	174
<u>Rayong</u>					
A. Maung	205/29-08	80	1.0	7.1	53
A. Maung	151/25-07	45	2.9	5.9	80
A. Bankhai	149/23-07	67	3.3	6.2	17
A. Bankhai	150/24-07	53	1.3	5.7	80



City	Well No.	Depth ft.	Total Fe mg/l	pH	Total hardness mg/l CaCO <sub>3</sub>
<u>Chanthaburi</u>					
A. Khlung	144/18-07	74	1.2	6.3	40
<u>Pichit</u>					
A. Tapanhin	163/37-07	215	2.3	7.8	136
A. Tapanhin	140/14-07	150	1.3	-	-
<u>Chainat</u>					
A. Sanphraya	238/17-09	91	0.7	7.2	302
A. Sanburi	243/22-09	232	0.6	7.4	234
<u>Prae</u>					
A. Maung	142/16-07	246	2.3	7.0	168
A. Sung-men	220/49-08	368	0.1	7.2	148
A. Maung	232/11-09	400	0.1	7.0	210
<u>Cha-choengsao</u>					
A. Bangpakong	100/11-06	295	1.8	7.1	148
A. Bangpakong	20/20-03	500	3.8	7.3	210

City	Well No.	Depth ft.	Total Fe mg/l	pH	Total hardness mg/l CaCO <sub>3</sub>
<u>Prachaupkhirikhun</u>					
A. Maung	91/2-06	750	0.3	7.4	146
A. Pranburi	-	317	1.0	7.4	940
Wat Ban Nongkao	K 37	100	33.0	8.0	2640
<u>Nakhornpathom</u>					
A. Kampaengsaen	218/42-08	350	0.1	7.5	168
A. Maung	200/24-08	302	0.4	7.2	400
A. Maung	191/15-08	307	0.7	7.9	497
<u>Nondhaburi</u>					
A. Maung	130/4-07	720	1.3	7.4	174
A. Pakred	82/93-05	530	3.0	7.4	340
A. Pakred	119/30-06	567	2.1	7.1	219
<u>Phetburi</u>					
A. Maung	H 32	850	17.0	7.1	1440
A. Khao-yoy	H 33	200	2.0	7.0	2044
A. Banlam	11/10-03	685	0.5	7.0	644



City	Well No.	Depth ft.	Total Fe mg/l	pH	Total hardness mg/l CaCO <sub>3</sub>
<u>Samutsakorn</u>					
A. Kathumban	212/ <sub>36</sub> -08	355	0.1	7.1	382
A. Kathumban	215/ <sub>39</sub> -08	542	1.8	7.5	2192
A. Kathumban	210/ <sub>34</sub> -08	450	1.6	7.5	174
<u>Dhonburi</u>					
A. Pasijareon	24	481	0.7	8.4	455
Wat Tongtamachart	12	580	0.5	7.5	173
Wat Panurangsri	9	530	0.2	7.6	98
Wat Chintayigawat	20	580	1.0	8.2	154
Wat Warurachin	6	670	1.2	7.8	484
Wat Nang	34	546	4.8	7.3	523
Wat Porieng	10	559	1.7	7.3	214
Soi Benja	23	520	0.7	8.4	127
<u>Bangkok</u>					
A. Sampantawong		713	0.9	7.4	513
A. Patumwan		-	1.0	7.6	403
A. Phranakorn		607	0.5	7.2	247
A. Phranakorn		597	0.5	7.2	195

City	Well No.	Depth ft.	Total Fe mg/l	pH	Total hardness mg/l CaCO <sub>3</sub>
A. Bangkhen		600	1.3	8.4	260
A. Bangkhen		570	1.3	7.9	126
A. Bangkapi		463	0.1	8.0	137
Average of overall chemical analyses from Chemical Analyses Section, Sam Sen Water Works		407	0.0	6.9	90
		-669	-1.4	-7.6	-242
		(580)	(0.7)	(7.5)	

Note: A = Ampheur



APPENDIX C



Table 22 Characteristics of Natural ground water from Metropolitan Water Works Authority.

Item	Name of Ground Water Wells			
	Pasichareon	Wat Kraavan	Wat Prasert-suthavas	Parachavang Police Sta.
Methyl orange alkalinity. mg/l	298	236	94	19.4
Phenolphthalein alkalinity "	16	-	-	-
Total Solids "	562	660	1670	1753
Dissolved Solids "	-	540	1130	1400
Total Hardness "	42	185	635	662
Carbonate Hardness "	42	185	195	194
Non-carbonate hardness "	-	-	440	468
Chloride, expressed as Cl <sub>2</sub> "	115.2	195	641	639.5
Sulphate, expressed as Na <sub>2</sub> SO <sub>4</sub> "	-	-	0.387	31.24
Oxygen consumed 37° C, 3 hours "	0.14	-	-	-
Ammonia, Free, expressed as nitrogen "	0.12	0.376	-	-
Albuminoid nitrogen expressed as nitrogen "	0.012	-	-	-
Nitrate, expressed as nitrogen "	0.3	0.013	-	-
Nitrite, expressed as nitrogen "	0.15	0.018	-	-
Calcium "	-	44	-	178.4
Iron "	0.1	0.42	4.5	1.16
Fluoride "	-	-	-	0.37
Manganese "	-	0.298	0.55	-
Magnesium "	-	-	-	51.84
pH	7.73	7.05	7.1	7.05
Turbidity, JTU	-	2.85	5.5	6.75