

APPENDIX A

Monthly and annual rainfall (mm) at Nuku'alofa, Tongatapu

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1947	118	248	94	73	84	74	142	69	287	115	32	272	1608
1948	230	212	112	225	49	226	28	23	120	22	351	168	1766
1949	243	217	201	210	24	26	103	203	66	83	7	251	1634
1950	249	249	334	210	17	67	259	148	155	131	146	132	2097
1951	202	564	304	104	127	72	104	26	187	42	21	3	1756
1952	582	443	289	126	25	153	164	130	100	21	119	154	2306
1953	128	198	193	288	69	116	49	36	23	39	72	115	1326
1954	110	218	114	450	65	242	38	133	302	133	49	581	2435
1955	197	83	388	78	61	64	122	122	38	103	289	220	1765
1956	259	342	340	334	153	27	190	86	133	274	150	6	2294
1957	401	447	131	48	74	242	69	147	94	47	62	70	1832
1958	31	306	269	138	38	7	118	116	56	337	138	77	1631
1959	203	61	366	118	114	84	56	273	184	192	41	106	1798
1960	70	323	469	194	101	163	102	34	54	133	207	231	2081
1961	372	228	242	112	47	58	83	152	89	65	202	66	1716
1962	382	188	263	111	139	75	85	53	41	70	116	242	1765
1963	145	147	227	69	203	102	60	150	107	135	11	24	1380
1964	99	288	280	141	117	8	256	102	191	105	255	215	2057
1965	397	289	211	40	210	31	67	131	76	129	178	17	1776
1966	85	95	84	458	63	45	52	46	181	180	29	159	1477
1967	189	105	243	203	55	25	63	32	152	147	25	15	1254
1968	527	244	296	96	59	85	27	204	92	93	26	51	1800
1969	177	296	348	85	22	43	136	17	132	50	52	5	1363
1970	179	373	137	110	96	83	63	57	41	373	106	352	1970
1971	187	210	248	176	188	36	18	112	198	131	368	783	2655
1972	197	162	326	124	166	151	160	209	341	340	33	167	2376
1973	35	256	205	303	37	103	108	25	207	112	343	294	2028
1974	243	462	279	346	78	115	67	90	196	452	151	74	2553
1975	203	83	174	163	140	135	95	160	84	133	322	54	1746
1976	252	371	231	365	94	50	61	59	212	129	246	46	2116
1977	377	284	266	43	46	17	73	130	56	17	6	48	1363
1978	40	151	214	248	204	46	82	250	102	272	229	92	1930
1979	115	77	261	183	208	243	75	237	271	60	133	159	2022
1980	139	123	291	267	45	111	144	161	189	399	114	143	2126
1981	60	98	118	72	102	94	23	56	66	54	90	41	874
1982	386	238	253	136	241	58	87	149	75	34	19	57	1733
1983	37	102	73	9	26	69	118	66	41	108	24	165	838
1984	222	217	71	126	26	75	70	41	142	64	80	177	1311
1985	97	162	212	54	102	140	56	27	28	53	3	429	1363
1986	12	69	113	285	118	215	62	98	16	57	25	199	1269
1987	57	204	169	17	85	35	54	17	25	40	41	157	901
1988	280	242	114	215	69	32	101	46	313	114	26	209	1761
1989	143	726	168	153	221	47	131	55	95	140	173	111	2163
1990	220	58	116	122	191	104	194	192	175	25	223	229	1849
1991	325	251											
Mean (a)	204	238	224	169	100	91	96	106	131	131	121	163	1770
Mean (b)	151	212	141	119	118	87	93	75	98	69	70	177	1406
Maximum	582	726	469	458	241	243	259	273	341	452	368	783	2655
Minimum	12	58	71	9	17	7	18	17	16	17	3	3	838
SD (c)	132	138	93	110	64	65	55	69	85	108	106	152	425
CV (d)	0.65	0.6	0.42	0.65	0.64	0.71	0.57	0.65	0.65	0.82	0.87	0.93	0.24

(a) 44 year period 1947-1990 except Jan and Feb (45 year period from 1947-91).

(b) 10 year period 1981-1990.

(c) SD: Standard Deviation

(d) CV: Coefficient of Variation (= Mean/SD): calculated using Mean (a)

Monthly and annual rainfall (mm) at Nuku'alofa, Tongatapu

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1947	118	248	94	73	84	74	142	69	287	115	32	272	1608
1948	230	212	112	225	49	226	28	23	120	22	351	168	1766
1949	243	217	201	210	24	26	103	203	66	83	7	251	1634
1950	249	249	334	210	17	67	259	148	155	131	146	132	2097
1951	202	564	304	104	127	72	104	26	187	42	21	3	1756
1952	582	443	289	126	25	153	164	130	100	21	119	154	2306
1953	128	198	193	288	69	116	49	36	23	39	72	115	1326
1954	110	218	114	450	65	242	38	133	302	133	49	581	2435
1955	197	83	388	78	61	64	122	122	38	103	289	220	1765
1956	259	342	340	334	153	27	190	86	133	274	150	6	2294
1957	401	447	131	48	74	242	69	147	94	47	62	70	1832
1958	31	306	269	138	38	7	118	116	56	337	138	77	1631
1959	203	61	366	118	114	84	56	273	184	192	41	106	1798
1960	70	323	469	194	101	163	102	34	54	133	207	231	2081
1961	372	228	242	112	47	58	83	152	89	65	202	66	1716
1962	382	188	263	111	139	75	85	53	41	70	116	242	1765
1963	145	147	227	69	203	102	60	150	107	135	11	24	1380
1964	99	288	280	141	117	8	256	102	191	105	255	215	2057
1965	397	289	211	40	210	31	67	131	76	129	178	17	1776
1966	85	95	84	458	63	45	52	46	181	180	29	159	1477
1967	189	105	243	203	55	25	63	32	152	147	25	15	1254
1968	527	244	296	96	59	85	27	204	92	93	26	51	1800
1969	177	296	348	85	22	43	136	17	132	50	52	5	1363
1970	179	373	137	110	96	83	63	57	41	373	106	352	1970
1971	187	210	248	176	188	36	18	112	198	131	368	783	2655
1972	197	162	326	124	166	151	160	209	341	340	33	167	2376
1973	35	256	205	303	37	103	108	25	207	112	343	294	2028
1974	243	462	279	346	78	115	67	90	196	452	151	74	2553
1975	203	83	174	163	140	135	95	160	84	133	322	54	1746
1976	252	371	231	365	94	50	61	59	212	129	246	46	2116
1977	377	284	266	43	46	17	73	130	56	17	6	48	1363
1978	40	151	214	248	204	46	82	250	102	272	229	92	1930
1979	115	77	261	183	208	243	75	237	271	60	133	159	2022
1980	139	123	291	267	45	111	144	161	189	399	114	143	2126
1981	60	98	118	72	102	94	23	56	66	54	90	41	874
1982	386	238	253	136	241	58	87	149	75	34	19	57	1733
1983	37	102	73	9	26	69	118	66	41	108	24	165	838
1984	222	217	71	126	26	75	70	41	142	64	80	177	1311
1985	97	162	212	54	102	140	56	27	28	53	3	429	1363
1986	12	69	113	285	118	215	62	98	16	57	25	199	1269
1987	57	204	169	17	85	35	54	17	25	40	41	157	901
1988	280	242	114	215	69	32	101	46	313	114	26	209	1761
1989	143	726	168	153	221	47	131	55	95	140	173	111	2163
1990	220	58	116	122	191	104	194	192	175	25	223	229	1849
1991	325	251											
Mean (a)	204	238	224	169	100	91	96	106	131	131	121	163	1770
Mean (b)	151	212	141	119	118	87	93	75	98	69	70	177	1406
Maximum	582	726	469	458	241	243	259	273	341	452	368	783	2655
Minimum	12	58	71	9	17	7	18	17	16	17	3	3	838
SD (c)	132	138	93	110	64	65	55	69	85	108	106	152	425
CV (d)	0.65	0.6	0.42	0.65	0.64	0.71	0.57	0.65	0.65	0.82	0.87	0.93	0.24

(a) 44 year period 1947-1990 except Jan and Feb (45 year period from 1947-91).

(b) 10 year period 1981-1990.

(c) SD: Standard Deviation

(d) CV: Coefficient of Variation (= Mean/SD); calculated using Mean (a)

Monthly and annual rainfall (mm) at Pangai, Lifuka, Ha'apai group

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1947	201	189	313	109	177	105	115	99	201	88	16	254	1867
1948	432	147	202	251	52	108	45	17	51	139	245	294	1983
1949	259	270	212	171	16	38	238	114	203	255	20	285	2081
1950	237	118	470	334	101	42	156	33	156	128	247	353	2375
1951	233	336	330	165	74	12	57	11	308	50	26	14	1616
1952	159	105	199	31	36	110	43	145	19	110	70	66	1093
1953	125	238	350	330	100	173	65	32	12	27	25	76	1553
1954	37	96	321	288	43	135	48	122	38	112	18	530	1788
1955	147	182	428	234	233	87	71	178	86	69	98	373	2186
1956	223	222	348	339	32	60	152	78	109	163	169	38	1933
1957	649	300	508	88	161	187	217	202	31	41	101	156	2641
1958	49	230	119	303	55	5	99	40	47	134	225	28	1334
1959	512	35	313	177									
1960	125	130	234	155	21	73	94	111	34	42	70		
1961	290	262	432	69	185	39	193	118	34	98	201	102	2023
1962	394	119	53	126	64	128	44	22	84	61	131	286	1512
1963	182	218	550	99	110	27	26	214	34	69	40	49	1618
1964	50	212	593	96	30	10	208	96	294	123	188	105	2005
1965	213	360	217	137	104	22	35	122	208	120	134	52	1724
1966	106	137	112	279	88	46	83	62	42	167	95	144	1361
1967	123	168	329	190	146	18	52	12	49	294	26	66	1473
1968	337	90	233	77	68	52	21	116	61	145	82	143	1425
1969	274	134	496	111	14	18	148		7	89	199	56	
1970	183	302	214	326	224	106	20	13	91	21	351	252	2103
1971	287	96	244	203	155	69	69	218	103	95	512	613	2664
1972	170	141	476	332		110	102	226	283	316	33	44	
1973	88	310	230	332	29	116	178	63	227	114	226	101	2014
1974	152	403	111	254	167	122	138	73	163	199	120	153	2055
1975	281	265	207	74	161	75	191	144	85	135	380	313	2311
1976	245	299	354	254	68	26	55	96	144	6	36		
1977	271	339	168	158	70	42	57	76	46	39	11	46	1323
1978	123	145	308	170	161	15	2	245	137	41	73	33	1453
1979	104	50	223	40	70	146	48	126	199	47	111	115	1279
1980	61	61	402	204	0	91	92	174	75	79	92	154	1485
1981	88	356	180	54	94	30	11	32	71	41	70	128	1155
1982	261			436	217	54	59	74	156	14	24	80	
1983	15	68	177	21	48	8	59	21	95	157	61	96	826
1984	230	238	52	217	34	92	94	95	216	44	5	60	1377
1985	35	236	238	130	35	116	231	66	38	13	4	172	1314
1986	88	77	154	307	98	231	163	75	50	63	11	12	1329
1987	21	110	352	2	47	41	64	103	6	0	3	385	1134
1988	236	108	145	113	210	35	84	20	237	114	27	209	1538
1989	131	486	348	437	430	74	38	41	97	96	134	221	2533
1990	270	88	264	157	263	163	77	104	108	129	29	57	1709
1991	442												
Mean (a)	203	197	284	190	107	76	94	96	110	100	110	164	1716
Mean (b)	137	196	212	187	148	84	88	63	107	67	37	142	1435
Maximum	649	486	593	437	430	231	238	245	308	316	512	613	2664
Minimum	15	35	52	2	0	5	2	11	6	0	3	12	826
SD (c)	131	107	132	111	86	54	64	64	83	72	112	141	450
CV (d)	0.64	0.54	0.46	0.58	0.8	0.71	0.68	0.67	0.75	0.72	1.1	0.86	0.26

(a) 44 year period 1947-1990 except Jan (45 year period 1947-1991)

(b) 10 year period 1981-1990.

(c) SD: Standard Deviation

(d) CV: Coefficient of Variation (= Mean/SD): calculated using Mean (a)

* Blank spaces indicate missing data

Monthly and annual rainfall (mm) at Neifu, Vava'u island, Vava'u group

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1947	316	103	657	55	161	287	134	73	90	172	65	312	2425
1948	463	360	329	183	61	115	51	17	65	113	503	490	2750
1949	199	98	364	133	47	14	103	148	192	148	39	363	1848
1950	313	238	466	366	68	65	252	112	177	258	312	393	3020
1951	255	277	457	129	116	114	42	28	330	59	29	58	1894
1952	239	117	222	62	66	103	66	81	139	165	84	96	1440
1953	126	134	252	300	53	92	111	14	12	54	75	58	1281
1954	256	222	495	275	83	167	22	162	79	177	102	604	2644
1955	109	193	384	91	139	393	322	236	188	247	244	182	2708
1956	258	168	617	235	98	139	110	80	47	105	581	90	2528
1957	759	491	126	259	65	173	157	99	44	11	108	346	2638
1958	60	408	358	243	158	9	70	146	66	217	283	14	2032
1959	191	128	610	231	129	101	66	68	456	251	60	50	2341
1960	239	211	711	296	70	48	208	273	94	34	56	211	2451
1961	470	127	799	144	176	67	102	138	119	118	218	415	2893
1962	324	320	237	509	131	196	78	27	150	84	473	231	2760
1963	105	438	359	200	202	20	118	177	78	112	75	186	2070
1964	50	224	680	117	91	44	266	50	187	100	258	81	2148
1965	362	261	327	204	206	56	42	60	109	247	80	29	1983
1966	244	15	176	155	33	57	153	78	178	281	134	165	1669
1967	1009	311	213	438	240	97	61	44	81	314	81	65	2954
1968	546	74	175	104	150	102	34	114	107	109	152	122	1789
1969	132	248	284	267	7	16	78	12	158	192	38	178	1610
1970	122	210	200	266	122	199	54	62	51	53	329	468	2136
1971	173	415	189	251	370	49	80	125	174	206	169	456	2657
1972	293	172	257	136	104	38	159	156	167	163	44	44	1733
1973	159	443	393	304	31	57	467	109	197	115	333	310	2918
1974	178	642	229	363	425	163	71	108	80	83	313	164	2819
1975	495	344	303	120	91	158	300	228	105	66	483	269	2962
1976	357	334	207	208	91	16	47	87	75	62	255	133	1872
1977	239	297	493	71	134	36	218	127	39	35	12	65	1766
1978	472	204	418	178	224	77	11	267	173	215	112	217	2568
1979	135	215	395	270	209	288	51	133	70	359	149	154	2428
1980	162	161	343	368	69	84	84	202	197	76	91	104	1941
1981	138	461	312	210	314	83	61	75	91	120	117	146	2128
1982	611	420	368	473	177	56	73	199	151	17	115	213	2873
1983	173	218	480	42	78	20	34	21	51	42	86	520	1765
1984	172	276	126	410	56	34	71	77	199	28	42	308	1799
1985	143	340	408	206	124	81	160	30	36	38	16	147	1729
1986	92	80	186	277	80	451	99	66	189	159	18	60	1757
1987	5	224	152	27	298	135	49	127	25	26	72	586	1726
1988	292	99	142	187	191	115	58	25	332	145	319	230	2135
1989	367	630	283	127	213	28	28	9	81	166	188	658	2778
1990	255	159	82	192	210	262	160	18	167	84	29	202	1820
Mean (a)	274	262	347	220	141	111	113	102	132	132	167	232	2231
Mean (b)	275	291	254	215	174	127	79	65	132	82	100	307	2051
Maximum	1009	642	799	509	425	451	467	273	456	359	581	658	3020
Minimum	5	15	82	27	7	9	11	9	12	11	12	14	1281
SD (c)	194	143	172	115	91	99	93	70	88	86	146	171	436
CV (d)	0.71	0.55	0.5	0.52	0.64	0.89	0.82	0.69	0.67	0.65	0.87	0.74	0.2

(a) 44 year period 1947-1990

(b) 10 year period 1981-1990.

(c) SD:Standard Deviation

(d) CV: Coefficient of Variation (= Mean/SD): calculated using Mean (a)

Monthly and annual rainfall (mm) at Niuatoputapu (Keppel)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1947	295	320	237	133	347	191	215	55	113	99	299	444	2748
1948	375	636	157	416	109	127	75	37	30	122	176	338	2798
1949	155	197	433	235	281	48	151	204	142	449	23	226	2544
1950	215	223	312	80	275	70	178	49	87	135	288	323	2235
1951	312	92	170	195	113	135	74	6	159	61	324	156	1797
1952	269	89	227	161	217	63	108	60	167	346	148	258	2113
1953	521	187	267	302	139	94	69	6	60	212	81	125	2062
1954	183	266	253	271	275	231	37	293	137	164	204	272	2606
1955	194	160				98	131						
1956	471	571	396	109	21	265	138	33	44	62	507	86	2703
1957	537	379	398	315	195	33	65	42	35	26	87	266	2378
1958	177	241	252	223	168	53	172	166	79	286	261	72	2090
1959	229	389	438	52	138	40	145	96	200	292	511	163	2693
1960	441	216	509	159	152	56	147	51	39	111	178	584	2643
1961	108	165	419	71	46	75	46	78	101	90	291	353	1843
1962	399	351	227	209	177	219	102	173	193	202	165	243	2660
1963	232	223	394	104	91	169	134	78	13	156	137	111	1842
1964	121	64	179	200	114	50	169	24	350	101	248	148	1768
1965	105	236	157	330	173	73	43	7	55	131	62	63	1435
1966	297	20	68		129	105	149	156	44	245	499	107	
1967	324	266	226	564	216	139	186	138	202	414	122	240	3037
1968	448	477	113	220	140	77	34	144	118	258	59	45	2133
1969	205	205	188	577	13	26	79	83	150	67	182	140	1915
1970	72	156	417	372	107	113	137	81	45	133	211	648	2492
1971	197	312	151	311	325	221	93	55	507	348	99	500	3119
1972	299	204	444	192	162	186	59	44	346	412	264	368	2980
1973	152	278	193	411	280	37	542	139	180	295	436	166	3109
1974	290	431	288	85	189	114	27	54	125	199	323	225	2350
1975	332	192	224	588	116	51	99	162	117	105	156	239	2581
1976	218	190	173	174	158	355	130	22	31	9	309	217	1986
1977	270	206	503	232		88	88	27	147	125	81	41	
1978	236	72	580		266	54	4	148	134	196	306	226	
1979	285	260	443		112	259	233	95	341	266	183	346	
1980	225	84			53	205	71	157	173	141	152	220	
1981	134	277	144	264	133	168	18	83	19	221	183	160	1804
1982	518	224	71	125	120	24	166	66	165	39	294	24	1836
1983	162	221	436	57	102	51	45	20	37	129	228	186	1684
1984	308	290	398	289	126	204	69	67	53	71	55	250	2180
1985	501	304	215	248	131	34	53	125	17	67	37	69	1837
1986	252	92	122	631	153	78	173	68	153	77	87	287	2173
1987	61	267	245	148	117	91	40	35	2	37	37	462	1542
1988	257	226	184	469	325	154	147	77	307	249	290	278	2963
1989	296	462	258	304	66	51	18	44	35	343	348	254	2479
1990	243	236	362	116	136	43	194	62	97	154	218	416	2277
Mean (a)	271	249	283	255	160	114	115	84	129	178	213	241	2301
Mean (b)	273	260	244	265	141	90	92	65	89	139	178	239	2078
Maximum	537	636	580	631	347	355	542	293	507	449	511	648	3119
Minimum	61	20	68	52	13	24	4	6	2	9	23	24	1435
SD (c)	123	129	131	154	81	78	88	61	108	114	128	144	461
CV (d)	0.45	0.52	0.46	0.6	0.51	0.68	0.77	0.72	0.84	0.64	0.6	0.6	0.2

(a) 44 year period 1947-1990

(b) 10 year period 1981-1990.

(c) SD:Standard Deviation

(d) CV: Coefficient of Variation (= Mean/SD): calculated using Mean (a)

* Blank spaces indicate missing data

APPENDIX B

Annual rainfall (mm) in Tonga :1927-1990

(data prior to 1947 is from Taylor (1963), An atlas of Pacific islands rainfall;
data from 1947 to present is from New Zealand and Tonga Meteorological Service records)

Year	Nuku'alofa	Ha'apai	Vava'u	Niutoputapu
1927	1890			
1928	1489			
1929	1801			
1930	1033			
1931	1765			
1932	1832	1338		
1933	1434			2756
1934	1445	1619	1898	2758
1935	1681	1618	2182	3104
1936	1969	1749	1935	2155
1937				
1938	1532	1549	1976	2734
1939	1650	1788	2079	3086
1940	1221	1291	1222	1824
1941				
1942				
1943				
1944				
1945	1282			
1946	1516			
1947	1608		2425	2748
1948	1766		2750	2798
1949	1634		1848	2544
1950	2097		3020	2235
1951	1756		1894	1797
1952	2246		1440	2113
1953	1316		1281	2062
1954	2435		2644	2606
1955	1765		2708	
1956	2294		2528	2703
1957	1832		2638	2378
1958	1631		2032	2090
1959	898		2341	2693
1960	2081		2451	2643
1961	1716		2893	1843
1962	1765		2760	2660
1963	1380		2070	1842
1964	2057		2148	1768
1965	1776		1983	1435
1966	1477		1669	
1967	1254		2954	3037
1968	1800		1789	2133
1969	1363		1610	1915
1970	1970		2136	2492
1971	2655		2657	3119
1972	2376		1733	2980
1973	2028		2918	3109
1974	2553		2819	2350
1975	1746		2962	2581
1976	2116		1872	1986
1977	1363		1766	
1978	1930		2568	
1979	2022		2428	
1980	2126		1941	
1981	874		2128	1804
1982	1733		2873	1836
1983	838		1765	1684
1984	1311		1799	2180
1985	1363		1729	1837
1986	1269		1757	2173
1987	901		1726	1542
1988	1761		2135	2963
1989	2163		2778	2479
1990	1849		1820	2277

APPENDIX C

Monthly and annual potential evaporation (mm) at four stations in Tonga
(data from Table 25 of Thompson (1986), The climate and weather of Tonga)

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tongatapu	164	137	139	108	89	77	85	96	116	144	152	154
Ha'apai	161	144	145	113	103	89	101	109	121	145	156	161
Vava'u	151	134	135	112	103	90	99	108	117	142	151	159
Niuaotuputu	149	130	138	112	108	99	106	116	129	143	148	152

Summary of Climatic Data

	Month												Annual		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
NUKU'ALOFA (TONGATAPU)															
Air Temp	Mean	25.9	26.3	26.1	25	23.3	22.5	21.4	21.3	21.8	22.6	23.7	25	23.7	23.7
	Max	28.9	29.3	29	28.2	26.6	25.7	24.6	24.6	25	25.8	27	28.2	26.9	26.9
	Min	22.8	23.2	23.1	21.8	20	19.3	17.9	18	18.6	19.4	20.6	21.8	20.5	20.5
Vapour Pressure	hPa	27.8	29.3	28.5	26.2	23.7	22.7	19.8	20.1	20.8	21.2	23	26.2	24.1	24.1
Sunshine	hrs	201	179	178	170	165	156	156	169	162	176	200	200	211.2	211.2
Wind Run	km/day	445	400.5	400.5	311.5	356	356	356	356	400.5	400.5	445	400.5	385.7	385.7
Penman ET	mm	164	137	139	108	89	77	85	96	116	144	152	154	1461	1461
HA'APAI															
Air Temp	Mean	26.4	26.9	26.6	25.9	24.5	24	23	22.6	23.2	23.9	24.8	25.6	24.8	24.8
	Max	29.3	29.8	29.4	28.8	27.2	26.7	25.7	25.5	26	26.6	27.6	28.5	27.6	27.6
	Min	23.6	23.9	23.8	22.8	21.7	21.3	20.1	19.7	20.3	21.1	22	22.8	21.9	21.9
Vapour Pressure	hPa	27.7	28.3	27.6	26.5	24.2	23.2	20.5	20.7	21.5	22.8	24.4	26.1	24.5	24.5
Sunshine	hrs	197	178	192	170	175	163	160	170	172	183	196	195	2151	2151
Wind Run	km/day	356	356	356	267	400.5	356	400.5	400.5	356	400.5	445	400.5	374.5	374.5
Penman ET	mm	161	144	145	113	103	89	101	109	121	145	156	161	1548	1548
VAVA'U															
Air Temp	Mean	26.7	26.9	26.6	26.1	25.1	24.4	23.4	23.3	23.9	24.6	25.4	26.1	25.2	25.2
	Max	29.8	30.2	29.9	29.3	28	27.4	26.5	26.6	27.1	27.6	28.5	29.2	28.3	28.3
	Min	23.4	23.5	23.2	22.9	21.8	21.3	20.3	20	20.8	21.5	22.3	22.9	22	22
Vapour Pressure	hPa	27.9	28.8	27.9	26.9	24.4	23.5	21.7	22	23.7	23.6	25.4	26.8	25.2	25.2
Sunshine	hrs	196	178	192	171	176	164	161	171	172	182	194	193	2150	2150
Wind Run	km/day	222.5	222.5	222.5	222.5	311.5	311.5	356	356	311.5	311.5	356	267	289.3	289.3
Penman ET	mm	151	134	135	112	103	90	99	108	117	142	151	159	1501	1501
NIUATOPUTAPU (KEPPEL)															
Air Temp	Mean	27.3	27.4	27.2	27	26.5	26.1	25.6	25.5	25.8	26.1	26.4	26.9	26.5	26.5
	Max	30.3	30.4	30.6	30.2	29.5	29	28.4	28.4	28.8	29	29.4	29.9	29.5	29.5
	Min	25.1	25.2	25.1	25.1	24.4	24.1	23.5	23.2	23.7	23.9	23.3	24.8	24.3	24.3
Vapour Pressure	hPa	29.7	31.2	29.8	29.8	28.5	26.9	24.8	25	25.6	26.9	27.8	28.6	27.9	27.9
Sunshine	hrs	190	173	203	172	182	184	177	186	186	189	196	191	2229	2229
Wind Run	km/day	222.5	222.5	222.5	178	311.5	311.5	311.5	311.5	311.5	311.5	311.5	276	275.2	275.2
Penman ET	mm	149	130	138	112	108	99	106	116	129	143	148	152	1530	1530

NOTE: data taken from Hassan (1989); originally from Thompson (1986)

APPENDIX D

Monthly and annual pan evaporation (mm) on Tongatapu
(from records at Vaini Research Farm)

Year	Month												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1982	95	252	145	126	128	88	107	119	155	182	266	243	1906
1983	238	171		151	148	99	162	134	160	220	201	157	
1984	168	83	126	109	110	94	102	116	139	177	170	156	1550
1985	182	147	119	132	100	92	82	141	148	166			
1986	190	174	142	113	100	79	103	123	128	165	182	206	1705
1987	196	158	165	170	131	97	125	141	138	205	172	186	1884
1988	181	190	155	131	101	101	148	114	285	183	197	164	1950
1989	178	123	129	156	105	93	107	125	135	150	185	198	1684
Mean	179	168	142	133	117	93	118	127	165	185	198	185	1799

APPENDIX F

Page No. 1
19/03/91

Tongatapu well monitoring
(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
2	26/07/90	0.00	1184	22.6	7.97	.F.
4	12/04/90	0.00	760	0.0	0.00	.F.
4	02/11/90	24.32	693	25.0	7.31	.F.
5	01/01/87	0.00	1040	0.0	0.00	.F.
5	23/05/90	0.00	1235	26.8	0.00	.F.
5	07/08/90	13.98	1365	25.1	7.73	.F.
7	31/10/90	12.81	0	0.0	0.00	.F.
8	01/01/87	0.00	350	0.0	0.00	.F.
8	23/05/90	0.00	670	28.7	0.00	.T.
8	24/07/90	32.14	650	24.6	7.53	.F.
8	02/11/90	0.00	619	25.9	7.90	.T.
10	01/01/87	0.00	350	0.0	0.00	.F.
10	02/03/90	0.00	670	0.0	0.00	.T.
10	24/07/90	44.30	570	23.2	8.08	.F.
10	02/11/90	44.29	556	24.7	7.50	.F.
10	22/01/91	44.26	594	23.2	7.10	.F.
12	06/06/90	0.00	570	26.9	0.00	.T.
13	01/07/79	35.95	880	24.0	0.00	.F.
13	01/01/87	0.00	670	0.0	0.00	.F.
13	12/04/90	0.00	980	0.0	0.00	.F.
13	24/07/90	35.89	969	24.6	7.47	.F.
13	02/11/90	35.96	595	31.1	7.27	.T.
13	21/01/91	35.95	880	27.6	7.14	.F.
14	03/02/65	0.00	800	0.0	0.00	.F.
14	01/02/71	29.60	880	0.0	0.00	.F.
14	01/07/79	29.32	1000	25.0	0.00	.F.
14	01/03/80	29.25	1000	25.0	0.00	.F.
14	01/05/81	29.20	1000	24.5	0.00	.F.
14	01/04/83	29.55	1200	24.0	0.00	.F.
14	01/01/87	0.00	900	0.0	0.00	.F.
14	01/06/90	0.00	1070	27.6	0.00	.T.
15	02/03/90	0.00	1300	0.0	0.00	.T.
15	24/07/90	31.07	0	0.0	0.00	.F.
15	21/01/91	0.00	1187	26.1	7.50	.T.
17	01/05/78	28.20	1950	25.0	0.00	.F.
17	01/07/79	28.20	2150	25.0	0.00	.F.
17	01/03/80	28.00	2100	24.0	0.00	.F.
17	01/05/81	28.15	2350	24.5	0.00	.F.
17	01/04/83	28.10	2300	24.0	0.00	.F.
17	01/01/87	0.00	2860	0.0	0.00	.F.
17	01/06/90	0.00	2510	27.3	0.00	.T.
17	24/07/90	27.88	3010	25.0	7.48	.T.
18	01/02/71	10.78	1580	0.0	0.00	.F.
18	02/03/90	0.00	2050	0.0	0.00	.T.
18	24/07/90	10.73	1520	24.9	7.80	.F.
18	31/10/90	10.80	1300	26.0	7.29	.F.
19	04/02/65	0.00	1100	0.0	0.00	.F.
19	01/07/79	9.20	0	0.0	0.00	.F.
19	01/03/80	9.20	1050	24.5	0.00	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
19	01/05/81	9.35	1990	24.0	0.00	.F.
19	01/04/83	9.38	1800	24.0	0.00	.F.
19	01/01/87	0.00	1870	0.0	0.00	.F.
19	01/05/87	0.00	5400	0.0	0.00	.F.
19	24/07/90	9.12	2580	24.9	7.80	.T.
19	31/10/90	9.20	1968	25.7	7.40	.T.
19	21/01/91	9.15	1921	25.7	7.27	.T.
21	01/06/90	0.00	2450	28.5	0.00	.T.
21	24/07/90	9.82	291	24.8	8.25	.F.
22	26/07/90	0.00	1383	24.7	7.83	.F.
22	07/11/90	8.67	1233	25.7	7.29	.F.
23	08/03/65	24.57	550	0.0	0.00	.F.
23	01/02/71	24.57	600	0.0	0.00	.F.
23	01/06/90	0.00	1736	25.5	0.00	.T.
23	26/07/90	24.42	1802	24.7	7.90	.F.
23	06/11/90	24.42	1260	36.1	7.48	.F.
23	22/01/91	0.00	1150	26.9	7.23	.F.
26	01/06/90	0.00	1820	26.0	0.00	.T.
26	06/11/90	27.15	1490	25.6	7.43	.F.
27	31/08/65	0.00	670	0.0	0.00	.F.
27	01/02/71	4.55	690	0.0	0.00	.F.
27	01/07/79	4.10	900	24.5	0.00	.F.
27	01/03/80	4.45	500	24.0	0.00	.F.
27	01/05/81	4.60	600	24.0	0.00	.F.
27	01/04/83	4.52	700	24.0	0.00	.F.
27	01/01/87	0.00	940	0.0	0.00	.F.
27	01/06/90	0.00	1260	27.1	0.00	.T.
27	26/07/90	4.43	1266	25.0	7.65	.T.
27	02/11/90	4.51	1143	25.3	7.30	.T.
27	22/01/91	4.48	1123	28.3	6.64	.F.
28	01/06/90	0.00	1346	26.9	0.00	.T.
28	26/07/90	4.08	1341	24.5	7.67	.F.
28	02/11/90	4.16	1255	27.1	6.76	.T.
29	01/06/90	0.00	952	26.4	0.00	.T.
29	26/07/90	4.32	1002	24.5	7.51	.F.
29	02/11/90	4.41	993	25.0	7.16	.F.
30	01/03/80	15.10	1100	24.5	0.00	.F.
30	01/05/81	15.10	1100	24.0	0.00	.F.
30	01/04/83	15.15	1000	24.5	0.00	.F.
30	01/06/90	0.00	1035	26.8	0.00	.T.
32	01/01/87	0.00	400	0.0	0.00	.F.
32	01/06/90	0.00	779	26.3	0.00	.T.
33	01/06/90	0.00	664	25.5	0.00	.T.
33	02/11/90	21.38	580	25.6	7.44	.T.
34	24/07/90	21.35	0	0.0	0.00	.F.
35	15/06/65	0.00	620	0.0	0.00	.F.
35	01/02/71	0.00	900	0.0	0.00	.F.
35	01/03/80	5.80	850	24.4	0.00	.F.
35	01/05/81	5.81	850	24.0	0.00	.F.

Tongatapu well monitoring
(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
35	01/04/83	5.83	900	24.0	0.00	.F.
35	01/01/87	0.00	1850	0.0	0.00	.F.
35	01/06/90	0.00	2340	27.9	0.00	.T.
35	31/10/90	0.00	2110	28.4	7.57	.T.
36	01/06/90	0.00	2490	33.2	0.00	.T.
37	01/06/90	0.00	2320	34.0	0.00	.T.
38	01/06/90	0.00	430	0.0	0.00	.T.
38	31/10/90	0.00	3350	26.1	7.84	.F.
39	01/01/87	0.00	600	0.0	0.00	.F.
39	23/05/90	0.00	770	28.0	0.00	.T.
39	24/07/90	0.00	776	23.1	7.83	.F.
41	01/01/87	0.00	550	0.0	0.00	.F.
42	03/02/65	0.00	620	0.0	0.00	.F.
42	01/02/71	42.77	620	0.0	0.00	.F.
42	01/07/79	42.45	800	25.0	0.00	.F.
42	01/03/80	0.00	850	24.0	0.00	.F.
42	01/05/81	42.75	850	24.0	0.00	.F.
42	01/04/83	42.70	950	24.0	0.00	.F.
42	01/01/87	0.00	600	0.0	0.00	.F.
42	23/05/90	0.00	875	28.9	0.00	.T.
42	24/07/90	42.45	838	24.9	7.49	.F.
42	02/11/90	42.50	760	25.4	7.40	.F.
43	23/05/90	0.00	790	30.7	0.00	.T.
43	02/11/90	0.00	560	24.9	7.63	.F.
44	07/08/90	25.18	691	34.8	7.83	.F.
44	02/11/90	25.14	660	38.3	7.57	.F.
45	05/07/63	0.00	960	0.0	0.00	.F.
45	01/02/71	19.76	1080	0.0	0.00	.F.
45	01/05/78	19.46	0	0.0	0.00	.F.
45	01/03/80	19.80	1300	24.0	0.00	.F.
45	01/05/81	20.01	1300	24.0	0.00	.F.
45	01/04/83	20.01	1300	24.5	0.00	.F.
45	01/10/86	0.00	620	0.0	0.00	.F.
45	01/01/87	0.00	660	0.0	0.00	.F.
45	23/05/90	0.00	1800	0.0	0.00	.T.
45	20/07/90	19.45	1247	0.0	0.00	.F.
45	23/07/90	19.47	1780	24.5	7.42	.T.
45	31/10/90	19.46	1516	26.8	7.49	.T.
45	21/01/91	19.52	1205	26.0	6.94	.F.
46	11/02/70	0.00	1820	0.0	0.00	.F.
46	01/02/71	7.52	1970	0.0	0.00	.F.
46	01/03/80	7.48	1850	25.0	0.00	.F.
46	01/05/81	7.48	1500	24.5	0.00	.F.
46	01/04/83	7.50	1555	24.0	0.00	.F.
46	01/05/87	0.00	1100	0.0	0.00	.F.
46	27/05/90	0.00	3280	0.0	0.00	.T.
46	23/07/90	7.57	3340	24.6	7.64	.F.
46	21/01/91	7.54	1979	24.6	7.00	.F.
47	01/07/79	7.68	1550	24.0	0.00	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
47	01/03/80	7.65	1500	24.0	0.00	.F.
47	01/05/81	7.65	1500	24.5	0.00	.F.
47	01/04/83	7.68	1450	24.0	0.00	.F.
47	01/01/87	0.00	1390	0.0	0.00	.F.
47	01/05/87	0.00	3020	0.0	0.00	.F.
47	27/05/90	0.00	1733	27.7	0.00	.T.
47	24/07/90	7.67	1800	24.9	7.59	.F.
47	31/10/90	7.78	1577	26.3	7.21	.T.
47	21/01/91	7.71	1381	25.3	6.90	.F.
48	02/09/65	0.00	620	0.0	0.00	.F.
48	01/02/71	3.78	720	0.0	0.00	.F.
48	01/07/79	3.57	0	0.0	0.00	.F.
48	01/03/80	0.00	950	23.0	0.00	.F.
48	01/05/81	3.56	1100	24.5	0.00	.F.
48	01/04/83	3.55	1000	24.0	0.00	.F.
48	01/01/87	0.00	970	0.0	0.00	.F.
48	01/05/87	0.00	980	0.0	0.00	.F.
48	27/05/90	0.00	1080	28.2	0.00	.T.
48	31/10/90	3.64	1162	25.1	7.26	.F.
48	21/01/91	3.64	1080	26.5	6.95	.F.
49	27/05/90	0.00	1080	36.0	0.00	.T.
49	31/10/90	4.60	767	25.5	7.30	.F.
50	20/07/90	22.56	802	25.3	0.00	.F.
50	21/01/91	0.00	1426	29.1	7.46	.F.
51	31/10/90	0.00	1580	26.1	7.26	.F.
52	04/02/65	0.00	1730	0.0	0.00	.F.
52	01/02/71	0.00	2190	0.0	0.00	.F.
52	01/03/80	6.50	1600	23.5	0.00	.F.
52	01/05/81	6.63	1600	24.5	0.00	.F.
52	01/04/83	6.60	1600	24.0	0.00	.F.
52	01/05/87	0.00	4800	0.0	0.00	.F.
52	01/05/87	0.00	7600	0.0	0.00	.F.
52	27/05/90	0.00	3300	27.7	0.00	.T.
52	23/07/90	6.75	3360	24.7	7.46	.F.
52	31/10/90	6.75	0	0.0	0.00	.F.
52	21/01/91	6.63	2760	25.4	6.81	.T.
53	27/05/90	0.00	1378	28.9	0.00	.T.
54	10/02/70	0.00	620	0.0	0.00	.F.
54	01/02/71	12.52	830	0.0	0.00	.F.
54	01/03/80	12.36	1000	24.5	0.00	.F.
54	01/05/81	12.60	1100	24.0	0.00	.F.
54	01/04/83	12.62	1100	24.5	0.00	.F.
54	01/01/87	0.00	1260	0.0	0.00	.F.
54	27/05/90	0.00	1645	28.8	0.00	.T.
54	24/07/90	12.42	1580	24.9	7.49	.F.
54	31/10/90	12.51	1163	25.3	7.33	.F.
54	22/01/91	12.47	1357	26.2	6.62	.F.
55	01/03/80	12.40	950	24.5	0.00	.F.
55	01/05/81	12.40	1000	24.0	0.00	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
55	01/04/83	12.40	1000	24.5	0.00	.F.
55	01/01/87	0.00	810	0.0	0.00	.F.
55	27/05/90	0.00	1100	29.4	0.00	.T.
55	24/07/90	12.20	1095	24.5	7.04	.F.
55	21/01/91	12.22	975	25.9	7.11	.F.
56	20/07/90	14.22	1321	0.0	0.00	.F.
57	20/07/90	7.67	1209	24.6	0.00	.F.
57	31/10/90	0.00	1502	32.9	6.99	.T.
58	01/01/87	0.00	990	0.0	0.00	.F.
58	27/05/90	0.00	1090	41.5	0.00	.T.
59	01/01/87	0.00	1070	0.0	0.00	.F.
59	01/05/87	0.00	2580	0.0	0.00	.F.
59	27/05/90	0.00	1310	36.1	0.00	.T.
59	31/10/90	0.00	1251	25.8	7.58	.F.
60	27/05/90	0.00	1300	37.1	0.00	.T.
60	31/10/90	0.00	1244	32.0	7.34	.T.
61	02/09/65	0.00	700	0.0	0.00	.F.
61	01/02/71	0.00	1150	0.0	0.00	.F.
61	01/03/80	17.58	1000	24.0	0.00	.F.
61	01/05/81	17.70	1000	24.5	0.00	.F.
61	01/04/83	17.70	1000	24.0	0.00	.F.
61	01/01/87	0.00	1090	0.0	0.00	.F.
61	01/05/87	0.00	2500	0.0	0.00	.F.
61	23/07/90	17.76	1290	25.0	7.44	.F.
61	31/10/90	17.79	0	0.0	0.00	.F.
61	21/01/91	17.76	1157	25.6	6.91	.F.
62	01/01/87	0.00	3600	0.0	0.00	.F.
62	01/05/87	0.00	3800	0.0	0.00	.F.
62	27/05/90	0.00	2250	32.9	0.00	.T.
62	23/07/90	2.12	1900	27.8	7.52	.F.
62	31/10/90	2.15	2060	25.3	7.34	.T.
62	21/01/91	2.07	1710	29.6	7.15	.F.
64	27/05/90	0.00	2250	29.2	0.00	.T.
64	31/10/90	5.42	2080	32.2	7.58	.T.
65	08/01/65	0.00	820	0.0	0.00	.F.
65	01/02/71	5.87	890	0.0	0.00	.F.
65	01/05/78	5.35	1000	0.0	0.00	.F.
65	01/07/79	5.37	1030	24.0	0.00	.F.
65	01/03/80	5.25	1000	25.0	0.00	.F.
65	01/05/81	5.30	600	24.0	0.00	.F.
65	01/04/83	5.32	750	24.5	0.00	.F.
65	01/10/86	0.00	1130	0.0	0.00	.F.
65	01/01/87	0.00	1040	0.0	0.00	.F.
65	27/05/90	0.00	1840	26.7	0.00	.T.
65	31/07/90	5.48	1737	25.2	7.28	.F.
65	07/11/90	5.47	1478	35.6	7.09	.F.
65	22/01/91	5.44	1440	25.5	6.96	.F.
65	27/02/91	5.38	1395	25.6	6.66	.F.
66	01/03/80	8.36	1000	23.0	0.00	.F.

Tongatapu well monitoring
(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
66	01/05/81	8.38	1000	24.0	0.00	.F.
66	01/04/83	8.40	1100	24.0	0.00	.F.
66	01/01/87	0.00	980	0.0	0.00	.F.
66	27/05/90	0.00	1200	26.8	0.00	.T.
66	01/08/90	8.46	1097	25.1	7.46	.T.
66	23/01/91	8.42	990	25.7	6.99	.F.
67	27/05/90	0.00	830	0.0	0.00	.T.
67	31/10/90	13.58	0	0.0	0.00	.F.
68	10/09/65	0.00	880	0.0	0.00	.F.
68	01/02/71	4.65	1100	0.0	0.00	.F.
68	01/07/79	4.68	1350	24.0	0.00	.F.
68	01/03/80	4.65	1000	24.0	0.00	.F.
68	01/05/81	4.78	1500	24.0	0.00	.F.
68	01/04/83	4.75	1200	24.0	0.00	.F.
68	01/10/86	0.00	1490	0.0	0.00	.F.
68	01/01/87	0.00	1480	0.0	0.00	.F.
68	27/05/90	0.00	1930	26.0	0.00	.T.
68	31/07/90	4.80	1522	24.8	7.39	.F.
68	07/11/90	4.78	1489	25.7	7.17	.F.
68	22/01/91	4.35	1462	31.6	7.03	.T.
68	27/02/91	4.71	1374	28.8	6.95	.F.
69	27/05/90	0.00	1270	0.0	0.00	.T.
71	03/02/65	0.00	450	0.0	0.00	.F.
71	01/02/71	0.00	550	0.0	0.00	.F.
71	01/07/79	16.70	800	24.5	0.00	.F.
71	01/03/80	16.67	780	24.0	0.00	.F.
71	01/05/81	16.65	850	24.0	0.00	.F.
71	01/04/83	16.62	1000	24.5	0.00	.F.
71	01/01/87	0.00	400	0.0	0.00	.F.
71	27/05/90	0.00	770	27.5	0.00	.T.
71	24/07/90	16.70	820	24.6	7.43	.F.
71	02/11/90	16.71	759	25.8	7.27	.T.
72	22/01/91	16.69	779	25.4	6.87	.T.
73	07/11/90	0.00	1530	32.3	7.43	.T.
74	23/05/90	0.00	996	26.7	0.00	.T.
76	16/04/70	0.00	820	0.0	0.00	.F.
76	01/02/71	7.25	1150	0.0	0.00	.F.
76	01/07/79	7.12	1000	25.0	0.00	.F.
76	01/03/80	7.20	650	24.0	0.00	.F.
76	01/05/81	7.23	700	24.5	0.00	.F.
76	01/04/83	7.30	800	24.0	0.00	.F.
76	01/01/87	0.00	1080	0.0	0.00	.F.
76	23/05/90	0.00	1910	27.2	0.00	.T.
76	02/11/90	0.00	1610	25.2	7.64	.F.
76	22/01/91	0.00	1475	26.4	6.73	.F.
77	23/05/90	0.00	942	26.0	0.00	.T.
78	24/05/90	0.00	2370	27.9	0.00	.T.
79	20/04/67	0.00	960	0.0	0.00	.F.
79	01/02/71	8.51	1040	0.0	0.00	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
79	01/07/79	8.40	1100	23.5	0.00	.F.
79	01/03/80	8.35	550	24.0	0.00	.F.
79	01/05/81	8.60	1770	24.0	0.00	.F.
79	01/04/83	8.58	1200	24.5	0.00	.F.
79	01/01/87	0.00	2120	0.0	0.00	.F.
79	02/11/90	8.36	1433	25.4	7.32	.F.
79	22/01/91	8.31	1440	25.8	6.70	.F.
80	26/07/90	0.00	2300	22.9	8.37	.F.
80	02/11/90	8.29	0	0.0	0.00	.F.
81	01/01/87	0.00	1040	0.0	0.00	.F.
81	24/05/90	0.00	1479	27.4	0.00	.T.
81	26/07/90	6.14	1108	25.8	7.08	.F.
81	02/11/90	6.27	952	25.3	7.17	.F.
81	22/01/91	6.25	1130	26.0	6.49	.F.
82	24/05/90	0.00	786	26.9	0.00	.T.
82	07/11/90	8.05	675	25.8	7.99	.F.
83	26/07/90	0.00	1107	24.3	8.03	.F.
83	07/11/90	8.25	1072	25.0	7.51	.F.
84	07/11/90	5.64	952	26.0	7.42	.F.
85	27/07/90	5.31	820	24.4	7.40	.F.
85	07/11/90	5.36	799	25.5	7.11	.T.
86	24/05/90	0.00	885	0.0	0.00	.T.
86	27/07/90	4.16	952	22.7	7.55	.F.
86	22/01/91	4.17	854	26.3	7.04	.F.
87	27/07/90	5.42	1015	22.1	7.63	.F.
87	07/11/90	5.45	940	29.0	7.32	.F.
88	05/02/66	0.00	450	0.0	0.00	.F.
88	01/02/71	0.00	530	0.0	0.00	.F.
88	01/05/78	7.05	0	0.0	0.00	.F.
88	01/07/79	6.90	700	24.0	0.00	.F.
88	01/03/80	7.00	800	24.0	0.00	.F.
88	01/05/81	7.02	900	24.5	0.00	.F.
88	01/04/83	7.01	900	24.0	0.00	.F.
88	01/01/87	0.00	630	0.0	0.00	.F.
88	24/05/90	0.00	867	27.2	0.00	.T.
88	27/07/90	7.04	868	24.9	7.56	.T.
88	07/11/90	7.10	808	25.4	7.41	.T.
89	03/09/65	0.00	720	0.0	0.00	.F.
89	01/02/71	8.64	820	0.0	0.00	.F.
89	01/07/79	8.40	860	24.5	0.00	.F.
89	01/03/80	8.42	900	25.5	0.00	.F.
89	01/05/81	8.60	900	24.5	0.00	.F.
89	01/04/83	8.50	850	24.0	0.00	.F.
89	01/10/86	0.00	870	0.0	0.00	.F.
89	01/01/87	0.00	870	0.0	0.00	.F.
89	24/05/90	0.00	1160	26.7	0.00	.T.
89	31/07/90	8.48	1108	24.2	7.46	.F.
89	07/11/90	8.44	939	26.6	7.27	.F.
89	22/01/91	8.43	914	26.0	7.21	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
89	27/02/91	8.37	809	26.0	6.83	.F.
90	01/03/80	3.33	800	23.5	0.00	.F.
90	01/05/81	3.13	950	23.5	0.00	.F.
90	01/04/83	3.33	1000	24.0	0.00	.F.
90	01/01/87	0.00	2450	0.0	0.00	.F.
90	09/03/90	0.00	1500	0.0	0.00	.F.
90	24/05/90	0.00	2270	26.9	0.00	.T.
90	31/07/90	3.10	1515	24.2	7.57	.F.
90	07/11/90	3.03	1467	25.7	7.26	.F.
90	22/01/91	2.99	787	26.0	7.12	.F.
90	27/02/91	3.00	1305	26.3	6.85	.F.
91	24/05/90	0.00	1010	27.3	0.00	.T.
91	31/07/90	3.65	950	24.6	7.43	.F.
91	07/11/90	3.70	1025	25.5	7.22	.F.
92	24/05/90	0.00	410	23.6	0.00	.T.
93	24/05/90	0.00	1230	26.7	0.00	.T.
93	31/07/90	4.24	1219	24.6	7.28	.F.
93	07/11/90	4.19	1133	34.0	7.52	.F.
93	22/01/91	4.15	1078	26.8	7.36	.F.
93	27/02/91	4.15	1069	27.9	7.39	.F.
95	24/05/90	0.00	832	26.4	0.00	.T.
96	24/05/90	0.00	843	26.2	0.00	.T.
97	24/05/90	0.00	780	25.9	0.00	.T.
98	24/05/90	0.00	672	26.1	0.00	.T.
99	24/05/90	0.00	835	25.8	0.00	.T.
100	24/05/90	0.00	834	25.3	0.00	.T.
101	23/11/66	0.00	550	0.0	0.00	.F.
101	01/02/71	12.31	660	0.0	0.00	.F.
101	06/08/90	12.18	1069	25.6	7.39	.F.
101	01/11/90	12.10	930	26.5	7.22	.T.
101	01/03/91	0.00	880	27.0	7.36	.T.
102	15/03/71	18.75	500	0.0	0.00	.F.
102	01/07/79	18.75	590	24.0	0.00	.F.
102	01/03/80	18.70	680	24.0	0.00	.F.
102	01/05/81	18.71	800	24.0	0.00	.F.
102	01/04/83	18.71	800	24.0	0.00	.F.
102	06/08/90	18.91	727	25.3	7.41	.F.
102	01/11/90	18.85	793	24.5	7.13	.F.
102	01/03/91	18.73	930	26.0	5.16	.T.
103	23/11/66	0.00	400	0.0	0.00	.F.
103	01/02/71	13.02	820	0.0	0.00	.F.
103	01/07/79	12.70	910	24.0	0.00	.F.
103	01/03/80	12.80	1050	24.0	0.00	.F.
103	01/05/81	12.25	1100	24.0	0.00	.F.
103	01/04/83	12.30	1200	24.0	0.00	.F.
103	06/08/90	12.58	1278	25.5	7.42	.F.
103	01/11/90	12.54	1140	25.5	7.30	.T.
103	01/03/91	0.00	1073	28.3	7.33	.F.
104	06/08/90	0.00	1363	24.6	7.48	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
104	01/11/90	0.00	1242	24.6	7.29	.F.
104	01/03/91	0.00	1220	26.0	5.13	.T.
105	01/07/79	14.78	870	23.5	0.00	.F.
105	01/03/80	14.80	900	24.0	0.00	.F.
105	01/05/81	14.78	1050	24.0	0.00	.F.
105	01/04/83	14.80	1000	24.0	0.00	.F.
105	06/08/90	14.73	1580	24.5	7.44	.F.
105	01/11/90	0.00	1453	25.8	7.12	.T.
105	01/03/91	14.67	1321	26.0	5.22	.T.
106	15/03/71	21.37	500	0.0	0.00	.F.
106	01/07/79	21.20	700	23.5	0.00	.F.
106	01/03/80	21.10	900	24.0	0.00	.F.
106	01/05/81	21.10	950	25.0	0.00	.F.
106	01/04/83	21.20	900	24.0	0.00	.F.
106	06/08/90	21.51	681	24.6	7.44	.F.
106	01/11/90	21.47	639	24.8	7.22	.F.
106	01/03/91	21.70	935	25.9	8.19	.T.
107	09/05/68	0.00	500	0.0	0.00	.F.
107	01/02/71	13.28	720	0.0	0.00	.F.
107	01/07/79	13.35	750	23.5	0.00	.F.
107	01/03/80	0.00	970	24.0	0.00	.F.
107	01/05/81	13.32	1100	24.0	0.00	.F.
107	01/04/83	13.32	1100	24.0	0.00	.F.
107	06/08/90	13.34	1417	25.0	7.40	.F.
107	01/11/90	13.30	1156	25.5	7.14	.T.
107	01/03/91	0.00	970	25.9	7.24	.T.
108	06/08/90	0.00	1492	24.7	7.37	.F.
108	01/11/90	0.00	1383	25.1	7.27	.T.
108	01/03/91	0.00	1347	25.8	9.48	.T.
109	23/11/66	0.00	500	0.0	0.00	.F.
109	01/02/71	11.16	680	0.0	0.00	.F.
109	01/07/79	11.28	850	24.0	0.00	.F.
109	01/03/80	11.30	1000	24.0	0.00	.F.
109	01/05/81	11.30	950	24.0	0.00	.F.
109	01/04/83	11.28	1100	24.0	0.00	.F.
109	06/08/90	11.19	1305	25.2	7.45	.F.
109	01/11/90	11.10	1159	25.5	7.22	.T.
109	01/03/91	10.95	973	26.0	7.27	.T.
110	15/03/71	17.67	450	0.0	0.00	.F.
110	01/07/79	17.58	650	23.5	0.00	.F.
110	01/03/80	17.60	700	24.0	0.00	.F.
110	01/05/81	17.60	750	24.0	0.00	.F.
110	01/04/83	17.58	1700	24.0	0.00	.F.
110	06/08/90	17.76	1280	24.4	7.74	.F.
110	01/11/90	17.72	1183	25.6	7.35	.T.
110	01/03/91	17.59	0	0.0	0.00	.F.
111	23/11/66	0.00	450	0.0	0.00	.F.
111	01/02/71	9.40	600	0.0	0.00	.F.
111	28/02/90	0.00	1000	0.0	0.00	.T.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
111	06/08/90	9.72	1020	25.5	7.44	.F.
111	01/11/90	9.66	942	26.1	7.14	.T.
111	01/03/91	9.52	899	26.4	7.30	.T.
112	06/08/90	0.00	1182	24.4	7.46	.F.
112	01/11/90	0.00	1028	24.9	7.47	.T.
112	01/03/91	0.00	746	25.3	7.60	.T.
113	06/08/90	16.69	1195	24.5	7.58	.F.
113	01/11/90	16.64	994	25.0	7.25	.T.
113	01/03/91	16.50	969	25.7	7.66	.T.
114	06/08/90	0.00	1182	24.9	7.53	.F.
114	01/11/90	0.00	1035	25.2	7.18	.T.
114	01/03/91	0.00	997	25.7	7.34	.T.
115	06/08/90	11.92	1056	25.3	7.45	.F.
115	01/11/90	11.88	974	25.5	7.26	.T.
115	01/03/91	11.73	931	26.1	7.39	.T.
116	06/08/90	0.00	1217	24.5	7.73	.F.
116	01/11/90	0.00	971	25.2	7.17	.T.
116	01/03/91	0.00	929	27.0	7.39	.T.
117	06/08/90	12.37	927	25.0	7.42	.F.
117	01/11/90	12.29	850	25.5	7.30	.T.
117	01/03/91	12.23	832	26.0	7.46	.T.
118	28/02/90	0.00	850	0.0	0.00	.T.
118	06/08/90	13.08	835	25.0	7.48	.F.
118	01/11/90	13.05	780	25.2	7.23	.T.
118	01/03/91	12.90	730	26.7	7.43	.T.
119	06/08/90	12.64	1051	23.3	7.42	.F.
119	01/03/91	12.50	930	28.7	7.70	.T.
120	06/08/90	0.00	980	24.7	7.63	.F.
120	01/11/90	0.00	827	26.4	7.35	.F.
120	01/03/91	0.00	740	25.8	7.47	.T.
121	01/03/91	0.00	879	26.2	5.20	.T.
122	01/11/90	0.00	841	25.4	7.32	.T.
122	01/03/91	0.00	832	26.3	7.98	.T.
123	01/03/91	11.46	0	0.0	0.00	.F.
124	06/08/90	23.11	349	24.5	7.42	.F.
124	01/11/90	23.08	242	22.2	7.52	.F.
124	01/03/91	22.95	450	25.6	5.05	.F.
126	01/03/91	8.80	0	0.0	0.00	.F.
129	01/03/91	8.11	988	26.6	5.09	.T.
131	28/02/90	0.00	3500	0.0	0.00	.T.
131	23/01/91	7.54	109	25.1	7.62	.F.
131	27/02/91	7.47	940	25.3	6.63	.F.
132	01/07/79	3.03	800	24.5	0.00	.F.
132	01/03/80	3.40	900	23.5	0.00	.F.
132	01/05/81	3.19	750	24.0	0.00	.F.
132	01/04/83	3.20	750	24.5	0.00	.F.
132	01/10/86	0.00	990	0.0	0.00	.F.
132	24/05/90	0.00	739	26.9	0.00	.T.
133	08/09/65	0.00	600	24.5	0.00	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
133	01/02/71	4.32	670	0.0	0.00	.F.
133	01/07/79	4.10	1000	25.0	0.00	.F.
133	01/03/80	4.12	850	0.0	0.00	.F.
133	01/05/81	4.19	750	0.0	0.00	.F.
133	01/04/83	4.10	800	0.0	0.00	.F.
133	01/10/86	0.00	670	0.0	0.00	.F.
133	01/01/87	0.00	1040	0.0	0.00	.F.
133	24/05/90	0.00	1438	26.8	0.00	.T.
133	31/07/90	4.22	1229	24.4	7.37	.F.
133	07/11/90	4.18	1298	25.7	7.24	.T.
133	22/01/91	4.16	1223	26.2	7.61	.F.
133	27/02/91	4.11	1118	25.7	7.23	.T.
134	10/07/70	0.00	400	0.0	0.00	.F.
134	01/02/71	5.52	500	0.0	0.00	.F.
134	01/07/79	0.00	850	24.0	0.00	.F.
134	01/03/80	5.38	850	25.0	0.00	.F.
134	01/05/81	5.60	900	24.0	0.00	.F.
134	01/04/83	5.50	900	24.0	0.00	.F.
134	28/05/90	0.00	960	26.7	0.00	.T.
134	07/08/90	5.55	1044	24.7	7.35	.F.
134	23/01/91	5.46	854	25.9	7.02	.F.
134	27/02/91	5.39	841	25.8	7.12	.F.
135	07/08/90	0.00	1034	21.5	7.82	.F.
136	07/08/90	6.39	807	23.0	7.51	.F.
137	28/05/90	0.00	856	26.8	0.00	.T.
138	28/05/90	0.00	850	25.6	0.00	.T.
138	07/08/90	4.99	850	24.5	7.29	.F.
142	29/05/90	0.00	958	24.4	0.00	.T.
143	29/05/90	0.00	653	24.5	0.00	.T.
144	16/07/65	0.00	550	0.0	0.00	.F.
144	01/02/71	4.34	560	0.0	0.00	.F.
144	01/07/79	4.20	800	24.0	0.00	.F.
144	01/03/80	0.00	900	25.0	0.00	.F.
144	01/05/81	4.74	500	24.0	0.00	.F.
144	01/04/83	4.30	800	24.5	0.00	.F.
144	29/05/90	0.00	940	26.3	0.00	.T.
144	31/07/90	4.30	923	25.4	7.36	.F.
144	07/11/90	4.29	888	25.5	7.20	.T.
144	22/01/91	4.25	893	25.6	6.98	.F.
144	27/02/91	4.19	865	25.8	7.08	.T.
145	29/05/90	0.00	947	0.0	0.00	.T.
147	09/09/65	0.00	600	0.0	0.00	.F.
147	01/02/71	7.29	710	0.0	0.00	.F.
147	01/07/79	7.53	920	24.5	0.00	.F.
147	01/03/80	7.40	950	24.5	0.00	.F.
147	01/05/81	7.50	1200	24.0	0.00	.F.
147	01/04/83	7.48	1000	24.5	0.00	.F.
147	29/05/90	0.00	1274	25.7	0.00	.T.
147	31/07/90	7.56	1147	24.4	7.52	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
147	23/01/91	7.54	854	25.4	7.00	.T.
147	27/02/91	7.46	955	25.3	7.05	.T.
149	07/11/90	3.45	0	0.0	0.00	.F.
151	29/05/90	0.00	2340	26.7	0.00	.T.
151	31/07/90	7.10	1995	24.8	7.35	.T.
151	07/11/90	7.09	1795	25.7	7.13	.T.
151	23/01/91	7.09	1904	25.1	7.07	.T.
151	27/02/91	7.03	1830	25.7	6.89	.T.
152	29/05/90	0.00	2900	26.0	0.00	.T.
152	31/07/90	5.76	0	0.0	0.00	.F.
152	07/11/90	5.77	0	0.0	0.00	.T.
153	20/07/65	0.00	1150	0.0	0.00	.F.
153	01/02/71	7.39	1730	0.0	0.00	.F.
153	01/05/78	0.00	2050	25.0	0.00	.F.
153	01/07/79	7.45	1930	25.0	0.00	.F.
153	01/05/81	7.65	1900	24.0	0.00	.F.
153	01/04/83	7.60	2000	24.0	0.00	.F.
153	01/10/86	0.00	2470	0.0	0.00	.F.
153	01/01/87	0.00	2560	0.0	0.00	.F.
153	31/07/90	7.46	1748	24.6	7.39	.F.
154	29/05/90	0.00	2900	28.0	0.00	.T.
154	31/07/90	0.00	2180	24.1	7.49	.F.
155	01/02/65	0.00	2640	0.0	0.00	.F.
155	01/02/71	7.91	3690	0.0	0.00	.F.
155	01/05/78	7.71	1690	24.5	0.00	.F.
155	01/07/79	7.70	1880	25.0	0.00	.F.
155	01/03/80	7.79	850	24.0	0.00	.F.
155	01/05/81	7.71	1400	24.5	0.00	.F.
155	01/04/83	7.75	1200	24.0	0.00	.F.
155	01/10/86	0.00	4050	0.0	0.00	.F.
155	01/01/87	0.00	4800	0.0	0.00	.F.
155	09/03/90	0.00	4400	0.0	0.00	.F.
155	29/05/90	0.00	4800	26.1	0.00	.T.
155	31/07/90	0.00	4750	24.0	7.56	.F.
155	07/11/90	7.69	2950	25.7	7.32	.F.
155	23/01/91	7.69	3430	25.6	7.05	.F.
155	27/02/91	7.62	2320	26.0	7.08	.F.
156	01/07/79	15.35	0	0.0	0.00	.F.
156	01/03/80	15.40	1100	24.5	0.00	.F.
156	01/05/81	15.52	1200	24.0	0.00	.F.
156	01/04/83	15.50	1100	24.0	0.00	.F.
156	29/05/90	0.00	1534	26.0	0.00	.T.
156	01/08/90	15.55	1343	25.3	7.37	.F.
156	23/01/91	15.49	1235	24.9	7.07	.F.
157	02/02/65	0.00	700	0.0	0.00	.F.
157	01/02/71	14.19	870	0.0	0.00	.F.
157	01/07/79	14.00	0	0.0	0.00	.F.
157	01/03/80	14.02	1150	24.5	0.00	.F.
157	01/05/81	14.16	1100	24.0	0.00	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
157	01/04/83	0.00	1050	24.5	0.00	.F.
157	01/01/87	0.00	1080	0.0	0.00	.F.
157	29/05/90	0.00	1460	25.6	0.00	.T.
157	01/08/90	14.08	1228	25.2	7.65	.T.
157	23/01/91	14.07	1248	25.5	7.04	.F.
159	01/07/79	12.03	0	0.0	0.00	.F.
159	01/03/80	12.28	600	24.0	0.00	.F.
159	01/05/81	12.60	800	24.5	0.00	.F.
159	01/04/83	12.40	900	24.0	0.00	.F.
159	29/05/90	0.00	744	35.3	0.00	.T.
159	27/07/90	12.34	818	24.7	0.00	.F.
159	23/01/91	12.35	781	25.6	7.14	.T.
159	27/02/91	12.22	765	25.8	7.23	.F.
160	01/08/90	15.94	870	25.0	7.38	.F.
160	07/08/90	0.00	927	22.0	8.33	.F.
161	07/01/65	0.00	620	0.0	0.00	.F.
161	01/02/71	26.01	670	0.0	0.00	.F.
161	01/07/79	25.80	0	0.0	0.00	.F.
161	01/03/80	25.38	900	23.0	0.00	.F.
161	01/05/81	25.30	900	23.0	0.00	.F.
161	01/05/81	26.00	900	24.0	0.00	.F.
161	01/04/83	26.10	1000	24.5	0.00	.F.
161	01/01/87	0.00	630	0.0	0.00	.F.
161	01/01/87	0.00	720	0.0	0.00	.F.
161	29/05/90	0.00	893	26.6	0.00	.T.
161	01/08/90	25.84	961	25.3	7.88	.T.
161	23/01/91	25.75	947	24.7	7.64	.T.
162	29/05/90	0.00	833	25.0	0.00	.T.
162	07/08/90	21.93	921	21.9	7.76	.F.
163	01/01/87	0.00	720	0.0	0.00	.F.
163	29/05/90	0.00	955	26.1	0.00	.T.
166	03/09/65	0.00	560	0.0	0.00	.F.
166	01/02/71	16.13	700	0.0	0.00	.F.
166	01/05/78	15.75	790	24.5	0.00	.F.
166	01/07/79	15.94	0	0.0	0.00	.F.
166	01/03/80	15.90	1000	23.0	0.00	.F.
166	01/05/81	0.00	1000	24.0	0.00	.F.
166	01/04/83	15.90	900	24.5	0.00	.F.
166	01/01/87	0.00	780	0.0	0.00	.F.
166	29/05/90	0.00	1048	26.1	0.00	.T.
166	23/01/91	15.89	790	25.6	7.04	.F.
167	09/03/90	0.00	1160	0.0	0.00	.F.
168	23/10/59	0.00	500	0.0	0.00	.F.
168	01/02/71	9.91	600	0.0	0.00	.F.
168	01/05/78	10.06	870	24.5	0.00	.F.
168	01/07/79	10.10	800	24.0	0.00	.F.
168	01/03/80	10.20	800	24.5	0.00	.F.
168	01/05/81	10.20	1000	24.0	0.00	.F.
168	01/04/83	10.25	1100	24.0	0.00	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
168	29/05/90	0.00	978	26.1	0.00	.T.
169	29/05/90	0.00	941	26.2	0.00	.T.
170	30/07/90	9.64	710	24.9	7.67	.F.
171	29/05/90	0.00	900	26.6	0.00	.T.
171	06/08/90	7.76	1008	24.5	7.52	.F.
172	29/05/90	0.00	803	33.4	0.00	.T.
173	29/05/90	0.00	5100	26.9	0.00	.T.
173	06/11/90	13.83	5260	25.9	7.63	.F.
174	29/05/90	0.00	6000	28.0	0.00	.T.
174	06/11/90	22.11	6100	27.1	7.59	.F.
175	22/04/66	0.00	650	0.0	0.00	.F.
175	01/02/71	0.00	720	0.0	0.00	.F.
175	01/07/79	0.00	1000	24.0	0.00	.F.
175	01/03/80	4.70	800	24.3	0.00	.F.
175	01/05/81	4.60	1000	24.3	0.00	.F.
175	01/04/83	4.62	1150	24.0	0.00	.F.
176	26/07/90	0.00	987	0.0	0.00	.F.
177	31/10/90	6.30	718	25.4	7.83	.F.
178	26/07/90	28.77	4490	24.6	8.00	.F.
178	06/11/90	29.07	3640	24.9	7.97	.F.
179	30/07/90	32.10	0	0.0	0.00	.F.
179	02/11/90	30.10	0	0.0	0.00	.F.
180	03/02/65	0.00	350	0.0	0.00	.F.
180	01/02/71	44.55	450	0.0	0.00	.F.
180	01/07/79	44.20	650	25.0	0.00	.F.
180	01/03/80	44.26	700	24.0	0.00	.F.
180	01/05/81	44.18	700	24.0	0.00	.F.
180	01/04/83	44.20	700	24.5	0.00	.F.
180	29/05/90	0.00	650	0.0	0.00	.T.
181	07/08/90	10.67	716	24.9	7.36	.F.
183	02/11/90	25.04	557	25.1	7.64	.F.
185	02/11/90	25.44	0	0.0	0.00	.F.
188	07/11/90	9.27	1141	25.5	7.72	.F.
188	22/01/91	7.08	811	25.5	0.71	.T.
192	01/07/79	14.50	650	25.0	0.00	.F.
192	01/03/80	14.50	500	23.5	0.00	.F.
192	01/05/81	14.50	600	24.0	0.00	.F.
192	01/04/83	14.50	600	24.0	0.00	.F.
192	27/07/90	14.00	822	24.8	7.40	.F.
192	23/01/91	14.00	800	25.7	7.11	.F.
193	17/07/90	28.71	449	0.0	0.00	.T.
195	06/08/90	7.70	0	0.0	0.00	.F.
198	06/08/90	9.33	0	0.0	0.00	.F.
199	06/08/90	9.41	0	0.0	0.00	.F.
200	01/01/87	0.00	860	0.0	0.00	.F.
200	07/08/90	7.64	1214	22.3	7.46	.F.
200	07/11/90	0.00	999	25.3	8.21	.T.
201	03/09/65	0.00	620	0.0	0.00	.F.
201	01/02/71	0.00	650	0.0	0.00	.F.

Tongatapu well monitoring

(from dbase file TBUWELLS.DBF)

Well No	Date	Depth to water (m)	Electrical Conductivity (uS/cm)	Temperature (degrees C)	pH	Pump stat (T=on, F=off)
201	01/07/79	10.50	900	24.0	0.00	.F.
201	01/03/80	10.50	800	25.0	0.00	.F.
201	01/04/83	10.52	780	24.0	0.00	.F.
201	01/01/87	0.00	730	0.0	0.00	.F.
201	07/08/90	10.68	980	25.1	7.48	.F.
201	07/11/90	10.60	889	25.7	7.24	.T.
201	22/01/91	10.60	866	25.4	7.09	.T.
203	02/11/90	21.98	0	0.0	0.00	.T.
205	07/08/90	31.46	6990	25.0	8.05	.F.
205	06/11/90	31.28	6100	24.9	7.97	.F.
206	22/01/91	0.00	1088	0.0	7.77	.T.
207	07/08/90	0.00	891	23.8	7.79	.F.
211	06/08/90	19.95	613	24.8	7.65	.F.
211	01/11/90	19.91	544	24.9	7.67	.F.
211	01/03/91	0.00	935	26.1	8.18	.T.
212	06/08/90	17.58	457	24.4	7.58	.F.
212	01/11/90	17.53	358	25.0	7.64	.F.
212	01/03/91	0.00	1060	26.0	8.26	.T.
213	10/08/90	13.24	1014	24.7	7.57	.F.
213	06/11/90	13.15	953	25.4	7.29	.F.
214	10/08/90	1.78	879	23.5	7.27	.F.
215	10/08/90	10.60	790	24.5	7.44	.F.
215	07/11/90	10.52	791	25.6	7.37	.F.
216	10/08/90	5.99	1072	25.0	7.44	.F.

APPENDIX G

Page No. 1
03/19/91

List of registered wells in Tonga
[tbu=Tongatapu, HAP=Ha'apai,
VAV=Vava'u]
(from dbase file WELLS.DBF)

Island	Well No	Location	Reduced Level (m)	Depth (m)	Type
tbu	1	siaosi moleni at vaini	0.000	14.90	drilled
tbu	2	lds church vaini	0.000	10.00	drilled
tbu	3	kelepi hala at vaini	0.000	0.00	dugwell
tbu	4	hon ma'afu tukuiaulahi	0.000	0.00	dugwell
tbu	5	beulah college no 1	0.000	0.00	dugwell
tbu	6	beulah college no 2	0.000	0.00	drilled
tbu	7	lds church malapo	0.000	10.00	drilled
tbu	8	taliai camp no 1	0.000	0.00	
tbu	9	taliai camp no 2	0.000	24.38	dugwell
tbu	10	fua'amotu primary school no. 1	0.000	0.00	dugwell
tbu	11	fua'amotu primary school no. 2	0.000	0.00	drilled
tbu	12	fua'amotu primary school no 3.	0.000	0.00	drilled
tbu	13	lavengatonga village	0.000	33.53	dugwell
tbu	14	fatumu village no 1	0.000	30.48	dugwell
tbu	15	fatumu village no 2	0.000	0.00	drilled
tbu	16	titali private well at fatumu	0.000	0.00	drilled
tbu	17	haveluliku village no 1	0.000	24.38	dugwell
tbu	18	tatakamotonga village no 1	0.000	10.97	dugwell
tbu	19	tatakamotonga village no 2	0.000	10.97	drilled
tbu	20	tatakamotonga village no 3	0.000	10.97	dugwell
tbu	21	tatakamotonga village no 4	0.000	16.20	drilled
tbu	22	veitongo lds church	0.000	0.00	drilled
tbu	23	vaini agriculture collage no 1	0.000	0.00	
tbu	24	vaini agriculture collage no 2	0.000	0.00	
tbu	25	vaini agriculture collage no 3	0.000	0.00	drilled
tbu	26	mahinae'a college at vaini	0.000	0.00	dugwell
tbu	27	vaini town no 1	0.000	4.88	dugwell
tbu	28	vaini town no 2	0.000	4.88	drilled
tbu	29	vaini town no 3	0.000	4.88	dugwell
tbu	30	hu'atolitoli prison no 1	0.000	10.97	dugwell
tbu	31	hu'atolitoli prison no 2	0.000	0.00	
tbu	32	tupou college no 1	0.000	18.29	drilled
tbu	33	tupou collage no 2	0.000	18.29	dugwell
tbu	34	tupou collage no 3	0.000	0.00	dug
tbu	35	lapaha town no 1	0.000	10.97	drilled
tbu	36	lapaha town no 2	0.000	10.97	dug
tbu	37	lapaha primary school [no 3]	0.000	10.97	dug
tbu	38	mu'a lds church	0.000	0.00	
tbu	39	nakolo village no 1	0.000	0.00	
tbu	40	nakolo village no 2	0.000	42.67	drilled
tbu	41	ha'asini/hamula no 1	0.000	36.58	drilled
tbu	42	ha'asini/hamula no 2	0.000	36.58	drilled
tbu	43	fu'amotu airport	0.000	38.10	drilled
tbu	44	end of runway [f/airport]	0.000	0.00	
tbu	45	niutoua village	0.000	12.80	dug
tbu	46	afa village	0.000	8.23	dug
tbu	47	hoi village	0.000	6.71	dug
tbu	48	kolonga village no 1	0.000	3.66	dug

List of registered wells in Tonga
[tbu=Tongatapu, HAP=Ha'apai,
VAV=Vava'u]
(from dbase file WELLS.DBF)

Island	Well No	Location	Reduced Level (m)	Depth (m)	Type
tbu	49	kolonga village no 2	0.000	3.66	
tbu	50	haveluliku village new well	0.000	24.38	
tbu	51	niutoua village new well	0.000	0.00	
tbu	52	navutoka old well	0.000	6.10	dug
tbu	53	'alakifonua village	0.000	13.72	drilled
tbu	54	holonga village	0.000	12.19	dug
tbu	55	malapo village	0.000	12.19	dug
tbu	56	navutoka village new well	0.000	0.00	
tbu	57	afa village new well	0.000	0.00	
tbu	58	nukuleka village well	0.000	7.92	dug
tbu	59	makaunga village	0.000	6.71	drilled
tbu	60	talafo'ou village new well	0.000	12.19	drilled
tbu	61	talafo'ou village old well	0.000	12.19	dug
tbu	62	manuka village	0.000	3.05	dug
tbu	63	'alakifonua private well [opp capt cook]	0.000	13.72	
tbu	64	'alakifonua private well [m.a.f.f.]	0.000	0.00	dug
tbu	65	te'ekiu village	5.920	4.88	dug
tbu	66	vaotu'u village	8.950	21.34	dug
tbu	67	lapaha town new well	0.000	0.00	drilled
tbu	68	masilamea village	5.090	4.88	dug
tbu	69	vaotu'u village new well	0.000	0.00	
tbu	70	lds church vaotu'u	8.890	0.00	
tbu	71	pelehake village new well	0.000	14.33	drilled
tbu	72	pelehake village old well	0.000	14.33	dug
tbu	73	te'ekiu village new well	0.000	0.00	drilled
tbu	74	veitongo village well	0.000	11.58	dugwell
tbu	75	veitongo private well	0.000	11.58	dugwell
tbu	76	longoteme village	0.000	6.10	
tbu	77	folaha private well	0.000	7.92	dugwell
tbu	78	folaha village no 2	0.000	7.92	dugwell
tbu	79	folaha village no 2	0.000	7.92	dugwell
tbu	80	folaha lds church	0.000	7.92	
tbu	81	nukuhetulu village	0.000	7.92	
tbu	82	golf club site at ha'ateiho	0.000	6.10	dugwell
tbu	83	haateiho lds church	0.000	6.10	drilled
tbu	84	tokomololo lds church	6.030	6.10	drilled
tbu	85	tokomololo agriculture dept	5.750	6.10	
tbu	86	tokomololo village well	7.110	6.10	dugwell
tbu	87	tokomololo private well	5.820	6.10	
tbu	88	pea village	7.550	6.10	dugwell
tbu	89	hofoa village	8.920	6.71	dugwell
tbu	90	puke village	3.530	4.57	dugwell
tbu	91	sia'atoutai village	4.140	4.57	dugwell
tbu	92	sia'atoutai private well	0.000	4.57	dugwell
tbu	93	sia'atoutai college	4.750	4.57	drilled
tbu	94	sia'atoutai college	0.000	4.57	drilled

List of registered wells in Tonga
[tbu=Tongatapu, HAP=Ha'apai,
VAV=Vava'u]
(from dbase file WELLS.DBF)

Island	Well No	Location	Reduced Level (m)	Depth (m)	Type
tbu	95	sia'atoutai college	0.000	4.57	dugwell
tbu	96	sia'atoutai college	0.000	4.57	dugwell
tbu	97	sia'atoutai college	0.000	4.57	dugwell
tbu	98	sia'atoutai college	0.000	4.57	dugwell
tbu	99	sia'atoutai college	0.000	4.57	dugwell
tbu	100	sia'atoutai college	0.000	4.57	dugwell
tbu	101	mataki'eua	12.500	0.00	
tbu	102	mataki'eua	20.320	0.00	
tbu	103	mataki'eua	12.890	0.00	
tbu	104	mataki'eua	16.590	0.00	
tbu	105	mataki'eua	15.020	0.00	
tbu	106	mataki'eua	21.870	0.00	
tbu	107	mataki'eua	13.590	0.00	
tbu	108	mataki'eua	21.580	0.00	
tbu	109	mataki'eua	11.440	0.00	
tbu	110	mataki'eua	18.120	0.00	
tbu	111	mataki'eua	10.060	0.00	
tbu	112	mataki'eua	16.530	0.00	
tbu	113	mataki'eua	16.920	0.00	
tbu	114	mataki'eua	11.960	0.00	
tbu	115	mataki'eua	12.290	0.00	
tbu	116	mataki'eua	13.160	0.00	
tbu	117	mataki'eua	12.740	0.00	
tbu	118	mataki'eua	13.490	0.00	
tbu	119	mataki'eua	12.540	0.00	
tbu	120	mataki'eua	13.810	0.00	
tbu	121	tongamai	12.550	0.00	
tbu	122	mataki'eua	17.860	0.00	
tbu	123	tongamai	12.090	0.00	
tbu	124	mataki'eua	0.920	0.00	
tbu	125	tongamai	9.870	0.00	
tbu	126		9.320	0.00	
tbu	127	tongamai	9.210	0.00	
tbu	128		8.370	0.00	
tbu	129	tongamai	8.590	0.00	
tbu	130		8.030	0.00	
tbu	131	tongamai	8.110	0.00	
tbu	132	sia'atoutai college	0.000	4.57	dugwell
tbu	133	fatai village	4.740	5.49	dugwell
tbu	134	lakepa village	6.040	0.00	dugwell
tbu	135	lakepa lds church	6.180	0.00	
tbu	136	lakepa private well	6.780	0.00	
tbu	137	private well dairy	0.000	0.00	
tbu	138	private well dairy	5.340	0.00	
tbu	139	liahona lds church	8.490	0.00	
tbu	140	liahona	0.000	0.00	dugwell
tbu	141	fatai lds church	3.420	0.00	
tbu	142	fatai private well	0.000	5.49	

List of registered wells in Tonga
[tbu=Tongatapu, HAP=Ha'apai,
VAV=Vava'u]
(from dbase file WELLS.DBF)

Island	Well No	Location	Reduced Level (m)	Depth (m)	Type
tbu	143	fatai private well	0.000	5.49	
tbu	144	nukunuku village no 1	4.800	5.49	dugwell
tbu	145	nukunuku village no 2	0.000	5.49	dugwell
tbu	146	nukunuku village no 3	0.000	5.49	drilled
tbu	147	matahau village	7.690	7.92	dugwell
tbu	148	matahau lds church	8.020	7.92	
tbu	149	nukunuku lds church	4.000	5.49	
tbu	150	te'ekiu lds church	4.620	0.00	
tbu	151	fo'ui village	7.460	0.00	dugwell
tbu	152	fo'ui village	6.140	0.00	drilled
tbu	153	fo'ui village	7.810	0.00	dugwell
tbu	154	fo'ui lds church	5.790	0.00	
tbu	155	ha'avakatolo village	7.980	6.10	dugwell
tbu	156	kala'au village	15.890	15.24	dugwell
tbu	157	fahefa village	0.000	18.29	dugwell
tbu	158	fahefa lds church	16.530	0.00	
tbu	159	kahoua village next to quarry	12.850	7.32	dugwell
tbu	160	utulau lds church	23.440	18.29	
tbu	161	utulau village	26.190	18.29	dugwell
tbu	162	ha'alalo village	22.310	20.73	dugwell
tbu	163	ha'akame village	0.000	21.34	drilled
tbu	164	ha'akame lds church	22.440	21.34	
tbu	165	houma lds church	22.150	23.16	
tbu	166	houma village	16.410	23.16	dugwell
tbu	167	houma village	0.000	23.16	drilled
tbu	168	liahona high school central well	0.000	0.00	drilled
tbu	169	liahona high school west well	0.000	0.00	drilled
tbu	170	liahona high school east well	10.160	0.00	dugwell
tbu	171	liahona piggery	8.220	0.00	dugwell
tbu	172	s.mafi private well at tokomololo	0.000	6.10	
tbu	173	keleti beach resort at ha'ateiho	0.000	0.00	
tbu	174	private well piggery	0.000	0.00	drilled
tbu	175	ha'ateiho village	0.000	6.10	dugwell
tbu	176	ha'ateiho village	0.000	6.10	drilled
tbu	177	kolonga investigation well	0.000	0.00	
tbu	178	makeke lds church	0.000	0.00	
tbu	179	tevita liti at vaini	0.000	0.00	
tbu	180	fua'amotou lds church	0.000	0.00	
tbu	181	private well liahona	11.100	0.00	
tbu	182	fu'amotu primary school	0.000	44.50	drilled
tbu	183	tuipelehake [lafalafa]	0.000	18.20	
tbu	184	semisi matakaiongo	0.000	0.00	drilled
tbu	185	tailoa	0.000	0.00	drilled
tbu	186	malapo village	0.000	0.00	drilled
tbu	187	bahai temple at nualei	0.000	0.00	drilled

List of registered wells in Tonga
[tbu=Tongatapu, HAP=Ha'apai,
VAV=Vava'u]
(from dbase file WELLS.DBF)

Island	Well No	Location	Reduced Level (m)	Depth (m)	Type
tbu	188	u.s.p campus at 'atele	0.000	0.00	
tbu	189	liahona village	0.000	0.00	drilled
tbu	190	holonga village no. 2	0.000	0.00	
tpu	191	private well at pea village	0.000	0.00	
tbu	192	halaloto village well	14.470	0.00	
tbu	193	airport extension well at fua'amotu	0.000	0.00	
tbu	194	private well opposite pea village well	6.840	6.10	dugwell
tbu	195	liahona high school	0.000	0.00	dugwell
tbu	196	liahona high school	0.000	0.00	dugwell
tbu	197	liahona high school	0.000	0.00	dugwell
tbu	198	liahona high school	0.000	0.00	dugwell
tbu	199	liahona high school	0.000	0.00	dugwell
tbu	200	tonga college at ha'ateiho	0.000	6.10	
tbu	201	veitongo village	0.000	11.58	
tbu	202	hon ma'afu near the prison	0.000	4.88	
tbu	203	saimone taumoepeau near tupou college	0.000	0.00	
tbu	204	maka taumoepeau at vaini	0.000	0.00	
tbu	205	sione tualau latu	0.000	0.00	
tbu	206	ha'ateiho new well	0.000	0.00	
tbu	207	gibson	0.000	0.00	
tbu	208	masao soakai	0.000	0.00	
tbu	209	masao soakai	0.000	0.00	
tbu	210	vili pele private well at vaini	0.000	4.88	drilled
tbu	211	mataki'eua windmill no 2	0.000	0.00	
tbu	212	mataki'eua windmill no 3	0.000	0.00	
tbu	213	metui panuve at nualei	0.000	0.00	dugwell
tbu	214	manase mamahi at nualei	0.000	0.00	dugwell
tbu	215	Pasi Vulangi at Nualei	0.000	0.00	dugwell
tbu	216	private well at Haveluloto	0.000	0.00	dugwell
Hap	1	Lolohea	0.000	4.35	
Hap	2	Talanoa	0.000	5.29	
Hap	3	Taniela	0.000	2.30	
Hap	4	Hingano	0.000	1.49	
Hap	5	Afepua	0.000	2.11	
Hap	6	Viliani Fisilau	0.000	2.30	
Hap	7	Masi Tu'ifua	0.000	3.04	
Hap	8	Isieta Tu'i	0.000	1.33	
Hap	9	Isileli 'Otunuku	0.000	2.71	
Hap	10	Kite Saafi	0.000	2.19	
Hap	11		0.000	2.13	
Hap	12	Epeli Musie	0.000	2.69	
Hap	13	Maukie Hafoka	0.000	1.96	
Hap	14	Fakakai hospital	0.000	1.97	
Hap	15	Vai ko Kanakana at Pukotala	0.000	1.66	

List of registered wells in Tonga
[tbu=Tongatapu, HAP=Ha'apai,
VAV=Vava'u]
(from dbase file WELLS.DBF)

Island	Well No	Location	Reduced Level (m)	Depth (m)	Type
Hap	16	Peni Nau	0.000	2.57	
Hap	17	Viliami Tausinga	0.000	3.44	
Hap	18	Moala Feleti	0.000	3.13	
Hap	19	Samiu Vaitohi	0.000	2.69	
Hap	20	Sesimani 'Ufi	0.000	1.89	
Hap	21	Ha'ahao	0.000	2.13	
Hap	22	Kilikiti Fakatou	0.000	2.47	
Hap	23	Felemea well	0.000	4.01	
Hap	24	'Uiha well	0.000	3.66	
Hap	25	Henele Saafi	0.000	3.42	
Hap	26	Fepale Tafuna	0.000	3.29	
Hap	27	Sa'ili	0.000	2.65	
Hap	28	Faleloa tap water	0.000	11.40	
Hap	29	Inoke Hafoka	0.000	9.70	
Hap	30	Fakafanua resort	0.000	0.00	
HAp	31	Sinamoni	0.000	2.70	
Hap	32		0.000	0.00	
Hap	33	Tanumafili	0.000	0.00	
Hap	34	Lotofoa	0.000	5.14	
Hap	35	NGata Hoeft	0.000	0.00	
Hap	36	Fotua well No.1	0.000	0.00	
Hap	37	Fotua well No.2	0.000	6.92	
Hap	38	Fangale'ounga	0.000	4.25	
Hap	39	Airport at Koulo	0.000	4.05	
Hap	40	Holopeka	0.000	0.00	
Hap	41	Vaifono at Holopeka	0.000	2.94	
Hap	42	Niuakalo motel	0.000	2.64	
Hap	43		0.000	2.63	
Hap	44	Sefili Finau	0.000	2.65	
Hap	45	Hihifo well No.1	0.000	7.23	
Hap	46	Hihifo well No2	0.000	7.18	
Hap	47	Peni Lalahi	0.000	4.00	
Hap	48	Pilolevu College	0.000	4.15	
Hap	49	WHO No.5	0.000	0.00	
Hap	50	Sione Tu'ineau	0.000	2.65	
Hap	51	Kuongakovi	0.000	2.30	
Hap	52	Sione 'Utumoengalu	0.000	2.22	
Hap	53		0.000	1.89	
Hap	54	Pule Mataka	0.000	2.43	
Hap	55		0.000	2.17	
Hap	56	Police site	0.000	1.46	
HAp	57	Tufau Siaki	0.000	2.80	
Hap	58	Police station	0.000	1.46	
Hap	59	Pepa Latu Kakau	0.000	2.82	
Hap	60	Vili and Fifita Le'ota	0.000	2.34	
Hap	61	Fale'one Prison	0.000	6.55	
Hap	62	Samisoni Kaifoto	0.000	3.16	
Hap	63	Fa'atoto well at west end of airstrip	0.000	2.23	

List of registered wells in Tonga
[tbu=Tongatapu, HAP=Ha'apai,
VAV=Vava'u]
(from dbase file WELLS.DBF)

Island	Well No	Location	Reduced Level (m)	Depth (m)	Type
VAV	1	Makave	0.000	0.00	
VAV	2	Fatai	0.000	0.00	
VAV	3	Loto'uiha for Mangia	0.000	0.00	
VAV	4	Ha'akio	0.000	0.00	
VAV	5	Houma	0.000	0.00	
VAV	6	Ta'anea village	0.000	0.00	
VAV	7	Ta'anea	0.000	0.00	
VAV	8	Tu'anekivale	0.000	0.00	
VAV	9	Holonga	0.000	0.00	
VAV	10	Mataika	0.000	0.00	
VAV	12	Leimatu'a	0.000	0.00	
VAV	11	Feletoa	0.000	0.00	
VAV	13	Taoa	0.000	0.00	
VAV	14	Pangaimotu	0.000	0.00	
VAV	15	Tefisi	0.000	0.00	
VAV	16	Vaimolo	0.000	0.00	
VAV	17	Tu'anuku	0.000	0.00	
VAV	18	Longamapu	0.000	0.00	
VAV	19	Prison	0.000	0.00	
VAV	20	MAF	0.000	0.00	
VAV	21		0.000	0.00	
VAV	22		0.000	0.00	
VAV	23	Neiafu	0.000	0.00	
VAV	24	Neiafu	0.000	0.00	
VAV	25	Neiafu	0.000	0.00	
VAV	26	Neiafu	0.000	0.00	
VAV	27	Neiafu	0.000	0.00	
VAV	28	Neiafu	0.000	0.00	
VAV	35	Ovaka well, Ovaka island	0.000	0.00	
VAV	36	Matamaka well, Nuapapu island	0.000	0.00	
VAV	37	Falevai well, Kapa island	0.000	0.00	
VAV	38	Otea well no 1, Kapa island	0.000	0.00	
VAV	39	Otea well no 2, Kapa island	0.000	0.00	

APPENDIX H

Tongatapu and 'Eua monthly rainfall from January 1982 to present

HEADER DATA FOR: C:TONGRAIN LABEL: Monthly rain: stations on Tongatapu
 NUMBER OF CASES: 108 NUMBER OF VARIABLES: 10

	Year	Month	Nukualof	Mua	Fuaamotu	Vaini	Mat.'eua	Liahona	Fo'ui	'Eua
1	1982	1	386	424	473	585	MISSING	447	457	MISSING
2	1982	2	238	302	370	311	MISSING	377	378	MISSING
3	1982	3	253	313	287	363	MISSING	283	365	MISSING
4	1982	4	136	131	200	226	MISSING	101	84	MISSING
5	1982	5	241	331	317	298	MISSING	288	282	MISSING
6	1982	6	58	70	79	86	MISSING	87	94	MISSING
7	1982	7	87	89	91	85	148	186	130	MISSING
8	1982	8	149	194	169	178	178	122	51	MISSING
9	1982	9	75	105	102	92	91	64	65	MISSING
10	1982	10	34	46	27	41	70	60	56	MISSING
11	1982	11	19	40	33	25	42	28	21	MISSING
12	1982	12	57	77	72	59	41	36	46	MISSING
13	1983	1	37	22	47	20	29	17	19	MISSING
14	1983	2	102	176	102	122	127	19	119	MISSING
15	1983	3	73	76	92	78	73	146	84	MISSING
16	1983	4	9	15	18	14	7	30	6	MISSING
17	1983	5	26	32	25	31	25	34	12	MISSING
18	1983	6	69	84	53	61	63	60	21	MISSING
19	1983	7	118	123	121	130	146	126	104	MISSING
20	1983	8	66	34	50	40	40	8	19	MISSING
21	1983	9	41	56	59	56	141	35	47	MISSING
22	1983	10	108	134	122	122	152	111	147	MISSING
23	1983	11	24	24	43	29	40	40	30	MISSING
24	1983	12	165	172	197	211	185	93	157	MISSING
25	1984	1	222	236	273	212	155	197	124	MISSING
26	1984	2	217	254	339	358	190	183	201	MISSING
27	1984	3	71	54	64	75	100	109	74	55
28	1984	4	126	147	191	162	131	94	65	346
29	1984	5	26	54	32	57	43	79	74	MISSING
30	1984	6	75	93	117	122	102	113	67	MISSING
31	1984	7	70	104	44	87	100	100	42	17
32	1984	8	41	44	60	44	48	31	32	109
33	1984	9	142	139	158	151	77	53	129	58
34	1984	10	64	81	62	85	71	30	59	7
35	1984	11	80	72	80	82	78	73	68	97
36	1984	12	177	288	227	237	181	119	99	166
37	1985	1	97	108	85	94	3	0	74	233
38	1985	2	162	106	108	120	96	101	205	MISSING
39	1985	3	212	220	253	260	241	329	273	104
40	1985	4	54	53	40	61	72	50	70	5
41	1985	5	102	83	88	110	99	MISSING	108	26
42	1985	6	140	97	113	121	84	MISSING	273	28
43	1985	7	56	52	49	49	49	44	59	3
44	1985	8	27	26	39	35	29	23	27	19
45	1985	9	28	18	21	20	22	17	26	14
46	1985	10	53	45	29	36	54	33	29	41
47	1985	11	3	56	22	8	69	21	4	MISSING
48	1985	12	429	347	313	359	499	416	393	MISSING
49	1986	1	12	5	4	18	10	0	21	15
50	1986	2	69	74	51	150	58	50	170	41
51	1986	3	113	131	156	161	72	194	191	MISSING
52	1986	4	285	252	290	292	178	289	275	MISSING

53	1986	5	118	133	122	120	80	71	54	MISSING
54	1986	6	215	198	239	277	262	243	211	MISSING
55	1986	7	62	57	84	72	70	68	68	MISSING
56	1986	8	98	101	113	116	87	102	110	MISSING
57	1986	9	16	25	28	21	19	17	12	MISSING
58	1986	10	57	43	74	57	54	29	47	MISSING
59	1986	11	25	MISSING	23	22	13	35	18	MISSING
60	1986	12	199	85	101	110	124	52	122	MISSING
61	1987	1	57	MISSING	100	97	71	MISSING	MISSING	MISSING
62	1987	2	204	189	225	222	240	MISSING	MISSING	MISSING
63	1987	3	169	293	259	247	251	MISSING	MISSING	MISSING
64	1987	4	17	22	21	13	38	MISSING	MISSING	MISSING
65	1987	5	85	83	86	97	80	MISSING	MISSING	MISSING
66	1987	6	35	32	42	54	31	MISSING	MISSING	MISSING
67	1987	7	54	45	83	81	60	MISSING	MISSING	MISSING
68	1987	8	17	15	16	15	13	MISSING	MISSING	MISSING
69	1987	9	25	65	66	61	43	MISSING	MISSING	MISSING
70	1987	10	40	64	58	53	79	MISSING	MISSING	MISSING
71	1987	11	41	38	31	37	35	MISSING	MISSING	MISSING
72	1987	12	157	70	150	148	144	MISSING	MISSING	MISSING
73	1988	1	280	190	172	237	258	MISSING	MISSING	MISSING
74	1988	2	242	162	215	194	319	MISSING	MISSING	MISSING
75	1988	3	114	118	107	121	130	MISSING	MISSING	MISSING
76	1988	4	215	206	189	187	189	MISSING	MISSING	MISSING
77	1988	5	69	353	49	56	59	MISSING	MISSING	MISSING
78	1988	6	32	45	19	18	23	MISSING	MISSING	MISSING
79	1988	7	101	112	105	100	97	MISSING	MISSING	MISSING
80	1988	8	46	58	67	83	50	MISSING	MISSING	MISSING
81	1988	9	313	246	371	326	380	MISSING	MISSING	MISSING
82	1988	10	114	112	105	128	106	MISSING	MISSING	MISSING
83	1988	11	26	5	28	15	36	MISSING	MISSING	MISSING
84	1988	12	209	13	206	244	253	MISSING	MISSING	MISSING
85	1989	1	143	MISSING	132	117	172	MISSING	216	131
86	1989	2	726	714	662	660	767	MISSING	MISSING	737
87	1989	3	168	126	165	160	158	MISSING	MISSING	110
88	1989	4	153	176	172	186	172	MISSING	MISSING	225
89	1989	5	221	190	200	172	162	MISSING	210	235
90	1989	6	47	68	50	62	41	MISSING	34	50
91	1989	7	131	141	137	124	124	MISSING	MISSING	137
92	1989	8	55	58	79	69	65	MISSING	49	63
93	1989	9	95	92	82	87	93	MISSING	84	104
94	1989	10	140	116	111	121	133	MISSING	MISSING	153
95	1989	11	173	126	124	119	136	MISSING	MISSING	173
96	1989	12	111	111	100	98	104	MISSING	MISSING	92
97	1990	1	220	228	192	185	203	MISSING	MISSING	205
98	1990	2	58	76	49	84	49	MISSING	52	53
99	1990	3	116	130	162	207	128	MISSING	130	184
100	1990	4	122	110	113	131	120	MISSING	130	132
101	1990	5	191	229	305	MISSING	213	MISSING	MISSING	313
102	1990	6	104	134	108	109	98	MISSING	MISSING	MISSING
103	1990	7	194	188	179	162	159	MISSING	145	172
104	1990	8	192	196	229	253	220	MISSING	206	MISSING
105	1990	9	175	164	257	206	178	MISSING	148	MISSING
106	1990	10	25	26	24	27	25	MISSING	MISSING	34
107	1990	11	223	247	263	271	249	MISSING	MISSING	235
108	1990	12	229	183	158	224	165	MISSING	MISSING	118