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August 1, 2003

Ms. Fran Farina
Acting General Manager
Monterey Peninsula Water Management District
5 Harris Court, Bldg. G
Monterey, CA 93942-0085

MPWMD

Subject: MONTERRA RANCH MUTUAL WATER COMPANY – ANNUAL WATER MONITORING PROGRAM REPORTS FOR REPORTING YEAR 2001 AND WATER YEAR 2002

Dear Ms. Farina:

Provided here are responses to comments contained in your letter of July 10, 2003, regarding the 2001 and 2002 annual monitoring reports for the Monterra Ranch Mutual Water Company.

General Comments

1. This acknowledges that we will follow your suggestion to use the following title for future reports – *Annual Water Monitoring Program Report for Water Year XXXX*.
2. This acknowledges that we will follow your request to include in future annual monitoring reports a copy of the *Annual Water Distribution System Report*, and that the reports will be due by the end of November for the preceding Water Year (ending September 30th).
3. **Attachment A** provides a listing of metered water delivery for each water user in the MRMWC system, as required by Condition #15. Per Public Utilities Commission confidentiality regulations, we have not included the associated lot number for the residential users. **Attachment B** provides an example template water bill. To date, there have been no charges for the water anywhere on the project, although regular billing is anticipated to begin within the next six months by January 2004.
4. This acknowledges that we will follow your suggestion to include in future reports a basic summary table to track ongoing well production, reverse osmosis treatment plant production, brine disposal, deliveries, losses, etc.

The increase you note in well production from RY 2001 to WY 2002 of 77 acre-feet is largely due to the Parcel N non-potable groundwater well in Cañada Woods being replaced, shifting its historic production to the other groundwater wells, in particular to High Well 2. Upon completion of the Parcel N replacement

well, the increased demand on High Well 2 will no longer be necessary; therefore, the anticipated trend in total system production is not expected to increase in this way next water year.

Further, the recent well production increases are attributable to construction water requirements and irrigation uses, which will decline in the future as the project facilities are completed. The use of potable water for irrigation is also expected to decrease as more reclaimed water becomes available for this use.

Lastly, water use is also expected to decline when MRMWC begins billing customers for water use. Water use in cities that meter and bill for water use tend to use 20 to 50 percent less water than those cities that do not meter and bill for water (Associated Press, June 4, 2003). The California Urban Water Conservation Council reports that unmetered communities have a very high per capita water use compared to metered communities. For example, Fresno (unmetered) has a daily water use rate of 328 gallons per person, whereas Clovis, a neighboring metered community, reports daily water use at 227 gallons per person.

6. As noted in your question, of the 166.4 acre-feet produced from all of the wells in the Monterra system, 27.8 acre-feet was used for potable production. The remainder, 138.6 acre-feet, was used for the non-potable needs, as reported in the annual reports and in the MPWMD annual well reporting forms, to include temporary construction purposes (e.g., compaction for utilities and roads, temporary golf course irrigation, erosion control irrigation, and temporary irrigation of hundreds of trees which have been planted and relocated on the project).

An estimate of temporary golf course irrigation for WY 2002 is approximately 146 acre-feet. An additional 46 acre-feet was estimated to be used to restore, establish, and maintain native grass restoration, as required by Conditions of Approval for Cañada Woods North, in areas around and adjacent to the golf course.

To facilitate gathering this information in the future, we will install meters on the discharge of the non-potable irrigation supply which will accurately measure the quantity of water used in the future for non-potable golf course use and native grass restoration. It is important to note that the supply for golf course and native grass irrigation came from three sources: 1) wells in the Monterra system; 2) groundwater wells in the Cañada Woods area (but not from the alluvial wells); and 3) 100% of the reclaimed water produced via the combined Monterra and Cañada Woods wastewater treatment plant.

The construction water, which generally goes into a number of 3,300-gallon water tank trucks, provides the non-potable construction needs of Monterra and Cañada

Woods North, the irrigation for tree planting and relocation, and erosion control establishment and maintenance, as required.

Specific Comments

7. **Attachment C** provides a summary of the current number of connections and percentages of projected buildout for each type of water use.
8. This acknowledges that, in future reports, we will report well production values in gallons per day (gpd) rather than kilogallons per day (kgpd).
9. The data presented on page 3, Table 1 cover the reporting years for the MRMWC. There was no metered water use prior to late 1997. Future reports will include rainfall recharge estimates for 1996-1997 per this comment. Also, instead of "long-term average", in the future we propose to use the term "running average". The "running average" describes and tracks the actual conditions at the project site which we believe is most consistent with the objective of the on-going monitoring program. Also see response to comment #10, below.
10. Please see response to comment #9. The "long-term average" value of 21.73 in/yr, should rather be termed the "running average". This will be revised in future reports. This value is obviously influenced by the high rainfall recorded the 1997-1998 El Niño year.
11. In our view, there is no discrepancy between the evapotranspiration values cited for different studies. Evapotranspiration, as a percentage of rainfall, declines as the amount of rainfall increases. Note that in our year-by-year calculations we adjusted the evapotranspiration to reflect this variation. Note that for reporting years with approximately 16 inches of rainfall (1998-1999 and 1999-2000), the annual evapotranspiration was estimated to be 78% to 80% of total annual rainfall. The recent *Laguna Seca Subarea Phase III Hydrogeologic Update* prepared for MPWMD in November 2002 reported an evapotranspiration rate of 78%. We cannot explain why Anderson-Nichols (80%) and Todd Engineers (86%) differed in their estimate of evapotranspiration percentage for a common rainfall value of 16 inches.
12. Our estimate of runoff for an annual rainfall amount of 21.73 inches (10% of annual rainfall) was based on SCS runoff methods. It yields a more conservative (safe) result with respect to groundwater recharge estimates than that assumed by Todd Engineers (4 to 6%) in their study of the Cañada Woods area. Please note that for reporting years with annual rainfall of approximately 16 inches, we estimated runoff to be 5% of rainfall, which falls in the middle of the estimates by Todd Engineers. Also, Anderson-Nichols assumed a runoff volume of 4.3% of annual rainfall in their analysis of the Monterra Ranch area. We find no discrepancies in these various estimates.

13. The Anderson-Nichols groundwater recharge estimate of 400 afy (acre-feet per year) corresponded to an annual rainfall total of 16 inches. Please note in Table 1 that our estimates of groundwater recharge for years having recorded rainfall amounts of approximately 16 inches (1998-1999 and 1999-2000) were 380 afy and 420 afy, respectively. This shows the consistency, not the discrepancy between our estimates and the work by Anderson-Nichols. In either case, the estimates of groundwater recharge exceed the projected annual production levels of 203 afy at buildout of the project.
14. The annual recharge rate is a function of the annual rainfall amount. The 0.22 acre-feet/acre annual recharge estimate contained in the 1996 water supply report for Cañada Woods North by Questa Engineering was based on prior work by Logan and Anderson-Nichols for the Monterra Ranch subdivision. It was used to provide a rough approximation of the annual recharge for an assumed average rainfall amount of about 17 in/yr. Please note (in Table 1) that for reporting years with annual rainfall amounts of 15.25 to 16.35 inches (1998-1999, 1999-2000, 2000-2001), the estimated annual recharge rate varied from 0.19 to 0.23 acre-feet/acre. For reporting year 2001-2002, with an annual rainfall of 11.42 inches, the estimated recharge rate was 0.15 acre-feet/acre. Todd Engineers' low estimate of 0.12 acre-feet/acre per year for the Canada Woods project area was a result of using a very high assumed evapotranspiration rate of 86% of annual rainfall.
15. All of the calculations in Table 1 are appropriate, with the provision that the term "average conditions" be clarified to mean the "running average" for the period of record, rather than the "long-term average". As previously stated, these data are presented as documentation of actual conditions as opposed to theoretical projections.
16. This acknowledges the lack of a north arrow and scale on Figure 1.
17. This acknowledges the comment regarding updated determination of water production capacity. In the future we will continue to update the water production estimates as information becomes available. However, where wells continue to meet demands without any significant change in water levels or other adverse effects, the original estimates by Logan will likely be retained. Thus far, this has been the case. We do not anticipate conducting pumping tests each year to recalibrate the production estimates for each well, and don't interpret this to be the intent of Condition #15.

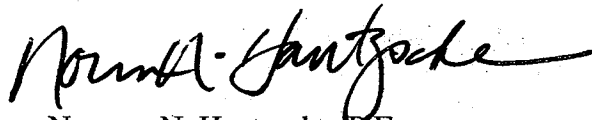
18. See response to comment #6.

Page 5
Ms. Farina
August 1, 2003

19. A copy of the water well production evaluation by Questa Engineering for HW-1 and HW-2 is provided in **Attachment D**. Please note that HW-2 serves as a backup to HW-1; the two wells are located in close proximity to one another.
20. Water use is expected to decline when MRMWC begins billing customers in January 2004. An audit of the water system will be conducted after billing has begun. See also response to comment #5.
21. Water billings for the Inclusionary Homes are planned to begin within the next six months. An example template water bill is provided in **Attachment B**.

I trust this is the information you require at this time. Please call if there are any questions.

Sincerely,



Norman N. Hantzsche, P.E.
Principal/Managing Engineer

xc: Michael Waxer, Carmel Development Company
Dave Fuller, WWD Corporation

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MONTERRA RANCH MUTUAL WATER COMPANY: GALLONS PER CONNECTION PER DAY, RY 1997 TO RY 2002

INCLUSIONARY	RY 1998												
	Dec-97	Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98	Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98
Inclusionary 1	85	155	246	162	156	189	205	156	162	156	189	205	156
Inclusionary 2	190	112	191	169	200	235	314	169	181	262	224	252	296
Inclusionary 3	196	120	181	262	224	252	296	224	155	193	225	213	225
Inclusionary 4	203	166	155	193	225	213	225	270	293	270	217	251	253
Inclusionary 5	154	224	293	270	217	251	253	180	121	158	293	301	300
Inclusionary 6	139	160	180	121	158	293	301	259	215	168	293	301	300
Inclusionary 7	210	151	259	215	168	293	301	53	16	30	11	132	132
Inclusionary 8	40	22	53	16	30	11	132	84	123	163	126	175	165
Inclusionary 9	84	123	163	126	175	165	165	31	112	64	102	151	151
Inclusionary 10	24	28	31	112	64	102	151	44	220	161	185	179	179
Inclusionary 11	0	17	44	220	161	185	179	1	4	4	8	10	10
Inclusionary 12	0	0	1	4	4	8	10	239	248	327	234	305	302
Inclusionary 13	80	239	248	327	234	305	302	178	216	215	206	248	265
Inclusionary 14	171	178	216	215	206	248	265	87	103	131	148	232	216
Inclusionary 15	39	87	103	131	148	232	216	184	261	210	207	288	345
Inclusionary 16	78	184	261	210	207	288	345	151	154	208	180	212	169
Inclusionary 17	144	151	154	208	180	212	169	1	14	15	17	117	117
Inclusionary 18	19	17	1	14	15	17	117	55	53	47	85	146	128
Inclusionary 19	55	53	47	85	146	128	128	82	64	89	90	180	284
Inclusionary 20	82	64	89	90	180	284	284	27	48	32	20	9	334
Inclusionary 21	27	48	32	20	9	334	334	88	185	63	138	128	356
Inclusionary 22	88	185	63	138	128	356	356	89	118	163	199	155	194
Inclusionary 23	89	118	163	199	155	194	194	119	94	149	515	672	284
Inclusionary 24	119	94	149	515	672	284	284	201	169	257	239	275	243
Inclusionary 25	201	169	257	239	275	243	243	8	13	33	76	523	292
Inclusionary 26	8	13	33	76	523	292	292	270	206	303	268	158	201
Inclusionary 27	270	206	303	268	158	201	201	109	97	100	166	91	236
Inclusionary 28	109	97	100	166	91	236	236	206	146	247	233	208	823
Inclusionary 29	206	146	247	233	208	282	278	123	78	89	103	84	121
Inclusionary 30	123	78	89	103	84	121	121	97	72	111	97	87	92
Inclusionary 31	97	72	111	97	87	92	129	204	141	228	186	129	245
Inclusionary 32	204	141	228	186	129	245	183	45	53	61	55	56	63
Inclusionary 33	45	53	61	55	56	63	63	192	111	173	150	194	311
Inclusionary 34	192	111	173	150	194	311	193	155	69	219	244	179	519
Inclusionary 35	155	69	219	244	179	519	519	136	133	128	117	205	143
Inclusionary 36	136	133	128	117	205	143	224	2	44	164	104	110	145
Inclusionary 37	2	44	164	104	110	145	207	110	46	96	71	55	133
Inclusionary 38	110	46	96	71	55	133	220	144	142	194	197	192	266
Inclusionary 39	144	142	194	197	192	266	266	152	139	181	132	93	158
Inclusionary 40	152	139	181	132	93	158	143	8	54	29	100	139	248
Inclusionary 41	8	54	29	100	139	248	248	181	126	196	201	157	260
Inclusionary 42	181	126	196	201	157	260	242						

NOTES:
NA = Not Available; Water meter data is not available due to meter failure or improper reading.

MONTERRA RANCH MUTUAL WATER COMPANY: GALLONS PER CONNECTION PER DAY, RY 1997 TO RY 2002

		RY 1998						
		Gallons per connection per day						
MARKET-RATE		Dec-97	Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98
	Market-Rate 1							
	Market-Rate 2							
	Market-Rate 3							
	Market-Rate 4							
	Market-Rate 5							
	Market-Rate 6							
	Market-Rate 7							
	Market-Rate 8							
	Market-Rate 9							
	Market-Rate 10							
	Market-Rate 11							
FIRE USE								
	Fire 1							
	Fire 2							
IRRIGATION								
	Irrigation 1 (Inclusionary)	63	4	0	0	0	0	0
	Irrigation 2 (Inclusionary)	2,017	0	0	0	7	7	10
CONSTRUCTION (TEMPORARY)								
	Temp. Metered Construct/Irig Connec 1							
	Temp. Metered Construct/Irig Connec 2							
	Temp. Metered Construct/Irig Connec 3							
	Temp. Metered Construct/Irig Connec 4							
	Temp. Metered Construct/Irig Connec 5							
	Temp. Metered Construct/Irig Connec 6							
	Temp. Metered Construct/Irig Connec 7							
	Temp. Metered Construct/Irig Connec 8							
	Temp. Metered Construct/Irig Connec 9							
COMMERCIAL								
	Commercial 1							
	Commercial 2							
	Commercial 3							
	Commercial 4							
	Commercial 5							
	Commercial 6							

NOTES:
 NA = Not Available; Water meter data is not available due to meter failure or improper reading.

MONTERRA RANCH MUTUAL WATER COMPANY: GALLONS PER CONNECTION PER DAY, RY 1997 TO RY 2002

INCLUSIONARY	RY 1999											
	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	
Inclusionary 1	222	228	206	158	191	190	187	149	288	227	213	
Inclusionary 2	229	284	214	159	128	113	168	94	220	288	335	
Inclusionary 3	272	241	222	113	259	261	159	134	135	137	241	
Inclusionary 4	214	235	257	235	156	193	145	120	174	218	305	
Inclusionary 5	293	199	246	200	126	135	135	112	121	136	164	
Inclusionary 6	253	363	322	168	166	176	218	186	164	232	370	
Inclusionary 7	272	575	55	231	199	198	207	163	225	213	221	
Inclusionary 8	172	170	171	169	157	135	65	61	70	145	89	
Inclusionary 9	167	135	142	129	127	258	201	133	137	162	154	
Inclusionary 10	292	137	181	181	211	160	193	155	170	193	202	
Inclusionary 11	180	178	139	143	163	237	197	169	152	173	157	
Inclusionary 12	11	21	15	15	16	16	17	12	10	9	13	
Inclusionary 13	369	339	344	283	293	312	296	255	288	281	271	
Inclusionary 14	311	267	282	298	205	273	266	238	246	235	283	
Inclusionary 15	227	222	249	207	206	238	255	165	261	248	217	
Inclusionary 16	346	397	374	344	316	264	250	211	245	267	254	
Inclusionary 17	217	186	255	178	429	216	163	169	161	199	286	
Inclusionary 18	121	78	151	78	37	9	16	20	13	57	115	
Inclusionary 19	178	189	148	111	121	143	147	120	138	145	115	
Inclusionary 20	280	207	184	147	76	89	102	100	124	494	437	
Inclusionary 21	536	461	369	341	135	111	61	41	59	168	271	
Inclusionary 22	295	583	NA	289	239	225	183	120	398	332	307	
Inclusionary 23	183	NA	1,441	212	166	365	274	195	217	287	282	
Inclusionary 24	315	345	319	239	221	137	453	12	59	213	297	
Inclusionary 25	495	311	431	304	265	314	259	243	242	297	311	
Inclusionary 26	309	355	361	353	348	220	290	243	258	366	363	
Inclusionary 27	285	261	246	167	152	146	144	159	150	192	14	
Inclusionary 28	653	1,093	679	433	85	136	152	113	280	392	558	
Inclusionary 29	279	259	293	218	161	206	192	155	203	217	213	
Inclusionary 30	287	79	146	110	91	113	84	63	83	85	117	
Inclusionary 31	123	142	204	184	91	82	140	75	99	103	163	
Inclusionary 32	207	274	344	157	150	179	172	90	135	209	248	
Inclusionary 33	51	53	59	66	59	62	63	45	53	57	56	
Inclusionary 34	244	338	278	156	124	152	140	116	162	191	295	
Inclusionary 35	658	523	390	305	198	208	196	158	180	360	378	
Inclusionary 36	249	270	272	395	238	140	157	130	157	227	279	
Inclusionary 37	228	268	218	122	74	119	88	75	88	153	221	
Inclusionary 38	141	145	175	138	83	192	87	83	83	61	105	
Inclusionary 39	944	221	253	256	199	221	215	153	192	188	186	
Inclusionary 40	155	166	203	168	148	196	170	135	146	149	137	
Inclusionary 41	282	196	401	269	94	172	102	71	114	94	215	
Inclusionary 42	299	253	222	157	127	125	120	123	225	201	476	

NOTES:
 NA = Not Available; Water meter data is not available due to meter failure or improper reading.

MONTERRA RANCH MUTUAL WATER COMPANY: GALLONS PER CONNECTION PER DAY, RY 1997 TO RY 2002

		RY 1999											
		Gallons per connection per day											
MARKET-RATE		Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	
	Market-Rate 1												
	Market-Rate 2												
	Market-Rate 3												
	Market-Rate 4												
	Market-Rate 5												
	Market-Rate 6												
	Market-Rate 7												
	Market-Rate 8												
	Market-Rate 9												
	Market-Rate 10												
	Market-Rate 11												
FIRE USE	Fire 1	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	
	Fire 2												
IRRIGATION	Irrigation 1 (Inclusionary)	105	2	1	2	155	1	3	1	0	0	0	
	Irrigation 2 (Inclusionary)	92	98	4	1	426	3	2	3	5	4	2	
CONSTRUCTION (TEMPORARY)	Temp. Metered Construc/Irrig Connec 1	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	
	Temp. Metered Construc/Irrig Connec 2												
	Temp. Metered Construc/Irrig Connec 3												
	Temp. Metered Construc/Irrig Connec 4												
	Temp. Metered Construc/Irrig Connec 5												
	Temp. Metered Construc/Irrig Connec 6												
	Temp. Metered Construc/Irrig Connec 7												
	Temp. Metered Construc/Irrig Connec 8												
	Temp. Metered Construc/Irrig Connec 9												
COMMERCIAL	Commercial 1	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	
	Commercial 2	0	0	0	0	0	68	62	0	0	0	1,222	
	Commercial 3												
	Commercial 4												
	Commercial 5												
	Commercial 6												

NOTES:
NA = Not Available; Water meter data is not available due to meter failure or improper reading.

MONTERRA RANCH MUTUAL WATER COMPANY; GALLONS PER CONNECTION PER DAY, RY 1997 TO RY 2002

INCLUSIONARY	RY 2000											
	Gallons per connection per day											
	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Jan-00	Feb-00	Mar-00	Apr-00	May-00	Jun-00
Inclusionary 1	273	379	165	195	161	191	189	163	224	195	219	276
Inclusionary 2	428	479	224	265	169	186	161	212	225	213	267	299
Inclusionary 3	208	381	328	224	213	157	170	172	176	164	308	395
Inclusionary 4	387	546	290	181	189	229	156	162	219	203	256	371
Inclusionary 5	180	382	300	203	217	182	123	137	179	170	187	222
Inclusionary 6	508	725	360	233	140	174	187	174	188	313	360	643
Inclusionary 7	339	522	281	182	183	168	152	139	184	226	283	283
Inclusionary 8	131	305	129	172	81	31	79	79	98	97	111	133
Inclusionary 9	198	296	126	191	126	112	130	140	165	175	175	216
Inclusionary 10	138	302	133	129	109	112	97	108	144	118	238	257
Inclusionary 11	195	313	134	196	127	186	131	134	198	126	162	261
Inclusionary 12	15	151	119	111	112	140	106	109	117	114	134	119
Inclusionary 13	362	561	354	217	263	281	284	286	284	286	302	124
Inclusionary 14	277	517	391	288	297	351	370	391	380	296	275	132
Inclusionary 15	285	470	262	164	212	188	167	197	211	175	172	230
Inclusionary 16	365	693	599	450	273	361	266	239	342	334	399	326
Inclusionary 17	435	537	333	222	143	195	288	174	169	214	281	419
Inclusionary 18	145	247	132	122	157	140	76	8	53	227	237	330
Inclusionary 19	125	190	132	94	96	95	93	95	104	90	90	120
Inclusionary 20	653	966	486	463	277	228	146	103	274	388	352	536
Inclusionary 21	345	630	135	367	172	211	147	70	117	117	215	NA
Inclusionary 22	431	661	446	316	421	301	157	142	239	307	342	252
Inclusionary 23	296	244	268	249	312	318	225	184	239	242	287	209
Inclusionary 24	358	556	339	212	218	162	222	167	143	258	313	233
Inclusionary 25	374	792	294	279	274	283	250	288	317	330	310	280
Inclusionary 26	424	631	350	337	290	194	156	227	269	300	388	279
Inclusionary 27	395	411	177	266	159	167	147	135	291	270	280	197
Inclusionary 28	758	1,231	477	413	371	427	157	60	291	409	459	459
Inclusionary 29	356	640	311	277	325	428	303	298	344	342	458	253
Inclusionary 30	146	250	148	93	86	97	75	76	130	100	159	104
Inclusionary 31	242	293	208	144	274	225	188	207	209	303	337	212
Inclusionary 32	248	609	379	271	274	274	225	188	209	303	337	212
Inclusionary 33	62	115	65	57	64	65	56	53	55	50	52	53
Inclusionary 34	372	626	323	217	191	211	148	151	366	336	457	239
Inclusionary 35	527	NA	1,343	1,172	377	183	192	161	282	281	336	317
Inclusionary 36	334	738	397	283	221	203	198	120	240	212	237	204
Inclusionary 37	292	504	248	170	108	193	115	89	224	187	304	178
Inclusionary 38	155	360	119	108	106	150	154	174	222	226	286	125
Inclusionary 39	285	459	253	212	203	207	185	192	181	231	261	200
Inclusionary 40	198	88	278	317	145	145	146	151	172	154	166	174
Inclusionary 41	240	436	303	218	107	151	83	53	139	220	301	207
Inclusionary 42	438	721	283	262	223	327	115	161	272	360	436	246

NOTES:
NA = Not Available; Water meter data is not available due to meter failure or improper reading.

MONTERRA RANCH MUTUAL WATER COMPANY: GALLONS PER CONNECTION PER DAY, RY 1997 TO RY 2002

RY 2000												
Gallons per connection per day												
MARKET-RATE	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99	Jan-00	Feb-00	Mar-00	Apr-00	May-00	Jun-00
Market-Rate 1	0	422	667	595	962	320	45	231	414	832	1,088	1,119
Market-Rate 2	0	0	0	0	0	0	59	331	544	340	374	1,876
Market-Rate 3	0	0	0	0	0	0	0	0	1	576	748	1,985
Market-Rate 4												
Market-Rate 5												
Market-Rate 6												
Market-Rate 7												
Market-Rate 8												
Market-Rate 9												
Market-Rate 10												
Market-Rate 11												
FIRE USE												
Fire 1												
Fire 2												
IRRIGATION												
Irrigation 1 (Inclusionary)	0	0	0	0	0	0	0	0	113	81	264	346
Irrigation 2 (Inclusionary)	6	6	3	3	7	8	0	22	172	197	233	153
CONSTRUCTION (TEMPORARY)												
Temp. Metered Construct/Irrig Connec 1												
Temp. Metered Construct/Irrig Connec 2												
Temp. Metered Construct/Irrig Connec 3												
Temp. Metered Construct/Irrig Connec 4												
Temp. Metered Construct/Irrig Connec 5												
Temp. Metered Construct/Irrig Connec 6												
Temp. Metered Construct/Irrig Connec 7												
Temp. Metered Construct/Irrig Connec 8												
Temp. Metered Construct/Irrig Connec 9												
COMMERCIAL												
Commercial 1	1,072	1,209	1,453	1,256	1,092	106	16	16	14	374	1,325	1,487
Commercial 2	0	0	0	0	0	0	0	0	0	0	0	14
Commercial 3	0	0	0	0	0	0	0	0	0	0	0	0
Commercial 4	0	0	0	0	0	0	0	0	0	0	0	0
Commercial 5												
Commercial 6												

NOTES: NA = Not Available; Water meter data is not available due to meter failure or improper reading.

MONTERRA RANCH MUTUAL WATER COMPANY: GALLONS PER CONNECTION PER DAY, RY 1997 TO RY 2002

RY 2001

INCLUSIONARY	Gallons per connection per day														
	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01
Inclusionary 1	230	408	335	242	209	209	241	213	230	194	316	496	335	321	345
Inclusionary 2	227	368	230	236	208	184	162	252	266	217	370	397	372	320	343
Inclusionary 3	199	350	311	228	198	190	185	196	199	169	363	388	282	229	369
Inclusionary 4	236	352	256	235	161	220	174	190	190	215	338	445	383	361	321
Inclusionary 5	173	231	160	130	129	147	119	166	149	148	176	221	189	198	199
Inclusionary 6	336	441	257	178	167	155	154	131	181	191	559	415	499	401	397
Inclusionary 7	224	250	133	117	183	190	172	106	160	181	203	227	265	269	218
Inclusionary 8	101	117	137	106	103	125	107	103	119	110	147	130	120	108	124
Inclusionary 9	159	197	170	181	140	181	128	170	248	294	516	559	533	324	458
Inclusionary 10	222	351	231	185	157	192	157	128	142	186	233	194	139	236	268
Inclusionary 11	177	355	245	142	134	166	115	154	167	184	308	261	200	259	364
Inclusionary 12	124	141	110	85	97	128	105	107	106	107	103	116	109	113	119
Inclusionary 13	486	352	311	275	324	316	304	318	326	306	373	370	330	348	397
Inclusionary 14	485	407	524	473	255	265	242	244	278	264	333	372	298	261	303
Inclusionary 15	185	252	168	176	207	185	211	168	125	156	182	182	158	152	157
Inclusionary 16	525	725	495	325	320	388	259	242	261	267	415	400	540	634	631
Inclusionary 17	217	342	287	211	223	248	149	187	173	145	304	320	287	263	278
Inclusionary 18	255	260	213	71	48	9	40	10	45	104	153	306	163	166	95
Inclusionary 19	90	101	101	123	132	108	65	19	14	24	25	27	21	15	20
Inclusionary 20	512	653	455	189	127	142	124	91	234	244	366	554	450	507	475
Inclusionary 21	643	327	263	208	189	196	134	130	183	209	278	290	265	270	254
Inclusionary 22	600	509	391	403	308	378	429	380	215	316	387	482	507	622	645
Inclusionary 23	386	290	252	243	259	304	262	248	275	222	258	325	291	235	200
Inclusionary 24	377	373	287	202	139	208	367	372	319	387	503	398	428	499	501
Inclusionary 25	405	382	384	281	219	224	244	243	318	241	554	480	542	527	442
Inclusionary 26	450	379	276	321	279	269	309	308	336	319	474	526	534	483	430
Inclusionary 27	519	372	304	173	208	246	176	182	225	284	388	448	402	284	369
Inclusionary 28	707	652	424	241	111	101	102	141	210	172	786	1,154	545	577	425
Inclusionary 29	688	505	512	389	366	446	410	313	304	491	484	567	592	671	663
Inclusionary 30	354	200	148	112	143	128	104	84	95	87	155	158	143	180	220
Inclusionary 31	257	139	104	107	74	67	91	108	95	66	97	156	139	132	187
Inclusionary 32	388	307	302	271	275	265	214	196	224	192	312	321	357	353	395
Inclusionary 33	143	139	105	97	105	107	101	86	64	72	165	215	125	141	159
Inclusionary 34	452	387	315	282	268	209	194	201	201	223	344	540	375	335	330
Inclusionary 35	509	259	260	193	186	178	153	127	155	207	436	785	550	430	354
Inclusionary 36	489	276	207	183	172	143	143	120	143	157	242	306	214	216	196
Inclusionary 37	505	358	262	110	110	82	89	105	122	123	290	378	282	310	228
Inclusionary 38	587	380	297	111	94	144	85	74	113	114	278	290	220	210	231
Inclusionary 39	374	274	232	253	177	238	224	216	203	255	297	246	215	181	221
Inclusionary 40	243	229	202	199	122	143	166	140	149	165	172	153	187	210	200
Inclusionary 41	332	387	267	196	72	158	63	84	147	94	297	321	353	243	469
Inclusionary 42	738	521	425	380	309	296	234	170	241	262	579	783	630	428	404

NOTES:
NA = Not Available; Water meter data is not available due to meter failure or improper reading.

MONTERRA RANCH MUTUAL WATER COMPANY: GALLONS PER CONNECTION PER DAY, RY 1997 TO RY 2002

RY 2001

	Gallons per connection per day															
	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	
MARKET-RATE																
Market-Rate 1	1,169	843	328	89	251	212	146	207	86	115	189	247	484	277	271	
Market-Rate 2	1,377	1,723	1,222	740	684	837	873	1,148	1,275	1,087	1,629	2,029	1,558	1,859	1,975	
Market-Rate 3	369	779	1,760	167	198	378	432	127	38	29	402	5,959	1,231	882	739	
Market-Rate 4	0	0	0	0	0	0	1	91	269	478	1,444	2,801	2,164	2,027	1,988	
Market-Rate 5	0	0	0	0	0	0	0	0	0	3	29	180	63	193	503	
Market-Rate 6	0	0	29	101	42	75	242	117	283	184	234	175	127	914	129	
Market-Rate 7	0	0	114	10	4	46	174	159	230	277	764	1,072	877	46	850	
Market-Rate 8	0	0	4	36	51	16	1	5	12	6	5	24	16	98	184	
Market-Rate 9	0	0	0	0	0	0	0	0	0	0	9	49	99	433	81	
Market-Rate 10	0	0	0	0	0	0	0	0	0	0	0	0	0	3	115	
Market-Rate 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	83	
FIRE USE																
Fire 1	1	0	120	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire 2	1	16	0	0	1	0	0	0	0	0	0	0	0	0	0	0
IRRIGATION																
Irrigation 1 (Inclusionary)	236	346	313	233	261	259	244	71	0	0	308	366	301	2,207	250	
Irrigation 2 (Inclusionary)	145	192	271	257	5	11	1	10	2	2	30	0	0	133	458	
CONSTRUCTION (TEMPORARY)																
Temp. Metered Construct/Irrig Connec 1	0	0	0	30	99	38	50	3	60	86	154	177	167	158	177	
Temp. Metered Construct/Irrig Connec 2	0	0	0	0	0	0	0	36	197	153	264	914	118	1,891	198	
Temp. Metered Construct/Irrig Connec 3	0	0	0	0	0	0	0	0	0	0	0	4	0	146	116	
Temp. Metered Construct/Irrig Connec 4	0	0	0	0	0	0	0	0	0	0	46	0	0	0	0	
Temp. Metered Construct/Irrig Connec 5	0	0	0	0	0	0	0	0	538	0	0	0	0	167	258	
Temp. Metered Construct/Irrig Connec 6	0	0	0	0	0	0	0	0	0	0	0	40	115	61	166	
Temp. Metered Construct/Irrig Connec 7	0	0	0	0	0	0	0	0	46	65	75	75	84	91	79	
Temp. Metered Construct/Irrig Connec 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	110	
Temp. Metered Construct/Irrig Connec 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
COMMERCIAL																
Commercial 1	1,081	1,586	891	7	10	28	8	11	7	8	12	2,003	769	13	10	
Commercial 2	111	82	300	64	308	285	320	250	345	379	408	553	296	258	249	
Commercial 3	1,904	3,885	3,903	2,745	2,774	3,042	1,755	1,529	2,461	2,674	4,429	5,500	5,458	4,697	4,642	
Commercial 4																
Commercial 5																
Commercial 6																

NOTES:
NA = Not Available; Water meter data is not available due to meter failure or improper reading.

MONTERRA RANCH MUTUAL WATER COMPANY: GALLONS PER CONNECTION PER DAY, RY 1997 TO RY 2002

INCLUSIONARY	RY 2002											
	Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02
Inclusionary 1	319	169	115	241	194	245	254	346	419	427	424	348
Inclusionary 2	243	277	177	145	269	219	331	332	322	351	332	321
Inclusionary 3	303	194	155	187	199	215	251	496	571	371	408	382
Inclusionary 4	270	231	213	246	252	229	284	329	506	459	360	410
Inclusionary 5	172	158	132	170	147	145	146	147	74	143	158	0
Inclusionary 6	291	213	168	191	185	173	510	337	455	596	346	409
Inclusionary 7	148	137	165	212	133	131	157	182	257	239	215	277
Inclusionary 8	106	111	49	88	113	104	112	101	122	139	191	129
Inclusionary 9	278	135	106	118	146	167	418	389	332	267	366	324
Inclusionary 10	229	258	182	166	114	131	178	476	389	323	506	516
Inclusionary 11	310	288	152	96	280	259	219	344	467	442	342	336
Inclusionary 12	108	123	103	119	119	113	133	111	127	114	117	116
Inclusionary 13	317	334	397	438	272	310	319	313	479	370	389	388
Inclusionary 14	272	262	181	253	244	262	293	302	455	460	425	496
Inclusionary 15	135	165	142	167	166	160	151	169	215	164	151	149
Inclusionary 16	589	470	241	370	260	308	353	398	535	398	662	588
Inclusionary 17	247	242	75	139	132	187	162	300	439	390	397	370
Inclusionary 18	52	60	55	71	60	79	68	54	71	135	126	174
Inclusionary 19	20	16	16	22	17	20	20	27	21	40	188	61
Inclusionary 20	376	197	135	142	261	235	297	367	513	448	412	500
Inclusionary 21	281	188	73	149	336	167	228	223	330	280	254	294
Inclusionary 22	582	623	81	350	266	625	677	687	677	678	587	669
Inclusionary 23	149	203	182	203	201	231	281	376	339	178	186	239
Inclusionary 24	434	456	183	256	199	279	301	371	454	448	436	505
Inclusionary 25	316	266	197	205	234	287	325	372	542	472	466	451
Inclusionary 26	398	368	223	260	293	277	357	411	459	487	425	436
Inclusionary 27	340	220	233	309	275	410	344	410	457	376	370	374
Inclusionary 28	341	174	142	108	120	75	281	359	475	418	402	373
Inclusionary 29	446	434	284	322	347	406	489	574	677	882	917	930
Inclusionary 30	223	140	69	88	90	104	135	144	217	175	174	166
Inclusionary 31	193	172	74	79	78	97	165	257	363	413	409	328
Inclusionary 32	372	364	296	359	400	251	382	332	334	379	350	339
Inclusionary 33	182	98	61	65	69	78	115	106	162	173	170	217
Inclusionary 34	271	300	182	266	237	269	310	270	511	519	365	542
Inclusionary 35	301	255	183	251	202	193	248	342	738	576	711	566
Inclusionary 36	177	198	126	151	149	126	202	251	277	283	294	267
Inclusionary 37	206	110	98	99	103	124	227	345	381	356	281	229
Inclusionary 38	164	102	81	89	87	106	116	235	279	251	234	213
Inclusionary 39	178	217	193	192	204	214	231	218	279	194	224	214
Inclusionary 40	286	186	139	153	151	116	147	214	238	229	195	203
Inclusionary 41	261	101	40	49	47	84	139	306	304	429	323	266
Inclusionary 42	421	236	134	249	291	293	475	665	684	618	546	600

NOTES:
 NA = Not Available; Water meter data is not available due to meter failure or improper reading.

MONTERRA RANCH MUTUAL WATER COMPANY: GALLONS PER CONNECTION PER DAY, RY 1997 TO RY 2002

		RY 2002											
		Gallons per connection per day											
MARKET-RATE		Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02
Market-Rate 1		422	200	233	250	307	356	337	271	363	435	617	723
Market-Rate 2		1,831	907	140	184	581	571	1,789	1,457	1,753	1,917	3,091	3,241
Market-Rate 3		392	44	7	11	37	49	75	342	691	962	730	838
Market-Rate 4		2,542	688	165	231	172	124	1,113	1,765	1,630	1,142	1,714	2,678
Market-Rate 5		585	84	75	69	104	258	433	487	853	1,229	1,441	3,368
Market-Rate 6		57	43	89	70	119	90	104	129	201	337	424	508
Market-Rate 7		761	928	502	664	678	810	889	855	1,409	1,095	1,095	1,175
Market-Rate 8		111	211	51	61	140	350	260	982	937	937	1,084	1,305
Market-Rate 9		13	3	2	4	13	10	20	189	115	1	47	193
Market-Rate 10		8	141	100	108	130	313	106	37	51	173	21	223
Market-Rate 11		4	17	0	9	3	7	21	104	120	0	53	43
FIRE USE		Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02
Fire 1		0	0	1	0	0	0	0	0	0	0	0	1
Fire 2		0	0	0	1	0	0	0	0	0	0	0	0
IRRIGATION		Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02
Irrigation 1 (Inclusionary)		137	98	37	35	3	0	0	0	106	227	566	323
Irrigation 2 (Inclusionary)		358	103	84	103	94	92	93	123	70	356	793	477
CONSTRUCTION (TEMPORARY)		Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02
Temp. Metered Construc/Irrig Conneec 1		210	87	26	42	76	101	128	154	269	293	293	322
Temp. Metered Construc/Irrig Conneec 2		0	0	0	0	0	0	0	0	0	0	0	0
Temp. Metered Construc/Irrig Conneec 3		155	181	142	79	0	0	0	35	117	86	159	116
Temp. Metered Construc/Irrig Conneec 4		220	229	191	215	218	231	233	159	55	60	560	1,099
Temp. Metered Construc/Irrig Conneec 5		214	255	247	247	247	273	253	819	819	429	571	615
Temp. Metered Construc/Irrig Conneec 6		220	244	178	217	202	229	125	0	0	0	0	0
Temp. Metered Construc/Irrig Conneec 7		0	0	0	0	0	0	0	0	0	0	0	0
Temp. Metered Construc/Irrig Conneec 8		0	0	0	0	0	0	0	0	0	0	0	0
Temp. Metered Construc/Irrig Conneec 9		394	74	61	85	95	101	107	83	92	90	269	0
COMMERCIAL		Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02
Commercial 1		159	16	12	15	17	17	16	39	37	942	634	391
Commercial 2		266	303	169	260	289	229	268	365	310	344	281	249
Commercial 3		4,319	2,587	1,823	1,758	1,751	2,697	3,393	3,613	5,183	4,868	4,568	4,945
Commercial 4		114	7	5	8	10	9	11	10	10	11	12	9
Commercial 5		0	0	0	0	0	23	18	22	73	103	100	48
Commercial 6		345	78	67	105	56	184	284	975	2,464	1,804	1,716	1,710

NOTES:
NA = Not Available. Water meter data is not available due to meter failure or improper reading.

Schedule No. 1

GENERAL METERED SERVICE

APPLICABILITY

Applicable to all metered water service.

TERRITORY

The territory within the Canada Woods and Monterra Ranch developments in Monterey County, and as described on the service area map.

RATES

Quantity Rate (Non-inclusionary housing customers):

All Water, per 100 cubic feet.....\$4.10

Quantity Rate (Inclusionary housing customers):

Per 100 cubic feet

First 800 cubic feet.....\$1.8374

Next 800 cubic feet.....\$2.4498

Next 1,600 cubic feet.....\$4.8996

Over 3,200 cubic feet.....\$9.7992

Service Charge (Non-inclusionary housing customers):

Per Meter Per Month
Service Charge

For 5/8 & 3/4 - inch meter \$ 38.55

For 1 - inch meter 96.38

For 1-1/2 - inch meter 192.75

For 2 - inch meter 308.40

Service Charge (Inclusionary housing customers):

Per Meter Per Month
Service Charge

For 5/8 and 1- inch meter \$ 6.37

The Service Charge is applicable to all metered service. It is a readiness-to-serve charge to which is added the charge, computed at the Quantity Rate, for water used during the month.

SPECIAL CONDITIONS

- 1. All bills are subject to the reimbursement fee set forth in Schedule No. UF.

(To be inserted by Water Utility)

Advice Letter No. 1

Decision No. 02-04-006

Issued By

R. Alan Williams

NAME

Manager

TITLE

(To be inserted by Cal. P.U.C.)

Date Filed MAY 8 2002

Effective MAY 13 2002

Resolution No.

ATTACHMENT B

Form No. 3

BILL FOR SERVICE

(continued: reverse side of bill)

"This bill is due and payable upon date of presentation. It will become past due if not paid within 19 days from the date of mailing.

Should the amount of this bill be questioned, an explanation should be requested from the utility. If an explanation satisfactory to the customer is not made by the utility and the bill is still questioned, the customer may deposit with the California Public Utilities Commission, Consumer Affairs Branch, 505 Van Ness Avenue, Room 2003, San Francisco, California 94102, (telephone numbers are: public (415) 703-1170 or 1 (800) 649-7570, hearing impaired (TDD) (415) 703-2032) the amount of the bill to avoid discontinuance of service. Make remittance payable to the "California Public Utilities Commission" and attach the bill and a statement setting forth the basis for the dispute of the amount of the bill. The Commission will review the basis of the billed amount and disburse the deposit in accordance with its findings."

The Commission will not, however, accept deposits when the dispute appears to be over matters that do not directly relate to the accuracy of the bill. Such matters include the quality of a utility's service, general level of rates, pending rate applications, and source of fuel or power.

ATTACHMENT B

BILL FOR SERVICE

REMIT TO: MAIL TO:	ACCOUNT NUMBER	METER NUMBER
	DATE PAYMENT DUE	
	PLEASE PAY THIS AMOUNT	

TEAR ALONG DOTTED LINE AND REMIT WITH YOUR PAYMENT

CHARGES

SERVICE ADDRESS	ACCOUNT NUMBER	BILLING DATE	PERIOD	PAY THIS AMOUNT
			FROM TO	

Item	Date	Description	Amount
			TOTAL \$

See Reverse Side of Bill

BILLING DATE		METER READINGS	USAGE*	PLEASE PAY THIS AMOUNT \$
		PRIOR YEAR'S USAGE:		

*MULTIPLY BY 748 GALLON/100 CUBIC FOOT

ATTACHMENT C

Table 1
Buildout Status at Monterra Ranch and Cañada Woods North

Connection Type	Number of Connections		Percent Buildout
	Existing	Buildout	
Monterra Ranch			
Inclusionary	42	42	100%
Single Family Unit	11	162	6.8%
w/ Caretaker unit	1	162	0.6%
Ranch Lot	0	9	0%
w/ Caretaker unit	0	9	0%
w/ Senior unit	0	9	0%
Gatehouse ^a	1	1	100%
Misc. Non-residential ^b	12	10	120%
Cañada Woods North			
Single Family Units	0	34	0%
w/ Caretaker unit	0	17	0%
Maintenance Center	1	1	100%
Club House	1	1	100%
w/ Member suites	4	12	33.3%
Fitness (Recreation) Center	0	1	0%
Equestrian Center	0	1	0%
Misc. Non-residential ^c	5	10	50%

^a Mid-Gate Guard House and Entry at Via Malpaso near Olmsted

^b Includes: Temporary Irrigation (9); Inclusionary Irrigation (2); Sales Office (1)

^c Includes: Fire Use (2); Fairway Bathrooms (2); Gatehouse (1)



November 29, 2001

Ms. Derinda Messenger
 Lombardo & Gillis, PLC
 P.O. Box 2119
 Salinas, CA 93902-2119

Subject: Water Well Production Evaluation for Monterra Ranch High Well #1 and #2

Dear Ms. Messenger:

At your request I have reviewed the pumping test data, well logs and related correspondence concerning the Monterra Ranch Water Company High Wells #1 and #2. It is my understanding that the Monterey County Division of Environmental Health has questioned the ability of these wells to provide sufficient capacity to meet the water supply needs of the subdivision, and requested that the pumping tests be repeated. The County has expressed concern that the two wells, which are located less than 100 feet from each other and were tested in different years, did not demonstrate the same pumping rate. The County is also concerned that because of the close proximity of the two wells, that they may have a draw-down influence on one another which would adversely affect the respective production capacities. I am in agreement with the County that the two wells influence each other. However, it is not necessary to re-run the pumping tests to verify the sustained yielded and the interference between the two wells; this can be determined from the results of the 72-hour pumping tests that have been run on the two wells using standard well hydraulic calculations. Following is my evaluation of the pumping test data for the two wells:

Water Well Characteristics

High Wells #1 and #2 (HW1 and HW2) are located approximately 86-feet from one another, on the north side and close to Saucito Ridge, the watershed divide that separates drainages to Carmel Valley and Canyon del Rey. The ground elevation at the wells is approximately 790 feet above sea level. The construction details of the two wells are summarized in **Table 1**, based on information from the Well Completion Reports.

**Table 1
 Water Well Characteristics**

<i>Characteristics</i>	<i>High Well #1</i>	<i>High Well #2</i>
Casing	Steel/PVC	Steel
Depth of Well Seal	120'	380'
Screened Depth	360' to 900'	380' - 880'
Total Well Depth	900'	880'
Static Water Depth (Oct. 2001)	560'	560'

ATTACHMENT D

Pumping Tests

A 72-hour constant rate pumping test was completed for each of the well. HW1 was tested in October 1999; HW2 was tested in October 2001. During the testing of HW2, HW1 was used as a monitoring well. The pertinent data from the pumping tests are summarized in **Table 2**. Semi-log plots of time-drawdown and recovery data for HW1 and HW2 as pumping wells and for HW1 as a monitoring well are included as **Attachment A**.

Table 2
Pumping Test Data
for Monterra Ranch Water Company High Wells #1 and #2

Test	High Well #1	High Well #2
Date of Pumping Test	October 4-8, 1999	October 8-14, 2001
Total Pumping Duration (hours)	72:43	72
Total Volume Pumped (gallons)	1,413,533	1,018,052
Average Pumping Rate (gpm)	327	235
Initial Depth to Water (feet)	474.55	560.3
Water Level at End of Test (feet)	528.45	594.8
Maximum Drawdown Achieved (feet)	53.9	34.5

Data Evaluation

The pumping data for the two wells were evaluated from the time-drawdown data for the pumping wells and monitoring well using the Theis Non-equilibrium Equation. This method of analysis is based on an idealized aquifer having uniform properties in all directions and infinite areal extent, which does not occur in the real world. The results cannot be considered definitive, Absolute@ determinations. However, the method is extremely useful and can be applied to obtain reasonable approximation of aquifer conditions, as long as the limitations are recognized and the results are used cautiously, i.e., with an appropriate factor of safety. In my analysis, the Theis method was used to determine aquifer transmissivity and storativity values, from which estimates were made of

maximum production capacity for the HW1 and HW2, and draw-down effects under different assumed pumping scenarios.

1. Transmissivity. Transmissivity (T) is measure of how much water will flow through an aquifer, expressed in terms of gallons per day per foot (gpd/ft). Transmissivity of the aquifer, in the immediate area of the pumping well and monitoring well, can be calculated from the time-drawdown and recovery data according to the following formula:

$$T = \frac{264 Q}{ds}$$

Where:

T = Transmissivity, in gpd/ft

Q = Constant pumping rate, in gpm

ds = Drawdown in the pumping well for one log cycle, in feet

The transmissivity for HW1 and HW2 was determined from the time-drawdown data and above equation to range from about 4,300 gpd/ft to 5,200 gpd/ft (see **Attachment A**). These values are indicative of a highly productive and permeable water-bearing zone. Aquifer transmissivities of less than 1,000 gpd/ft are considered suitable for low-yield uses; transmissivities over 10,000 gpd/ft are typical in aquifers supporting large-production wells for municipal and industrial uses.

2. Storativity. Storativity (or "coefficient of storage") is a measure of the amount of water that can be drawn or drained from an aquifer. For an unconfined aquifer it is equivalent to the "specific yield" or "drainable voids". Storativity is estimated most accurately from the drawdown data at a monitoring well. Using the drawdown data for HW1 during the pumping of HW2 (Oct. 2001), the storativity was determined to be approximately 0.007, which is typical of the fractured shale formation from which HW1 and HW2 draw water. The supporting calculations are provided in **Attachment B**.

3. Sustained Yield. The sustained yield or production capacity for HW1 and HW2 was estimated using the Theis Non-equilibrium Equation. Calculations were made for each well pumping alone, with the other well assumed to be idle. The calculations were made using a transmissivity value of 4,900 gpd/ft (determined from the HW1 monitoring well data) and for the assumption of an extended drought period; i.e., no aquifer recharge for a period of 18 months (540 days). The other key assumption was that the aquifer thickness available to each of the wells is equal to approximately 2/3 of the total aquifer thickness, as determined based on the water level (560 feet below ground surface) at the time of the October 2001 pumping test of HW2. For HW1 the available aquifer thickness was

determined to be $900' - 560' = 340'$, and the available thickness is $2/3 \times 340' = 227'$. For HW2 the available aquifer thickness was determined to be $880' - 560' = 320'$, and the available thickness is $2/3 \times 320' = 213'$.

By this analysis, the calculation of yield gives the approximate rate of pumping that can be sustained over an 18-month period, with continuous pumping (24 hours per day), from each well, without causing the water table to drop more than $2/3$ of the available aquifer thickness (i.e., 227 feet and 213 feet, respectively). The resulting theoretical well yields calculated by this method are as follow:

- High Well #1 - 507 gpm
- High Well #2 - 477 gpm

4. **Well Interference.** If the two wells are pumped concurrently they will interfere with the production capacity the other. The drawdown effect on each well is additive; i.e., the effect on each well is due to pumping the well itself plus the drawdown effect from the other well. Using the same assumptions as for the sustained yield analysis above (i.e., 18-month extended dry period, transmissivity of 4,900 gpd/ft) the drawdown at each of the wells was determined based on the assumption that the two wells are pumped together, continuously, at the approximate testing rates of 320 gpm for HW1 and 235 gpm for HW2, for a combined production of 555 gpm. The resulting drawdown at the each well was calculated to be as

- High Well #1 - 196 feet (vs 227' "available")
- High Well #2 - 177 feet (vs 213' "available")

As indicated the theoretical drawdown at each well pumping at the respective testing rates would not result in a drawdown that exceeds the "available" aquifer thickness.

Conclusions

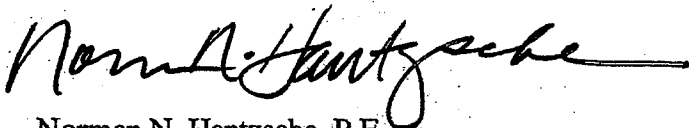
My conclusions from this analysis are that the two wells pumping independently are each potentially capable of producing approximately 500 gpm for a sustained period. Pumping together, the analysis indicates that the two well are capable of producing in excess of 550 gpm for a sustained period. The required production capacity for the project is 187,000 gpd, or approximately 130 gpm. With a theoretical production capacity of as much as 550 gpm from HW1 and HW2, less than 25% of the available capacity of the two wells ($0.25 \times 550 = 137$ gpm) would be required to meet the project water demand. It is common practice in fractured rock formations to apply a generous safety factor to the results of pumping test data analysis, such as a 25% "rule of thumb" limitation. The data from the pumping of HW1 and HW2 indicate that these two wells meet the "25%" criterion and, therefore, clearly demonstrate suitable source capacity for the project. I have spoken with Steve Setodeh of the Department of Health Services, Drinking Water Branch, regarding this analysis. He indicated his

Page 5
Ms. Messenger
November 29, 2001

agreement that the existing pumping data should be analyzed fully and combined with hydrological-engineering judgment, experience and a reasonable safety factor to assess the production capacity for wells in fractured rock-shale formations. He could not comment on the specifics of my analysis without further review, but he generally agreed with the approach.

I trust this is the information you require at this time. Please call if there are any questions.

Sincerely,



Norman N. Hantzsche, P.E.
Principal/Managing Engineer

xc: Michael Waxer, Carmel Development Company
Dave Fuller, WWD Corporation

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