Table 1

Water Quality Data

Graphed in the Hydrogeologic Evaluation

TABLE 1
WATER QUALITY DATA GRAPHED IN THE HYDROGEOLOGIC EVALUATION

DATA FOR FIGURE 9, FIGURE 10, PLATE 1, AND PLATE 2
Piper and Stiff Diagrams of Surface Water

Sample Location = MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA, USGS Database (http://waterdata.usgs.gov/nwis/qw)

Date	Sodium as Na, Dissolved (mg/l)	Potassium as K, Dissolved (mg/l)	Calcium as Ca, Dissolved (mg/l)	Magnesium as Mg, Dissolved (mg/l)	Chloride as Cl, Dissolved (mg/l)	Bicarbonate as HCO3 (mg/l)	Carbonate (mg/L)	Sulfate as SO4, Dissolved (mg/l)
04/05/67	11	2	17	30	6	73	0	12
10/05/67	56	5	40	13	32	220	0	44
04/02/68	48	5	42	11	25	210	0	38
10/16/68	46	5	40	12	28	200	0	40
04/23/69	11	4	16	4	5	79	0	12
10/20/69	45	18	37	8	24	200	0	40
04/16/70	45	14	40	10	26	210	0	44
11/06/70	44	4	45	10	30	190	0	44
04/21/71	37	3	39	9	22	170	0	38
10/20/71	39	3	35	8	24	160	0	45
04/27/72	55	5	44	13	34	200	0	62
11/29/72	45	4	42	9	26	180	0	47
04/26/73	24	3	23	6	15	110	0	19
11/21/73	51	4	43	11	28	200	0	50
04/24/74	53	6	48	10	32	220	0	50
11/20/74	53	6	54	9	36	210	0	57
04/23/75	51	6	49	10	34	210	0	57
10/31/75	58	8	49	10	38	220	0	56
04/21/76	48	6	47	9	31	200	0	50
10/26/76	44	6	44	9	29	200	0	41
04/13/77	42	4	41	8	23	110	0	39
10/18/77	44	4	40	8	29	190	0	39
04/13/78	25	3	22	6	26	88	0	22
10/10/66	60	9	48	11	38	220	0	65
11/03/66	57	6	49	10	36	210	0	60
12/07/66	10	3	23	2	4	83	0	15
01/05/67	51	5	47	11	29	210	0	55
02/08/67	47	5	45	9	26	200	0	50
03/21/67	22	3	26	6	11	120	0	22
05/03/67	14	2	18	6	7	93	0	12
05/31/67	45	6	41	8	22	190	0	46
07/11/67	56	6	43	10	28	220	0	50
08/10/67	59	7	38	10	28	210	0	53
08/31/67	58	7	41	11	30	220	0	50
11/09/67	52	5	40	10	29	220	0	36
12/13/67	44	5	39	10	24	200	0	38
01/12/68	45	5	41	9	22	200	0	38
02/09/68	40	4	40	9	20	190	0	35
03/13/68	42	4	42	10	24	200	0	36
05/01/68	44	5	44	11	28	200	0	40
06/13/68	48	5	42	10	26	200	0	44
07/24/68	56	6	45	10	32	220	0	49
01/15/69	48	8	44	9	31	200	0	45
07/26/69	40	14	37	8	21	200	0	35
01/21/70	47	26	35	9	25	210	0	44
07/23/70	47	7	44	12	32	210	0	53
01/22/71	42	3	41	10	26	180	0	44
07/14/71	39	3	36	8	23	160	0	44
01/07/72	50	6	45	10	32	200	0	54
07/26/72	51	7	43	12	33	200	0	55
01/11/73	39	3	43	9	28	180	0	45
01/31/73	43	3	37	10	25	180	0	44
03/21/73	29	3	27	6	26	82	0	27

TABLE 1
WATER QUALITY DATA GRAPHED IN THE HYDROGEOLOGIC EVALUATION

DATA FOR FIGURE 12, FIGURE 13, PLATE 1, AND PLATE 2
Piper and Stiff Diagrams of Groundwater

Date obtained from USGS Database (http://waterdata.usgs.gov/nwis/qw)

Well Location (Sample Date)	Sodium as Na, Dissolved (mg/l)	Potassium as K, Dissolved (mg/l)	Calcium as Ca, Dissolved (mg/l)	Magnesium as Mg, Dissolved (mg/l)	Chloride as Cl, Dissolved (mg/l)	Bicarbonate as HCO3, Field (mg/L)	Carbonate (mg/L), assumed to be nondetect	Sulfate as SO4, Dissolved (mg/l)	Database
08N/04W-31G01 (3/28/1995)	166.6	2.80	59	2.6	125.0	163.5	NA	220.0	MWA
08N/04W-29D03 (6/28/1994)	350.7	2.90	144	6.7	427.0	194.2	NA	415.0	MWA
07N/04W-07K02 (5/9/1995)	100.0	2.70	120	16.0	120.0	256.0	NA	160.0	USGS
06N/05W-12H01 (6/20/1991)	100.0	1.30	83	14.0	79.0	335.0	NA	150.0	USGS
06N/05W-08F05 (5/9/1995)	84.0	0.80	6	1.7	2.6	114.0	NA	100.0	USGS
06N/05W-03Q02 (5/19/1994)	100.0	1.50	16	1.8	5.8	196.0	NA	110.0	USGS
06N/04W-30Q06 (2/7/1995)	41.7	1.90	24	4.8	36.0	108.0	NA	16.9	MWA
06N/04W-30P05 (2/7/1995)	53.6	3.60	48	2.4	54.3	148.0	NA	65.9	MWA
06N/04W-30K05 (2/7/1995)	50.9	2.30	27	4.8	45.6	112.0	NA	24.7	MWA
06N/04W-30K04 (2/7/1995)	54.5	4.50	51	6.0	62.0	158.0	NA	37.1	MWA
06N/04W-30K03 (2/7/1995)	55.9	3.90	48	6.0	59.0	136.0	NA	47.0	MWA
06N/04W-30G03 (2/7/1995)	51.3	3.90	46	7.2	58.0	140.0	NA	36.9	MWA
06N/04W-30G01 (2/7/1995)	49.0	4.40	43	8.4	70.0	132.0	NA	30.7	MWA
06N/04W-30D10 (5/19/1993)	130.0	1.00	97	19.0	91.0	337.0	NA	220.0	USGS
06N/04W-29M09 (8/1/2001)	96.0	1.50	180	11.0	120.0	320.0	NA	250.0	MWA
08N/04W-31G01 (3/2/1998)	181.0	2.90	58.2	5.4	127.0	168.0	NA	247.0	MWA
08N/04W-31G01 (3/21/2001)	197.0	3.63	72	3.5	160.0	144.0	NA	190.0	MWA
08N/04W-31G01 (6/20/1989)	184.0	3.00	51	29.0	42.0	159.0	NA	255.0	MWA
08N/04W-31G01 (10/8/1992)	165.8	2.70	59.1	1.9	129.6	152.3	NA	212.9	MWA
07N/04W-07K02 (5/23/1990)	110.0	3.00	130	18.0	130.0	270	NA	250.0	USGS
07N/04W-07K02 (6/20/1991)	110.0	1.70	120	16.0	120.0	268	NA	240.0	USGS
07N/04W-07K02 (10/29/1991)	120.0	2.90	110	16.0	110.0	259	NA	210.0	USGS
07N/04W-07K02 (5/18/1993)	97.0	2.60	96	14.0	86.0	251	NA	180.0	USGS
06N/05W-12H01 (10/29/1991)	87.0	2.70	80	15.0	67.0	303	NA	130.0	USGS
06N/05W-08F05 (5/19/1993)	89.0	0.90	6.4	1.7	3.2	117	NA	110.0	USGS
06N/04W-30Q06 (2/27/1992)	46.5	2.00	33	6.2	20.3	134.2	NA	54.7	MWA
06N/04W-30P05 (2/27/1992)	42.2	2.10	45.7	4.4	24.7	178.1	NA	37.8	MWA
06N/04W-30K05 (2/27/1992)	50.7	2.20	32.5	7.3	22.3	134.2	NA	65.5	MWA
06N/04W-30K04 (2/27/1992)	52.4	3.20	50.6	11.1	33.8	192.8	NA	68.5	MWA
06N/04W-30K04 (5/23/1995)	57.0	6.20	40	7.2	58.0	128.0	NA	57.4	MWA
06N/04W-30K03 (2/27/1992)	50.8	2.60	47.3	5.3	29.6	148.8	NA	79.4	MWA
06N/04W-30G03 (2/27/1992)	49.0	2.90	44.1	13.6	29.6	185.4	NA	60.2	MWA
06N/04W-30G01 (2/27/1992)	50.5	3.50	44.2	11.6	32.2	187.9	NA	55.2	MWA
06N/04W-30D10 (5/23/1990)	94.0	0.40	66	12.0	38.0	332	NA	110.0	USGS
06N/04W-30D10 (6/19/1991)	85.0	0.80	54	9.8	50.0	210	NA	130.0	USGS
06N/04W-30D10 (10/30/1991)	100.0	0.60	68	13.0	42.0	344	NA	120.0	USGS
Samples Collected By MWA for this Evaluation									
VVWRA.Effluent (8/15/2002)	110	11.00	27	5.0	80.0	140.0	0	64.0	MWA
06N/05W-12H02.(8/15/2002)	170	1.00	170	31.0	150.0	460.0	0	370.0	MWA
07N/05W-24R05.(8/15/2002)	130	2.40	12	0.0	17.0	200.0	0	110.0	MWA
07N/05W-24R06.(8/15/2002)	140	2.10	11	0.0	38.0	190.0	0	130.0	MWA
07N/05W-24R07.(8/15/2002)	120	2.30	30	2.1	47.0	210.0	0	88.0	MWA
07N/05W-24R08.(8/15/2002)	140	2.50	74	11.0	130.0	250.0	0	160.0	MWA
08N/04W-21M1.(8/19/2002)	89	2.70	38	3.2	48.0	190.0	0	68.0	MWA
08N/04W-21M2.(8/19/2002)	92	3.60	49	4.5	51.0	220.0	0	91.0	MWA
08N/04W-21M3.(8/19/2002)	78	2.20	34	3.2	33.0	200.0	0	55.0	MWA
08N/04W-21M4.(8/19/2002)	76	2.20	37	3.3	32.0	210.0	0	55.0	MWA

TABLE 1
WATER QUALITY DATA GRAPHED IN THE HYDROGEOLOGIC EVALUATION

DATA FOR FIGURE 12
Surface Water Time Series Sulfate, Chloride, and Electrical Conductivity

USGS Database http://waterdata.usgs.gov/nwis/qw					
Sample Location	**Sample Date**	**Chloride as Cl, Dissolved (mg/l)**	**Solids, Sum of Constituents, Dissolved (mg/l)**	**Specific Conductance (micorsiemens / cm @ 25 C)**	**Sulfate as SO4, Dissolved (mg/l)**
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/10/66	38	NA	601	65
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/03/66	36	NA	576	60
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	12/07/66	4	NA	170	15
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/05/67	29	NA	528	55
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/08/67	26	NA	494	50
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/21/67	11	NA	277	22
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/05/67	6	NA	161	12
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/03/67	7	NA	200	12
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/31/67	22	NA	475	46
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/11/67	28	NA	532	50
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	08/10/67	28	NA	541	53
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	08/31/67	30	NA	545	50
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/05/67	32	307	519	44
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/09/67	29	283	493	36
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	12/13/67	24	265	478	38
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/12/68	22	262	437	38
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/09/68	20	247	451	35
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/13/68	24	262	475	36
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/02/68	25	276	506	38
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/01/68	28	278	517	40
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	06/13/68	26	277	504	44
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/24/68	32	309	543	49
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/16/68	28	NA	493	40
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/15/69	31	NA	533	45
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/23/69	5	NA	165	12
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/26/69	21	NA	441	35
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/20/69	24	NA	479	40
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/21/70	25	NA	514	44
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/16/70	26	NA	491	44
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/23/70	32	NA	518	53
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/06/70	30	NA	489	44
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/22/71	26	NA	461	44
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/21/71	22	NA	415	38
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/14/71	23	NA	407	44
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/20/71	24	NA	400	45
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/07/72	32	NA	560	54
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/27/72	34	NA	550	62
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/26/72	33	NA	525	55
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/29/72	26	NA	460	47
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/11/73	28	NA	480	45
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/31/73	25	NA	420	44
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/21/73	26	178	221	27
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/28/73	20	190	320	26
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/26/73	15	NA	260	19
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/25/73	35	NA	465	56
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/21/73	28	NA	525	50
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/30/74	29	NA	470	46
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/24/74	32	NA	550	50
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/24/74	40	NA	575	59
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/20/74	36	NA	550	57
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/22/75	35	NA	490	56
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/27/75	34	339	574	53
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/13/75	33	336	551	54
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/19/75	32	333	560	54
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/23/75	34	NA	475	57
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/29/75	35	345	550	54
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/30/75	37	346	570	54
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	06/30/75	37	362	607	56
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/17/75	40	349	581	60
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/23/75	38	NA	550	58
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	08/21/75	39	364	585	59
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	09/26/75	37	349	552	55
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/31/75	38	349	595	56
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/19/75	35	NA	610	54
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/26/75	34	337	590	52
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	12/30/75	33	334	575	53
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/29/76	32	325	565	54
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/04/76	30	NA	475	54
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/24/76	30	317	535	53
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/25/76	32	320	570	54
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/21/76	31	NA	485	50

TABLE 1
WATER QUALITY DATA GRAPHED IN THE HYDROGEOLOGIC EVALUATION

DATA FOR FIGURE 12
Surface Water Time Series Sulfate, Chloride, and Electrical Conductivity

USGS Database http://waterdata.usgs.gov/nwis/qw					
Sample Location	**Sample Date**	**Chloride as Cl, Dissolved (mg/l)**	**Solids, Sum of Constituents, Dissolved (mg/l)**	**Specific Conductance (micorsiemens / cm @ 25 C)**	**Sulfate as SO4, Dissolved (mg/l)**
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/29/76	29	303	525	52
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/27/76	31	NA	523	50
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	06/28/76	33	NA	520	120
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/13/76	33	319	550	49
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/28/76	32	NA	500	51
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	08/19/76	33	323	460	56
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	09/14/76	28	303	470	52
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/26/76	29	295	430	41
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/23/76	25	277	435	43
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	12/01/76	25	NA	470	40
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	12/10/76	25	280	430	41
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/19/77	23	268	436	38
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/29/77	25	NA	490	38
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/15/77	29	265	421	37
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/16/77	27	266	430	41
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/13/77	23	235	453	39
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/22/77	26	NA	445	40
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/19/77	25	251	434	38
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	06/16/77	27	277	457	39
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/20/77	30	296	480	43
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/26/77	32	NA	490	45
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	08/18/77	31	308	492	48
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	09/22/77	27	288	470	40
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/18/77	29	286	457	39
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/22/77	26	276	454	33
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	12/01/77	21	249	490	36
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	12/29/77	38	226	367	34
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/18/78	45	208	371	31
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/01/78	24	231	430	34
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/15/78	35	175	320	23
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/23/78	28	152	249	21
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/13/78	26	167	273	22
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/26/78	19	137	250	18
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/09/78	28	190	300	26
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	06/30/78	35	278	466	41
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/26/78	36	NA	490	43
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/28/78	39	340	551	44
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	08/15/78	37	329	560	41
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	09/29/78	31	296	500	37
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/19/78	28	287	488	35
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/16/78	27	284	463	42
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/30/78	27	NA	390	36
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	12/28/78	27	267	463	35
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/23/79	27	269	437	39
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/24/79	24	NA	440	34
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/27/79	24	187	303	25
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/29/79	17	121	210	16
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/18/79	12	116	215	13
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/18/79	12	NA	200	13
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/22/79	23	233	382	30
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	06/27/79	20	180	450	27
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/17/79	28	NA	410	37
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/25/79	31	292	468	38
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	08/23/79	29	288	485	41
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	09/27/79	25	281	460	38
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/25/79	25	275	450	35
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/28/79	27	NA	430	34
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/29/79	26	287	225	36
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	12/20/79	24	275	425	33
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/01/80	33	NA	260	24
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/07/80	30	237	360	37
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/21/80	14	126	215	16
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/16/80	14	NA	250	19
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/23/80	13	161	240	20
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/09/80	16	175	300	23
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/28/80	18	211	380	22
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	06/18/80	22	269	280	31
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/23/80	28	NA	370	37
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/29/80	25	290	380	35
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	08/19/80	32	311	540	37
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	09/23/80	29	284	500	33

TABLE 1
WATER QUALITY DATA GRAPHED IN THE HYDROGEOLOGIC EVALUATION

DATA FOR FIGURE 12
Surface Water Time Series Sulfate, Chloride, and Electrical Conductivity

USGS Database http://waterdata.usgs.gov/nwis/qw					
Sample Location	**Sample Date**	**Chloride as Cl, Dissolved (mg/l)**	**Solids, Sum of Constituents, Dissolved (mg/l)**	**Specific Conductance (micorsiemens / cm @ 25 C)**	**Sulfate as SO4, Dissolved (mg/l)**
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	10/17/80	24	280	480	31
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/20/80	24	264	450	32
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	12/17/80	22	256	470	30
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/14/81	21	249	425	33
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	02/20/81	22	258	440	35
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/19/81	23	257	450	33
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/16/81	20	267	420	35
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/21/81	26	293	500	39
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	06/16/81	NA	NA	560	NA
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/22/81	23	305	520	46
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	08/14/81	29	304	500	39
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	09/18/81	30	NA	505	NA
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	11/18/81	25	283	460	41
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/21/82	24	249	430	30
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/05/82	22	257	440	33
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	05/21/82	24	255	435	35
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/29/82	26	282	440	37
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	09/23/82	24	274	405	41
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	04/29/92	36	NA	520	NA
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	01/13/93	NA	NA	305	NA
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	03/12/96	31.1	NA	485	41
MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA	07/19/96	45	NA	586	64

Data provide by RWQCB					
Sample Location	**Sample Date**	**Chloride (mg/l)**	**TDS (mg/L)**	**EC Estimated (EC=TDS/0.62) (uS/cm)**	**Sulfate (mg/l)**
Lower Narrows Mojave River	03/21/00	15	319	515	22
Lower Narrows Mojave River	06/15/00	65	430	694	62
Lower Narrows Mojave River	01/03/01	40	360	581	43
Lower Narrows Mojave River	03/26/01	46	327	527	42
Lower Narrows Mojave River	06/25/01	56	406	655	33
Lower Narrows Mojave River	08/27/01	58	410	661	30
Lower Narrows Mojave River	11/20/01	54	397	640	52
Upper Narrows Mojave River	03/21/00	240	897	1447	47
Upper Narrows Mojave River	06/15/00	240	840	1355	240
Upper Narrows Mojave River	01/03/01	230	1100	1774	260
Upper Narrows Mojave River	03/26/01	290	1090	1758	220
Upper Narrows Mojave River	06/25/01	190	885	1427	190
Upper Narrows Mojave River	08/27/01	220	826	1332	200
Upper Narrows Mojave River	11/20/01	56	400	645	58

DATA FOR FIGURE 9, FIGURE 10, PLATE 1, AND PLATE 2

Piper and Stiff Diagrams of Surface Water

Sample Location = MOJAVE RIVER AT LOWER NARROWS NEAR VICTORVILLE CA, USGS Database (http://waterdata.usgs.gov/nwis/qw)

Date	Sodium as Na, Dissolved (mg/l)	Potassium as K, Dissolved (mg/l)	Calcium as Ca, Dissolved (mg/l)	Magnesium as Mg, Dissolved (mg/l)	Chloride as Cl, Dissolved (mg/l)	Bicarbonate as HCO3 (mg/l)	Carbonate (mg/L)	Sulfate as SO4, Dissolved (mg/l)
03/28/73	28	3	27	6	20	120	0	26
07/25/73	60	4	37	9	35	180	0	56
01/30/74	47	4	43	10	29	200	0	46
07/24/74	60	9	50	10	40	220	0	59
01/22/75	52	7	50	10	35	220	0	56
01/27/75	51	7	51	11	34	210		53
02/13/75	51	7	50	11	33	220		54
03/19/75	50	7	47	11	32	220	0	54
04/29/75	52	6	50	11	35	230	0	54
05/30/75	56	8	49	10	37	220	0	54
06/30/75	62	11	49	10	37	230	0	56
07/17/75	57	9	48	10	40	200	0	60
07/23/75	60	10	53	6	38	220	0	58
08/21/75	63	12	46	9	39	220	0	59
09/26/75	60	9	47	9	37	220	0	55
11/19/75	54	7	50	11	35	210	0	54
11/26/75	53	8	48	11	34	220	0	52
12/30/75	52	7	51	11	33	210	0	53
01/29/76	50	6	47	11	32	210	0	54
02/04/76	49	6	50	10	30	210	0	54
02/24/76	46	5	50	10	30	200	0	53
03/25/76	47	7	47	10	32	200	0	54
04/29/76	46	6	41	10	29	200	0	52
07/13/76	50	6	47	10	33	200	0	49
07/28/76	51	6	43	9	32	200	0	51
08/19/76	53	6	44	8	33	200	0	56
09/14/76	45	5	44	9	28	190	0	52
11/23/76	42	5	40	8	25	180	0	43
12/01/76	42	5	41	8	25	180	0	40
12/10/76	42	4	41	8	25	190	0	41
01/19/77	40	4	41	8	23	180	0	38
01/29/77	43	2	41	8	25	180	0	38
02/15/77	39	4	39	9	29	170	0	37
03/16/77	39	4	40	8	27	170	0	41
04/22/77	44	3	42	8	26	190	0	40
05/19/77	39	4	25	8	25	180	0	38
06/16/77	43	5	43	8	27	180	0	39
07/20/77	47	5	44	9	30	190	0	43
07/26/77	48	4	45	8	32	190	0	45
08/18/77	49	5	45	9	31	190	0	48
09/22/77	44	5	42	8	27	190	0	40
11/22/77	44	4	40	8	26	190	0	33
12/01/77	42	3	42	7	21	190	0	36
12/29/77	39	5	31	7	38	110	0	34
01/18/78	37	3	24	8	45	92	0	31
02/01/78	40	3	38	6	24	160	0	34
02/15/78	29	3	22	7	35	83	0	23
03/23/78	22	3	20	6	28	74	0	21
04/26/78	24	3	18	6	19	90	0	18

Table 2

Key Areas and Key Wells in the Transition Zone

Key Hydrogeologic Areas	Well	Aquifer		
		Floodplain, Shallow Zone	Floodplain, Deep Zone	Regional
Inflow Areas				
Mojave River Area Up Gradient From The TZ (Alto Sub-Area)	Upper Narrows Well (05N/04W-14D)	14D1	14D2	14D3 & 14D4
Mojave River Area Down Gradient From The Lower Narrows	Riverside Cement Well (06N/04W-30J5)	30J5		
Shadow Mountains Fault - Up Gradient Area	El Mirage (06N/06W-21J2)			21J2
Mojave River Area Adjacent The VVWRP	Oro Grande (06N/05W-12H1)	12H2	12H1	
Central TZ Highway 395 Area	(08N/06W-15J1)			15J1
Outflow Areas				
Adelanto Area	(06N/05W-34F1)			34F1
Central TZ Mojave River Area	(07N/05W-24)R5, R6, R7, & R8	24R8	24R7	24R6 & 24R5
Silver Lakes Area & Area Up Gradient From The Helendale Fault	Helendale 4 (08N/04W-19G)	19G4	19G3	19G2 (19G1 in bedrock fractures)
Area Within The Helendale Fault	Helendale 2 (08N/04W-20Q)	20Q11	20Q9	20Q7, Q8, & Q9 (all in bedrock fractures)
Mojave River Area Down Gradient From The TZ (Centro Subarea)	(08N04W12Q1 & 12C1)	12Q1	12C1	

Table 3

Groundwater Production In the Transition Zone

By Water Use (acre-feet)

	1994	1995	1996	1997	1998	1999	2000	2001	Avg.
Agriculture	4,610	3,997	5,096	5,175	3,614	3,074	2,868	2,120	3,819
Domestic	85	65	137	123	120	112	76	70	99
Silver Lakes Association	2,947	2,826	3,457	3,372	2,925	3,458	3,899	3,416	3,288
Industrial	2,757	3,077	2,042	1,783	1,387	2,405	2,485	1,856	2,224
Municipal	2,980	2,464	6,066	5,946	5,307	5,802	6,376	6,726	5,208
Minimal Producers (estimated)	177	177	177	177	177	177	177	177	177
Total	13,556	12,606	16,975	16,576	13,530	15,028	15,881	14,365	14,815

Table 4

Transition Zone Water Budget

Components	Average Year	Subtotal
Sources (Inflow)		61,150 AF
Surface Water		
Mojave River Base Flow at the Lower Narrows	8,142 AF [1]	
Mojave River Stormflow at the Lower Narrows	33,107 AF [2]	
Precipitation	96 AF [3]	
VVWRA Discharge	8,659 AF [4]	
Ungaged Tributaries	320 AF [7]	
Pumping Return Flows	5,926 AF [6]	
Groundwater		
Subsurface Inflows	4,900 AF [5]	
Sinks (Outflow)		61,336 AF
Surface Water		
Evaporation	1,159 AF [9]	
Riparian Transpiration	6,000 AF [10]	
Surface Outflow Across Helendale Fault	34,762 AF [12]	
Groundwater		
Subsurface Outflow Across Helendale Fault	4,600 AF [11]	
Total Pumping	14,815 AF [8]	
Municipal Well Pumping	5,208 AF [8]	
Domestic Well Pumping	99 AF [8]	
Agricultural Pumping	3,819 AF [8]	
Industrial Pumping	2,224 AF [8]	
Silver Lakes Association	3,288 AF [8]	
Minimal Producers (<10 AFY)	177 AF [13]	
Difference		-186 AF

Footnotes are on the following page.

Footnotes to Table 4

1 The base flow value is an average value determined from data provided by the Mojave River Basin Watermaster for Water Years 1991 through 2001. Storm flow and base flow are derived from total flow by the Mojave River Basin Watermaster using the method outlined in Exhibit C of the Judgment After Trial (California Superior Court, 1996). Base flow and Storm flow values at the Lower Narrows are based on total flow measurements taken at the USGS stream gage at the Lower Narrows. For the water budget, a longer period average was not used because the decline in base flow values observed since 1950 would not representing average conditions over the past 10 years. The long term average base flow (1931-2001) is 18,829 AFY.

2 This value is an average of storm flow values reported by the Watermaster for Water Years 1931 through 2001. Base flow and Storm flow values at the Lower Narrows are based on stream flow measurements taken at the USGS stream gage at the Lower Narrows. The determination of storm flow and base flow was made by the Mojave River Basin Watermaster using the method outlined in Exhibit C of the Judgment After Trial (California Superior Court, 1996).

3 Precipitation falling on desert areas, in the dry river channel, and/or in riparian areas is considered lost to evapotranspiration in accordance with assumptions made by the USGS (1996c and 2001a). The value presented reflects direct precipitation on bodies of open water from which recharge can occur. The value presented was estimated by multiplying the average annual precipitation by the area of the open water body. Open bodies of water were determined from USGS (1996c) and personal communication with VVWRA to be approximately 206 acres. NOAA data collected from 1939 through 2001 at the Victorville Pumping Plant, indicate an average precipitation of 5.61 inches per year.

4 The value presented is an average of annual VVWRA discharge for the period tabulated by the Watermaster (1994-2001). This period corresponds to the verified groundwater production data tabulated by the Watermaster. VVWRA annual discharges observed during this period are the highest recorded. Future VVWRA discharges are expected to increase annually.

5 As calculated by URS for this study. Calculations are presented in Appendix H of this report.

6 Return flow value is estimated to be 40 percent of total pumping. USGS (1971) assumes 40 - 45 percent return on total pumping and 55 - 60 percent return on water pumped for irrigation. USGS (2001a) states that improvements to irrigation techniques since 1971 have reduced irrigation return flows to approximately 46 percent. Webb (2000) performed a detailed consumptive use study based on the 1996-97 water year. Webb assumed a maximum irrigation consumptive use of 65 percent when production exceeded crop requirements. Otherwise, Webb applied crop specific consumptive use values to the number of acres under cultivation with each crop. Webb assumed a 50 percent return value for water produced for domestic and municipal use. Webb assumed that 100 percent of water produced for industrial processes in the Transition Zone is consumed.

Based on these calculations and assumptions Webb determined a consumptive use value for the Transition Zone of 10,390 AFY for the 1996-97 Water Year. Total verified production in the Transition Zone for the 1996-97 Water Year was 17,199 AFY. The detailed consumptive use value determined by Webb for the 1996-97 water year is 60.4 percent which leaves a return flow of approximately 40 percent. For the purposes of this study, Pumping Return Flows are assumed to be returns of groundwater pumped from within the Transition Zone and include averaged returns from irrigation and domestic septic systems.

7 The value presented is from Webb (2000). This value for ungaged tributary stream flow in the Transition Zone was determined from data presented in *Groundwater and Surface Water Relations Along the Mojave River, Southern California, USGS (1996a)*. Described in text as occurring at the Transition Zone boundaries. Assumes 100 percent is recharged.

8 The Mojave River Basin Watermaster has tabulated Transition Zone groundwater pumping since 1994. The groundwater production values used in this water balance are average values representing the years 1994-2001.

9 This value reflects an evaporation rate of 67.5 inches per year (USGS 1996c) from 206 acres of free surface water associated with the VVWRA percolation ponds and surface water in the Mojave River Channel. Silver Lakes are not included in this value because the lakes are lined, and water pumped to fill the lakes is considered outflow from the system accounted for by Total Pumping (Footnote 8). Losses associated with agriculture, including evaporation, are accounted for in the estimate of pumping return flow, which is derived in part from agricultural consumptive use (Webb, 2000).

10 The value represents only riparian transpiration as determined by the USGS (1996c). Transpiration from vegetation irrigated in urban areas is accounted for in domestic consumptive use as calculated by Webb (2000). Transpiration from non-irrigated vegetation in urban areas is accounted for by the loss of deep infiltration from direct rainfall, similar transpiration from xerophytes in undeveloped areas as assumed by USGS (1996c). Transpiration losses associated with agriculture are accounted for as agricultural consumptive use as calculated by Webb (2000)

11 As calculated by URS for this study. Calculations are presented in Appendix H of this report. The Mojave Basin Area Adjudication, Table C-1 gives a value of 2,000 AFY.

12 This value represents 105% of storm flow measured at the Lower Narrows gage. Based on calculations performed by Webb (2000) approximately 105% of long term average storm flow leaves the Transition Zone as surface flow in an average year. There is likely a lower limit of storm flow beneath which this relationship cannot be applied. That limit has not been defined.

13 The Mojave Water Agency estimates that there are approximately 177 small producers in the Transition Zone. The small producers typically use the water for domestic purposes and use an average of 1 AFY (Webb, 2000). For this study it is assumed that the 177 small producers each use 1 AFY.

Table 5 Groundwater Storage Volume Estimates

Region	Entire Thickness		Upper 100 Feet	
	Regional Aquifer	Floodplain Aquifer	Regional Aquifer	Floodplain Aquifer
	(acre-feet)		(acre-feet)	
Transition Zone (TZ)	6,600,000	700,000	1,100,000	300,000
Area South of TZ, but North of Shadow Mountains and Adelanto Faults	900,000		120,000	
Area North of TZ, but within the TZ Watershed	300,000		30,000	
Specifiy Yield	10%	20%	10%	20%