UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical Results of 78 Water Samples from Domeland Wilderness and Adjacent Further Planning Areas (RARE II), California

By

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.

Mineral Surveys

Wilderness Studies Related to Bureau of Land Management

The Federal Land Policy and Management Act (Public Law 94-579, Oct. 21, 1976), requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral resource potential. Results must be made available to the public and be submitted to the Administration and the Congress. This report presents the results of a mineral survey of the Domeland Wilderness and adjacent Further Planning Areas (RARE II), California.

CONTENTS

Page

Introduction---------- 1

Sample collection techniques---------- 3

Analytical techniques---------- 4

Results---------- 6

Acknowledgments---------- 13

References cited---------- 14

ILLUSTRATIONS

Figure 1. Index map showing location of Domeland Wilderness and adjacent Further Planning Areas (RARE II), California--- 2

2. Sample locality map of Domeland Wilderness and adjacent Further Planning Areas (RARE II), California---------- 7

TABLES

Table 1. Analytical methods used for water analyses, Domeland Wilderness and adjacent Further Planning Areas (RARE II), California---------- 5

2. Water analyses from Domeland Wilderness and adjacent Further Planning Areas (RARE II), California---------- 8

3. Summary of the chemical analyses of 78 water samples, Domeland Wilderness and adjacent Further Planning Areas (RARE II), California---------- 12

INTRODUCTION

To aid in the mineral resource appraisal of the Domeland Wilderness and adjacent Further Planning Areas (RARE II), California, 78 water samples were collected from 8 springs and 70 surface stream, during June 1979. Figure 1 is an index map of the area.

Each water sample was analyzed for calcium, magnesium, sodium, potassium, lithium, silica, alkalinity as bicarbonate, sulfate, chloride, fluoride, zinc, copper, molybdenum, arsenic, and uranium. Specific conductance, pH, and temperature were also measured on each sample.

The location and results of analysis for each of the 78 samples along with a statistical summary of these analytical results are presented in this report.

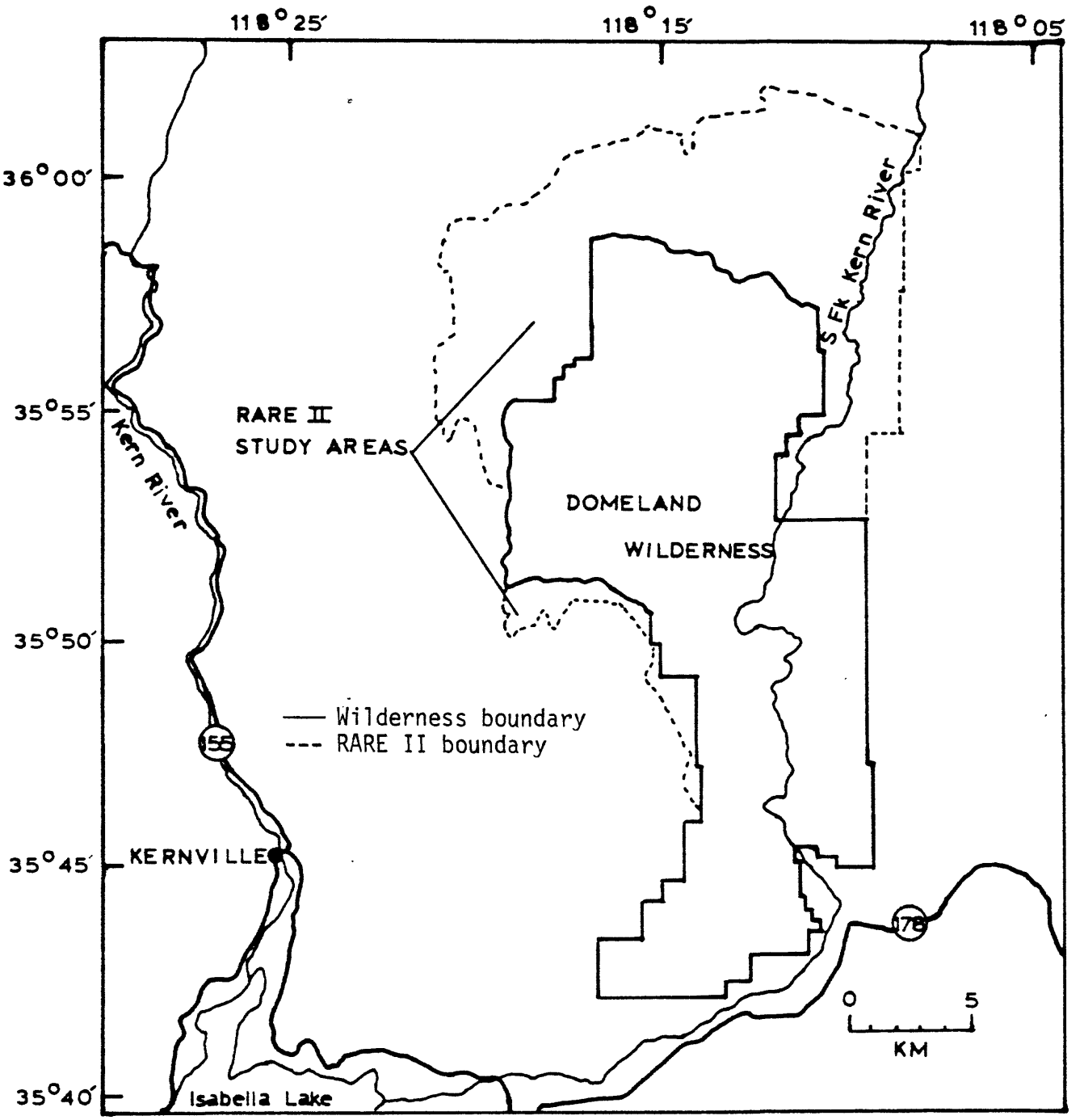

Figure 1.--Index map showing location of Domeland Wilderness and adjacent Further Planning Areas (RARE II), California.

SAMPLE COLLECTION TECHNIQUES

Water samples were collected in acid-rinsed polyethylene bottles. At each locality, two water samples were collected: a 60-mL sample, which was filtered through an 0.45-μm membrane filter and acidified with reagent-grade concentrated nitric acid to pH<2, and an untreated 0.5L sample.

ANALYTICAL TECHNIQUES

Water temperature was measured at the sample site. The pH of the sample was measured on the day of collection, but not at the sample site. The remaining analyses were completed at the U.S. Geological Survey laboratory in Denver, Colorado.

Calcium, magnesium, sodium, potassium, lithium, silica, zinc, copper, molybdenum, arsenic, and uranium were determined using the 0.45-μm filtered and acidified sample. Alkalinity, sulfate, chloride, fluoride, and specific conductance were determined using the untreated sample. The analytical methods used for the analyis of each constituent are shown in table 1.

Table 1.--Analytical methods used for water analyses, Domeland Wilderness and adjacent Further Planning Areas (RARE II), California

Constituent	Method	Reference
Alkalinity	Gran's plot potentiometric titration	Orion Research, Inc. (1978).
Sulfate	Ion chromatography	Smee, and Hall (1978)
Chloride	do	do
Fluoride	do	do
Calcium	Flame atomic absorption spectrophotometry	Perkin-Elmer Corp. (1976).
Magnesium	do	do
Sodium	do	do
Potassium	do	do
Lithium	do	do
Silica	do	do
Copper	Flamesless atomic absorption spectrophotometry	Perkin-Elmer Corp. (1977).
Zinc	do	do
Molybdenum	do	do
Arsenic	do	do
Uranium	Fluorometric	McHugh (1979).
Specific conductance	Conductivity bridge	Brown, Skougstad, and Fishman (1970), p. 28-29.

RESULTS

Sample collection localities are shown in figure 2. The locality numbers coincide with the sample numbers appearing in the first column of table 2. Table 2 shows analytical data for each water sample, as well as the location of each sample by latitude and longitude, in degrees, minutes, and seconds. Table 3 is a summary of the chemical analyses for the 78 Domeland Wilderness and adjacent Further Planning Areas (RARE II) water samples showing each variable with its minimum and maximum values, mean, geometric mean, standard deviation, and geometric deviation.

Theoretically, ionic solutions are electrically balanced. Therefore, accuracy of analyses can be checked by comparing the sum of the positive ionic charges (cations) to the sum of the negative ionic charges (anions). The charge balance of the cations and anions for 54 of the samples in this report are within 5 percent, 23 of the samples are within 10 percent, and one sample is 13 percent.

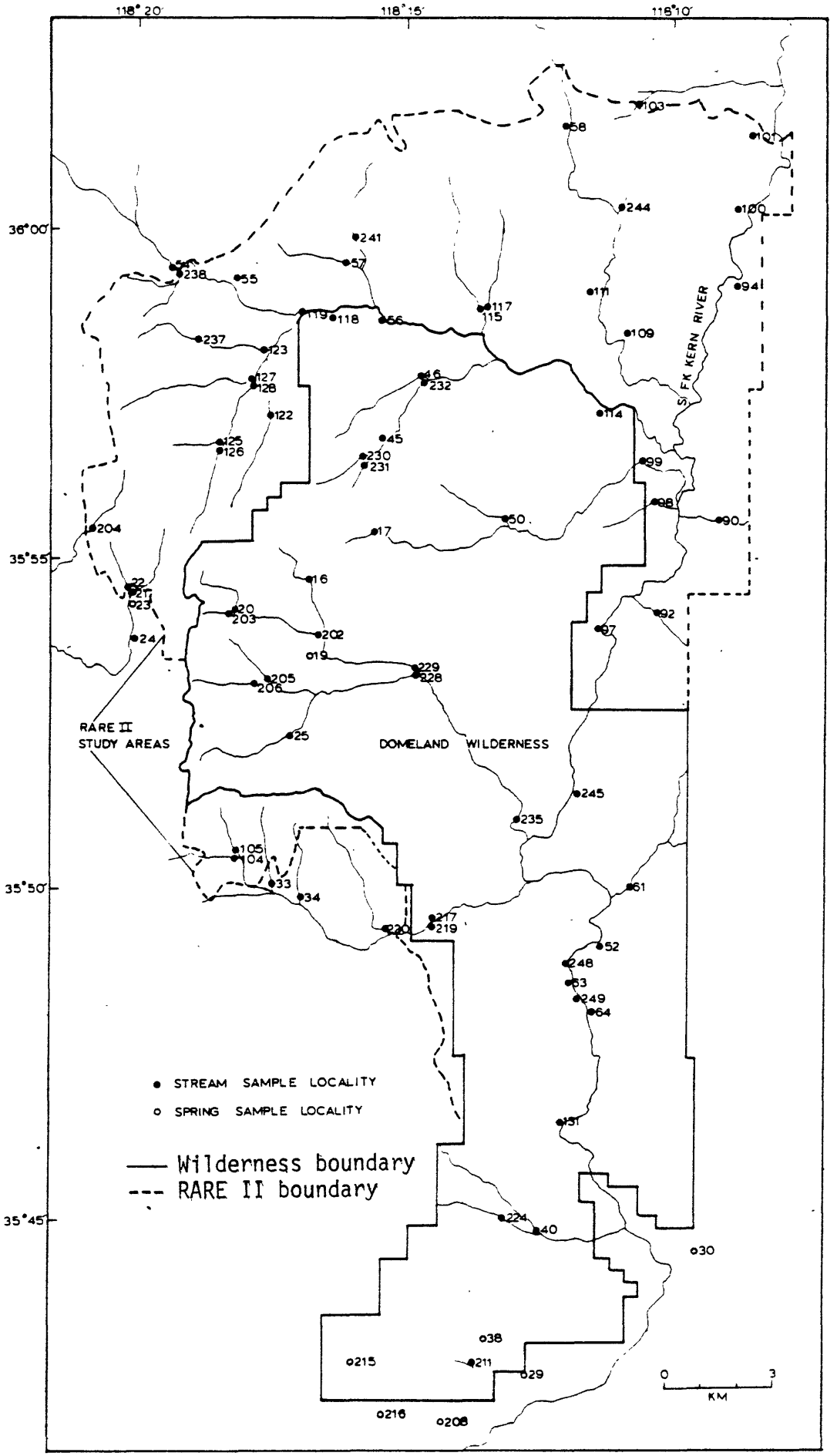

Figure 2.--Sample locality map of Domeland Wilderness and adjacent Further Planning Areas (RARE II), California.

TABLE 2.--WATER ANALYSES FROM DOMELAND WILDERNESS & ADJACENT FURTHER PLANNING AREAS (RARE II), CALIF.

sample	LATITUDE	LONGITUDE	CA(mg/L)	MG(mg/L)	NA(mg/L)	K(mg/L)	LI(ug/L)	SIO2(mg/L)	ALK(mg/L)	SO4(mg/L)	CL(mg/L)
016SW	35 54 41	118 16 53	2.1	.4	3.7	.60	<2	22	14.0	.70	.57
017SW	35 55 23	118 15 39	3.4	.6	4.9	.84	<2	25	23.0	.35	.55
019GW	35 53 31	118 16 52	12.0	1.2	9.6	.74	12	34	63.0	1.10	.34
020SW	35 54 12	118 18 17	1.1	.2	2.4	.33	<2	15	7.3	.46	.63
021SW	35 54 31	118 20 12	3.5	.4	3.4	.40	3	19	20.0	.69	.40
022SW	35 54 31	118 20 17	1.9	.4	3.1	.70	<2	17	14.0	.69	.27
023GW	35 54 18	118 20 10	15.0	1.1	5.0	.68	12	18	51.0	2.42	.57
024SW	35 53 49	118 20 9	1.7	.4	3.8	.51	4	20	14.0	.69	.37
025SW	35 52 20	118 17 17	5.5	.7	5.3	1.10	5	23	31.0	.36	.82
029GW	35 42 36	118 12 56	23.0	1.8	24.0	1.00	45	42	112.0	6.20	5.50
030GW	35 44 27	118 9 47	40.0	4.9	27.0	1.80	35	38	131.0	62.00	6.50
033SW	35 50 5	118 17 40	4.1	.5	4.6	.67	3	19	22.0	.79	.97
034SW	35 49 52	118 17 8	14.0	.8	10.0	.64	25	27	68.0	1.00	.66
038GW	35 43 8	118 13 44	19.0	1.0	17.0	.50	34	35	104.0	1.37	3.00
040SW	35 44 47	118 12 46	12.0	1.4	10.0	1.30	13	26	56.0	.73	1.60
045SW	35 58 5	118 17 26	2.8	.5	5.1	1.10	2	25	24.0	.51	1.30
046SW	35 57 42	118 14 48	15.0	2.1	11.0	1.70	7	33	80.0	.09	1.20
050SW	35 55 33	118 13 14	11.0	1.4	9.1	1.00	9	27	53.0	.17	1.70
052SW	35 49 6	118 11 32	49.0	10.0	27.0	2.30	56	38	261.0	13.00	5.90
054SW	35 59 23	118 19 21	5.8	.8	3.6	.67	<2	16	31.0	2.73	.82
055SW	35 59 13	118 18 11	21.0	2.5	10.0	1.60	2	21	97.0	1.19	.23
056SW	35 58 33	118 15 30	12.0	2.2	9.4	2.10	6	32	69.0	4.35	1.00
057SW	35 59 27	118 16 11	40.0	6.0	11.0	1.80	<2	29	135.0	22.90	1.50
058SW	36 1 28	118 12 1	34.0	4.5	14.0	2.90	<2	21	121.0	26.30	1.60
061SW	35 49 58	118 10 58	87.0	28.0	46.0	5.00	56	30	305.0	140.00	12.00
063SW	35 48 33	118 12 6	35.0	6.0	18.0	1.40	39	36	179.0	4.35	2.40
064SW	35 48 6	118 11 42	93.0	14.0	21.0	3.00	64	44	285.0	96.80	7.40
090SW	35 55 29	118 9 15	61.0	15.0	30.0	4.10	4	27	204.0	85.40	13.00
092SW	35 54 5	118 10 24	57.0	15.0	25.0	3.30	7	33	222.0	60.70	11.00
094SW	35 59 2	113 8 51	54.0	17.0	30.0	3.90	3	24	211.0	47.00	17.00
097SW	35 53 53	118 11 30	37.0	2.5	21.0	.83	63	28	161.0	4.65	2.50
098SW	35 55 47	118 10 26	13.0	2.3	13.0	1.50	10	32	70.0	1.37	5.90
099SW	35 56 23	118 10 37	5.5	.8	7.1	.83	5	20	35.0	.91	1.40
00SW	36 0 11	113 8 49	50.0	12.0	34.0	2.30	6	32	276.0	20.50	12.00
01SW	36 1 17	118 8 32	56.0	14.0	35.0	4.10	6	33	210.0	90.60	13.00
03SW	36 1 47	118 10 38	43.0	12.0	23.0	3.90	8	38	200.0	59.90	7.00
04SW	35 50 30	118 18 19	1.8	.3	2.9	1.00	<2	13	10.0	.93	.53
05SW	35 50 34	118 18 19	2.2	.3	3.6	1.00	<2	17	17.0	.54	.35
09SW	35 58 18	118 10 53	34.0	9.1	17.0	2.90	9	34	191.0	1.52	4.30
11SW	35 58 57	118 11 37	23.0	6.5	17.0	2.40	10	29	138.0	.22	.43
14SW	35 57 7	118 11 26	8.0	1.3	9.9	.79	7	23	55.0	.54	.51
15SW	35 58 43	118 13 39	64.0	7.8	10.0	2.20	<2	36	250.0	44.60	3.00
17SW	35 58 43	118 13 31	62.0	12.0	23.0	3.20	10	36	242.0	58.00	5.90
18SW	35 58 36	118 16 25	13.0	1.3	9.5	1.10	15	19	54.0	4.98	.66
19SW	35 58 42	113 16 59	7.2	1.0	4.1	.74	2	16	36.0	2.80	.37

TABLE 2.--WATER ANALYSES FROM DOMELAND WILDERNESS & ADJACENT FURTHER PLANNING AREAS (RARE II), CALIF.--Continued

sample	F(mg/L)	ZN(ug/L)	CU(ug/L)	MO(ug/L)	AS(ug/L)	U(ug/L)	SP.COND. (umhos/cm)	pH	TEMP.(C)
016SW	.02	2.0	.3	1.20	.92	<.2	28	6.65	7
017SW	.03	2.8	.5	1.00	.83	<.2	43	6.45	11
019GW	.25	1.6	.3	.90	.65	4.5	103	6.95	10
020SW	.05	<.1	.5	1.00	.77	.2	18	7.10	11
021SW	.03	1.4	.3	1.00	.73	.2	35	7.55	14
022SW	.04	3.1	.4	1.00	.76	<.2	28	6.75	11
023GW	.17	.7	.9	3.90	1.27	8.0	102	7.55	7
024SW	.03	2.8	.3	1.00	.73	.2	30	6.85	13
025SW	.06	.5	.1	.40	.75	<.2	57	7.25	13
029GW	1.00	37.0	1.0	9.30	1.45	4.9	226	7.95	21
030GW	.98	8.3	1.6	54.00	1.70	14.0	360	7.05	19
033SW	.08	.8	.1	.80	.86	<.2	44	7.10	11
034SW	.52	.7	.7	1.30	.80	15.0	123	7.85	18
038GW	.87	1.3	.7	4.80	.99	1.5	153	8.15	21
040SW	.39	2.3	.3	1.80	.85	1.2	112	8.05	21
045SW	.10	4.0	.4	.60	.75	<.2	42	6.75	14
046SW	.09	1.7	.2	.90	.82	.7	138	7.75	15
050SW	.15	4.4	.9	1.30	1.07	1.3	110	7.50	22
052SW	.60	6.4	.4	5.70	1.18	12.0	405	7.95	18
054SW	<.01	1.5	.2	1.00	.86	<.2	51	7.95	9
055SW	.03	2.2	.5	4.50	.70	22.0	170	8.50	13
056SW	.09	26.0	.4	.90	.76	.4	116	7.80	12
057SW	.29	.7	.3	4.10	.92	2.3	280	8.25	15
058SW	.09	.7	.6	4.80	.83	2.1	260	8.45	21
061SW	.77	11.3	2.9	36.00	2.05	29.0	760	8.20	14
063SW	.38	8.3	.5	6.00	1.27	28.0	270	8.10	23
064SW	1.02	1.9	.6	41.00	1.42	20.0	630	7.75	18
090SW	.38	1.6	2.8	14.10	1.63	25.0	520	8.15	15
092SW	.32	12.3	2.4	12.20	1.45	5.2	465	8.25	14
094SW	.29	130.0	2.0	39.00	1.45	12.0	500	8.50	15
097SW	2.30	12.4	2.2	5.60	.70	28.0	265	8.05	15
098SW	.42	2.5	.4	1.50	.92	.6	136	7.30	13
099SW	.31	3.4	.3	1.00	.73	<.2	63	7.60	13
100SW	.58	4.2	2.3	18.10	1.01	8.6	450	8.15	16
101SW	.52	15.1	1.5	16.00	1.39	5.0	520	7.75	15
103SW	.50	2.0	2.0	13.10	1.06	2.3	400	7.95	14
104SW	.19	3.4	2.2	1.10	.76	.2	27	6.55	14
105SW	.02	3.3	.6	.74	.76	.3	34	6.75	17
109SW	.29	17.3	.8	1.10	.86	1.4	303	7.85	13
111SW	.03	6.7	2.3	1.20	.74	1.9	26	7.75	15
114SW	.02	8.1	.7	1.00	.76	.8	91	6.55	12
115SW	.32	5.7	1.3	6.90	1.46	2.9	390	8.15	14
117SW	.33	4.4	.9	13.60	1.39	4.6	470	7.70	16
118SW	.22	2.3	.2	5.00	.71	18.0	[illegible]	7.95	11
119SW	.15	22.4	.3	1.30	.65	1.1		7.90	11

TABLE 2.--WATER ANALYSES FROM DOMELAND WILDERNESS & ADJACENT FURTHER PLANNING AREAS (RARE II), CALIF.--Continued

sample	LATITUDE	LONGITUDE	CA(mg/L)	MG(mg/L)	NA(mg/L)	K(mg/L)	LI(ug/L)	SIO2(mg/L)	ALK(mg/L)	SO4(mg/L)	CL(mg/L)
122SW	35 57 9	118 17 36	3.0	.7	3.8	.77	<2	19	20.0	.97	.59
123SW	35 58 7	118 17 42	14.0	1.6	6.0	1.10	4	17	57.0	9.20	.46
125SW	35 56 44	118 18 33	1.9	.4	3.2	.24	<2	16	14.0	.27	.21
126SW	35 56 39	118 18 32	1.3	.3	2.9	.30	<2	13	10.0	.36	.38
127SW	35 57 41	118 17 55	4.1	.5	4.0	.47	2	17	26.0	1.81	.28
128SW	35 57 37	118 17 56	2.4	.4	3.4	.40	<2	17	16.0	.66	.27
131SW	35 46 25	118 12 18	30.0	1.5	15.0	1.00	38	27	116.0	2.50	1.30
202SW	35 53 51	118 16 46	2.3	.4	3.5	.45	<2	18	15.0	.46	.63
203SW	35 54 10	118 18 23	1.2	.3	3.4	.42	2	17	11.0	3.00	.69
204SW	35 55 25	118 20 56	1.5	.3	2.1	.45	<2	15	8.2	.84	.48
205SW	35 53 9	118 17 41	8.9	1.9	7.8	.63	20	29	60.0	1.33	.85
206SW	35 53 6	118 17 57	6.1	1.3	6.8	.54	14	29	44.0	1.00	.87
208GW	35 41 54	113 14 35	48.0	6.0	55.0	2.70	77	48	216.0	28.30	23.00
211SW	35 42 47	118 13 59	15.0	1.7	29.0	1.50	34	48	107.0	1.33	8.10
215GW	35 42 47	118 16 16	3.6	.1	52.0	.55	58	32	54.0	46.00	9.20
216GW	35 42 2	118 15 45	22.0	1.1	64.0	1.20	85	28	136.0	55.00	12.00
217SW	35 49 31	118 14 41	4.8	1.3	6.4	.80	2	27	34.0	3.33	2.10
219SW	35 49 25	118 14 41	11.0	.8	11.0	.64	22	24	51.0	3.25	.81
220SW	35 49 23	118 15 32	3.6	.7	6.1	.82	4	25	33.0	.67	1.40
224SW	35 44 59	118 13 26	14.0	.7	10.0	.62	23	22	62.0	1.00	2.00
228SW	35 53 12	118 14 58	12.0	1.1	13.0	.65	15	24	57.0	4.44	.59
229SW	35 53 16	118 14 57	5.0	.7	5.1	.60	2	21	32.0	.37	.53
230SW	35 56 30	118 15 52	3.1	.6	5.5	.88	<2	25	28.0	.37	.94
231SW	35 56 21	118 15 50	4.3	.8	6.6	1.00	<2	35	37.0	.46	.73
232SW	35 57 37	118 14 46	10.0	.7	9.6	.92	12	27	60.0	1.26	1.40
235SW	35 51 0	118 13 3	11.0	.9	16.0	.69	18	25	49.0	12.00	1.10
237SW	35 58 18	118 18 54	2.8	.4	3.4	.34	<2	16	17.0	.90	.30
238SW	35 59 20	118 19 19	2.6	.4	2.9	.34	<2	15	16.0	.92	.37
241SW	35 59 44	118 15 58	66.0	11.0	11.0	2.70	3	27	205.0	44.00	2.40
244SW	36 0 12	118 11 0	60.0	13.0	32.0	3.10	4	27	304.0	14.00	7.20
245SW	35 51 23	118 11 58	30.0	8.5	24.0	1.50	18	36	171.0	9.32	13.00
246SW	35 48 49	118 12 11	32.0	1.8	24.0	1.30	50	27	140.0	15.10	3.90
249SW	35 48 19	118 11 58	40.0	4.2	16.0	1.80	35	34	166.0	9.00	3.00

TABLE 2.--WATER ANALYSES FROM DOMELAND WILDERNESS & ADJACENT FURTHER PLANNING AREAS (RARE II), CALIF.--Continued

sample	F(mg/L)	ZN(ug/L)	CU(ug/L)	MO(ug/L)	AS(ug/L)	U(ug/L)	SP.COND. (µmhos/cm)	pH	TEMP.(C)
122SW	.06	43.3	1.2	.50	.83	<.2	41	7.55	10
123SW	.11	2.3	.7	5.40	.69	3.1	110	8.25	10
125SW	.02	4.0	.4	.30	.73	<.2	25	7.35	9
126SW	.03	1.9	.4	.30	.82	<.2	21	7.20	9
127SW	.02	3.9	.5	1.80	.87	1.1	42	7.55	10
128SW	.05	29.6	.3	.70	.66	.4	30	7.45	10
131SW	1.28	47.0	.3	8.80	1.03	37.0	215	8.40	17
202SW	.06	1.9	.2	.40	.81	.4	29	6.90	10
203SW	.08	1.3	.1	1.60	.70	.2	23	6.85	9
204SW	.05	3.7	.8	1.50	.77	.2	20	6.55	15
205SW	.16	1.4	2.1	.80	.70	4.0	93	7.55	10
206SW	.16	1.5	.6	.80	.89	1.7	68	7.10	11
208GW	2.13	50.0	1.5	53.00	3.52	13.0	500	7.35	21
211SW	.59	3.6	.7	2.00	1.29	1.0	215	8.15	23
215GW	5.70	1.2	2.2	19.20	6.91	<.2	275	8.35	26
216GW	5.90	.8	1.8	92.50	9.68	12.0	385	7.95	21
217SW	.04	13.0	.3	.90	.65	.3	64	6.90	13
219SW	.23	1.3	.6	3.90	.90	14.0	110	8.00	14
220SW	<.01	1.8	.4	.72	.71	<.2	52	7.15	17
224SW	.14	6.4	.2	1.90	.87	4.8	116	7.75	15
228SW	.22	3.4	.2	1.70	.66	7.5	126	7.70	10
229SW	.03	3.0	.3	.80	.71	.2	54	7.50	10
230SW	.03	4.7	.1	.60	.78	<.2	46	7.35	10
231SW	.04	4.3	.2	.50	.81	<.2	60	7.00	9
232SW	.29	5.6	.3	1.40	.76	9.6	99	7.60	14
235SW	.80	4.8	.1	3.40	.84	6.6	135	8.05	10
237SW	<.01	1.7	.6	.80	.68	<.2	32	7.85	7
238SW	.05	1.9	.5	.40	.68	<.2	28	7.60	7
241SW	.45	1.2	.4	2.80	1.39	1.0	440	8.15	15
244SW	.31	1.4	1.7	22.00	.81	14.0	510	8.35	15
245SW	.49	10.2	.7	2.50	.74	35.0	320	7.30	17
248SW	2.11	1.0	.3	22.00	2.27	64.0	270	8.35	15
249SW	.63	1.4	.3	6.50	.92	36.0	290	8.45	20

Table 3.--Summary of the chemical analyses of 78 water samples, Domeland Wilderness and adjacent Further Planning Areas (RARE II), California

[Leaders (--) indicate no data]

Variable	Minimum	Maximum	Mean	Geometric mean	Standard deviation	Geometric deviation
Ca (mg/L)	1.1	93.	21.0	10.9	22.2	3.47
Mg (mg/L)	.10	28.	3.72	1.56	5.30	3.73
Na (mg/L)	2.1	64.	14.1	9.75	13.0	2.37
K (mg/L)	.24	5.0	1.38	1.06	1.09	2.07
Li (µg/L)	<2	85.	15.0	6.45	19.9	3.77
SiO_2 (mg/L)	13	48.	26.3	25.1	8.23	1.37
Alkalinity (mg/L)	7.3	305.	93.9	59.0	84.6	2.82
SO_4 (mg/L)	.09	140.	14.8	2.92	27.2	6.40
Cl (mg/L)	.21	23.	3.33	1.49	4.58	3.54
F (mg/L)	<.01	5.9	0.482	0.161	0.985	4.60
Zn (µg/L)	<.10	130.	8.41	3.46	17.4	3.45
Cu (µg/L)	.10	2.9	0.796	0.546	0.728	2.41
Mo (µg/L)	.30	92.5	7.76	2.56	15.0	4.08
As (µg/L)	.65	9.68	1.17	0.973	1.26	1.61
U (µg/L)	<.20	64.	7.11	1.57	11.5	7.14
Sp. Cond (µmhos/cm)	18.	760.	184.	112.	177.	2.88
pH	6.45	8.50	7.62	--	0.553	--
Temp (C°)	7.0	26.	14.0	13.4	4.27	1.36

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