APPENDIX A

WATER RIGHTS

Table A-1
Ground Water Rights, Application for Ground Water Rights, and Other Known Wells

App[1] #	Map[2] #	Status Permit/ Certificate[3]	Certificate Number	Township	Range	Section	Subdivision	Use[4]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[5]	Owner	Comment
Basin 50 – Susie Creek Area												
36901	1	RFP		33 N.	52 E.	12	NE¼ SW¼	IRD	5.400	N.S.	Jefferson, Thomas F.	Application Only
36902	2	RFP		33 N.	52 E.	13	NW¼ SE¼	IRD	5.400	N.S.	Jefferson, Dorothy	Application Only
36993	3	RFA		34 N.	52 E.	25	NE¼ SW¼	IRD	5.400	N.S.	Newman, Claude W.	Application Only
36994	4	RFP		33 N.	52 E.	12	NW¼ NE¼	IRD	5.400	N.S.	Johnson, Ernest W.	Application Only
36995	5	RFA		33 N.	52 E.	13	NE¼ SW¼	IRD	5.400	N.S.	Stoltman, Dorothy J.	Application Only
36996	6	RFA		34 N.	52 E.	36	NE¼ SE¼	IRD	5.400	N.S.	Boyer, David E.	Application Only
36997	7	RFA		34 N.	52 E.	24	SW¼ SW¼	IRD	5.400	N.S.	Kaiser, Joseph F.	Application Only
36998	8	RFP		33 N.	53 E.	8	NW¼ SW¼	IRD	5.400	N.S.	Johnson, Barbara L.	Application Only
36999	9	RFA		33 N.	52 E.	1	SW¼ NE¼	IRD	5.400	N.S.	Salley, Curtis R.	Application Only
39438	10	CER	11400	34 N.	52 E.	15	NE¼ NE¼	STK	0.026	18.82	Maggie Creek Ranch, Inc.	
43062	11	CER	13266	33 N.	53 E.	19	SE¼ SW¼	IND	0.036	0.18	Van Waters & Rogers, Inc.	
43131	12	CER	13228	33 N.	52 E.	24	SW¼ NE¼	QM	0.167	0.18	Meta-Tantay, Inc.	
43298	13	CER	12982	33 N.	53 E.	19	SW¼ SE¼	IND	0.033	1.14	E.I. Dupond Denemours	
46662	14	CER	11855	34 N.	52 E.	21	SW¼ NE¼	STK	0.009	6.51	Maggie Creek Ranch, Inc	
49309	15	CER	12146	35 N.	53 E.	15	NE¼ SE¼	STK	0.016	11.21	Maggie Creek Ranch, Inc	
49310	16	CER	12966	35 N.	53 E.	22	SW¼ NE¼	STK	0.010	11.21	Maggie Creek Ranch, Inc	
49316	17	CER	12151	34 N.	53 E.	25	NW¼ SE¼	STK	0.022	13.75	Maggie Creek Ranch, Inc	
49317	18	CER	12968	34 N.	53 E.	30	NW¼ NE¼	STK	0.009	6.51	Maggie Creek Ranch, Inc	
49637	19	CER	12675	33 N.	52 E.	25	NW¼ NW¼	IND	0.031	0.71	Thatcher Chemical Co.	
51576	20	CER	13752	33 N.	52 E.	24	NE¼ SW¼	QM	0.334	16.82	Prisons Department - Nevada	
52372	21	CER	13591	34 N.	53 E.	26	SW¼ NW¼	STK	0.031	22.41	Maggie Creek Ranch, Inc	
53179	22	CER	13593	34 N.	53 E.	5	SW¼ SW¼	STK	0.031	22.41	Maggie Creek Ranch, Inc	
56510	24	CER	14768	33 N.	52 E.	24	NE¼ SW¼	QM	0.089	13.88	Prisons Department - Nevada	
58029	25	CER	14529	35 N.	53 E.	9	NE¼ SW¼	STK	0.025	17.93	Maggie Creek Ranch, Inc	
58030	26	CER	14530	35 N.	53 E.	28	NE¼ SE¼	STK	0.011	7.98	Maggie Creek Ranch, Inc	
59836	27	PER		33 N.	52 E.	25	NE¼ NW¼	IND	0.600	24.19	P.S.F. Limited Liabilities Company	
60045	28	RFP		33 N.	53 E.	19	SW¼ SE¼	IND	0.110	30.70	E.I. Dupond Denemours	Application Only
63609	29	PER		33 N.	52 E.	25	NW¼ NE¼	IND	0.020	1.14	Continental Lime, Inc.	
64120	116	PER		33 N.	53 E.	20	SE¼ NE¼	QM	0.490	18	Board of Regents (on behalf of UNR)	
64121	117	PER		33 N.	53 E.	20	NE¼ SE¼	OTH	1.500	302	Board of Regents (on behalf of UNR)	
64873	118	APP		33 N.	53 E.	20	SE¼ NE¼	OTH	1.000	202	Board of Regents (on behalf of UNR)	Application Only
65003	119	APP		35 N.	54 E.	14	NW¼ NW¼	STK	0.010	N.S.	Lauglin, Catalina; Lauglin, Patrick	Application Only

Table A-1 (Continued)
Ground Water Rights, Application for Ground Water Rights, and Other Known Wells

App[1] #	Map[2] #	Status Permit/ Certificate[3]	Certificate Number	Township	Range	Section	Subdivision	Use[4]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[5]	Owner	Comment
Basin 51 – Maggie Creek Area												
18551	30	CER	5876	33 N.	52 E.	16	NE¼ NE¼	IRR	5.000	1339.95	Hadley, Robert H.; Newmont Gold Company	
20227	31	CER	5706	33 N.	52 E.	26	NW¼ NW¼	IRR	0.045	5.59	Meierhoff, Randy & Carmelia	
22214	32	CER	7188	33 N.	52 E.	26	NW¼ NW¼	IRR	0.011	7.20	Meierhoff, Ralph J.	
31273	120	CER	10672	33 N.	52 E.	4	SW¼ SW¼	IRR	1.000	78.42	Newmont Gold Company	
39872	121	CER	11673	34 N.	51 E.	7	LT01 (NE¼ NE¼)	STK	0.031	22.41	Elko Land and Livestock, Co.	
39874	122	CER	11674	35 N.	51 E.	31	SE¼ SE¼	STK	0.006	4.36	Elko Land and Livestock, Co.	
46041	123	CER	11926	35 N.	51 E.	27	NE¼ NE¼	STK	0.009	6.51	Elko Land and Livestock, Co.	
46045	124	CER	11930	34 N.	51 E.	3	LT02 (NW¼ NE¼)	STK	0.009	6.51	Elko Land and Livestock, Co.	
46046	125	CER	11931	35 N.	51 E.	30	NE¼ NE¼	STK	0.005	2.76	Elko Land and Livestock, Co.	
48256	33	CER	11577	33 N.	52 E.	15	NE¼ SW¼	IRR	2.061	443.22	Newmont Gold Company	
49311	34	CER	12147	37 N.	52 E.	16	SW¼ SE¼	STK	0.018	22.41	Maggie Creek Ranch Inc.	
49312	35	CER	12967	37 N.	52 E.	27	SE¼ SW¼	STK	0.018	11.21	Maggie Creek Ranch, Inc	
49319	36	CER	12152	34 N.	52 E.	20	NE¼ NW¼	STK	0.010	7.21	Maggie Creek Ranch, Inc	
51981	37	PER		33 N.	52 E.	23	SW¼ SW¼	MUN	2.000	735.57	Carlin - City of	
53269	38	CER	13727	37 N.	51 E.	36	SE¼ NW¼	STK	0.031	22.41	Maggie Creek Ranch Inc.	
54522	23	CER	13919	33 N.	52 E.	26	SW¼ NE¼	COM	0.056	0.03	The Anschutz Marketing and Trans.	
57020	39	RFP		34 N.	51 E.	35	NW¼	REC	5.000	N.S.	Elko County	Application Only
57021	40	RFP		34 N.	51 E.	34	NE¼	REC	5.000	N.S.	Elko County	Application Only
57022	41	RFP		33 N.	51 E.	3	NE¼	REC	5.000	N.S.	Elko County	Application Only
57023	42	RFP		33 N.	51 E.	2	NW¼	REC	20.000	N.S.	Elko County	Application Only
57024	43	RFP		34 N.	51 E.	35	NE¼	REC	5.000	N.S.	Elko County	Application Only
57025	44	RFP		34 N.	51 E.	35	SE¼	REC	10.000	N.S.	Elko County	Application Only
57026	45	RFP		34 N.	51 E.	35	SW¼	REC	40.000	N.S.	Elko County	Application Only
57027	46	RFP		33 N.	51 E.	2	NE¼	REC	5.000	N.S.	Elko County	Application Only
57028	47	RFP		34 N.	51 E.	34	SE¼	REC	15.000	N.S.	Elko County	Application Only
60768	126	PER		35 N.	51 E.	25	SW¼ NW¼	STK	0.063	45.25	Newmont Gold Company	
60769	127	PER		35 N.	51 E.	12	NW¼ SE¼	STK	0.063	45.25	Newmont Gold Company	
62012	49	PER		34 N.	51 E.	11	SE¼ SW¼	STK	0.007	5.07	Maggie Creek Ranch, Inc	
62013	50	PER		35 N.	52 E.	30	NE¼ SW¼	STK	0.007	5.07	Maggie Creek Ranch, Inc	
62014	51	PER		35 N.	52 E.	18	NW¼	STK	0.007	5.07	Maggie Creek Ranch, Inc	
62530	128	PER		34 N.	51 E.	9	NW¼ NW¼	STK	0.004	3.10	Elko Land and Livestock, Co.	
62531	129	PER		35 N.	51 E.	29	NW¼ SW¼	STK	0.004	3.10	Elko Land and Livestock, Co.	
NP	111			33 N.	52 E.	8		DOM			Callahan	No water right permit required or obtained for use

Table A-1 (Continued)
Ground Water Rights, Application for Ground Water Rights, and Other Known Wells

App[1] #	Map[2] #	Status Permit/ Certificate[3]	Certificate Number	Township	Range	Section	Subdivision	Use[4]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[5]	Owner	Comment
NP	112			33 N.	52 E.	9	NW¼ NW¼	DOM			Crouse	No water right permit required or obtained for use
NP	113			33 N.	52 E.	9	NW¼ NW¼	DOM			Whitlock Lot 1 Bock A	No water right permit required or obtained for use
NP	114			33 N.	52 E.	10	SW¼ SW¼	STK			Hadley	No water right permit required or obtained for use
NP	115			34 N.	52 E.	17	NW¼ SE¼	STK			Hadley	No water right permit required or obtained for use
Basin 52 – Marys Creek Area												
30971	53	CER	10102	33 N.	52 E.	27	SE¼ SE¼	STK	0.003	2.18	Eklund, Jo Ann; Eklund, L.W.	
30987	54	CER	10103	33 N.	52 E.	27	SE¼ SE¼	IRR	0.280	41.20	Eklund, Jo Ann; Eklund, L.W.	
34410	55	CER	10868	33 N.	52 E.	34	NE¼ NW¼	IRR	0.100	9.81	Jones, Melvin R.; Jones, Rachel S.	
35107	56	CER	12535	33 N.	52 E.	33	NE¼ NE¼	IRR	0.897	101.91	Jones, Melvin R.; Jones, Rachel S.	
42982	57	CER	11266	33 N.	52 E.	33	NE¼ SW¼	STK	0.015	10.87	Barrows, Elmer; Cater, Diana J.; Cater, Franklin L.; Newmont Gold Company	
43918	58	RFA		33 N.	52 E.	33	NE¼ SW¼	OTH	4.000	N.S.	Barrows, Elmer; Newmont Gold Company	Application Only
47027	59	PER		33 N.	52 E.	27	SW¼ SE¼	ENV	1.000	724.21	Southern Pacific Transportation Co.	
47028	60	PER		33 N.	52 E.	27	SW¼ SE¼	ENV	1.000	724.21	Southern Pacific Transportation Co.	
50436	61	PER		33 N.	52 E.	27	SE¼ SW¼	MUN	0.890	644.58	Carlin - City of	
52266	62	PER		33 N.	52 E.	27	NE¼ NW¼	MUN	0.560	405.58	Carlin - City of	
57712	48	PER		33 N.	52 E.	27	SE¼ SE¼	MUN	2.000	735.57	Carlin - City of	
58323E	52	PER		33 N.	52 E.	27	SW¼ SE¼	ENV	0.446	322.96	Southern Pacific Transportation Co.	
Basin 61 – Boulder Flat												
12487	130	CER	4872	33 N.	48 E.	25	SE¼ SE¼	IRR	5.587	861.84	Newmont Gold Company	
16951	131	CER	5605	34 N.	49 E.	5	NE¼ NW¼	IRR	3.500	681.92	Elko Land and Livestock, Co.	
16952	132	CER	5606	34 N.	49 E.	6	NE¼ NE¼	IRR	3.500	592	Elko Land and Livestock, Co.	
17490	133	CER	6214	33 N.	48 E.	24	NW¼ SW¼	IRR	5.998	1444.80	Newmont Gold Company	
21083	63	CER	7306	33 N.	48 E.	26	NW¼ NE¼	MM	0.334	242.04	Baroid Division; National Lead Co.	
22976	134	CER	7620	32 N.	45 E.	1	SE¼ SE¼	IRR	3.000	671.40	The 25 Corporation	
23881	135	CER	7642	35 N.	50 E.	22	NW¼ NW¼	STK	0.045	5.10	Newmont Gold Company	
24682	136	CER	8622	32 N.	45 E.	2	SE¼ SE¼	IRR	3.000	1200.00	25 Corporation, Inc.	
25247	137	CER	8461	33 N.	48 E.	23	NE¼ NE¼	IRR	3.686	760.50	Newmont Gold Company	

Table A-1 (Continued)
Ground Water Rights, Application for Ground Water Rights, and Other Known Wells

App[1] #	Map[2] #	Status Permit/ Certificate[3]	Certificate Number	Township	Range	Section	Subdivision	Use[4]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[5]	Owner	Comment
26873	138	CER	8659	35 N.	50 E.	20	LT01 (NE¼ NE¼)	STK	0.025	12.03	Elko Land and Livestock, Co.	
27956	139	CER	8972	35 N.	49 E.	28	SW¼ NE¼	STK	0.008	3.93	Elko Land and Livestock, Co.	
27957	140	CER	8973	33 N.	49 E.	26	SE¼ SW¼	STK	0.003	1.96	Elko Land and Livestock, Co.	
28197	64	CER	10722	36 N.	50 E.	30	NW¼ SE¼	MM	0.140	96.83	Polar Resources Company	
28966	141	CER	10226	34 N.	49 E.	7	SE¼ NE¼	IRR	0.600	291.55	Elko Land and Livestock, Co.	
28967	142	CER	10227	34 N.	49 E.	8	SE¼ NW¼	IRR	5.106	1021.44	Elko Land and Livestock, Co.	
28969	143	CER	9282	36 N.	50 E.	30	NW¼ SE¼	STK	0.009	6.72	Elko Land and Livestock, Co.	
29529	144	CER	10228	34 N.	50 E.	19	LT04 (NW¼ NW¼)	STK	0.012	17.93	Elko Land and Livestock, Co.	
29952	145	CER	10043	33 N.	49 E.	2	SW¼ NW¼	IRR	5.124	2794.25	Elko Land and Livestock, Co.	
29953	146	CER	10044	33 N.	49 E.	3	SE¼ NW¼	IRR	4.902	2673.19	Elko Land and Livestock, Co.	
30240	147	CER	10046	33 N.	49 E.	3	SW¼ NW¼	IRR	4.233	2308.35	Elko Land and Livestock, Co.	
30241	148	CER	10047	33 N.	49 E.	1	SW¼ NW¼	IRR	5.793	3159.06	Elko Land and Livestock, Co.	
30242	149	CER	10048	33 N.	49 E.	2	SW¼ NE¼	IRR	5.347	2915.85	Elko Land and Livestock, Co.	
30253	150	CER	10229	34 N.	49 E.	7	SE¼ NE¼	IRR	4.524	1017.88	Elko Land and Livestock, Co.	
30615	65	CER	10865	35 N.	50 E.	10	SW¼ SE¼	MM	0.160	64.29	Polar Resources Company	
30849	151	CER	10057	33 N.	49 E.	1	SW¼ SW¼	IRR	5.459	2976.93	Elko Land and Livestock, Co.	
31288	152	PER		34 N.	49 E.	5	NE¼ NW¼	IRR	6.000	2560.00	Elko Land and Livestock, Co.	
31289	153	PER		34 N.	49 E.	6	NE¼ NE¼	IRR	5.400	2560.00	Elko Land and Livestock, Co.	
34766	154	PER		33 N.	49 E.	1	SE¼ NW¼	IRR	3.790	2743.18	Elko Land and Livestock, Co.	
34767	155	PER		33 N.	49 E.	2	SW¼ SE¼	IRR	3.790	2742.80	Elko Land and Livestock, Co.	
34768	156	PER		33 N.	49 E.	2	SW¼ SW¼	IRR	3.790	2742.80	Elko Land and Livestock, Co.	
34769	157	PER		33 N.	49 E.	3	SW¼ SE¼	IRR	3.790	2742.80	Elko Land and Livestock, Co.	
34770	158	PER		33 N.	49 E.	3	SW¼ SW¼	IRR	3.790	20889.92	Elko Land and Livestock, Co.	
34771	159	PER		33 N.	49 E.	11	SW¼ NW¼	IRR	3.790	2742.80	Elko Land and Livestock, Co.	
34772	160	PER		33 N.	49 E.	10	SW¼ NE¼	IRR	3.790	2742.80	Elko Land and Livestock, Co.	
34773	161	PER		33 N.	49 E.	10	SW¼ NW¼	IRR	3.790	2742.80	Elko Land and Livestock, Co.	
36022	162	PER		34 N.	49 E.	8	SE¼ NE¼	IRR	2.870	2039.72	Elko Land and Livestock, Co.	
39871	163	CER	10875	33 N.	49 E.	8	SW¼ SE¼	STK	0.031	22.41	Elko Land and Livestock, Co.	
39873	164	CER	10876	33 N.	48 E.	1	SE¼ NW¼	STK	0.062	44.82	Elko Land and Livestock, Co.	
40859	66	CER	12278	32 N.	49 E.	22	LT08 (NE¼ NE¼)	STK	0.019	13.51	BLM	
43562	67	CER	11638	33 N.	48 E.	26	NE¼ NE¼	QM	0.010	0.03	Davis, Joanna; Davis, John N.	
44882	68	RFA		35 N.	48 E.	34	SE¼ SE¼	STK	0.005	3.62	BLM	Application Only
45664	69	CER	12985	32 N.	49 E.	28	NE¼ SW¼	IRR	4.460	2176.20	Zeda Corporation	
45665	70	CER	12986	32 N.	49 E.	28	NW¼ SW¼	IRR	5.120	2498.20	Zeda Corporation	
45666	71	CER	12987	32 N.	49 E.	28	NW¼ NE¼	IRR	5.400	2634.80	Zeda Corporation	
46042	165	CER	11927	35 N.	49 E.	23	NE¼ NE¼	STK	0.009	6.51	Elko Land and Livestock, Co.	
46043	166	CER	11928	35 N.	49 E.	19	SE¼ NE¼	STK	0.009	6.51	Elko Land and Livestock, Co.	

Table A-1 (Continued)
Ground Water Rights, Application for Ground Water Rights, and Other Known Wells

App[1] #	Map[2] #	Status Permit/ Certificate[3]	Certificate Number	Township	Range	Section	Subdivision	Use[4]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[5]	Owner	Comment
46044	167	CER	11929	34 N.	50 E.	10	SE¼ NE¼	STK	0.013	9.42	Elko Land and Livestock, Co.	
46047	168	CER	11915	33 N.	48 E.	5	LT04 (NW¼ NW¼)	STK	0.011	7.95	Elko Land and Livestock, Co.	
46048	169	CER	11916	34 N.	49 E.	16	NE¼ SE¼	STK	0.009	6.51	Elko Land and Livestock, Co.	
46049	170	CER	11917	34 N.	49 E.	30	NE¼ NW¼	STK	0.016	11.57	Elko Land and Livestock, Co.	
46050	171	CER	11918	34 N.	49 E.	34	SE¼ NW¼	STK	0.016	11.57	Elko Land and Livestock, Co.	
46051	172	CER	11919	34 N.	49 E.	2	SE¼ NW¼	STK	0.009	6.51	Elko Land and Livestock, Co.	
46052	173	CER	11920	34 N.	49 E.	8	NE¼ SE¼	STK	0.009	6.51	Elko Land and Livestock, Co.	
46053	174	CER	11921	34 N.	49 E.	4	NW¼ SW¼	STK	0.009	6.51	Elko Land and Livestock, Co.	
46054	175	CER	11932	33 N.	47 E.	14	SE¼ NE¼	STK	0.013	9.42	Elko Land and Livestock, Co.	
46055	176	CER	11933	33 N.	47 E.	10	SW¼ SE¼	STK	0.013	9.42	Elko Land and Livestock, Co.	
46056	177	CER	11934	33 N.	47 E.	1	NW¼ SW¼	STK	0.013	9.42	Elko Land and Livestock, Co.	
46057	178	CER	11935	33 N.	47 E.	17	SW¼ SE¼	STK	0.013	9.42	Elko Land and Livestock, Co.	
46058	179	CER	11936	33 N.	47 E.	21	SW¼ NE¼	STK	0.011	7.95	Elko Land and Livestock, Co.	
46059	180	CER	11937	33 N.	47 E.	27	SE¼ NW¼	STK	0.011	7.95	Elko Land and Livestock, Co.	
46060	181	CER	11938	33 N.	47 E.	28	NE¼ NW¼	STK	0.013	9.42	Elko Land and Livestock, Co.	
46061	182	CER	11939	33 N.	47 E.	29	SW¼ NW¼	STK	0.016	11.57	Elko Land and Livestock, Co.	
46062	183	CER	11940	32 N.	49 E.	11	NE¼ SE¼	STK	0.009	6.51	Elko Land and Livestock, Co.	
46063	184	CER	11941	34 N.	48 E.	1	NE¼ SW¼	STK	0.013	9.42	Elko Land and Livestock, Co.	
46064	185	CER	11942	34 N.	48 E.	34	SE¼ SE¼	STK	0.011	7.95	Elko Land and Livestock, Co.	
46065	186	CER	11943	35 N.	48 E.	34	SE¼ SE¼	STK	0.013	9.42	Elko Land and Livestock, Co.	
46066	187	CER	11944	33 N.	49 E.	15	NW¼ SW¼	STK	0.016	11.21	Elko Land and Livestock, Co.	
46067	188	CER	11945	34 N.	48 E.	21	NW¼ NW¼	STK	0.011	7.95	Elko Land and Livestock, Co.	
46489	189	PER		33 N.	48 E.	19	SW¼ SE¼	STK	0.100	67.23	Elko Land and Livestock, Co.	
46490	190	PER		33 N.	47 E.	24	NW¼ SE¼	STK	0.100	67.23	Elko Land and Livestock, Co.	
47688	191	CER	12827	33 N.	48 E.	1	SE¼ NW¼	STK	0.116	82.92	Elko Land and Livestock, Co.	
52941	192	PER		35 N.	48 E.	36	NE¼ SW¼	IRR	5.400	3909.44	Elko Land and Livestock, Co.	
52942	193	PER		35 N.	48 E.	36	NE¼ NW¼	IRR	5.400	3090.44	Elko Land and Livestock, Co.	
52943	194	PER		35 N.	48 E.	25	NE¼ SW¼	IRR	5.400	3909.44	Elko Land and Livestock, Co.	
52944	195	PER		35 N.	49 E.	31	NE¼ NE¼	IRR	5.400	3909.44	Elko Land and Livestock, Co.	
52945	196	PER		35 N.	48 E.	25	NE¼ NW¼	IRR	5.400	3909.44	Elko Land and Livestock, Co.	
52946	197	PER		35 N.	49 E.	30	NE¼ SE¼	IRR	5.400	3909.44	Elko Land and Livestock, Co.	
52947	198	PER		35 N.	49 E.	30	NE¼ NE¼	IRR	5.400	3909.44	Elko Land and Livestock, Co.	
52948	199	PER		35 N.	49 E.	19	NE¼ SE¼	IRR	5.400	3909.44	Elko Land and Livestock, Co.	
52949	200	PER		35 N.	49 E.	29	NE¼ SE¼	IRR	5.400	3909.44	Elko Land and Livestock, Co.	
52950	201	PER		35 N.	49 E.	29	NE¼ NE¼	IRR	5.400	3909.44	Elko Land and Livestock, Co.	
53715	72	PER		36 N.	49 E.	3	SE¼ SW¼	MM	1.000	645.44	Cordex Exploration Co.	
54497	73	PER		33 N.	45 E.	35	NE¼ SE¼	IND	1.000	389.92	Coastal Chem Inc.	
54520	74	CER	14782	33 N.	45 E.	27	NE¼ SE¼	IND	0.347	1.75	FMC Corporation	

Table A-1 (Continued)
Ground Water Rights, Application for Ground Water Rights, and Other Known Wells

App[1] #	Map[2] #	Status Permit/ Certificate[3]	Certificate Number	Township	Range	Section	Subdivision	Use[4]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[5]	Owner	Comment
54568	202	PER		34 N.	48 E.	2	SW¼ NW¼	STK	0.062	8.96	Elko Land and Livestock, Co.	
54827	203	PER		35 N.	48 E.	24	NE¼ SE¼	IRR	5.400	2560.00	Elko Land and Livestock, Co.	
54828	204	PER		35 N.	48 E.	25	SW¼ SE¼	IRR	5.400	2560.00	Elko Land and Livestock, Co.	
54829	205	PER		35 N.	48 E.	36	SW¼ NW¼	IRR	2.530	1800.28	Elko Land and Livestock, Co.	
54830	206	PER		34 N.	48 E.	1	NE¼ NW¼	IRR	5.400	2560.00	Elko Land and Livestock, Co.	
54831	207	PER		34 N.	48 E.	1	NW¼ SW¼	IRR	5.400	2560.00	Elko Land and Livestock, Co.	
54832	208	PER		34 N.	48 E.	2	SW¼ SW¼	IRR	2.210	1599.97	Elko Land and Livestock, Co.	
54833	209	PER		34 N.	48 E.	11	NW¼ NE¼	IRR	2.210	1599.97	Elko Land and Livestock, Co.	
54834	210	PER		34 N.	48 E.	11	NE¼ SW¼	IRR	2.210	1599.97	Elko Land and Livestock, Co.	
54835	211	PER		34 N.	48 E.	14	NW¼ NW¼	IRR	2.210	7680.00	Elko Land and Livestock, Co.	
54836	212	PER		34 N.	48 E.	15	SW¼ SE¼	IRR	2.210	1599.97	Elko Land and Livestock, Co.	
54837	213	PER		34 N.	48 E.	22	NE¼ NW¼	IRR	2.210	1599.97	Elko Land and Livestock, Co.	
54838	214	PER		34 N.	48 E.	12	NW¼ SW¼	IRR	2.210	1599.97	Elko Land and Livestock, Co.	
54839	215	PER		34 N.	48 E.	11	SE¼ SE¼	IRR	2.210	1599.97	Elko Land and Livestock, Co.	
55625	75	PER		33 N.	45 E.	35	NE¼ NW¼	IND	0.200	3.93	Sierra Chemical Company	
56207	218	RFA		34 N.	49 E.	5	NE¼ NW¼	IRR	2.667	N.S.	Elko Land and Livestock, Co.	Application Only
56208	219	RFA		34 N.	48 E.	23	NW¼ NW¼	IRR	0.833	N.S.	Elko Land and Livestock, Co.	Application Only
56209	220	RFA		34 N.	48 E.	23	NW¼ NW¼	IRR	0.934	N.S.	Elko Land and Livestock, Co.	Application Only
56210	221	RFA		34 N.	49 E.	5	NE¼ NW¼	IRR	4.466	N.S.	Elko Land and Livestock, Co.	Application Only
56211	222	RFA		34 N.	49 E.	6	NE¼ NE¼	IRR	4.466	N.S.	Elko Land and Livestock, Co.	Application Only
56212	223	RFA		34 N.	48 E.	14	NW¼ SE¼	IRR	0.934	N.S.	Elko Land and Livestock, Co.	Application Only
56213	224	RFA		34 N.	48 E.	14	NW¼ SE¼	IRR	0.350	N.S.	Elko Land and Livestock, Co.	Application Only
56214	225	RFA		34 N.	49 E.	6	NE¼ NE¼	IRR	3.150	N.S.	Elko Land and Livestock, Co.	Application Only
56429	226	RFA		34 N.	48 E.	11	SE¼ SE¼	IRR	1.110	N.S.	Elko Land and Livestock, Co.	Application Only
56430	227	RFA		34 N.	48 E.	12	NW¼ SW¼	IRR	1.110	N.S.	Elko Land and Livestock, Co.	Application Only
56431	228	RFA		34 N.	48 E.	22	NE¼ NW¼	IRR	1.110	4352.36	Elko Land and Livestock, Co.	Application Only
56432	229	RFA		34 N.	48 E.	15	SW¼ SE¼	IRR	1.110	4352.36	Elko Land and Livestock, Co.	Application Only
56433	230	RFA		34 N.	48 E.	14	NW¼ NW¼	IRR	1.110	4352.36	Elko Land and Livestock, Co.	Application Only
56434	231	RFA		34 N.	48 E.	11	NE¼ SW¼	IRR	1.110	4352.36	Elko Land and Livestock, Co.	Application Only
56435	232	RFA		34 N.	48 E.	11	NW¼ NE¼	IRR	1.110	4352.36	Elko Land and Livestock, Co.	Application Only
56436	233	RFA		34 N.	48 E.	2	SW¼ SW¼	IRR	1.110	4352.36	Elko Land and Livestock, Co.	Application Only
57755	76	PER		36 N.	49 E.	4	NE¼ NE¼	MM	1.000	645.20	Dee Gold Mining Company	
57756	77	PER		36 N.	49 E.	3	SE¼ SW¼	MM	1.000	645.20	Dee Gold Mining Company	
57757	78	PER		36 N.	49 E.	4	NE¼ NE¼	MM	1.000	645.20	Dee Gold Mining Company	
57758E	85	PER		36 N.	49 E.	10	SE¼ SW¼	ENV	0.250	181.13	Cordex Exploration Company	
57759E	86	PER		36 N.	49 E.	10	NE¼ SW¼	ENV	0.250	181.13	Cordex Exploration Company	
57788	87	PER		36 N.	49 E.	28	NW¼ NE¼	STK	0.031	22.41	Packer, Willis; Rhoads, Dean A; Rhoads, Sharon	

Table A-1 (Continued)
Ground Water Rights, Application for Ground Water Rights, and Other Known Wells

App[1] #	Map[2] #	Status Permit/ Certificate[3]	Certificate Number	Township	Range	Section	Subdivision	Use[4]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[5]	Owner	Comment
57789	79	PER		35 N.	49 E.	18	SW¼ NE¼	STK	0.031	22.41	Packer, Willis; Rhoads, Dean A; Rhoads, Sharon	
57882	80	PER		36 N.	49 E.	3	SW¼ SW¼	MM	1.000	645.20	Dee Gold Mining Company	
57883	81	PER		36 N.	49 E.	3	SW¼ SW¼	MM	1.000	645.20	Cordex Exploration Co.	
58254	82	PER		36 N.	49 E.	2	NE¼ NW¼	MM	2.000	1084.50	Dee Gold Mining Company	
59055	235	CER	14588	32 N.	50 E.	11	NW¼ SE¼	STK	0.009	5.03	Elko Land and Livestock, Co.	
59060	236	PER		33 N.	48 E.	25	SE¼ SE¼	OTH	0.500	77.13	Newmont Gold Company	
59342	83	PER		32 N.	50 E.	14	NE¼ NE¼	QM	0.160	1.60	Transportation Department-Nevada	
62579	84	PER		37 N.	49 E.	27	SE¼ NE¼	MM	2.000	1448.00	Meridian Gold Company	
63002	237	PER		33 N.	49 E.	32	NW¼ NE¼	STK	0.003	1.96	Elko Land and Livestock, Co.	
64229	238	RFP		35 N.	49 E.	3	NE¼ NW¼	STO	78.000	N.S.	Newmont Gold Company	Application Only
64359	239	RFA		32 N.	49 E.	5	LT03 (NE¼ NW¼)	QM	0.110	N.S.	Transportation Department - Nevada	Application Only
V05780	88	VST		32 N.	45 E.	15	NW¼ NW¼	STK	0.025	N.S.	Julian Tomera Ranches, Inc.	
V05782	89	VST		32 N.	45 E.	9	NW¼ NE¼	STK	0.025	N.S.	Julian Tomera Ranches, Inc.	
Basin 62 – Rock Creek Valley												
42931	90	PER		37 N.	49 E.	22	NW¼ NE¼	MM	1.000	724.24	Baroid Drilling Fluids Inc; FMC Minerals Corp.	
42932	91	PER		37 N.	49 E.	22	NE¼ NE¼	MM	1.000	724.24	Baroid Drilling Fluids Inc; FMC Minerals Corp.	
42934	92	PER		37 N.	49 E.	15	NE¼ SE¼	MM	0.220	159.03	Baroid Drilling Fluids Inc; FMC Minerals Corp.	
44881	93	CER	12662	35 N.	46 E.	10	SE¼ NW¼	STK	0.006	4.36	BLM	
44954	94	CER	12610	36 N.	46 E.	22	NW¼ SW¼	STK	0.008	6.05	BLM	
52750	95	CER	14005	37 N.	48 E.	8	NE¼ NE¼	MM	0.116	33.03	Newmont Exploration, LTD.; Touchstone Resources Co.	
52751	96	CER	14006	37 N.	48 E.	9	NE¼ NW¼	MM	0.223	51.15	Newmont Exploration, LTD.; Touchstone Resources Co.	
52752	97	PER		37 N.	48 E.	9	SE¼ NW¼	MM	0.400	289.81	Newmont Exploration, LTD.; Touchstone Resources Co.	
52754	98	PER		37 N.	48 E.	9	SW¼ SW¼	MM	0.500	362.26	Newmont Exploration, LTD.; Touchstone Resources Co.	
59063	99	CER	14938	35 N.	48 E.	11	SE¼ NW¼	STK	0.018	12.89	Packer, Willis; Rhoads, Dean A; Rhoads, Sharon	
61410	100	PER		37 N.	49 E.	22	SE¼ SW¼	MM	0.780	565.00	Baroid Drilling Fluids, Inc.	
62577	101	PER		37 N.	49 E.	16	SW¼ SW¼	MM	2.000	1448.00	Meridian Gold Company	
62578	102	PER		37 N.	49 E.	22	NE¼ SW¼	MM	2.000	1448.00	Meridian Gold Company	
Basin 63 – Willow Creek Valley												
44946	103	CER	12271	38 N.	46 E.	33	NW¼ NW¼	STK	0.010	7.25	BLM	

Table A-1 (Continued)
Ground Water Rights, Application for Ground Water Rights, and Other Known Wells

App[1] #	Map[2] #	Status Permit/ Certificate[3]	Certificate Number	Township	Range	Section	Subdivision	Use[4]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[5]	Owner	Comment
45107	240	CER	10777	38 N.	47 E.	5	NW¼ NE¼	IRR	4.650	3365.67	Barrick Goldstrike Mines, Inc.	
46559	241	CER	10779	38 N.	46 E.	2	SW¼ NW¼	IRR	2.160	1563.40	Barrick Goldstrike Mines, Inc.	
48243	242	CER	11576	38 N.	46 E.	33	NW¼ NW¼	STK	0.007	5.07	Barrick Goldstrike Mines, Inc.	
58714	104	PER		39 N.	46 E.	17	SE¼ SE¼	QM	0.100	40.00	Midas Water Cooperative	
60669	105	PER		39 N.	46 E.	34	NE¼ SE¼	MM	0.250	5.00	Midas Joint Venture	
61888	106	PER		39 N.	46 E.	22	NW¼ NW¼	MM	0.250	4.50	Midas Joint Venture	
62114	107	PER		39 N.	46 E.	21	NE¼ NW¼	MM	0.018	0.30	Midas Joint Venture	
62582	108	PER		39 N.	46 E.	27	NW¼ NW¼	MM	0.545	59.95	Midas Joint Venture	
63022	109	PER		39 N.	46 E.	27	NW¼ NE¼	MM	0.056	40.51	Midas Joint Venture	
64391	243	RFA		39 N.	46 E.	21	NW¼ NE¼	MM	0.150	N.S.	Romarco Nevada, Inc.	Application Only
64392	244	RFA		39 N.	46 E.	21	NW¼ SE¼	MM	0.150	N.S.	Romarco Nevada, Inc.	Application Only
64598	245	RFA		39 N.	46 E.	22	NW¼ NW¼	MM	0.250	N.S.	Midas Joint Venture	Application Only
64802T	246	PER		39 N.	46 E.	27	NW¼ SW¼	MM	0.545	59.95	Midas Joint Venture	
64803	247	RFA		39 N.	46 E.	27	NW¼ SW¼	MM	0.545	N.S.	Midas Joint Venture	Application Only
V04120	110	VST		39 N.	46 E.	17	NE¼ SW¼	QM	0.084	N.S.	The Midas Water Cooperative	

[1]NP = No water right permit required or obtained for use
[2]Refer to Figure 3.2-8.
[3]Status: APP - Application
CER - Certificate
PER - Permit
RFA - Ready for Action
RFP - Ready for Action (protested)
VST - Vested Right

[5]Annual Duty – Annual or Seasonal Amounts
N.S. – Not Specified

[4]Use: COM - Commercial
DOM - Domestic
ENV - Environmental
IND - Industrial
IRD - Irrigation (DLE)
IRR - Irrigation
MM - Mining and Milling
MUN - Municipal
OTH - Other
QM - Quasi-municipal
REC - Recreation
STK - Stock Watering
STO - Storage

Table A-2
Surface Water Rights and Application for Surface Water Rights

App #	Map[1] #	Status Permit/ Certificate [2]	Certificate Number	Township	Range	Section	Subdivision	Use[3]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[4]	Owner	Comment
Basin 50 – Susie Creek Area												
46542	1	RFA		35 N.	54 E.	19	NE¼ SE¼	STK	0.100	N.S.	Dressi Ranching Company	Application Only
54712	2	PER		34 N.	53 E.	16	NW¼ NW¼	STK	0.031	22.4	Maggie Creek Ranch Inc.	
56340	3	RFA		33 N.	53 E.	7	LT01 (NE¼ NE¼)	STK	0.015	N.S.	Maggie Creek Ranch Inc.	Application Only
56557	4	RFA		34 N.	53 E.	16	NW¼ NW¼	STK	0.031	N.S.	Maggie Creek Ranch Inc.	Application Only
R05315	5	RES		35 N.	54 E.	12	SW¼ SW¼	OTH	0.012	N.S.	BLM	
Basin 51 – Maggie Creek Area												
00322		PRO						DEC		96	Elko Land and Livestock/JW Pruett [5]	Dispersed Points of Diversion, not illustrated [6]
00325		PRO						DEC		N.S.	Roy Ash/Charles Thorton [5]	Dispersed Points of Diversion, not illustrated [6]
00326		PRO						DEC		N.S.	Roy Ash/Charles Thorton [5]	Dispersed Points of Diversion, not illustrated [6]
00327		PRO						DEC		906.5 [7]	Roy Ash/Charles Thorton [5]	Dispersed Points of Diversion, not illustrated [6]
00328		PRO						DEC		N.S.	Roy Ash/Charles Thorton [5]	Dispersed Points of Diversion, not illustrated [6]
00329		PRO						DEC		N.S.	Roy Ash/Charles Thorton [5]	Dispersed Points of Diversion, not illustrated [6]
2286	6	CER	346	33 N.	52 E.	26	SW¼ SE¼	OTH	7.570	150.0	Nevada Land & Resource Company, LLC; Vogeler, A.H.; Vogeler, Mary B.	
2473	7	CER	11156	38 N.	53 E.	33	NE¼ NE¼	IRR	0.257	62.6	25 Corporation, Inc.	
2480	8	CER	11157	37 N.	53 E.	21	NE¼ SW¼	IRR	0.240	58.6	Munson, Freda F. Bank-1/2 Interest; Secrist, John D. & Marian L.-1/2 Interest	
3474	118	CER	3609	34 N.	51 E.	29	SW¼ SE¼	IRR		29.84	Charles Drake	
6969	9	CER	1680	33 N.	52 E.	26	SW¼ SE¼	OTH	6.570	576.0	Nevada Land & Resource Company, LLC; Vogeler, A.H.; Vogeler, Mary B.	
7887	83	CER	2540	38 N.	53 E.	34	SE¼ NE¼	STK	0.022	10.1	W.T. Jenkins Co.	
8246	10	CER	2233	37 N.	53 E.	10	SE¼ SW¼	STK	0.082	37.7	BLM	
10299	84	CER	2811	37 N.	53 E.	3	SW¼ SE¼	MM	0.500	361.9	Huber, Albert H.; Oldham, John	

Table A-2 (Continued)
Surface Water Rights and Application for Surface Water Rights

App #	Map[1] #	Status Permit/ Certificate [2]	Certificate Number	Township	Range	Section	Subdivision	Use[3]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[4]	Owner	Comment
18552	11	CER	6423A	33 N.	52 E.	9	SE¼ SE¼	IRR	5.143	809.9	Newmont/Robert HHadley	
31193S01	33	CER	14197	33 N.	52 E.	26	SE¼ SW¼	IRR		N.S.	Carlin-City	
35659	12	CER	11721	37 N.	53 E.	10	SW¼ SE¼	STK	0.011	5.1	BLM	
45509	85	CER	11660	33 N.	51 E.	10	SE¼ NW¼	STK	0.346	84.2	Newmont Gold Company	
63506	86	PER		33 N.	52 E.	26	NW¼ NE¼	IRR	0.350	15.8	Newmont Gold Company	
R04600	13	RES		38 N.	53 E.	26	SE¼ SE¼	OTH	0.007	N.S.	BLM	
V06241	15	VST		37 N.	51 E.	18	NE¼ NE¼	STK	0.006	N.S.	26 Ranch Inc.	
V06243	51	VST		37 N.	51 E.	21	SE¼ NE¼	STK	0.006	N.S.	26 Ranch Inc.	
V06244	52	VST		37 N.	51 E.	21	SE¼ NW¼	STK	0.002	N.S.	26 Ranch Inc.	
V06245	53	VST		37 N.	51 E.	16	SE¼ SE¼	STK	0.002	N.S.	26 Ranch Inc.	
V06246	54	VST		37 N.	51 E.	26	NW¼ SE¼	STK	0.003	N.S.	26 Ranch Inc.	
V06247	16	VST		37 N.	52 E.	11	SW¼ NE¼	STK	0.002	N.S.	26 Ranch Inc.	
V06248	17	VST		37 N.	51 E.	1	SW¼ SW¼	STK	0.006	N.S.	26 Ranch Inc.	
V06249	18	VST		37 N.	53 E.	5	SW¼ NE¼	STK	0.005	N.S.	26 Ranch Inc.	
V06250	19	VST		37 N.	53 E.	7	SE¼ SE¼	STK	0.006	N.S.	26 Ranch Inc.	
V06251	20	VST		38 N.	53 E.	22	NE¼ SW¼	STK	0.006	N.S.	26 Ranch Inc.	
V06252	21	VST		38 N.	53 E.	17	SW¼ SE¼	STK	0.003	N.S.	26 Ranch Inc.	
V06254	22	VST		38 N.	52 E.	3	SE¼ SE¼	STK		N.S.	26 Ranch Inc.	
Basin 52 – Marys Creek Area												
04723	35	VST		32 N.	51 E.	35	NE¼ SE¼	DOM	0.000	N.S.	Johnson, Leo N.	
20075	87	CER	6043	32 N.	51 E.	35	SE¼ NE¼	DOM	0.002	1.6	Palisade Ranch, Inc.	
31214	88	CER	10430	33 N.	52 E.	33	NE¼ NE¼	DEC	0.132	32.1	Jones, Melvin R.; Jones, Rachel S.	
31215	89	CER	10431	33 N.	52 E.	33	NE¼ NE¼	DEC	0.278	67.8	Jones, Melvin R.; Jones, Rachel S.	
31216	90	CER	10432	33 N.	52 E.	33	NE¼ NE¼	DEC	1.240	32.1	Jones, Melvin R.; Jones, Rachel S.	
46299	23	RFA		32 N.	51 E.	11	NE¼ SW¼	STK	0.100	N.S.	Palisade Ranch Inc.	Application Only
50434	24	PER		33 N.	52 E.	28	SE¼	MUN	0.144	35.2	Carlin-City	
50437	25	PER		33 N.	52 E.	28	SW¼ SE¼	MUN	1.000	N.S.	Carlin-City	
50438	26	PER		33 N.	52 E.	28	SW¼ SE¼	MUN	3.000	N.S.	Carlin-City	
50439	27	PER		33 N.	52 E.	28	SW¼ SE¼	MUN	0.770	N.S.	Carlin-City	
62455	28	PER		32 N.	52 E.	5	SE¼ SW¼	STK	0.003	1.7	Palisade Ranch Inc.	
62456	29	PER		32 N.	51 E.	17	SE¼ SE¼	STK	0.003	1.7	Palisade Ranch Inc.	
62467	30	RFA		32 N.	52 E.	4	NE¼ NW¼	DEC	2.860	N.S.	Newmont Gold Company; Palisade Ranch	Application Only

Table A-2 (Continued)
Surface Water Rights and Application for Surface Water Rights

App #	Map[1] #	Status Permit/ Certificate[2]	Certificate Number	Township	Range	Section	Subdivision	Use[3]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[4]	Owner	Comment
62468	31	PER		32 N.	52 E.	4	NE¼ NW¼	DEC	2.577	560.9	Newmont Gold Company; Palisade Ranch	
62469	32	PER		32 N.	52 E.	4	NE¼ NW¼	DEC	5.347	1073.2	Newmont Gold Company; Palisade Ranch	
V01580	91	VST		32 N.	51 E.	35	SE¼ SW¼	OTH	0.060	N.S.	Central Pacific Railroad Co.	
V01582	34	VST		33 N.	52 E.	28	SW¼ SE¼	OTH	0.000	N.S.	Central Pacific Railway Co.	
Basin 61 – Boulder Flat												
00168	[6]	PRO						DEC		1072.52	Roy Ash/Charles Thorton [4]	
00171	[6]	PRO						DEC		1815.9	William Dunphy/Newmont [4]	
00333	[6]	PRO						DEC		13488.2[7]	Roy Ash/Charles Thorton [4]	
2345	36	PER	1903	33 N.	50 E.	18	SE¼ NE¼	IRR	1.250	455.0	Elko Land & Livestock	
3035	37	CER	11160	36 N.	49 E.	15	SW¼ SW¼	IRR	3.154	675.8	Packer, Willis; Rhoade, Sharon; Rhoads, Dean	
3146	38	CER	11162	35 N.	49 E.	8	NE¼ NE¼	IRR	0.812	53.0	Fox, Almond C.	
3147	39	CER	11163	35 N.	49 E.	8	SE¼ SW¼	IRR	1.286	139.4	Fox, Almond C.	
4034	40	CER	1913	33 N.	50 E.	18	NW¼ NW¼	DOM	0.025	N.S.	Weber, Thomas R.	
7626	41	CER	1624	32 N.	50 E.	14	NE¼ NE¼	DOM	0.025	18.1	Primeaux, Roy L.	
7657	42	CER	2517	32 N.	50 E.	12	SW¼ SE¼	DOM	0.006	4.4	Lewis. H. E.	
7932	43	CER	8109	32 N.	45 E.	16	NW¼ SW¼	IRR	5.505	1761.6	Lander County; Licking, Lillian F.; Venturacci, Eddie; Venturacci, Gloria; Veturacci, Leila;Venturacci, Louie	
9822	44	CER	3939	31 N.	49 E.	11	SE¼ NW¼¼	IRR	8.835	1744.9	Horseshoe Ranch Inc.	
10733	45	CER	3347	32 N.	45 E.	13	SE¼ SW	IRR	0.000	694.9	Lander County; Licking, Lillian F.; Venturacci, Eddie; Venturacci, Gloria; Veturacci, Leila;Venturacci, Louie	
16842	46	CER	4458	32 N.	50 E.	14	N¼E NE¼	DOM	0.007	N.S.	Transportation Dept. - Nevada	
55272	119	PER		35 N.	49 E.	3	NE¼ NW¼	STO	100.0		Barrick Goldstrike Mines, Inc.	Primary storage right at the TS Ranch Reservoir associated with mine dewatering rights

Table A-2 (Continued)
Surface Water Rights and Application for Surface Water Rights

App #	Map[1] #	Status Permit/ Certificate[2]	Certificate Number	Township	Range	Section	Subdivision	Use[3]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[4]	Owner	Comment
55272 S01	92	PER		35 N.	49 E.	3	NE¼ NW¼	IRR	80.000	21612.0	Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights
55272 S02	93	PER		35 N.	49 E.	3	NE¼ NW¼	STK	0.100	22.4	Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights
55272 S03	94	PER		35 N.	49 E.	3	NE¼ NW¼	IRR	18.000	7200.0	Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights
55272 S04	95	PER		35 N.	49 E.	3	NE¼ NW¼	STK	1.000	45.9	Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights
55272 S06	97	PER		35 N.	49 E.	3	NE¼ NW¼	IRR	100.000	72000.0	Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights
55272 S07	98	PER		35 N.	49 E.	3	NE¼ NW¼	IRR	10.000	7239.7	Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights
55272 S08	99	PER		35 N.	49 E.	3	NE¼ NW¼	STK	0.100	47.0	Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights
55272 SO9	120	PER		35 N.	49 E.	3	NE¼ NW¼	STK	0.065		Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights
55272 S010	100	PER		35 N.	49 E.	3	NE¼ NW¼	WLD	10.000	7238.7	Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights

Table A-2 (Continued)
Surface Water Rights and Application for Surface Water Rights

App #	Map[1] #	Status Permit/ Certificate [2]	Certificate Number	Township	Range	Section	Subdivision	Use[3]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[4]	Owner	Comment
55272 S011	101	PER		35 N.	49 E.	3	NE¼ NW¼	WLD	45.000	32574.2	Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights
55272 S013	103	PER		35 N.	49 E.	3	NE¼ NW¼	STK	2.000	1447.9	Barrick Goldstrike Mines, Inc.	Secondary storage right at the TS Ranch Reservoir associated with mine dewatering rights
V06227	47	VST		33 N.	46 E.	15	NW¼ SE¼	STK	0.016	N.S.	26 Ranch Inc.	
V06236	48	VST		36 N.	49 E.	5	SW¼ SE¼	STK		N.S.	26 Ranch Inc.	
V06238	49	VST		37 N.	50 E.	10	SE¼ NW¼	STK		N.S.	26 Ranch Inc.	
V06240	14	VST		37 N.	50 E.	10	LT01 (NE¼ NE¼)	STK	0.006	N.S.	26 Ranch Inc.	
V06242	50	VST		37 N.	50 E.	28	SE¼ NW¼	STK	0.003	N.S.	26 Ranch Inc.	
Basin 62 – Rock Creek Valley												
19	55	CER	97	37 N.	47 E.	18	SW¼ SW¼	IRR	1.500	600.0	25 Corporation	
27455	105	CER	8343	38 N.	49 E.	29	NW¼ SW¼	STK	0.006	4.1	25 Corporation, Inc.	
27456	106	CER	8344	38 N.	49 E.	28	NW¼ SW¼	STK	0.009	6.4	25 Corporation, Inc.	
27457	107	CER	8345	33 N.	46 E.	11	SW¼ NW¼	STK	0.047	33.9	25 Corporation, Inc.	
27658	108	CER	8346	37 N.	49 E.	8	NW¼ SE¼	STK	0.022	16.1	25 Corporation, Inc.	
27659	109	CER	8347	34 N.	46 E.	28	SW¼ SW¼	STK	0.047	33.9	25 Corporation, Inc.	
27693	110	CER	8644	36 N.	46 E.	7	SE¼ NW¼	STK	0.033	23.6	25 Corporation, Inc.	
27695	111	CER	8623	36 N.	46 E.	5	SE¼ SE¼	STK	0.033	23.6	25 Corporation, Inc.	
46744	56	CER	12245	37 N.	48 E.	18	NE¼ NE¼	STK	0.017	12.3	BLM	
V06228	57	VST		33 N.	46 E.	16	NE¼ SE¼	STK	0.003	N.S.	26 Ranch Inc.	
V06229	58	VST		33 N.	46 E.	11	SW¼ NW¼	STK	0.003	N.S.	26 Ranch Inc.	
V06232	59	VST		36 N.	46 E.	7	SE¼ NW¼	STK	0.016	N.S.	26 Ranch Inc.	
V06233	60	VST		34 N.	46 E.	28	SW¼ SW¼	STK	0.013	N.S.	26 Ranch Inc.	
V06234	61	VST		37 N.	48 E.	6	LT07 (NE¼ NE¼)	STK		N.S.	26 Ranch Inc.	
V06235	62	VST		37 N.	48 E.	12	NE¼ SW¼	STK		N.S.	26 Ranch Inc.	
V06237	63	VST		37 N.	49 E.	21	NW¼ NE¼	STK		N.S.	26 Ranch Inc.	
V06239	64	VST		36 N.	46 E.	5	SE¼ SE¼	STK		N.S.	26 Ranch Inc.	
V06261	65	VST		38 N.	49 E.	32	SE¼ NW¼	STK	0.005	N.S.	26 Ranch Inc.	
V06262	66	VST		38 N.	49 E.	32	SE¼ NW¼	STK	0.005	N.S.	26 Ranch Inc.	
V06263	67	VST		38 N.	49 E.	35	SW¼ NE¼	STK	0.016	N.S.	26 Ranch Inc.	
Basin 63 – Willow Creek Valley												

Table A-2 (Continued)
Surface Water Rights and Application for Surface Water Rights

App #	Map[1] #	Status Permit/ Certificate[2]	Certificate Number	Township	Range	Section	Subdivision	Use[3]	Diversion Rate (CFS)	Annual Duty (Acre-Feet)[4]	Owner	Comment
1486	112	CER	256	39 N.	47 E.	7	SW¼ NE¼	IRR	3.540	N.S.	Barrick Goldstrike Mines, Inc.	
1487	113	CER	182	39 N.	46 E.	22	E2 NW¼	STK	0.056	40.5	Barrick Goldstrike Mines, Inc.	
1760	114	PER		39 N.	48 E.	27		IRR	29.770	21555.8	Barrick Goldstrike Mines, Inc.	
1997	68	CER	231	39 N.	46 E.	15	SE¼ SW¼	MM	0.100	72.4	Rex Mines Company	
3930	69	CER	1318	38 N.	48 E.	17	NW¼ NW¼	STK	0.188	N.S.	Russell Land and Cattle Company	
3931	70	CER	1319	38 N.	48 E.	20	SW¼ NW¼	STK	0.019	N.S.	Russell Land and Cattle Company	
10208	115	CER	2673	39 N.	48 E.	27	NE¼ SW¼	IRR		21555.8	Barrick Goldstrike Mines, Inc.	
26445	71	CER	8818	39 N.	46 E.	20	NE¼ SE¼	QM	0.050	1.8	Kratz, Albert G.; Lukens, Edwin R.;Tieber, Betty Jane; Tieber, Stephen V.	
27488	72	CER	8638	39 N.	46 E.	20	NW¼ SE¼	QM	0.009	1.1	Baker, Joseph; Pullen, Loretta; Swindlehurst, Donald; Timmons,Edna G.; Timmons, Wilbur V.	
31184	73	CER	9284	39 N.	46 E.	9	SE¼ SW¼	QM	0.011	7.9	Midas Water	
42837	74	CER	11785	39 N.	46 E.	20	NW¼ SE¼	DOM	0.001	0.8	Murdock, John G.	
46406	75	CER	13952	39 N.	46 E.	20	NE¼ NW¼	DOM	0.005	3.2	Wilkerson, Byron L.	
R05587	76	RES		41 N.	49 E.	32	SW¼ NW¼	OTH	0.002	N.S.	BLM	
R09057	116	RES		41 N.	48 E.	34	SW¼ SW¼	OTH	0.013	9.2	BLM	
V06255	77	VST		38 N.	50 E.	10	NE¼ NW¼	STK	0.005	N.S.	26 Ranch Inc.	
V06256	78	VST		38 N.	50 E.	15	NW¼ NE¼	STK	0.005	N.S.	26 Ranch Inc.	
V06257	79	VST		38 N.	50 E.	16	SE¼ SE¼	STK	0.003	N.S.	26 Ranch Inc.	
V06258	80	VST		38 N.	50 E.	21	SE¼ SE¼	STK	0.003	N.S.	26 Ranch Inc.	
V06259	81	VST		38 N.	50 E.	8	SW¼ SW¼	STK	0.016	N.S.	26 Ranch Inc.	
V06260	82	VST		38 N.	50 E.	5	NE¼ SE¼	STK	0.016	N.S.	26 Ranch Inc.	

[1]Refer to Figure 3.2-11.

[2]Status:
- APP - Application
- CER - Certificate
- PER - Permit
- RFA – Ready for Action
- RFP - Ready for Action (protested)
- VST - Vested Right
- RES - Reserved
- PRO - Proof (Decreed)

[3]Use:
- COM - Commercial
- DEC - as decreed
- DOM - Domestic
- ENV - Environmental
- IND - Industrial
- IRD - Irrigation (DLE)
- IRR - Irrigation
- MM - Mining and Milling
- MUN - Municipal
- OTH - Other

Table A-2 (Continued)
Surface Water Rights and Application for Surface Water Rights

QM - Quasi-municipal
REC - Recreation
REL - Relinquished (to state)
STK - Stock Watering
WLD - Wildlife

[4]Annual Duty - Annual or Seasonal Amounts
N.S. - Not Specified
[5]Current Ownership Record, Transfer in Progress
[6]Dispersed Points of Diversion, Not Illustrated on Map (Harvest, Meadow, or Div. Pasture)
[7]Newmont Gold Record

APPENDIX B

WATER QUALITY

Table B-1
Nevada Standards for Toxic Materials Applicable to
Class A, B, C and Waters Upstream and Tributary to the Humboldt River

Constituent	Units	Municipal or Domestic Supply	Propagation of Aquatic Life (warm water)			Propagation of Wildlife	Water Contact Recreation	Irrigation	Watering of Livestock
			Single Value Limit	1-hour Avg.	96-hour Avg.				
Inorganic Nonmettalic Constituents									
Cyanide	mg/L as CN	0.2		0.022	0.0052				
Fluoride	mg/L as F							1.0	2.0
Metals and Semi-metals[1]									
Antimony	µg/L as Sb	146							
Arsenic (total)	µg/L as As	50						100	200
Arsenic (III)	µg/L as As			342[2]	180[2]				
Barium	µg/L as Ba	2000							
Beryllium	µg/L as Be	0						100	
Boron	µg/L as B							750	5,000
Cadmium	µg/L as Cd	5		5.3[2,3]	1.3[2,3]			10	50
Chromium (total)	µg/L as Cr	100						100	1,000
Chromium (III)	µg/L as Cr			2,057[2,3]	245[2,3]				
Chromium (VI)	µg/L as Cr			15[2]	10[2]				
Copper	µg/L as Cu			22.1[2,3]	14.2[2,3]			200	500
Iron	µg/L as Fe		1,000					5,000	
Lead	µg/L as Pb	50		68.4[2,3]	1.3[2,3]			5,000	100
Manganese	µg/L as Mg							200	
Mercury	µg/L as Hg	2		2[2]	0.012				10
Molybdenum	µg/L as Mo		19						
Nickel	µg/L as Ni	13.4		1,699[2,3]	189[2,3]			200	
Selenium	µg/L as Se	50		20	5.0			20	50
Silver	µg/L as Ag		6.9[2,3]						
Thallium	µg/L as Tl	13							
Zinc	µg/L as Zn			140[2,3]	127[2,3]			2,000	25,000

Source: Nevada Administrative Code 445A.144.
[1]The standards for metals are expressed as total recoverable, unless otherwise noted.
[2]Standard applies to the dissolved fraction.
[3]Hardness-derived standard (Nevada Administrative Code 445A.144). Values calculated assuming a hardness of 150 mg/L as $CaCO_3$.
Single concentration limits and 24-hour average concentration limits must not be exceeded; one-hour average and 96-hour average concentration limits may be exceeded only once every 3 years.

Table B-2
Selected Water Quality Standards for Class A, B, C, and Waters Upstream and Tributary to the Humboldt River

Item	Class A Specification	Class B Specification	Class C Specification	Waters Tributary to the Humboldt River Upstream of Battle Mountain and Palisade Control Points
Floating Solids or Sludge Deposits	None attributed to human activities	See Nevada Administrative Code 445A.125	See Nevada Administrative Code 445A.126	See Nevada Administrative Code 445A.121
Odor-Producing Substances	None attributed to human activities	See Nevada Administrative Code 445A.125	Not specified	See Nevada Administrative Code 445A.121
Sewage, Industrial Wastes, or Other Wastes	None allowed	None that are not effectively treated to the satisfaction of the department	None that are not effectively treated to the satisfaction of the department	See Nevada Administrative Code 445A.121
Toxic Materials, Oil, Deleterious Substances, Colored or Other Wastes	None allowed	See Nevada Administrative Code 445A.125	See Nevada Administrative Code 445A.126	See Nevada Administrative Code 445A.121
Settleable Solids	See Nevada Administrative Code 445A.124	See Nevada Administrative Code 445A.125	See Nevada Administrative Code 445A.126	See Nevada Administrative Code 445A.121
pH	Range between 6.5 and 8.5	Range between 6.5 to 8.5	Range between 6.5 to 8.5	Range between 6.5 to 9.0 and maximum $\Delta pH \pm 0.5$
Dissolved Oxygen	Must not be less than 6.0 mg/L	For trout waters, not less than 6.0 mg/L; for nontrout waters, not less than 5.0 mg/L	For waters with trout, not less than 6.0 mg/L; for waters without trout, not less than 5.0 mg/L	$\geq$ 5.0 mg/L
Temperature	Must not exceed 20° C; allowable temperature increase above natural receiving water temperature: None	Must not exceed 20°C for trout waters or 24°C for nontrout waters; allowable temperature increase above natural receiving water temperatures: None	Must not exceed 20°C for trout waters or 34°C for nontrout waters; allowable temperature increase above normal receiving water temperatures: 3°C	Maximum ΔTemperature $\leq$ 2°C
Nitrate Species	Not Specified	Not Specified	Not Specified	Nitrate $\leq$ 10 mg/L; Nitrite $\leq$ 10 mg/L; and un-ionized ammonia $\leq$ 0.02 mg/L
Chloride	Not Specified	Not Specified	Not Specified	$\leq$ 250 mg/L
Sulfate	Not Specified	Not Specified	Not Specified	$\leq$ 250 mg/L
Total Phosphates	Must not exceed 0.15 mg/L in any stream at the point where it enters any reservoir or lake, nor 0.075 mg/L in any reservoir or lake, nor 0.30 mg/L in streams and other flowing waters	Must not exceed 0.3 mg/L	Must not exceed 1.0 mg/L	Total Phosphorus: April – November seasonal average $\leq$ 0.1 mg/L
Turbidity	Not Specified	Not Specified	Not Specified	$\leq$ 50 NTU
Suspended Solids	Not Specified	Not Specified	Not Specified	Annual Median $\leq$ 80 mg/L

Total Dissolved Solids	Must not exceed 500 mg/L or one-third above that characteristic of natural conditions (whichever is less)	Must not exceed 500 mg/L or one-third above that characteristic of natural conditions (whichever is less)	Must not exceed 500 mg/L or one-third above that characteristic of natural conditions (whichever is less)	Annual average $\leq$ 500 mg/L

Source: Nevada Administrative Code 445A.124 through 445A-126 and 445A-204 and 445A-205.

Table B-3
Stream Water Quality Summary

Constituent	Units	Maggie Creek[1]				Rock Creek		Boulder Creek	
		n	min	max	avg	*n*	Value	*n*	Value
Stream Discharge	cfs	5	0.09	2.49	0.75	1	2.6	1	36.9
Physical and Aggregrate Properties									
SAR	ratio	5	1.2	1.4	1.3	1	1.9	1	0.5
Temperature	°C	5	0.5	26	7.6	1	4	1	7
TDS	mg/L @180°C	5	372	460	399	1	263	1	134
Turbidity	NTU	5	0.3	2.4	1.5	1	2.6	1	50
Inorganic Nonmetallic Constituents									
Chloride	mg/L as Cl	5	19	32	21	1	22	1	4
Cyanide	µg/L as CN	5	<0.01	<0.01	<0.01	1	<0.01	1	<0.01
Dissolved Oxygen	mg/L as O_2	5	9.4	13	12	1	11.6	1	10
Fluoride	mg/L as F	5	0.3	0.6	0.4	1	0.6	1	0.2
Nitrate	mg/L as N	5	0.45	1.4	0.94		--		--
Nitrite	mg/L as N	5	0.01	0.08	0.02	1	<0.01	1	<0.01
pH	standard units	5	8.1	8.8	8.4	1	8.4	1	7.9
Sulfate	mg/L as SO_4	5	57	96	73	1	31	1	23
Total Ammonia	mg/L as N	5	0.01	0.03	0.02	1	0.02	1	0.02
Metals (dissolved)									
Aluminum	µg/L as Al	5	5	10	5.6	1	120	1	340
Arsenic	µg/L as As	5	6	25	12	1	6	1	3
Barium	µg/L as Ba	5	91	110	97	1	60	1	57
Beryllium	µg/L as Be	5	<0.5	<0.5	<0.5	1	<0.5	1	<0.5
Cadmium	µg/L as Cd	5	0.5	1	0.6	1	<1	1	<1
Chromium	µg/L as Cr	5	0.5	8	1.5	1	<1	1	<1
Copper	µg/L as Cu	5	0.5	3	1	1	<1	1	2
Iron	µg/L as Fe	5	3	11	9	1	130	1	65
Lead	µg/L as Pb	5	<1	<1	<1	1	<1	1	<1
Magnesium	µg/L as Mg	5	18	26	21	1	7.5	1	5.7
Manganese	µg/L as Mn	5	6.0	130	25	1	19	1	7
Mercury	µg/L as Hg	3	<0.1	<0.1	<0.1	1	0.05	1	--
Molybdenum	µg/L as Mo	5	5	10	6	1	<10	1	<10
Nickel	µg/L as Ni	5	0.5	2	1.7	1	<1	1	2
Selenium	µg/L as Se	5	0.5	5	1.6	1	<1	1	1
Silver	µg/L as Ag	5	<1	<1	<1	1	<1	1	<1
Thallium	µg/L as Tl	5	1.5	**44**	11	1	**15**	1	4
Water Type	---	Ca,Na-HCO_3				Na,Ca-HCO_3		Ca,Mg-HCO_3	

Source: Data summarized from USGS database.
n = sample size.
[1]Data summarized from 2 sampling sites.
See Figure 3.2-15 for sampling locations.

Table B-3 (continued)
Stream Water Quality Summary

Constituent	Units	Antelope Creek[1]				Bell Creek[1]			
		n	min	max	avg	*n*	min	max	avg
Physical and Aggregrate Properties									
Alkalinity	mg/L as $CaCO_3$	5	121.5	200	156	36	60.5	140	91.3
TDS	mg/L @180°C	5	184	333	275	36	109	280	185
TSS	mg/L@103-5°C	4	6.1	41.7	16.5	28	0.05	300	33.7
Inorganic Nonmetallic Constituents									
Chloride	mg/L as Cl	5	9	26.3	17.9	36	4	8.8	5.4
Fluoride	mg/L as F	5	0.31	**4.4**	**1.2**	36	0.2	0.6	0.3
Nitrate	mg/L as N	1	<0.05	<0.05	<0.05	16	<0.05	0.55	0.091
pH	standard units	5	7.6	8.4	8.1	36	7.4	9.0	8.0
Sulfate	mg/L as SO_4	1	36	36	36	26	21.2	82	41.8
Metals									
Arsenic (T)	µg/L as As	1	18	18	18	36	<1.0	17	3
Iron (D)	µg/L as Fe	5	<1.0	120	30	33	<10	646	190
Magnesium (T)	µg/L as Mg	1	330	330	330	36	6,700	18,000	10,600
Manganese (T)	µg/L as Mn	1	33	33	33	36	<2	**590**	51
Water Type	---	Na-HCO_3				Ca,Mg-HCO_3			

Constituent	Units	Boulder Creek[2]				Brush Creek[1]			
		n	min	max	avg	*n*	min	max	avg
Physical and Aggregrate Properties									
Alkalinity	mg/L as $CaCO_3$	86	22	100	64	66	84.9	220	151
TDS	mg/L @180°C	85	72	250	144	66	156	470	282
TSS	mg/L@103-5°C	66	0.05	460	54.8	54	0.005	92.6	11.0
Inorganic Nonmetallic Constituents									
Chloride	mg/L as Cl	86	<3	40.6	5.5	66	5	33	14
Fluoride	mg/L as F	85	0.1	**1.2**	0.27	66	0.12	**1.7**	0.58
Nitrate	mg/L as N	50	<0.05	0.71	0.13	41	<0.05	19	0.51
pH	standard units	95	7.1	9.0	7.9	88	7.6	9.4	8.2
Sulfate	mg/L as SO_4	43	8	100	30	47	30	130	67
Metals									
Arsenic (T)	µg/L as As	95	<5	**505**	15	86	<5	42	5
Iron (D)	µg/L as Fe	66	<10	**1,310**	370	54	<10	739	71
Magnesium (T)	µg/L as Mg	86	4,080	21,000	774	66	12,000	41,900	20,300
Manganese (T)	µg/L as Mn	86	<5	**1,060**	73	65	<5	200	17
Water Type	---	Na-HCO_3				Ca,Mg-HCO_3			

Source: Data summarized from the Boulder Valley Monitoring Plan.
n = sample size.
[1]Data summarized from 2 sampling sites.
[2]Data summarized from 4 sampling sites.
(T) = Total
(D) = Dissolved
See Figure 3.2-15 for sampling locations.

Table B-3 (continued)
Stream Water Quality Summary

Constituent	Units	Rock Creek[2]				Rodeo Creek[2]			
		n	min	max	avg	*n*	min	max	avg
Physical and Aggregrate Properties									
Alkalinity	mg/L as $CaCO_3$	8	107	147	121	78	30	330	120
TDS	mg/L @180°C	8	190	258	212	78	130	2,300	561
TSS	mg/L@103-5°C	8	1.1	8.3	4.2	81	<5	14,000	426
Inorganic Nonmetallic Constituents									
Chloride	mg/L as Cl	8	20.4	33.3	24.9	78	4	1,000	140
Fluoride	mg/L as F	8	0.38	**1.35**	0.65	77	0.1	**1.1**	0.41
Nitrate	mg/L as N	0	---	---	---	55	<0.05	14	1.5
pH	standard units	8	7.8	8.7	8.3	106	7.1	10.0	8.2
Sulfate	mg/L as SO_4	8	34.0	40.2	36.1	61	12	1,100	96
Metals									
Arsenic (T)	µg/L as As	0	---	---	---	107	<5	**1,400**	**140**
Iron (D)	µg/L as Fe	8	4.9	32	20	54	<10	**6,330**	250
Magnesium (T)	µg/L as Mg	0	---	---	---	78	3,700	250,000	40,000
Manganese (T)	µg/L as Mn	0	---	---	---	78	<5	**4,400**	**290**
Water Type	---	$Na\text{-}HCO_3$				$Ca,Mg\text{-}HCO_3$			

Source: Data summarized from the Boulder Valley Monitoring Plan.
n = sample size.
[1]Data summarized from 2 sampling sites.
[2]Data summarized from 4 sampling sites.
(T) = Total
(D) = Dissolved
See Figure 3.2-15 for sampling locations.

Table B-4
Stream Water Quality Summary for Lahontan Cutthroat Trout Streams

Constituent	Units	Nelson Creek	Lewis Creek	Toe Jam Creek	Upper Rock Creek	Frazer Creek
Sample Date	mm/dy/yr	8/13/97	8/13/97	8/14/97	8/14/97	8/15/97
Stream Discharge	cfs	<0.1	0.2-0.3	0.09	0.29	0.15
Physical and Aggregrate Properties						
Alkalinity	mg/L as $CaCO_3$	65	80	65	59	63
TDS	mg/L @180°C	140	150	100	90	140
Temperature	°C	**23.3**	17.0	16.4	14.2	15.2
TSS	mg/L @103 C	<5	<5	<5	<5	<5
Turbidity	NTU	1.3	1.2	2.3	0.4	1.1
Inorganic Nonmetallic Constituents						
Chloride	mg/L as Cl	4	4	1	1	9
Dissolved Oxygen	mg/L as O_2	7.8	6.6	8.13	**5.6**	9.4
Fluoride	mg/L as F	0.1	0.2	0.1	<0.1	0.3
Nitrate	mg/L as N	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrite	mg/L as N	<0.01	<0.01	<0.01	<0.01	<0.01
pH, field	su	8.6	7.6 (lab)	7.9	8.0	8.1
Phosphorus, ortho	mg/L as P	0.1	0.09	0.044	0.027	0.021
Sulfate	mg/L as SO_4	<10	<10	10	10	10
Total Ammonia	mg/L as N	0.19	0.06	<0.05	<0.05	0.09
Total Phosphate	mg/L as PO_4	0.226	0.093	0.056	0.045	0.031
Metals						
Arsenic total	µg/L as As	3	3	2	5	1
Arsenic,dissolved	µg/L as As	3	3	2	5	2
Cadmium, dissolved	µg/L as Cd	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium, total	µg/L as Cd	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium, total	µg/L as Cr	0.4	0.5	0.7	0.4	0.5
Chromium, dissolved	µg/L as Cr	<0.4	<0.4	<0.4	<0.4	<0.4
Copper, dissolved	µg/L as Cu	1	1	<1	1	1
Copper, total	µg/L as Cu	1	<1	2	2	1
Iron, dissolved	µg/L as Fe	100	140	560	180	130
Iron, total	µg/L as Fe	150	230	680	210	210
Lead, dissolved	µg/L as Pb	<0.4	<0.4	<0.4	<0.4	<0.4
Lead, total	µg/L as Pb	<0.4	<0.4	<0.4	<0.4	<0.4
Magnesium, dissolved	µg/L as Mn	4,400	5,800	3,700	2,900	4,300
Manganese, dissolved	µg/L as Mg	6	13	19	21	7
Manganese, total	µg/L as Mg	9	21	29	21	21
Mercury, dissolved	µg/L as Hg	<0.2	<0.2	<0.2	<0.2	<0.2
Mercury, total	µg/L as Hg	<0.2	<0.2	<0.2	<0.2	<0.2
Nickel, dissolved	µg/L as Ni	<1	1	<1	<1	<1
Nickel, total	µg/L as Ni	<1	1	1	<1	<1
Potassium, dissolved	µg/L as K	6,000	5,000	1,500	1,100	2,300
Selenium, dissolved	µg/L as Se	<1	<1	<1	<1	<1
Selenium, total	µg/L as Se	<1	<1	<1	<1	<1
Zinc,dissolved	µg/L as Zn	10	1.0	<10	10	<10
Zinc, total	µg/L as Zn	10	100	10	10	10
Water Type	---	Ca,Na-HCO_3	Ca,Na-HCO_3	Ca-HCO_3	Ca-HCO_3	Ca,Na-HCO_3

Source: AATA International, Inc. 1998a
See Figure 3.6-1 for Lahonton Cutthroat Trout stream segment locations.

APPENDIX C

HUMBOLDT RIVER INFORMATION

Table C-1
Water Withdrawals by County[1]
(thousands of acre-feet/year)

Year	Use	Elko		Eureka		Humboldt		Lander		Pershing		Total	
		Flow	Percent	Flow	Percent	Flow	Percent	Flow	Percent	Flow	Percent	Flow	Percent
1990	Municipal/Industrial	11.6	1.2	0.4	0.3	3.2	0.7	0.9	0.5	1.2	0.5	17.3	0.9
	Irrigation/Livestock	960.4	98.3	121.2	82.2	433.8	93.4	156.1	88.8	216.4	98.6	1887.9	95.1
	Domestic	0.8	0.1	0.1	0.1	0.6	0.1	0.2	0.1	0.2	0.1	1.9	0.1
	Mining	4.4	0.5	25.8	17.5	27.1	5.8	18.6	10.6	1.7	0.8	77.6	3.9
2000	Municipal/Industrial	15.6	1.5	0.5	0.2	4.5	0.8	1.3	0.5	1.7	0.8	23.6	1.0
	Irrigation/Livestock	1000.7	98.3	121.3	42.8	433.8	81.4	161.9	62.1	216.4	99.1	1934.1	83.6
	Domestic	1.2	0.1	0.1	0.0	0.8	0.2	0.3	0.1	0.3	0.1	2.7	0.1
	Mining	0.0	0.0	161.8	57.0	94.1	17.6	97.4	37.3	0.0	0.0	353.3	15.3
2010	Municipal/Industrial	18.9	1.8	0.6	0.3	5.4	1.2	1.6	0.9	2.1	1.0	28.6	1.3
	Irrigation/Livestock	1040.9	98.1	121.4	58.9	433.9	94.1	168.2	97.7	216.4	98.9	1980.8	93.5
	Domestic	1.4	0.1	0.1	0.0	1.0	0.2	0.3	0.2	0.3	0.1	3.1	0.1
	Mining	0.0	0.0	83.9	40.7	21.0	4.6	2.0	1.2	0.0	0.0	106.9	5.0
2020	Municipal/Industrial	21.9	2.0	0.7	0.6	6.3	1.4	1.9	1.1	2.4	1.1	33.2	1.6
	Irrigation/Livestock	1081.2	97.9	121.6	96.9	433.9	97.9	174.0	97.6	216.5	98.7	2027.2	97.9
	Domestic	1.6	0.1	0.2	0.2	1.2	0.3	0.4	0.2	0.4	0.2	3.8	0.2
	Mining	0.0	0.0	3.0	2.4	2.0	0.5	2.0	1.1	0.0	0.0	7.0	0.3

Source: Nevada Division of Water Planning 1992a, 1992b; Horton 1998.
Flow = thousands of acre-feet/year.
Percent = Percent of total flow withdrawal.
[1]More recently revised agency estimates indicate different levels of water usage than shown in the table (Nevada Division of Water Planning 1998).

Table C-2
Consumptive Water Uses by County[1]
(thousands of acre-feet/year)

Year	Use	Elko	Eureka	Humboldt	Lander	Pershing	Total
1990	Municipal/Industrial	4.4	0.2	1.3	0.4	0.5	6.6
	Irrigation/Livestock	515.6	73.4	227.4	83.3	110.6	1010.3
	Domestic	0.4	0.0	0.3	0.1	0.1	1.0
	Mining	3.9	12.5	7.0	7.4	1.6	32.4
2000	Municipal/Industrial	5.9	0.2	1.8	0.5	0.6	9.1
	Irrigation/Livestock	537.2	73.4	227.4	86.4	110.6	1035.0
	Domestic	0.6	0.0	0.4	0.2	0.2	1.4
	Mining	0.0	19.4	13.0	6.4	0.0	38.8
2010	Municipal/Industrial	18.9	0.2	2.1	0.7	0.8	22.7
	Irrigation/Livestock	1040.9	73.5	227.4	89.7	110.6	1542.1
	Domestic	1.4	0.0	0.5	0.2	0.2	2.3
	Mining	0.0	19.4	8.0	2.0	0.0	29.4
2020	Municipal/Industrial	21.9	0.3	2.5	0.8	0.9	26.4
	Irrigation/Livestock	1081.2	73.6	227.4	92.8	110.6	1585.6
	Domestic	1.6	0.1	0.6	0.2	0.2	2.7
	Mining	0.0	3.0	2.0	2.0	0.0	7.0

Source: Nevada Division of Water Planning 1992a,b; Horton 1998.
[1]More recently revised agency estimates indicate different levels of water usage than shown in the table (Nevada Division of Water Planning 1998).

Table C-3
Water Use by Category for 1995 in the Humboldt River Basin

County	Water Withdrawal (acre-feet/year)			
	Irrigation/Livestock	Municipal/Industrial	Domestic	Mining
Elko	910,300	20,200	700	5,400
Eureka	125,000	5,100	100	114,200
Humboldt	600,500	8,100	1,400	76,600
Lander	161,700	1,400	250	35,600
Pershing	117,200	1,700	150	2,100
Five-county Total	**1,914,700 (87.5%)**	**36,500 (1.7%)**	**2,600 (0.1%)**	**233,900 (10.7%)**

Source: Horton 1998.

Table C-4
Water Use by Source for 1995 in the Humboldt River Basin

County	Water Withdrawal (acre-feet/year)			Consumptive Use (acre-feet/year)
	Groundwater	Surface Water	Total	
Elko	124,200	812,400	936,600	477,300 (51% of total)
Eureka	220,700	23,700	244,400	93,400 (38% of total)
Humboldt	546,900	139,700	686,600	334,800 (49% of total)
Lander	144,000	55,000	199,000	94,100 (47% of total)
Pershing	40,900	80,300	121,200	65,300 (54% of total)
Five-county Total	**1,076,700**	**1,111,100**	**2,187,800**	**1,064,900 (49% of total)**

Source: Horton 1998.

Table C-5
Water Use Forecast for Selected Purveyors in the Humboldt River Basin (1990-2020)

Water Purveyor	Current Water Supply (acre-feet/year)	Water Use (acre-feet/year)			
		1990	2000	2010	2020
Elko County					
Carlin City Water	4,538	777	1,186	1,381	1,559
Elko City Water	17,154	5,957	9,829	12,378	14,926
Eureka County					
Eureka Water Association	1,522	307	371	460	520
Humboldt County					
Winnemucca City Water	5,854	2,540	3,192	3,696	4,167
Lander County					
Lander County Sewer/Water District #1	2,896	919	1,294	1,553	1,811
Pershing County					
Lovelock City Water	3,795	1,204	1,960	2,350	2,700
Imlay City Water	560	49	65	82	98

Source: Nevada Division of Water Planning 1992a.

Table C-6
Active NPDES Facility Locations in the Humboldt River Basin

Permit No.	Facility	City/County	Permitted Flow (cfs)	Discharge Type	Receiving Water
NV0022675	Barrick Goldstrike Mines	Carlin/Eureka	100.8	Mine Dewatering	Humboldt River
NV0021962	Lone Tree Mining Co.	Valmy/Humboldt	108.0	Mine Dewatering	Humboldt River
NV0020311	Lovelock, City of	Lovelock/Pershing	0.5	Waste/Process Municipal	Toulon River
NV0020656	NDOW - Gallagher	Elko/Elko	3.0	Waste/Process Hatchery	Ruby Marsh
NV0022268	Newmont/Gold Quarry	Carlin/Eureka	72.0	Mine Dewatering	Humboldt River
NV0021725	Twin Creeks Mining	Golconda/Humboldt	14.55	Mine Pump/Well Test	Humboldt River

Source: Narala 1999.

Table C-7
Water Release from Public Sewage Treatment Facilities in the Humboldt River Basin (1990)

County	Total Release (gallons/day)	Total Release (acre-feet/year)
Elko	3,840,000	4,300
Eureka	60,000	70
Humboldt	890,000	1,000
Lander	460,000	520
Pershing	250,000	280
State Total	**152,230,000**	**170,520**

Source: Internet - Nevada Division of Water Planning, 1999.

Table C-8
Monthly Flow Ranges for 1946-1990, Humboldt River Gages[1]
(cfs)

	Carlin			Palisade		
	Minimum	Average	Maximum	Minimum	Average	Maximum
Jan	10	148	452	30	176	543
Feb	22	287	1,324	36	350	1,779
Mar	107	521	2,190	129	634	2,949
Apr	108	751	3,684	121	913	4,222
May	79	985	5,728	83	1,078	5,719
Jun	67	1,228	4,876	78	1,270	4,635
Jul	7	377	1,908	24	360	1,960
Aug	1	53	492	92	67	571
Sep	1	27	154	10	41	199
Oct	18	48	331	15	66	370
Nov	6	79	361	23	100	411
Dec	7	104	625	24	125	720

	Argenta[2]			Battle Mountain[2]		
	Minimum	Average	Maximum	Minimum	Average	Maximum
Jan	10	166	514	10	178	622
Feb	24	329	1,528	23	338	1,518
Mar	108	588	2,467	102	614	2,713
Apr	105	838	4,277	97	823	4,065
May	52	946	6,263	51	950	6,465
Jun	40	1,146	4,971	35	1,108	4,776
Jul	7	353	2,030	6	371	2,055
Aug	0	50	519	0	63	658
Sep	0	16	111	0	23	177
Oct	0	37	297	0	42	351
Nov	0	81	403	0	84	419
Dec	5	115	743	4	117	727

	Comus			Imlay		
	Minimum	Average	Maximum	Minimum	Average	Maximum
Jan	0	152	762	11	126	779
Feb	0	280	904	19	203	991
Mar	66	582	3,267	34	432	1,991
Apr	94	806	5,312	46	596	4,489
May	31	850	6,227	28	690	6,223
Jun	25	970	4,630	13	732	5,355
Jul	0	417	1,930	1	475	2,340
Aug	0	64	637	1	122	936
Sep	0	17	190	3	48	292
Oct	0	32	259	6	46	301
Nov	0	64	386	6	66	412
Dec	0	105	791	10	97	685

Source: USGS 1999; RTi 1998.
[1]Input data are daily flows in cfs; these are then averaged for each month of each year in the record.
[2]Includes periods of highly-correlated synthesized data (RTi 1998).

Table C-9
General Rainfall Conditions for Recent Years in the Humboldt River Basin

Recent Year	Annual Precipitation at Battle Mountain	Basin-wide Precipitation for Calendar Year in Upper Humboldt[1]	Basin-wide Precipitation for Calendar Year in Lower Humboldt[1]
1991	Almost exactly average	Low	Average to high
1992	37% above average	Low	Low
1993	8% below average	Average **-**	Low
1994	24% above average	Low	Generally high
1995	26% below average	High to very high	High to very high
1996	57% above average	High to very high	High to very high
1997	16% above average	Average	Average **+**
1998	Approx. 116% above average	High to very high	High to very high

Source: National Climatic Data Center precipitation station data 1999.
[1]Very generally, the upper Humboldt subbasin is upstream of Emigrant Pass/Palisade, and the lower Humboldt subbasin is downstream of Emigrant Pass/Palisade. This corresponds to the administration areas for the Edwards Decree vs Bartlett Decree. Qualitative examinations were based on rating several stations in each subbasin with their historical averages.

Table C-10
Comparison of River Flows for 1991 - 1998 with Average Annual Premine Discharge Conditions (1946-1990) [1]

Recent Year	Elko	Carlin	Battle Mountain	Comus	Imlay
1991	-65%	-60%	-67%	-75%	-80%
1992	-85%	-80%	-85%	-85%	-90%
1993	+15%	+5%	+25%	+5%	Average
1994	-67%	-67%	-67%	-60%	-70%
1995	+60%	+60%	+50%	+40%	+30%
1996	+25%	+30%	+70%	+50%	+50%
1997	+60%	+60%	+125%	+120%	+115%
1998	+60%	+65%	+110%	+125%	+130%

Source: USGS 1999.
[1]All percentages are approximate.

Table C- 11
Flow Changes Between Humboldt River Gages in Recent High-flow Years
Compared with Discharge from the Goldstrike Mine
(all values are mean monthly flows in cfs)

	Dunphy Flow	Battle Mtn Flow	Difference (dQ)	Goldstrike Mine Q	Difference[1] Mine Q - dQ	Battle Mtn Flow	Comus Flow	Difference (dQ)	Goldstrike Mine Q	Difference[1] Mine Q – dQ
Jan-95	125.58	108.32	-17.26	0.00	na	108.32	107.23	-1.09	0.00	na
Feb-95	301.29	248	-53.29	0.00	na	248	279.36	31.36	0.00	-31.36
Mar-95	460.74	449.48	-11.26	0.00	na	449.48	416.55	-32.93	0.00	na
Apr-95	508	551.27	43.27	0.00	-43.27	551.27	490.87	-60.4	0.00	na
May-95	1130.81	1164.06	33.25	0.00	-33.25	1164.06	687.32	-476.74	0.00	na
Jun-95	2580.67	2563.33	-17.34	0.00	na	2563.33	2060.67	-502.66	0.00	na
Jul-95	1300.26	1417.87	117.61	0.00	-117.61	1417.87	1450	32.13	0.00	-32.13
Aug-95	166.03	182.94	16.91	0.00	-16.91	182.94	274	91.06	0.00	-91.06
Sep-95	51.5	52.1	0.6	0.00	-0.60	52.1	71.57	19.47	0.00	-19.47
Oct-95	69.1	61.35	-7.75	0.00	na	61.35	70.87	9.52	0.00	-9.52
Nov-95	98.4	98.2	-0.2	0.00	na	98.2	113.77	15.57	0.00	-15.57
Dec-95	106.45	113.84	7.39	0.00	-7.39	113.84	126.74	12.9	0.00	-12.90
Jan-96	177.71	181.03	3.32	0.00	-3.32	181.03	199.32	18.29	0.00	-18.29
Feb-96	452.69	446.03	-6.66	0.00	na	446.03	423	-23.03	0.00	na
Mar-96	1240.74	1457.06	216.32	0.00	-216.32	1457.06	1114.13	-342.93	0.00	na
Apr-96	1369	1723.67	354.67	0.00	-354.67	1723.67	1433.33	-290.34	0.00	na
May-96	1338.81	1604.84	266.03	0.00	-266.03	1604.84	1142.16	-462.68	0.00	na
Jun-96	1313.7	1606.63	292.93	0.00	-292.93	1606.63	1320.5	-286.13	0.00	na
Jul-96	302.32	415.1	112.78	0.00	-112.78	415.1	369.1	-46	0.00	na
Aug-96	41.1	41.74	0.64	0.00	-0.64	41.74	69.39	27.65	0.00	-27.65
Sep-96	23.6	14.5	-9.1	0.00	na	14.5	38	23.5	0.00	-23.50
Oct-96	47.65	31.65	-16	0.00	na	31.65	51.65	20	0.00	-20.00
Nov-96	126.9	109.17	-17.73	0.00	na	109.17	128.03	18.86	0.00	-18.86
Dec-96	252.74	234.84	-17.9	0.00	na	234.84	211.16	-23.68	0.00	na
Jan-97	667.39	1123.32	455.93	0.00	-455.93	1123.32	750.42	-372.9	0.00	na
Feb-97	564.07	812.79	248.72	0.00	-248.72	812.79	774.93	-37.86	0.00	na
Mar-97	1432.74	1693.03	260.29	0.00	-260.29	1693.03	1304.45	-388.58	0.00	na
Apr-97	1249.3	1533.33	284.03	0.00	-284.03	1533.33	1604.33	71	0.00	-71.00
May-97	1682.9	1910.97	228.07	0.00	-228.07	1910.97	1482.26	-428.71	0.00	na
Jun-97	2046.83	2074	27.17	0.00	-27.17	2074	2100	26	0.00	-26.00
Jul-97	470.48	509.87	39.39	0.00	-39.39	509.87	595.68	85.81	0.00	-85.81

Table C- 11 (Continued)
Flow Changes Between Humboldt River Gages in Recent High-flow Years
Compared with Discharge from the Goldstrike Mine
(all values are mean monthly flows in cfs)

	Dunphy Flow	Battle Mtn Flow	Difference (dQ)	Goldstrike Mine Q	Difference[1] Mine Q - dQ	Battle Mtn Flow	Comus Flow	Difference (dQ)	Goldstrike Mine Q	Difference[1] Mine Q – dQ
Aug-97	156.35	137.77	-18.58	0.00	na	137.77	149.39	11.62	0.00	-11.62
Sep-97	42.9	63.6	20.7	8.11	-12.59	63.6	81.97	18.37	8.11	-10.26
Oct-97	76.06	168.94	92.88	126.58	33.70	168.94	174.94	6	126.58	120.58
Nov-97	114.23	255.83	141.6	126.58	-15.02	255.83	257.63	1.8	126.58	124.78
Dec-97	139.61	328.13	188.52	126.58	-61.94	328.13	303.32	-24.81	126.58	na
Jan-98	301.9	426.29	124.39	100.78	-23.61	426.29	476.71	50.42	100.78	50.36
Feb-98	350.82	440.96	90.14	100.78	10.64	440.96	578.14	137.18	100.78	-36.40
Mar-98	642.26	703.94	61.68	100.78	39.10	703.94	714.71	10.77	100.78	90.01
Apr-98	1127.33	1322.33	195	49.09	-145.91	1322.33	939.27	-383.06	49.09	na
May-98	1939.03	2262.26	323.23	49.09	-274.14	2262.26	1967.77	-294.49	49.09	na
Jun-98	2412.33	2918.67	506.34	49.09	-457.25	2918.67	2683.67	-235	49.09	na
Jul-98	1218.26	1249.9	31.64	12.10	-19.54	1249.9	1621.74	371.84	12.10	-359.74
Aug-98	215.58	210.97	-4.61	12.10	na	210.97	324.61	113.64	12.10	-101.54
Sep-98	72.9	95.37	22.47	12.10	-10.37	95.37	152.63	57.26	12.10	-45.16

Source: USGS 1999; Barrick 1999a.

[1] A positive or negative Mine Q – dQ indicates the possibility that some or all of the mine discharge is involved in the flow increase. Relatively large positive Mine Q-dQ may indicate that mine discharges are being significantly withdrawn for other uses (e.g., March 1998). Negative Mine Q – dQ indicates that there is more gain in the streamflow between the gages than can be accounted for by the mine discharges. “na”: The Mine Q – dQ approach may not give insight to gage losses between stations, only the increases. However, it is quite possible for the entire mine discharge amount to be withdrawn from the river as part of the streamflow losses between gages.

Figure C-1. All Humboldt Basin Counties - Demand

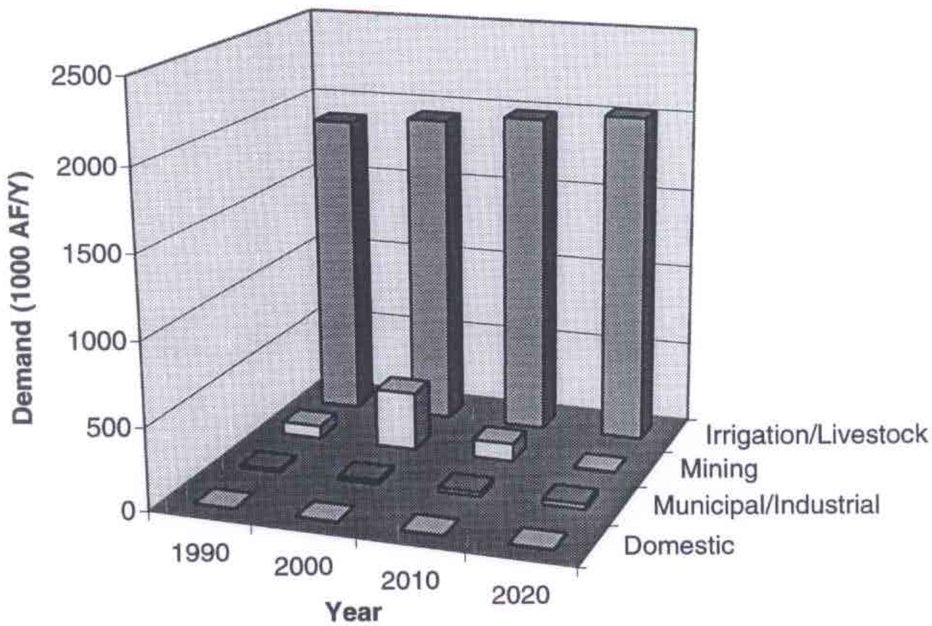


Figure C-2. All Humboldt Basin Counties - Consumptive Use

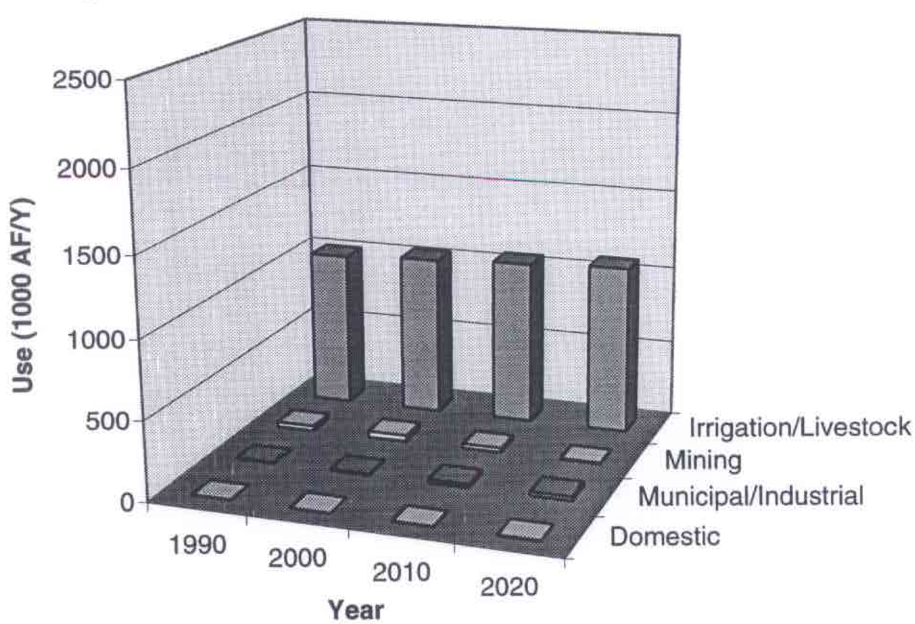


Table C- 12
Flow Changes Between Humboldt River Gages in Recent High-flow Years Compared with the Cumulative Mine Discharge
(all values are mean monthly flows in cfs)

Month	Carlin Flow	Battle Mtn. Flow	Difference (dQ)	Cumulative Mine Q	Difference,[1] Mine Q – dQ	Battle Mtn Flow	Comus Flow	Difference (dQ)	Cumulative Mine Q	Difference,[1] Mine Q dQ
Jan-95	76.71	108.32	31.61	33.14	1.53	108.32	107.23	-1.09	70.48	na
Feb-95	233.21	248	14.79	36.69	21.90	248	279.36	31.36	74.03	42.67
Mar-95	408.77	449.48	40.71	33.14	-7.57	449.48	416.55	-32.93	70.48	na
Apr-95	482.13	551.27	69.14	18.99	-50.15	551.27	490.87	-60.4	79.67	na
May-95	1155.81	1164.06	8.25	18.38	10.13	1164.06	687.32	-476.74	79.05	na
Jun-95	3132.33	2563.33	-569	18.99	na	2563.33	2060.67	-502.66	79.67	na
Jul-95	1384.03	1417.87	33.84	13.03	-20.81	1417.87	1450	32.13	73.71	41.58
Aug-95	140.32	182.94	42.62	13.03	-29.59	182.94	274	91.06	73.71	-17.35
Sep-95	48.87	52.1	3.23	13.47	10.24	52.1	71.57	19.47	74.14	54.67
Oct-95	61.77	61.35	-0.42	21.90	22.32	61.35	70.87	9.52	82.57	73.05
Nov-95	78.07	98.2	20.13	22.63	2.50	98.2	113.77	15.57	83.30	67.73
Dec-95	107.29	113.84	6.55	21.90	15.35	113.84	126.74	12.9	82.57	69.67
Jan-96	141.23	181.03	39.8	15.63	-24.17	181.03	199.32	18.29	70.21	51.92
Feb-96	407.62	446.03	38.41	17.30	-21.11	446.03	423	-23.03	71.88	na
Mar-96	1019.77	1457.06	437.29	15.63	-421.66	1457.06	1114.13	-342.93	70.21	na
Apr-96	1126.93	1723.67	596.74	15.85	-580.89	1723.67	1433.33	-290.34	70.43	na
May-96	1372.35	1604.84	232.49	15.34	-217.15	1604.84	1142.16	-462.68	69.92	na
Jun-96	1334.4	1606.63	272.23	15.85	-256.38	1606.63	1320.5	-286.13	70.43	na
Jul-96	237.48	415.1	177.62	14.80	-162.82	415.1	369.1	-46	69.38	na
Aug-96	45.29	41.74	-3.55	14.80	na	41.74	69.39	27.65	69.38	41.73
Sep-96	22.17	14.5	-7.67	15.29	na	14.5	38	23.5	69.87	46.37
Oct-96	27.84	31.65	3.81	35.37	31.56	31.65	51.65	20	89.95	69.95
Nov-96	60.4	109.17	48.77	36.55	-12.22	109.17	128.03	18.86	95.32	76.46
Dec-96	142.26	234.84	92.58	35.37	-57.21	234.84	211.16	-23.68	94.15	na
Jan-97	394.32	1123.32	729	27.87	-701.13	1123.32	750.42	-372.9	89.51	na
Feb-97	391.14	812.79	421.65	30.86	-390.79	812.79	774.93	-37.86	92.50	na
Mar-97	1070.23	1693.03	622.8	27.87	-594.93	1693.03	1304.45	-388.58	82.91	na
Apr-97	1020.37	1533.33	512.96	28.23	-484.73	1533.33	1604.33	71	83.27	12.27
May-97	1646.13	1910.97	264.84	27.32	-237.52	1910.97	1482.26	-428.71	82.36	na
Jun-97	2055.53	2074	18.47	28.23	9.76	2074	2100	26	74.46	48.46
Jul-97	307.77	509.87	202.1	14.61	-187.49	509.87	595.68	85.81	60.84	-24.97
Aug-97	124.23	137.77	13.54	14.61	1.07	137.77	149.39	11.62	60.84	49.22
Sep-97	45.67	63.6	17.93	23.20	5.27	63.6	81.97	18.37	76.04	57.67
Oct-97	54.23	168.94	114.71	159.72	45.01	168.94	174.94	6	212.55	206.55
Nov-97	86.5	255.83	169.33	160.82	-8.51	255.83	257.63	1.8	222.46	220.66
Dec-97	92.29	328.13	235.84	159.72	-76.12	328.13	303.32	-24.81	221.36	na
Jan-98	225.52	426.29	200.77	141.73	-59.04	426.29	476.71	50.42	191.73	141.31
Feb-98	253.18	440.96	187.78	146.12	-41.66	440.96	578.14	137.18	196.12	58.94

Table C- 12 (Continued)
Flow Changes Between Humboldt River Gages in Recent High-flow Years
Compared with the Cumulative Mine Discharge
(all values are mean monthly flows in cfs)

Month	Carlin Flow	Battle Mtn. Flow	Difference (dQ)	Cumulative Mine Q	Difference,[1] Mine Q – dQ	Battle Mtn Flow	Comus Flow	Difference (dQ)	Cumulative Mine Q	Difference,[1] Mine Q dQ
Mar-98	457.61	703.94	246.33	141.73	-104.60	703.94	714.71	10.77	191.73	180.96
Apr-98	822.77	1322.33	499.56	65.37	-434.19	1322.33	939.27	-383.06	129.66	na
May-98	1808.1	2262.26	454.16	64.85	-389.31	2262.26	1967.77	-294.49	129.13	na
Jun-98	2655.33	2918.67	263.34	65.37	-197.97	2918.67	2683.67	-235	129.66	na
Jul-98	1036.42	1249.9	213.48	32.28	-181.20	1249.9	1621.74	371.84	96.56	-275.28
Aug-98	137.74	210.97	73.23	32.28	-40.95	210.97	324.61	113.64	96.56	-17.08
Sep-98	58.87	95.37	36.5	32.95	-3.55	95.37	152.63	57.26	97.23	39.97

Source: USGS 1999; Barrick 1999; and Newmont 1999a, b.

[1]A positive Mine Q - dQ indicates the possibility that some or all of the mine discharge is involved in the flow increase.
Negative Mine Q - dQ indicates that there is more gain in the streamflow between the gages than can be accounted for by the mine discharges.
na: The Mine Q - dQ approach may not give insight to gage losses between stations, only the increases. However, it is quite possible for the entire mine discharge amount to be withdrawn from the river as part of the streamflow losses between gages.

TREATMENT OF STREAMFLOW DATA

The USGS streamgage data sets have periods of discontinuous records, particularly at Battle Mountain and the Argenta gage (which is no longer in operation). This is typical for most long-term gaging networks, as a result of changing data collection priorities through the years, the river stability at the gaging location, or the operation of instruments under remote and often harsh conditions. In recent years, additional data has been collected at the Old U.S. Highway 40 Bridge at Dunphy, just upstream of Barrick's discharge outfall. Less than 10 years of record currently exist for this site. Further information regarding the agency streamgaging and data compilation program can be obtained from the USGS, Water Resources Division, in Carson City and Elko, Nevada.

Tabulations of average daily flows for the Battle Mountain and Argenta gages were developed using the historical data available for these gages. Statistical distributions of these data indicate that the flows at both locations show a distinct central tendency. On the basis of this result, it was determined that the analysis should consider the effects to the average monthly flow hydrograph. The monthly flow hydrograph was developed by averaging the instantaneous daily flow values for each month, using the USGS streamgaging data. In the RTi analysis, data filling was conducted for periods when data were missing at Battle Mountain and Argenta as described below.

Under RTi's approach, if necessary data were missing for a particular gage or period, a continuous record was statistically synthesized. This was produced solely for analysis purposes using a statistical approach based on available upstream and downstream data characteristics (RTi 1998). Data-filling was conducted for the Battle Mountain gage (1981 through 1991) and Argenta gage (1982 through 1996), by loading all available daily values into a database. Statistical time series tools were applied to explore correlations with the other gages for the available periods of data. Both linear and logarithmic regression equations for streamflows were then developed for the Battle Mountain and Argenta gages in terms of flows at the other gages. Linear regression produced the most useful relationships. As summarized on a monthly basis in Table C-13 below, the most useful correlations were found with the Carlin gage.

Table C-13
Data Filling Results
Monthly Correlation Coefficients (r squared values) with the Carlin Gage

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Battle Mountain	0.89	0.93	0.96	0.94	0.94	0.90	0.97	0.96	0.85	0.91	0.96	0.98
Argenta	0.94	0.99	0.98	0.99	0.96	0.97	0.99	0.92	0.64	0.81	0.96	0.97

Streamflow Simulations. The immediate influence of the projected mine discharges to the surface water environment of the Humboldt River was analyzed by developing a simple river network model of the Humboldt River in order to simulate the immediate influence of the projected average instantaneous mine discharges presented in Chapter 5.0. This analysis, although simplified, makes an attempt to explicitly account for irrigation diversions and lagged return flows.

The model chosen for this analysis is the Stream Simulation Model (StateMod) (Colorado Division of Water Resources 1996) as developed by the State of Colorado. StateMod is a monthly water allocation and accounting model that simulates irrigation diversions, reservoir storage, reservoir operations, and instream flow requirements based on the prior appropriation doctrine, the same legal standard used in Nevada. Water diversions are based upon priorities or (in a sense), rights.

StateMod represents the river basin using a network of nodes to reflect the stream system's physical and legal operational parameters. The nodes are located at major stream features, including stream gaging stations, diversion structures, minimum streamflow reaches, and locations for water imports (mine discharges) into the stream system.

StateMod first computes the baseflows for the river basin of interest. Baseflows are defined as those flows available in a stream system in the absence of human activity. StateMod generates baseflows using an inverse modeling approach in which the monthly streamflow data at the known gages are adjusted by adding back into the gage value depletions attributable to historic diversions. Once this baseflow file is created, the model allocates water on assigned priority sequence. For each priority, the amount of water available at a structure is calculated by observing the flow at the node and at all other downstream nodes to the lower end of the basin. The available flow is generally the minimum of physical availability, legal availability, demand, and capacity. After the diversion is made for the first priority, the flows at all of the nodes are adjusted downstream to reflect the diversion and any return flows. The general river network modeled for the Humboldt River analysis is shown in Figure C-3.

The process is then repeated for the next priority. The amount of water available for the next priority can include any return flow that accrues to the river from the more senior diversions that occur in the same monthly time step and return flows from previous time steps. The returns are assigned to accrue to one or multiple locations in the network, and vary in time depending on the return pattern. Return flows are specified as a percentage of the diversion assigned return flows, including both surface and ground water components.

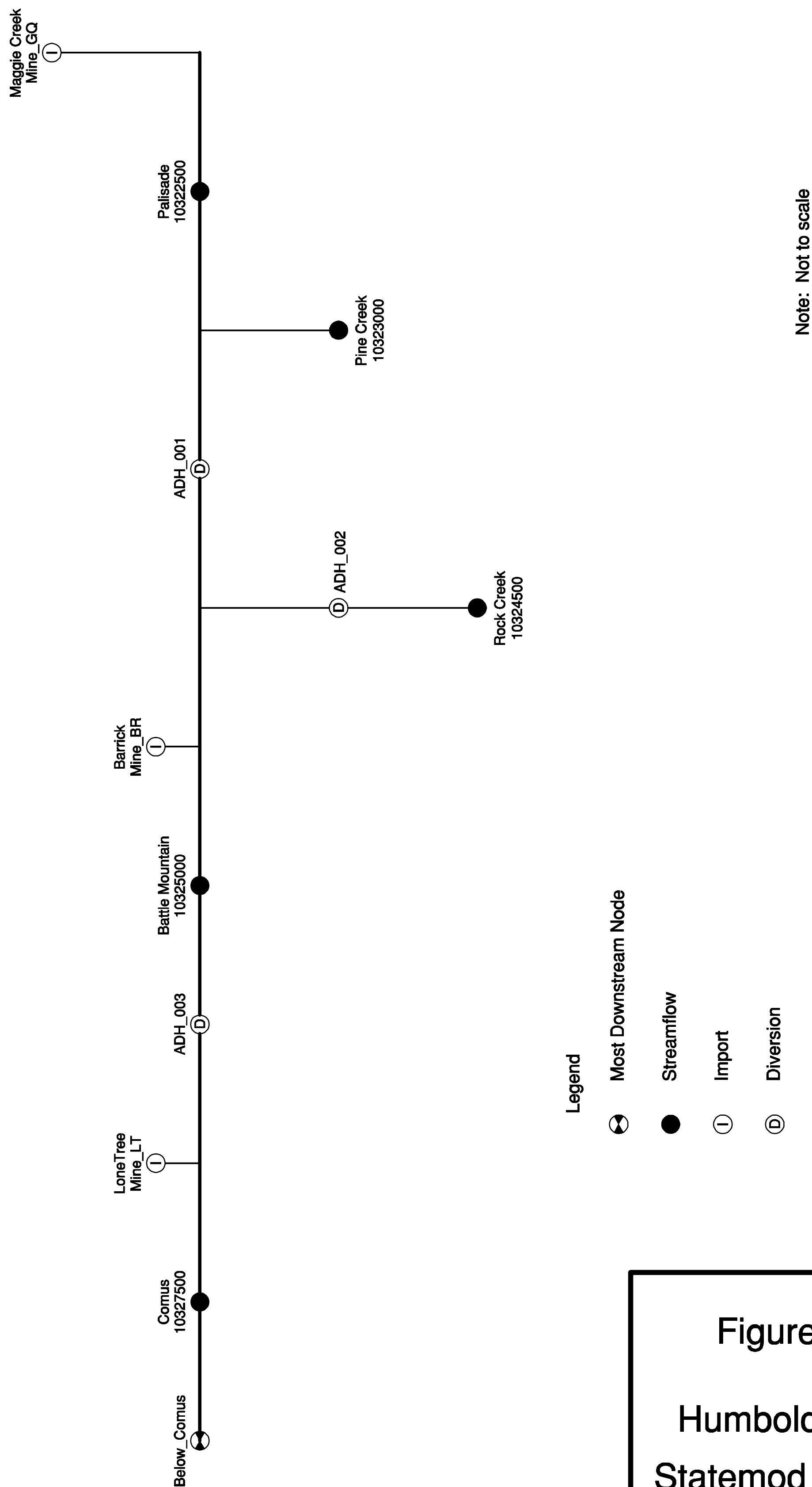


Figure C-3

Humboldt River Statemod Network

APPENDIX D

SUMMARY OF THE BARRICK HYDROLOGIC MODEL

D1 .0 BARRICK MODEL

The dewatering requirements, general area of drawdown and mounding of ground water levels, and postclosure pit lake development were estimated using the U.S. Geological Survey (USGS) modular three-dimensional, finite-difference ground water flow model MODFLOW (McDonald and Harbaugh 1988). The calibrated model was used to simulate the hydrologic effects resulting from: (1) the Goldstrike Mine (independent of other dewatering activities in the northern Carlin Trend area) and, (2) the combined or cumulative dewatering and water management activities at the Goldstrike Mine, Gold Quarry Mine (from existing operation and proposed expansion) and proposed Leeville Mine. This section provides a summary of the model setup and presentation of the results of the modeling under the cumulative scenario. Details regarding the model design, model modifications, calibration, simulations, and sensitivity analyses are presented in McDonald Morrissey Associates, Inc. (1998).

D1.1 Model Setup, Assumptions, and Calibration

D1.1.1 Introduction

MODFLOW is designed to simulate flow in an anisotropic, heterogeneous porous medium. As described in Section 3.1.2, the hydrogeology of the region is controlled by flow thorough both porous sediments and fractured rock aquifers. Flow within porous media occurs within interconnected pores within the sediments and sedimentary rocks. Flow within the fractured rock is controlled primarily by a network of interconnected fractures and locally by flow through solution cavities in carbonate rocks. For the purpose of developing the regional numerical model, it was assumed that flow through the fractured medium can be treated as equivalent to flow within a porous medium. This assumption of an equivalent porous medium for the bedrock aquifers is consistent with the distribution of fractures observed in cores and reported during drilling (McDonald Morrissey Associates, Inc. 1998), and the general patterns of drawdown and mounding that have been observed to date in bedrock areas (Barrick 1999a). Flow through discrete fractures or solution cavities is not explicitly represented in the model. The model also assumes that the temperature of the ground water will remain constant throughout the model simulation periods.

Key components of the ground water flow model include (McDonald Morrissey Associates, Inc. 1998):

- Precipitation varies seasonally, with greater precipitation occurring during April through June (wetter months), compared to October through December (drier months).
- Recharge to ground water occurs as both a percentage of precipitation that infiltrates where it falls, and as infiltration of runoff along streams.
- Little hydraulic communication occurs between the modeled area and areas outside the model; however, there is some ground water flow to and from the model from the south.
- Modeled pumping rates for the 1990 through 1996 period vary according to actual mine pumping records.

- Most of the pumped ground water originates from water stored in the marine carbonate rocks and, to a lesser extent, the marine clastic rocks.

- Most of the infiltration that has occurred caused by mine water management activities has been confined to the volcanic rocks and alluvium in the area.

- Bedrock ground water flow is compartmentalized and controlled by near vertical faults.

- Higher permeability rocks exist between the Post and Siphon faults caused by increased fracture density and solution cavities.

D1.1.2 Model Grid and Discretization

The numerical model domain and finite difference grid is illustrated in Figure D-1 (McDonald Morrisey Associates, Inc. 1998). The modeled area includes six ground water basins: Susie Creek, Maggie Creek, Marys Creek, Boulder Flat, Rock Creek, and Willow Creek described in Section 3.1.1. The model domain extends approximately 50 miles east-west and 60 to 70 miles north-south. In order to provide more detailed flow information in the mine area, the grid cell dimensions vary from 75 feet in the mine area to 10,000 feet at the model boundaries. Four model layers were used to vertically subdivide the modeled area. The vertical and horizontal discretization was designed to simulate variations in the hydraulic properties of the six general hydrostratigraphic units recognized in the modeled area. The top of the first layer is the water table; layer four generally represents the top 2,000 feet of low-permeability marine carbonate rocks.

D1.1.3 Hydrostratigraphic Units

Six primary hydrostratigraphic units were further subdivided into model zones to represent variable hydraulic conductivity and storage properties within the units. The initial hydraulic parameters for the model were estimated from earlier model versions. The model parameters were then refined by model calibration. This process led to the selection of the 15 model zones shown in Table D-1. The most permeable rocks in the modeled area are fractured volcanics and carbonates, and alluvium. These rocks have hydraulic conductivities that are 1,000 to 10,000 times greater than most of the rocks in the study area (McDonald Morrissey Associates, Inc. 1998).

D1.1.4 Hydrostructural Units

Long-term monitoring of drawdown and mounding in the vicinity of the Goldstrike property has resulted in the recognition of three major faults or fault zones that tend to impede the movement of ground water across the faults. These faults include the (1) Boulder Narrows Fault located in Boulder Valley; (2) Siphon Fault located between the TS Ranch Reservoir and the Betze-Post Pit; and (3) Post Fault located on the east side of the Betze-Post Pit. The locations of these major hydrostructural features are illustrated in Figure D-2 (McDonald Morrisey Associates, Inc. 1998) and a generalized cross section is shown in Figure D-3 (Barrick Goldstrike Mines Inc. 1999a).

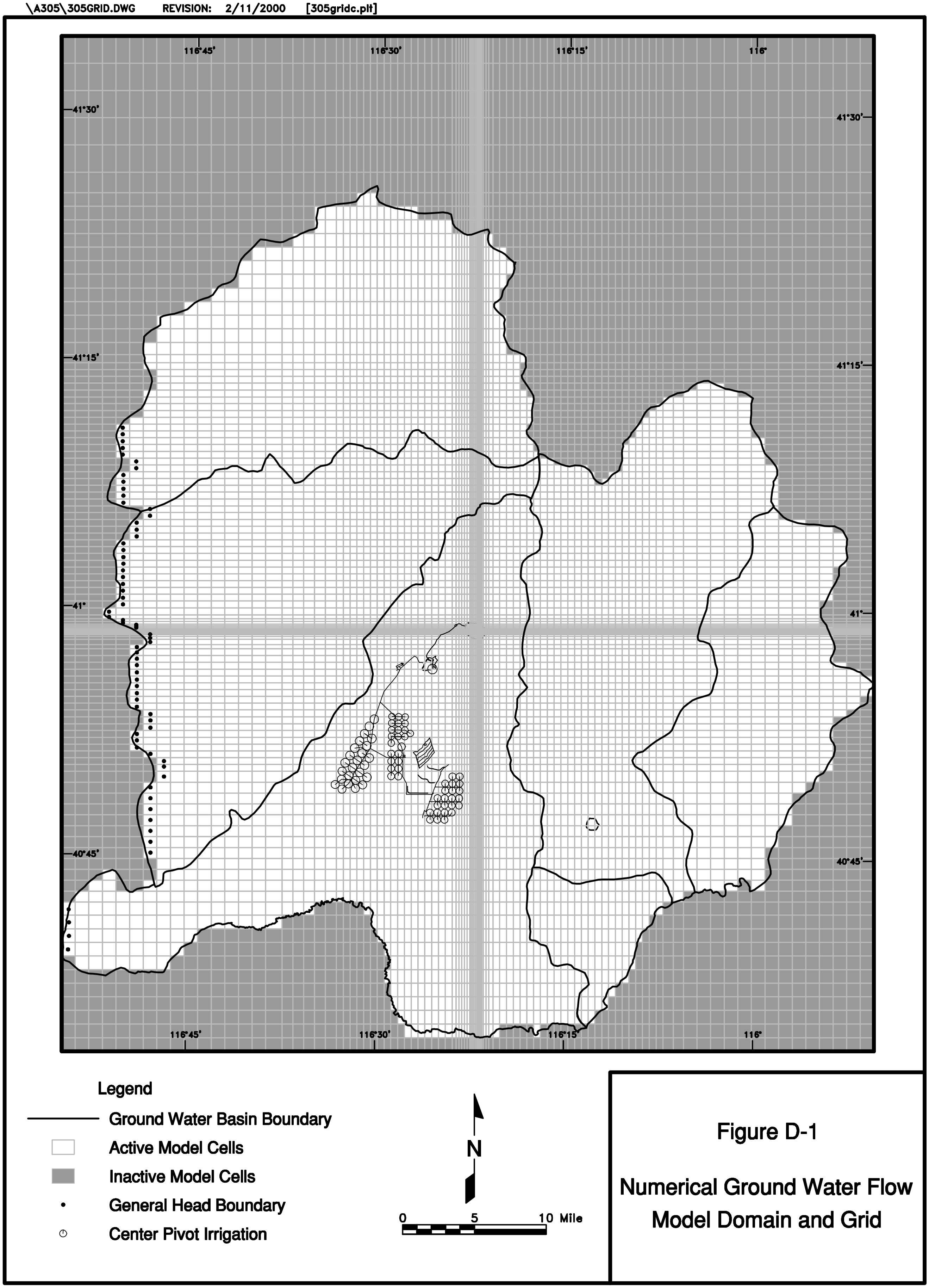


Figure D-1

Numerical Ground Water Flow Model Domain and Grid

Table D-1
Hydraulic Parameters Used in the Hydrologic Model

Hydrostratigraphic Unit	Model Zones (subdivided by relative permeability)	Hydraulic Conductivity (feet/day)	Storage (unitless)
Alluvium	NA	20.0	0.250
Carlin Formation	moderate	0.1	0.100
	low	0.05	0.050
Volcanic Rocks	high	45.0	0.030
	medium high	2.0	0.030
	medium low	0.1	0.030
	low	0.02	0.030
Intrusive Rocks	high	3.0	0.030
	medium	0.01	0.030
	Low	0.003	0.030
Marine Clastics	medium	0.2	0.030 - 0.050
	low	0.02	0.030
Marine Carbonates	high	40.0	0.008 - 0.016
	medium	0.1	0.010 - 0.030
	low	0.01	0.010 - 0.030

Source: McDonald Morrissey Associates, Inc. 1998.
NA = Not applicable.

\A305\DWG\305MJHYS.DWG REVISION: 2/12/2000 [305mjhyc.plt]

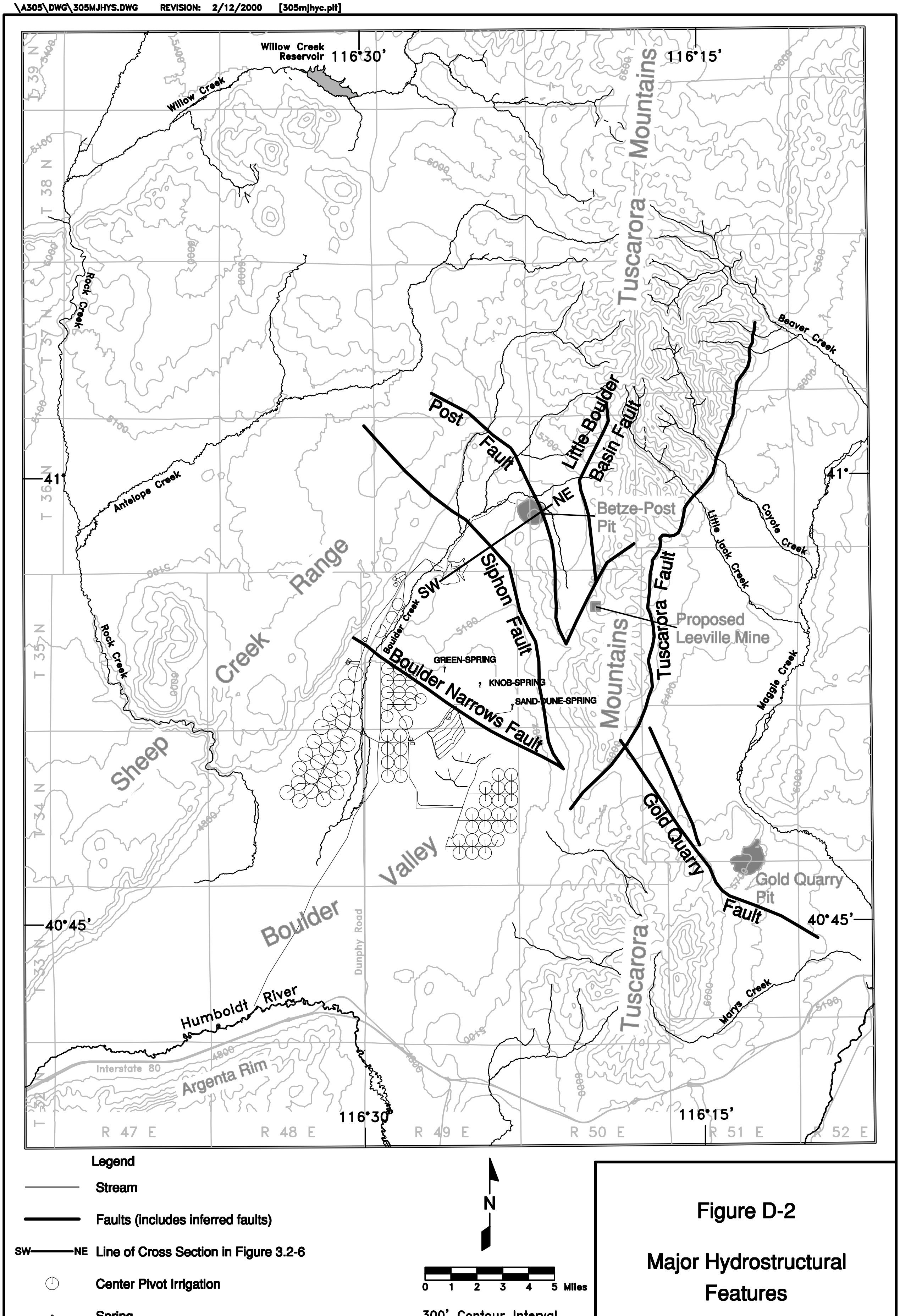


Figure D-2

Major Hydrostructural Features

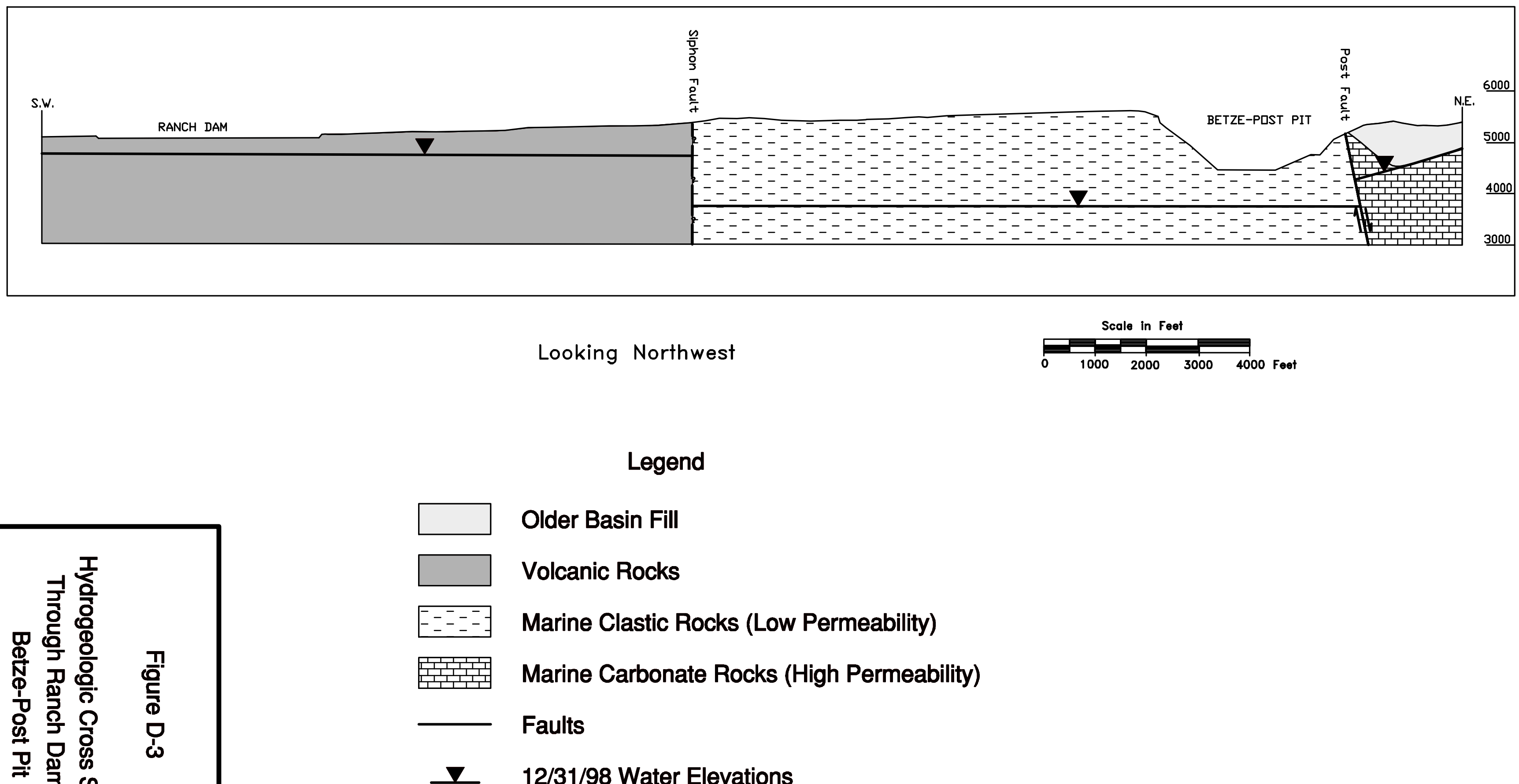


Figure D-3

Hydrogeologic Cross Section Through Ranch Dam and Betze-Post Pit

D1.1.4.1 Boulder Narrows Fault

The Boulder Narrows Fault in Boulder Valley has no surface expression. McDonald Morrissey Associates, Inc. (1997) reports that evidence for this fault includes (1) offset of rhyolite in the area of the fault by approximately 700 feet, (2) the presence of Green, Knob, and Sand Dune springs (see the section on Seeps and Springs below for a description of these springs), (3) Newmont gravity surveys indicating that the basin is 3,000 feet deep just to the south of the fault, and (4) water-table gradients in the alluvium that are noticeably steeper, and water levels are elevated north of the inferred fault. The Boulder Narrows Fault is thought to impede ground water flow across the fault (McDonald Morrissey Associates, Inc. 1997).

D1.1.4.2 Siphon Fault

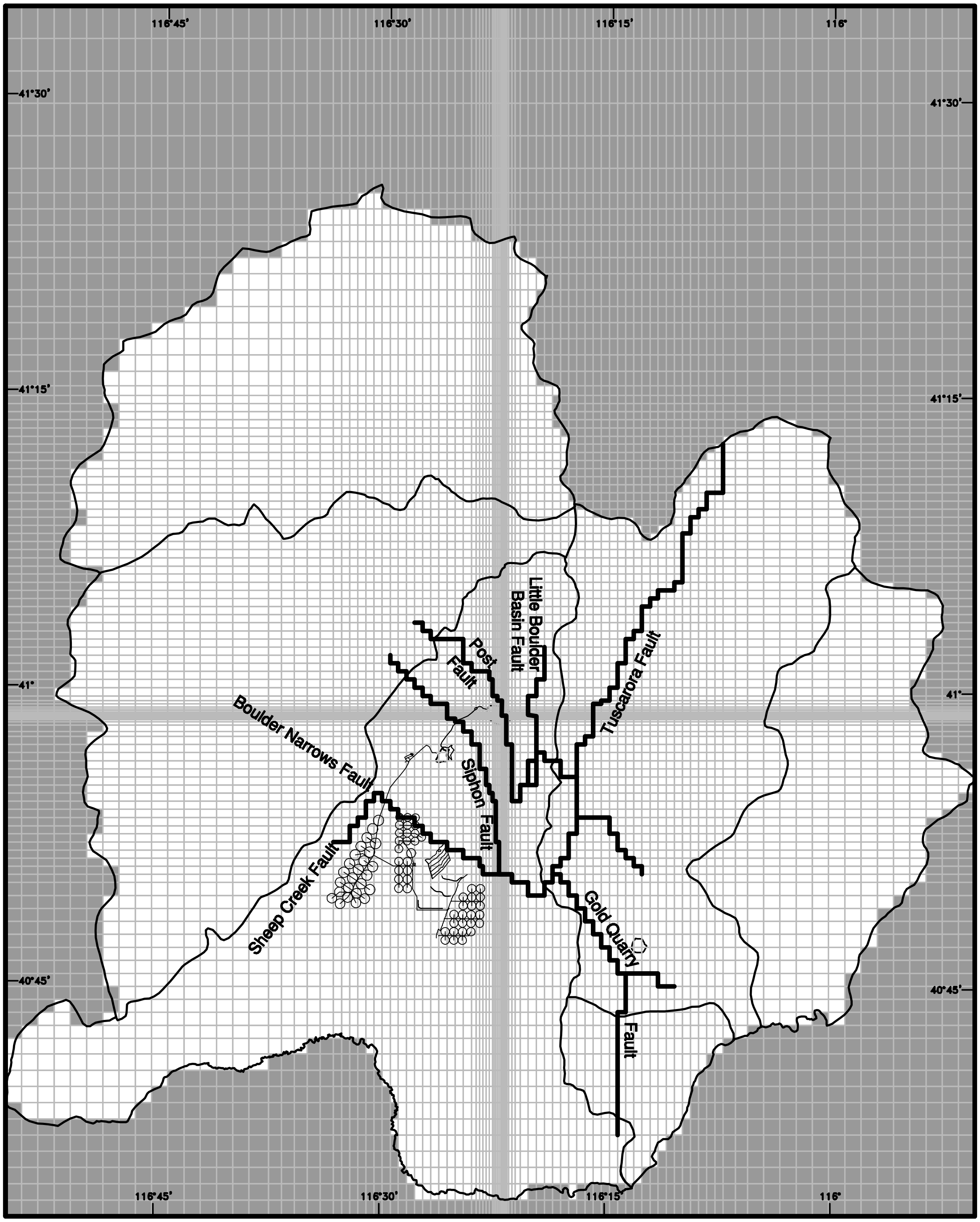
The Siphon Fault separates highly permeable marine carbonate rocks north of the fault from less permeable volcanic rocks south of the fault. As illustrated in Figure D-3, the fault acts as a pronounced barrier that separates the drawdown cone developed from mine dewatering activity north of the fault from the ground water mound developed from the infiltration activities south of the fault (McDonald Morrissey Associates, Inc. 1996b). Wells located on either side of the fault record dramatically different water levels. For example, the water level in monitoring well NA-50D, located east of the Siphon Fault, was 4,375 feet amsl in late 1997, but the water level in monitoring well NA-7D, west of the fault, was 4,759 feet amsl. Both of these wells are completed in volcanic rocks, and their head difference of nearly 400 feet provides evidence that the Siphon Fault is a barrier to ground water flow (Barrick 1999a). (Note that NA-50D is located approximately 1 mile southeast of NA-7A. However, both wells are located within a few hundred feet of, but on opposite sides of, the Siphon fault.)

D1.1.4.3 Post Fault

The Post Fault generally trends north-south and is exposed in the east wall of the Betze-Post Pit. Near vertical movement along the Post Fault has juxtaposed low permeability marine clastic rocks against the high permeability marine carbonate hydrostratigraphic unit. Exploratory drilling prior to active dewatering in the area revealed a 100-foot drop in ground water elevations across the fault from east to west (BLM 1991a). As mine dewatering has progressed, there has been a significant difference in the rates of observed water level decline in wells on either side of the Post Fault. As shown in Figure D-3, much greater water level declines are seen on the west side of the Post Fault than on the east side (McDonald Morrissey Associates, Inc. 1996b). For example, monitoring well PZ95-1D, located on the east side of the Post Fault, had a water level of 4,819 feet amsl at the end of 1997. At the same time, monitoring well PZ96-2D, located on the west side of the fault, had a water level of 4,214 feet amsl. Both of these wells are completed in marine clastic rocks, and the difference in head of approximately 600 feet between the two wells is evidence that the fault is a barrier to ground water flow (McDonald Morrissey Associates, Inc. 1998). Again, this is probably controlled more by the juxtaposition of the different rock types across the fault than by the hydraulic characteristics of the fault itself.

In addition to modeling the known hydrostratigraphic units in the study area, the ground water model also incorporated the hydrostructural units discussed in Section 3.1.2 and shown in Figure D-2. Faults that may impede flow are represented in the model using the horizontal flow barrier module designed for MODFLOW. Faults represented as barriers to flow are shown in Figure D-4 (McDonald Morrisey Associates, Inc. 1998),

\A305\305MJMHY.DWG REVISION: 2/11/2000 [305mjmhc.plt]



Legend

Ground Water Basin Boundary

Active Model Cells

Inactive Model Cells

Horizontal Flow Barriers

Center Pivot Irrigation

N

0 5 10 Mile

Figure D-4

Numerical Model Representation of Major Hydrostructural Features

and include the Post, Siphon, Boulder Narrows, Gold Quarry, Tuscarora, Sheep Creek, and Little Boulder Basin faults. All of these faults were assumed to consist of a 100-foot wide low permeability zone. During the calibration process the assumed hydraulic parameters of the low permeability hydrostructural zones were modified to better represent the observed head distribution (McDonald Morrissey Associates, Inc. 1998).

D1.1.5 Recharge, Evaporation, and Evapotranspiration

The numerical model incorporated ground water recharge due to direct infiltration and infiltration along stream channels and mountain fronts, as described in Section 3.1.2. Recharge along streams was simulated with the modified version of the RIV 2 Package (Miller 1988) River module of MODFLOW. Green, Sand Dune, and Knob springs, as well as the canal that captures their discharge also were modeled with the River Package. Seepage from the TS Ranch Reservoir and infiltration ponds was simulated as ground water injection with the Well Package. Ground water recharge from injection wells and irrigated areas also was simulated with the Well Package. Evapotranspiration from natural and irrigated areas was simulated in the model using the Evapotranspiration Package assuming an extinction depth of 20 feet from the land surface (McDonald Morrissey Associates, Inc. 1998).

D1.1.6 Dewatering Wells, Injection Wells, Infilatration Ponds, and Irrigation

Mine dewatering wells were simulated with the Well Package for MODFLOW, and their pumping rates were selected to correspond to actual mine pumping records. Dewatering wells that penetrate more than one hydrostratigraphic unit were modeled as multiple wells in the same location that pump water from different layers. The pumping rates of these wells were proportioned according to the transmissivity of the rock units screened in the actual dewatering wells (McDonald Morrissey Associates, Inc. 1998). Infiltration from infiltration ponds, reservoir leakage, injection wells, and irrigation were also simulated using the Well module.

D1.1.7 Model Calibration

The hydraulic conductivity estimates and zones, as well as the hydraulic characteristics of the low permeability faults, were modified during steady-state and transient model calibrations. In addition, model calibrations required small adjustments to the initial estimates for the ratio of vertical to horizontal hydraulic conductivity and for aquifer storage. Specifications for evapotranspiration and recharge from streams were represented by long-term seasonal averages and were not allowed to vary during model calibrations (McDonald Morrissey Associates, Inc. 1998).

The calibration procedure involved adjusting calibration parameters until the model was able to approximately match, within some relatively small degree of error, the ground water elevations and streamflows actually measured at various locations throughout the study area. Steady-state calibrations were used to adjust the model so that it would match premining heads at 144 wells and surface water flows at 6 sites prior to 1990. Transient calibrations were used to modify the model to match changes in heads at 76 wells and changes in streamflow at 6 locations due to mine dewatering and water management activities from 1987 through 1996. In this time period, water levels in the Betze-Post Pit area had fallen approximately

1,300 feet. As previously mentioned, historic records of mine pumping rates, injection rates, and irrigation rates were used to specify the transient stresses in the model (McDonald Morrissey Associates, Inc. 1998).

D1.1.8 Sensitivity Analysis

A sensitivity analysis was performed to determine how sensitive the ground water flow model is to specified changes in certain model parameters. Results of the sensitivity analysis indicate that the model is very sensitive to changes in the hydraulic conductivity of the low-permeability marine clastic rocks, highly permeable volcanic rocks, alluvium, and high-permeability carbonate rocks. The model is also sensitive to changes in the storage properties of the high-permeability carbonate rocks and to changes in recharge (McDonald Morrissey Associates, Inc. 1998).

D1.1.9 Simulated Premine Ground Water Elevations

The model simulated elevation of the regional ground water surface in the hydrologic study area prior to the initiation of mine dewatering and water management activities is shown in Figure D-5 (McDonald Morrissey Associates, Inc. 1998). According to this evaluation, the elevation of the potentiometric surface ranged from over 7,000 feet amsl in the Tuscarora Mountains to approximately 5,300 feet amsl in the vicinity of the mines, and less than 4,600 feet amsl in the lower part of Boulder Flat (McDonald Morrissey Associates, Inc. 1998.) Based on these elevations, the depth to ground water in the mountains prior to pumping was in the range of 150 to 400 feet below the land surface. In the vicinity of the mines, the depth was 200 to 400 feet. The premining depth to ground water in the rhyolite ranged from approximately 500 feet near the TS Ranch Reservoir to near land surface (0 to 50 feet) in the northern portion of Boulder Flat. In the alluvium in the southern half of Boulder Valley, depth to ground water was less than 10 feet near the Humboldt River (McDonald Morrissey Associates, Inc. 1996a).

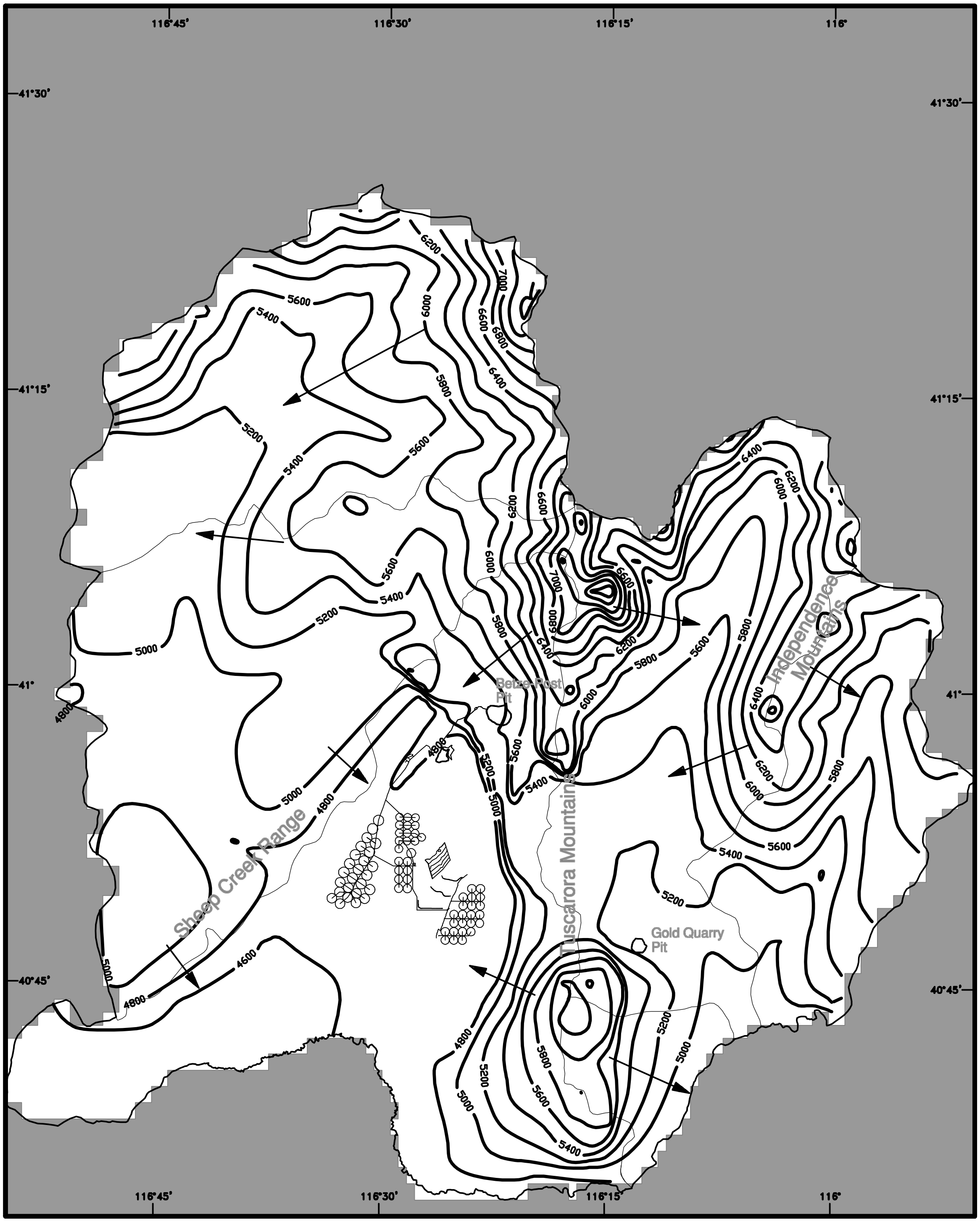
D1.2 Comparison of 1991, 1994, and 1998 Hydrologic Model Predictions of Drawdown from Barrick's Dewatering Operations

The numerical ground water model used by Barrick to simulate drawdown resulting from mine dewatering has been updated several times over the past decade in response to additional monitoring data, technical review, and modifications to Barrick's mining and dewatering plans. Figure D-6 presents the maximum areal extent of drawdown (> 10 feet) as projected by three different versions of the ground water model:

1) The original ground water model used for the Betze EIS (BLM 1991b). This model evaluated lowering the water table to 4160 feet amsl over a 10-year period and holding it there until the year 2000.

2) The revised ground water model used to predict drawdown for the Meikle Mine as authorized by the BLM in 1994 (BLM 1994c), and used for the Biological Assessment of Barrick's Dewatering Operations (BLM 1994b) and the associated Biological Opinion (USFWS 1994). This version of the model evaluated lowering the water table to 4160 feet amsl over a 5-year period and holding it there until 2000.

\A305\305PSURF.DWG [layer on: textcum] REVISION: 2/11/2000 [305psurc.plt]



Legend

- Contours of Heads Simulated for Model Layer 1
- General Direction of Ground Water Flow
- Ground Water Basin Boundary
- Inactive Model Cells
- Center Pivot Irrigation

N

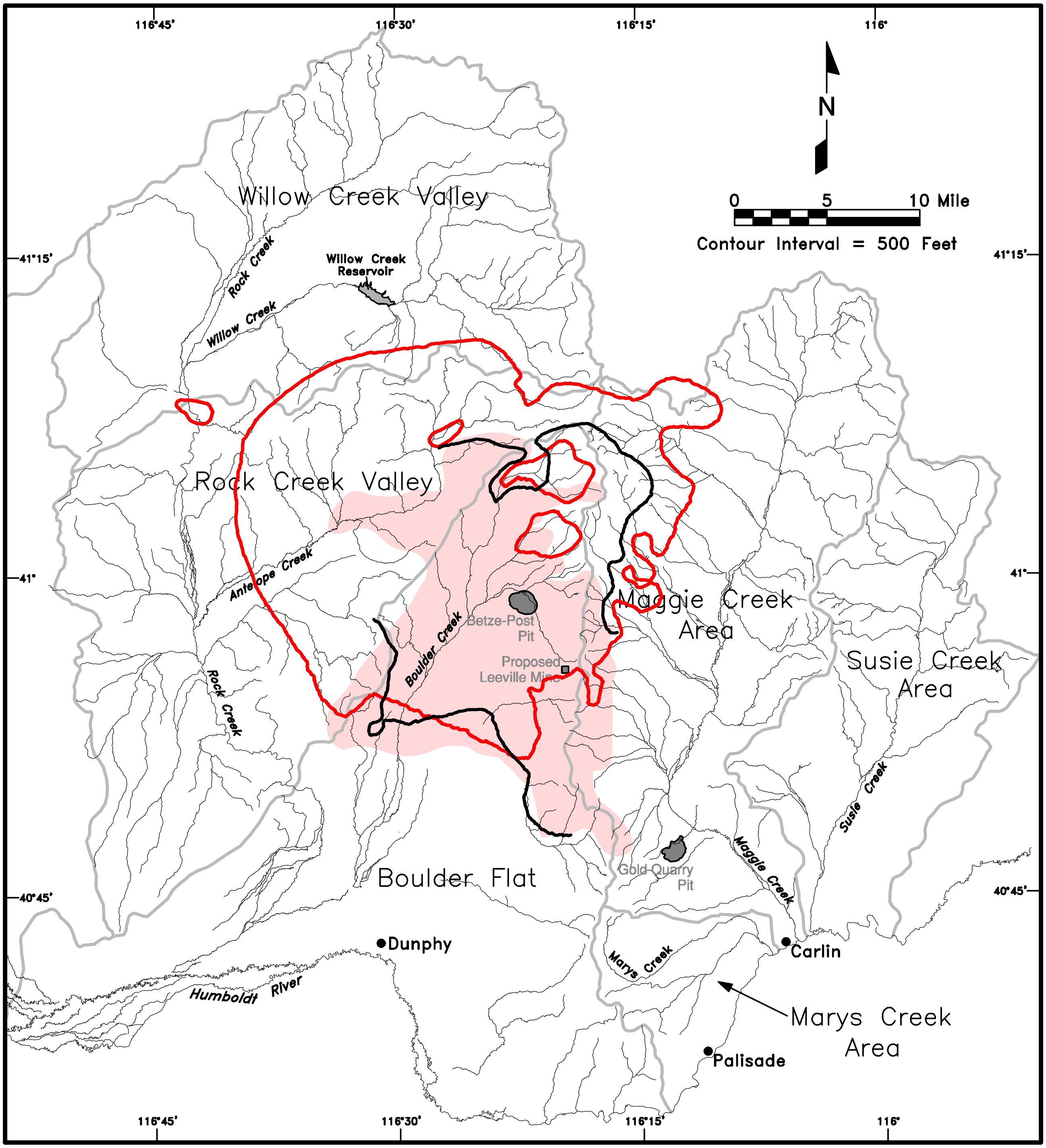
0 5 10 Mile

200' Contour Interval

Figure D-5

Elevation of Premine Potentiometric Surface (Barrick Model)

\A305\DWG\305max3.dwg REVISION: 8/21/2000



Legend

Ground Water Basin Boundary

Stream (Perennial, Intermittent, or Ephemeral)

1991 Projection - Betze Project EIS 1991 (BLM 1991a)

1994 Projection - Meikle Mine Development FONSI and Decision Record (BLM 1994c); Biological Assessment (BLM 1994b); and Biological Opinion (USFWS 1994)

1998 Projection - Betze Project Supplemental EIS (this document)

Figure D-6

Comparison of the 1991, 1994, and 1998 Hydrologic Model Projections of Drawdown from Barrick's Dewatering Operations

3) The revised ground water model used for this SEIS (McDonald Morrisey Associates, Inc. 1998; Barrick Goldstrike Mines Inc. 1998c). This version of the model evaluates lowering the water table to approximately 3600 feet amsl over an 11-year period and holding it there until 2010.

The initial modeling presented in the Betze Project EIS preceded any substantial dewatering activities. As shown in Figure D-6, the area of projected drawdown for this model was truncated by the model boundaries. For the 1994 dewatering simulation associated with approval of the Meikle Mine, the model domain was expanded out to major drainage features (Rock Creek, Willow Creek, Maggie Creek, and the Humboldt River) and allowed for simulation of the entire cone of depression. The model was also calibrated to the actual dewatering rates and measured drawdown data and was revised to account for the more aggressive dewatering schedule (drawdown to 4160 feet amsl in 5 years instead of 10 years). Monitoring since 1994 has indicated that this model version tended to overpredict drawdown, particularly toward the northwest, north, and northeast. Between 1996 and 1998, the ground water model was extensively revised and recalibrated to reflect fault-controlled bedrock compartmentalization detected during post-1994 monitoring. The model domain also was expanded to include six hydrographic basins now included in the hydrologic study area, and revised as necessary to address other technical review comments developed during the SEIS process. The version of the model used for the SEIS more accurately reflects the magnitude and areal extent of the drawdown cone observed to date and is considered to provide a more accurate projection of the extent of future areal drawdown due to the extensive monitoring data collection and recalibration that has occurred over the last several years.

The results of the model simulations are compared in Figure D-6 and Table D-2. As described previously, the original projections used in the Betze EIS did not define portions of the drawdown cone located northwest and southeast of the Betze-Post Pit due to the location of the model boundaries; therefore, it is not possible to compare drawdown cones for the three different model projections for these areas. All three models did, however, simulate the maximum areal extent of the drawdown cone (defined as the area that would experience $\geq$ 10 feet of drawdown) for the area northeast of the Betze-Post Pit. For this area, the original 1991 model simulations indicated that drawdown would extend up to approximately 10 miles from the Betze-Post Pit; the 1994 Meikle EA/BA/BO projections indicated that drawdown would extend up to approximately 13 to 14 miles; and the 1998 simulations used in this SEIS indicate that drawdown would extend approximately 7 miles. In summary, the updated model results indicate that the drawdown toward the northeast would be less than predicted by earlier models.

In comparing the 1994 and the 1998 model simulations, the 1998 model simulations used for the SEIS indicate that the areal extent of drawdown would be much less extensive in the Rock Creek Valley Hydrographic Area to the northwest, but more extensive to the southeast of the Betze-Post Pit. Overall, the areal extent of the drawdown cone simulated by the 1998 model is smaller than projected by the 1994 model (Figure D-6).

In comparison to earlier predictions, the 1998 model simulations used for the SEIS indicate that it will take substantially longer than previously projected for the drawdown cone to reach its maximum areal extent and recover to steady-state conditions. The 1998 model also projects that a larger volume of water would be withdrawn from the groundwater system during mining and reclamation. The increased volume of water projected by the 1998 model reflects the increased depth of dewatering (approximately 3600 feet amsl for the 1998 model versus 4160 feet amsl in the two earlier models), and the longer period during which that depth would be maintained (until 2010 versus 2000 for the earlier model scenarios).

Table D-2
Comparison of 1991, 1994, and 1998 Model Projections

	Betze EIS (1991)	**Meikle EA/BA/BO (1994)**	**Betze SEIS**
Total Planned Pumped Volume at Closure – Acre-feet (Approximate)	285,000	746,240	1,085,000
End of Mining (and Dewatering)	2000	2000	2010
Target Dewatering Elevation (Approximate feet amsl)	4160	4160	3600
Years to Achieve Target	10	5	11
Years Postmining Until Maximum Areal Extent of Drawdown is Reached	30	29	100
Years Postmining Until Steady-state Recovery is Reached	100	100	>233

APPENDIX E

WATERFOWL DATA

Table E-1
Aerial Duck Breeding Pair Survey
Average Number of Breeding Pairs Recorded Annually in Region 1
(1959 – 1998)

Area	1959 – 1966	1967 – 1979	1978 – 1987	1980 – 1989	1990 – 1998	1959 – 1998	High	Low
Humboldt River	299	154	324	365	260	266	658	40
Humboldt WMA	312	472	388	398	161	357	1,049	0
Stillwater WMA	2,621	1,678	1,590	1,687	1,194	1,760	4,829	122
Carson Lake	985	908	1,235	1,362	1,006	1,059	2,251	63

Source: Saake 1998.

Table E-2
Annual Waterfowl Occurrence from August 15 to January 30
(1968 – 1997)
(x 1,000)

Area	1968 – 1977		1978 – 1987		1988 – 1997		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Humboldt WMA[1]								
Ducks	2,803.83	1,433.80	2,256.48	1,487.29	1,442,04	1,951,94	2,145.51	1,686.26
Geese	65.97	24.82	94.69	53.90	28.82	33.28	63.06	47.38
Swans	22.44	27.18	34.04	51.14	14.79	27.66	23.80	36.94
Stillwater WMA								
Ducks	7,536.92	4,021.94	9,121.53	7,172.44	5,381.32	4,826.21	7,346.59	5,535.77
Geese	197.36	73.75	260.93	72.71	266.35	129.81	241.55	97.84
Swans	126.74	63.65	185.51	120.88	93.43	79.87	135.23	96.29
Carson Lake								
Ducks	5,384.15	2,649.05	4,587.44	1,611.03	2,635.89	1,934.21	4,202.49	2,350.16
Geese	270.79	146.11	218.28	72.32	142.54	134.72	210.54	129.41
Swans	3.17	2.71	24.77	41.85	18.25	35.69	15.40	32.03

Source: Saake 1998.
[1]No data were obtained for the Humboldt WMA in 1968.
SD = standard deviation.

Table E-3
Humboldt Wildlife Management Area
Annual Peak Population by Species
August 15 – January 30
(1969 – 1998)

Species	Average (Aug 15 – Jan 30)	Average Yearlong	1969 - 1998	
			High	Low
Mallard	3,074	6,148	12,880	1
Gadwall	1,994	3,988	10,530	0
Northern pintail	10,019	20,038	33,130	0
Green-winged teal	6,531	13,062	23,760	0
Cinnamon teal	700	1,400	3,260	0
American wigeon	4,455	8,910	14,850	0
Northern shoveler	2,581	5,162	13,500	0
Redhead	1,222	2,444	10,330	0
Ring-necked duck	98	196	2,050	0
Canvasback	1,162	2,324	15,880	0
Lesser scaup	7	14	30	0
Common goldeneye	3	6	20	0
Bufflehead	11	22	50	0
Ruddy duck	726	1,452	5,635	0
Other duck species	0	0	0	0
Total Ducks	**32,583**	**65,166**	**76,625**	**1**
Common merganser	706	1,412	6,800	0
Dark goose	729	1,458	2,640	0
White goose	20	40	300	0
Total Geese	**749**	**1,498**	**2,940**	**0**
Tundra swan	525	1,050	3,890	0
American coot	39,434	78,868	235,651	0
Total Waterfowl	**73,997**	**147,994**	**315,468**	**1**

Source: Saake 1998.

APPENDIX F

AQUATIC RESOURCES TABLES

Table F-1
Mean Fish Abundance[1] (number/mile) in the Maggie Creek Subbasin, 1992

Stream	Location No.	Speckled Dace	Redside Shiner	Mountain Sucker	Brook Trout	Lahontan Cutthroat	Total
Buck Rake Jack Creek	BRJ-004	10	0	0	0	0	**10**
West Cottonwood Creek	COW-001	1,070	0	0	0	0	**1,070**
Coyote Creek	COY-002	0	0	0	10	0	**10**
Indian Creek	IND-001	380	0	0	0	0	**380**
Jack Creek	JAC-003	60	0	0	0	0	**60**
	JAC-004	10	0	0	0	0	**10**
Little Jack Creek	LTL-007	20	0	0	0	150	**170**
Maggie Creek	MAG-007	12,890	270	20	0	0[2]	**13,180**
	MAG-102	3,180	680	0	0	0	**3,860**
Susie Creek	SUS-010	13,410	190	280	0	0	**13,880**

Source: JBR 1992a.
[1]Number of fish/sampling segment (in feet) was extrapolated to number/mile.
[2]Five LCT were electroshocked by JBR (1992e) during a qualitative survey.

Table F-2
Mean Fish Abundance[1] (number/mile) in the Beaver Creek Drainage, 1994

Stream	Location	LCT		Tahoe Sucker	Speckled Dace	Lahontan Redside
		Juvenile	Adult	All Stages	All Stages	All Stages
Beaver Creek	1	0	10	10	578	0
	2	0	0	429	992	107
	3	0	0	116	2,988	0
	4	44	0	0	0	0
	5	0	0	0	112	0
	6	28	28	28	428	0
	7	15	15	0	47	0
	8	43	43	0	1,056	0
	9	128	0	0	0	0
	10	15	0	0	0	0
	11	0	0	0	0	0
Williams Canyon	1	0	0	0	70	0
	2	81	0	0	0	0
	3	132	0	0	0	0
Toro Canyon	1	0	0	0	0	0
	2	170	34	0	0	0
	3	270	0	0	0	0
	4	114	0	0	28	0
	5	103	26	0	118	0
Toro Tributary A	1	128	64	0	0	0
Toro Tributary B	1	313	0	0	0	0
Toro Tributary C	1	328	0	0	73	0
Barber Canyon	1	0	0	0	0	0
Unnamed Trib.	1	0	0	0	0	0
	2	0	0	0	0	0
Little Beaver Ck.	1	0	0	0	0	0
	2	634	70	0	0	0

Source: Valdez et al. 1994.
[1]Number of fish/sampling segment (in feet) was extrapolated to number/mile.

Table F-3
Mean Fish Abundance[1] (number/mile) in the Rock Creek Subbasin, 1996

Stream	No. of Locations	Speckled Dace	Redside Shiner	Mountain Sucker	Tahoe Sucker	Lahontan Cutthroat	Total
Upper Rock Creek	4	53	0	0	0	70	**123**
Lewis Creek	5	348	0	0	0	290	**638**
Willow Creek	9	2,823	396	211	92	0	**3,522**
Nelson Creek	6	1,571	53	106	0	79	**1,809**
Toe Jam Creek	5	334	0	88	0	106	**528**
Frazer Creek	4	3,590	0	0	0	853	**4,443**

Source: NDOW 1996b.

[1]Number of fish/sampling segment (in feet) was extrapolated to number/mile.

Table F-4
Location Descriptions of the Humboldt River Sampling Stations

Station I.D.	Location Description
BG-HUM-01	This station is located approximately 1/2 mile upstream of the mine at Barth.
BG-HUM-02	This station is located approximately 1 mile below Cluro or approximately 5.5 miles downstream of BG-HUM-01.
BG-HUM-03	This station is located approximately 5 river miles above Beowawe.
BG-HUM-04	This station is located approximately 2 miles upstream from Dunphy.
BG-HUM-05	This station is just downstream of Dunphy. It was the most upstream station in the initial August/September 1995 sampling.
BG-HUM-06	This station is immediately downstream from Shoshone. It is in Eureka County near the Lander County line and above the confluence of Blue Horse Slough.
BG-HUM-07	This station is located 2 miles below where Blue House Slough enters the river. It is in Lander County just west of the Eureka County line.
BG-HUM-08	This station is situated near the gaging station north of Mosel.
BG-HUM-08a	This station is located at the levees in Lander County.
BG-HUM-09	This station is downstream from Argenta at Argenta Siding.
BG-HUM-10	This station is located approximately 2 miles above the confluence of Rock Creek.
BG-HUM-11	This station is only a short distance downstream from the confluence of Rock Creek.
BG-HUM-12	This station is located 2 miles below the Rock Creek confluence. It is situate immediately adjacent to the structures and buildings at Tomera Ranch.

Source: JBR 1997.

Table F-5
Fish Species Collected in the Humboldt River

Common Name	Scientific Name	Status	
		Game Species	Nongame Species
Suckers	**Family Catostomidae**		
Lahontan mountain sucker[1]	*Catostomus platyrhynchus*		X
Tahoe sucker[1]	*Catostomus tahoensis*		X
Minnows and Carp	**Family Cyprinidae**		
Goldfish[2]	*Carassius auratus*		X
Carp[2]	*Cyprinus carpio*		X
Lahontan tui chub[1]	*Gila bicolor*		X
Sacramento blackfish[2]	*Orthodon microlepidotus*		X
Redside shiner[1]	*Rhichardsonius balteatus*		X
Lahontan redside[1]	*Richardsonius egregius*		X
Lahontan speckled dace[1]	*Rhinichthys osculus robustus*		X
Catfishes	**Family Ictaluridae**		
White catfish[2]	*Ictalurus catus*	X	
Black bullhead[2]	*Ictalurus melas*	X	
Brown bullhead[2]	*Ictalurus nebulosus*	X	
Channel catfish[2]	*Ictalurus punctatus*	X	
Livebearers	**Family Poeciliidae**		
Mosquitofish[2]	*Gambusia affinis*		X
Perches	**Family Percidae**		
Yellow perch[2]	*Perca flavescens*	X	
Walleye[2]	*Stizostedion vitreum vitreum*	X	
Temperate Basses	**Family Percichthyidae**		
White bass[2]	*Morone americana*	X	
Sunfishes	**Family Centrarchidae**		
Green sunfish[2]	*Lepomis cyanellus*	X	
Bluegill[2]	*Lepomis macrochirus*	X	
Smallmouth bass[2]	*Micropterus dolomieui*	X	
Largemouth bass[2]	*Micropterus salmoides*	X	
White crappie[2]	*Pomoxis annularis*	X	
Black crappie[2]	*Pomoxis nigromaculatus*	X	

Sources: Sevon 1994; JBR 1992a; French 1994, as cited in BLM 1996c; Emerson 1975; La Rivers 1962.
[1]Native species.
[2]Introduced species.