

RAYMOND BASIN SNMP TABLES

TABLE III.1
WATER QUALITY OBJECTIVES FOR THE RAYMOND BASIN

CONSTITUENT	BASIN PLAN OBJECTIVES
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BACTERIA (Objective in coliforms per 100 mL)

COLIFORM	1.1
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INORGANIC CHEMICALS (MCLs in mg/L) (TABLE 64431-A) ¹

ALUMINUM	1
ANTIMONY	0.006
ARSENIC	0.01
ASBESTOS ² (in MFL)	7
BARIUM	1
BERYLLIUM	0.004
CADMIUM	0.005
CHROMIUM	0.05
CYANIDE	0.15
FLUORIDE	2
MERCURY	0.002
NICKEL	0.1
NITRATE (as NO ₃)	45
NITRATE + NITRITE (as N)	10
NITRITE (as N)	1
PERCHLORATE	0.006
SELENIUM	0.05
THALLIUM	0.002

RADIOACTIVITY (MCLs in pCi/L) (TABLES 64442 AND 64443) ¹

RADIUM 226 + RADIUM 228	5
GROSS ALPHA	15
URANIUM	20
BETA/PHOTON EMITTERS (in millirem/year)	4
STRONTIUM 90	8
TRITIUM	20,000

ORGANIC CHEMICALS (MCLs in mg/L)

VOLATILE ORGANIC CHEMICALS (TABLE 64444-A) ¹

BENZENE	0.001
CARBON TETRACHLORIDE	0.0005
1,2-DICHLOROBENZENE	0.6
1,4-DICHLOROBENZENE	0.005
1,1-DICHLOROETHANE	0.005
1,2-DICHLOROETHANE	0.0005
1,1-DICHLOROETHYLENE	0.006
cis-1,2-DICHLOROETHYLENE	0.006
trans-1,2-DICHLOROETHYLENE	0.01

TABLE III.1
WATER QUALITY OBJECTIVES FOR THE RAYMOND BASIN

CONSTITUENT	BASIN PLAN OBJECTIVES
DICHLOROMETHANE	0.005
1,2-DICHLOROPROPANE	0.005
1,3-DICHLOROPROPENE	0.0005
ETHYLBENZENE	0.3
METHYL-TERT-BUTYL ETHER (MTBE)	0.013
MONOCHLOROBENZENE	0.07
STYRENE	0.1
1,1,2,2-TETRACHLOROETHANE	0.001
TETRACHLOROETHYLENE	0.005
TOLUENE	0.15
1,2,4-TRICHLOROBENZENE	0.005
1,1,1-TRICHLOROETHANE	0.2
1,1,2-TRICHLOROETHANE	0.005
TRICHLOROETHYLENE	0.005
TRICHLOROFLUOROMETHANE	0.15
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (FREON 113)	1.2
VINYL CHLORIDE	0.0005
XYLENES	1.75 ³

NON-VOLATILE SYNTHETIC ORGANIC CHEMICALS (TABLE 64444-A)¹

ALACHLOR	0.002
ATRAZINE	0.001
BENTAZON	0.018
BENZO (A) PYRENE	0.0002
CARBOFURAN	0.018
CHLORDANE	0.0001
2,4-D	0.07
DALAPON	0.2
DIBROMOCHLOROPROPANE	0.0002
DI (2-ETHYLHEXYL) ADIPATE	0.4
DI (2-ETHYLHEXYL) PHTHALATE	0.004
DINOSEB	0.007
DIQUAT	0.02
ENDOTHALL	0.1
ENDRIN	0.002
ETHYLENE DIBROMIDE (EDB)	0.00005
GLYPHOSATE	0.7
HEPTACHLOR	0.00001
HEPTACHLOR EPOXIDE	0.00001
HEXACHLOROBENZENE	0.001
HEXACHLOROCYCLOPENTADIENE	0.05
LINDANE	0.0002
METHOXYCHLOR	0.03
MOLINATE	0.02
OXAMYL	0.05
PENTACHLOROPHENOL	0.001

TABLE III.1
WATER QUALITY OBJECTIVES FOR THE RAYMOND BASIN

CONSTITUENT	BASIN PLAN OBJECTIVES
PICLORAM	0.5
POLYCHLORINATED BIPHENOLS (Total PCBs)	0.0005
SIMAZINE	0.004
THIOBENCARB	0.07
TOXAPHENE	0.003
2,3,7,8-TCDD (DIOXIN)	3×10^{-8}
2,4,5-TP (SILVEX)	0.05

MINERALS (Objectives in mg/L)

TOTAL DISSOLVED SOLIDS	450
SULFATE	100
CHLORIDE	100
BORON	0.5

NOTES :

¹ Title 22, Division 4, Chapter 15 - California Code of Regulations - Updated June 21, 2012

² For fibers exceeding 10 micrometers in length

³ MCL for either a single isomer or the sum of isomers

MCL : Maximum contaminant level

mL : Milliliter

MFL : Million fibers per liter

pCi/L : Picocuries per liter

mg/L : Milligrams per liter

TABLE III.2
GROUNDWATER VOLUME ESTIMATES IN RAYMOND BASIN BY
RELATIVE AREA OF SUBAREAS

	Area		Groundwater in Storage†
	- miles ² -	--- % ---	-- ac-ft --
Raymond Basin	40.9	100.0%	800,000
Monk Hill	9.7	23.8%	190,400
Pasadena	27.4	67.1%	536,800
Santa Anita	3.7	9.1%	72,800

† Ch. 4 Groundwater Basin Reports: San Gabriel Valley Basins, Raymond Basin, September :

TABLE III.3.
RAYMOND BASIN SUBAREA GROUNDWATER QUALITY CHARACTERISTICS BY DECADE

Nitrate													
NO ₃	Monk Hill				Pasadena				Santa Anita				Valley Water Company
mg/L	to 1991	1992 to 2001	2002 to 2011		to 1991	1992 to 2001	2002 to 2011		to 1991	1992 to 2001	2002 to 2011		to 1991 1992 to 2001 2002 to 2011
0 to 25	34%	38%	24%		68%	23%	23%		67%	51%	74%		31% 16% 31%
26 to 35	38%	20%	8%		24%	21%	21%		7%	42%	20%		13% 12% 13%
36 to 45	21%	28%	48%		4%	39%	39%		27%	5%	6%		8% 20% 8%
46 to 75	7%	14%	19%		3%	16%	16%		0%	2%	0%		48% 51% 48%
> 75	0%	0%	0%		1%	0%	0%		0%	1%	0%		0% 1% 0%
no. wells	29	415	392		72	1222	1223		15	124	924		222 164 222
	----- Nitrate, mg/L -----				----- Nitrate, mg/L -----				----- Nitrate, mg/L -----				----- Nitrate, mg/L -----
mean	29	31	36		24	32	33		25	23	18		56 43 38
25%	23	22	27		18	24	26		15	14	11		53 33 21
50%	30	32	39		23	33	36		23	25	16		54 48 44
75%	35	42	45		28	41	40		36	29	26		58 57 58

Chloride													
Cl	Monk Hill				Pasadena				Santa Anita				Valley Water Company
mg/L	to 1991	1992 to 2001	2002 to 2011		to 1991	1992 to 2001	2002 to 2011		to 1991	1992 to 2001	2002 to 2011		to 1991 1992 to 2001 2002 to 2011
0 to 50	92%	87%	76%		95%	85%	81%		100%	100%	100%		0% 0% 0%
51 to 75	8%	13%	10%		5%	11%	19%		0%	0%	0%		0% 3% 9%
76 to 100	0%	0%	14%		0%	3%	0%		0%	0%	0%		33% 69% 57%
101 to 125	0%	0%	0%		0%	1%	0%		0%	0%	0%		67% 29% 29%
>125	0%	0%	0%		0%	0%	0%		0%	0%	0%		0% 0% 6%
no. wells	13	38	21		41	123	80		15	47	40		3 35 35
	----- Chloride, mg/L -----				----- Chloride, mg/L -----				----- Chloride, mg/L -----				----- Chloride, mg/L -----
mean	35	31	43		26	34	34		17	17	15		103 95 96
25%	31	16	26		17	21	22		14	15	12		97 89 91
50%	35	29	44		25	31	31		16	17	16		114 94 95
75%	39	44	47		37	42	42		19	20	19		115 104 108

Sulfate													
SO ₄	Monk Hill				Pasadena				Santa Anita				Valley Water Company
mg/L	to 1991	1992 to 2001	2002 to 2011		to 1991	1992 to 2001	2002 to 2011		to 1991	1992 to 2001	2002 to 2011		to 1991 1992 to 2001 2002 to 2011
0 to 50	79%	58%	41%		60%	39%	29%		87%	89%	91%		33% 0% 0%
51 to 100	21%	42%	50%		38%	53%	48%		13%	11%	7%		33% 10% 3%
101 to 150	0%	0%	9%		3%	7%	23%		0%	0%	2%		33% 29% 43%
151 to 200	0%	0%	0%		0%	0%	0%		0%	0%	0%		0% 58% 55%
>200	0%	0%	0%		0%	2%	0%		0%	0%	0%		0% 3% 0%
no. wells	14	38	22		40	123	73		15	47	44		3 31 40
	----- Sulfate, mg/L -----				----- Sulfate, mg/L -----				----- Sulfate, mg/L -----				----- Sulfate, mg/L -----
mean	37	48	66		47	62	73		37	36	35		83 159 155
25%	28	36	44		30	40	44		32	28	19		52 138 146
50%	34	44	60		44	58	68		38	37	36		90 160 152
75%	45	61	92		65	77	93		42	43	45		118 184 166

Total Dissolved Solids													
TDS	Monk Hill				Pasadena				Santa Anita				Valley Water Company
mg/L	to 1991	1992 to 2001	2002 to 2011		to 1991	1992 to 2001	2002 to 2011		to 1991	1992 to 2001	2002 to 2011		to 1991 1992 to 2001 2002 to 2011
0 to 250	0%	27%	0%		17%	18%	20%		9%	24%	48%		0% 0% 0%
251 to 350	60%	38%	33%		54%	32%	31%		91%	71%	48%		0% 0% 0%
351 to 450	30%	31%	28%		22%	29%	26%		0%	0%	3%		0% 0% 0%
451 to 550	10%	4%	33%		5%	14%	11%		0%	2%	0%		33% 13% 5%
551 to 650	0%	0%	6%		2%	7%	10%		0%	2%	0%		0% 55% 20%
651 to 750	0%	0%	0%		0%	0%	2%		0%	0%	0%		67% 26% 40%
>750	0%	0%	0%		0%	0%	0%		0%	0%	0%		0% 6% 35%
no. wells	10	45	18		41	123	61		11	49	29		3 31 20
	----- TDS, mg/L -----				----- TDS, mg/L -----				----- TDS, mg/L -----				----- TDS, mg/L -----
mean	345	322	411		319	359	363		279	275	268		633 643 731
25%	282	250	343		260	264	273		271	258	220		604 600 683
50%	340	321	410		289	351	352		281	283	260		661 630 740
75%	397	392	479		356	438	438		293	298	330		676 700 788

*(Data compiled from Appendices J, K.) Data are reported as the percentage of wells with test values in the given range in the specified period. (Valley Water Company is in the Monk Hill subarea, but not included in the analysis.)

TABLE III.4a
NITRATE CONCENTRATION IN WATER SOURCES FOR RAYMOND BASIN SUBAREAS

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Surface Water			Groundwater Production						Return Flow, weighted mean			
			Santa		Verdugo	Monk		Santa	Imported	MWD			
Water Year	Monk Hill	Pasadena	Anita	Runoff	Basin	Hill+	Pasadena	Anita	Ground Water	Weymouth WRP	Monk Hill	Pasadena	Santa Anita
								mg/L					
1986-87				4		29	13	18	30				
1987-88				6		28	28	23	29				
1988-89				3		27	20	28	30				
1989-90			11	3		27	24	24	30				
1990-91				10		22	24	27	29				
1991-92	1	7		4		35	30	29	26				
1992-93		7	12	3		35	33	32	32				
1993-94	2	7	11	2		19	33	16	37		6	6	12
1994-95	2	10	11	5		14	23	29	22	3	12	8	11
1995-96	3	12	10	2	50	29	30	37	22	2	11	10	11
1996-97	3	12	11	2	41	27	36	25	24	2	6	12	11
1997-98	3	12	11	2		26	35	19	26	2	12	9	12
1998-99	3	14	11	2	56	28	34	21	24	3	12	11	12
1999-00	3	14	11	2	44	27	32	17	20	3	11	10	12
2000-01	3	14	11	2	45	28	32	22	22	3	10	8	11
2001-02	3	12	11	2	48	28	31	24	28	3	11	8	11
2002-03	2	12	11	5	65	30	32	24	21	3	12	7	11
2003-04	3	10	11	3	47	31	28	26	19	4	11	7	10
2004-05	3	8	12	3	47	29	33	26	21	2	9	5	12
2005-06	2	9	11	4	43	21	30	19	14	3	8	6	12
2006-07	3	9	12	2	43	16	36	15	16	4	13	6	12
2007-08	3	9	12	3	43	29	37	14	27	2	10	5	12
2008-09	3	8	11	4	44	25	37	17	27	3	12	5	10
2009-10	4	8	11	2	43	27	35	17	24	3	10	5	11
2010-11	3	8	9	3	39	27	34	17	43	3	10	6	10
2011-12	4	7	9	2	39	29	36	15	38	3	10	5	9

1986-2012

Minimum	1	7	9	2	39	14	13	14	14	2	6	5	9
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Maximum	4	14	12	10	65	35	37	37	43	4	13	12	12
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Mean	3	10	11	3	46	27	30	22	26	3	10	7	11
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2002-2012 Mean	3	9	11	3	45	26	34	19	25	3	11	6	11
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2007-2012 Mean	3	8	10	3	42	27	36	16	32	3	10	5	10
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[†]Valley Water Company production wells are excluded from these means.

*(Compiled from Appendices J, L, M, N, O.)

TABLE III.4b
CHLORIDE CONCENTRATION IN WATER SOURCES FOR RAYMOND BASIN SUBAREAS

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Surface Water			Groundwater Production					Imported	MWD	Return Flow, weighted mean		
Water Year	Monk Hill	Pasadena	Santa Anita	Runoff	Verdugo Basin	Monk Hill†	Pasadena	Santa Anita	Ground Water	Weymouth WRP	Monk Hill	Pasadena	Santa Anita
									mg/L				
1986-87				27		37	39	17	23				
1987-88				18		31	23	18	23				
1988-89				16		39	23	13	37				
1989-90	24		9	46		24	25	16	26				
1990-91			14	28		43	27	19	25				
1991-92			12	16		45	40	22	27				
1992-93	8	10	11	17		25	38	12	32				
1993-94	7	10	10	10		25	37	22	14		61	27	11
1994-95	5	10	10	19		23	21	18	25		57	36	10
1995-96	6	10	9	11	55	32	35	16	19		61	33	9
1996-97	6	10	8	2	92	40	57	11	17		69	13	8
1997-98	6	10	8	5		33	21	25	21		58	34	9
1998-99	5	10	8	10	76	40	33	13	32		60	34	8
1999-00	6	10	8	19	85	20	37	18	14		62	41	8
2000-01	7	10	8	10	80	42	28	18	17		76	53	8
2001-02	7	10	9	9	74	64	35	17	42	85	79	48	9
2002-03	8	10	10	6	94	29	36	19	15	79	60	50	10
2003-04	8	10	10	10	62	18	20	13	18	86	65	51	19
2004-05	7	10	9	8	64	23	40	8	39	75	53	44	11
2005-06	7	10	9	27	99	20	51	18	11	61	44	37	10
2006-07	7	10	9	22	64	24	18	14	14	86	61	53	9
2007-08	7	9	7	4	81	41	52	10	40	96	77	61	8
2008-09	6	9	7	14	81	41	35	20	28	98	75	60	18
2009-10	6	10	7	7	36	58	26	17	15	88	78	55	10
2010-11	7	10	7	12	36	40	45	9	45	70	60	43	7
2011-12	7	10	7	14	35	46	45	21	33	90	77	54	8
1986-2012													
Minimum	5	9	7	2	35	18	18	8	11	61	44	13	7
Maximum	24	10	14	46	99	64	57	25	45	98	79	61	19
Mean	7	10	9	15	70	35	34	16	25	83	65	44	10
2002-2012 Mean	7	10	8	12	65	34	37	15	26	83	65	51	11
2007-2012 Mean	7	9	7	10	54	45	41	15	32	88	73	55	10

†Valley Water Company production wells are excluded from these means.

*(Compiled from Appendices K, L, M, N, O.)

TABLE III.4c
SULFATE CONCENTRATION IN WATER SOURCES FOR RAYMOND BASIN SUBAREAS

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Surface Water			Groundwater Production					Imported	MWD	Return Flow, weighted mean		
Water Year	Monk Hill	Pasadena	Santa Anita	Runoff	Verdugo Basin	Monk Hill†	Pasadena	Santa Anita	Ground Water	Weymouth WRP	Monk Hill	Pasadena	Santa Anita
									mg/L				
1986-87				33		36			36				
1987-88				32		35	43	38	35				
1988-89				47		23	46	34	23				
1989-90	59		23	50		36	49	34	36				
1990-91				42		52	50	36	52				
1991-92				38		40	55	42					
1992-93	47	31	23	38		42	80	36	42				
1993-94	57	31	23	22		43	74	37	31		126	65	23
1994-95	51	30	23	39		45	65	36	45		90	63	23
1995-96	51	28	23	21	89	45	57	41	45		102	65	24
1996-97	51	28	23	22	211	44	58	33	78		180	36	24
1997-98	52	26	24	13		45	61	36	45		159	103	24
1998-99	47	27	24	21	142	49	61	32	67		130	85	24
1999-00	34	26	24	29	135	50	62	36	48		97	66	24
2000-01	34	26	24	23	123	52	64	34	57		113	86	24
2001-02	31	26	25	29	120	56	64	39	64	171	138	98	25
2002-03	25	26	25	38	170	61	67	41	60	111	91	76	26
2003-04	25	25	27	25	100	58	68	41	35	145	118	90	41
2004-05	24	25	24	16	110	59	67	33		164	119	97	29
2005-06	20	26	24	25	151	62	67	42		116	93	74	26
2006-07	20	26	21	24	110	57	50	42	46	140	107	91	22
2007-08	19	26	21	26	120	41	73	45		209	151	136	22
2008-09	20	27	21	24	125	46	79	32	95	240	164	149	47
2009-10	20	26	22	24	125	78	76	35	94	194	157	123	28
2010-11	20	26	20	16	130	70	78	29	57	122	105	79	21
2011-12	21	25	20	17	130	70	78	30	47	140	118	88	20
1986-2012													
Minimum	19	25	20	13	89	23	43	29	23	111	90	36	20
Maximum	59	31	27	50	211	78	80	45	95	240	180	149	47
Mean	35	27	23	28	131	50	64	37	52	159	124	88	26
2002-2012 Mean	21	26	22	24	127	60	70	37	62	158	122	100	28
2007-2012 Mean	20	26	21	21	126	61	77	34	73	181	139	115	28

†Valley Water Company production wells are excluded from these means.

*(Compiled from Appendices K, L, M, N, O.)

TABLE III.4d
TOTAL DISSOLVED SOLIDS CONCENTRATION IN WATER SOURCES FOR RAYMOND BASIN SUBAREAS

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Surface Water			Groundwater Production					Imported	MWD	Return Flow, weighted mean		
Water Year	Monk Hill	Pasadena	Santa Anita	Runoff	Verdugo Basin	Monk Hill†	Pasadena	Santa Anita	Ground Water	Weymouth WRP	Monk Hill	Pasadena	Santa Anita
									mg/L				
1986-87				236		267	305		298				
1987-88				270		347	303	287	314				
1988-89				256		391	337	268	331				
1989-90	338		236	304		310	302		295				
1990-91				330		327	305	279	290				
1991-92				204		295	400	284	258				
1992-93				226		312	368	230	292				
1993-94	278	200	221	199		231	382	305	247		383	265	224
1994-95	237	211	205	284		320	335	279	237		333	262	205
1995-96	237	216	205	198	437	318	343	279	231		388	290	210
1996-97	237	216	198	180	655	318	351	268	243		520	233	202
1997-98	232	223	191	160		308	345	282	267		487	366	196
1998-99	224	224	192	204	552	319	356	273	386		434	333	198
1999-00	199	225	192	255	576	320	361	274	245		357	290	196
2000-01	204	224	192	250	557	322	356	274	263		422	354	195
2001-02	213	226	197	240	553	331	355	279	295	500	451	363	199
2002-03	218	228	197	270	513	348	352	275	273	387	369	321	199
2003-04	224	228	200	240	540	350	358	273	286	445	415	346	230
2004-05	223	228	208	200	510	369	356	267	315	452	412	345	220
2005-06	222	230	208	240	604	369	356	274	326	344	348	292	213
2006-07	216	223	215	210	480	386	363	257	322	437	415	346	216
2007-08	210	223	209	200	600	381	360	262	310	565	499	429	211
2008-09	216	215	209	210	583	390	356	268	327	620	527	447	258
2009-10	224	215	203	210	620	426	351	273	330	532	497	399	216
2010-11	236	215	212	200	595	413	363	263	360	380	388	307	215
2011-12	240	215	212	200	600	413	376	273	358	470	452	355	214
1986-2012													
Minimum	199	200	191	160	437	231	302	230	231	344	333	233	195
Maximum	338	230	236	330	655	426	400	305	386	620	527	447	258
Mean	231	220	205	230	561	342	350	273	296	467	426	334	212
2002-2012 Mean	223	222	207	218	565	384	359	269	321	463	432	359	219
2007-2012 Mean	225	217	209	204	600	405	361	268	337	513	473	387	223

†Valley Water Company production wells are excluded from these means.

*(Compiled from Appendices K, L, M, N, O.)

TABLE III.5a
FACTORS AND COEFFICIENTS USED IN CALIBRATING LOADING-UNLOADING CONSTITUENT MODELS:
RAYMOND BASIN, MONK HILL SUBAREA

Subsurface inflow: Verdugo Basin	Use annual water quality.			
Artificial recharge: Injection	Use annual injection water quality.			
Mean groundwater concentration (GW), mg/L (1994-95 to 2011-12)	Nitrate 27	Chloride 35	Sulfate 55	TDS 356
Volume of annual recharge from precipitation to mean or annual surface spreading to mean	Coefficient (multiplier)			
Greater than mean	0.8	0.8	0.7	1
75% to mean	0.9	0.9	0.8	1
Less than 75% of mean	1	1	1	1
	Multiply appropriate coefficient for each year by GW (c*GW).			
Precipitation	c*GW	c*GW	c*GW	c*GW
Artificial recharge: Surface Spreading	c*GW	c*GW	c*GW	c*GW
Return flow, weighted				
Ratio of water quality of annual return flow (WQ) to mean groundwater concentration (GW)	Use appropriate factor for each year.			
Less than mean groundwater	0.8 GW	1.0 GW	1.0 GW	1.0 WQ
1 to 1.25 mean groundwater	0.9 GW	1.0 WQ	1.0 WQ	1.0 WQ
Greater than 1.25 mean groundwater	1.0 GW	0.9 WQ	0.8 WQ	1.0 WQ

TABLE III.5b
FACTORS AND COEFFICIENTS USED IN CALIBRATING LOADING-UNLOADING CONSTITUENT MODELS:
RAYMOND BASIN, PASADENA SUBAREA

Subsurface inflow: Monk Hill subarea	Use annual water quality.			
Artificial recharge: Injection	Use annual injection water quality.			
	Nitrate	Chloride	Sulfate	TDS
Mean groundwater concentration (GW), mg/L	33	35	66	355
Volume of annual recharge from precipitation to mean or annual surface spreading to mean	Coefficient (multiplier)			
Greater than mean	0.4	0.6	0.5	0.4
75% to mean	0.6	0.8	0.7	0.5
Less than 75% of mean	0.8	0.9	0.9	0.8
	Multiply appropriate coefficient for each year by GW (c*GW).			
Precipitation	c*GW	c*GW	c*GW	1.0 WQ
Artificial recharge: Surface Spreading	c*GW	c*GW	c*GW	1.0 WQ
Return flow, weighted				
Ratio of water quality of annual return flow (WQ) to mean groundwater concentration (GW)	Use appropriate factor for each year.			
Less than mean groundwater	0.4 GW	1.0 GW	1.0 GW	0.4 WQ
1 to 1.25 mean groundwater	0.6 GW	1.0 WQ	1.0 WQ	0.5 WQ
Greater than 1.25 mean groundwater	0.8 GW	0.7 WQ	0.7 WQ	0.8 WQ

TABLE III.5c
FACTORS AND COEFFICIENTS USED IN CALIBRATING LOADING-UNLOADING CONSTITUENT
MODELS: RAYMOND BASIN, SANTA ANITA SUBAREA

Subsurface inflow: Pasadena subarea	Use annual water quality.				
Artificial recharge: Injection	Use annual injection water quality.				
	Nitrate	Chloride	Sulfate	TDS	
Mean groundwater concentration (GW), mg/L	21		16	37	272
Volume of annual recharge from precipitation to mean or annual surface spreading to mean	Coefficient (multiplier)				
Greater than mean	0.60		1.05	0.85	1.25
75% to mean	0.75		1.10	0.88	1.10
Less than 75% of mean	1.00		1.10	1.00	1.05
	Multiply appropriate coefficient for each year by GW (c*GW).				
Precipitation	c*GW			c*GW	
Artificial recharge: Surface Spreading	c*GW			c*GW	
	Use lesser of GW or product of coefficient and water quality for each year				
Precipitation			GW or c*WQ		GW or c*WQ
Artificial recharge: Surface Spreading			GW or c*WQ		GW or c*WQ
Return flow, weighted					
Ratio of water quality of annual return flow (WQ) to mean groundwater concentration (GW)	Use appropriate factor for each year.				
Less than mean groundwater	0.6 GW		1.1 WQ		1 WQ Lesser of GW or 1.4 WQ
1 to 1.25 mean groundwater	0.75 GW		1.1 WQ		1 WQ Lesser of GW or 1.3 WQ
Greater than 1.25 mean groundwater	1.0 GW		1.1 WQ		1 WQ Lesser of GW or 1.2 WQ

**TABLE III.6
RAYMOND BASIN MONK HILL SUBAREA NITRATE (NO3) BALANCE**

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6-c9					=c14-c13
Water Year	NO ₃ loading					NO ₃ unloading			NO ₃ balance	NO ₃ in Groundwater in Storage			Allowable	Assimilative
	Precipitation	Verdugo Basin Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	NO ₃ Conc.	Total	Loading	Capacity
	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	ac-ft	mg/l	lbs	45 mg/l lbs	lbs
1994-95	479,000	236,000	217,000	452,000	1,384,000	796,000	485,000	1,281,000	103,000	195,123	27	14,160,000	23,865,000	9,705,000
1995-96	224,000	297,000	223,000	249,000	993,000	936,000	435,000	1,371,000	-378,000	189,699	27	13,783,000	23,202,000	9,419,000
1996-97	215,000	212,000	237,000	271,000	935,000	656,000	439,000	1,095,000	-160,000	188,265	27	13,622,000	23,027,000	9,405,000
1997-98	500,000	382,000	234,000	584,000	1,700,000	702,000	483,000	1,185,000	515,000	197,825	26	14,137,000	24,196,000	10,059,000
1998-99	144,000	604,000	228,000	258,000	1,234,000	702,000	519,000	1,221,000	13,000	195,541	27	14,151,000	23,917,000	9,766,000
1999-00	223,000	107,000	224,000	231,000	785,000	811,000	489,000	1,300,000	-515,000	190,698	26	13,636,000	23,324,000	9,688,000
2000-01	243,000	322,000	229,000	227,000	1,021,000	589,000	473,000	1,062,000	-41,000	190,561	26	13,595,000	23,308,000	9,713,000
2001-02	97,000	433,000	227,000	98,000	855,000	599,000	500,000	1,099,000	-244,000	187,776	26	13,351,000	22,967,000	9,616,000
2002-03	236,000	368,000	232,000	207,000	1,043,000	339,000	516,000	855,000	188,000	190,537	26	13,539,000	23,305,000	9,766,000
2003-04	208,000	254,000	237,000	94,000	793,000	381,000	497,000	878,000	-85,000	190,189	26	13,455,000	23,262,000	9,807,000
2004-05	747,000	118,000	238,000	493,000	1,596,000	300,000	376,000	676,000	920,000	205,062	26	14,375,000	25,081,000	10,706,000
2005-06	224,000	278,000	225,000	301,000	1,028,000	224,000	323,000	547,000	481,000	208,598	26	14,856,000	25,514,000	10,658,000
2006-07	57,000	155,000	232,000	116,000	560,000	486,000	547,000	1,033,000	-473,000	204,000	26	14,382,000	24,951,000	10,569,000
2007-08	262,000	191,000	236,000	200,000	889,000	436,000	454,000	890,000	-1,000	203,824	26	14,381,000	24,930,000	10,549,000
2008-09	203,000	244,000	227,000	140,000	814,000	423,000	500,000	923,000	-109,000	201,982	26	14,273,000	24,704,000	10,431,000
2009-10	318,000	209,000	218,000	33,000	778,000	286,000	509,000	795,000	-17,000	202,437	26	14,256,000	24,760,000	10,504,000
2010-11	351,000	209,000	221,000	185,000	966,000	334,000	549,000	883,000	83,000	205,262	26	14,339,000	25,106,000	10,767,000
2011-12	168,000	159,000	192,000	187,000	706,000	564,000	436,000	1,000,000	-294,000	201,017	26	14,045,000	24,586,000	10,541,000
mean	272,000	265,000	227,000	240,000	1,004,000	531,000	474,000	1,005,000	-1,000	197,000	26	14,019,000	24,111,000	10,093,000
median, 50%	224,000	240,000	228,000	217,000	951,000	525,000	487,000	1,017,000	-29,000	197,000	26	14,144,000	24,057,000	9,933,000
2002-03 to 2011-12	277,000	219,000	226,000	196,000	917,000	377,000	471,000	848,000	69,000	201,000	26	14,190,000	24,620,000	10,430,000
2007-08 to 2011-12	260,000	202,000	219,000	149,000	831,000	409,000	490,000	898,000	-68,000	203,000	26	14,259,000	24,817,000	10,558,000

* (Condensed from App. P).

TABLE III.7
RAYMOND BASIN MONK HILL SUBAREA CHLORIDE (CI) BALANCE

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6-c9					=c14-c13
Water Year	CI loading					CI unloading			CI balance LBS/YR	CI in Groundwater in Storage			Allowable Loading 100 mg/l lbs	Assimilative Capacity lbs
	Precipitation	Verdugo Basin Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	CI Conc.	Total		
	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR		ac-ft	mg/l	lbs		
1994-95	610,000	465,000	467,000	596,000	2,138,000	632,000	385,000	1,017,000	1,121,000	195,123	33	17,566,000	53,034,000	35,468,000
1995-96	299,000	324,000	513,000	403,000	1,539,000	1,139,000	530,000	1,669,000	-130,000	189,699	34	17,436,000	51,560,000	34,124,000
1996-97	285,000	477,000	611,000	463,000	1,836,000	1,004,000	672,000	1,675,000	161,000	188,265	34	17,597,000	51,170,000	33,573,000
1997-98	636,000	617,000	504,000	869,000	2,626,000	831,000	572,000	1,403,000	1,223,000	197,825	35	18,820,000	53,769,000	34,949,000
1998-99	186,000	829,000	516,000	428,000	1,959,000	1,026,000	758,000	1,784,000	175,000	195,541	36	18,995,000	53,148,000	34,153,000
1999-00	296,000	205,000	572,000	404,000	1,477,000	586,000	354,000	940,000	537,000	190,698	38	19,532,000	51,832,000	32,300,000
2000-01	322,000	564,000	710,000	422,000	2,018,000	885,000	711,000	1,595,000	423,000	190,561	39	19,955,000	51,794,000	31,839,000
2001-02	126,000	675,000	731,000	316,000	1,848,000	1,268,000	1,059,000	2,327,000	-479,000	187,776	38	19,476,000	51,038,000	31,562,000
2002-03	314,000	535,000	568,000	417,000	1,834,000	321,000	489,000	810,000	1,024,000	190,537	40	20,500,000	51,788,000	31,288,000
2003-04	270,000	335,000	631,000	265,000	1,501,000	228,000	297,000	525,000	976,000	190,189	42	21,476,000	51,693,000	30,217,000
2004-05	951,000	161,000	516,000	910,000	2,538,000	340,000	424,000	764,000	1,774,000	205,062	42	23,250,000	55,736,000	32,486,000
2005-06	298,000	639,000	407,000	614,000	1,958,000	280,000	404,000	684,000	1,274,000	208,598	43	24,524,000	56,697,000	32,173,000
2006-07	74,000	230,000	583,000	351,000	1,238,000	396,000	446,000	842,000	396,000	204,000	45	24,920,000	55,447,000	30,527,000
2007-08	336,000	359,000	740,000	267,000	1,702,000	720,000	749,000	1,469,000	233,000	203,824	45	25,153,000	55,399,000	30,246,000
2008-09	270,000	448,000	697,000	203,000	1,618,000	651,000	770,000	1,421,000	197,000	201,982	46	25,350,000	54,899,000	29,549,000
2009-10	405,000	172,000	700,000	47,000	1,324,000	613,000	1,092,000	1,705,000	-381,000	202,437	45	24,969,000	55,022,000	30,053,000
2010-11	447,000	196,000	497,000	266,000	1,406,000	465,000	763,000	1,228,000	178,000	205,262	45	25,147,000	55,790,000	30,643,000
2011-12	217,000	140,000	490,000	243,000	1,090,000	991,000	766,000	1,758,000	-668,000	201,017	45	24,479,000	54,636,000	30,157,000
mean	352,000	410,000	581,000	416,000	1,758,000	688,000	625,000	1,312,000	446,000	197,000	40	21,619,000	53,581,000	31,962,000
median, 50%	299,000	404,000	570,000	404,000	1,768,000	642,000	622,000	1,412,000	315,000	197,000	41	20,988,000	53,459,000	31,701,000
2002-03 to 2011-12	358,000	322,000	583,000	358,000	1,621,000	501,000	620,000	1,121,000	500,000	201,000	44	23,977,000	54,711,000	30,734,000
2007-08 to 2011-12	335,000	263,000	625,000	205,000	1,428,000	688,000	828,000	1,516,000	-88,000	203,000	45	25,020,000	55,149,000	30,130,000

*(Condensed from App. Q).

**TABLE III.8
RAYMOND BASIN MONK HILL SUBAREA SULFATE (SO₄) BALANCE**

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6-c9					=c14-c13
Water Year	SO ₄ loading					SO ₄ unloading			SO ₄ balance LBS/YR	SO ₄ in Groundwater in Storage			Allowable Loading 100 mg/l lbs	Assimilative Capacity lbs
	Precipitation	Verdugo Basin Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	SO ₄ Conc.	Total		
	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR		ac-ft	mg/l	lbs		
1994-95	935,000	872,000	652,000	832,000	3,291,000	1,266,000	771,000	2,037,000	1,254,000	195,123	46	24,368,000	53,034,000	28,666,000
1995-96	514,000	526,000	763,000	591,000	2,394,000	1,578,000	734,000	2,312,000	82,000	189,699	47	24,450,000	51,560,000	27,110,000
1996-97	484,000	1,095,000	1,419,000	812,000	3,810,000	1,090,000	729,000	1,819,000	1,991,000	188,265	52	26,441,000	51,170,000	24,729,000
1997-98	968,000	1,157,000	1,241,000	1,435,000	4,801,000	1,143,000	786,000	1,930,000	2,871,000	197,825	55	29,312,000	53,769,000	24,457,000
1998-99	293,000	1,542,000	989,000	706,000	3,530,000	1,272,000	940,000	2,212,000	1,318,000	195,541	58	30,630,000	53,148,000	22,518,000
1999-00	415,000	328,000	788,000	567,000	2,098,000	1,460,000	882,000	2,342,000	-244,000	190,698	59	30,386,000	51,832,000	21,446,000
2000-01	454,000	872,000	938,000	598,000	2,862,000	1,107,000	889,000	1,995,000	867,000	190,561	60	31,253,000	51,794,000	20,541,000
2001-02	198,000	1,085,000	1,139,000	585,000	3,007,000	1,114,000	930,000	2,044,000	963,000	187,776	63	32,216,000	51,038,000	18,822,000
2002-03	437,000	965,000	772,000	629,000	2,803,000	673,000	1,027,000	1,700,000	1,103,000	190,537	64	33,319,000	51,788,000	18,469,000
2003-04	424,000	541,000	1,021,000	433,000	2,419,000	757,000	988,000	1,745,000	674,000	190,189	66	33,993,000	51,693,000	17,700,000
2004-05	1,369,000	277,000	1,030,000	1,501,000	4,177,000	857,000	1,072,000	1,929,000	2,248,000	205,062	65	36,241,000	55,736,000	19,495,000
2005-06	417,000	976,000	758,000	979,000	3,130,000	852,000	1,230,000	2,082,000	1,048,000	208,598	66	37,289,000	56,697,000	19,408,000
2006-07	116,000	395,000	902,000	564,000	1,977,000	946,000	1,064,000	2,010,000	-33,000	204,000	67	37,256,000	55,447,000	18,191,000
2007-08	536,000	532,000	1,294,000	367,000	2,729,000	715,000	744,000	1,458,000	1,271,000	203,824	70	38,527,000	55,399,000	16,872,000
2008-09	459,000	689,000	1,349,000	339,000	2,836,000	733,000	866,000	1,599,000	1,237,000	201,982	72	39,764,000	54,899,000	15,135,000
2009-10	615,000	607,000	1,249,000	76,000	2,547,000	824,000	1,467,000	2,291,000	256,000	202,437	73	40,020,000	55,022,000	15,002,000
2010-11	674,000	706,000	772,000	373,000	2,525,000	814,000	1,337,000	2,151,000	374,000	205,262	72	40,394,000	55,790,000	15,396,000
2011-12	341,000	529,000	675,000	381,000	1,926,000	1,496,000	1,156,000	2,653,000	-727,000	201,017	73	39,667,000	54,636,000	14,969,000
mean	536,000	761,000	986,000	654,000	2,937,000	1,039,000	978,000	2,017,000	920,000	197,000	63	33,640,000	53,581,000	19,940,000
median, 50%	457,000	698,000	964,000	588,000	2,820,000	1,018,000	935,000	2,024,000	1,006,000	197,000	65	33,656,000	53,459,000	19,115,000
2002-03 to 2011-12	539,000	622,000	982,000	564,000	2,707,000	867,000	1,095,000	1,962,000	745,000	201,000	69	37,647,000	54,711,000	17,064,000
2007-08 to 2011-12	525,000	613,000	1,068,000	307,000	2,513,000	916,000	1,114,000	2,030,000	482,000	203,000	72	39,674,000	55,149,000	15,475,000

*(Condensed from App. R).

TABLE III.9
RAYMOND BASIN MONK HILL SUBAREA TOTAL DISSOLVED SOLIDS (TDS) BALANCE

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6+c9					=c14-c13
Water Year	TDS loading					TDS unloading			TDS balance LBS/YR	TDS in Groundwater in Storage			Allowable Loading 450 mg/l lbs	Assimilative Capacity lbs
	Precipitation	Verdugo Basin Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	TDS Conc.	Total		
	LBS/YR	LBS/YR	LBS/YR	LBS/YR		LBS/YR	LBS/YR			LBS/YR	ac-ft			
1994-95	7,752,000	3,630,000	3,007,000	7,403,000	21,792,000	8,912,000	5,429,000	14,341,000	7,451,000	195,123	325	172,474,000	238,655,000	66,181,000
1995-96	3,326,000	3,552,000	3,612,000	4,473,000	14,963,000	11,217,000	5,214,000	16,431,000	-1,468,000	189,699	332	171,006,000	232,021,000	61,015,000
1996-97	3,133,000	3,113,000	5,140,000	5,252,000	16,638,000	7,930,000	5,305,000	13,235,000	3,403,000	188,265	341	174,409,000	230,267,000	55,858,000
1997-98	8,091,000	4,812,000	4,743,000	10,441,000	28,087,000	7,782,000	5,351,000	13,133,000	14,954,000	197,825	352	189,363,000	241,960,000	52,597,000
1998-99	1,897,000	6,513,000	4,116,000	4,818,000	17,344,000	8,210,000	6,069,000	14,279,000	3,065,000	195,541	362	192,428,000	239,166,000	46,738,000
1999-00	3,252,000	1,456,000	3,626,000	4,184,000	12,518,000	9,289,000	5,607,000	14,896,000	-2,378,000	190,698	367	190,050,000	233,243,000	43,193,000
2000-01	3,534,000	4,253,000	4,396,000	3,938,000	16,121,000	6,860,000	5,510,000	12,370,000	3,751,000	190,561	374	193,801,000	233,075,000	39,274,000
2001-02	1,279,000	5,447,000	4,656,000	2,365,000	13,747,000	6,549,000	5,468,000	12,017,000	1,730,000	187,776	383	195,531,000	229,669,000	34,138,000
2002-03	3,470,000	3,415,000	3,899,000	3,420,000	14,204,000	3,846,000	5,865,000	9,711,000	4,493,000	190,537	386	200,024,000	233,046,000	33,022,000
2003-04	2,742,000	3,244,000	4,479,000	1,937,000	12,402,000	4,532,000	5,919,000	10,450,000	1,952,000	190,189	391	201,976,000	232,620,000	30,644,000
2004-05	12,094,000	1,512,000	4,451,000	9,602,000	27,659,000	5,371,000	6,714,000	12,085,000	15,574,000	205,062	390	217,550,000	250,811,000	33,261,000
2005-06	3,272,000	3,889,000	3,551,000	6,070,000	16,782,000	5,049,000	7,283,000	12,331,000	4,451,000	208,598	392	222,001,000	255,136,000	33,135,000
2006-07	750,000	2,156,000	4,373,000	2,488,000	9,767,000	6,392,000	7,193,000	13,585,000	-3,818,000	204,000	393	218,183,000	249,512,000	31,329,000
2007-08	4,185,000	2,660,000	5,356,000	2,972,000	15,173,000	6,674,000	6,945,000	13,619,000	1,554,000	203,824	397	219,737,000	249,297,000	29,560,000
2008-09	2,970,000	3,306,000	5,435,000	1,982,000	13,693,000	6,178,000	7,305,000	13,483,000	210,000	201,982	401	219,947,000	247,044,000	27,097,000
2009-10	5,149,000	2,913,000	4,938,000	459,000	13,459,000	4,486,000	7,992,000	12,479,000	980,000	202,437	402	220,927,000	247,601,000	26,674,000
2010-11	5,681,000	3,258,000	3,570,000	2,844,000	15,353,000	4,830,000	7,927,000	12,757,000	2,596,000	205,262	401	223,523,000	251,056,000	27,533,000
2011-12	2,210,000	2,443,000	3,215,000	2,468,000	10,336,000	8,491,000	6,562,000	15,054,000	-4,718,000	201,017	400	218,805,000	245,864,000	27,059,000
mean	4,155,000	3,421,000	4,254,000	4,284,000	16,113,000	6,811,000	6,314,000	13,125,000	2,988,000	197,000	377	202,319,000	241,114,000	38,795,000
median, 50%	3,299,000	3,282,000	4,385,000	3,679,000	15,068,000	6,612,000	5,994,000	13,184,000	2,274,000	197,000	388	201,000,000	240,563,000	33,198,000
2002-03 to 2011-12	4,252,000	2,880,000	4,327,000	3,424,000	14,883,000	5,585,000	6,971,000	12,555,000	2,327,000	201,000	395	216,267,000	246,199,000	29,931,000
2007-08 to 2011-12	4,039,000	2,916,000	4,503,000	2,145,000	13,603,000	6,132,000	7,346,000	13,478,000	124,000	203,000	400	220,588,000	248,172,000	27,585,000

*(Condensed from App. S)

**TABLE III.10
RAYMOND BASIN PASADENA SUBAREA NITRATE (NO3) BALANCE**

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6-c9					=c14-c13
Water Year	NO ₃ loading					NO ₃ unloading			NO3 balance LBS/YR	NO ₃ in Groundwater in Storage			Allowable Loading 45 mg/l lbs	Assimilative Capacity lbs
	Precipitation	Monk Hill Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	NO ₃ Conc.	Total		
	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR		ac-ft	mg/l	lbs		
1994-95	239,000	485,000	360,000	272,000	1,356,000	1,428,000	474,000	1,902,000	-546,000	540,874	33	48,345,000	66,154,000	17,809,000
1995-96	137,000	435,000	362,000	226,000	1,160,000	1,264,000	472,000	1,735,000	-575,000	536,585	33	47,770,000	65,630,000	17,860,000
1996-97	126,000	439,000	254,000	187,000	1,006,000	861,000	470,000	1,330,000	-324,000	535,321	33	47,446,000	65,475,000	18,029,000
1997-98	233,000	483,000	379,000	309,000	1,404,000	852,000	501,000	1,353,000	51,000	541,963	32	47,497,000	66,287,000	18,790,000
1998-99	61,000	519,000	378,000	199,000	1,157,000	835,000	466,000	1,302,000	-145,000	537,667	32	47,352,000	65,762,000	18,410,000
1999-00	121,000	490,000	276,000	88,000	975,000	927,000	513,000	1,440,000	-465,000	528,362	33	46,887,000	64,624,000	17,737,000
2000-01	153,000	473,000	274,000	81,000	981,000	661,000	463,000	1,124,000	-143,000	526,467	33	46,744,000	64,392,000	17,648,000
2001-02	46,000	500,000	261,000	62,000	869,000	626,000	470,000	1,096,000	-227,000	517,725	33	46,517,000	63,323,000	16,806,000
2002-03	98,000	516,000	270,000	85,000	969,000	306,000	399,000	704,000	265,000	511,918	34	46,782,000	62,613,000	15,831,000
2003-04	155,000	497,000	273,000	60,000	985,000	423,000	467,000	890,000	95,000	502,541	34	46,877,000	61,466,000	14,589,000
2004-05	384,000	376,000	272,000	306,000	1,338,000	439,000	331,000	770,000	568,000	512,393	34	47,445,000	62,671,000	15,226,000
2005-06	121,000	323,000	260,000	149,000	853,000	489,000	382,000	872,000	-19,000	509,322	34	47,426,000	62,295,000	14,869,000
2006-07	17,000	547,000	271,000	80,000	915,000	610,000	485,000	1,095,000	-180,000	500,530	35	47,246,000	61,220,000	13,974,000
2007-08	122,000	454,000	275,000	106,000	957,000	639,000	495,000	1,134,000	-177,000	498,182	35	47,069,000	60,933,000	13,864,000
2008-09	114,000	500,000	258,000	81,000	953,000	560,000	483,000	1,044,000	-91,000	493,015	35	46,978,000	60,301,000	13,323,000
2009-10	146,000	510,000	367,000	96,000	1,119,000	358,000	447,000	805,000	314,000	493,661	35	47,292,000	60,380,000	13,088,000
2010-11	154,000	549,000	340,000	205,000	1,248,000	418,000	437,000	854,000	394,000	497,871	35	47,686,000	60,895,000	13,209,000
2011-12	59,000	428,000	362,000	74,000	923,000	720,000	387,000	1,107,000	-184,000	495,437	35	47,502,000	60,597,000	13,095,000
mean	138,000	474,000	305,000	148,000	1,065,000	690,000	452,000	1,142,000	-77,000	516,000	34	47,270,000	63,057,000	15,787,000
median, 50%	124,000	488,000	275,000	101,000	983,000	633,000	469,000	1,102,000	-144,000	512,000	34	47,322,000	62,642,000	15,529,000
2002-03 to 2011-12	137,000	470,000	295,000	124,000	1,026,000	496,000	431,000	928,000	99,000	501,000	35	47,230,000	61,337,000	14,107,000
2007-08 to 2011-12	119,000	488,000	320,000	112,000	1,040,000	539,000	450,000	989,000	51,000	496,000	35	47,305,000	60,621,000	13,316,000

*(Condensed from App. T).

**TABLE III.11
RAYMOND BASIN PASADENA SUBAREA CHLORIDE (CI) BALANCE**

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6-c9					=c14-c13
Water Year	Cl loading					Cl unloading			Cl balance LBS/YR	Cl in Groundwater in Storage			Allowable Loading 100 mg/l lbs	Assimilative Capacity lbs
	Precipitation	Monk Hill Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	Cl Conc.	Total		
	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR		ac-ft	mg/l	lbs		
1994-95	430,000	385,000	645,000	439,000	1,899,000	982,000	326,000	1,308,000	591,000	540,874	38	55,597,000	147,009,000	91,412,000
1995-96	219,000	530,000	640,000	368,000	1,757,000	1,236,000	461,000	1,697,000	60,000	536,585	38	55,657,000	145,844,000	90,187,000
1996-97	165,000	672,000	691,000	303,000	1,831,000	1,428,000	779,000	2,207,000	-376,000	535,321	38	55,281,000	145,500,000	90,219,000
1997-98	424,000	572,000	670,000	499,000	2,165,000	520,000	306,000	826,000	1,339,000	541,963	38	56,620,000	147,305,000	90,685,000
1998-99	72,000	758,000	668,000	322,000	1,820,000	854,000	477,000	1,331,000	489,000	537,667	39	57,109,000	146,138,000	89,029,000
1999-00	160,000	354,000	873,000	141,000	1,528,000	1,061,000	586,000	1,647,000	-119,000	528,362	40	56,990,000	143,609,000	86,619,000
2000-01	198,000	711,000	782,000	199,000	1,890,000	607,000	425,000	1,032,000	858,000	526,467	40	57,848,000	143,094,000	85,246,000
2001-02	54,000	1,059,000	670,000	73,000	1,856,000	695,000	522,000	1,217,000	639,000	517,725	42	58,487,000	140,718,000	82,231,000
2002-03	135,000	489,000	732,000	101,000	1,457,000	403,000	525,000	928,000	529,000	511,918	42	59,016,000	139,139,000	80,123,000
2003-04	183,000	297,000	750,000	71,000	1,301,000	261,000	288,000	549,000	752,000	502,541	44	59,768,000	136,591,000	76,823,000
2004-05	688,000	424,000	916,000	494,000	2,522,000	576,000	434,000	1,009,000	1,513,000	512,393	44	61,281,000	139,268,000	77,987,000
2005-06	160,000	404,000	748,000	241,000	1,553,000	701,000	548,000	1,249,000	304,000	509,322	44	61,585,000	138,434,000	76,849,000
2006-07	20,000	446,000	775,000	95,000	1,336,000	303,000	241,000	544,000	792,000	500,530	46	62,377,000	136,044,000	73,667,000
2007-08	223,000	749,000	912,000	228,000	2,112,000	908,000	702,000	1,610,000	502,000	498,182	46	62,879,000	135,406,000	72,527,000
2008-09	150,000	770,000	834,000	95,000	1,849,000	562,000	484,000	1,046,000	803,000	493,015	48	63,682,000	134,002,000	70,320,000
2009-10	326,000	1,093,000	704,000	236,000	2,359,000	279,000	348,000	627,000	1,732,000	493,661	49	65,414,000	134,177,000	68,763,000
2010-11	344,000	763,000	728,000	332,000	2,167,000	529,000	553,000	1,081,000	1,086,000	497,871	49	66,500,000	135,321,000	68,821,000
2011-12	69,000	725,000	504,000	88,000	1,386,000	902,000	486,000	1,388,000	-2,000	495,437	49	66,498,000	134,660,000	68,162,000
mean	223,000	622,000	736,000	240,000	1,822,000	712,000	472,000	1,183,000	638,000	516,000	43	60,144,000	140,126,000	79,982,000
median, 50%	174,000	622,000	730,000	232,000	1,840,000	651,000	481,000	1,149,000	615,000	512,000	43	59,392,000	139,204,000	79,055,000
2002-03 to 2011-12	230,000	616,000	760,000	198,000	1,804,000	542,000	461,000	1,003,000	801,000	501,000	46	62,900,000	136,304,000	73,404,000
2007-08 to 2011-12	222,000	820,000	736,000	196,000	1,975,000	636,000	515,000	1,150,000	824,000	496,000	48	64,995,000	134,713,000	69,719,000

*(Condensed from App. U).

**TABLE III.12
RAYMOND BASIN PASADENA SUBAREA SULFATE (SO4) BALANCE**

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6-c9					=c14-c13
Water Year	SO ₄ loading					SO ₄ unloading			SO ₄ balance LBS/YR	SO ₄ in Groundwater in Storage			Allowable Loading 100 mg/l lbs	Assimilative Capacity lbs
	Precipitation	Monk Hill Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	SO ₄ Conc.	Total		
	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR		ac-ft	mg/l	lbs		
1994-95	606,000	771,000	1,197,000	689,000	3,263,000	3,083,000	1,024,000	4,107,000	-844,000	540,874	59	86,906,000	147,009,000	60,103,000
1995-96	321,000	734,000	1,204,000	579,000	2,838,000	2,012,000	751,000	2,763,000	75,000	536,585	60	86,981,000	145,844,000	58,863,000
1996-97	285,000	729,000	1,299,000	476,000	2,789,000	1,453,000	793,000	2,245,000	544,000	535,321	60	87,525,000	145,500,000	57,975,000
1997-98	592,000	786,000	1,367,000	784,000	3,529,000	1,542,000	908,000	2,449,000	1,080,000	541,963	60	88,605,000	147,305,000	58,700,000
1998-99	135,000	940,000	1,129,000	506,000	2,710,000	1,578,000	881,000	2,458,000	252,000	537,667	61	88,857,000	146,138,000	57,281,000
1999-00	275,000	882,000	1,411,000	264,000	2,832,000	1,797,000	994,000	2,791,000	41,000	528,362	62	88,898,000	143,609,000	54,711,000
2000-01	344,000	889,000	1,269,000	372,000	2,874,000	1,370,000	958,000	2,328,000	546,000	526,467	63	89,444,000	143,094,000	53,650,000
2001-02	102,000	930,000	1,383,000	137,000	2,552,000	1,269,000	953,000	2,223,000	329,000	517,725	64	89,773,000	140,718,000	50,945,000
2002-03	224,000	1,027,000	1,566,000	189,000	3,006,000	743,000	970,000	1,713,000	1,293,000	511,918	65	91,066,000	139,139,000	48,073,000
2003-04	343,000	988,000	1,321,000	134,000	2,786,000	874,000	964,000	1,838,000	948,000	502,541	67	92,014,000	136,591,000	44,577,000
2004-05	976,000	1,072,000	1,422,000	777,000	4,247,000	977,000	736,000	1,713,000	2,534,000	512,393	68	94,548,000	139,268,000	44,720,000
2005-06	274,000	1,230,000	1,474,000	379,000	3,357,000	919,000	718,000	1,636,000	1,721,000	509,322	70	96,269,000	138,434,000	42,165,000
2006-07	37,000	1,064,000	1,329,000	178,000	2,608,000	830,000	659,000	1,488,000	1,120,000	500,530	72	97,389,000	136,044,000	38,655,000
2007-08	293,000	744,000	2,016,000	382,000	3,435,000	1,274,000	986,000	2,259,000	1,176,000	498,182	73	98,565,000	135,406,000	36,841,000
2008-09	258,000	866,000	2,068,000	179,000	3,371,000	1,244,000	1,073,000	2,317,000	1,054,000	493,015	74	99,619,000	134,002,000	34,383,000
2009-10	371,000	1,468,000	1,580,000	443,000	3,862,000	804,000	1,004,000	1,808,000	2,054,000	493,661	76	101,673,000	134,177,000	32,504,000
2010-11	390,000	1,337,000	1,337,000	521,000	3,585,000	909,000	950,000	1,858,000	1,727,000	497,871	76	103,400,000	135,321,000	31,921,000
2011-12	130,000	1,089,000	826,000	165,000	2,210,000	1,586,000	853,000	2,439,000	-229,000	495,437	77	103,171,000	134,660,000	31,489,000
mean	331,000	975,000	1,400,000	397,000	3,103,000	1,348,000	899,000	2,246,000	857,000	516,000	67	93,595,000	140,126,000	46,531,000
median, 50%	289,000	935,000	1,352,000	381,000	2,940,000	1,272,000	952,000	2,252,000	1,001,000	512,000	66	91,540,000	139,204,000	46,397,000
2002-03 to 2011-12	330,000	1,089,000	1,494,000	335,000	3,247,000	1,016,000	891,000	1,907,000	1,340,000	501,000	72	97,771,000	136,304,000	38,533,000
2007-08 to 2011-12	288,000	1,101,000	1,565,000	338,000	3,293,000	1,163,000	973,000	2,136,000	1,156,000	496,000	75	101,286,000	134,713,000	33,428,000

*(Condensed from App. V).

**TABLE III.13
RAYMOND BASIN PASADENA SUBAREA TOTAL DISSOLVED SOLIDS (TDS) BALANCE**

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6-c9					=c14-c13
Water Year	TDS loading					TDS unloading			TDS balance LBS/YR	TDS in Groundwater in Storage			Allowable Loading 450 mg/l lbs	Assimilative Capacity lbs
	Precipitation	Monk Hill Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	TDS Conc.	Total		
	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR		ac-ft	mg/l	lbs		
1994-95	1,543,000	5,428,000	2,360,000	1,755,000	11,086,000	15,907,000	5,282,000	21,189,000	-10,103,000	540,874	334	490,545,000	661,543,000	170,998,000
1995-96	738,000	5,215,000	2,627,000	1,529,000	10,109,000	12,096,000	4,516,000	16,612,000	-6,503,000	536,585	332	484,042,000	656,297,000	172,255,000
1996-97	773,000	5,305,000	2,287,000	1,254,000	9,619,000	8,736,000	4,766,000	13,502,000	-3,883,000	535,321	330	480,159,000	654,751,000	174,592,000
1997-98	1,597,000	5,352,000	3,467,000	2,115,000	12,531,000	8,707,000	5,127,000	13,834,000	-1,303,000	541,963	325	478,856,000	662,875,000	184,019,000
1998-99	403,000	6,069,000	3,154,000	1,380,000	11,006,000	9,153,000	5,109,000	14,262,000	-3,256,000	537,667	325	475,600,000	657,620,000	182,020,000
1999-00	769,000	5,609,000	2,464,000	792,000	9,634,000	10,476,000	5,793,000	16,269,000	-6,635,000	528,362	327	468,965,000	646,240,000	177,275,000
2000-01	970,000	5,510,000	2,997,000	1,111,000	10,588,000	7,578,000	5,301,000	12,879,000	-2,291,000	526,467	326	466,674,000	643,921,000	177,247,000
2001-02	307,000	5,469,000	2,915,000	413,000	9,104,000	7,021,000	5,274,000	12,295,000	-3,191,000	517,725	329	463,483,000	633,229,000	169,746,000
2002-03	618,000	5,866,000	2,655,000	574,000	9,713,000	3,892,000	5,078,000	8,971,000	742,000	511,918	334	464,225,000	626,127,000	161,902,000
2003-04	1,048,000	5,918,000	2,896,000	408,000	10,270,000	4,636,000	5,114,000	9,750,000	520,000	502,541	340	464,745,000	614,658,000	149,913,000
2004-05	2,690,000	6,713,000	2,886,000	2,142,000	14,431,000	5,195,000	3,913,000	9,107,000	5,324,000	512,393	338	470,069,000	626,707,000	156,638,000
2005-06	784,000	7,283,000	2,336,000	1,056,000	11,459,000	4,874,000	3,809,000	8,682,000	2,777,000	509,322	342	472,846,000	622,952,000	150,106,000
2006-07	110,000	7,192,000	2,878,000	529,000	10,709,000	6,000,000	4,764,000	10,764,000	-55,000	500,530	348	472,791,000	612,198,000	139,407,000
2007-08	1,021,000	6,945,000	3,623,000	903,000	12,492,000	6,299,000	4,874,000	11,173,000	1,319,000	498,182	350	474,110,000	609,326,000	135,216,000
2008-09	806,000	7,304,000	3,557,000	513,000	12,180,000	5,633,000	4,857,000	10,490,000	1,690,000	493,015	355	475,800,000	603,007,000	127,207,000
2009-10	967,000	7,996,000	3,650,000	1,271,000	13,884,000	3,690,000	4,607,000	8,297,000	5,587,000	493,661	359	481,387,000	603,797,000	122,410,000
2010-11	1,017,000	7,928,000	2,598,000	1,358,000	12,901,000	4,241,000	4,432,000	8,673,000	4,228,000	497,871	359	485,615,000	608,946,000	123,331,000
2011-12	373,000	6,449,000	3,808,000	474,000	11,104,000	7,599,000	4,089,000	11,688,000	-584,000	495,437	360	485,031,000	605,969,000	120,938,000
mean	919,000	6,308,000	2,953,000	1,088,000	11,268,000	7,319,000	4,817,000	12,135,000	-868,000	516,000	340	475,275,000	630,565,000	155,290,000
median, 50%	795,000	5,994,000	2,891,000	1,084,000	11,046,000	6,660,000	4,866,000	11,431,000	-320,000	512,000	336	474,855,000	626,417,000	159,270,000
2002-03 to 2011-12	943,000	6,959,000	3,089,000	923,000	11,914,000	5,206,000	4,554,000	9,760,000	2,155,000	501,000	348	474,662,000	613,369,000	138,707,000
2007-08 to 2011-12	837,000	7,324,000	3,447,000	904,000	12,512,000	5,492,000	4,572,000	10,064,000	2,448,000	496,000	357	480,389,000	606,209,000	125,820,000

* (Condensed from App. W).

**TABLE III.14
RAYMOND BASIN SANTA ANITA SUBAREA NITRATE (NO3) BALANCE**

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6-c9					=c14-c13
Water Year	NO ₃ loading					NO ₃ unloading			NO3 balance LBS/YR	NO ₃ in Groundwater in Storage			Allowable Loading 45 mg/l lbs	Assimilative Capacity lbs
	Precipitation	Pasadena Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	NO ₃ Conc.	Total		
	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR		ac-ft	mg/l	lbs		
1994-95	119,000	147,000	38,000	88,000	392,000	724,000	58,000	782,000	-390,000	74,864	24	4,907,000	9,157,000	4,250,000
1995-96	89,000	88,000	35,000	104,000	316,000	394,000	42,000	436,000	-120,000	75,302	23	4,787,000	9,210,000	4,423,000
1996-97	65,000	96,000	35,000	80,000	276,000	334,000	34,000	368,000	-92,000	74,397	23	4,695,000	9,099,000	4,404,000
1997-98	126,000	130,000	36,000	99,000	391,000	373,000	34,000	407,000	-16,000	77,256	22	4,679,000	9,449,000	4,770,000
1998-99	67,000	102,000	35,000	93,000	297,000	326,000	30,000	356,000	-59,000	75,445	23	4,620,000	9,228,000	4,608,000
1999-00	68,000	160,000	37,000	60,000	325,000	381,000	40,000	421,000	-96,000	74,109	22	4,524,000	9,064,000	4,540,000
2000-01	76,000	120,000	35,000	64,000	295,000	387,000	44,000	431,000	-136,000	73,627	22	4,388,000	9,005,000	4,617,000
2001-02	48,000	115,000	34,000	12,000	209,000	352,000	47,000	400,000	-191,000	70,789	22	4,197,000	8,658,000	4,461,000
2002-03	121,000	93,000	40,000	79,000	333,000	379,000	52,000	431,000	-98,000	70,276	21	4,099,000	8,595,000	4,496,000
2003-04	81,000	111,000	41,000	31,000	264,000	432,000	49,000	481,000	-217,000	67,639	21	3,882,000	8,273,000	4,391,000
2004-05	165,000	35,000	36,000	148,000	384,000	312,000	58,000	370,000	14,000	73,138	20	3,896,000	8,946,000	5,050,000
2005-06	77,000	11,000	37,000	106,000	231,000	339,000	31,000	370,000	-139,000	70,230	20	3,757,000	8,590,000	4,833,000
2006-07	34,000	101,000	40,000	36,000	211,000	332,000	16,000	348,000	-137,000	64,590	21	3,620,000	7,900,000	4,280,000
2007-08	83,000	118,000	36,000	75,000	312,000	308,000	19,000	327,000	-15,000	63,856	21	3,605,000	7,810,000	4,205,000
2008-09	77,000	119,000	41,000	66,000	303,000	320,000	25,000	345,000	-42,000	61,633	21	3,563,000	7,538,000	3,975,000
2009-10	76,000	78,000	39,000	91,000	284,000	255,000	30,000	284,000	0	62,986	21	3,563,000	7,704,000	4,141,000
2010-11	83,000	58,000	36,000	99,000	276,000	267,000	23,000	290,000	-14,000	63,450	21	3,549,000	7,761,000	4,212,000
2011-12	68,000	78,000	41,000	61,000	248,000	220,000	14,000	234,000	14,000	61,413	21	3,563,000	7,511,000	3,948,000
mean	85,000	98,000	37,000	77,000	297,000	358,000	36,000	393,000	-96,000	70,000	22	4,105,000	8,528,000	4,422,000
median, 50%	77,000	102,000	37,000	80,000	296,000	337,000	34,000	370,000	-94,000	71,000	21	3,998,000	8,627,000	4,414,000
2002-03 to 2011-12	87,000	80,000	39,000	79,000	285,000	316,000	32,000	348,000	-63,000	66,000	21	3,710,000	8,063,000	4,353,000
2007-08 to 2011-12	77,000	90,000	39,000	78,000	285,000	274,000	22,000	296,000	-11,000	63,000	21	3,569,000	7,665,000	4,096,000

*(Condensed from App. X).

**TABLE III.15
RAYMOND BASIN SANTA ANITA SUBAREA CHLORIDE (CI) BALANCE**

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6+c9					=c14-c13
Water Year	CI loading					CI unloading			CI balance LBS/YR	CI in Groundwater in Storage			Allowable Loading 100 mg/l lbs	Assimilative Capacity lbs
	Precipitation LBS/YR	Pasadena Subsurface Inflow LBS/YR	Returned flow Total LBS/YR	Injection & Spreading LBS/YR	Total LBS/YR	Groundwater extraction unloading LBS/YR	Subsurface outflow unloading LBS/YR	Total LBS/YR		Groundwater volume ac-ft	CI Conc. mg/l	Total lbs		
1994-95	125,000	101,000	36,000	81,000	343,000	358,000	29,000	387,000	-44,000	74,864	14	2,940,000	20,348,000	17,408,000
1995-96	49,000	86,000	30,000	78,000	243,000	256,000	28,000	284,000	-41,000	75,302	14	2,899,000	20,467,000	17,568,000
1996-97	37,000	160,000	25,000	53,000	275,000	195,000	20,000	215,000	60,000	74,397	15	2,959,000	20,221,000	17,262,000
1997-98	95,000	79,000	28,000	66,000	268,000	447,000	40,000	487,000	-219,000	77,256	13	2,740,000	20,998,000	18,258,000
1998-99	26,000	105,000	27,000	62,000	220,000	255,000	24,000	278,000	-58,000	75,445	13	2,682,000	20,506,000	17,824,000
1999-00	44,000	183,000	29,000	26,000	282,000	314,000	33,000	346,000	-64,000	74,109	13	2,618,000	20,143,000	17,525,000
2000-01	47,000	110,000	27,000	38,000	222,000	278,000	32,000	310,000	-88,000	73,627	13	2,530,000	20,012,000	17,482,000
2001-02	19,000	127,000	28,000	6,000	180,000	256,000	34,000	290,000	-110,000	70,789	13	2,420,000	19,241,000	16,821,000
2002-03	57,000	123,000	30,000	41,000	251,000	272,000	37,000	309,000	-58,000	70,276	12	2,362,000	19,101,000	16,739,000
2003-04	45,000	68,000	57,000	16,000	186,000	226,000	26,000	252,000	-66,000	67,639	12	2,296,000	18,384,000	16,088,000
2004-05	159,000	46,000	36,000	111,000	352,000	130,000	24,000	154,000	198,000	73,138	13	2,494,000	19,879,000	17,385,000
2005-06	49,000	16,000	34,000	79,000	178,000	414,000	38,000	452,000	-274,000	70,230	12	2,220,000	19,088,000	16,868,000
2006-07	11,000	50,000	33,000	17,000	111,000	330,000	16,000	346,000	-235,000	64,590	11	1,985,000	17,556,000	15,571,000
2007-08	50,000	167,000	25,000	40,000	282,000	192,000	12,000	204,000	78,000	63,856	12	2,063,000	17,356,000	15,293,000
2008-09	35,000	119,000	55,000	25,000	234,000	362,000	28,000	389,000	-155,000	61,633	11	1,908,000	16,752,000	14,844,000
2009-10	61,000	61,000	29,000	61,000	212,000	253,000	29,000	282,000	-70,000	62,986	11	1,838,000	17,120,000	15,282,000
2010-11	67,000	74,000	20,000	66,000	227,000	157,000	14,000	171,000	56,000	63,450	11	1,894,000	17,246,000	15,352,000
2011-12	27,000	97,000	17,000	23,000	164,000	318,000	20,000	338,000	-174,000	61,413	10	1,720,000	16,692,000	14,972,000
mean	56,000	98,000	31,000	49,000	235,000	279,000	27,000	305,000	-70,000	70,000	12	2,365,000	18,951,000	16,586,000
median, 50%	48,000	99,000	29,000	47,000	231,000	264,000	28,000	300,000	-65,000	71,000	13	2,391,000	19,171,000	16,845,000
2002-03 to 2011-12	56,000	82,000	34,000	48,000	220,000	265,000	24,000	290,000	-70,000	66,000	12	2,078,000	17,917,000	15,839,000
2007-08 to 2011-12	48,000	104,000	29,000	43,000	224,000	256,000	21,000	277,000	-53,000	63,000	11	1,885,000	17,033,000	15,149,000

* (Condensed from App. Y).

**TABLE III.16
RAYMOND BASIN SANTA ANITA SUBAREA SULFATE (SO4) BALANCE**

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6+c9					=c14-c13
Water Year	SO ₄ loading					SO ₄ unloading			SO ₄ balance LBS/YR	SO ₄ in Groundwater in Storage			Allowable Loading 100 mg/l lbs	Assimilative Capacity lbs
	Precipitation	Pasadena Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	SO ₄ Conc.	Total		
	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR		ac-ft	mg/l	lbs		
1994-95	353,000	317,000	72,000	229,000	971,000	705,000	56,000	762,000	209,000	74,864	37	7,508,000	20,348,000	12,840,000
1995-96	157,000	140,000	69,000	270,000	636,000	1,454,000	71,000	1,525,000	-889,000	75,302	32	6,619,000	20,467,000	13,848,000
1996-97	152,000	163,000	68,000	206,000	589,000	834,000	60,000	894,000	-305,000	74,397	31	6,314,000	20,221,000	13,907,000
1997-98	369,000	235,000	72,000	255,000	931,000	916,000	58,000	974,000	-43,000	77,256	30	6,271,000	20,998,000	14,727,000
1998-99	106,000	193,000	70,000	240,000	609,000	831,000	59,000	890,000	-281,000	75,445	29	5,990,000	20,506,000	14,516,000
1999-00	158,000	310,000	75,000	107,000	650,000	1,058,000	67,000	1,125,000	-475,000	74,109	27	5,515,000	20,143,000	14,628,000
2000-01	172,000	249,000	71,000	136,000	628,000	718,000	61,000	780,000	-152,000	73,627	27	5,363,000	20,012,000	14,649,000
2001-02	71,000	232,000	73,000	22,000	398,000	774,000	78,000	851,000	-453,000	70,789	26	4,910,000	19,241,000	14,331,000
2002-03	169,000	227,000	68,000	139,000	603,000	455,000	81,000	536,000	67,000	70,276	26	4,977,000	19,101,000	14,124,000
2003-04	150,000	228,000	112,000	55,000	545,000	537,000	80,000	616,000	-71,000	67,639	27	4,906,000	18,384,000	13,478,000
2004-05	549,000	78,000	87,000	383,000	1,097,000	479,000	99,000	579,000	518,000	73,138	27	5,424,000	19,879,000	14,455,000
2005-06	159,000	20,000	79,000	273,000	531,000	577,000	88,000	665,000	-134,000	70,230	28	5,290,000	19,088,000	13,798,000
2006-07	42,000	137,000	72,000	63,000	314,000	697,000	46,000	743,000	-429,000	64,590	28	4,861,000	17,556,000	12,695,000
2007-08	194,000	235,000	68,000	160,000	657,000	783,000	52,000	835,000	-178,000	63,856	27	4,683,000	17,356,000	12,673,000
2008-09	144,000	263,000	130,000	116,000	653,000	507,000	45,000	552,000	101,000	61,633	29	4,784,000	16,752,000	11,968,000
2009-10	235,000	176,000	72,000	235,000	718,000	365,000	59,000	424,000	294,000	62,986	30	5,078,000	17,120,000	12,042,000
2010-11	260,000	127,000	50,000	257,000	694,000	344,000	45,000	389,000	305,000	63,450	31	5,383,000	17,246,000	11,863,000
2011-12	124,000	171,000	40,000	108,000	443,000	617,000	29,000	646,000	-203,000	61,413	31	5,180,000	16,692,000	11,512,000
mean	198,000	195,000	75,000	181,000	648,000	703,000	63,000	766,000	-118,000	70,000	29	5,503,000	18,951,000	13,447,000
median, 50%	159,000	210,000	72,000	183,000	632,000	701,000	60,000	753,000	-143,000	71,000	28	5,327,000	19,171,000	13,823,000
2002-03 to 2011-12	203,000	166,000	78,000	179,000	626,000	536,000	62,000	599,000	27,000	66,000	28	5,057,000	17,917,000	12,861,000
2007-08 to 2011-12	191,000	194,000	72,000	175,000	633,000	523,000	46,000	569,000	64,000	63,000	29	5,022,000	17,033,000	12,012,000

* (Condensed from App. Z).

**TABLE III.17
RAYMOND BASIN SANTA ANITA SUBAREA TOTAL DISSOLVED SOLIDS (TDS) BALANCE**

column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					=c2+c3+c4+c5			=c7+c8	=c6+c9					=c14-c13
Water Year	TDS loading					TDS unloading			TDS balance LBS/YR	TDS in Groundwater in Storage			Allowable Loading 450 mg/l lbs	Assimilative Capacity lbs
	Precipitation	Pasadena Subsurface Inflow	Returned flow Total	Injection & Spreading	Total	Groundwater extraction unloading	Subsurface outflow unloading	Total		Groundwater volume	TDS Conc.	Total		
	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR		ac-ft	mg/l	lbs		
1994-95	2,912,000	1,636,000	869,000	1,887,000	7,304,000	5,474,000	438,000	5,912,000	1,392,000	74,864	274	55,843,000	91,566,000	35,723,000
1995-96	1,110,000	844,000	791,000	2,228,000	4,973,000	4,485,000	482,000	4,968,000	5,000	75,302	273	55,848,000	92,102,000	36,254,000
1996-97	1,014,000	977,000	784,000	1,651,000	4,426,000	4,731,000	478,000	5,209,000	-783,000	74,397	272	55,065,000	90,995,000	35,930,000
1997-98	2,847,000	1,325,000	807,000	1,970,000	6,949,000	4,968,000	449,000	5,416,000	1,533,000	77,256	270	56,598,000	94,492,000	37,894,000
1998-99	577,000	1,121,000	789,000	1,856,000	4,343,000	5,384,000	501,000	5,885,000	-1,542,000	75,445	268	55,056,000	92,277,000	37,221,000
1999-00	1,022,000	1,808,000	849,000	581,000	4,260,000	4,838,000	502,000	5,340,000	-1,080,000	74,109	268	53,976,000	90,643,000	36,667,000
2000-01	1,104,000	1,379,000	805,000	898,000	4,186,000	4,335,000	498,000	4,833,000	-647,000	73,627	266	53,329,000	90,053,000	36,724,000
2001-02	398,000	1,286,000	778,000	121,000	2,583,000	4,104,000	553,000	4,657,000	-2,074,000	70,789	266	51,255,000	86,582,000	35,327,000
2002-03	1,125,000	1,190,000	689,000	779,000	3,783,000	3,979,000	541,000	4,520,000	-737,000	70,276	264	50,518,000	85,955,000	35,437,000
2003-04	850,000	1,211,000	741,000	313,000	3,115,000	4,615,000	525,000	5,140,000	-2,025,000	67,639	264	48,493,000	82,729,000	34,236,000
2004-05	4,588,000	414,000	817,000	3,197,000	9,016,000	4,339,000	805,000	5,145,000	3,871,000	73,138	263	52,364,000	89,455,000	37,091,000
2005-06	1,111,000	108,000	841,000	2,284,000	4,344,000	6,285,000	574,000	6,859,000	-2,515,000	70,230	261	49,849,000	85,898,000	36,049,000
2006-07	257,000	993,000	899,000	386,000	2,535,000	5,940,000	281,000	6,221,000	-3,686,000	64,590	263	46,163,000	79,000,000	32,837,000
2007-08	1,605,000	1,160,000	817,000	1,149,000	4,731,000	4,802,000	304,000	5,106,000	-375,000	63,856	264	45,788,000	78,102,000	32,314,000
2008-09	1,015,000	1,193,000	752,000	684,000	3,644,000	4,907,000	379,000	5,285,000	-1,641,000	61,633	264	44,147,000	75,383,000	31,236,000
2009-10	1,927,000	809,000	711,000	1,924,000	5,371,000	4,016,000	466,000	4,482,000	889,000	62,986	263	45,036,000	77,038,000	32,002,000
2010-11	2,215,000	593,000	653,000	2,189,000	5,650,000	4,712,000	407,000	5,119,000	531,000	63,450	264	45,567,000	77,605,000	32,038,000
2011-12	743,000	819,000	507,000	650,000	2,719,000	4,101,000	263,000	4,364,000	-1,645,000	61,413	263	43,922,000	75,114,000	31,192,000
mean	1,468,000	1,048,000	772,000	1,375,000	4,663,000	4,779,000	469,000	5,248,000	-585,000	70,000	266	50,490,000	85,277,000	34,787,000
median, 50%	1,107,000	1,141,000	790,000	1,400,000	4,344,000	4,722,000	480,000	5,143,000	-760,000	71,000	264	50,887,000	86,269,000	35,580,000
2002-03 to 2011-12	1,544,000	849,000	743,000	1,356,000	4,491,000	4,770,000	455,000	5,224,000	-733,000	66,000	263	47,185,000	80,628,000	33,443,000
2007-08 to 2011-12	1,501,000	915,000	688,000	1,319,000	4,423,000	4,508,000	364,000	4,871,000	-448,000	63,000	264	44,892,000	76,648,000	31,756,000

*(Condensed from App. AA).

TABLE III.18
ASSIMILATIVE CAPACITY FOR GROUNDWATER RECHARGE THROUGH INJECTION AND SPREADING OF
RECYCLED WATER, RAYMOND BASIN: MONK HILL SUBAREA

Water Quantity Assumptions, 2002-03 to 2011-12				
	----- ac-ft -----			
Mixing model, 100% of groundwater in storage	190,400	190,400	190,400	190,400
	----- ac-ft/yr -----			
Groundwater recharge/Removal	13,300	13,300	13,300	13,300
Recycled Water Replenishment	225	225	225	225
Balance of Recharge	13,075	13,075	13,075	13,075
Water Quality Characteristics, 2002-03 to 2011-12				
	Nitrate	Chloride	Sulfate	TDS [†]
	----- mg/L -----			
Groundwater	26	44	69	395
Basin Water Quality Objectives	45	100	100	450
Recycled Water	26	163	210	720
Loading Characteristics, 2002-03 to 2011-12				
	----- lbs -----			
Allowable loading	24,619,900	54,710,700	54,710,700	246,198,700
Current load	14,144,000	23,976,800	37,647,000	216,267,300
Assimilative Capacity (AC)	10,475,900	30,733,900	17,063,700	29,931,400
10% AC	1,047,590	3,073,390	1,706,370	2,993,140
	----- lbs -----			
Recycled Water Project loading	16,000	100,000	128,000	440,000
Balance of Recharge loading	924,000	1,563,000	2,452,000	14,035,000
Total loading	940,000	1,663,000	2,580,000	14,475,000
Groundwater removal unloading	940,000	1,590,000	2,494,000	14,277,000
Net load	0	73,000	86,000	198,000
	----- percent -----			
Percent AC used with 225 AFY after 1 year	0.0	0.2	0.5	0.7
Percent AC used with 225 AFY after 5 years	0.0	1.1	2.3	3.0
Percent AC used with 225 AFY after 10 years	0.0	2.0	4.0	5.2
Percent AC used with 225 AFY after 20 years	0.0	2.8	5.9	7.6
Percent AC used with 225 AFY after Equilibrium Reached	0.0	3.6	7.7	10.0

† If ratio of TDS/SO₄ in recharge water < 3.0, sulfate will be limiting, otherwise TDS.

TABLE III.19
ASSIMILATIVE CAPACITY FOR GROUNDWATER RECHARGE THROUGH INJECTION AND SPREADING OF
RECYCLED WATER, RAYMOND BASIN: PASADENA SUBAREA

Water Quantity Assumptions, 2002-03 to 2011-12				
	----- ac-ft -----			
Mixing model, 100% of groundwater in storage	536,800	536,800	536,800	536,800
	----- ac-ft/yr -----			
Groundwater recharge/Removal	19,700	19,700	19,700	19,700
Recycled Water Replenishment	405	405	405	405
Balance of Recharge	19,295	19,295	19,295	19,295
Water Quality Characteristics, 2002-03 to 2011-12				
	Nitrate	Chloride	Sulfate	TDS [†]
	----- mg/L -----			
Groundwater	35	46	72	348
Basin Water Quality Objectives	45	100	100	450
Recycled Water	26	163	210	720
Loading Characteristics, 2002-03 to 2011-12				
	----- lbs -----			
Allowable loading	61,337,100	136,304,200	136,304,200	613,368,700
Current load	47,230,300	62,900	97,771,400	474,661,900
Assimilative Capacity (AC)	14,106,800	136,241,300	38,532,800	138,706,800
10% AC	1,410,680	13,624,130	3,853,280	13,870,680
	----- lbs -----			
Recycled Water Project loading	29,000	179,000	231,000	792,000
Balance of Recharge loading	1,835,000	2,412,000	3,775,000	18,248,000
Total loading	1,864,000	2,591,000	4,006,000	19,040,000
Groundwater removal unloading	1,874,000	2,463,000	3,855,000	18,631,000
Net load	-10,000	128,000	151,000	409,000
	----- percent -----			
Percent AC used with 405 AFY after 1 year	-0.1	0.1	0.392	0.295
Percent AC used with 405 AFY after 5 years	-0.3	0.8	1.7	1.3
Percent AC used with 405 AFY after 10 years	-0.6	1.4	3.2	2.3
Percent AC used with 405 AFY after 20 years	-1.0	2.8	5.3	3.9
Percent AC used with 405 AFY after Equilibrium Reached	-1.8	4.5	10.0	7.5

† If ratio of TDS/SO₄ in recharge water >4.0 sulfate will be limiting, otherwise TDS.

TABLE III.20
ASSIMILATIVE CAPACITY FOR GROUNDWATER RECHARGE THROUGH INJECTION AND SPREADING OF
RECYCLED WATER, RAYMOND BASIN: SANTA ANITA SUBAREA

Water Quantity Assumptions, 2002-03 to 2011-12				
	----- ac-ft -----			
Mixing model, 100% of groundwater in storage	72,800	72,800	72,800	72,800
	----- ac-ft/yr -----			
Groundwater recharge/Removal	6,200	6,200	6,200	6,200
Recycled Water Replenishment	245	245	245	245
Balance of Recharge	5,955	5,955	5,955	5,955
Water Quality Characteristics, 2002-03 to 2011-12				
	Nitrate	Chloride	Sulfate	TDS [†]
	----- mg/L -----			
Groundwater	21	12	28	263
Basin Water Quality Objectives	45	100	100	450
Recycled Water	26	163	210	720
Loading Characteristics, 2002-03 to 2011-12				
	----- lbs -----			
Allowable loading	8,062,800	17,917,400	17,917,400	80,627,900
Current load	3,709,700	2,078,000	5,056,600	47,184,700
Assimilative Capacity (AC)	4,353,100	15,839,400	12,860,800	33,443,200
10% AC	435,310	1,583,940	1,286,080	3,344,320
	----- lbs -----			
Recycled Water Project loading	17,000	109,000	140,000	479,000
Balance of Recharge loading	340,000	194,000	453,000	4,256,000
Total loading	357,000	303,000	593,000	4,735,000
Groundwater removal unloading	354,000	202,000	472,000	4,431,000
Net load	3,000	101,000	121,000	304,000
	----- percent -----			
Percent AC used with 245 AFY after 1 year	0.1	0.6	0.9	0.9
Percent AC used with 245 AFY after 5 years	0.3	2.4	3.6	3.5
Percent AC used with 245 AFY after 10 years	0.5	4.0	5.9	5.7
Percent AC used with 245 AFY after 20 years	0.7	5.6	8.3	8.0
Percent AC used with 245 AFY after Equilibrium Reached	0.8	6.8	10.0	9.7

† If ratio of TDS/SO₄ in recharge water > 3.5 sulfate will be limiting, otherwise TDS.

Table III.21

Existing and Potential Implementation Measures

Activity	Timeframe	Type of Implementation Measure	Loading Impact	Concentration Impact
Groundwater Replenishment	Existing	• Spreading Grounds • Replenishment Coordinating Group	Increase	Decrease
	Potential	• New replenishment facilities	Increase	Decrease
Reduce Stormwater Runoff	Potential	• Stormwater BMPs to reduce runoff	Increase	No Change
Institutional/Regulatory	Existing	• Basin Adjunction • Title 22 Water Quality Monitoring	None	None
		• SNMP Monitoring Program	None	None
Imported Water Regional Salinity Control	Existing	• MWD Salinity Source Control	No Change	Decrease

Existing – Implementation measures or projects/programs that are currently in place

Potential – Implementation measures that are anticipated to be in operation before 2025 notwithstanding exigencies that are outside in the control of the project sponsors