

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water  
Quality for Irrigay Units 1 through 9

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	AP-3 UNIT 1 1976				AP-4 UNIT 1 1976				AP-5 UNIT 1 1976			
Ca	7.3	7.3	7.3	9.6	9.1	9.4	9.4	14.1	2.3	1.6	1.8	5.4
Mg	0.8	0.8	0.8	0.8	0.9	0.9	1	1.2	0.1	0.1	0.1	0.26
Na	128	127	125	134	128	125	126	145	125	127	128	130
K	2.4	2.1	2.1	2.5	1.9	2.5	1.9	2.4	3.6	5.3	4.9	3.6
CO3	2.2	1.2	4.2	16.1	3.6	1.3	3.9	12.4	8.4	21	19.5	28.5
HCO3	73.6	79.2	71.7	98.3	77.4	84.2	82.2	118	44.8	14.2	20.8	75.9
SO4	200	195	193	185	206	201	202	210	195	225	228	180
Cl	12.3	12.3	13	8.9	12.3	12	11.8		12.8	12.8	13	9.2
NH4	< 0.2	< 0.2	0.2	0.1	< 0.2	< 0.2	0.2	< 0.2	< 0.2	< 0.2	0.2	0.15
NO2 (N)	0.02	0.02	0.02	0.25	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
NO3 (N)	0.4	0.35	0.53	0.3	0.44	0.58	0.66	0.65	0.4	0.35	0.31	0.2
F	0.28	0.28	0.28	0.68	0.31	0.33	0.33	0.35	0.28	0.3	0.28	0.25
SiO2	3.9	3.8	3.75	3.8	4.3	4.2	4.6	4.4	3.2	3.85	4	3.4
TDS	380	358	372	394	386	386	388	438	350	338	308	364
Cond. (umho/cm)	605	615	620	610	630	535	618	670	600	638	625	610
Alk. (as CaCO3)	92	98	92	93.6	98	102	102	106.8	84	92	94	85.4
pH (units)	8.70	8.40	9.00	8.50	8.90	8.40	8.90	9.00	9.50	10.40	10.20	9.70
Trace Metals mg/l:												
Al												
As	< 0.01	0.012	0.012	0.022	0.082	0.095	0.094	0.105	< 0.01	< 0.01	< 0.01	0.005
Ba	0.016	0.016	0.011	0.01	0.01	0.015	0.02	0.022	0.01	0.043	0.036	0.022
B	0.225	0.1	0.095	0.06	0.109	0.077	0.117	0.08	0.113	0.118	0.11	0.06
Cd	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Cr	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Cu	< 0.005	0.005	< 0.005	< 0.005	0.005	0.009	0.012	0.005	< 0.005	0.005	0.009	0.005
Fe	0.036	0.436	0.518	0.20	0.04	0.206	0.559	0.019	0.071	0.21	0.314	0.115
Pb	0.002	0.008	0.008	0.005	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Mn	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Mo	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02	< 0.02
Ni	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Se	0.022	0.024	0.02	0.174	0.266	0.416	0.283	2.0*	0.057	0.043	0.035	0.218
V	< 0.05	< 0.05	0.05	0.08	0.21	0.29	0.31	0.55	0.12	0.1	0.09	0.09
Zn	< 0.02	< 0.02	0.02	0.017	< 0.02	< 0.02	< 0.02	< 0.009	< 0.02	< 0.02	< 0.02	< 0.009
Radiometric pCi/l:												
U (mg/l)	3.35	3.4	3.46	5.17	9.73	11.89	14.05	18.6	0.56	0.32	0.33	0.33
Ra 226	43	51	59	76	77	125	165	210	22	22	22	28
Ra 226 +/-	7	7	8	8	8	15	20	20	5	5	5	5

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TABLE A-1**

Individual Well Baseline Water  
Quality for Irrigatory Units 1 through 9

Well I.D.:	AP-10 UNIT 1 1976				DI-4 UNIT 2 1978				DI-12 UNIT 2 1978		
Production Unit:											
Sample Date:											
Major Ions mg/l:											
Ca	7.5	6.8	6.7	8.8	5.9	3.9	4.2	5.8	8.8	8.3	7.5
Mg	1	0.9	0.9	1.19	0.12	0.12	0.13	0.31	1.1	0.96	0.9
Na	121	127	125	131	100	97	105	118	113	102	112
K	1.9	1.7	1.7	2.3	2	1.7	1.9	1.3	2	1.7	1.8
CO <sub>3</sub>	1.5	0.8	1.9	12.4	40	31	38	5	5	5	6
HC0 <sub>3</sub>	79.1	84.1	78.9	102.1	39	57	39	116	131	131	115
SO <sub>4</sub>	188	189	195	180	221	153	156	157	174	168	165
Cl	13.3	13.5	13.8	9.4	12	11.4	12.3	13	7	5.3	11
NH <sub>4</sub>	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
NO <sub>2</sub> (N)	0.24	< 0.02	< 0.02	< 0.02	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
NO <sub>3</sub> (N)	0.35	0.44	0.44	0.27	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F	0.28	0.28	0.33	0.28	0.43	0.4	0.42	0.37	0.33	0.35	0.35
SiO <sub>2</sub>	3.45	3.75	3.65	3.3	10.6	10.4	9.6	7.4	9.9	10.2	10
TDS	368	410	358	390	413	338	348	367	388	368	373
Cond. (umho/cm)	595	580	580	600	739	608	640	636	661	623	641
Alk. (as CaCO <sub>3</sub> )	90	96	96	93.6	131	145	127	95	215	215	199
pH (units)	8.50	8.20	8.60	9.10	9.90	9.80	9.80	8.00	8.60	8.60	8.50
Trace Metals mg/l:											
Al	<	<	<	<	<	<	<	<	<	<	<
As	< 0.01	< 0.01	< 0.01	< 0.009	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ba	0.023	0.015	0.015	0.022	0.05	0.05	0.05	0.05	0.05	0.05	0.05
B	0.134	0.125	0.099	0.04	0.01	0.01	0.01	0.05	0.02	0.01	0.01
Cd	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.013	< 0.002	< 0.002	< 0.002	< 0.002
Cr	< 0.002	< 0.002	< 0.002	< 0.002	< 0.005	< 0.005	< 0.063	< 0.063	< 0.005	< 0.005	< 0.005
Cu	< 0.005	< 0.005	< 0.005	< 0.005	< 0.013	< 0.013	< 0.025	< 0.005	< 0.009	< 0.025	< 0.022
Fe	2.0	0.651	0.332	1.2	0.07	0.05	0.41	0.06	0.05	0.08	0.07
Pb	< 0.002	< 0.008	< 0.002	< 0.002	< 0.005	< 0.005	< 0.014	< 0.014	< 0.005	< 0.005	< 0.005
Mn	< 0.025	< 0.025	< 0.025	< 0.038	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Mo	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ni	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Se	0.022	0.01	0.011	0.066	0.01	0.01	0.01	0.01	0.01	0.01	0.01
V	< 0.05	< 0.05	< 0.05	< 0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Zn	< 0.02	< 0.02	< 0.02	< 0.009	< 0.02	< 0.02	< 0.03	< 0.02	< 0.02	< 0.02	< 0.02
Radiometric pCi/l:											
U (mg/l)	0.83	1.38	0.93	1.51	0.198	0.103	0.131	0.03	0.067	0.054	0.053
Ra 226	35	26	17	34	44	45	35.5	24	78.3	48.1	63.6
Ra 226 +/-	3	2	2	8	1.7	1.7	1.5	2.0	2.5	2.0	2.3

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water  
Quality for Irigaray Units 1 through 9

Well I.D.:	DP-7 UNIT 2 1978			EI-34 UNIT 2 1978			DI-21 UNIT 3 1978			
Production Unit:										
Sample Date:										
Major Ions mg/l:										
Ca	9.1	8.6	8.5	10.3	9.1	8.7	5.8	6.2	7.9	6.5
Mg	1.5	1.3	1.2	2.1	1.8	1.7	0.02	0.04	0.02	0.17
Na	112	99	106	110	103	110	100	95	104	118
K	2	1.4	1.8	2.2	1.8	2.1	3	2.2	2.4	1.3
CO3	12	5	10	9	8	11	96	73	49	16.8
HC03	104	124	107	132	131	107	5	5	5	75.6
SO4	185	170	167	180	176	173	144	140	136	150
Cl	12.4	12.2	11.1	12	12.5	11.4	12	12.7	11.5	13
NH4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.2	0.2	0.07
NO2 (N)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
NO3 (N)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
F	0.35	0.35	0.3	0.31	0.31	0.31	0.36	0.35	0.36	0.39
SiO2	8.1	5.6	10.2	8.3	9.6	9.8	13.7	13.1	6.7	7.8
TDS	395	366	371	401	389	382	378	346	321	353
Cond. (umho/cm)	691	631	641	695	667	665	755	674	622	631
Alk. (as CaCO3)	191	203	193	232	228	194	160	122	82	90
pH (units)	8.80	8.80	8.70	8.70	8.70	8.60	10.80	10.90	11.00	8.40
Trace Metals mg/l:										
Al										0.07
As	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ba	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
B	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.07
Cd	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Cr	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cu	0.011	0.021	0.012	0.037	0.04	0.032	0.021	0.02	0.022	< 0.005
Fe	0.36	0.13	0.09	0.50	0.14	0.54	0.04	0.03	0.04	0.10
Pb	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Mn	< 0.005	< 0.005	< 0.005	0.007	0.022	0.146	< 0.005	< 0.005	< 0.005	< 0.005
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Mo	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ni	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Se	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
V	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Zn	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Radiometric pCi/l:										
U (mg/l)	0.464	0.346	0.274	0.096	0.086	0.089	0.014	0.014	< 0.01	0.03
Ra 226	23.9	25.2	21.5	84.8	70.6	64.5	21.7	20.7	23.2	14
Ra 226 +/-	1.2	1.4	1.2	2.3	2.0	2.0	1.2	1.2	1.2	1.0

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water  
Quality for Irigaray Units 1 through 9

Well I.D.:	DI-27 UNIT 3 1978			FI-60 UNIT 4 1978			FI-62 UNIT 4 1978		
Production Unit:									
Sample Date:									
Major Ions mg/l:									
Ca	9.5	9.7	9	10.1	5.8	4.7	6.3	7.7	7.1
Mg	2	2.2	2.1	2.5	0.52	0.65	1.4	1.3	1.2
Na	101	96	105	105	113	115	102	110	117
K	2.2	2.4	2.2	4	1.8	2.1	3.5	2.6	2.8
CO3	6	6	9	31	17	26	20	21	26
HCO3	128	132	114	95	76	61	101	82	76
SO4	168	156	160	189	180	189	179	179	177
Cl	11.9	12.3	11.9	12.2	13.4	13	12.4	13.2	13.2
NH4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
NO2 (N)	< 0.03	0.082	0.055	0.052	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
NO3 (N)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
F	0.38	0.38	0.36	0.28	0.27	0.28	0.27	0.28	0.28
SiO2	10.3	10.6	10.4	8.3	7.8	7.8	8.3	9.6	7.2
TDS	376	363	368	401	379	389	385	387	391
Cond. (umho/cm)	645	620	637	711	669	699	675	685	705
Alk. (as CaCO3)	220	227	202	113	91	93.5	116.5	102	106
pH (units)	8.70	8.70	8.60	9.20	9.30	9.30	9.10	9.40	9.20
Trace Metals mg/l:									
Al									
As	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ba	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
B	< 0.01	< 0.01	< 0.01	0.02	0.03	0.01	0.02	0.02	0.02
Cd	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Cr	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cu	0.021	0.018	0.017	0.036	0.028	0.02	0.033	0.03	0.019
Fe	0.77	3.37	1.81	0.46	0.07	0.65	0.06	0.13	0.04
Pb	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Mn	0.023	0.093	0.048	0.012	0.006	0.01	< 0.005	< 0.005	< 0.005
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Mo	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ni	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Se	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
V	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Zn	< 0.02	< 0.02	< 0.02	0.03	0.03	0.03	< 0.02	< 0.02	< 0.02
Radiometric pCi/l:									
U (mg/l)	0.057	0.039	0.035	0.032	0.039	0.043	0.232	0.192	0.164
Ra 226	17	34	25.7	29.2	34.6	22.9	33	38	31.2
Ra 226 +/-	1.2	1.5	1.4	0	1.5	1.2	1.5	1.5	1.4

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water  
Quality for Irrigay Units 1 through 9

Well I.D.:	FI-64 UNIT 4 1978				FI-66 UNIT 4 1978				FI-67 UNIT 4 1978			
Production Unit:												
Sample Date:												
Major Ions mg/l:												
Ca	5.5	5	3.5	8.4	4.2	2.4	2.1	5.3	3.7	3.5	6.8	
Mg	0.34	0.32	0.14	0.48	1.4	0.61	0.47	1.8	1.1	0.75	0.32	
Na	98	112	118	125	104	113	111	106	117	115	126	
K	2.8	3.1	3.1	1.5	2.9	3.5	3.6	3.9	3.2	3.3	1.5	
CO3	37	38	41	13.2	25	31	34	41	30	33	14.4	
HCO3	46	37	34	89.1	78	69	63	54	61	52	89.1	
SO4	177	185	171	164	176	180	171	182	195	186	182	
Cl	12.5	13.2	13.1	13	12.3	13.1	12.3	11.7	12.8	12.7	13	
NH4	0.2 <	0.1	0.2 <	0.1 <	0.1	0.1	0.1	0.2	0.1	0.1 <	0.1	
NO2 (N)	< 0.03 <	0.03 <	0.03 <	0.03 <	0.03 <	0.03 <	0.03 <	0.03 <	0.03 <	0.03 <	0.01	
NO3 (N)	< 1.0 <	1.0 <	1.0 <	1.0 <	1.0 <	1.0 <	1.0 <	1.0 <	1.0 <	1.0 <	1.0	
F	0.3	0.28	0.28	0.35	0.28	0.27	0.27	0.27	0.28	0.28	0.32	
SiO2	8.4	14.8	17.2	7.5	11.5	8.7	10.7	11.9	11.1	11.5	7.8	
TDS	366	391	385	379	378	388	378	392	406	393	398	
Cond. (umho/cm)	666	705	697	673	666	697	680	713	724	706	702	
Alk. (as CaCO3)	99	94	96.5	95	105.5	108	108	112.5	100	97.5	97	
pH (units)	9.70	9.90	9.90	8.10	9.30	9.70	9.80	9.90	9.60	9.80	8.10	
Trace Metals mg/l:												
Al												
As	< 0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01	
Ba	< 0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05	
B	0.02	0.01	0.02	0.03	0.01	0.02	0.02	0.02	0.01	0.01	0.07	
Cd	< 0.002 <	0.002 <	0.002 <	0.002 <	0.002 <	0.002 <	0.002 <	0.002 <	0.002 <	0.002 <	0.002	
Cr	< 0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005	
Cu	0.026	0.017	0.027	0.007 <	0.005	0.025	0.023	0.014	0.015	0.018	0.005	
Fe	0.69	0.16	0.02	0.02 <	0.02	0.27	0.11	0.06	0.13	0.07	0.71	
Pb	< 0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005	
Mn	< 0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.013	
Hg	< 0.0002 <	0.0002 <	0.0002 <	0.0002 <	0.0002 <	0.0002 <	0.0002 <	0.0002 <	0.0002 <	0.0002 <	0.0002	
Mo	< 0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05	
Ni	< 0.2 <	0.2 <	0.2 <	0.2 <	0.2 <	0.2 <	0.2 <	0.2 <	0.2 <	0.2 <	0.2	
Se	< 0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01	
V	< 0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05	
Zn	< 0.02	0.07 <	0.02 <	0.02 <	0.02 <	0.02 <	0.02 <	0.02	0.06	0.06 <	0.01	
Radiometric pCi/l:												
U (mg/l)	0.02	0.032	0.036	0.05	0.045	0.055	0.055	0.017	0.024	0.023	0.02	
Ra 226	34.5	56.6	53.1	0	19.2	22.5	23	66.1	73	67.1	87	
Ra 226 +/-	1.5	1.9	1.9	0.3	1.0	1.2	1.2	2.0	2.1	2.0	3.0	

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water  
Quality for Irigaray Units 1 through 9

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	GI-76 UNIT 4 1978-1979			GI-82 UNIT 5 1982			GI-105 UNIT 5 1979			GI-122 UNIT 5 1979		
Ca	6.4	6.1	6.8	5.1	4.6	3.3	6.6	12.1	12.9	7.3	8.0	8.1
Mg	0.85	0.8	0.84	0.55	0.53	0.37	0.56	1.03	1.11	0.67	0.83	0.87
Na	116	117	121	121	120	118	117	116	120	129	115	125
K	1.5	0.92	1.7	2.4	2.6	3.0	1.9	2.0	1.7	1.7	1.8	1.8
CO3	8.4	11.4	8.7	30.7	25.7	26.6	11	32.9	25.2	9.6	14.4	10.6
HCO3	101.3	95.4	108.4	60	49.8	45.3	88	52.9	68.3	85.4	92.1	91.5
SO4	178	174	178	168	174	171	164	169	165	176	165	195
Cl	12.8	12.2	11.9	13.2	12.7	11.7	12.7	12	15.1	10.7	10.7	11.6
NH4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
NO2 (N)												
NO3 (N)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
F	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
SiO2	8.3	6.4	9.1	11.4	11.2	10.8	6	4.3	4.1	7	7.2	7.3
TDS	394	401	402	427	362	357	370	322	390	375	379	420
Cond. (umho/cm)	625	623	586	558	615	602	619	605	662	612	645	647
Alk. (as CaCO3)	97.1	97.2	96	100.4	83.7	81.5	105.8	98.2	98	86	92.5	92.6
pH (units)	8.70	8.80	8.50	9.40	9.30	9.30	9.50	9.40	9.60	9.00	8.90	8.90
Trace Metals mg/l:												
Al	< 0.05	< 0.05	< 0.05	< 0.05	< 0.06	< 0.05	< 2.3	< 0.17	< 0.4	< 0.09	< 0.25	< 1.57
As	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.003	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ba	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.12	< 0.06	< 0.06	< 0.05	< 0.05	< 0.06
B	< 0.01	< 0.01	< 0.01	< 0.07	< 0.07	< 0.08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cd	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Cr	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.006	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cu	< 0.005	< 0.005	< 0.005	< 0.03	< 0.03	< 0.03	< 0.007	< 0.005	< 0.005	< 0.002	< 0.004	< 0.015
Fe	< 0.04	< 0.03	< 0.02	< 0.04	< 0.05	< 0.03	< 3.95	< 0.21	< 0.8	< 0.19	< 0.41	< 3.17
Pb	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.007
Mn	< 0.006	< 0.007	< 0.007	< 0.005	< 0.005	< 0.005	< 0.08	< 0.005	< 0.02	< 0.005	< 0.008	< 0.041
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Mo	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ni	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.01
Se				< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
V	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Zn	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.03	< 0.01	< 0.02	< 0.01	< 0.01	< 0.02
Radiometric pCi/l:												
U (mg/l)	0.02	0.01	0.01	0.01	0.04	0.06	0.03	0.01	0.01	0.02	0.02	0.02
Ra 226	4.6	6.3	4.9	8.3	5.3	6.3	3.9	2.3	3.5	4	6	10
Ra 226 +/-	1.1	1.3	1.1	0.7	0.6	0.6	0.6	0.5	0.6	0.4	0.5	0.6

APPENDIX A  
TABLE A-1

Individual Well Baseline Water Quality  
for Irrigay Units 1 through 8

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	HI-50 UNIT 6					HI-53 UNIT 6					HI-57 UNIT 6				
	03-Dec-87	22-Dec-87	14-Jan-88	02-Feb-88	23-Feb-88	05-Oct-87	08-Sep-87	16-May-79	02-Jun-79	06-Jun-79	20-Jun-79	28-Jun-79	05-Jul-79	17-Dec-87	05-Jan-88
Ca	3.2	3.4	3.1	5.0	5.0	4.9	5.0	13.9	12.2	11.3	8.7	12.4	14.7	23.1	24.7
Mg	0.38	0.41	0.58	0.61	0.67	0.48	0.5	1.05	0.75	1.0	0.53	0.7	0.8	2.6	2.7
Na	126	126	130	127	126	112	110	119	115	114	124	126	133	248	242
K	1.9	2.2	1.5	1.6	1.4	1.3	1.2	3.7	2.6	3.0	2.1	1.9	1.9	3.5	3
CO3	8.5	7	2.4	2.4	2.8	3.0	2.3	22.6	24.1	25.0	19.9	24	18.6	0	0
HCO3	83.7	91.8	106	107	106	110	127	62.2	69.8	55	97	73.2	77.5	82.7	82.7
SO4	175	171	181	174	181	140	137	165	164	162	163	168	180	504	493
Cl	11.8	9.9	10.4	9.8	10.8	8.8	7.8	13.2	12.4	11.8	12.8	12.9	11.5	10.5	9
NH4	0.07	0.14	0.27	0.14	0.27	0.21	0.18 <	0.5 <	0.5 <	0.5 <	0.5 <	0.5 <	0.5	0.29	0.26
NO2 (N)	0.1 <	0.02 <	0.04 <	0.03	0.02	0.06 <	0.03 <	1.0 <	1.0 <	1.0 <	1.00 <	1.00 <	1.00 <	0.04 <	0.02
NO3 (N)															
F	0.3	0.29	0.27	0.34	0.26	0.2	0.46	0.3	0.3	0.3	0.30	0.20	0.30	0.16	0.15
SiO2	9.8	9.8	10.5	8.8	9.2	9.2	9	9.5	6.3	12	6	9.4	7.7	9.2	9.4
TDS	352	384	368	360	386	348	324	408.4	370.8	319.6	420.4	424.2	446.1	784	766
Cond. (umho/cm)	627	623	668	660	642	535	490	625	616	586	632	637	632	1257	1343
Alk. (as CaCO3)	83.8	87.8	91	91.8	91.8	95.8	108	96.2	98.2	86.7	96.1	100	94.5	67.8	67.8
pH (units)	9.34	9.22	8.7	8.68	8.75	8.77	8.59	9.1	9.1	9.3	9.4	9.3	9.3	7.68	7.75
Trace Metals mg/l:															
Al	< 0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1	0.93	0.42	0.37 <	0.05 <	0.05 <	0.05 <	0.10 <	0.10
As	0.005	0.004	0.002	0.003	0.002 <	0.001 <	0.001 <	0.002 <	0.002 <	0.002	0.003	0.002	0.003	0.002	0.002
Ba	< 0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1	0.1	0.09	0.07 <	0.05 <	0.05 <	0.05 <	0.10 <	0.10
B	< 0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.2 <	0.2 <	0.2 <	0.2 <	0.2 <	0.2 <	0.1 <	0.1
Cd	< 0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.002 <	0.002 <	0.002 <	0.002 <	0.002 <	0.002 <	0.01 <	0.01
Cr	< 0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.05 <	0.05
Cu	< 0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01	0.007 <	0.005 <	0.005	0.013	0.008	0.013 <	0.01 <	0.01
Fe	< 0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05	1.4	0.72	0.81 <	0.02 <	0.02 <	0.02 <	0.05 <	0.05
Pb	< 0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.05 <	0.05
Mn	< 0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01	0.03 <	0.005 <	0.005 <	0.005 <	0.005 <	0.005 <	0.01 <	0.01
Hg	< 0.001 <	0.001 <	0.001 <	0.001 <	0.001 <	0.001 <	0.001 <	0.0002 <	0.0002 <	0.0002 <	0.0002 <	0.0002 <	0.0002 <	0.001 <	0.001
Mo	< 0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.10 <	0.10
Ni	< 0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.01 <	0.01 <	0.01	0.01 <	0.01	0.01	0.05 <	0.05
Se	< 0.001 <	0.001 <	0.001 <	0.001 <	0.001 <	0.001 <	0.001	0.002	0.004	0.005 <	0.002 <	0.002 <	0.002 <	0.001 <	0.001
V	< 0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.1 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.05 <	0.10 <	0.10
Zn	< 0.01 <	0.01 <	0.01	0.03 <	0.01	0.2 <	0.01	0.11	0.02	0.02	0.01 <	0.01	0.01 <	0.01 <	0.01
Radiometric pCi/l:															
U (mg/l)	0.0355	0.0326	0.0221	0.0335	0.0192	0.007	0.004	0.0594	0.0424	0.0424	0.6106	0.7971	1.0176	0.624	0.394
Ra 226	14.9	14.9	16.6	19.9	37.6	7.1	1.3	21	20	19	90	96	77	247.7	203.7
Ra 226 +/-	1.1	0.9	0.9	1.2	1.7	0.8	0.4	1	1	1	3	3	3	3.8	3.6

APPENDIX A  
TABLE A-1

Individual Well Baseline Water Quality  
for Irrigatory Units 1 through 6

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	HI-62 UNIT 6					HP-24 UNIT 6					HP-59 UNIT 6				
	16-Aug-79	23-Aug-79	28-Aug-79	04-Mar-88	15-Mar-88	03-Dec-87	22-Dec-87	04-Jan-88	02-Feb-88	23-Feb-88	27-Sep-79	03-Oct-79	10-Oct-79	03-Mar-88	15-Mar-88
Ca	7	6.5	11.9	14.7	10.7	5.9	5.8	5.8	6.8	7.4	26.5	27.1	19	7.7	7
Mg	0.57	0.41	1.8	0.31	0.09	0.68	0.63	0.62	0.84	0.94	7.1	9	4.4	0.8	0.43
Na	119	116	117	128	130	130	121	124	128	135	164	147	138	138	131
K	2.9	2.9	4.4	11	13	1.9	1.8	1.7	0.4	1.1	2.1	3	1.8	4.1	11.4
CO3	27.6	23.4	46.8	28.8	36.4	2.9	1.6	1.1	2.7	3	3.8	7.3	6.7	4.4	3.7
HCO3	70.5	80.8	53.7	58.1	44.3	113	109	109	104	98.2	121.8	131.5	103.7	113	102
SO4	148	162	165	191	182	178	168	176	185	215	300	300	255	194	195
Cl	9.8	10.2	11.5	11	12.1	11.9	9.4	9.8	10.2	10.5	10.9	12.6	10.5	12.2	11.8
NH4	< 0.5	< 0.5	0.5	0.27	0.31	0.21	0.29	0.22	0.2	0.37	< 0.5	< 0.5	0.5	1.88	0.17
NO2 (N)	< 1.00	< 1.00	1.00	0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 1	< 1	1	0.03	< 0.02
NO3 (N)															
F	0.30	0.30	0.30	0.30	0.26	0.32	0.34	0.28	0.40	0.29	0.30	0.30	0.30	0.30	0.23
SiO2	7.4	7.5	7.5	8.8	8.8	8.1	8.3	9.6	8.6	8.3	8.5	8.2	8.2	9	8.6
TDS	336	384	423	440	398	380	356	380	370	430	581	575	510	450	370
Cond. (umho/cm)	574	578	586	729	679	653	608	642	673	702	870	858	798	715	628
Alk. (as CaCO3)	101.1	105.3	122	101	106	98	92	91.2	89.6	84.2	106.2	119.8	96.2	100	90
pH (units)	9.4	9.5	9.4	10	10.2	8.74	8.5	8.34	8.75	8.8	8.3	8.9	8.4	8.9	8.9
Trace Metals mg/l:															
Al			<	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.05	4.25	< 0.05	< 0.10	< 0.10
As	0.002	0.002	0.002	0.003	0.008	0.001	0.001	0.001	0.001	0.001	0.002	0.002	< 0.002	< 0.001	< 0.001
Ba			<	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
B			<	0.1	< 0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1
Cd			<	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.003	0.003	0.002	< 0.01	< 0.01
Cr			<	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.005	0.01	< 0.05	< 0.05	< 0.05
Cu			<	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.005	0.008	< 0.005	< 0.01	< 0.01
Fe	3.4	5.4	11.8	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	9.33	< 0.04	< 0.05	< 0.05
Pb			<	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.014	0.014	< 0.01	< 0.05	< 0.05
Mn			<	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.034	0.19	0.019	< 0.01	< 0.01
Hg			<	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.0002	0.0002	< 0.0002	< 0.001	< 0.001
Mo			<	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
Ni			<	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.02	< 0.01	< 0.05	< 0.05
Se	< 0.002	< 0.002	0.002	0.003	0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.002	0.002	0.002	< 0.001	< 0.001
V			<	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
Zn			<	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.05	< 0.01	< 0.01	< 0.01
Radiometric pCi/l:															
U (mg/l)	0.0085	0.017	0.0254	0.0083	0.0104	0.0619	0.0623	0.0226	0.033	0.0326	0.0254	0.0678	0.017	0.0817	0.082
Ra 226	10	13	10	33.6	33.2	16.6	17.5	15.8	22.2	27.7	42	35	32	85.1	75.9
Ra 226 +/-	0.6	0.8	0.7	1.5	3.9	1.1	1	0.9	1.3	1.8	2	2	1	2.4	6

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water Quality  
for Irrigay Units 1 through 9

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	HP-87 UNIT 6					JP-15 UNIT 7					JP-26 UNIT 7				
	11-Oct-79	17-Oct-79	25-Oct-79	03-Dec-87	29-Sep-87	27-Dec-79	20-Jan-80	10-Jan-80	16-Jun-87	01-Jul-87	18-Oct-79	24-Oct-79	31-Oct-79	11-Jun-87	30-Jun-87
Ca	8.6	7.6	7.4	6.9	7.4	33.6	19.3	28.4	11.6	11	14.1	9.6	9	7	6.8
Mg	0.95	0.89	1.03	0.83	0.83	5.2	5.67	4.4	2	1.8	1.45	1.11	1.15	0.81	0.64
Na	125	130	128	137	135	256	280	275	174	174	140	131	123	125	128
K	1.3	1.5	1.5	2	1.8	4.3	3.9	4.2	2.3	2.1	1.6	1.5	1.8	1.9	1.8
CO3	10.8	7.8	3.6	1.7	0	2.4	4.2	1.8	0	1.3	5.1	2.1	6.5	2.2	0
HC03	89.6	99.4	104.9	118	119	32.8	47.6	37.2	81.6	96.7	105.2	106.4	100	99.5	110
SO4	171	177	189	193	182	609	624	600	306	293	215	203	183	176	179
Cl	10.6	10.6	10.5	12.8	13.6	10.7	10.9	10.3	10.9	11.1	11	10.5	10.5	9.1	11.3
NH4	<	0.5 <	0.5 <	0.5	0.17 <	0.5 <	0.5 <	0.5	0.19	0.24 <	0.5 <	0.5 <	0.5	0.24	0.27
NO2 (N)	<	1 <	1 <	1 <	0.03 <	1 <	1 <	1 <	0.03 <	0.02 <	1 <	1 <	1	0.07 <	0.02
NO3 (N)															
F	0.30	0.30	0.30	0.29	0.28	0.2	0.2	0.2	0.26	0.15	0.30	0.30	0.30	0.21	0.22
SiO2	8.6	8.6	8.6	9	9	8.3	9.4	7.5	9	9	8.6	8.6	8.6	9.4	9.4
TDS	382.8	398.8	434	408	390	1054.4	1020.4	934.2	600	584	476	453.8	381.9	378	422
Cond. (umho/cm)	619	613	617	665	651	1465	1427	1415	900	917	697	646	639	628	674
Alk. (as CaCO3)	91.4	94.5	92	99.8	97.8	30.9	46	33.5	66.9	81.6	94.8	90.8	92.8	85.5	90.2
pH (units)	8.7	8.6	8.2	8.49	8.06	9	9.2	8.4	8.2	8.47	8.4	8.2	8.2	8.68	8.15
Trace Metals mg/l:															
Al			<	0.10 <	0.10			<	0.10 <	0.10 <	0.05 <	0.05 <	0.05 <	0.10 <	0.10
As	0.002	0.002	0.002	0.003	0.004 <	0.002	0.002 <	0.002	0.004 <	0.001 <	0.002 <	0.002 <	0.002	0.004 <	0.001
Ba			<	0.10 <	0.10			<	0.10 <	0.10 <	0.05 <	0.05 <	0.05 <	0.10 <	0.10
B			<	0.1 <	0.1			<	0.1 <	0.1 <	0.2 <	0.2 <	0.2 <	0.1 <	0.1
Cd			<	0.01 <	0.01			<	0.01 <	0.01 <	0.002 <	0.002 <	0.002 <	0.01 <	0.01
Cr			<	0.05 <	0.05			<	0.05 <	0.05 <	0.005 <	0.005 <	0.005 <	0.05 <	0.05
Cu			<	0.01 <	0.01			<	0.01 <	0.01	0.005 <	0.005 <	0.005 <	0.01 <	0.01
Fe	0.64	0.13	0.38 <	0.05 <	0.05	0.1	0.04	0.08 <	0.05 <	0.05	0.13	0.19	0.08 <	0.05 <	0.05
Pb			<	0.05 <	0.05			<	0.05 <	0.05	0.005	0.008 <	0.005 <	0.05 <	0.05
Mn			<	0.01 <	0.01			<	0.01 <	0.01	0.007	0.007 <	0.005 <	0.01 <	0.01
Hg			<	0.001 <	0.001			<	0.001 <	0.001 <	0.0002 <	0.0002 <	0.0002 <	0.001 <	0.001
Mo			<	0.10 <	0.10			<	0.10 <	0.10 <	0.05 <	0.05 <	0.05 <	0.10 <	0.10
Ni			<	0.05 <	0.05			<	0.05 <	0.05 <	0.01 <	0.01 <	0.01 <	0.05 <	0.05
Se	0.002	0.002	0.002 <	0.001 <	0.001	0.007 <	0.002 <	0.002 <	0.001 <	0.001	0.005 <	0.002 <	0.002	0.008	0.003
V			<	0.10 <	0.10			<	0.10 <	0.10 <	0.05 <	0.05 <	0.05 <	0.10 <	0.10
Zn			<	0.01 <	0.01			<	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01
Radiometric pCi/l:															
U (mg/l)	0.008	0.0169	0.0169	0.0275	0.0362	0.0254	0.0084	0.0254	0.0125	0.017	0.0678	0.0848	0.1102	0.442	0.361
Ra 226				9.6	5.2	9	8	9	3.9	3.8	54	42	44	46.4	42.8
Ra 226 +/-				0.9	0.7	0.7	0.7	0.7	0.6	0.7	2	2	2	1.9	2.6

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water Quality  
for Irigaray Units 1 through 9

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	JP-47 UNIT 7					JP-50 UNIT 7					JP-53 UNIT 7				
	16-Jan-80	22-Jan-80	29-Jan-80	11-Jun-87	30-Jun-87	27-Dec-79	02-Jan-80	10-Jan-80	11-Jun-87	30-Jun-87	16-Jan-80	22-Jan-80	29-Jan-80	16-Jun-87	01-Jul-87
Ca	7.4	6.7	7.4	5.7	5.7	6.1	6.5	6.4	7.1	5.9	7	9.2	6.6	6.4	6.6
Mg	0.76	0.76	0.77	0.53	0.6	0.57	0.56	0.58	0.77	0.84	0.77	1.12	0.72	0.77	0.77
Na	129	136	135	125	127	121	121	124	125	127	117	137	123	127	129
K	1.6	1.5	1.5	2.1	2	1.5	1.3	1.3	1.8	1.8	6.4	1.7	1.4	1.4	1.5
CO3	7.8	9.6	3.9	2.8	2	8.4	5.4	7.2	2.1	1.7	5.5	6.2	5.4	1.2	0
HC03	86.6	87.8	95.8	90.2	90.5	96	103.1	95.2	99.8	113.4	106.1	112.2	104.3	97.3	111
SO4	200	204	213	179	182	179	174	180	179	176	170	189	175	180	179
Cl	10.7	10.4	10.6	11.1	11.5	10.8	12	10.1	11.4	10.6	10.9	10.5	10.7	11.4	11.1
NH4	< 0.5	< 0.5	0.5	0.22	0.2	< 0.5	< 0.5	0.5	0.12	0.13	< 0.5	< 0.5	0.5	0.09	0.19
NO2 (N)	< 1	< 1	< 1	0.03	0.02	< 1	< 1	< 1	0.04	0.02	< 1	< 1	< 1	0.02	0.02
NO3 (N)															
F	0.30	0.30	0.30	0.20	0.25	0.30	0.30	0.30	0.19	0.22	0.30	0.30	0.30	0.33	0.20
SiO2	7.9	5.6	7.6	9	9	7.5	8.8	7.5	9.2	8.8	8.2	5.8	5.9	9	9.2
TDS	404.8	401.2	432.6	358	404	402.8	363.2	345.6	350	400	378.8	398.8	392	406	406
Cond. (umho/cm)	653	653	660	622	667	615	601	621	619	654	615	649	599	643	658
Alk. (as CaCO3)	84	88	85	78.9	77.8	92.8	94	90	85.5	96	96.2	102.4	94.5	81.9	91
pH (units)	8.7	9	8.9	8.62	8.69	9.1	8.9	8.8	8.6	8.52	8.7	8.7	8.7	8.43	8.15
Trace Metals mg/l:															
Al	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10				< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
As	0.003	0.003	0.002	0.008	0.001	0.002	0.002	0.002	0.005	0.002	0.002	0.002	0.002	0.002	0.001
Ba	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10				< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
B	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1				< 0.1	< 0.1	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1
Cd	< 0.002	< 0.002	< 0.002	< 0.01	< 0.01				< 0.01	< 0.01	< 0.002	< 0.002	< 0.002	< 0.01	< 0.01
Cr	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05				< 0.05	< 0.05	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05
Cu	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01				< 0.01	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01
Fe	0.02	0.02	0.02	< 0.05	< 0.05	0.02	0.02	0.03	< 0.05	< 0.05	0.1	0.04	0.03	< 0.05	< 0.05
Pb	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05				< 0.05	< 0.05	< 0.005	< 0.007	< 0.008	< 0.05	< 0.05
Mn	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01				< 0.01	< 0.01	0.009	0.013	0.008	< 0.01	< 0.01
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.001				< 0.001	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.001
Mo	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10				< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
Ni	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05				< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05
Se	< 0.005	< 0.002	< 0.002	< 0.001	< 0.001	0.002	0.002	0.002	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001
V	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10				< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Radiometric pCi/l:															
U (mg/l)	0.0932	0.0593	0.0678	0.0355	0.0722	0.1017	0.1187	0.1611	0.0997	0.142	0.0763	0.0593	0.0508	1.577	0.0665
Ra 226	13	17	20	13.9	18	28	22	22	14.9	18.9	46	44	43	32.1	24.7
Ra 226 +/-	1	1	1	1.1	1.6	1	1	1	1.1	1.5	2	2	2	1.6	1.7

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water Quality  
for Irrigation Units 1 through 9

Well I.D.: Production Unit: Sample Date:	JP-57 UNIT 7					JP-63 UNIT 7					KI-128 UNIT 8				
	16-Jan-80	22-Jan-80	29-Jan-80	11-Jun-87	30-Jun-87	20-Dec-79	26-Dec-79	02-Jan-80	11-Jun-87	30-Jun-87	19-Jun-80	25-Jun-80	20-Jul-80	15-Oct-87	06-Nov-87
Major Ions mg/l:															
Ca	6.8	6.9	6.9	6	6.1	7.6	7.4	7.5	7.7	6.5	10.9	6.3	5.5	5.7	5.8
Mg	0.87	0.92	0.94	0.77	0.78	0.84	0.81	0.86	0.16	0.23	0.77	0.78	0.72	0.88	0.86
Na	118	132	130	126	130	129	130	130	130	130	130	121	123	128	127
K	6.1	1.2	1.4	1.7	1.6	1.87	1.8	1.7	1.8	1.7	1.3	1.3	1.32	1.6	1.5
CO3	6	8.4	7.2	1.9	1.3	5.1	4.8	3.9	8	5.3	42	9	12.7	2.7	3
HCO3	99.8	98.7	101.3	114.2	126.8	99.6	98.8	101.6	82.5	91.2	50.02	94.2	81.9	109	114
SO4	180	188	186	173	171	204	209	198	191	194	177	177	171	178	171
Cl	10.5	10.4	10.6	10.9	11.3	10.7	10.9	10.8	10.8	11.3	13.5	14	11.3	10	10.9
NH4	< 0.5	< 0.5	< 0.5	< 0.16	< 0.16	< 0.5	< 0.5	< 0.5	< 0.15	< 0.15	< 0.5	< 0.5	< 0.5	< 0.11	< 0.16
NO2 (N)	< 1	< 1	< 1	< 0.08	< 0.02	< 1	< 1	< 1	< 0.03	< 0.02	< 1	< 1	< 1	< 0.03	< 0.02
NO3 (N)															
F	0.30	0.30	0.30	0.19	0.23	0.30	0.30	0.30	0.19	0.21	0.3	0.3	0.3	0.22	0.28
SiO2	5.7	7.5	7.7	9.2	9	7.5	8.1	8.3	11.3	11.6	8.1	8.6	8.5	9.4	9
TDS	390.8	384.2	394.4	368	426	443.6	447	385.2	392	434	406.2	387.9	383.2	354	380
Cond. (umho/cm)	632	621	615	622	648	663	655	641	659	693	682	623	602	658	620
Alk. (as CaCO3)	91.8	94.8	95	96.9	106.2	89.3	89	89.8	81.9	84.2	111	92.2	88.4	94.2	98.8
pH (units)	9	8.9	8.8	8.55	8.34	8.8	9	8.5	9.22	9.1	9.8	8.8	8.9	8.73	8.76
Trace Metals mg/l:															
Al	0.08	< 0.05	< 0.05	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
As	0.005	0.002	0.003	0.003	0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	0.003	0.003	0.002	0.002	0.001
Ba	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
B	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1
Cd	< 0.002	< 0.002	< 0.002	< 0.01	< 0.01	< 0.002	< 0.002	< 0.002	< 0.01	< 0.01	< 0.002	< 0.002	< 0.002	< 0.01	< 0.01
Cr	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05
Cu	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01
Fe	0.11	0.02	0.03	< 0.05	< 0.05	0.03	0.02	0.05	< 0.05	< 0.05	0.02	0.08	1	< 0.05	< 0.05
Pb	0.007	0.006	0.006	< 0.05	< 0.05	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05
Mn	0.008	< 0.005	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	0.009	0.005	0.007	< 0.01	< 0.01
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.001
Mo	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
Ni	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05
Se	< 0.002	< 0.003	< 0.002	< 0.001	< 0.001	< 0.002	< 0.002	< 0.007	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001
V	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Radiometric pCi/l:															
U (mg/l)	0.2968	0.1611	0.1441	0.0455	0.0405	0.0593	0.0508	0.0593	0.0386	0.0506	0.0848	0.0339	0.1526	0.0062	0.0164
Ra 226	33	30	29	31	34	15	13	10	10.2	10.6	61	58	47	50	36.9
Ra 226 +/-	2	2	1	1.5	2	0.9	0.9	0.8	0.9	1.1	4	4	4	2.5	1.5

APPENDIX A  
TABLE A-1

Individual Well Baseline Water Quality  
for Irrigay Units 1 through 9

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	KP-29 UNIT 8					KP-44 UNIT 8					KP-50 UNIT 8				
	02-Apr-80	09-Apr-80	16-Apr-80	15-Oct-87	06-Nov-87	23-Apr-80	30-Apr-80	07-May-80	14-Oct-87	05-Nov-87	23-Apr-80	30-Apr-80	07-May-80	08-Oct-87	27-Oct-87
Ca	11.4	9.24	8.9	4.8	4.8	10.6	10.7	10.3	5.2	5.4	6.6	6.7	6.3	4.7	5.3
Mg	1.03	1.02	1.11	0.59	0.83	1.2	1.14	1.07	0.69	0.71	0.9	0.8	0.81	0.53	0.46
Na	149	142	142	130	130	143	144	142	124	129	124	119	119	129	128
K	2.8	2.4	2.6	1.8	1.8	1.8	2.2	2.3	1.7	1.7	1.5	1.54	1.7	1.9	2.2
CO3	20.4	14.6	9.5	5	4.3	20.04	23.4	13.2	4.1	4.1	10.6	9.9	7.4	3.1	4.3
HCO3	79.4	88.1	100.2	101	112	72.47	68.2	85.8	106	109	97.4	97.2	100.3	107	103
SO4	231	222	219	178	179	234	228	233	174	177	174	165	174	178	184
Cl	10.2	10.6	10.4	10.4	10.2	10.2	10.3	9.5	10.4	10.6	10.4	10.1	10.3	9.6	10.8
NH4	<	0.5 <	0.5 <	0.5	0.23	<	0.5 <	0.5 <	0.5	0.1	<	0.5 <	0.5 <	0.5	0.16
NO2 (N)	<	1 <	1 <	1 <	0.03 <	<	1 <	1 <	1 <	0.03 <	<	1 <	1 <	1 <	0.02 <
NO3 (N)															
F	0.3	0.3	0.3	0.21	0.28	0.3	0.3	0.3	0.48	0.28	0.3	0.3	0.3	0.26	0.29
SiO2	8.1	7.9	8	9	8.8	8.9	8.7	8.1	9.4	9.4	8.1	8.3	8.2	9	8.6
TDS	480	460.6	461.6	402	374	482.2	488.4	503.8	376	366	384.4	387.4	412.4	402	432
Cond. (umho/cm)	754	715	699	645	629	722	775	769	645	632	593	627	627	639	623
Alk. (as CaCO3)	99.1	88.1	97.9	91.6	99.6	92.8	95.6	92.3	93.8	96.2	97.4	96.3	94.6	93.4	92.2
pH (units)	9.2	9.2	8.8	9.03	8.92	9.2	9.2	8.6	8.92	8.91	8.9	8.8	8.6	8.8	8.96
Trace Metals mg/l:															
Al	<	0.05 <	0.05 <	0.05 <	0.10 <	<	0.05 <	0.05 <	0.05 <	0.10 <	<	0.05 <	0.05 <	0.05 <	0.10 <
As	<	0.002 <	0.002 <	0.002	0.002	<	0.002 <	0.002 <	0.002	0.001	<	0.004	0.002 <	0.002	0.007
Ba	<	0.05 <	0.05 <	0.05 <	0.10 <	<	0.05 <	0.05 <	0.05 <	0.10 <	<	0.05 <	0.05 <	0.05 <	0.10 <
B	<	0.2 <	0.2 <	0.2 <	0.1 <	<	0.2 <	0.2 <	0.2 <	0.1 <	<	0.2 <	0.2 <	0.2 <	0.1 <
Cd	<	0.002 <	0.002 <	0.002 <	0.01 <	<	0.002 <	0.002 <	0.002 <	0.01 <	<	0.002 <	0.002 <	0.002 <	0.01 <
Cr	<	0.005 <	0.005 <	0.005 <	0.05 <	<	0.005	0.005	0.005 <	0.05 <	<	0.005	0.005	0.005 <	0.05 <
Cu	<	0.005 <	0.005 <	0.005 <	0.01 <	<	0.005 <	0.005 <	0.005 <	0.01 <	<	0.005 <	0.005 <	0.005 <	0.01 <
Fe	<	0.02 <	0.02	0.02 <	0.05 <	<	0.21	0.08	0.02 <	0.05 <	<	0.08	0.05	0.04 <	0.05 <
Pb	<	0.005 <	0.005	0.008 <	0.05 <	<	0.005 <	0.005 <	0.005 <	0.05 <	<	0.005 <	0.005 <	0.005 <	0.05 <
Mn	<	0.005 <	0.005	0.005	0.02 <	<	0.09	0.008	0.005 <	0.01 <	<	0.005 <	0.005 <	0.005 <	0.01 <
Hg	<	0.0002 <	0.0002 <	0.0002 <	0.001 <	<	0.0002 <	0.0002 <	0.0002 <	0.001 <	<	0.0002 <	0.0002 <	0.0002 <	0.001 <
Mo	<	0.05 <	0.05 <	0.05 <	0.10 <	<	0.05 <	0.05 <	0.05 <	0.10 <	<	0.05 <	0.05 <	0.05 <	0.10 <
Ni	<	0.01 <	0.01 <	0.01 <	0.05 <	<	0.01 <	0.01 <	0.01 <	0.05 <	<	0.01 <	0.01 <	0.01 <	0.05 <
Se	<	0.002 <	0.002 <	0.002 <	0.001 <	<	0.002 <	0.002 <	0.002 <	0.001 <	<	0.002 <	0.002 <	0.002 <	0.001 <
V	<	0.05 <	0.05 <	0.05 <	0.10 <	<	0.05 <	0.05 <	0.05 <	0.10 <	<	0.05 <	0.05 <	0.05 <	0.10 <
Zn	<	0.01 <	0.01 <	0.01 <	0.01 <	<	0.03	0.01 <	0.01	0.01 <	<	0.03 <	0.01 <	0.01	0.02 <
Radiometric pCi/l:															
U (mg/l)	0.0084	0.0084	0.0084	0.0057	0.012	0.0169	0.0084	0.0763	0.0003	0.0067	0.178	0.0763	0.0169	0.0052	0.0341
Ra 226	11	11	11	4.9	4.7	11	12	16	11.4	8.4	32	33	38	59.7	30.8
Ra 226 +/-	0.9	1	1	0.8	0.6	2	3	2	0.8	0.7	5	5	5	1.9	1.6

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water Quality  
for Integrity Units 1 through 9

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	KP-63 UNIT 8					KP-70 UNIT 8				
	06-Feb-80	12-Feb-80	20-Feb-80	08-Oct-87	27-Oct-87	18-Mar-80	25-Mar-80	01-Apr-80	08-Oct-87	27-Oct-87
Ca	5.7	5.4	5.5	7.1	5.9	9.9	10.2	9.1	7	13.6
Mg	0.55	0.57	0.58	0.72	0.59	0.92	0.88	0.67	0.8	0.03
Na	118	120	118	123	125	132	132	137	122	130
K	1.4	1.5	1.4	1.3	1.3	1.5	1.7	1.2	6.4	17.5
CO3	8.4	7.2	6	0	1.3	15.6	15.8	38.4	12	8.5
HC03	97.4	101.3	101.3	117	110	83.3	85.2	41.5	98.5	23.7
SO4	174	176	174	177	178	213	212	207	175	166
Cl	10.3	10.2	10.5	9.7	9.7	10.4	10.4	10.1	9.7	11.7
NH4	<	0.5 <	0.5 <	0.33	0.2 <	0.5 <	0.5 <	0.5	0.13	0.2
NO2 (N)	<	1 <	1 <	1 <	0.26 <	0.03 <	1 <	1 <	0.04 <	0.02
NO3 (N)										
F	0.3	0.3	0.3	0.11	0.32	0.3	0.3	0.3	0.24	0.32
SiO2	8	7.9	7.8	9	8.6	8.5	7.7	8.7	8.9	7.9
TDS	380.4	344	444.6	372	408	434	443.2	434.4	400	446
Cond. (umho/cm)	577	567	620	645	605	700	712	685	669	791
Alk. (as CaCO3)	93.8	95	93	96.2	92.4	94.3	96.2	99	102	136
pH (units)	8.7	8.8	8.6	8.2	8.4	9.2	9.1	9.6	9.42	10.7
Trace Metals mg/l:										
Al				<	0.10 <	0.05	0.06	0.06 <	0.10	0.20
As	0.002	0.003	0.002	0.002	0.002 <	0.002 <	0.002 <	0.002	0.004	0.003
Ba				<	0.10 <	0.05 <	0.05 <	0.05 <	0.10 <	0.10
B				<	0.1 <	0.1 <	0.2 <	0.2 <	0.1 <	0.1
Cd				<	0.01 <	0.01 <	0.002 <	0.002 <	0.002 <	0.01 <
Cr				<	0.05 <	0.05 <	0.005 <	0.005 <	0.005 <	0.05 <
Cu				<	0.01 <	0.01 <	0.005 <	0.005 <	0.005 <	0.01 <
Fe	0.23	6.72	2.92 <	0.05 <	0.05 <	0.02 <	0.02	0.05 <	0.05 <	0.05
Pb				<	0.05 <	0.05 <	0.005 <	0.005 <	0.05 <	0.05
Mn				<	0.01 <	0.01 <	0.005 <	0.005 <	0.005 <	0.01 <
Hg				<	0.001 <	0.001 <	0.0002 <	0.0002 <	0.001 <	0.001
Mo				<	0.10 <	0.10 <	0.05 <	0.05 <	0.10 <	0.10
Ni				<	0.05 <	0.05 <	0.01 <	0.01 <	0.01 <	0.05
Se	<	0.002 <	0.002 <	0.002 <	0.001 <	0.001 <	0.002 <	0.002 <	0.002	0.001 <
V				<	0.10 <	0.10 <	0.05 <	0.05 <	0.10 <	0.10
Zn				<	0.01 <	0.01 <	0.01 <	0.01 <	0.01 <	0.01
Radiometric pCi/l:										
U (mg/l)	0.0254	0.0508	0.0508 <	0.0003	0.0217	0.0169	0.0254	0.0508	0.119	0.12
Ra 226	18	42	18	4.9	13.1	67	75	51	44.7	87.1
Ra 226 +/-	1	2	1	0.6	1.1	2	2	2	1.8	3.1

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water Quality  
for Ingaray Units 1 through 9

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	LI-51 UNIT 9					LP-13 UNIT 9					LP-20 UNIT 9				
	14-Jan-81	20-Jan-81	28-Jan-81	19-Nov-87	09-Dec-87	21-Oct-80	28-Oct-80	05-Nov-80	19-Nov-87	09-Dec-87	14-Jan-81	21-Jan-81	28-Jan-81	02-Sep-87	09-Oct-87
Ca	5.2	5.4	5.4	5.4	4.9	9.2	9.1	8.5	9.5	8.4	6.9	6.8	6.7	5.1	5.7
Mg	0.55	0.58	0.59	0.76	0.75	0.58	0.61	0.61	0.15	0.2	0.37	0.47	0.55	0.37	0.29
Na	128	115	125	129	122	125	129	126	134	130	120	124	125	131	129
K	1.9	1.8	1.8	1.4	2.7	1.4	1.7	1.7	1.7	3.1	2.7	2.6	2.2	2.9	2.6
CO3	15	12	12	0	1.2	19.2	38.6	18	0	9.2	21.6	17	14.4	8.1	0
HCO3	82.1	89.1	88.9	116	110	83.4	60.4	83.9	144	107	68.3	84.9	89.1	93.9	121
SO4	183	186	183	180	174	180	180	180	180	180	183	174	171	181	171
Cl	10.6	10.6	10.5	10.8	10.5	10.4	10.7	10.9	11	11.2	10.4	10.6	10.4	11.9	10.6
NH4	< 0.5	< 0.5	< 0.5	< 0.1	< 0.14	< 0.5	< 0.5	< 0.5	< 0.1	< 0.05	< 0.5	< 0.5	< 0.5	< 0.56	< 0.87
NO2 (N)	< 1	< 1	< 1	< 0.03	< 0.03	< 1	< 1	< 1	< 0.04	< 0.02	< 1	< 1	< 1	< 0.05	< 0.02
NO3 (N)															
F	0.32	0.31	0.31	0.28	0.29	0.20	0.20	0.20	0.25	0.28	0.33	0.30	0.30	0.36	0.38
SIO2	7.43	6.4	7.1	9.2	9.2	10.1	9.48	9.39	10.1	9.8	7.21	7.1	7.21	8.6	9.4
TDS	416.6	434.8	402	366	402	410.1	417.4	391.4	392	422	421.4	422.4	385.2	390	404
Cond. (umho/cm)	640	637	639	632	626	630	651	630	659	655	635	631	621	588	644
Alk. (as CaCO3)	92.3	93	92.9	95.2	92.4	100.4	110.5	98.8	118	104	94	98	97.2	91.4	99.6
pH (units)	8.2	8.7	8.8	8.58	8.36	9.2	9.2	9.2	7.2	9.27	9.1	9	8.9	9.27	8.3
Trace Metals mg/l:															
Al			<	0.10	0.10	0.05	0.05	0.05	0.10	0.10			<	0.10	0.10
As	0.002	0.002	0.002	0.001	0.001	0.003	0.002	0.002	0.003	0.003	0.002	0.003	0.002	0.002	0.001
Ba			<	0.10	0.10	0.05	0.05	0.05	0.10	0.10			<	0.10	0.10
B			<	0.1	0.1	0.2	0.2	0.2	0.1	0.1			<	0.1	0.1
Cd			<	0.01	0.01	0.003	0.003	0.003	0.01	0.01			<	0.01	0.01
Cr			<	0.05	0.05	0.005	0.005	0.005	0.05	0.05			<	0.05	0.05
Cu			<	0.01	0.01	0.005	0.005	0.005	0.01	0.01			<	0.01	0.01
Fe	0.08	0.02	0.04	0.05	0.05	0.57	0.08	0.02	0.05	0.05	0.37	0.53	0.23	0.05	0.05
Pb			<	0.05	0.05	0.035	0.03	0.03	0.05	0.05			<	0.05	0.05
Mn			<	0.01	0.01	0.006	0.005	0.005	0.01	0.01			<	0.01	0.01
Hg			<	0.001	0.001	0.0002	0.0002	0.0002	0.001	0.001			<	0.001	0.001
Mo			<	0.10	0.10	0.05	0.05	0.05	0.10	0.10			<	0.10	0.10
Ni			<	0.05	0.05	0.01	0.01	0.01	0.05	0.05			<	0.05	0.05
Se	0.004	0.002	0.002	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.002	0.002	0.005	0.001	0.001
V			<	0.10	0.10	0.05	0.05	0.05	0.10	0.10			<	0.10	0.10
Zn			<	0.01	0.01	0.01	0.01	0.01	0.01	0.01			<	0.03	0.01
Radiometric pCi/l:															
U (mg/l)	0.0169	0.0169	0.0084	0.0287	0.0183	0.0508	0.0339	0.0254	0.0459	0.031	0.1187	0.1187	0.0593	0.24	0.0366
Ra 226	18	20.1	14	17.5	12	75	71	75	85.4	53.7	40	38	28	14.2	10.7
Ra 226 +/-	1.3	1.3	1.1	1.5	0.9	11	9	11	2.8	1.8	1.9	1.9	1.6	1	0.8

APPENDIX A  
TABLE A-1

Individual Well Baseline Water Quality  
for Irigaray Units 1 through 9

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	LP-24 UNIT 9					LP-22 UNIT 9				
	21-Oct-80	28-Oct-80	05-Nov-80	19-Nov-87	09-Dec-87	21-Oct-80	28-Oct-80	05-Nov-80	11-Sep-87	09-Oct-87
Ca	8.4	7.7	7.2	4.7	4.4	7.2	6.8	6.1	4.9	4.7
Mg	0.31	0.34	0.43	0.47	0.5	0.44	0.5	0.55	0.63	0.62
Na	124	124	123	132	126	125	125	128	127	128
K	1.9	2	1.9	1.4	2.2	2.3	2.8	2.3	1.8	1.7
CO3	18.9	15.9	9.9	0	2.9	20.4	20.4	14.4	5.2	0
HCO3	87.4	86.3	95.9	114	106	73.2	73.2	88.4	105	122
SO4	174	183	183	180	171	180	183	183	174	166
Cl	10.6	11.1	11.2	12.2	11	10.7	11	11.1	11	10.2
NH4	< 0.5	< 0.5	< 0.5	0.16	0.13	< 0.5	< 0.5	< 0.5	0.18	0.33
NO2 (N)	< 1	< 1	< 1	0.04	0.02	< 1	< 1	< 1	0.02	0.03
NO3 (N)										
F				0.26	0.26	0.2	0.2	0.2	0.22	0.26
SiO2				9.6	9.8	9.01	8.82	9.01	10.1	9.6
TDS	446.4	411.4	395.2	396	404	436	418	383	392	402
Cond. (umho/cm)	644	645	742	645	634	630	637	621	601	625
Alk. (as CaCO3)	99.8	97.3	95.2	93.6	92.2	94	94	94.8	95.8	99.8
pH (units)	9.2	9	8.9	8.9	8.77	9.3	9.1	9.1	9.03	8.22
Trace Metals mg/l:										
Al			<	0.10	0.10			<	0.10	0.10
As				0.001	0.001	0.002	0.002	0.002	0.001	0.001
Ba			<	0.10	0.10			<	0.10	0.10
B			<	0.1	0.1			<	0.1	0.1
Cd			<	0.01	0.01			<	0.01	0.01
Cr			<	0.05	0.05			<	0.05	0.05
Cu			<	0.01	0.01			<	0.01	0.01
Fe			<	0.05	0.05	1.05	0.83	0.02	0.05	0.05
Pb			<	0.05	0.05			<	0.05	0.05
Mn			<	0.01	0.01			<	0.01	0.01
Hg			<	0.001	0.001			<	0.001	0.001
Mo			<	0.10	0.10			<	0.10	0.10
Ni			<	0.05	0.05			<	0.05	0.05
Se			<	0.001	0.001	0.002	0.002	0.002	0.001	0.001
V			<	0.10	0.10			<	0.10	0.10
Zn			<	0.01	0.01			<	0.02	0.03
Radiometric pCi/l:										
U (mg/l)				0.0688	0.0711	0.0508	0.0508	0.0508	0.0794	0.0437
Ra 226				87.1	57.7	35	33	27	21.9	36.8
Ra 226 +/-				2.8	1.9	6	9	10	1.2	1.5

**APPENDIX A  
TABLE A-1**

Individual Well Baseline Water Quality  
for Ingray Units 1 through 9

Well I.D.: Production Unit: Sample Date: Major Ions mg/l:	LP-43 UNIT 9					LP-63 UNIT 9				
	03-Dec-80	10-Dec-80	16-Dec-80	12-Nov-87	02-Dec-87	28-Oct-80	12-Nov-80	18-Nov-80	12-Nov-87	02-Dec-87
Ca	16.4	10.9	11.6	4.7	5	8.8	7.8	7.5	6.6	6.5
Mg	2.9	2.42	2.9	0.68	0.77	0.72	0.77	0.77	0.71	0.77
Na	139	131	137	127	131	124	129	122	123	124
K	2.4	2.1	2.2	1.7	2.4	2.1	1.8	1.7	1.2	2.9
CO3	15.1	20.4	14.9	5.3	5	28.8	15.6	12.2	3.7	2.2
HCO3	75.8	41.5	75.8	104	106	59.5	82.4	90.4	109	108
SO4	243	243	231	171	181	183	192	189	177	178
Cl	10.9	11.3	11.1	11.8	12.2	10.6	11.4	10.9	11.5	11.2
NH4	<	0.5 <	0.5	0.17	0.13 <	0.5 <	0.5 <	0.5	0.28	0.29
NO2 (N)	<	1 <	1 <	0.02 <	0.03 <	1 <	1 <	1	0.02 <	0.03
NO3 (N)										
F	0.3	0.3	0.3	0.27	0.29	0.2	0.2	0.2	0.29	0.30
SiO2	6.48	7.23	7.51	9.8	9.4	9.01	8.65	8.17	8.8	9
TDS	427	464.4	442	388	412	422.8	397.6	424.6	416	416
Cond. (umho/cm)	751	712	707	675	634	651	640	634	661	634
Alk. (as CaCO3)	87.3	68	86.9	95	96	96.8	93.5	94.5	96	92
pH (units)	8.6	9.5	9.1	9.04	9.01	9.2	9	9	8.86	8.64
<b>Trace Metals mg/l:</b>										
Al				<	0.10 <				<	0.10 <
As	0.006	0.01	0.006	0.001 <	0.001 <	0.002 <	0.002 <	0.002 <	0.001 <	0.001
Ba				<	0.10 <				<	0.10 <
B				<	0.1 <				<	0.1 <
Cd				<	0.01 <				<	0.01 <
Cr				<	0.05 <				<	0.05 <
Cu				<	0.01 <				<	0.01 <
Fe	3.3	0.2	0.87 <	0.05 <	0.05 <	0.02	0.23	1.72 <	0.05 <	0.05
Pb				<	0.05 <				<	0.05 <
Mn				<	0.01 <				<	0.01 <
Hg				<	0.001 <				<	0.001 <
Mo				<	0.10 <				<	0.10 <
Ni				<	0.05 <				<	0.05 <
Se	<	0.002 <	0.002 <	0.002 <	0.001 <	0.002 <	0.002 <	0.002 <	0.001 <	0.001
V				<	0.10 <				<	0.10 <
Zn				0.02	0.07				<	0.01
<b>Radiometric pCi/l:</b>										
U (mg/l)	0.195	0.254	0.2035	0.042	0.0447	0.025	0.025	0.017 <	0.0003	0.0023
Ra 226	86.4	105	78.4	26.9	28.5	44	40	90	38.9	35.4
Ra 226 +/-	3.1	3.5	3.1	1.5	1.4	14	11	18	1.8	1.6

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POST-MINING RESULTS  
IRIGARAY DESIGNATED RESTORATION WELLS

POST - MINING

Well I.D.:	AP-4 Unit 1	BP-4 Unit 1	CP-10 Unit 2	DI-27 Unit 3	DI-90 Unit 2	DP-28 Unit 2	DP-29 Unit 3	FP-5 Unit 3	FI-62 Unit 4	FI-132 Unit 4	GI-76 Unit 5	GI-82 Unit 5	GP-9 Unit 5	GI-134 Unit 5	HI-53 UNIT 6	HI-57 UNIT 6
Production Unit:	Unit 1	Unit 1	Unit 2	Unit 3	Unit 2	Unit 2	Unit 3	Unit 3	Unit 4	Unit 4	Unit 5	Unit 5	Unit 5	Unit 5	UNIT 6	UNIT 6
Sample Date:	05/18/90	05/18/90	05/18/90	05/21/90	05/18/90	05/18/90	05/21/90	05/18/90	05/21/90	05/21/90	05/21/90	05/18/90	05/21/90	05/21/90	04/15/95	04/15/95
<b>Major Ions mg/l:</b>																
Ca	150.0	137.0	17.4	210.0	190.0	138.0	200.0	160.0	154	107	117	40.4	210	230	262	240
Mg	49.5	39.8	3.9	51.9	45.1	40.9	50.3	48.8	49.1	22.7	30.3	9.8	46.4	40.4	60	54
Na	570	587	239	655	690	582	614	610	610	417	511	262	619	760	771	732
K	8.0	9.3	17.0	10.8	15.1	9.2	10.2	10.8	9.5	6.3	6.5	10.8	8.8	14.4	9.2	8.8
CO <sub>3</sub>	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.0	< 1.0
HCO <sub>3</sub>	1337	1244	297	1371	1098	1152	1298	1252	1264	913	996	469	1391	1879	1731	1692
SO <sub>4</sub>	551	604	175	638	708	504	659	532	646	413	431	264	554	487	784	738
Cl	426	378	141	414	437.0	419	433	425	429	224	275	86.2	371	303	287	260
NH <sub>4</sub>	91.4	84.3	6.7	69.8	52.8	66.9	68.5	66.3	82.5	60.2	44.8	23.5	29.0	0.35	0.91	0.98
NO <sub>3</sub> (N)	0.03	0.02	0.01	0.58	0.80	0.02	0.09	0.37	0.03	0.01	0.01	0.01	0.01	0.01	< 0.10	< 0.10
NO <sub>2</sub> (N)	0.34	0.08	0.04	17.70	23.00	6.40	2.82	6.25	2.88	< 0.01	0.01	1.41	0.03	0.49	< 0.10	< 0.10
F	< 0.10	< 0.10	< 0.17	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1	< 0.1	0.13	< 0.1	< 0.10	< 0.10	< 0.10
SiO <sub>2</sub>	9.8	10.1	12.0	9.2	10.9	9.6	14.1	8.8	12.8	8.6	6.8	7.3	11.1	20.1	13.6	11
TDS	2314	2248	721	2637	2579	2198	2507	2289	2404	1664	1781	863	2400	2624	3027	2912
Cond. (mmho/cm)	4208	4118	1421	4468	4432	3984	4435	4062	4402	2989	3239	1690	4062	4292	4326	4187
Alk. (as CaCO <sub>3</sub> )	1096	1020	244	1124	900	944	1064	1026	1036	748	816	384	1140	1540	1419	1387
pH (units)	6.88	6.82	8.14	6.98	6.86	7.02	7.00	6.98	7.20	7.54	7.32	7.43	7.42	6.76	7.19	6.90
<b>Trace Metals mg/l:</b>																
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.12	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
As	0.003	0.028	0.012	0.001	0.001	0.001	0.001	0.001	0.003	0.007	0.003	0.004	0.074	0.001	0.001	0.001
Ba	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
B	< 0.10	< 0.10	< 0.10	< 0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.11	< 0.14	< 0.12
Cd	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cr	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fe	6.90	5.40	0.07	0.22	0.44	0.05	0.51	0.07	0.12	0.40	0.05	0.06	2.30	0.06	0.050	0.050
Pb	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Mn	4.4	1.4	0.03	1.10	0.81	0.79	1.10	0.64	0.01	0.55	0.48	0.14	2.30	0.96	1.420	1.330
Hg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Mo	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Se	0.068	0.015	0.001	1.054	0.387	0.824	1.054	0.368	0.008	0.002	0.012	0.035	0.003	0.703	0.043	0.027
V	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Zn	0.03	0.03	0.02	0.05	0.08	0.03	0.05	0.04	0.01	0.05	0.04	0.05	0.04	0.27	0.01	0.02
<b>Radiometric pCi/l:</b>																
U (mg/l)	4.952	8.865	0.785	8.254	1.636	3.485	8.254	10.394	4.158	17.425	2.935	0.459	24.456	3.546	5.271	5.835
Ra 226	429	464	14.1	210.0	118	71.2	210	58.3	170	118	100	43	57.8	262	127	276
Ra 226+/-	9.0	9.2	0.9	5.8	4.7	3.6	5.8	3.3	5.2	4.4	4.0	2.9	3.1	6.5	3.8	5.6

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POST-MINING RESULTS  
IRIGARAY DESIGNATED RESTORATION WELLS

POST - MINING

Well I.D.: Production Unit: Sample Date:	HI-62 UNIT 6 04/15/95	HP-59 UNIT 6 04/15/95	HP-87 UNIT 6 04/15/95	Ji-91 UNIT 7 04/15/95	JP-26 UNIT 7 04/15/95	JP-53 UNIT 7 04/15/95	JP-57 UNIT 7 04/15/95	JP-63 UNIT 7 04/15/95	KP70B UNIT 7 04/15/95	KI-128 UNIT 8 04/15/95	KP-44 UNIT 8 04/15/95	LI-51 Unit 9 04/15/95	LP-13 Unit 9 04/15/95	LP-22 Unit 9 04/15/95	LP-63 Unit 9 04/15/95	LP43 Unit 9 04/15/95	MEAN Units 1-9
Major Ions mg/l:																	
Ca	175	212	232	239	242	257	267	276	290	168	267	262	231	274	356	262	199.2
Mg	36	40	53	54	54	56	50	60	61	34.5	59	62	39	67	77	64	45.7
Na	551	714	711	700	711	796	828	780	787	489	730	759	569	768	840	714	627
K	9.2	8.3	8.8	8.8	9.1	8.7	9	10	9.6	5.9	9	9.3	9	9.3	10.3	8.7	9.3
CO <sub>3</sub>	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.6
HCO <sub>3</sub>	1151	1592	1725	1578	1529	1384	1737	1744	1478	1077	1704	1882	1370	1812	1617	1543	1342.6
SO <sub>4</sub>	533	620	621	723	771	873	884	877	850	560	777	681	617	840	1249	920	638.9
Cl	211	264	244	238	227	265	266	258	274	135	260	266	174	260	261	241	277.3
NH <sub>4</sub>	0.81	1.49	0.87	1.32	2.01	0.88	0.8	1.27	0.71	0.64	1.2	0.73	1.39	0.97	1.21	1.07	23.2
NO <sub>2</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.7
NO <sub>3</sub> (N)	< 0.11	< 0.10	< 0.37	< 0.10	< 0.10	< 0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 2.4
F	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 1.0
SiO <sub>2</sub>	13	18.4	13.4	12.4	15.6	11	15.4	14.2	13.2	9.4	14.5	12	15.4	12.2	16.9	12	12.0
TDS	2126	2611	2726	2866	2866	3167	3120	3107	3185	1878	2907	2975	2342	3199	3614	3013	2450.6
Cond. (mmho/cm)	3161	3856	3984	4027	4080	4411	4336	4411	4465	2798	4198	4294	3386	4411	4881	4208	3794.6
Alk. (as CaCO <sub>3</sub> )	943	1305	1414	1294	1254	1135	1424	1429	1212	885	1397	1543	1123	1485	1325	1265	1100.6
pH (units)	7.33	7.26	7.43	7.16	7.15	7.77	7.10	7.15	7.99	7.46	7.32	7.54	7.44	7.43	7.43	7.55	7.1
Trace Metals mg/l:																	
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 1.04
As	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.641
Ba	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 1.07
B	0.11	0.17	0.18	0.11	0.12	0.12	0.12	0.13	0.12	0.09	0.11	0.1	0.1	0.11	0.11	0.1	< 0.4
Cd	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.979
Cr	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.02
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.83
Fe	< 0.050	3.680	< 0.050	< 0.050	< 0.050	< 0.050	< 0.300	< 0.050	< 0.050	< 0.570	< 0.050	< 0.050	< 0.050	< 0.050	< 0.090	< 0.310	< 1.10
Pb	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.02
Mn	1.160	0.810	0.930	1.650	2.780	1.570	1.020	2.480	1.600	0.990	1.380	0.960	1.290	1.260	2.120	1.750	1.25
Hg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.971
Mo	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 1.07
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.02
Se	0.097	0.005	0.3	0.054	0.028	0.21	0.032	0.025	0.211	0.067	0.702	0.294	0.022	0.162	0.234	0.099	< 0.25
V	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 1.07
Zn	0.03	0.01	0.01	0.02	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.03	0.02	< 0.06
Radiometric pCi/l:																	
U (mg/l)	10.71	2.614	1.583	1.536	0.71	17.44	21.75	3.054	14.2	7.027	0.596	5.961	13.32	5.501	13.39	7.048	7.41
Ra 226	134	510	27.1	145	178	160	465	278	236	213	141	57.2	565	196	173	208	200.5
Ra 226+/-	3.9	7.6	1.8	4	4.5	5.6	8.3	5.6	5.1	4.9	4	2.4	8.4	4.5	4.2	4.6	4.9

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POST-GROUNDWATER SWEEP RESULTS  
IRIGARAY DESIGNATED RESTORATION WELLS

POST GWS

Well I.D.: Production Unit: Sample Date:	AP-4 Unit 1 02/11/91	BP-4 Unit 1 02/11/91	CI-17 Unit 2 02/12/91	DI-27 Unit 3 02/12/91	DI-90 Unit 2 02/12/91	DP-28 Unit 2 02/12/91	DP-29 Unit 3 02/11/91	FP-5 Unit 3 02/11/91	FI-62 Unit 4 08/25/93	FI-132 Unit 4 08/25/93	GP-9 Unit 5 08/26/93	GI-76 Unit 5 08/26/93	GI-82 Unit 5 08/26/93	GI-134 Unit 5 08/26/93	HI-53 UNIT 6 07/12/00	HI-57 UNIT 6 07/12/00
Major Ions mg/l:																
Ca	118.0	59.9	53.9	74.6	212.0	192.0	115.0	103.0	56.0	40.0	88.0	88.0	43.0	93.0	31.6	47.1
Mg	38.3	18.3	18.9	19.9	59.2	50.3	34.2	38.5	13.5	9.2	18.7	23.7	4.7	18.6	5.8	9.9
Na	529	343	382	387	702	721	530	546	487	272	307	483	160	447	166	293
K	8.4	5.0	7.4	6.0	13.0	10.2	8.8	10.8	4.7	4.0	4.7	5.5	12.7	5.1	2.2	3.6
CO <sub>3</sub>	< 0.1	< 0.1	2.0	1.0	1.0	1.0	< 0.1	1.0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.0	< 1.0
HCO <sub>3</sub>	1020	595	706	681	1169	1396	1005	1004	716	481	647	925	514	1097	292	590
SO <sub>4</sub>	521	407	349	331	813	534	415	481	316	239	200	311	46	165	173	274
Cl	336	137	213	226	452.0	466	343	309	383	75.0	128	217	31.4	131	29.5	31.9
NH <sub>4</sub>	78.8	28.0	33.8	27.1	55.4	34.4	50.2	48.1	50.5	28.2	6.3	28.2	14.3	0.4	0.26	0.42
NO <sub>3</sub> (N)	0.12	< 0.01	0.04	0.05	< 0.01	0.01	0.06	0.07	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1	< 0.10	< 0.10	< 0.10
NO <sub>2</sub> (N)	0.34	0.24	0.25	0.18	0.03	0.05	4.54	0.77	5.56	0.70	0.12	0.5	0.18	0.18	< 0.10	< 0.10
F	0.17	0.15	< 0.10	0.19	< 0.10	< 0.10	< 0.10	< 0.10	0.19	0.10	0.30	0.10	0.14	0.14	0.38	< 0.10
SiO <sub>2</sub>	6.7	5.5	6.1	5.1	8.8	14.0	8.8	6.2	6.4	5.8	9.8	7.3	5.5	5.5	5	5.5
TDS	2179	1294	1462	1402	3004	2859	2141	2098	1580	911	1159	1652	571	571	580	979
Cond. (mmho/cm)	3499	2068	2372	2307	4292	4028	3247	3247	3356	1786	2047	3138	1164	1164	912	1530
Alk. (as CaCO <sub>3</sub> )	836	488	579	588	958	1144	824	823	587	394	530	758	421	421	240	484
pH (units)	7.10	7.26	7.60	7.50	7.16	7.23	7.10	7.25	7.45	7.65	7.84	7.54	8.09	8.09	7.95	7.89
Trace Metals mg/l:																
Al	< 0.10	< 0.10	< 0.10	< 0.10	0.28	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
As	< 0.001	0.004	0.001	0.002	0.003	0.001	0.001	0.001	0.005	0.002	0.049	0.002	0.001	0.001	0.003	0.003
Ba	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.02	0.03	0.05	0.03	0.08	0.08	< 0.10	< 0.10
B	< 0.10	< 0.10	< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10	0.05	0.05	0.06	0.08	0.05	0.05	< 0.10	< 0.10
Cd	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.005
Cr	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	0.009	0.009	0.005	0.005	0.005	0.005	0.005	0.05
Cu	< 0.01	< 0.01	< 0.01	0.02	0.01	0.02	< 0.01	< 0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Fe	< 0.05	< 0.05	< 0.05	0.05	17.42	0.73	< 0.05	< 0.05	0.35	< 0.05	0.39	0.19	0.19	0.19	0.170	0.220
Pb	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.001	0.001	0.001	0.001	0.001	0.001	< 0.05	< 0.05
Mn	0.72	0.39	0.30	0.28	0.94	0.51	0.50	0.32	0.13	0.13	0.79	0.23	0.10	0.10	0.240	0.190
Hg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Mo	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.04	0.04	0.04	0.04	0.04	0.04	< 0.10	< 0.10
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Se	0.386	0.084	0.089	0.092	0.003	0.038	0.381	0.103	0.002	0.011	0.014	0.005	0.001	0.001	0.003	0.002
V	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Radiometric pCi/l:																
U (mg/l)	18.050	5.414	9.415	2.982	2.275	23.54	10.200	8.239	0.494	0.967	1.78	1.27	0.210	4.52	0.645	4.23
Ra 226	317	468	43.0	154	78.6	224.0	102	56.8	67.1	74.3	90.3	105	42.8	135.0	67.1	209
Ra 226+/-	8.0	9.6	2.6	5.6	3.9	7.0	4.6	3.4	2.6	3.0	3.8	3.7	2.4	4.3	2.6	7.5

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**POST-GROUNDWATER SWEEP RESULTS**  
**IRIGARAY DESIGNATED RESTORATION WELLS**

**POST GWS**

Well I.D.: Production Unit: Sample Date:	HI-62 UNIT 8 07/12/00	HP-59 UNIT 6 07/12/00	HP-87 UNIT 8 07/12/00	JI-91 UNIT 7 01-13-99	JP-26 UNIT 7 01-14-99	JP-53 UNIT 7 01-14-99	JP-57 UNIT 7 01-14-99	JP-63 UNIT 7 01-14-99	KI-128 UNIT 8 12-31-98	KP-44 UNIT 8 12-31-98	KP-61 UNIT 8 01-15-99	LI-51 Unit 9 11-06-98	LP-13 Unit 9 11-06-98	LP-22 Unit 9 11-10-98	LP-63 Unit 9 11-10-98	LI-91 Unit 9 11-10-98	MEAN Units 1-9
Major Ions mg/l:																	
Ca	30.3	155	87.4	298	295	270	207	127	122	273	30.4	116	116	266	90.9	221	124.9
Mg	5.1	27.6	21.3	97.9	83.3	64.4	48.9	28.2	27.6	73.6	6	18.9	19	69.9	24.7	40.2	31.3
Na	225	538	387	699	706	668	590	464	455	756	175	379	381	727	356	618	451
K	3	6.8	5.0	9.4	9.1	9.2	8.2	6.7	5.6	8.3	2.7	8.7	8.6	9.7	4.9	8.2	6.9
CO <sub>3</sub>	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.6
HCO <sub>3</sub>	411	1210	924	2120	1990	1990	1650	1040	1130	2270	314	940	946	2021	887	1510	1036.1
SO <sub>4</sub>	203	387	236	680	773	672	597	594	439	640	235	373	367	751	329	666	409.6
Cl	29.1	206	103	230	247	236	161	90.2	121	203	17.8	68.9	69.7	228	77.1	186	175.2
NH <sub>4</sub>	0.33	0.67	0.63	0.39	0.77	0.85	0.55	0.49	0.42	0.44	0.39	0.93	0.95	0.82	0.45	0.79	14.9
NO <sub>2</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.9
NO <sub>3</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 1.0
F	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.8
SiO <sub>2</sub>	8.3	9.8	6.4	7.1	7.8	7.8	7.3	8.1	7.8	6.7	6.3	11.4	11.6	8.2	6	10.2	7.3
TDS	718	2010	1350	3120	3210	3030	2480	1840	1910	3370	610	1510	1520	3290	1390	2670	1771.8
Cond. (mmho/cm)	1140	3070	2140	4510	4610	4400	3710	2780	2860	4720	1020	2230	2230	4680	2140	3810	2733.5
Alk. (as CaCO <sub>3</sub> )	337	992	757	1740	1630	1630	1350	852	926	1870	257	771	776	1657	728	1239	836.0
pH (units)	8.03	7.85	7.90	7.38	7.21	7.49	7.51	7.43	7.79	7.59	7.78	8.00	7.94	7.74	7.96	7.67	7.4
Trace Metals mg/l:																	
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 1.04
As	0.043	0.008	0.001	0.002	0.003	0.001	0.002	0.002	0.011	0.007	0.013	0.107	0.119	0.003	0.012	0.012	0.255
Ba	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.24	0.26	< 0.10	< 0.10	< 0.82
B	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.9
Cd	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.975
Cr	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.92
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.02	< 0.83
Fe	0.040	1.460	0.040	0.050	0.400	0.130	0.110	0.320	0.380	0.050	0.790	8.810	9.190	0.720	0.270	3.670	1.69
Pb	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.01
Mn	0.100	0.680	0.490	1.650	1.360	1.280	0.960	0.900	0.840	1.390	0.180	0.710	0.680	1.480	0.510	1.660	0.82
Hg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.971
Mo	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 1.06
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 1.02
Se	0.001	0.003	0.007	0.031	0.044	0.002	0.031	0.01	0.096	0.206	0.001	0.009	0.002	0.012	0.057	0.01	0.17
V	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 1.06
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.95
Radiometric pCi/l:																	
U (mg/l)	0.773	5.01	1.64	2.71	5.71	5.2	5.68	4.69	12.7	1.01	2.99	2.73	2.61	19.1	7.24	25.5	6.24
Ra 226	30.3	462	19.8	94.9	226	58.6	187	125	244	153	197	1095	1196	237.1	148.2	496.8	225.1
Ra 226+/-	1.8	16.6	1.4	3.5	5.2	2.6	5.2	4.2	1.3	1	5	13.4	10.9	4.7	3.7	6.9	5.1

POST-RO RESULTS  
IRIGARAY DESIGNATED RESTORATION WELLS

POST-RO

Well I.D.:	AP-4 Unit 1	BP-4 Unit 1	CI-17 Unit 2	DI-90 Unit 2	DP-28 Unit 2	DI-27 Unit 3	DP-29 Unit 3	FP-5 Unit 3	FI-82 Unit 4	FI-132 Unit 4	GI-76 Unit 5	GP-9 Unit 5	GI-82 Unit 5	HI-50 Unit 6	HI-62 Unit 6	HP-24 Unit 6	HP-59 Unit 6	HP-87 Unit 6
Production Unit:	Unit 1	Unit 1	Unit 2	Unit 2	Unit 2	Unit 3	Unit 3	Unit 3	Unit 4	Unit 4	Unit 5	Unit 5	Unit 5	Unit 6	Unit 6	Unit 6	Unit 6	Unit 6
Sample Date:	11/17/92	11/17/92	11/17/92	11/17/92	11/17/92	11/17/92	11/17/92	11/17/92	08/18/98	08/18/98	08/18/98	08/18/98	08/18/98	10/11/01	10/11/01	10/11/01	10/11/01	10/11/01
Major Ions mg/l:																		
Ca	30.9	22.0	42.6	46.4	37.3	30.5	31.2	28.3	22.0	8.1	19.0	2.4	12.3	34.4	30.5	18.5	2.6	36.5
Mg	8.3	4.5	4.7	9.1	10.8	7.8	8.2	9.0	3.9	1.4	3.6	1.0	3.9	6.5	5.6	4.1	1	8.8
Na	185	183	230	187	203	179	151	226	144	119	50.0	32.0	84.0	190	185	133	35.8	213
K	4.5	3.1	4.5	4.2	4.3	4.3	3.8	4.7	1.5	1.2	1.0	1.0	1.3	2.2	2.1	1.6	1	2.8
CO <sub>3</sub>	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
HCO <sub>3</sub>	483	322	510	378	569	447	401	526	385	318	148	80.1	230	448	381	312	79.6	470
SO <sub>4</sub>	180	224	219	201	162	164	143	175	67.0	40.0	33.0	8.0	44.0	113	153	66.8	14.4	141
Cl	73.3	34.5	82.0	64.0	60.4	49.7	49.0	70.3	24.0	11.0	13.0	2.0	15.0	34	31.9	28.9	5.6	62.6
NH <sub>4</sub>	35.0	19.6	19.1	24.5	22.4	24.5	19.3	20.3	2.87	5.54	0.34	0.06	4.88	0.13	0.18	0.12	0.16	0.29
NO <sub>3</sub> (N)	< 0.10	< 0.10	1.43	< 0.10	< 0.10	< 0.10	< 0.10	1.19	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
NO <sub>2</sub> (N)	< 0.10	< 0.10	0.70	< 0.10	< 0.10	3.20	< 0.10	2.79	< 0.10	0.11	0.40	0.87	0.54	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
F	0.40	0.25	0.14	< 0.10	< 0.10	0.11	< 0.10	0.10	< 0.10	0.13	< 0.10	< 0.10	< 0.10	0.20	0.20	0.20	< 0.10	0.20
SiO <sub>2</sub>	5.6	5.1	6.6	8.8	5.8	5.8	7.9	4.8	4.8	2.9	1.9	1.0	1.5	6.2	7.2	5.1	2.6	5.3
TDS	775	645	964	698	812	682	600	895	414	304	184	87.0	261	615	646	432	111	734
Cond. (mmho/cm)	1404	1097	1504	1324	1425	1231	1127	1422	610	344	158	513	1000	1020	705	186	1190	
Alk. (as CaCO <sub>3</sub> )	400	267	424	310	471	369	332	426	316	260	122	65.7	189	368	312	256	68	386
pH (units)	7.95	8.05	8.18	7.35	7.94	7.80	7.91	8.00	8.12	8.09	8.03	7.67	7.91	7.90	8.00	8.60	7.80	
Trace Metals mg/l:																		
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
As	0.002	0.004	0.001	0.003	0.002	0.001	0.003	0.001	0.002	0.008	0.001	0.002	0.001	0.002	0.014	0.001	0.006	0.001
Ba	0.05	0.06	0.05	0.05	0.06	0.03	0.08	0.08	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
B	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cd	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cr	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fe	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pb	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Mn	0.19	0.17	0.14	0.49	0.18	0.12	0.19	0.10	0.06	0.04	0.03	0.01	0.01	0.210	0.100	0.100	0.040	0.150
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Mo	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Se	0.195	0.048	0.065	0.019	0.216	0.264	0.116	0.059	0.002	0.009	0.007	0.021	0.012	0.051	0.02	0.045	0.016	0.047
V	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Zn	0.11	0.04	0.03	0.02	0.01	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Radiometric pCi/l:																		
U (mg/l)	5.110	2.025	2.396	4.700	4.400	5.200	2.300	3.000	1.64	1.43	0.359	0.0203	0.404	3.66	0.693	1.11	0.22	0.588
Ra 226	36	118	40.6	32.2	34.2	13.5	22.8	19	30.7	35.1	10.9	4.9	19.9	94	27	150	35	20
Ra 226+/-	2.2	4.0	2.3	2.0	2.1	0.8	0.9	0.9	1.6	1.7	1.0	0.5	1.3	3.4	1.6	5.4	1.8	1.3

POST-RO RESULTS  
IRIGARAY DESIGNATED RESTORATION WELLS

POST-RO

Well I.D.:	JP-91	JP-28	JP-53	JP-57	JP-63	KP70B	KP-29	KP-63	JP-15	JP-84	KP-45	KP-119	LI-51	LP-13	LP-43	LP-63	MEAN
Production Unit:	UNIT 7	UNIT 7	UNIT 7	UNIT 7	UNIT 7	UNIT 7	UNIT 7	UNIT 7	UNIT 7	UNIT 7	UNIT 8	UNIT 8	UNIT 9	UNIT 9	UNIT 9	UNIT 9	Units 1-9
Sample Date:	07/18/01	07/18/01	07/18/01	07/18/01	07/18/01	07/18/01	07/18/01	07/18/01	07/18/01	07/18/01	29-JUN-2000	29-JUN-2000	03/24/00	03/24/00	03/24/00	03/24/00	
Major Ions mg/l:																	
Ca	23.8	22.2	48.8	10.8	22.7	14.8	25.9	37.4	31.5	8.9	42.9	15.8	9.4	17.5	6.4	6.2	23.1
Mg	7.7	5	12.8	2.4	4.4	3.8	8	9.4	8.4	2.3	11.1	3.7	2.4	3.1	1.4	1.6	5.5
Na	198	133	266	111	183	112	182	219	181	122	246	143	99.9	165	75.4	98.3	151.2
K	2.7	1.7	3.1	1.5	2.2	1.5	2.4	3	2.5	1	3.2	1.8	2.5	3.4	2.8	3.5	2.6
CO <sub>3</sub>	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.8
HCO <sub>3</sub>	487	335	640	244	281	258	485	446	444	120	614	315	306	332	208	250	359.0
SO <sub>4</sub>	73.7	50.6	156	48.6	164	52.3	82.6	161	67.5	164	156	89.2	5.8	132	10.3	19	103.0
Cl	32.4	35.7	56.9	25.5	28.9	23.7	23.7	47.6	20.9	15	43.5	19.8	6	22.2	5	7	32.3
NH <sub>4</sub>	0.12	0.06	0.15	0.11	0.16	0.12	0.18	0.19	0.12	< 0.05	0.26	0.18	< 0.05	0.2	0.14	0.13	5.8
NO <sub>2</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.2
NO <sub>3</sub> (N)	0.21	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.3
F	0.13	< 0.10	0.11	0.14	0.10	0.23	0.18	0.12	< 0.10	0.12	< 0.10	0.18	< 0.10	0.10	0.13	0.11	0.1
SiO <sub>2</sub>	3.9	3.5	4.2	3.4	6.7	4.3	6.3	6.3	3.6	2.8	6.7	5.5	4	6.4	4.6	3.7	4.8
TDS	599	425	897	327	536	354	579	737	529	387	821	424	292	538	205	257	517.7
Cond. (mmho/cm)	992	719	1440	556	867	578	952	1190	859	630	1330	725	495	882	357	442	878.0
Alk. (as CaCO <sub>3</sub> )	399	275	525	200	231	210	381	366	364	99	504	259	251	273	171	205	295.1
pH (units)	7.98	8.04	7.86	8.12	7.96	8.03	7.96	8.14	8.04	7.81	8.08	8.03	7.95	7.84	7.99	7.95	8.0
Trace Metals mg/l:																	
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
As	0.002	0.004	0.002	0.001	0.001	0.002	0.003	0.002	0.001	0.002	0.004	0.006	0.003	0.015	0.005	0.003	0.003
Ba	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.23	< 0.10	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.09
B	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1
Cd	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.004
Cr	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.04
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Fe	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	0.06
Pb	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.04
Mn	0.100	0.040	0.190	0.050	0.120	0.080	0.280	0.200	0.090	0.050	0.150	0.060	0.020	0.110	0.030	0.030	0.11
Hg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001
Mo	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.09
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Se	0.082	0.196	0.057	0.014	0.002	0.01	0.001	0.051	0.029	0.001	0.086	0.036	0.116	0.001	0.215	0.097	0.07
V	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.09
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02
Radiometric pCi/l:																	
U (mg/l)	0.625	1.13	2.33	1	0.431	1.05	0.319	0.947	1.4	0.061	2.11	0.383	0.342	0.849	0.594	0.867	1.56
Ra 228	17.1	31.1	208	18.3	34.1	60.8	191	98.8	36.1	61.3	192	63	77.9	159	58.7	71	63.4
Ra 226+J	1.2	1.6	7.4	2	1.7	2.2	6.8	3.5	1.7	2.2	4.5	2.6	2.5	3.6	2.2	2.4	2.4

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STABILIZATION ROUND 1  
IRIGARAY DESIGNATED RESTORATION WELLS

STABILITY  
ROUND 1

Well I.D.: Production Unit: Sample Date:	AP-4 Unit 1 02-09-93	BP-4 Unit 1 02-09-93	CI-17 Unit 2 02-09-93	DI-27 Unit 3 02-09-93	DI-90 Unit 2 02-09-93	DP-28 Unit 2 02-09-93	DP-29 Unit 3 02-09-93	FP-5 Unit 3 02-09-93	FI-82 Unit 4 10-23-98	FI-132 Unit 4 10-23-98	GI-76 Unit 5 10-30-98	GI-82 Unit 5 10-30-98	GP-8 Unit 5 10-30-98	HI-57 Unit 6 15-Nov-01	HI-82 Unit 6 15-Nov-01	HP-59 Unit 6 15-Nov-01	HI-53 Unit 6 15-Nov-01
Major Ions mg/l:																	
Ca	33	28	29	35	42	40	36	18	18.3	11.7	24	27	18.4	32.3	40.7	49.0	37.9
Mg	9	6	7	8	8	12	9	5	3.7	2.6	5.9	8.2	4.2	7.0	7.5	10.7	9.2
Na	161	186	255	167	165	255	264	207	164	153	158	205	114	173	219	256	222
K	3	3	3	3	3	4	4	3	2.3	1.7	2.6	3	1.9	2.9	2.8	3.5	3.2
CO <sub>3</sub>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1	1	1	1	1	1	1.0	1.0	1.0
HCO <sub>3</sub>	419	449	603	422	379	666	556	418	364	366	424	219	368	427	556	482	
SO <sub>4</sub>	206	213	187	183	213	183	194	158	81.7	78.2	105	165	106	131	201	181	166
Cl	50.9	50.3	59.1	52.7	51	74.8	99.5	40.4	27.3	22.4	48	87	23	39.1	48.6	61.3	57
NH <sub>4</sub>	47.9	38.6	38.6	25.2	36.6	42.3	30.8	10.9	11.7	8.93	12.8	20.8	4.33	0.23	0.21	0.3	0.21
NO <sub>3</sub> (N)	< 0.1	< 0.1	0.41	< 0.1	0.83	< 0.1	< 0.1	< 0.1	0.11	< 0.1	< 0.1	< 0.1	< 0.1	0.30	< 0.10	0.20	0.20
NO <sub>2</sub> (N)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.06	0.18	0.24	< 0.1	< 0.1	< 0.10	< 0.10	< 0.10	< 0.10
F	0.35	0.25	0.23	0.23	0.2	0.21	0.19	0.19	0.19	0.17	0.11	0.12	0.15	0.10	< 0.10	< 0.10	< 0.10
SiO <sub>2</sub>	6.1	5.6	6.4	6.7	6.5	5.6	7.4	4.2	3.8	3.4	3	3.2	2.6	5.43	8.41	7.1	8.59
TDS	752	777	887	698	727	973	931	658	490	452	497	668	349	596	746	901	783
Cond. (mmho/cm)	1304	1268	1514	1256	1281	1651	1630	1185	895	780	941	1270	651	922	1180	1340	1170
Alk. (as CaCO <sub>3</sub> )	343	368	494	346	311	546	456	366	343	298	300	348	179	302	350	456	379
pH (units)	7.44	7.57	7.67	7.6	7.13	7.54	7.55	7.63	8.17	8.27	8.01	7.82	7.96	8.1	7.9	7.9	7.8
Trace Metals mg/l:																	
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
As	0.003	0.006	< 0.001	< 0.001	0.009	< 0.001	< 0.001	0.001	0.004	0.004	0.002	0.002	0.004	0.0012	0.0127	0.0013	0.001
Ba	0.08	0.07	0.05	0.04	0.06	0.07	0.07	0.06	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.13
B	< 0.05	< 0.05	0.07	< 0.05	0.06	0.06	0.05	0.07	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1	< 0.1	< 0.1	0.1
Cd	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Cr	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Cu	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Fe	0.71	0.25	0.05	0.12	0.25	0.06	0.65	< 0.05	0.05	0.05	0.05	0.05	0.05	0.030	0.044	0.030	0.030
Pb	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Mn	1.0	0.21	0.14	0.16	0.54	0.23	0.21	0.07	0.05	0.1	0.05	0.1	0.04	0.142	0.116	0.179	0.22
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Mo	< 0.04	< 0.04	< 0.04	< 0.05	< 0.04	< 0.04	< 0.04	< 0.04	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10	< 0.10
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Se	0.006	0.001	0.01	0.066	0.004	0.007	0.009	0.082	0.153	0.021	0.033	0.004	0.043	0.0259	0.0133	0.0383	0.0141
V	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Zn	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.018
Radiometric pCi/l:																	
U (mg/l)	1.07	1.94	2.61	5.07	4.06	6.87	2.43	2.08	4.19	2.44	1.64	1.53	1.13	2.91	0.962	1.17	1.59
Ra 226	334	472	178	48.0	85.6	143	105	82.0	54.1	117	38.6	60.9	24.8	331	44.9	137	242
Ra 226+/-	5.9	7.0	4.3	2.2	2.9	4.8	3.3	2.9	2.3	3.4	1.9	2.5	1.6	11.8	2.00	4.9	8.7

STABILIZATION ROUND 1  
IRIGARAY DESIGNATED RESTORATION WELLS

STABILITY  
ROUND 1

Well I.D.: Production Unit: Sample Date:	HP-87 UNIT 6 15-Nov-01	JI-91 UNIT 7 29-Aug-01	JP-26 UNIT 7 29-Aug-01	JP-53 UNIT 7 29-Aug-01	JP-57 UNIT 7 29-Aug-01	JP-63 UNIT 7 29-Aug-01	KP70B UNIT 7 29-Aug-01	KI-128 UNIT 8 07-Sep-2000	KP-44 UNIT 8 07-Sep-2000	LI-51 Unit 9 22-May-00	LP-13 Unit 9 16-May-00	LP-20 Unit 9 17-May-00	LP-22 Unit 9 16-May-00	LP-24 Unit 9 16-May-00	LP-63 Unit 9 22-May-00	LP-43 Unit 9 23-May-00	MEAN Units 1-9 Round -1
Major Ions mg/l:																	
Ca	48.7	38	25.2	36.2	15.5	22.3	31.0	28.2	27.2	22.0	19.5	20.0	19.3	28.7	37.5	21.2	29.0
Mg	11.3	9.7	6.7	9.1	3.5	5.5	7.2	7.1	6.9	5.9	3.5	5.7	5.0	6.5	9.9	4.8	7.0
Na	259	200	175	193	150	153	166	165	166	163	166	161	161	172	193	135	167
K	3.6	3.3	3.1	3.2	2.5	2.6	2.7	2.8	2.6	1.9	3.1	3.1	2.9	2.3	2.9	2.3	2.9
CO <sub>3</sub>	<	1.0	<	1.0	<	1.0	<	1.0	<	1.0	<	1	<	1	<	1	<
HCO <sub>3</sub>	457	481	414	452	340	288	397	467	467	421	337	380	393	336	474	367	424.7
SO <sub>4</sub>	187	130	92.5	122.0	67.4	131.0	100	87.5	82.5	100	116	81	69	118	132	54	133.9
Cl	70.4	43	38.8	58.9	30.2	33.4	37.4	28.1	24.8	24.1	24.4	21.8	19.3	30.7	39.4	17.3	43.3
NH <sub>4</sub>	0.4	0.15	0.1	0.15	0.17	0.08	0.07	0.12	0.10	0.06	0.22	0.21	0.22	0.16	0.17	0.14	10.0
NO <sub>3</sub> (N)	0.20	<	0.10	<	0.10	<	0.10	<	0.10	<	0.1	<	0.1	<	0.1	<	0.1
NO <sub>3</sub> (N)	<	0.10	<	0.10	<	0.10	<	0.10	<	0.10	<	0.1	<	0.1	<	0.1	<
F	<	0.10	<	0.10	<	0.10	<	0.10	<	0.1	<	0.1	<	0.1	<	0.1	<
SiO <sub>2</sub>	6.91	5.2	4.1	5.1	3.8	5.2	5.0	5.5	5.5	6.6	6.4	4.8	5.0	5.1	5.1	6.9	5.4
TDS	902	685	576	663	448	513	581	588	589	550	529	505	493	644	651	423	642.6
Cond. (mmho/cm)	1370	1100	919	1080	752	822	914	962	957	910	825	801	783	1010	1070	705	1066.0
Alk. (as CaCO <sub>3</sub> )	457	394	340	371	286	236	326	382	383	346	277	312	323	275	389	301	351.0
pH (units)	7.9	8.10	8.20	7.9	8.40	8.30	7.90	7.81	7.87	7.98	7.96	7.82	7.90	7.99	7.87	7.98	7.9
Trace Metals mg/l:																	
Al	<	0.10	<	0.10	<	0.10	<	0.10	<	0.10	<	0.10	<	0.10	<	0.10	<
As	<	0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.003	0.003	0.001	0.020	0.003	0.003	0.005	0.002	0.004
Ba	<	0.10	<	0.10	<	0.10	<	0.10	<	0.10	<	0.1	<	0.1	<	0.1	<
B	<	0.1	<	0.10	<	0.10	<	0.10	<	0.10	<	0.1	<	0.1	<	0.1	<
Cd	<	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.004
Cr	<	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04
Cu	<	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Fe	<	0.030	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.39	0.05	0.06	0.15	0.05	0.05	0.05	0.12
Pb	<	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04
Mn	0.162	0.22	0.08	0.20	0.06	0.10	0.1	0.29	0.12	0.04	0.12	0.10	0.06	0.20	0.23	0.17	0.18
Hg	<	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Mo	<	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09
Ni	<	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Se	0.0439	0.046	0.038	0.045	0.03	0.026	0.026	0.024	0.054	0.081	0.001	0.113	0.071	0.005	0.077	0.075	0.04
V	<	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.09
Zn	<	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Radiometric pCi/l:																	
U (mg/l)	0.750	2.000	2.80	2.00	1.50	1.30	2.6	1.60	1.59	0.87	0.84	0.90	2.18	2.59	3.50	0.88	2.17
Ra 226	51.4	120	34.9	130	54.9	86.4	110	159	148	60.5	175.0	41.9	194.0	313.0	319.0	210.0	142.5
Ra 228	2.1	4.5	1.8	4.7	2.2	3.1	3.9	4.9	4.8	3.1	4.1	2.0	4.3	5.4	6.9	4.3	4.1

STABILIZATION ROUND 2  
IRIGARAY DESIGNATED RESTORATION WELLS

STABILITY  
ROUND 2

Well I.D.: Production Unit: Sample Date:	AP-4 Unit 1 07-Apr-93	BP-4 Unit 1 07-Apr-93	CI-17 Unit 2 07-Apr-93	DI-27 Unit 3 07-Apr-93	DI-90 Unit 2 07-Apr-93	DP-28 Unit 2 07-Apr-93	DP-29 Unit 3 07-Apr-93	FP-5 Unit 3 07-Apr-93	FI-62 Unit 4 16-Dec-88	FI-132 Unit 4 17-Dec-88	GI-76 Unit 5 17-Dec-88	GI-82 Unit 5 17-Dec-88	GP-9 Unit 5 07-Dec-88	HI-50 Unit 6 12-Feb-02	HI-62 Unit 6 12-Feb-02
Major Ions mg/l:															
Ca	28.0	25.0	50.0	37.0	49.0	35.0	37.0	19.0	15	10.8	20	24.5	15	29.2	32.9
Mg	11.0	7.0	14.0	11.0	12.0	11.0	10.0	6.0	3	2.4	4.9	7.3	3.6	5.5	5.8
Na	166	190	308	190	198	184	289	196	150	154	129	182	102	196	200
K	3.0	3.0	4.0	3.0	3.0	4.0	4.0	3.0	2	1.4	2	2.6	1.7	2.9	2.8
CO <sub>3</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
HCO <sub>3</sub>	431	382	687	417	482	439	586	465	404	364	327	398	220	441	396
SO <sub>4</sub>	176	197	211	177	189	173	158	139	71	88	92	155	105	127	181
Cl	47.6	51.2	118	56.6	67.0	78.1	113	38.0	23	22.2	40	78	21	37.8	35.6
NH <sub>4</sub>	28.4	20.5	30.3	21.4	32.2	29.3	24.2	16.4	8.04	8.89	9.9	19.4	3.8	0.24	0.24
NO <sub>3</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
NO <sub>3</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.12	< 0.10	< 0.10	< 0.10	< 0.10
F	0.22	0.12	< 0.10	0.15	0.12	0.12	< 0.10	0.12	0.13	0.16	0.12	0.13	0.17	0.10	0.10
SiO <sub>2</sub>	7.3	5.4	6.7	4.8	6.2	5.2	6.7	4.3	4	3.4	2.6	3.3	2.6	5.77	7.53
TDS	681	630	1060	737	776	728	938	629	462	466	485	629	355	653	699
Cond. (mmho/cm)	1273	1218	1816	1243	1404	1245	1610	1211	873	808	883	1250	654	1020	1080
Alk. (as CaCO <sub>3</sub> )	353	313	547	342	395	360	480	381	332	299	268	327	181	362	325
pH (units)	7.97	7.88	8.01	7.95	8.02	8.14	8.03	8.27	7.98	8.05	8.05	7.99	7.96	7.90	7.70
Trace Metals mg/l:															
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
As	0.004	0.004	0.001	0.003	0.019	0.001	0.003	0.001	0.003	0.005	0.002	0.003	0.005	0.004	0.014
Ba	0.06	0.05	0.06	0.04	0.06	0.05	0.06	0.04	0.1	0.1	0.1	0.1	0.1	0.1	0.1
B	< 0.05	< 0.05	< 0.06	< 0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cr	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fe	< 0.05	< 0.05	< 0.05	< 0.07	< 0.05	< 0.05	< 0.45	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.233	< 0.030
Pb	< 0.001	< 0.001	< 0.002	< 0.001	< 0.002	< 0.001	< 0.001	< 0.001	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Mn	0.29	0.20	0.17	0.17	0.47	0.14	0.18	0.06	0.06	0.1	0.11	0.14	0.08	0.130	0.390
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Mo	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Se	0.02	0.004	0.031	0.007	0.006	0.013	0.029	0.082	0.017	0.013	0.018	0.003	0.039	0.008	0.004
V	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Radiometric pCi/l:															
U (mg/l)	1.74	1.49	4.08	4.85	3.98	3.35	2.83	3.18	1.83	2.38	1.45	1.54	1.13	2.13	0.73
Ra 226	134	297	112	54.0	101	78	90.6	50.7	27	106	34.6	62.1	44.3	125	39.5
Ra 226 +/-	2.8	4.1	2.5	1.8	2.5	2.2	2.3	1.8	1.8	2.7	2	2.6	1.7	4.5	2.10

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STABILIZATION ROUND 2  
IRIGARAY DESIGNATED RESTORATION WELLS

STABILITY  
ROUND 2

Well I.D.: Production Unit: Sample Date:	HP-24 Unit 6 12-Feb-02	HP-59 Unit 6 12-Feb-02	HP-87 Unit 6 12-Feb-02	JP-28 Unit 7 28-Nov-01	JP-53 Unit 7 29-Nov-01	KP-29 Unit 7 29-Nov-01	KP-63 Unit 7 29-Nov-01	JP-15 Unit 7 28-Nov-01	JP-84 Unit 7 28-Nov-01	KI-128 Unit 8 06-Nov-00	KP-44 Unit 8 06-Nov-00	LI-51 Unit 9 26-Jul-00	LP-13 Unit 9 26-Jul-00	LP-22 Unit 9 26-Jul-00	LP-63 Unit 9 26-Jul-00	LP-43 Unit 9 26-Jul-00	MEAN Units 1-9 Round -2
Major Ions mg/l:																	
Ca	22.7	53.4	29	16	50.3	24.8	27.7	33.1	9.9	30.2	30	24.5	23.4	24.8	24.2	23.0	28.2
Mg	5.6	10.6	6.6	4.4	14.4	7.7	6.6	9.2	2.4	7.9	7.8	6.4	4.2	6.5	6.4	5.1	7.3
Na	170	230	202	161	315	187	184	204	123	190	188	181	182	173	176	135	188
K	2.5	2.8	2.9	2.1	3.3	2.3	2.4	3.2	1.2	2.9	2.9	2.3	2.6	2.6	2.6	2.4	2.7
CO <sub>3</sub>	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	0.7
HCO <sub>3</sub>	382	545	424	375	796	490	353	505	125	469	470	450	346	429	454	366	431.5
SO <sub>4</sub>	109	167	144	79.2	174.0	84.1	173	122	168.0	99.4	92.1	100	180	102	90	74	135.4
Cl	38	52.5	44.8	27.2	60.9	26.6	31.9	38.8	16.8	25.6	21.8	30.4	26.0	26.8	20.4	20.1	43.1
NH <sub>4</sub>	0.23	0.22	0.24	0.15	0.22	0.16	0.26	0.21	0.08	0.13	0.05	0.05	0.26	0.20	0.18	0.19	8.3
NO <sub>3</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.1
NO <sub>3</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.1
F	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20	< 0.10	< 0.20	< 0.20	0.1
SiO <sub>2</sub>	5.01	5.37	5.11	3.48	3.92	5.29	5.12	4.28	2.96	5.4	4.8	5.3	7.4	4.9	5.3	6.7	5.0
TDS	539	802	667	489	1070	584	625	689	402	585	565	586	611	567	582	459	638.5
Cond. (mmho/cm)	885	1290	1070	810	1690	968	1010	1120	662	974	966	947	975	920	920	750	1082.1
Alk. (as CaCO <sub>3</sub> )	297	447	348	308	653	402	290	414	103.0	385	385	369	284	352	372	300	354.0
pH (units)	7.70	7.80	8.00	7.90	7.6	7.60	7.80	7.80	7.20	7.59	7.68	8.14	8.12	7.94	7.98	8.11	7.9
Trace Metals mg/l:																	
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.10
As	< 0.001	< 0.004	< 0.001	< 0.001	< 0.001	< 0.003	< 0.001	< 0.002	< 0.003	< 0.004	< 0.002	< 0.001	< 0.026	< 0.004	< 0.002	< 0.018	< 0.005
Ba	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.11	< 0.09
B	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1
Cd	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.004
Cr	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fe	< 0.040	< 0.063	< 0.107	< 0.03	< 0.038	< 0.345	< 0.047	< 0.03	< 0.06	< 0.04	< 0.03	< 0.07	< 0.45	< 0.06	< 0.03	< 0.53	< 0.11
Pb	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04
Mn	< 0.14	< 0.36	< 0.15	< 0.06	< 0.36	< 0.18	< 0.34	< 0.19	< 0.07	< 1.45	< 0.46	< 0.08	< 0.14	< 0.14	< 0.10	< 0.16	< 0.23
Hg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Mo	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.08
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Se	< 0.027	< 0.002	< 0.0180	< 0.038	< 0.020	< 0.005	< 0.036	< 0.006	< 0.002	< 0.002	< 0.033	< 0.080	< 0.001	< 0.069	< 0.067	< 0.094	< 0.03
V	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.09
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Radiometric pCi/l:																	
U (mg/l)	2.25	1.59	0.640	2.70	0.798	0.334	0.846	1.78	0.0889	1.61	1.41	1.65	1.21	3.01	2.73	1.20	1.95
Ra 226	184	234	43.6	48.1	4.9	7.9	2.7	38.0	78.4	149	107	67	183	207	167	207	89.3
Ra 226±	6.6	8.4	2.2	2.1	0.2	0.30	0.1	1.90	2.8	5.4	3.8	2.6	6.8	7.4	6.0	7.4	3.3

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**STABILIZATION ROUND 3**  
**IRIGARAY DESIGNATED RESTORATION WELLS**

**STABILITY  
ROUND 3**

Well I.D.: Production Unit: Sample Date:	AP-4 Unit 1 02-Jun-93	BP-4 Unit 1 02-Jun-93	CI-17 Unit 2 02-Jun-93	DI-27 Unit 3 02-Jun-93	DI-90 Unit 2 02-Jun-93	DP-28 Unit 2 02-Jun-93	DP-29 Unit 3 02-Jun-93	FP-5 Unit 3 02-Jun-93	FI-62 Unit 4 25-Mar-99	FI-132 Unit 4 25-Mar-99	GP-8 Unit 5 25-Mar-99	GI-78 Unit 5 25-Mar-99	GI-82 Unit 5 25-Mar-99	HI-57 Unit 6 22-May-02	HI-62 Unit 6 22-May-02
Major Ions mg/l:															
Ca	22.8	20.7	27.2	40.9	67.7	38.7	28.9	18.9	14.6	12.2	16.4	21.3	34.8	29.5	25.7
Mg	7.5	5.8	6.7	9.1	13.0	9.7	7.0	5.5	3.3	2.8	4.2	5.3	10	6.5	4.9
Na	150	176	207	190	251	178	267	211	153	154	115	133	227	190	189
K	2.0	2.5	3.1	3.1	3.8	3.3	3.6	2.9	2	1.7	1.8	2.3	3.4	2.8	2.7
CO <sub>3</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
HCO <sub>3</sub>	322	328	391	402	566	447	526	434	386	372	238	317	458	408	381
SO <sub>4</sub>	177	193	187	181	210	162	165	163	66.9	70.2	85.5	91.6	174	136	166
Cl	31.0	45.2	64.3	69.2	109	52.8	65.9	34.6	24.2	26.9	28.6	41.8	105	40.0	30.7
NH <sub>4</sub>	29.1	25.5	22.0	28.0	34.9	28.0	21.9	19.1	10.7	9.58	3.93	10.1	21.2	0.24	0.24
NO <sub>3</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
NO <sub>2</sub> (N)	< 0.10	< 0.10	< 0.30	< 0.20	< 0.20	< 0.10	< 0.10	< 0.10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
F	0.19	0.12	0.17	0.15	< 0.10	0.15	< 0.10	< 0.10	0.11	0.15	0.14	0.11	0.1	< 0.10	< 0.10
SiO <sub>2</sub>	6.1	5.9	6.3						3.9	3.4	2.5	2.3	3.4	5.64	7.3
TDS	554	610	712	673	920	717	807	638	449	465	385	437	769	623	629
Cond. (mmho/cm)	1158	1205	1343	1318	1769	1286	1524	1203	819	811	652	821	1420	1010	995
Alk. (as CaCO <sub>3</sub> )	264	269	320	330	484	366	432	356	317	308	196	260	378	335	296
pH (units)	7.46	7.47	7.32	7.58	7.44	7.78	7.78	7.82	8.05	8.12	7.97	8.02	7.88	8.30	8.12
Trace Metals mg/l:															
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
As	0.004	0.005	0.001	0.003	0.012	0.001	0.001	0.001	0.003	0.005	0.005	0.002	0.003	0.003	0.016
Ba	0.05	0.05	0.04	0.03	0.06	0.05	0.04	0.04	0.1	0.1	0.11	0.1	0.12	0.10	0.10
B	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cr	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fe	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.09	< 0.030
Pb	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Mn	0.22	0.21	0.16	0.15	0.57	0.16	0.10	0.06	0.06	0.11	0.09	0.11	0.18	0.180	0.500
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Mo	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Se	0.038	0.014	0.037	0.074	0.008	0.016	0.065	0.106	0.012	0.008	0.032	0.015	0.002	0.005	0.004
V	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Radiometric pCi/l:															
U (mg/l)	0.640	0.942	2.330	4.750	5.570	3.610	1.960	2.700	1.78	2.48	1.46	1.59	1.97	2.40	0.794
Ra 226	133	312	54.1	50.2	108	88.0	68.1	70.0	27.1	98.3	40.6	25	68.5	437	40.4
Ra 228 +/-	2.9	4.4	1.9	1.8	3.3	2.3	2.1	2.1	1.5	3	1.9	1.5	2.5	7.9	2.4

STABILIZATION ROUND 3  
IRIGARAY DESIGNATED RESTORATION WELLS

STABILITY  
ROUND 3

Well I.D.: Production Unit: Sample Date:	HP-59 Unit 6 22-May-02	HI-53 Unit 6 22-May-02	HP-87 Unit 6 22-May-02	JI-91 Unit 7 05-Mar-02	JP-26 Unit 7 27-Feb-02	JP-53 Unit 7 26-Feb-02	JP-57 Unit 7 26-Feb-02	JP-63 Unit 7 26-Feb-02	KP706 Unit 7 26-Feb-02	KI-128 Unit 8 08-Mar-01	KP-44 Unit 8 08-Mar-01	LI-51 Unit 9 25-Oct-00	LP-13 Unit 9 25-Oct-00	LP-20 Unit 9 25-Oct-00	LP-22 Unit 9 25-Oct-00	LP-24 Unit 9 26-Oct-00	MEAN Units 1-9 Round -3
Major Ions mg/l:																	
Ca	53.1	35.1	23.9	27.5	20.3	55.0	14.0	18.6	66.4	28.8	26.7	27.9	22.3	31.1	27.5	25.3	29.5
Mg	11.3	8.3	5.7	8.0	5.1	14.6	3.1	3.4	13.9	7.1	6.6	7.3	3.9	7.7	7.0	5.5	7.0
Na	239	205	194	203	180	316	139	138	277	192	181	199	185	187	199	172	192
K	2.5	3.1	2.8	2.6	2.8	3.9	2.5	2.5	4.0	3.5	3.3	4.7	4.8	5.8	5.3	4.5	3.3
CO <sub>3</sub>	< 1.0	< 1.0	4.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 0.9
HCO <sub>3</sub>	583	454	392	494	400	739	300	197	609	482	470	469	376	468	493	426	427.7
SO <sub>4</sub>	159	143	134	92.7	90.9	192.0	64.7	168.0	232	91.4	70.5	113	138	104	101	95.2	133.4
Cl	61.1	49	43.5	35.8	33.4	67.9	29	21.2	66.2	24.5	18.8	30.9	27.3	26.2	27.5	22.3	43.1
NH <sub>4</sub>	0.23	0.28	0.23	0.12	0.18	0.21	0.14	0.29	0.280	0.18	0.09	0.05	0.18	0.08	0.21	0.15	8.0
NO <sub>3</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1
NO <sub>3</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1
F	< 0.10	< 0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.30	< 0.10	< 0.10	< 0.10	< 0.12	< 0.30	< 0.30	< 0.30	< 0.12	< 0.30	< 0.2
SiO <sub>2</sub>	5.39	6.17	5.07	4.21	4.59	4.75	4.21	6.98	6.7	5.8	4.7	4.5	6.4	4.7	4.5	4.1	5.0
TDS	858	698	611	582	506	990	373	427	922	548	502	637	593	811	633	548	620.7
Cond. (mmho/cm)	1370	1120	1010	995	845	1600	650	694	1490	951	882	1040	959	1010	1040	913	1080.0
Alk. (as CaCO <sub>3</sub> )	478	373	328	405	328	606	246	162	500	395	385	385	308	384	404	349	351.0
pH (units)	8.14	8.20	8.31	7.90	8.10	8.00	8.10	7.80	7.80	7.86	7.89	7.86	7.8	7.68	7.87	7.78	7.9
Trace Metals mg/l:																	
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
As	0.003	0.003	0.001	0.001	0.001	0.001	0.001	0.003	0.003	0.009	0.002	0.003	0.025	0.003	0.003	0.007	0.005
Ba	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.09
B	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1
Cd	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.004
Cr	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.02	< 0.02	< 0.01
Fe	< 0.030	< 0.133	< 0.084	< 0.030	< 0.03	< 0.06	< 0.030	< 0.119	< 0.075	< 0.31	< 0.03	< 0.03	< 0.25	< 0.03	< 0.03	< 0.26	< 0.07
Pb	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04
Mn	1.00	0.570	0.180	0.18	0.07	0.36	0.06	0.82	0.30	1.45	0.51	0.09	0.14	0.16	0.17	0.17	0.29
Hg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Mo	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.09
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Se	0.002	0.003	0.013	0.032	0.021	0.016	0.012	0.002	0.011	0.001	0.026	0.078	0.001	0.076	0.052	0.001	0.03
V	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.09
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Radiometric pCi/l:																	
U (mg/l)	2.76	1.59	0.766	0.752	3.020	1.120	1.160	0.217	3.030	1.75	1.42	1.59	0.856	1.45	2.19	2.10	1.97
Ra 226	332	241	39.3	29.2	47.2	114	62.6	169	167	175	96.8	57.1	160	108	156	221	127.5
Ra 228+/-	7.1	5.4	2.4	1.7	2.1	4.1	2.4	6.1	6.0	6.3	3.5	2.1	5.7	3.9	5.6	7.9	3.9

STABILIZATION ROUND 4  
IRIGARAY DESIGNATED RESTORATION WELLS

STABILITY  
ROUND 4

Well I.D.:	AP-4 Unit 1	BP-4 Unit 1	CI-17 Unit 2	DI-90 Unit 2	DP-28 Unit 2	DI-27 Unit 3	DP-29 Unit 3	FP-5 Unit 3	FI-62 Unit 4	FI-132 Unit 4	GI-78 Unit 5	GP-9 Unit 5	GI-82 Unit 5	HI-50 Unit 6	HI-57 Unit 6
Production Unit:	Unit 1	Unit 1	Unit 2	Unit 2	Unit 2	Unit 3	Unit 3	Unit 3	Unit 4	Unit 4	Unit 5	Unit 5	Unit 5	Unit 6	Unit 6
Sample Date:	02-Sep-93	02-Sep-93	02-Sep-93	02-Sep-93	02-Sep-93	02-Sep-93	02-Sep-93	02-Sep-93	16-Jul-99	16-Jul-99	28-Jun-99	30-Jun-99	14-Jul-99	13-Aug-02	13-Aug-02
Major Ions mg/l:															
Ca	32	27	20	65	38	37	28	21	15	13	16	16.3	37	24.5	31.6
Mg	8.9	5.5	5	13	10	8.6	7.3	5.9	4	4	5	4.1	11.8	4.6	6.7
Na	134	182	170	245	176	159	251	182	131	141	163	107	262	185	188
K	2.1	2.7	2.6	3.9	3.6	2.9	3.5	2.8	3	2.6	3	2.2	4.9	2.7	3.1
CO <sub>3</sub>	0	0	0	0	0	0	0	0	1	1	1	1	1	1.0	1.0
HCO <sub>3</sub>	248	407	326	600	451	359	479	346	365	5.1	366	233	500	400	403
SO <sub>4</sub>	228	197	184	237	154	165	150	159	67	74	94	81.9	190	115	137
Cl	34.3	43.9	37.5	104	47.9	52.7	90.9	39.9	17	24	37	22.1	117	22	40.6
NH <sub>4</sub>	27.5	35.8	23.2	38.1	29.8	28.4	22.7	20.2	9.76	8.94	8.07	4.04	23.6	0.17	0.28
NO <sub>3</sub> (N)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
NO <sub>2</sub> (N)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
F	0.22	0.11	0.13	0.12	0.12	0.18	0.1	0.12	0.14	0.17	0.13	0.15	0.1	0.20	0.10
SiO <sub>2</sub>	6	5.5	5.8	8.2	8.2	4.5	5.2	4.6	4	3.4	3	2.5	3.5	5.79	5.39
TDS	605	713	615	968	722	642	834	614	437	448	503	343	804	577	641
Cond. (mmho/cm)	1092	1237	1324	1367	1228	1970	1671	1308	802	614	673	604	1580	940	1030
Alk. (as CaCO <sub>3</sub> )	203	334	267	492	370	294	393	284	300	302	300	191	410	328	330
pH (units)	7.2	7.16	7.28	7.07	8.05	7.47	7.61	7.5	8.11	8.4	8.15	8.03	7.96	7.78	7.77
Trace Metals mg/l:															
Al	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
As	< 0.001	< 0.004	< 0.001	< 0.001	< 0.001	< 0.016	< 0.003	< 0.005	< 0.003	< 0.005	< 0.002	< 0.004	< 0.004	< 0.003	< 0.002
Ba	< 0.06	< 0.06	< 0.04	< 0.07	< 0.08	< 0.03	< 0.04	< 0.04	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
B	< 0.05	< 0.05	< 0.05	< 0.05	< 0.07	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cd	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cr	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fe	< 0.25	< 0.06	< 0.05	< 0.05	< 0.05	< 0.18	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.030	< 0.030
Pb	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Mn	< 0.25	< 0.19	< 0.08	< 0.52	< 0.16	< 0.14	< 0.1	< 0.07	< 0.06	< 0.1	< 0.07	< 0.08	< 0.16	< 0.110	< 0.170
Hg	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Mo	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Se	< 0.012	< 0.001	< 0.001	< 0.001	< 0.002	< 0.004	< 0.009	< 0.036	< 0.01	< 0.006	< 0.04	< 0.028	< 0.002	< 0.011	< 0.006
V	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Radiometric pCi/l:															
U (mg/l)	0.317	0.517	0.972	5.79	2.18	4.33	0.218	0.183	1.85	2.41	1.62	1.08	1.76	2.34	2.82
Ra 226	165	521	38.1	149	152	70.2	48.3	119	23.5	63.5	31.3	26	80.1	119	334
Ra 226+/-	5	8.6	2.4	4.5	4.6	3.2	2.2	3.6	1.6	2.6	1.9	1.7	3	4.3	12

STABILIZATION ROUND 4  
IRIGARAY DESIGNATED RESTORATION WELLS

STABILITY  
ROUND 4

Well I.D.: Production Unit: Sample Date:	HI-62 Unit 6 13-Aug-02	HP-24 Unit 6 13-Aug-02	HP-59 Unit 6 13-Aug-02	JP-26 Unit 7 05-Jun-02	JP-53 Unit 7 05-Jun-02	KP-29 Unit 7 05-Jun-02	KP-63 Unit 7 05-Jun-02	JP-15 Unit 7 05-Jun-02	JI-84 Unit 7 05-Jun-02	KP44 Unit 8 06-Jun-01	KI128 Unit 8 05-Jun-01	LI51 Unit 9 24-Jan-01	LP13 Unit 9 24-Jan-01	LP20 Unit 9 25-Jan-01	LP22 Unit 9 24-Jan-01	LP24 Unit 9 24-Jan-01	MEAN Units 1-9 Round 4
Major Ions mg/l:																	
Ca	24.2	24.2	49.8	19.5	38.1	28.1	33.2	32.9	11.6	23.3	25.3	29.7	24.2	52.7	29.4	25.3	28.8
Mg	4.6	8.1	10.5	5.4	11.1	8.9	8.2	9.5	2.8	5.9	6.4	7.6	4.1	12.1	7.1	5.3	7.0
Na	190	173	237	180	275	209	209	214	135	161	172	194	179	211	191	165	186
K	2.8	2.6	2.5	2.3	2.9	2.6	2.8	3.3	1.1	2.2	2.3	2.7	3.0	4.4	3.3	2.4	2.9
CO <sub>3</sub>	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.8
HCO <sub>3</sub>	343	351	567	412	631	534	417	525	155	457	468	473	385	590	492	404	409.0
SO <sub>4</sub>	189	124	157	80.0	148.0	88.3	171	103	168.0	62.8	81.9	105	124	134	99.5	82.6	132.0
Cl	32.4	33	59.6	29.7	48.8	22.8	34.6	32.4	0.1	19.3	24.8	35	31.2	43	28.1	25.4	39.4
NH <sub>4</sub>	0.23	0.21	0.23	0.19	0.19	0.15	0.24	0.26	0.11	0.13	0.24	0.05	0.21	0.11	0.21	0.16	8.5
NO <sub>3</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1
NO <sub>3</sub> (N)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1
F	0.10	0.10	0.10	0.10	0.10	0.10	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.1
SiO <sub>2</sub>	7.3	5.05	6.01	3.84	4.10	5.50	5.48	4.31	3.27	4.5	5.9	4.5	7.2	5.4	4.9	4.5	5.0
TDS	621	561	831	540	891	655	706	675	415	526	542	618	575	748	609	522	625.9
Cond. (mmho/cm)	978	905	1320	678	1400	1040	1120	1090	688	875	943	1030	946	1270	1020	864	1093.8
Alk. (as CaCO <sub>3</sub> )	281	288	465	338	518	438	342	431	127.0	375	384	388	316	475	404	332	344.5
pH (units)	7.93	7.91	8.10	8.06	7.89	7.97	8.05	8.11	7.73	7.97	7.96	7.54	7.4	7.55	7.56	7.27	7.8
Trace Metals mg/l:																	
Al	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.14	< 0.10	< 0.10	< 0.10
As	0.017	0.001	0.003	0.001	0.001	0.003	0.001	0.002	0.004	0.002	0.01	0.002	0.029	0.002	0.002	0.008	0.005
Ba	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.09
B	< 0.1	< 0.1	< 0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1
Cd	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.004
Cr	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04
Cu	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
Fe	< 0.030	< 0.038	< 0.030	< 0.030	< 0.068	< 0.425	< 0.030	< 0.280	< 0.134	< 0.03	< 0.05	< 0.03	< 0.50	< 0.04	< 0.03	< 0.43	< 0.11
Pb	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.09	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04
Mn	< 0.420	< 0.150	< 0.310	< 0.09	< 0.31	< 0.23	< 0.32	< 0.21	< 0.07	< 0.51	< 0.95	< 0.09	< 0.14	< 0.30	< 0.20	< 0.15	< 0.21
Hg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Mo	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.07
Ni	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Se	0.004	0.021	0.003	0.033	0.024	0.001	0.041	0.002	0.001	0.025	0.001	0.071	0.001	0.076	0.048	0.001	0.02
V	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.09
Zn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Radiometric pCi/l:																	
U (mg/l)	0.844	1.91	6.03	2.48	1.490	0.420	0.863	1.59	0.0840	1.45	1.9	1.47	0.859	3.19	2.71	2.16	1.83
Ra 226	35.9	155	312	55.8	84.2	150	43.5	28.0	63.9	112	186	68.3	212	194	206	225	130.7
Ra 226+/-	1.90	5.6	6.3	2.1	3.0	5.4	1.9	1.5	2.3	4	6.7	2.5	7.6	7	7.4	8.1	4.4

**APPENDIX B**

**DETAILED SITE SETTING, GEOLOGY AND HYDROLOGY**

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**APPENDIX B  
DETAILED SITE SETTING, GEOLOGY AND HYDROLOGY**

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Plate 2 - West-East Stratigraphic Cross-section H-H': Irigaray Mine

## **APPENDIX B**

### **DETAILED SITE GEOLOGY AND HYDROLOGY**

The Irigaray project is located approximately 90 miles north of Casper, 45 miles southeast of Buffalo, and 40 miles southwest of Gillette, Wyoming (Figure 1-1), in the west central part of the Powder River Basin. The principal mining areas of interest (e.g., Mine Units 1-9) are located in Sections 9 and 16, T45N, R77W (Figures 1-2 and 1-3). The wellfield area, as shown in Figure 2-1, comprises approximately 30 acres.

#### **B.1 PHYSIOGRAPHY AND CLIMATE**

##### **B.1.1 Topography**

The topography of the central Powder River Basin (PRB) is dominated by plains, rolling hills, and tablelands. Topographic relief has resulted from structural deformation on the west, east and south edges of the Basin and historical deposition and erosional cycles within the Basin itself. On a regional basis, the surface of the Basin sediments dips gently (1 to 2 degrees) to the north/northwest.

The Irigaray site is located in the west-central portion of the PRB, approximately 2.5 miles east of the north-flowing Powder River (Figure 1-2). The site is part of the Great Plains Physiographic Province, which is characterized by broad river plains and low plateaus on stratified sedimentary rocks. Willow Creek flows to the west-northwest immediately north of the site (Mine Unit 1) (Figures 1-3 and 1-4).

Locally, the elevation in the Irigaray area ranges from approximately 4,350 to 4,500 feet AMSL within Mine Units 1 to 9, respectively. The area is characterized by gently rolling hills with deeply dissected drainages. The land surface elevation to the south-southeast of the mine site increases over an approximate three-mile distance to approximately 4,870 feet at Table Mountain (Figure 1-2). To the west-northwest, the land surface slopes downward over a 3-mile distance to the Powder River at approximately 4,220 feet.

##### **B.1.2 Climate**

The climate of the Irigaray area is semi arid, with an average annual precipitation of approximately 13 inches (Western Regional Climate Center; Kaycee and Midwest, Wyoming Stations; Wendell, et. al., 1976). The average minimum temperatures range from about 6° F in January to 50° F in July and August. Average maximum temperatures range from 37° F in January to 87° F in mid-summer. Seasonal temperature extremes can vary from -40° F to 100° F.

The majority of precipitation (e.g., 60 to 70 percent) is in the form of rain which falls during the summer months. Historically, precipitation can vary dramatically. For example, precipitation at Midwest in 1972 was 19.8 inches, whereas only 8.4 inches

was received at that location in 1951 (Lowry and Wilson, 1986). Prevailing winds are from the west and northwest, with an average annual wind velocity of 13 miles per hour.

## **B.2 REGIONAL GEOLOGY**

The Powder River Basin is a large, asymmetrical structure bounded on the west by the Big Horn Mountains, on the east by the Black Hills, and by the Laramie Range and Hartville Uplift on the south (Figure B-1). The Basin orientation and plunge generally are south to north. The Basin is open to the north and encloses approximately 13,000 square miles of northeastern Wyoming (Sharp & Gibbons, 1964). Most of the structural expression of the Basin is due to subsidence and sedimentation, rather than uplifting. The Irigaray Mine is located just east of the axis of the PRB.

Approximately 16,000 to 18,000 feet of sediments overly the Precambrian basement in the basin. Lower to Upper Cretaceous-age rocks (Frontier to Lance Formations) outcrop on the west side of the PRB, whereas predominately Upper Cretaceous (Lance) and Pliocene (Fort Union) deposits are present on the south and east sides (Hodson, et. al., 1973). In the central portion of the basin, these marine and fluvial deposits are approximately 8,000 feet below the outcrop elevations. Eocene Wasatch Formation is present at the surface across most of the PRB.

The southern part of the Basin appears to have been relatively stable during and after Eocene time (Sharp & Gibbons, 1964). Dips of beds within the Wasatch section range from less than one degree to 2 ½ degrees. At the fringes of the PRB, the Fort Union dips to the center of the PRB from 2 to 20 degrees.

## **B.3 SITE STRATIGRAPHY**

The specific stratigraphy that applies to this study includes the section from the Oligocene White River Formation to the Paleocene Fort Union Formation. These deposits are described, in descending sequence, in the following sections.

### **B.3.1 Surficial Deposits**

Surficial deposits in the vicinity of Irigaray consist mainly of weathered sediments of the Wasatch Formation, alluvium in small drainages, and alluvium/terrace deposits in the immediate vicinity of the Powder River. The general character of the alluvium has been described by Love and Christiansen (1985) as clay, sand, silt and gravel present in flood plains, fans, terraces, and slopes.

A more detailed presentation of surface geology specific to the vicinity of the Powder River drainage is provided by Ringen and Daddow (1990) who classify the alluvial deposits in descending order as follows: (1) the Kaycee terrace (sandy silt, gravel and coarse sand with cobbles), (2) the Moorcroft terrace, consisting of silty, fine-grained alluvium, and the Lightning terrace (silty, fine or medium sand with lenses of coarse sand or fine gravel).

The Oligocene White River Formation, which is commonly found on the surface in the fringes of the PRB, has been eroded away in the Irigaray area; occasional surficial deposits are encountered in the vicinity of Pumpkin Buttes. The White River is composed of tuffaceous sandstone, conglomerate, and claystone.

### **B.3.2 Wasatch Formation**

The Eocene-age Wasatch Formation unconformably overlies the Fort Union Formation. It is present on the surface throughout the Irigaray area, and most of the central portion of the PRB. The Wasatch is comprised of claystone, lenticular sandstone, and minor coal deposits from fluvial origin. Approximately 3,500 feet of Wasatch is present in the northern portion of the PRB. Due to erosion, progressively thinner Wasatch deposits are found to the south. Sediments on the edges of the Basin typically are characterized by broad sheet-like sandstones deposited by braided streams that have not been confined within a single channel. These sandstones commonly are coarse-grained, poorly sorted, and contain low concentrations of carbonaceous materials.

Toward the interior of the Basin, channel sand deposits from meandering streams are more common. Between the channels, siltstones and mudstones, containing high carbon content, have been deposited by flood events. The channel sandstones typically are crossbedded, grade upwards from coarse to fine, and contain carbonaceous debris (Honea, 1974). Rose (1971) suggests that the gradational nature of the Wasatch deposits is indicative of deposition by large, high-energy streams, or high-energy events in medium-sized streams.

According to Morris and Bahr (1975), the channel systems which deposited the Wasatch sandstones in the Irigaray area trend approximately north. Several subparallel systems are present, consisting of multi-storied channels superimposed on top of one another, but all having the same general trend. The channel deposits average about 100 feet in thickness, two to seven miles in width, and have been identified to extend over twenty miles in length. The width in the specific Irigaray area is generally reported as two to three miles.

On a more detailed scale, Morris and Bahr identified two superposed channel systems which are ore bearing within the Irigaray property, referred to as the Upper Irigaray Sandstone (UISS) and the Lower Irigaray Sandstone (LISS). Because of greater ore grades and sand quality, all mining operations to date have been conducted in the UISS. The UISS and LISS generally are separated by 10 to 30 feet of clay, and are underlain by sandstone, silt and shale. Within the Irigaray area, the mineralized deposits typically are encountered at depths from 100 to 300 feet below ground surface.

The UISS consists of feldspathic to arkosic sandstone, with grain sizes that range from very fine to coarse, and sorting from good to poor. Interbedded siltstone, mudstone, and coal are common. Carbon is present but erratically distributed, and pyrite is usually less than 0.5 percent.

A thin lignite bed (referred to as the overlying coal unit) is present above the UISS throughout the Irigaray area, and has been shown to be continuous over a large area (e.g., more than 6 miles east to west).

### **B.3.3 Fort Union Formation**

The Paleocene Fort Union Formation consists of 1,900 to 3,200 feet of sediments. Deposition of the Fort Union was primarily from large sluggish streams or swampy conditions, with local areas of high-energy stream deposition. Honea (1974) described the Fort Union as having three sections: (1) the upper (Tongue River) member that includes about 1,000 feet of arkosic channel sands, mudstones, and an extensive coal bed, the Roland Coal, (2) a middle portion, 500 feet of carbonaceous shale, bentonite, and minor lignite (Lebo Shale Member), and (3) the lower section (Tullock Member) consisting of approximately 1,000 feet of fluvial siltstone and fine grained sandstone

### **B.3.4 Geologic Characteristics of the UISS**

#### Structure and Thickness

The local character of the UISS was evaluated based on 8 west-east geologic cross-sections and one north-south cross-section through Mine Units 1-9 prepared by Wyoming Minerals. An example of one of the cross-sections (H-H') is attached as Plate 2; the locations of the cross-sections is shown on Figures B-2 through B-4.

Based on data from those sections (including over 120 wells), and review by a former CMI geologist who worked at Irigaray for many years, top and bottom structure maps and a total sand isopach for the UISS were prepared. The top of the UISS is relatively flat (Figure B-2), whereas erosional sequences during deposition are evident at the bottom of the deposit (Figure B-3). As mentioned previously, the UISS is approximately 100 feet thick in the Irigaray vicinity. As expected in a fluvial system, the sand thickness varies at specific locations (Figure B-4).

#### Detailed Stratigraphy

Based on numerous historical studies performed for the site operators, the detailed stratigraphy of the UISS and overlying sediments in the immediate vicinity of Irigaray is summarized below.

Generalized Stratigraphic Column and Description Surface to the UISS Irigaray Mine		
<i>Geologic Section (Classification)</i>	<i>Typical Thickness (feet)</i>	<i>Description</i>
Overburden Unit	60 – 125	Interbedded, discontinuous sand and claystone
Unit 1 Sand (Shallow/upper monitor zone)	5 – 50	Fine-grained, discontinuous sandstone
Interburden Unit	20 – 30	Interbedded claystone, sandstone, and coal
Coal Unit	5	Fractured, soft coal seams 1-2 feet thick
Claystone Unit	18 – 25	Gray, hard claystone
Upper Irigaray Sandstone (UISS) (Mining zone)	75 - 130	Fine to medium-grained arkosic sandstone

To specifically characterize the UISS, Morris and Bahr performed a detailed evaluation of 18 coreholes drilled in the UISS in Section 9, T45N, R77W. The mineralized and non-mineralized zones in the UISS were classified based on visual observations and gamma logs. Based on those classifications, 2-foot core sections were delivered to Core Laboratories in Casper, Wyoming. Twenty samples from the mineralized zones and ten samples from the non-mineralized zones were tested for vertical and horizontal permeability, porosity, and density. The remaining ten samples were selected from claystone and siltstone above and below the UISS, and similar testing performed.

Based on this work, the UISS was described as fine to coarse-grained, poorly-sorted, poorly-cemented sand with occasional silt and gravel. The primary cement was reported as calcite. Some well-sorted silt and clay zones of variable thickness were observed. As expected for a fluvial system, irregular sequences of graded bedding were observed, generally fining upward.

Laboratory core testing results reported by Morris and Bahr are summarized below. Because the units for permeability and density were not specified, common laboratory units based on air permeability and helium porosity testing were assumed.

Average Permeability, Porosity, and Density for UISS Core Samples (after Morris & Bahr, 1975)				
<i>Sample Description</i>	<i>Horizontal Permeability (md)</i>	<i>Vertical Permeability (md)</i>	<i>Porosity (percent)</i>	<i>Density (g/cc)</i>
Clay & Silt above UISS	0.3	0.5	16.6	na
Mineralized Zone	806	607	23.4	1.96
Non-mineralized Zone	3312	2256	29.0	1.86

Based on the results presented above, the horizontal permeability of the non-mineralized zone is approximately four times that in the mineralized zone. In addition, the non-mineralized zone has higher porosity and lower density. These results are expected because (1) the mineralized areas typically have finer grain size, (2) accumulation of carbonaceous materials and silt (which enhances precipitation of uranium), will reduce permeability in the mineralized zone, and (3) deposition of additional material (carbon, silt, and uranium) would increase bulk density. Similar results with regard to mineralization and grain size at Irigaray were obtained by Honea (1974), who found that higher mineralization occurred predominantly in fine-grained sediments. Further, Rose (1971) indicated that the highest mineralization at Irigaray occurred in the transition between massive sandstones and silts.

The ratio of horizontal to vertical permeability (approximately 1.4 for all samples) is lower than anticipated for a fluvial system. Experience indicates that a ratio of 5 to 10 is more common.

## **B.4 REGIONAL HYDROGEOLOGY**

### **B.4.1 Regional Ground-water Flow**

Historical studies have stated that the general direction of ground-water flow in the PRB is to the north. It has been postulated that regional flow systems (e.g., the Wasatch, Fort Union, and deeper sediments) generally flow to the northern portion of the PRB and discharge via unknown avenues in Montana. The hydraulic communication between the flow systems has been reported to vary from none to direct. Flow direction in those sediments near outcrop areas generally has been characterized as toward the center of the PRB. The specific discharge areas have not been clearly identified in historical studies, and the degree of interaction between surface and ground water in the PRB was not fully defined.

More recent studies performed in the PRB regarding regional ground-water flow and the impact of ground-water on surface water bodies have provided new and more detailed information; however, the results of most of the recent work indicate that ground-water flow in the PRB is more appropriately evaluated on a local, rather than regional scale, both with regard to flow direction and gradient.

Lowry & Wilson (1986) present data for deep (Lower Cretaceous) water-bearing strata in the PRB, which indicate a general northward trend in the ground-water flow, with variable gradients in shallow coal-bearing intervals.

Results reported by Rankl & Lowry (1990) include the following: (1) regional ground-water flow from the Wasatch and Fort Union Formations in the Powder River Basin is not as simple as presented in historical studies, (2) areas of ground-water discharge from a regional flow system that would be inferred from potentiometric data could not be substantiated, (3) the regional flow system may have a smaller flow (and transmissivity)

that previously thought, (4) general northward flow can be inferred from potentiometric data, but specific discharge areas could not be identified based on chemical data or streamflow records, and (5) the nonhomogeneity of the formations precludes the use of simple regional water-level maps as a substitute for sets of stratigraphically based potentiometric maps.

Further, the authors indicate that, because vertical flow in the PRB is limited. Most flow occurs horizontally (e.g., to the north) in specific stratigraphic units, and regional/local potentiometric data must be from the same stratigraphic horizon to assess the direction and gradient. They found large differences in hydraulic head occur in Wasatch wells completed at different depth intervals; therefore, potentiometric maps are only meaningful if all the data are from the same specific horizon.

For these reasons, only wells completed in the UISS were utilized to assess the hydraulic gradient in the vicinity of Irigaray. Water level data from over 60 monitoring and trend wells in the vicinity of the Irigaray wellfield, and 4 monitoring wells approximately 3,700 feet to the north of the wellfield (517 Area – Plate 1) were used to construct a semi-regional potentiometric map for June 2002 (Figure B-5). In general, monitoring and trend wells outside the wellfield were used because the historical water-level data were more consistent and representative than levels from specific mining wells, or monitoring wells inside the wellfield area. The water level data are included in Table B-1.

On a semi-regional scale, ground-water flow occurs to the north-northwest, and the gradient is on the order of 0.004 to 0.006 ft/ft. This ground-water flow direction is consistent with results numerous studies (Honea, 1974; Morris & Bahr, 1975; NRC, 1978; Rose, 1971) on a scale specific to Irigaray. In particular, Honea concluded that (1) the mineralized front occurs parallel to major direction of transmissivity of the UISS channel system (north/northwest), and (2) oxidizing groundwater resulting in alteration and transport of dissolved uranium were believed to have originated to the south of the Irigaray area, and moved parallel to the channel direction.

#### **B.4.2 Surface-water and Ground-water Interaction**

Additional support for a general north-northwest direction of ground-water flow in the Wasatch is provided by results from studies of surface- and ground-water interaction. Namely, if direct communication between the Wasatch and the Powder River existed, it would be anticipated that, during dry periods, ground-water flow would occur in a westerly direction from Irigaray to the Powder River.

For example, Rankl & Lowry (1990) indicate that some local discharge from upper Wasatch to surface drainages undoubtedly occurs, but because of stratification, this discharge may be at elevations above stream channels. As such, the discharged groundwater is evaporated or transpired during the growing season, and does not contribute significantly to stream baseflow. Results from their study do indicate that thin alluvial deposits adjacent to stream channels may store water during periods of high

water levels, and discharge that water to surface drainages as surface-water levels decline.

Ringen & Daddow (1990) state that, due to a common clay/shale interval in the upper portion of the Wasatch, there appears to be little or no communication between bedrock (Wasatch) and surface drainages such as the Powder River. This is supported by the lack of recharge to the Powder River from the Wasatch documented by Rankl and Lowry. Isolation between the upper/middle Wasatch and surface drainages also is consistent with the demonstration of containment for the Irigaray ISL project, and supports a regional north/northwesterly hydraulic gradient in the vicinity of Irigaray.

## **B.5 LOCAL HYDROGEOLOGY**

As discussed previously in Section B.3, the hydrostratigraphic unit of interest is the UISS, where all the mining activities at Irigaray have been conducted. Discussion of the site hydraulics related to the UISS follows.

### **B.5.1 Hydraulic Gradient and Direction**

Having established that the general direction of ground-water flow is to the north-northwest, assessment of the local gradient and direction, specifically applicable to the Irigaray site is necessary. In this regard, data from the same set of wells (except those from the 517 area to the north) were used to prepare potentiometric maps for March 2002 through June 2002 (Figures B-6 through B-9; Table B-1).

Review of these figures indicates that in a general sense, the gradient is to the north-northwest, and the overall gradient throughout the wellfield area (approximately 0.005 ft/ft) is consistent with the regional gradient. The change in the flow direction in the central and northern portion of the wellfield is likely a function of changes in lithology that are expected in a fluvial system. For example, review of Figures B-3 and B-4 indicate that the sand in the middle of the wellfield is thicker than that encountered at the north and south ends.

To a smaller degree, the change in flow direction may also be a result of lower permeability in the mineralized zone along the Irigaray trend (see Section B.3.4), and/or permeability alteration due to mining operations. In this regard, NRC (1983) suggested that the effective permeability after ISL mining zone could be factor of two lower than that present before mining. Canonie (1985; Attachment 2-2) indicated that use of ammonium bicarbonate as a lixiviant in Mine Units 1-5 may have plugged the completions, the UISS matrix, or both.

Because restoration (reverse osmosis) operations were recently completed (November, 2001), water levels in the UISS have not reached steady state. To assess the validity of using existing data for determination of the local ground-water flow regime, water level data from December, 2001 to June 2002 were evaluated (Figures B-10, B-11, B-12). Review of these plots indicates that (1) systematic and consistent increases in water

levels are occurring, and (2) changes in water levels in different areas (e.g., Mine Units and/or differing sides of the wellfield) are consistent.

The variation in the flow across the mining area is not unexpected for a stratified fluvial system, especially considering the degree of mining and restoration that has been performed. In this regard, the numerical modeling conducted to assess the hydraulics of the site, and the fate and transport of certain ground-water constituents, has fully accounted for the variation discussed here. A summary of the modeling results is presented in Section 5, and the detailed modeling report in Appendix C.

### **B.5.2 Aquifer Properties**

#### **UISS**

Based on the site stratigraphic sections, water levels in the UISS observed by CMI and other researchers, the confinement demonstrated during the mine permitting process, and subsequent detailed work by D'Appolonia (1982), the UISS has been shown to be a confined aquifer in the vicinity of Irigaray.

Ten aquifer pumping tests were performed at Irigaray in the UISS between 1977 and 1987. Testing duration ranged from 2.5 to 96 hours and pumping rates ranged from 7.6 to 20.0 gallons per minute (gpm). The tests included 3 to 27 observation wells at distances from 40 to 800 feet from the pumping well. For selected tests, observation wells were also completed in the overlying and underlying confining zones. A summary of the pumping tests and the testing results is presented on Table B-2.

Based on review of the testing data, the average transmissivity (T) ranged from 40.1 to 136 ft<sup>2</sup>/d; the average hydraulic conductivity (K) varied from 0.37 to 1.36 ft/d. Eliminating two tests with results that appear to be anomalous (Canonie, 1986 and Hydrology Associates, undated), the average K value is 0.55 ft/d, and the average storativity (S) is  $2.7 \times 10^{-4}$ . Based on an extensive review of site hydrology during the property evaluation, Canonie (1985) stated that the average K was on the order of 0.46 ft/d.

These hydraulic properties are consistent with a fine-grained sandstone in a confined system. It is noted, that in general, observation wells outside the wellfield (e.g., outside the mineralized zone) had aggregate hydraulic conductivity values approximately 40 percent higher than the wells inside the mining zone. This result supports conclusions from Morris and Bahr (1975) which demonstrated that the hydraulic conductivity of the mineralized zone was significantly less than the non-mineralized zone.

#### **Underlying Claystone and Overlying Interburden Unit**

As reported by Canonie (1986), the vertical permeability of the upper and lower confining units are less than  $10^{-6}$  cm/sec (approximately 0.02 feet/day). This is consistent with the results reported by D'Appolonia (1983), who performed extensive

straddle packer tests to assess the properties of the confining zones. Additional support for low vertical permeability and large extent of the confining zones was presented by Canonie (1985).

## **B.6 MINERALIZED ZONE CHARACTERISTICS**

According to Morris and Bahr (1975), the Irigaray deposits are similar to many other Tertiary basins in Wyoming. Most of the ore is associated with large areas of oxidized (altered) sandstones due to destruction of interstitial pyrite and dispersed carbonaceous materials. The water from the altered zones flowed downgradient until reducing conditions were encountered. The uranium was precipitated at the interface between the oxidized and reduced sandstones, commonly resulting in 'C'-shaped ore bodies referred to as roll fronts. Ore reserves at Irigaray typically occur in thin (20 feet or less) stacked layers, with three main beds commonly encountered.

At Irigaray, the uranium deposits occur along the margins of large tongues of oxidized sandstone. One oxidized tongue occupies the central portion of the UISS channel. The associated altered zone is approximately two to seven miles in width, and over 14 miles in length (Morris & Bahr, 1975; Honea, 1974).

Typically, the interior of the roll is oxidized, and the exterior reduced (Honea, 1974). The reduced side is significantly enriched with uranium, which occurs as uraninite and coffinite. Work by Honea indicated that, in general, the eastern side of the Irigaray trend was reduced, and the western side oxidized. Additional information regarding the specific mineral characteristics of the UISS in the Irigaray area are provided by Honea and others.

The mineralogy of the UISS was described in detail by Morris & Bahr, and Honea (1974). Morris & Bahr state that the UISS is comprised primarily of quartz (55 to 75 percent), feldspar (10 to 33 percent) with minor concentrations of biotite, muscovite, and chlorite. Authigenic minerals associated with oxidation and reduction were primarily calcite and iron (pyrite, hematite, and limonite/goethite), barite, uraninite and coffinite. Based on samples from Section 9, Honea reported carbon content ranging from 0.2 to 2.5 percent.

Mineralization at Irigaray is present in thick (100 on average) north-trending channel sands with an average width of seven miles. Repeated sequences of vertical grading from coarse to fine sands indicates multistoried channel deposition with two or more periods of downcutting and subsequent infilling. This is consistent with the variability of sand thickness and ore distribution observed at Irigaray.

Based on evaluation of completion (under-ream) intervals from 688 production/injection wells at Irigaray, the average completion thickness is 19 feet. Conservatively assuming a 10 percent flare (which is larger than historical operations indicate), the affected portion of the UISS would be approximately 21 feet. This is consistent with the site geology, mining history, and typical roll-front deposits (Harshman, 1974).

## B.7 REFERENCES

Canonie Environmental; February, 1985; Evaluation Report – Irigaray Property; Internal report prepared for Malapai Resources Company (MRC) and Western Nuclear, Inc. (WNI), 1985.

Canonie Environmental, 1986; Aquifer-Aquitard Characterization; Production Units 2 and 3; Irigaray Mine; prepared for Westinghouse Electric Corporation.

Canonie Environmental; 1987; Aquifer-Aquitard Characterization; Section 5 Test Site; Irigaray Mine; prepared for Malapai Resources Company.

D'Appolonia, 1982; Hydrostratigraphy Study; internal report prepared for Malapai Resources Company, 1982.

D'Appolonia, 1983; D-5 Geological Assessment; internal report prepared for Malapai Resources Company, 1983.

Harshman, E.N., 1974; Distribution of elements in some roll-type uranium deposits; in Formation of Uranium Ore Deposits, International Atomic Energy Agency, PP 169-183).

Hodson, W., Pearl, R., Druse, S., 1973; Water Resources of the Powder River Basin and Adjacent Areas, Northeastern Wyoming; U.S. Geological Survey Hydrologic Investigations Atlas HA-465.

Honea, R., 1974; Geology and Geochemistry of Irigaray-Hoe Uranium Mineralization, Johnson County, Wyoming; prepared for the Nuclear Fuel Division, Westinghouse Electric Corporation.

Hydro-Engineering, 1987a; K30 Pumping Test Report; prepared for Malapai Resources Company.

Hydro Engineering, 1987b; Ground-water Properties of Mining Units 6-9; Irigaray Mine (KP33A Pumping Test); prepared for Malapai Resources Company.

Love, J., and A. Christiansen, 1985; Geologic Map of Wyoming; U.S. Geological Survey/Wyoming Geological Survey.

Lowry, M., and Wilson, J., 1986; Hydrology of Area 50, Northern Great Plains and Rocky Mountain Coal Provinces, Wyoming and Montana; U.S. Geological Survey Water Resources Investigations Open File Report 83-545.

Morris, A., and Bahr, J., 1975; Geology and Ore Reserves of the Irigaray Area, Johnson County, Wyoming; Internal report prepared for Wyoming Mineral Corporation.

Rankl, J., and M. Lowry; 1990; Ground-water Flow Systems in the Powder River Structural Basin, Wyoming and Montana; U.S. Geological Survey Water Resources Investigations Report 85-4229.

Ringen, B., and P. Daddow, 1990; Hydrology of the Powder River Alluvium Between Sussex, Wyoming and Moorhead, Montana; U.S. Geological Survey Water Resources Investigations Report 89-4002.

Rose, S., 1971; Lithologic Favorability of the Irigaray-Hoe Area: A interim report.

Sharp, W. and A. Gibbons, 1964; Geology and Uranium Deposits of the Southern Part of the Powder River Basin, Wyoming; U.S. Geological Survey Bulletin 1147-D.

Wendell, W., Glass, B., Breckenridge, R., Root, F., Langeson, D., and the Remote Sensing Lab, University of Wyoming, 1976; Johnson County, Wyoming: Geologic Map Atlas and Summary of Land, Water and Mineral Resources; Geological Survey of Wyoming; County Resource Series No. 4.

U.S. NRC, 1978; Final Environmental Impact Statement Related to Operation of Irigaray Uranium Solution Mining Project – Wyoming Mineral Company; NUREG-0481, September, 1978.

U.S. NRC, 1983. Aquifer Restoration at In-Situ Leach Uranium Mines: Evidence for Natural Restoration Processes. NUREG/CR-3136; PNL-4604. Prepared by W. Deutsch, R. Seme, N. Bell, and W. Martin.

Table B-1: Historical Water Level Summary, Irigaray Mine

Well	07/23/1997	07/13/1998	07/26/1999	06/19/2000	05/31/2001	12/15/2001	01/22/2002	02/21/2002	03/18/2002	04/15/2002	05/14/2002	06/20/2002	07/16/2002	08/16/2002	09/14/2002	10/15/2002	Well
RS26	na	na	na	na	na	na	na	na	4296.3	4298.0	4299.8	4300.2	4300.7	4301.1	4302.2	4302.6	RS26
RS27	4260.1	4262.3	4273.7	4258.9	4266.0	4284.0	4291.3	4294.9	4296.8	4298.4	4300.1	4300.8	4301.0	4301.3	4302.7	4303.0	RS27
DI40	4256.1	4262.8	4274.7	4262.2	4270.1	4288.0	4289.1	4292.4	4294.2	4295.7	4297.1	4297.5	4298.0	4298.6	4299.8	4300.2	DI40
LI3	na	na	na	4283.0	4258.8	4282.7	4299.5	4302.8	4304.8	4307.2	4308.3	4309.4	4310.6	4311.2	4312.4	4312.5	LI3
M1	4272.1	4273.1	4279.4	4271.8	4272.6	na	4290.7	4292.9	4295.8	4297.2	4298.6	4299.3	4299.8	4300.3	4301.3	4301.4	M1
M7	4280.3	4281.3	4287.0	4278.7	4276.8	4291.4	4295.0	4297.8	4299.8	4301.6	4303.0	4303.5	4303.0	4303.6	4305.6	4305.9	M7
M10	na	na	na	na	na	na	na	na	4292.5	4293.7	4293.7	4296.2	4296.4	4296.7	4298.5	4298.6	M10
M12	4259.5	4269.1	4271.3	4249.6	4251.0	na	4297.4	4300.8	4302.5	4304.7	4306.1	4306.9	4307.8	4308.3	4309.4	4309.7	M12
M15	4257.5	4260.6	4271.3	4255.1	4257.4	na	4291.9	4295.2	4296.9	4299.0	4300.4	4301.1	4301.2	4302.0	4303.0	4303.5	M15
M17	4269.5	4266.6	4281.0	4272.0	4276.3	4285.7	4290.7	4293.8	4295.2	4296.4	4298.3	4298.5	4299.1	4299.0	4300.3	4302.0	M17
M18	4277.3	4278.5	4285.1	4275.5	4278.5	4290.7	4295.5	4298.6	4300.4	4302.0	4303.4	4304.0	4304.5	4305.2	4306.1	4306.3	M18
M19	4270.7	4272.7	4279.7	4266.2	4271.1	4290.0	4295.3	4298.5	4300.3	4302.2	4303.6	4304.4	4305.0	4305.8	4306.5	4306.9	M19
M24	4273.4	4276.1	4275.2	4256.8	4268.8	4292.0	4298.7	4302.2	4304.0	4306.1	4307.0	4308.4	4309.3	4309.8	4310.7	4311.1	M24
M25	4258.6	4261.4	4269.2	4251.5	4262.4	4287.0	4291.2	4294.7	4296.4	4298.6	4299.5	4300.6	4301.0	4301.7	4302.7	4303.2	M25
M26	4267.4	4277.0	4261.7	4243.6	4259.5	4290.0	4296.2	4299.8	4302.0	4304.0	4305.3	4306.0	4307.1	4307.9	4309.0	4309.1	M26
M27	4255.8	4268.1	4250.9	4229.4	4247.8	4286.5	4292.5	4296.1	4298.0	4300.1	4301.5	4302.3	4303.3	4304.0	4305.0	4305.2	M27
M28	4269.9	4285.4	4252.1	4257.0	4267.0	4295.6	4300.8	4304.2	4305.9	4308.5	4309.9	4310.8	4311.9	4312.5	4313.6	4313.6	M28
M29	4261.2	4278.7	4246.4	4238.3	4251.3	4292.9	4298.2	4300.7	4303.6	4305.8	4307.5	4308.4	4309.4	4310.1	4311.1	4311.2	M29
M30	4276.8	4292.9	4258.7	4270.5	4277.6	4299.2	4304.1	4307.5	4309.4	4311.9	4312.6	4314.1	4315.3	4315.8	4315.8	4317.0	M30
M32	4283.3	4297.7	4269.8	4277.4	4283.7	4301.6	4306.7	4309.9	4311.8	4314.0	4315.3	4316.5	4317.4	4318.1	4319.2	4319.2	M32
M33	4267.1	4268.9	4248.1	4259.9	4267.8	4295.4	4299.9	4303.4	4305.3	4307.5	4308.9	4310.3	4311.2	4312.0	4313.0	4313.0	M33
T3	4264.1	4261.8	4277.6	4267.2	4246.5	na	4289.5	4292.5	4294.4	4294.3	4297.3	4297.4	4297.8	4297.9	4299.5	4300.2	T3
T8	4267.8	4265.3	4280.3	4270.5	4250.9	na	4291.1	4294.1	4295.2	4297.0	4298.7	4299.3	4299.3	4299.5	4300.5	4301.4	T8
T12	na	na	na	na	na	na	na	na	4290.5	4291.3	4293.2	4293.3	4292.3	4293.4	4295.1	4296.1	T12
T24	na	na	na	na	na	na	na	na	4295.8	4297.0	4299.0	4299.2	4299.5	4300.0	4301.4	4301.9	T24
T25	na	na	na	na	na	na	na	na	4292.4	4293.3	4294.8	4295.7	4295.5	4295.8	4297.4	4298.0	T25
T27	4268.1	4271.1	4278.1	4262.5	4267.0	na	4296.0	4299.6	4301.2	4303.3	4304.6	4305.2	4305.9	4306.5	4307.6	4307.9	T27
T32	4270.2	4268.7	4281.6	4272.0	4257.0	na	4291.8	4295.0	4296.6	4298.0	4299.4	4300.0	4300.1	4300.6	4302.0	4302.2	T32
T33	4272.3	4274.4	4282.5	4271.8	4273.0	na	4294.4	4297.7	4299.3	4301.2	4302.2	4303.3	4303.6	4304.1	4305.1	4305.4	T33
T36	4259.5	4262.5	4265.6	4244.2	4255.8	na	4292.6	4296.0	4297.7	4299.9	4301.4	4302.0	4302.7	4303.2	4304.6	4304.8	T36
T38	4263.9	4269.7	4262.6	4235.3	4259.0	na	4294.3	4297.9	4299.7	4301.9	4302.9	4303.9	4304.9	4305.1	4306.5	4306.9	T38
T39	4259.6	4268.6	4257.1	4233.7	4255.8	na	4294.7	4298.1	4300.2	4302.1	4303.5	4304.3	4305.3	4305.8	4307.2	4307.4	T39
T42	4263.3	4274.9	4254.8	4228.2	4245.0	na	4296.2	4299.6	4301.3	4303.6	4305.1	4305.7	4307.0	4307.4	4308.6	4308.9	T42
T43	4259.0	4274.1	4247.6	4225.2	4251.5	na	4295.8	4299.4	4301.4	4303.6	4304.7	4305.9	4305.6	4307.4	4308.5	4308.7	T43
T46	4261.6	4278.0	4236.7	4239.4	4255.4	na	4297.1	4300.6	4302.6	4304.8	4306.2	4307.1	4308.0	4308.7	4309.8	4310.0	T46
T47	4259.3	4277.3	4242.3	4244.0	4259.6	na	4296.5	4300.1	4301.9	4304.3	4305.5	4306.5	4307.5	4308.0	4309.2	4309.5	T47
T50	4264.8	4284.3	4228.0	4260.7	4266.7	na	4300.3	4303.8	4306.0	4308.0	4309.4	4310.3	4311.3	4312.1	4313.1	4313.3	T50
T51	4261.8	4281.0	4239.8	4250.0	4262.5	na	4299.4	4303.0	4305.4	4307.2	4308.7	4309.7	4310.6	4311.2	4312.2	4312.3	T51
T54	4271.2	4290.0	4242.3	4265.0	4270.2	na	4302.4	4305.9	4307.7	4309.7	4311.4	4312.4	4313.5	4314.3	4315.4	4315.3	T54
T55	4262.1	4282.4	4241.9	4251.8	4265.4	na	4298.5	4302.1	4304.1	4306.2	4307.6	4308.9	4309.8	4310.4	4311.6	4311.7	T55
T58	4279.5	4293.5	4260.4	4270.8	4280.5	na	4303.2	4307.5	4309.5	4311.6	4313.0	4314.1	4315.1	4315.9	4317.1	4317.0	T58
T59	4266.5	4286.5	4244.3	4258.2	4271.2	na	4300.4	4303.6	4305.5	4308.0	4309.4	4310.2	4311.3	4312.1	4313.3	4313.0	T59
T62	4274.3	4293.2	4254.6	4268.3	4278.9	na	4304.1	4307.5	4309.2	4311.2	4313.0	4314.2	4315.2	4316.0	4317.0	4317.0	T62
5I7-M1	na	na	na	na	na	na	na	na	4276.7	4277.8	4278.7	4279.4	4279.7	4279.7	4280.8	4280.9	5I7-M1
5I7-M4	na	na	na	na	na	na	na	na	4276.9	4278.1	4279.3	4279.3	4279.6	4279.6	4280.5	4281.1	5I7-M4
5I7-M5	na	na	na	na	na	na	na	na	4278.0	4279.5	4280.5	4280.9	4280.9	4281.5	4282.2	4282.4	5I7-M5
5I7-NM2	na	na	na	na	na	na	na	na	4277.3	4275.1	4279.7	4279.9	4280.1	4280.6	4281.4	4281.6	5I7-NM2

Table Summary of Pumping Tests Results, Irigaray Mine

Testing Performed By	Report Date	Test Date	Mine Units	Rate (gpm)	Duration (hours)	No. of Obs. Wells	Obs. Well Dist. (ft)	Average H (ft)	Average T (ft <sup>2</sup> /d)	Average K (ft/d)	Average S
D'Appolonia	02/01/1982	Jun-80	8-9	10	48	4	250-430	92	38.6	0.42	1.60E-04
Hydro Eng.	Dec-87	Jul-87	7-8	7.6	2.5	9	40-147	100	53.4	0.53	4.00E-04
Hydro Eng.	Sep-87	Jul-87	6-9	12.5	96	27	50-540	100	50.8	0.51	7.00E-04
Cannonie	Sep-86	Jul-87	2-3	13.8	96	9	40-800	112	120.3	1.07	2.00E-04
Cannonie	1987	Feb-87	Sec. 5	16.2	50	3	59-107	111	41.4	0.37	1.60E-04
D'Appolonia	02/01/1982	Feb-77	A	10	15	3	40-90	100	66.8	0.67	8.00E-05
D'Appolonia	02/01/1982	Oct-77	B	17	5	4	160-170	100	91.4	0.91	2.70E-04
D'Appolonia	02/01/1982	Aug-77	C & D	15	23	4	70-130	100	58.7	0.59	2.30E-04
Hyd. Assoc	02/21/1979	May-79	E	20	24	4	70-170	100	40.1	0.40	1.70E-04
Hyd Assoc	??	Mar-79	G (5)	16	48	5	48-340	100	136	1.36	3.70E-05

gpm- gallons per minute  
 Obs.- observation  
 H -aquifer thickness  
 T - transmissivity  
 K - hydraulic conductivity  
 S- storativity

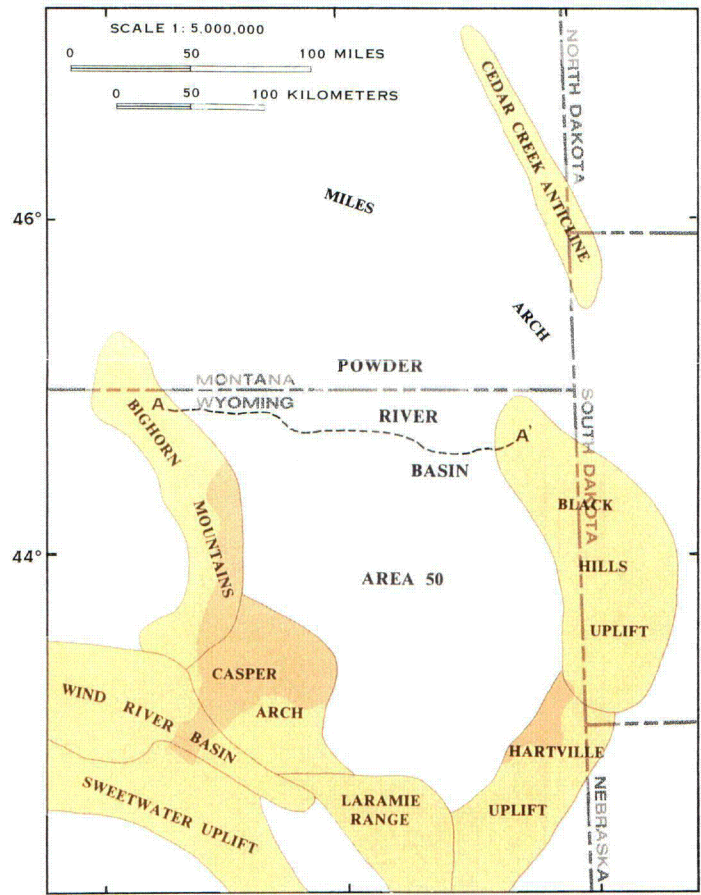
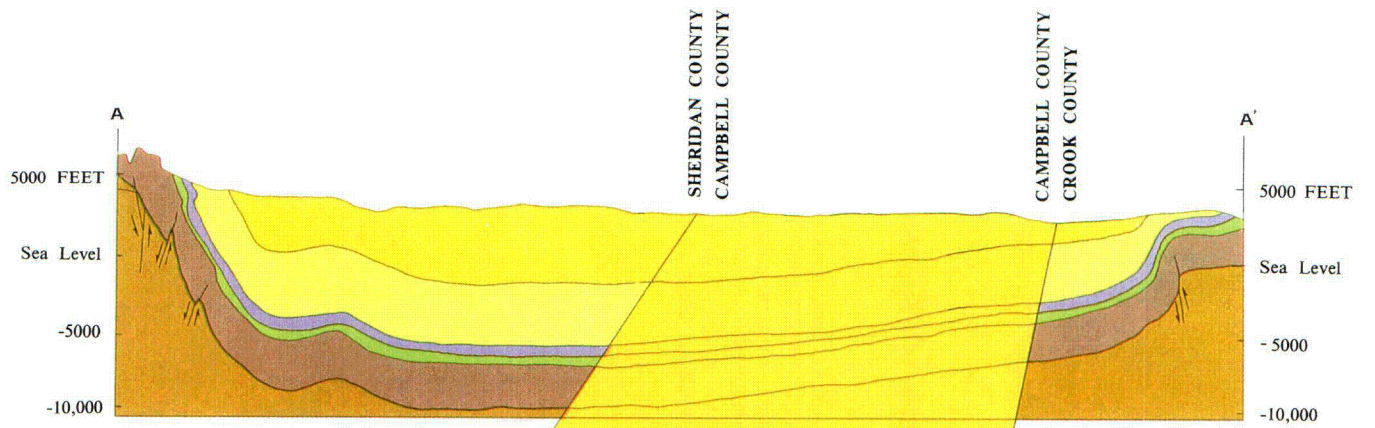
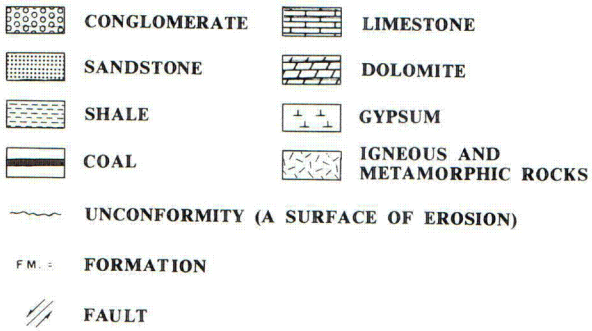


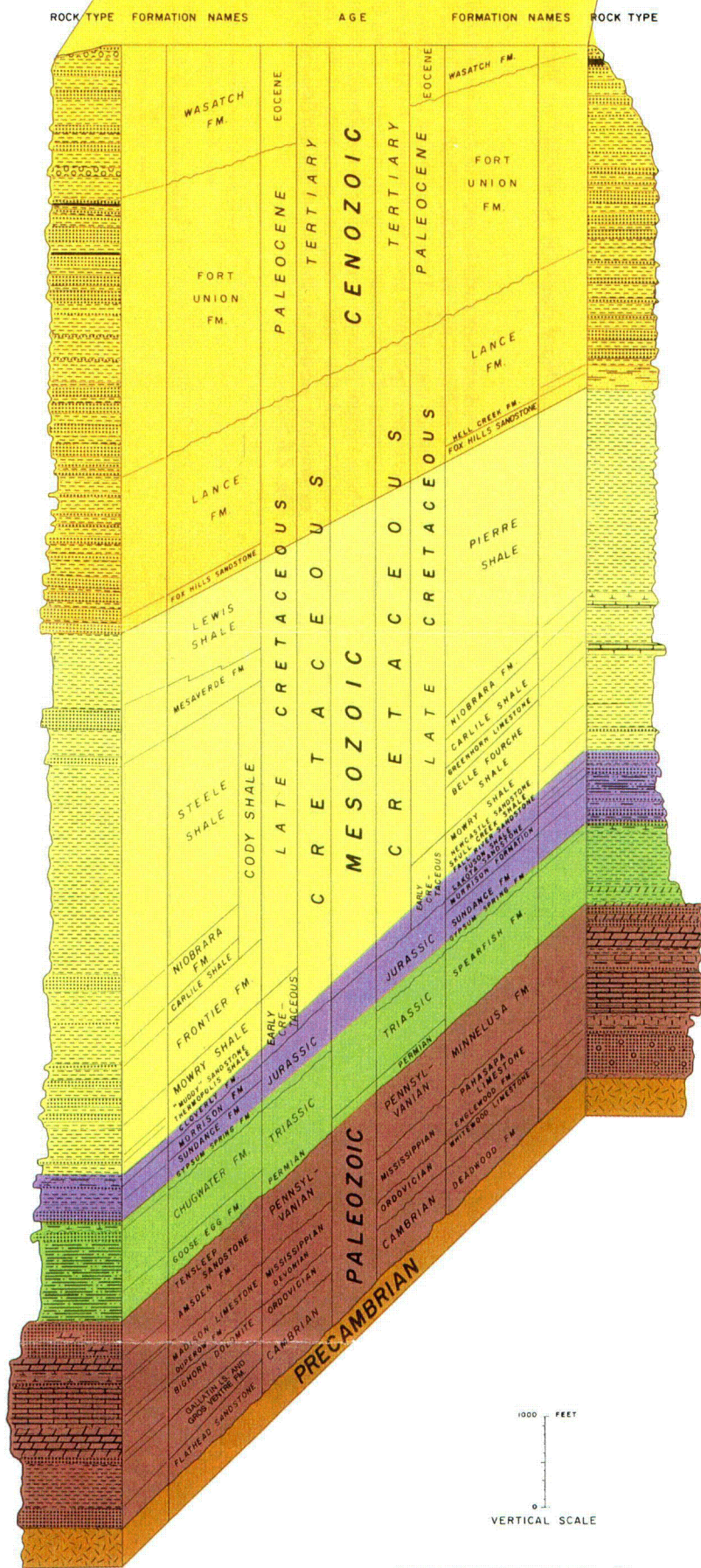
Figure 3.6.1-1 Location of Area 50, major structural features, and geologic section A-A'.

EXPLANATION



Modified from Breckenridge and others (1974).

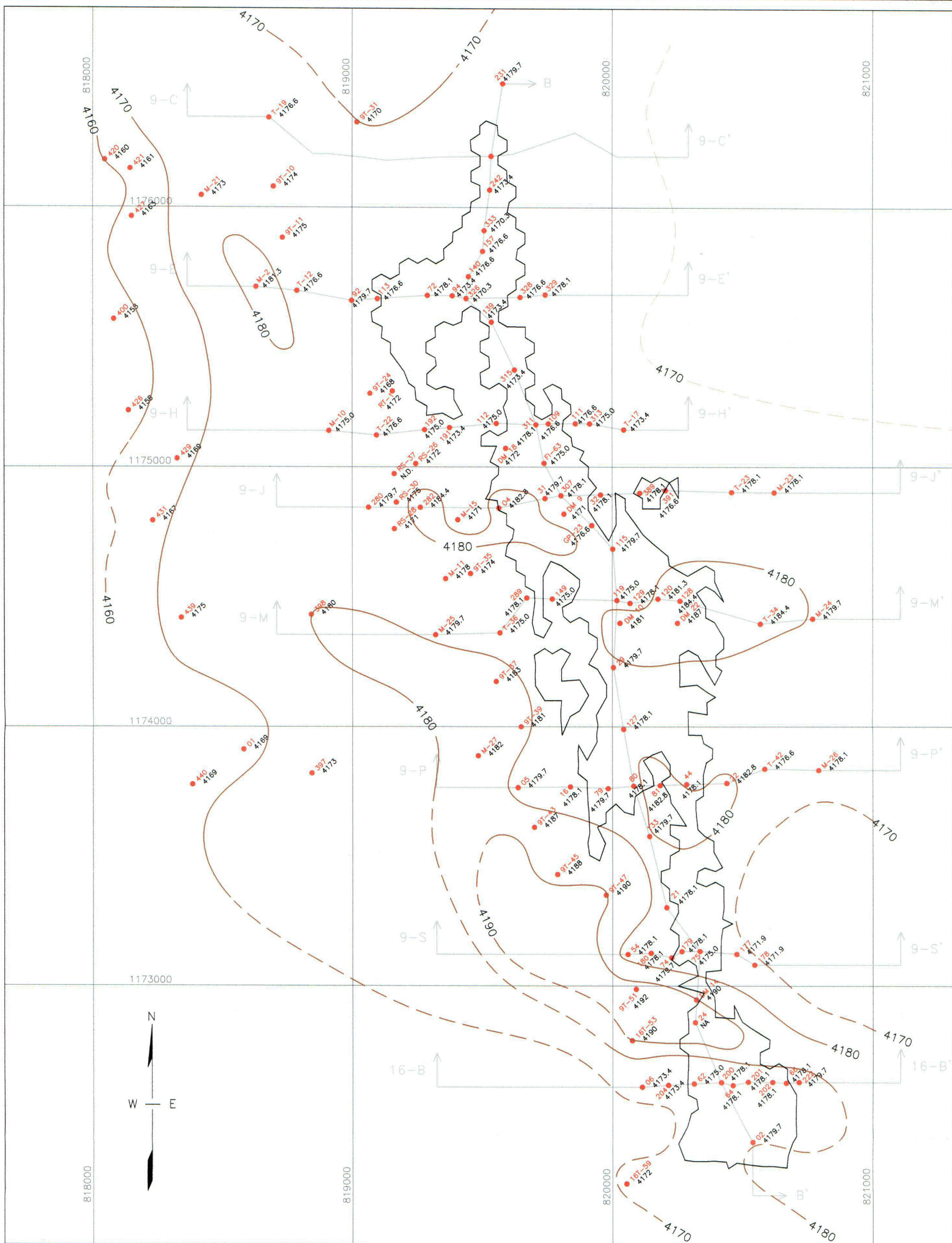
VERTICAL SCALE GREATLY EXAGGERATED



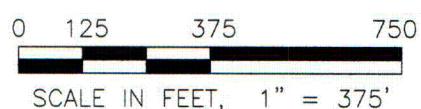
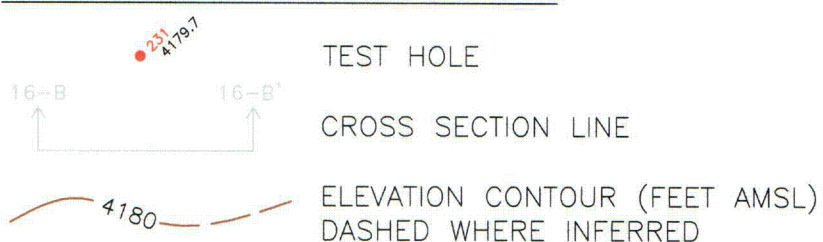
Modified from Breckenridge and others (1974).

Figure 3.6.1-3 Stratigraphic section east and west sides of Campbell County, Wyoming.

Figure B-1	
Stratigraphic Section of Powder River Basin	
(after Lowry, 1986)	
COGEMA Mining, Inc.	
Irigaray Restoration Report	May-04



# LEGEND



COGEMA Mining Inc.

FIGURE B-2

IRIGARAY MINE — STRUCTURE MAP  
TOP OF UPPER IRIGARAY SANDSTONE (UISS)

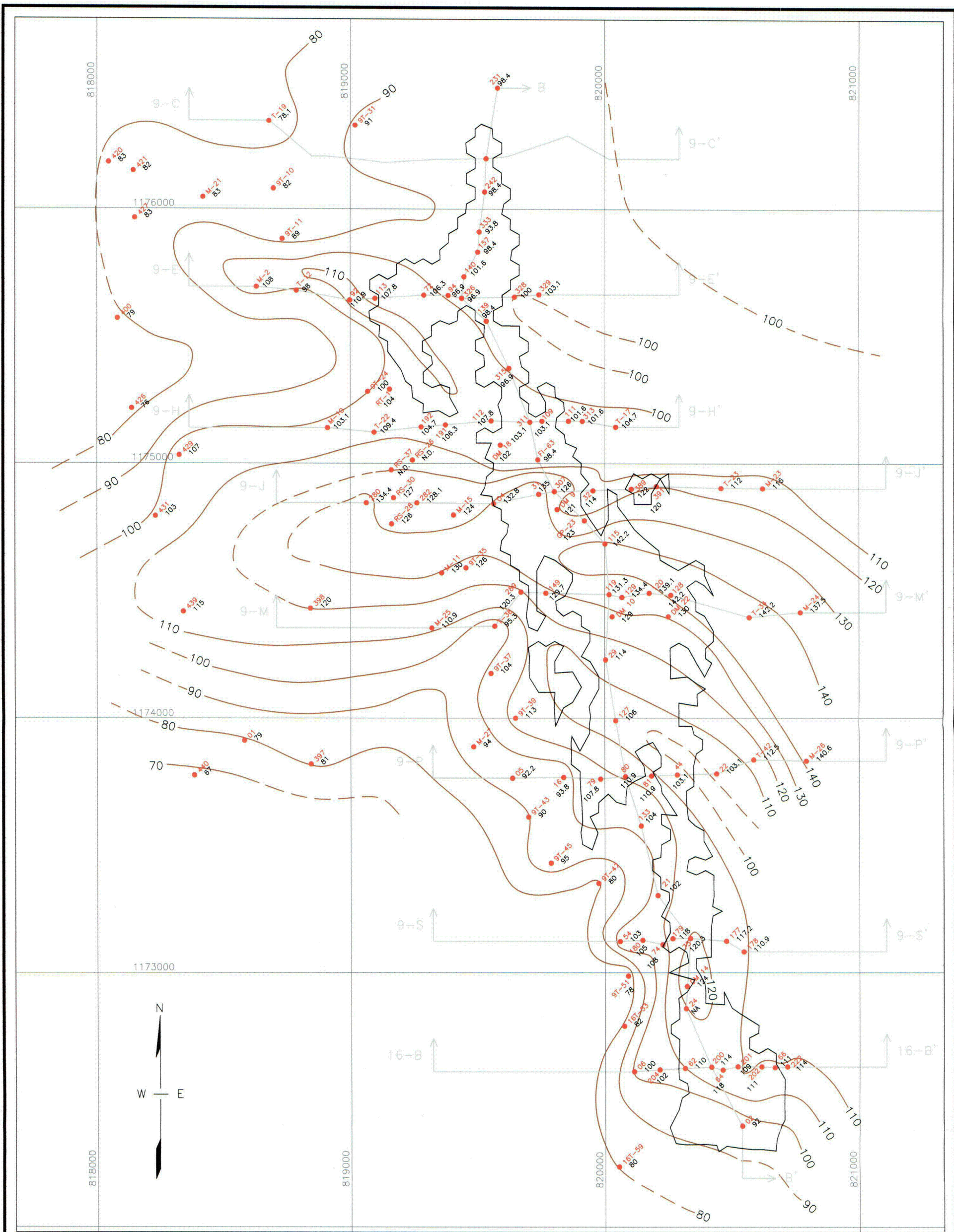
PROJECT: CMI-IR1 DATE: SEPTEMBER 2002

DWG: SandPackages.dwg BY: HPD CHECKED: KRS

**PETROTEK ENGINEERING CORPORATION**

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# LEGEND

- TEST HOLE
- CROSS SECTION LINE
- SAND THICKNESS, DASHED WHERE INFERRED

0 125 375 750  
  
SCALE IN FEET, 1" = 375'

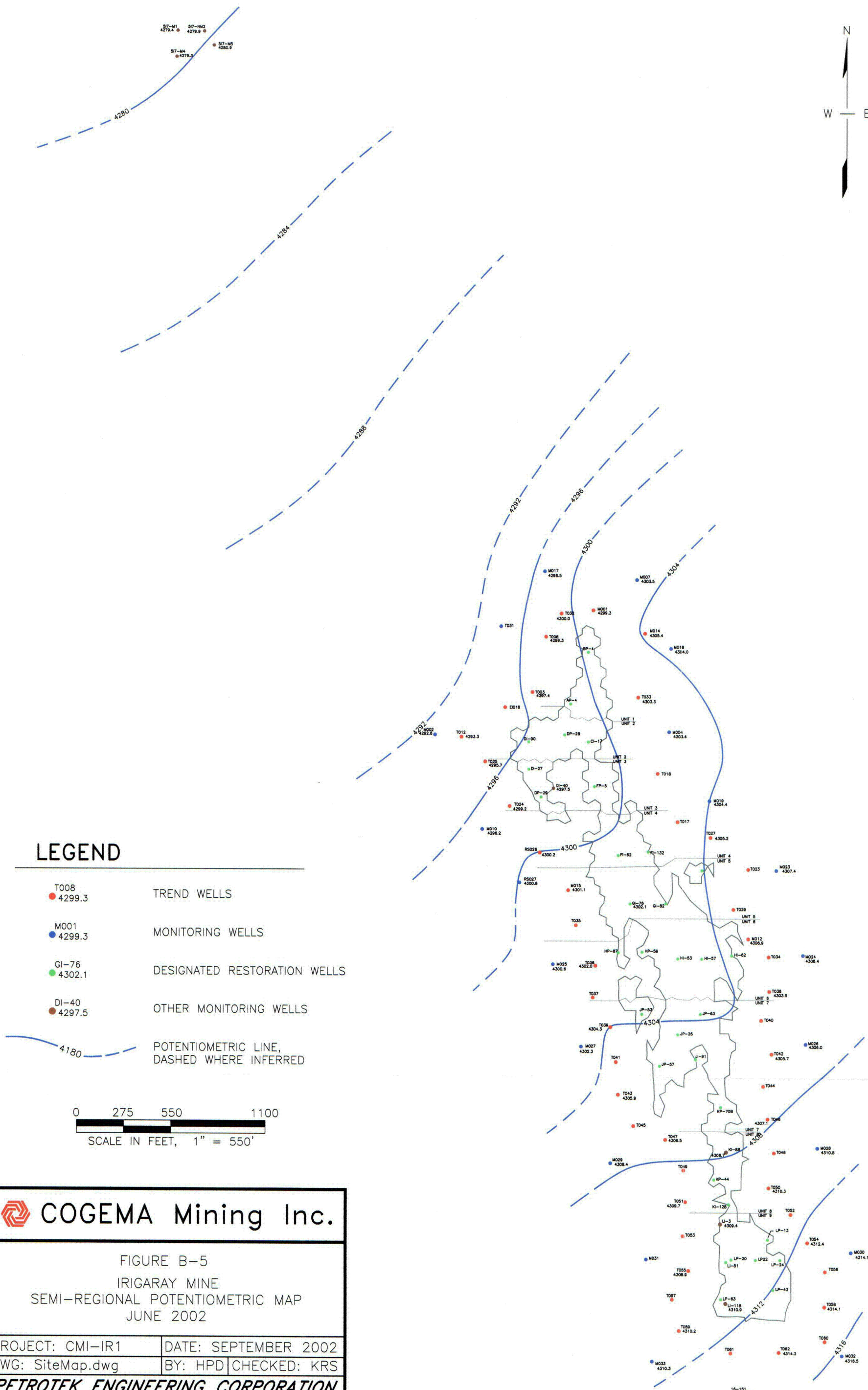
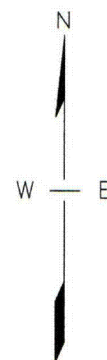


COGEMA Mining Inc.

FIGURE B-4

IRIGARAY MINE - ISOPACH MAP  
UPPER IRIGARAY SANDSTONE (UISS)  
TOTAL SAND THICKNESS (FEET)

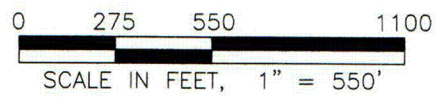
PROJECT: CMI-IR1	DATE: SEPTEMBER 2002
DWG: SandPackages.dwg	BY: HPD CHECKED: KRS
<b>PETROTEK ENGINEERING CORPORATION</b> 9088 South Ridgeline Blvd., Suite 105 Littleton, Colorado 80129 (303) 290-9414	



# LEGEND

- T008 4299.3 TREND WELLS
- M001 4299.3 MONITORING WELLS
- GI-76 4302.1 DESIGNATED RESTORATION WELLS
- DI-40 4297.5 OTHER MONITORING WELLS

POTENTIOMETRIC LINE, DASHED WHERE INFERRED

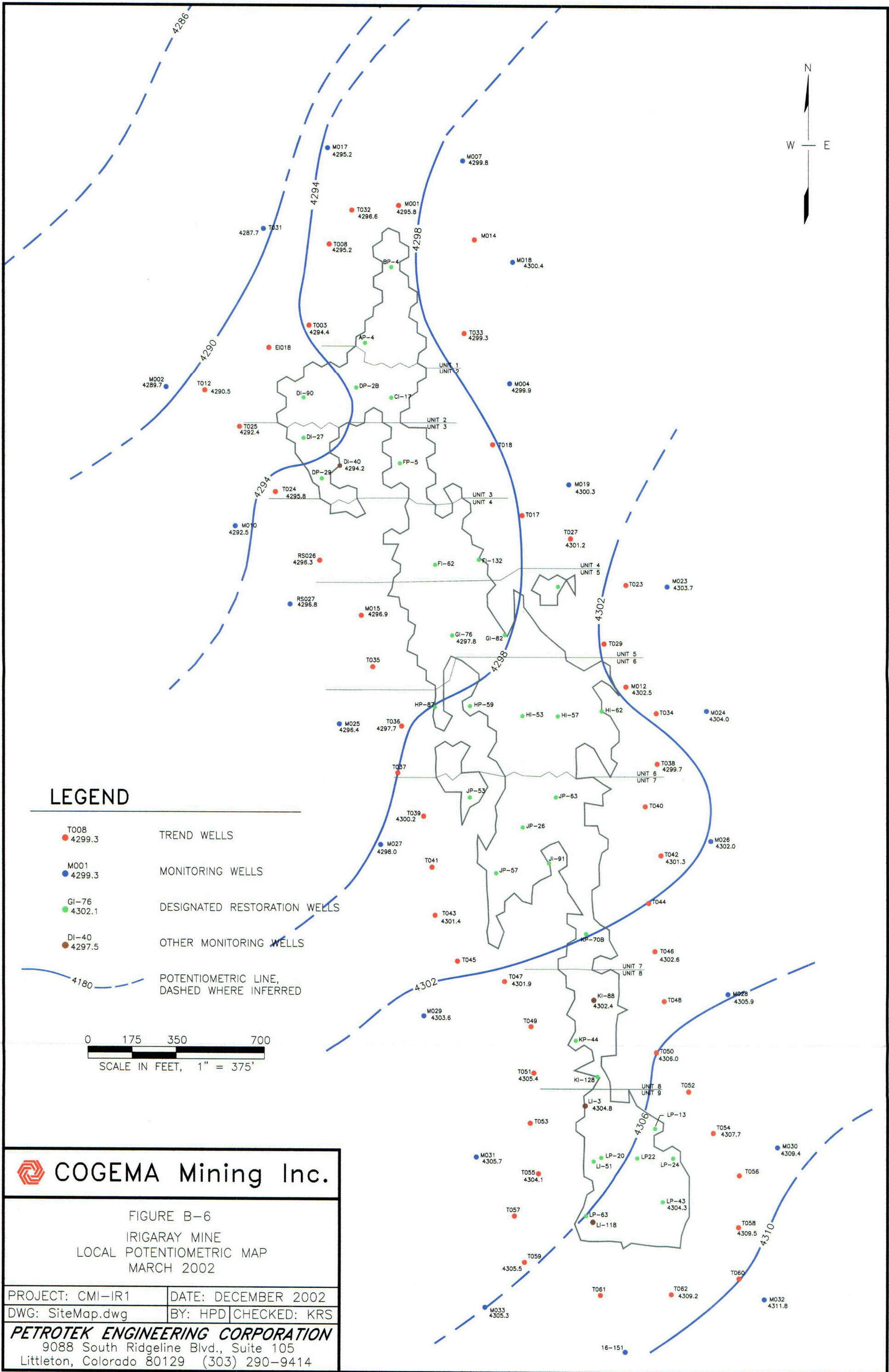


**COGEMA Mining Inc.**

FIGURE B-5  
IRIGARAY MINE  
SEMI-REGIONAL POTENTIOMETRIC MAP  
JUNE 2002

PROJECT: CMI-IR1	DATE: SEPTEMBER 2002
DWG: SiteMap.dwg	BY: HPD   CHECKED: KRS

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Littleton, Colorado 80129 (303) 290-9414

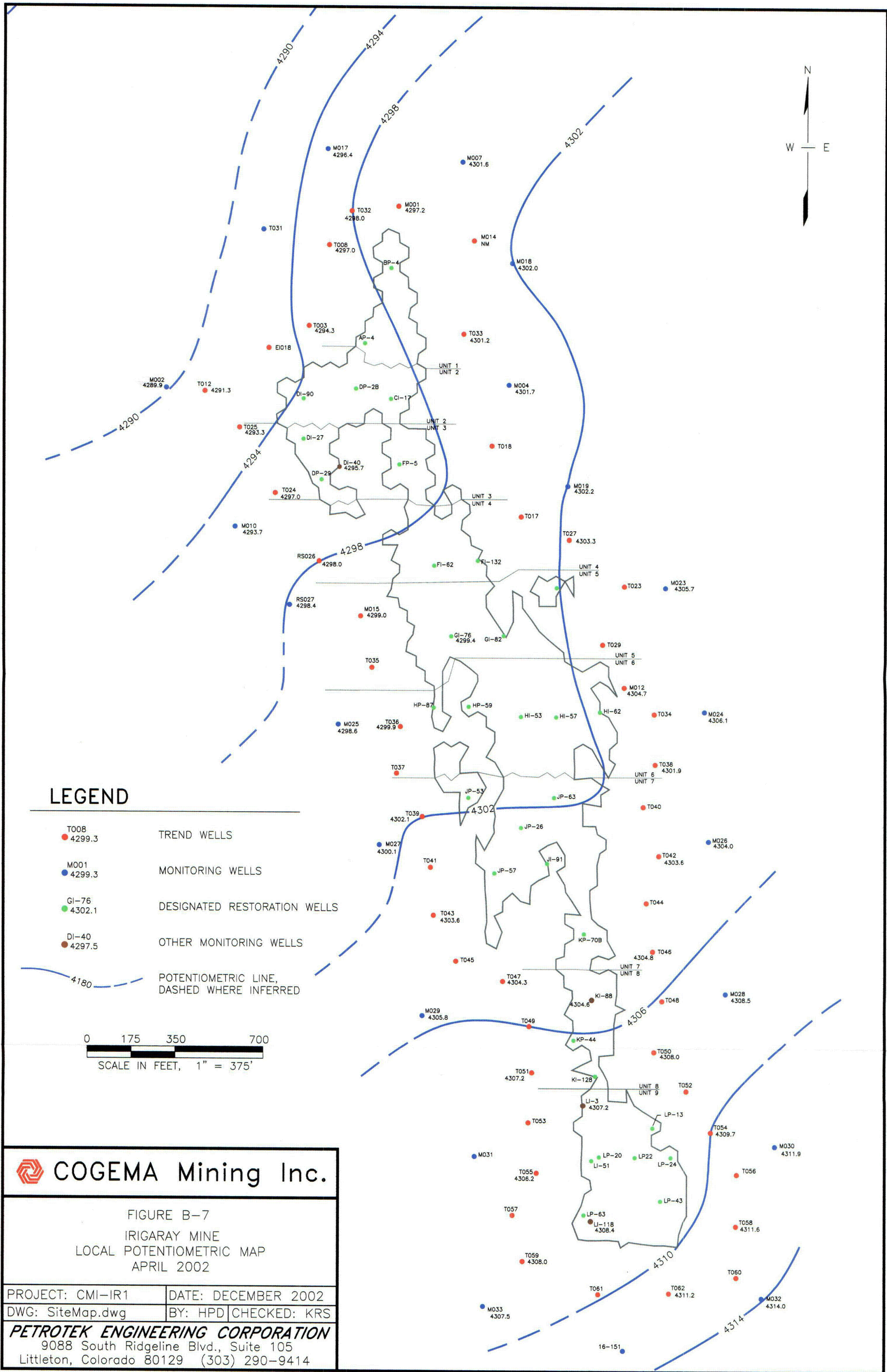


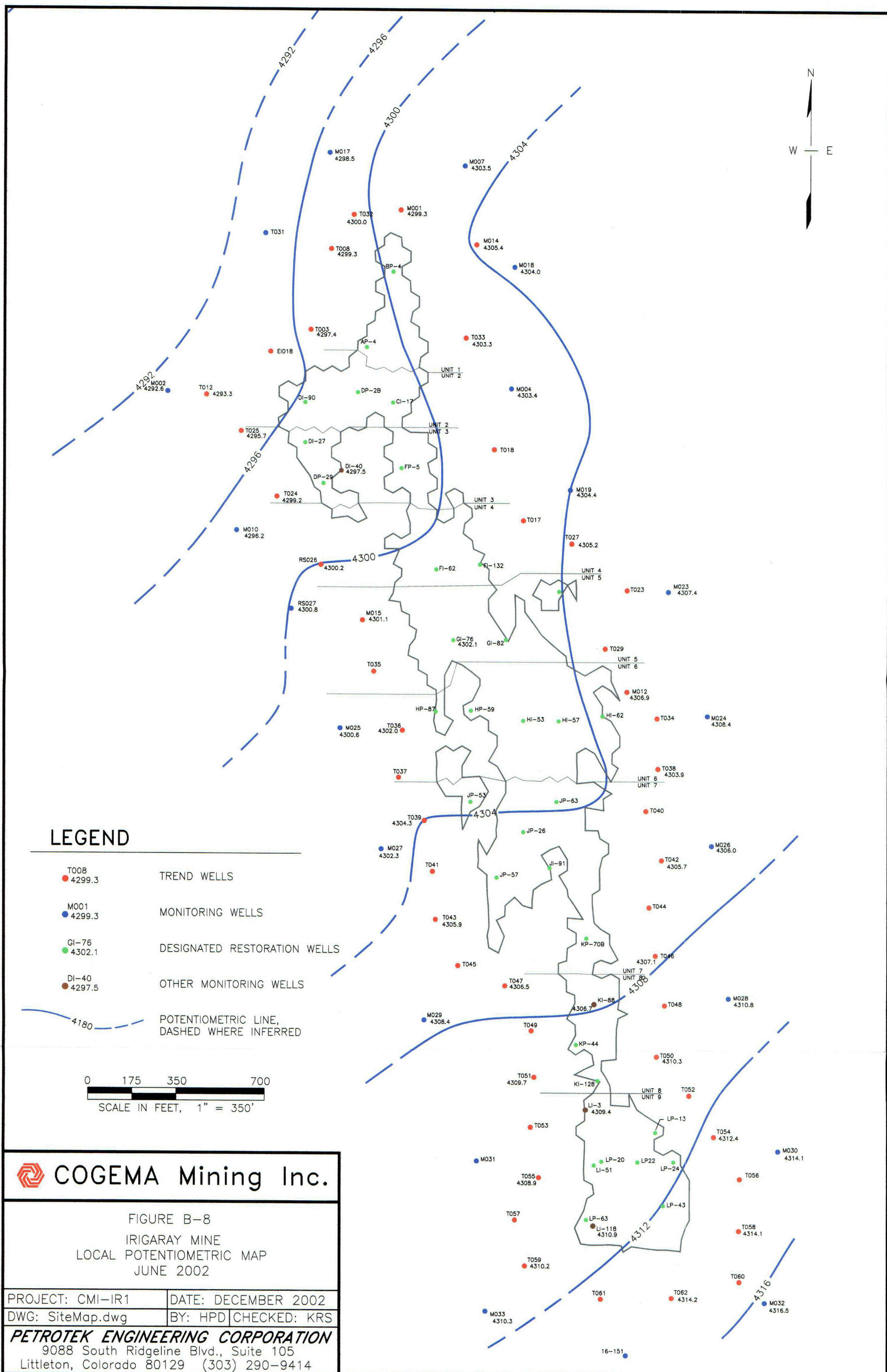
COGEMA Mining Inc.

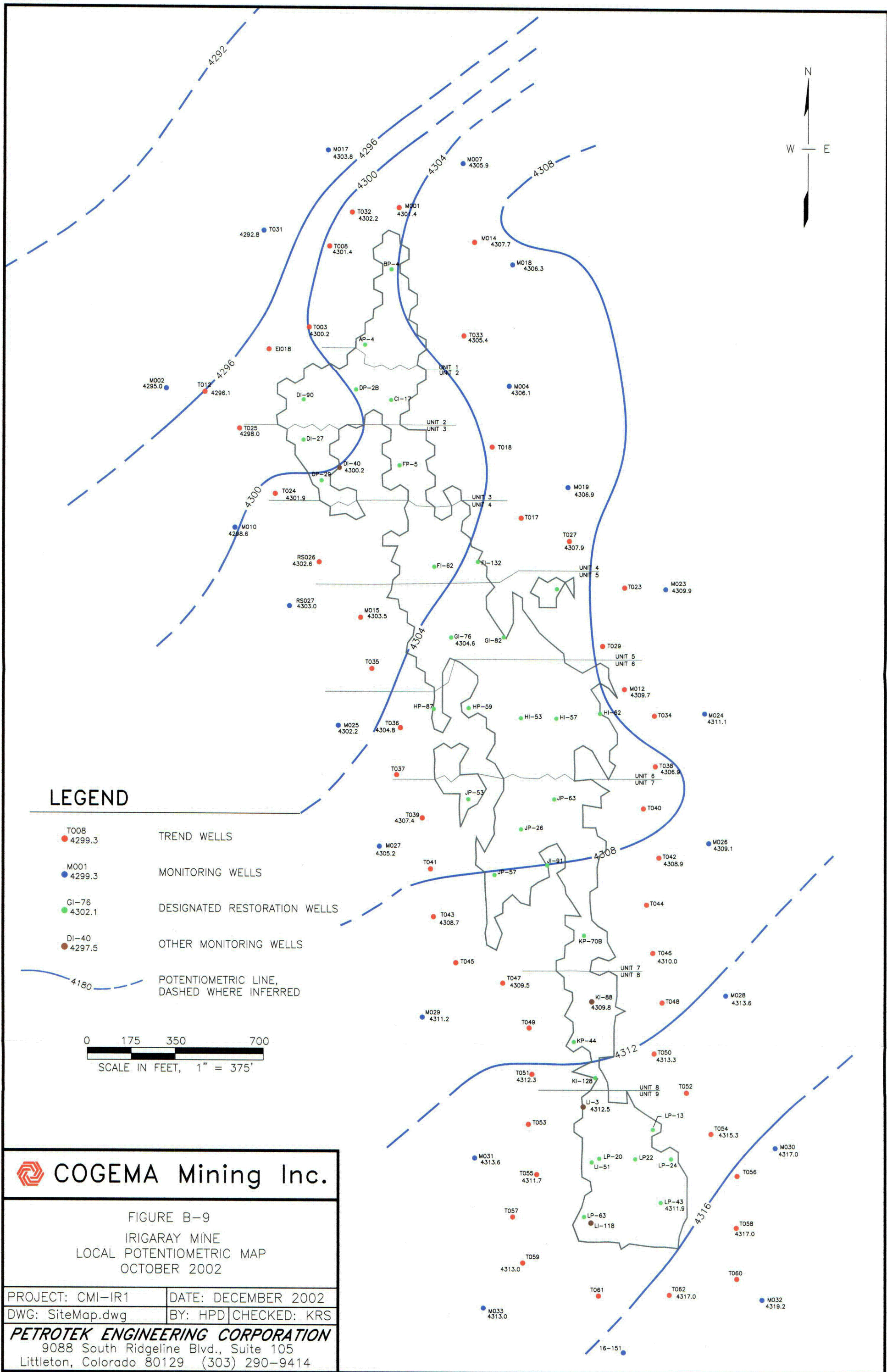
FIGURE B-6  
IRIGARAY MINE  
LOCAL POTENTIOMETRIC MAP  
MARCH 2002

PROJECT: CMI-IR1 DATE: DECEMBER 2002  
DWG: SiteMap.dwg BY: HPD CHECKED: KRS

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Littleton, Colorado 80129 (303) 290-9414







### Perimeter Monitoring Wells: Units 1-5

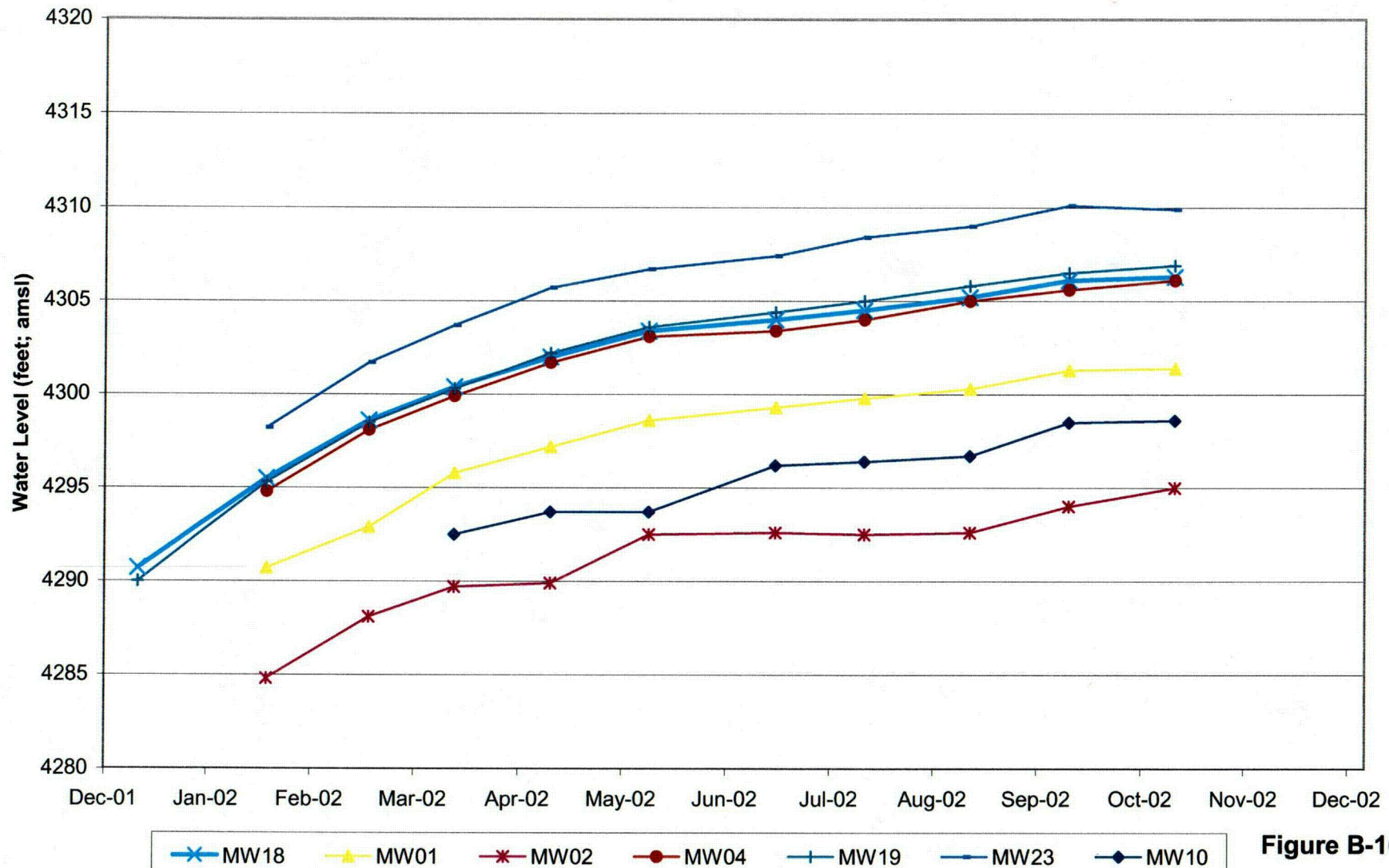


Figure B-10

### Perimeter Monitoring Wells: Units 6-8

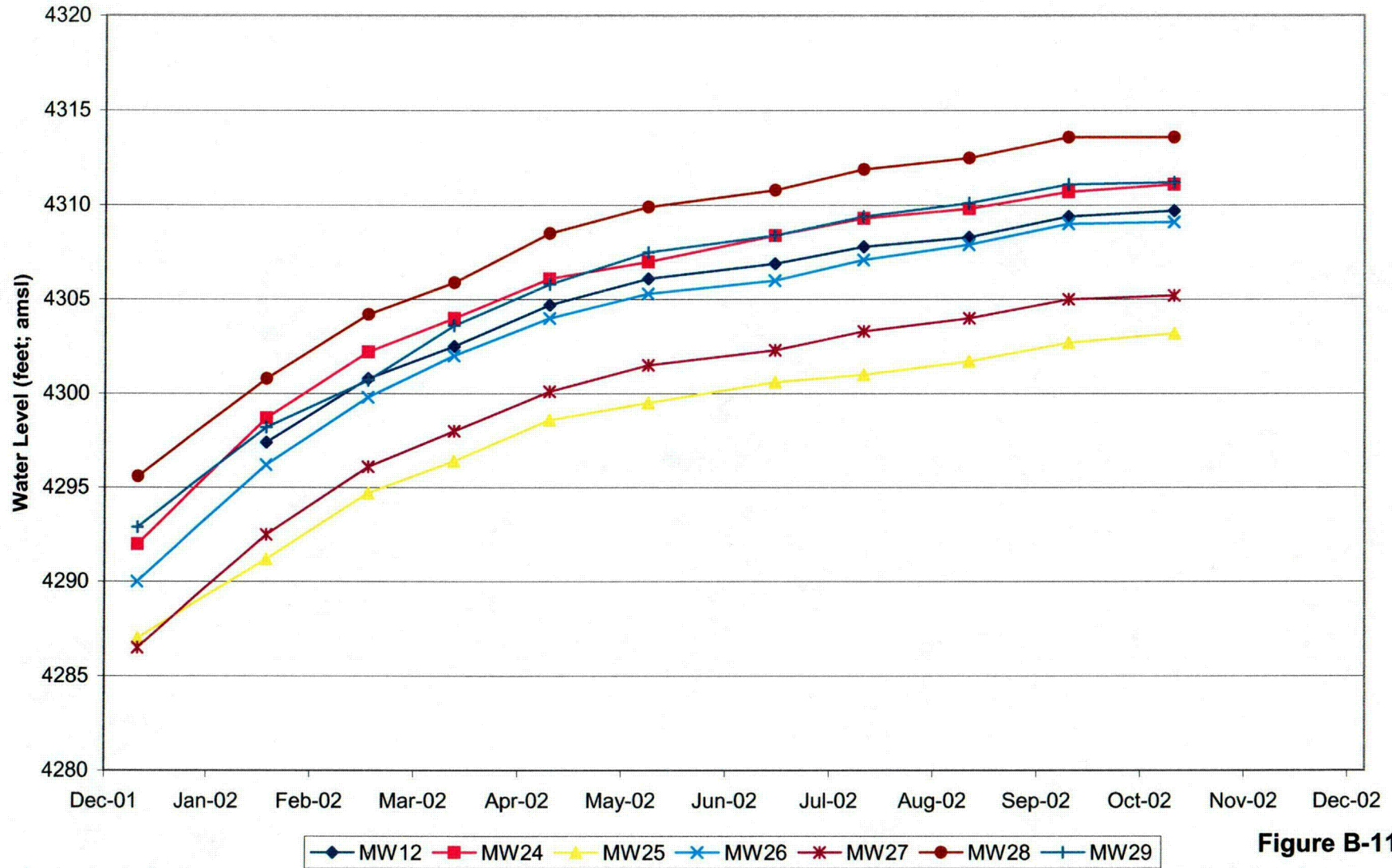


Figure B-11

### Perimeter Monitoring Wells: Unit 9

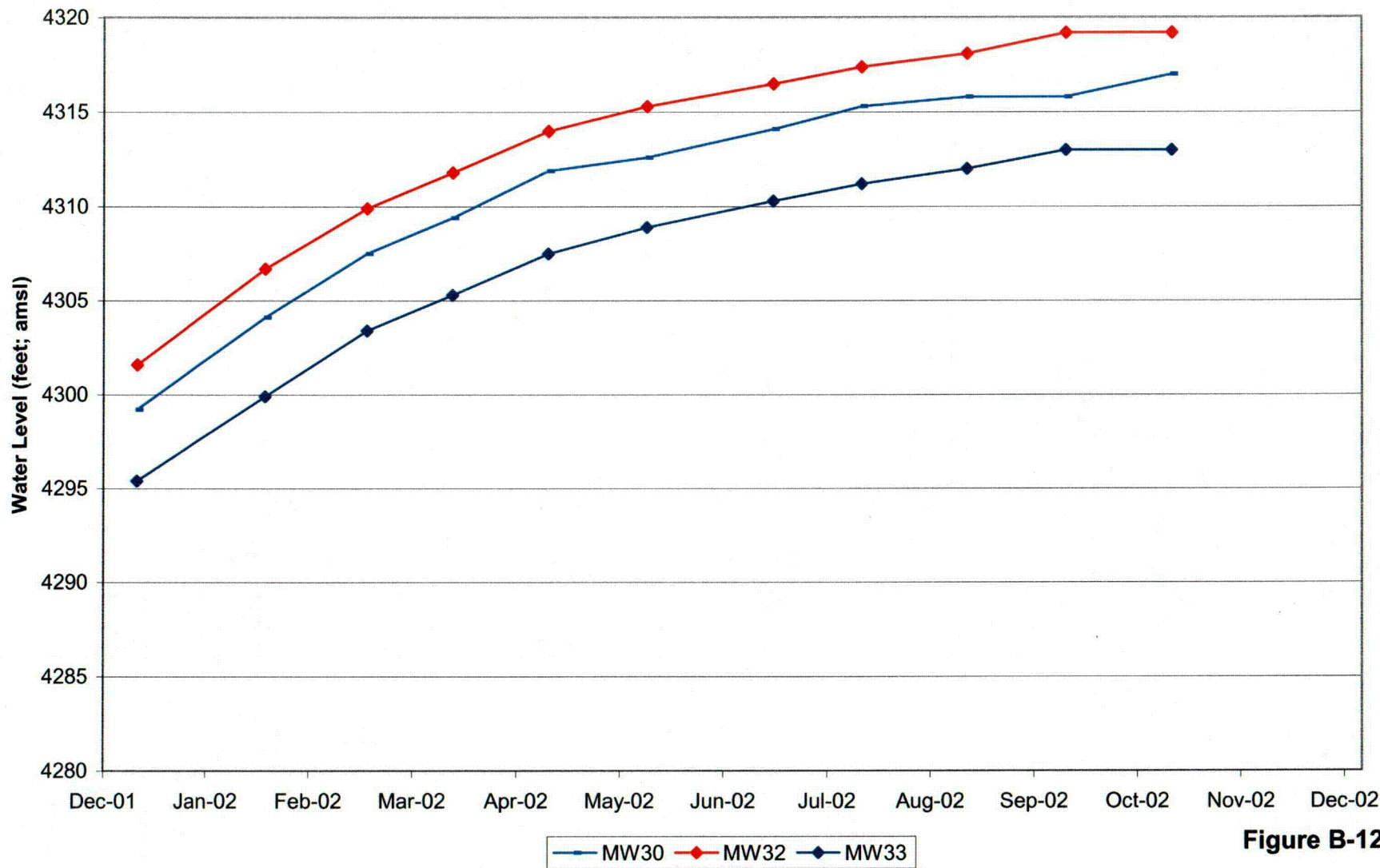


Figure B-12