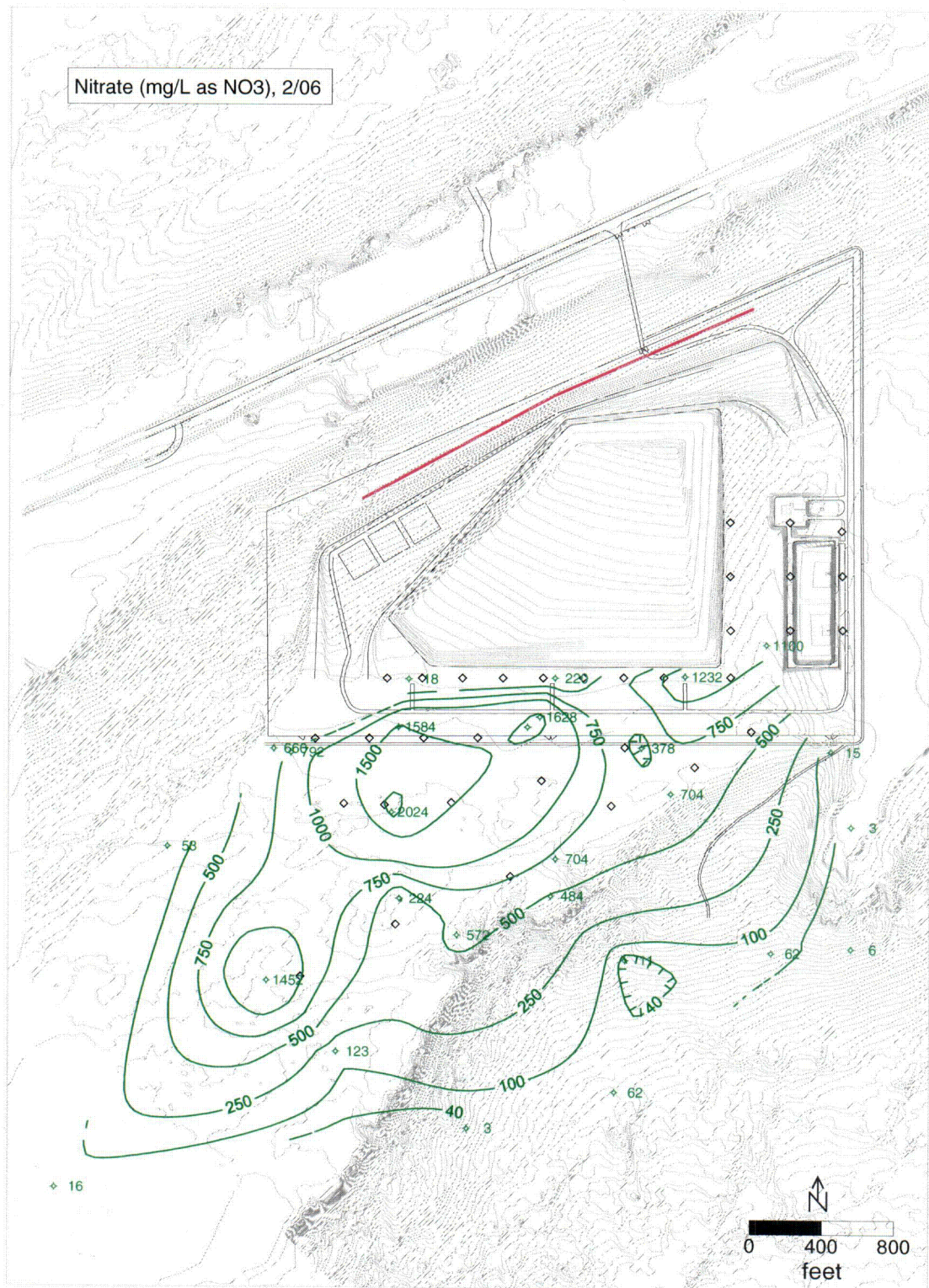


**Appendix B**

**Nitrate, Sulfate,  
and  
Uranium Plume Maps**

*(See text for an explanation of contouring  
methods and well selection criteria)*





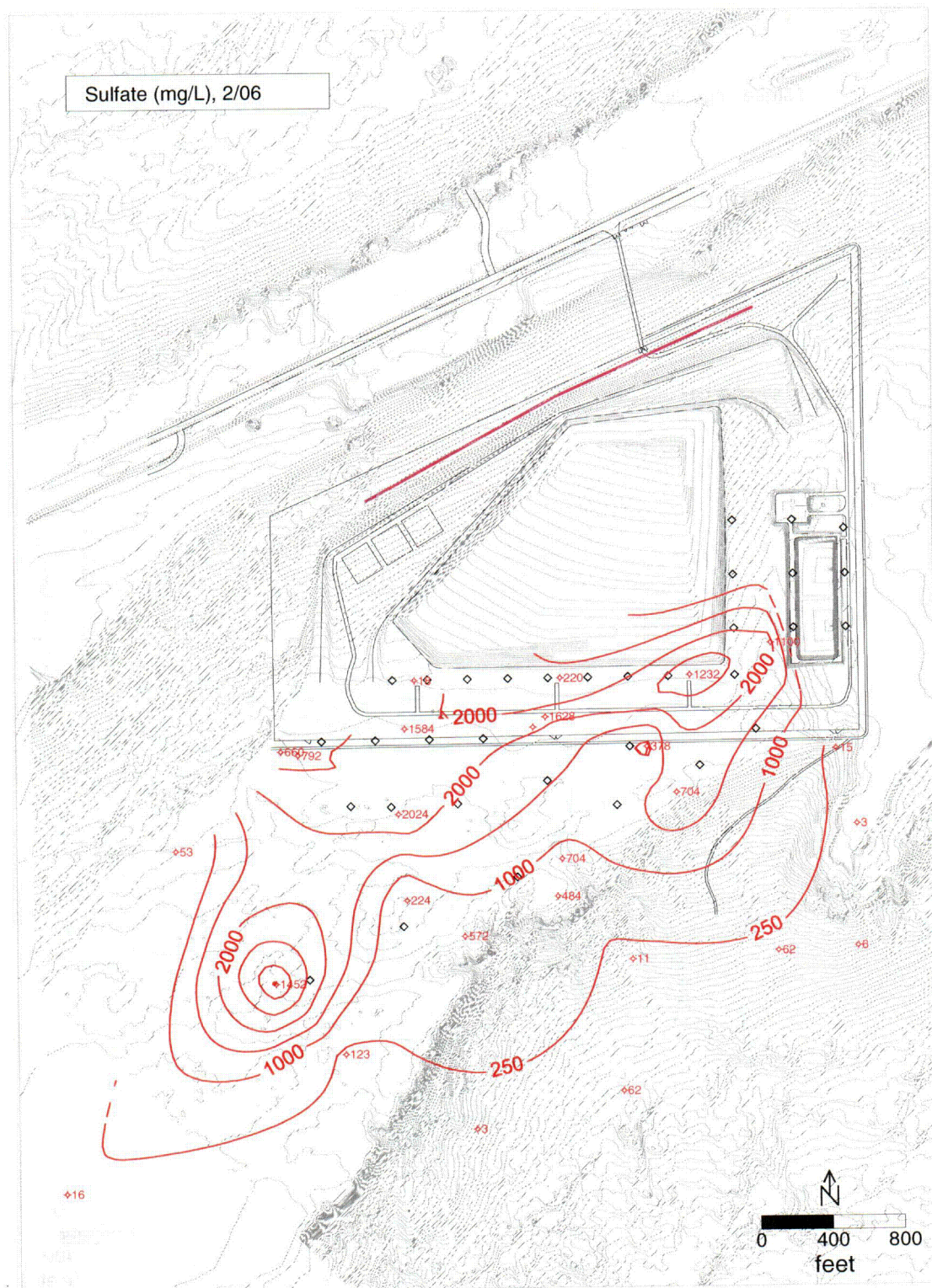


Figure B-2. Sulfate (mg/L) Plume Map



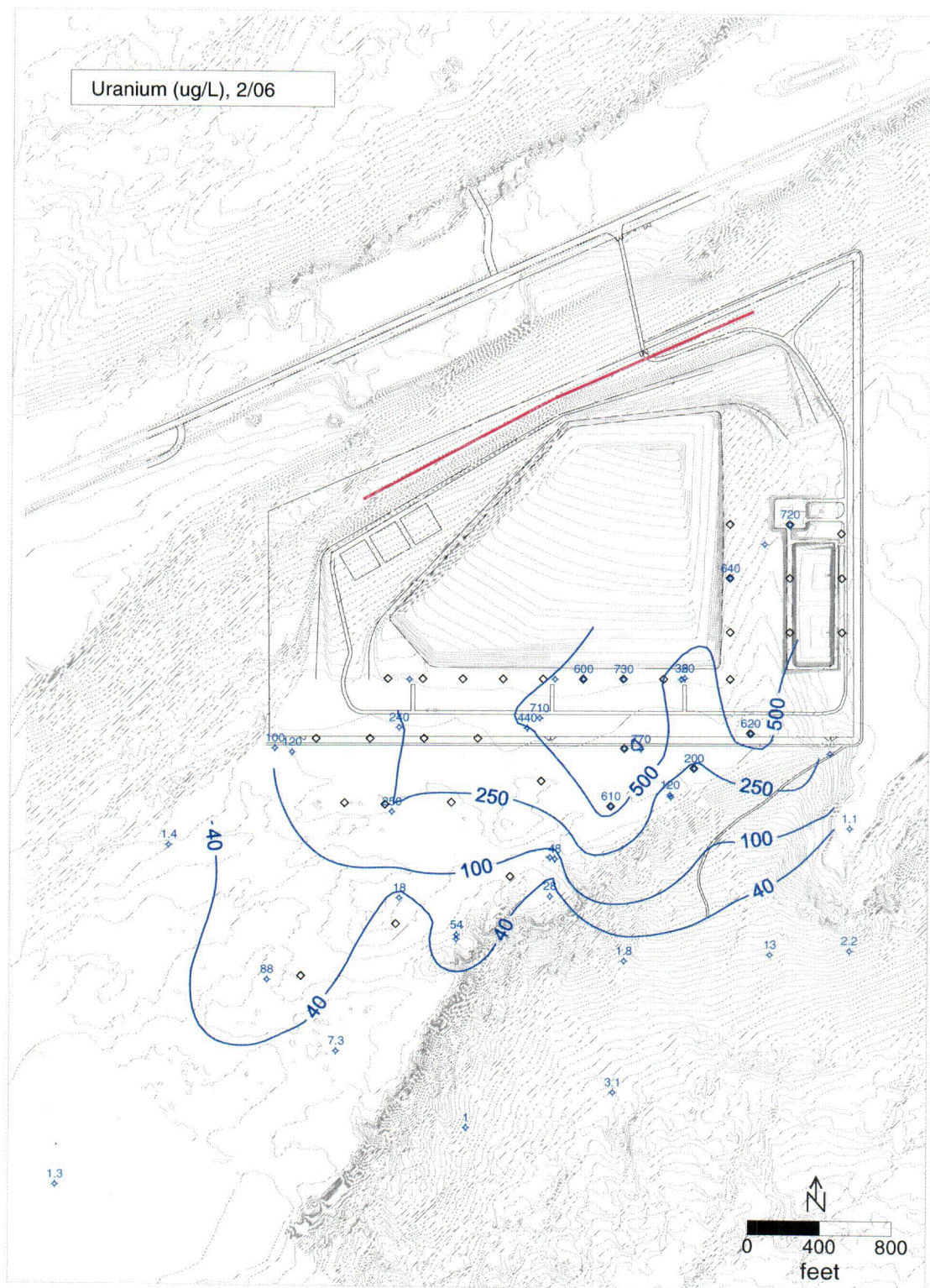


Figure B-3. Uranium (ug/L) Plume Map

End of current text



## **Appendix C**

**Ground Water Sample Results for Contaminants of Concern;  
August 2005, February 2006, and the Baseline Period**

Table C-1. Baseline, August 2005 and February 2006 Molybdenum Concentrations

Well Number	Horizon	Baseline Molybdenum Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Molybdenum Concentration (mg/L)	Feb 2006 Molybdenum Concentration (mg/L)
000I	A			NS	NS
000M	A			NS	NS
0284	A			NS	NS
0285	A			NS	NS
0686	A	0.0015U	2002	0.002U	NS
0687	A	0.0113	2002	0.003	NS
0688	A	0.0015U	2002	0.0025U	NS
0901	A	0.00078	2001	0.00075BU	NS
0906	A	0.0137	2002	NS	0.011
0929	A	0.0015U	2002	0.00048BU	0.00059BU
0940	A	0.0015U	2002	NS	NS
0941	A	0.0284	2002	NS	NS
0945	A	0.0015U	2002	0.00086BU	NS
0946	A			0.012	NS
000J	B			NS	NS
0262	B	0.432	2001	0.55	0.65
0263	B	0.192	2001	0.025	0.019
0265	B	0.00046	2001	0.00043BU	0.00023BU
0267	B	0.0015U	2002	0.00044BU	0.00033BU
0271	B	0.0015U	2002	0.00046BU	NS
0281	B			0.0046	0.0013U
0282	B			0.0032	0.0015U
0283	B			0.0039	0.0033
0908	B	0.0015U	2002	0.00033BU	0.00035BU
0909	B	0.0015U	2002	0.00049BU	0.00029BU
0910	B			0.0007BU	NS
0918	B			NS	NS
0934	B	0.0015U	2002	0.00036BU	0.00085BU
0935	B	0.0015U	2002	0.0003BU	0.00022BU
0936	B	0.0015U	2002	0.0024U	0.0011
0938	B	0.001U	1999	0.049	0.044
0942	B	0.021	2002	0.029	0.015
0943	B	0.0015U	2002	0.001U	NS
0947	B	0.0015U	2002	0.00048BU	NS
1126	B			0.00041BU	NS
1127	B			0.00055BU	NS
1128	B			0.00038BU	NS
1129	B			0.45	NS
1130	B			0.031	NS
1131	B			0.00051BU	NS
1132	B			0.81	NS
1133	B			0.0016U	NS

Table C-1 (continued). Baseline, August 2005 and February 2006 Molybdenum Concentrations

Well Number	Horizon	Baseline Molybdenum Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Molybdenum Concentration (mg/L)	Feb 2006 Molybdenum Concentration (mg/L)
0274	C			0.00053BU	0.00095BU
0276	C			0.00058BU	0.00057BU
0279	C			0.00075BU	NS
0280	C			0.0013U	NS
0683	C	0.0015U	2002	0.0005BU	NS
0684	C	0.0015U	2002	0.00048BU	NS
0685	C	0.0015U	2002	0.00054BU	NS
0689	C	0.0015U	2002	0.00062BU	NS
0691	C	0.0015U	2002	0.00051BU	0.00059BU
0903	C	0.0015U	2002	0.00044BU	NS
0912	C	0.0003U	2001	0.00038BU	NS
0914	C	0.00081	2001	0.0009BU	NS
0917	C	0.0013	2001	NS	NS
0930	C	0.0015U	2002	0.001U	0.00045BU
0932	C	0.0018U	2002	0.00063BU	0.00062BU
1008	C	0.0004U	2000	NS	NS
1116	C	0.0015U	2002	0.00037BU	NS
1117	C	0.0015U	2002	0.00033BU	NS
1118	C	0.0015U	2002	0.00041BU	NS
0258	D	0.00063	2000	0.0005BU	0.00061BU
0261	D	0.0026	2001	0.00053BU	NS
0264	D	0.0031	2001	0.00045BU	0.00054BU
0266	D	0.00058	2001	0.00049BU	0.00032BU
0272	D			0.00045BU	0.00023BU
0273	D			0.029	0.033
0275	D			0.00061BU	0.0006BU
0277	D			0.0016U	NS
0278	D			0.0007BU	NS
0690	D	0.0015U	2002	0.0024U	NS
0692	D	0.0015U	2002	0.0011U	NS
0695	D	0.0015U	2002	0.00065BU	NS
0904	D	0.00077	2001	0.00065BU	NS
0915	D	0.00054	2001	0.00057BU	NS
1003	D	0.0004U	2000	0.00035BU	NS
1004	D	0.0004U	2000	0.00044BU	NS
1005	D	0.0004U	2000	NS	NS
1006	D	0.0004U	2000	0.00063BU	NS
1007	D	0.0004U	2000	0.00054BU	NS
1101	D	0.0015U	2002	0.0004BU	NS
1102	D	0.0015U	2002	0.00039BU	NS
1103	D	0.0015U	2002	0.002U	NS
1104	D	0.0916	2002	0.044	NS
1105	D	2.96	2002	0.64	NS



Table C-1 (continued). Baseline, August 2005 and February 2006 Molybdenum Concentrations

Well Number	Horizon	Baseline Molybdenum Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Molybdenum Concentration (mg/L)	Feb 2006 Molybdenum Concentration (mg/L)
1106	D	1.26	2002	0.33	NS
1107	D	0.16	2002	0.015	NS
1108	D	0.0015U	2002	0.0018U	NS
1109	D	0.0015U	2002	0.00049BU	NS
1110	D	0.0015U	2002	0.0005BU	NS
1111	D	0.0015U	2002	0.00041BU	NS
1112	D	0.0015U	2002	0.00039BU	NS
1113	D	0.0015U	2002	0.00041BU	NS
1114	D	0.0027	2002	0.0047	NS
1115	D	0.0015U	2002	0.00039BU	NS
1119	D	0.0053	2002	0.0022U	NS
1120	D	0.0815	2002	0.059	NS
1121	D	0.105	2002	0.027	NS
1122	D	0.0015U	2002	0.0004BU	NS
1123	D	0.0015U	2002	0.0004BU	NS
1124	D	0.0015U	2002	0.00042BU	NS
1125	D	0.0015U	2002	0.00048BU	NS
0251	E	0.0015U	2002	0.00051BU	0.00052BU
0268	E	0.0015U	2002	0.00048BU	0.00025BU
0920	E	0.0003U	2001	0.00042BU	NS
0911	F			0.00046BU	NS
0913	G	0.0003U	2001	0.00033BU	NS
0916	G	0.00096	2001	0.00072BU	NS
0919	G			NS	NS
0902	H			NS	NS
0252	I	0.0015U	2002	0.00039BU	0.00037BU
0921	I	0.0003U	2001	0.00038BU	NS

Table C-2. Baseline, August 2005 and February 2006 Nitrate Concentrations

Well Number	Horizon	Baseline Nitrate Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Nitrate Concentration (mg/L)	Feb 2006 Nitrate Concentration (mg/L)
000I	A			NS	NS
000M	A			NS	NS
0284	A			NS	NS
0285	A			NS	NS
0686	A	32.2	2002	9.3	NS
0687	A	60.6	2002	8.4	NS
0688	A	35.1	2002	42	NS
0901	A	13	2001	5.8	NS
0906	A	1470	2002	NS	1640
0929	A	69.5	2002	53	53
0940	A	1800	2002	NS	NS
0941	A	358	2002	NS	NS
0945	A	12.7	2002	11	NS
0946	A			20	NS
000J	B			NS	NS
0262	B	380	2001	7.5	380
0263	B	1140	2001	620	708
0265	B	720	2001	576	576
0267	B	1640	2002	1460	1460
0271	B	15.6	2002	16	NS
0281	B			100	120
0282	B			290	230
0283	B			487	487
0908	B	651	2002	664	664
0909	B	485	2002	664	708
0910	B			14	NS
0918	B			NS	NS
0934	B	2320	2002	2120	2040
0935	B	525	2002	753	797
0936	B	2950	2002	1900	1590
0938	B	1450	1999	1150	753
0942	B	1360	2002	1240	1240
0943	B	22.1	2002	80	NS
0947	B	12.5	2002	12	NS
1126	B			1150	NS
1127	B			370	NS
1128	B			620	NS
1129	B			487	NS
1130	B			708	NS
1131	B			1460	NS
1132	B			1150	NS
1133	B			350	NS

Table C-2 (continued). Baseline, August 2005 and February 2006 Nitrate Concentrations

Well Number	Horizon	Baseline Nitrate Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Nitrate Concentration (mg/L)	Feb 2006 Nitrate Concentration (mg/L)
0274	C			15	15
0276	C			14	14
0279	C			49	NS
0280	C			6.6	NS
0683	C	14.1	2002	14	NS
0684	C	13.9	2002	10	NS
0685	C	14.3	2002	14	NS
0689	C	14.3	2002	14	NS
0691	C	298	2002	62	62
0903	C	54.8	2002	49	NS
0912	C	403	2001	250	NS
0914	C	13	2001	11	NS
0917	C	15.7	2001	NS	NS
0930	C	50.9	2002	6.6	62
0932	C	25.3	2002	27	27
1008	C	15.7	2000	NS	NS
1116	C	106	2002	130	NS
1117	C	225	2002	620	NS
1118	C	164	2002	576	NS
0258	D	15	2000	10	15
0261	D	14	2001	10	NS
0264	D	24.3	2001	36	39
0266	D	14	2001	14	14
0272	D			17	19
0273	D			230	220
0275	D			1110	1110
0277	D			12	NS
0278	D			14	NS
0690	D	12.5	2002	6.6	NS
0692	D	12.5	2002	6.6	NS
0695	D	25.4	2002	30	NS
0904	D	5.13	2001	4.2	NS
0915	D	14.1	2001	13	NS
1003	D	176	2000	220	NS
1004	D	49.1	2000	40	NS
1005	D	14.5	2000	NS	NS
1006	D	14.1	2000	14	NS
1007	D	15.3	2000	19	NS
1101	D	438	2002	443	NS
1102	D	650	2002	576	NS
1103	D	1120	2002	930	NS
1104	D	993	2002	753	NS
1105	D	648	2002	300	NS



Table C-2 (continued). Baseline, August 2005 and February 2006 Nitrate Concentrations

Well Number	Horizon	Baseline Nitrate Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Nitrate Concentration (mg/L)	Feb 2006 Nitrate Concentration (mg/L)
1106	D	614	2002	230	NS
1107	D	1060	2002	280	NS
1108	D	1410	2002	797	NS
1109	D	798	2002	340	NS
1110	D	227	2002	170	NS
1111	D	421	2002	390	NS
1112	D	617	2002	140	NS
1113	D	143	2002	120	NS
1114	D	228	2002	260	NS
1115	D	766	2002	390	NS
1119	D	468	2002	620	NS
1120	D	493	2002	487	NS
1121	D	573	2002	180	NS
1122	D	954	2002	620	NS
1123	D	643	2002	93	NS
1124	D	781	2002	290	NS
1125	D	104	2002	49	NS
0251	E	426	2002	18	17
0268	E	15.4	2002	71	100
0920	E	14.8	2001	14	NS
0911	F			14	NS
0913	G	12.4	2001	10	NS
0916	G	11.6	2001	9.7	NS
0919	G			NS	NS
0902	H			NS	NS
0252	I	15.3	2002	10	11
0921	I	11	2001	11	NS

Table C-3. Baseline, August 2005 and February 2006 Selenium Concentrations

Well Number	Horizon	Baseline Selenium Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Selenium Concentration (mg/L)	Feb 2006 Selenium Concentration (mg/L)
000I	A			NS	NS
000M	A			NS	NS
0284	A			NS	NS
0285	A			NS	NS
0686	A	0.0088	2002	0.0002	NS
0687	A	0.0145	2002	0.00029	NS
0688	A	0.0033	2002	0.017	NS
0901	A	0.0024	2001	0.002	NS
0906	A	0.0335	2002	NS	0.018
0929	A	0.0028	2002	0.0027	0.0027
0940	A	0.105	2002	NS	NS
0941	A	0.0348	2002	NS	NS
0945	A	0.0035	2002	0.0038	NS
0946	A			0.0049	NS
000J	B			NS	NS
0262	B	0.0621	2001	0.058	0.064
0263	B	0.0632	2001	0.028	0.026
0265	B	0.0071	2001	0.0045	0.0048
0267	B	0.0532	2002	0.047	0.04
0271	B	0.0016	2002	0.0012	NS
0281	B			0.0013	0.0016
0282	B			0.0025	0.0021E
0283	B			0.0081	0.0086
0908	B	0.0163	2002	0.02	0.02
0909	B	0.0224	2002	0.042	0.048
0910	B			0.0013	NS
0918	B			NS	NS
0934	B	0.0116	2002	0.01	0.01
0935	B	0.0195	2002	0.018	0.02
0936	B	0.0869	2002	0.018	0.033
0938	B	0.0432	1999	0.04	0.042
0942	B	0.0348	2002	0.032	0.042
0943	B	0.0021	2002	0.0051	NS
0947	B	0.0019	2002	0.0015	NS
1126	B			0.048	NS
1127	B			0.0063	NS
1128	B			0.0075	NS
1129	B			0.064	NS
1130	B			0.023	NS
1131	B			0.013	NS
1132	B			0.13	NS
1133	B			0.013	NS

Table C-3 (continued). Baseline, August 2005 and February 2006 Selenium Concentrations

Well Number	Horizon	Baseline Selenium Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Selenium Concentration (mg/L)	Feb 2006 Selenium Concentration (mg/L)
0274	C			0.0013	0.0014
0276	C			0.0013	0.0014
0279	C			0.0017	NS
0280	C			0.0019	NS
0683	C	0.0022	2002	0.0017	NS
0684	C	0.0019	2002	0.0015	NS
0685	C	0.0017	2002	0.0013	NS
0689	C	0.0014	2002	0.0011	NS
0691	C	0.0046	2002	0.0019	0.0019
0903	C	0.0023	2002	0.0017	NS
0912	C	0.0137	2001	0.0056	NS
0914	C	0.0016	2001	0.00092	NS
0917	C	0.0017	2001	NS	NS
0930	C	0.002	2002	0.0018	0.0018
0932	C	0.0019	2002	0.0013	0.0014
1008	C	0.0015	2000	NS	NS
1116	C	0.0018	2002	0.0022	NS
1117	C	0.0028	2002	0.02	NS
1118	C	0.0028	2002	0.018	NS
0258	D	0.0018	2000	0.0016	0.0016
0261	D	0.0021	2001	0.0017	NS
0264	D	0.0018	2001	0.0015	0.0015
0266	D	0.0013	2001	0.00072	0.00099
0272	D			0.00071	0.001
0273	D			0.019	0.021
0275	D			0.02	0.02
0277	D			0.0011	NS
0278	D			0.00081	NS
0690	D	0.0014	2002	0.001	NS
0692	D	0.0022	2002	0.0015	NS
0695	D	0.0019	2002	0.0016	NS
0904	D	0.0131	2001	0.015	NS
0915	D	0.0019	2001	0.0015	NS
1003	D	0.003	2000	0.0028	NS
1004	D	0.0021	2000	0.0017	NS
1005	D	0.0014	2000	NS	NS
1006	D	0.0013	2000	0.00072	NS
1007	D	0.0013	2000	0.00043	NS
1101	D	0.0188	2002	0.025	NS
1102	D	0.0121	2002	0.018	NS
1103	D	0.0613	2002	0.025	NS
1104	D	0.0344	2002	0.026	NS
1105	D	0.0871	2002	0.023	NS



Table C-3 (continued). Baseline, August 2005 and February 2006 Selenium Concentrations

Well Number	Horizon	Baseline Selenium Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Selenium Concentration (mg/L)	Feb 2006 Selenium Concentration (mg/L)
1106	D	0.0925	2002	0.022	NS
1107	D	0.0903	2002	0.013	NS
1108	D	0.0704	2002	0.033	NS
1109	D	0.0372	2002	0.01	NS
1110	D	0.0081	2002	0.0055	NS
1111	D	0.0172	2002	0.014	NS
1112	D	0.0154	2002	0.0036	NS
1113	D	0.0025	2002	0.0016	NS
1114	D	0.0035	2002	0.006	NS
1115	D	0.0362	2002	0.011	NS
1119	D	0.029	2002	0.021	NS
1120	D	0.0563	2002	0.039	NS
1121	D	0.0455	2002	0.014	NS
1122	D	0.0558	2002	0.044	NS
1123	D	0.0449	2002	0.0045	NS
1124	D	0.0186	2002	0.0072	NS
1125	D	0.0025	2002	0.0021	NS
0251	E	0.0035	2002	0.00057	0.00084
0268	E	0.0018	2002	0.0015	0.0018
0920	E	0.0014	2001	0.00092	NS
0911	F			0.00053	NS
0913	G	0.00063	2001	0.00046	NS
0916	G	0.001	2001	0.00056	NS
0919	G			NS	NS
0902	H			NS	NS
0252	I	0.00092	2002	0.00037	0.00071
0921	I	0.00091	2001	0.00048	NS

Table C-4. Baseline, August 2005 and February 2006 Sulfate Concentrations

Well Number	Horizon	Baseline Sulfate Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Sulfate Concentration (mg/L)	Feb 2006 Sulfate Concentration (mg/L)
000I	A			NS	NS
000M	A			NS	NS
0284	A			NS	NS
0285	A			NS	NS
0686	A	98.6	2002	28	NS
0687	A	329	2002	28	NS
0688	A	40	2002	310	NS
0901	A	26.2	2001	33	NS
0906	A	1660	2002	NS	2100
0929	A	28.1	2002	28	27
0940	A	7550	2002	NS	NS
0941	A	745	2002	NS	NS
0945	A	32.1	2002	48	NS
0946	A			110	NS
000J	B			NS	NS
0262	B	931	2001	830	820
0263	B	1990	2001	2000	2000
0265	B	1520	2001	1100	1000
0267	B	3680	2002	3600	3500
0271	B	16.4	2002	16	NS
0281	B			78	87
0282	B			600	300
0283	B			630	590
0908	B	2430	2002	3000	3000
0909	B	666	2002	770	840
0910	B			17	NS
0918	B			NS	NS
0934	B	7360	2002	2500	2500
0935	B	2690	2002	2500	2600
0936	B	4360	2002	2600	2100
0938	B	2120	1999	2300	1300
0942	B	3030	2002	2800	3000
0943	B	29	2002	220	NS
0947	B	18.7	2002	18	NS
1126	B			3600	NS
1127	B			530	NS
1128	B			890	NS
1129	B			1000	NS
1130	B			1200	NS
1131	B			2000	NS
1132	B			2100	NS
1133	B			340	NS

Table C-4 (continued). Baseline, August 2005 and February 2006 Sulfate Concentrations

Well Number	Horizon	Baseline Sulfate Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Sulfate Concentration (mg/L)	Feb 2006 Sulfate Concentration (mg/L)
0274	C			16	16
0276	C			17	17
0279	C			57	NS
0280	C			23	NS
0683	C	21.6	2002	19	NS
0684	C	18	2002	17	NS
0685	C	26.2	2002	17	NS
0689	C	13.7	2002	15	NS
0691	C	587	2002	130	110
0903	C	76.5	2002	66	NS
0912	C	846	2001	420	NS
0914	C	15.6	2001	14	NS
0917	C	13.9	2001	NS	NS
0930	C	59.8	2002	80	72
0932	C	30.2	2002	27	27
1008	C	13	2000	NS	NS
1116	C	176	2002	190	NS
1117	C	255	2002	1400	NS
1118	C	163	2002	1500	NS
0258	D	17.4	2000	20	18
0261	D	18.2	2001	19	NS
0264	D	37.7	2001	62	59
0266	D	10.9	2001	11	11
0272	D			12	13
0273	D			250	250
0275	D			2100	2200
0277	D			22	NS
0278	D			13	NS
0690	D	13.8	2002	13	NS
0692	D	20.8	2002	19	NS
0695	D	50.4	2002	56	NS
0904	D	96.5	2001	140	NS
0915	D	17.8	2001	18	NS
1003	D	302	2000	410	NS
1004	D	66.2	2000	65	NS
1005	D	12.7	2000	NS	NS
1006	D	12.2	2000	13	NS
1007	D	11.7	2000	27	NS
1101	D	960	2002	1300	NS
1102	D	1320	2002	1300	NS
1103	D	2570	2002	1800	NS
1104	D	1870	2002	1200	NS
1105	D	1590	2002	590	NS

Table C-4 (continued). Baseline, August 2005 and February 2006 Sulfate Concentrations

Well Number	Horizon	Baseline Sulfate Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Sulfate Concentration (mg/L)	Feb 2006 Sulfate Concentration (mg/L)
1106	D	1050	2002	430	NS
1107	D	1200	2002	350	NS
1108	D	3400	2002	1900	NS
1109	D	3280	2002	950	NS
1110	D	512	2002	350	NS
1111	D	988	2002	1000	NS
1112	D	1140	2002	220	NS
1113	D	136	2002	110	NS
1114	D	328	2002	450	NS
1115	D	1930	2002	710	NS
1119	D	1560	2002	1300	NS
1120	D	2330	2002	3000	NS
1121	D	2590	2002	1500	NS
1122	D	2960	2002	2900	NS
1123	D	1240	2002	210	NS
1124	D	1170	2002	470	NS
1125	D	165	2002	78	NS
0251	E	617	2002	16	14
0268	E	17.4	2002	120	170
0920	E	12.7	2001	13	NS
0911	F			9.7	NS
0913	G	8.43	2001	8.3	NS
0916	G	13.5	2001	11	NS
0919	G			NS	NS
0902	H			NS	NS
0252	I	19.2	2002	6.8	6.7
0921	I	8.52	2001	8.3	NS

Table C-5. Baseline, August 2005 and February 2006 Uranium Concentrations

Well Number	Horizon	Baseline Uranium Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Uranium Concentration (mg/L)	Feb 2006 Uranium Concentration (mg/L)
000I	A			NS	NS
000M	A			NS	NS
0284	A			NS	NS
0285	A			NS	NS
0686	A	0.0021	2002	0.000081BU	NS
0687	A	0.0208	2002	0.000073BU	NS
0688	A	0.002	2002	0.0037	NS
0901	A	0.0026	2001	0.0027	NS
0906	A	0.951	2002	NS	0.71
0929	A	0.0012	2002	0.0014	0.0014
0940	A	0.546	2002	NS	NS
0941	A	0.0886	2002	NS	NS
0945	A	0.0031	2002	0.005	NS
0946	A			0.00031U	NS
000J	B			NS	NS
0262	B	0.379	2001	0.66	0.77
0263	B	0.485	2001	0.14	0.12
0265	B	0.0897	2001	0.06	0.054
0267	B	0.0731	2002	0.095	0.088
0271	B	0.0014	2002	0.0013	NS
0281	B			0.0055	0.0073
0282	B			0.029	0.018
0283	B			0.028	0.028
0908	B	0.122	2002	0.1	0.1
0909	B	0.0389	2002	0.042	0.048
0910	B			0.0011	NS
0918	B			NS	NS
0934	B	0.312	2002	0.26	0.25
0935	B	0.0868	2002	0.12	0.12
0936	B	0.267	2002	0.35	0.24
0938	B	0.21	1999	0.62	0.44
0942	B	0.246	2002	0.23	0.35
0943	B	0.0049	2002	0.1	NS
0947	B	0.0024	2002	0.0011	NS
1126	B			0.071	NS
1127	B			0.019	NS
1128	B			0.048	NS
1129	B			0.61	NS
1130	B			0.2	NS
1131	B			0.62	NS
1132	B			1.7	NS
1133	B			0.047	NS



Table C-5 (continued). Baseline, August 2005 and February 2006 Uranium Concentrations

Well Number	Horizon	Baseline Uranium Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Uranium Concentration (mg/L)	Feb 2006 Uranium Concentration (mg/L)
0274	C			0.0014	0.0015
0276	C			0.0015	0.0017
0279	C			0.002	NS
0280	C			0.0014	NS
0683	C	0.0012	2002	0.0011	NS
0684	C	0.0019	2002	0.0012	NS
0685	C	0.0012	2002	0.0012	NS
0689	C	0.0011	2002	0.001	NS
0691	C	0.0657	2002	0.018	0.013
0903	C	0.0022	2002	0.0018	NS
0912	C	0.0342	2001	0.02	NS
0914	C	0.0013	2001	0.000051BU	NS
0917	C	0.0013	2001	NS	NS
0930	C	0.0023	2002	0.0029	0.0031
0932	C	0.0016	2002	0.0015	0.0014
1008	C	0.001	2000	NS	NS
1116	C	0.0081	2002	0.012	NS
1117	C	0.0151	2002	0.057	NS
1118	C	0.0098	2002	0.068	NS
0258	D	0.0018	2000	0.0012	0.0012
0261	D	0.0018	2001	0.0011	NS
0264	D	0.0033	2001	0.0031	0.0031
0266	D	0.0019	2001	0.0015	0.0017
0272	D			0.0014	0.0015
0273	D			0.062	0.064
0275	D			0.47	0.46
0277	D			0.0027	NS
0278	D			0.0012	NS
0690	D	0.0018	2002	0.0017	NS
0692	D	0.0015	2002	0.0016	NS
0695	D	0.002	2002	0.0022	NS
0904	D	0.0044	2001	0.0056	NS
0915	D	0.0017	2001	0.000044BU	NS
1003	D	0.0205	2000	0.033	NS
1004	D	0.0053	2000	0.007	NS
1005	D	0.0013	2000	NS	NS
1006	D	0.0014	2000	0.0011	NS
1007	D	0.0012	2000	0.0011	NS
1101	D	0.245	2002	0.35	NS
1102	D	0.533	2002	0.37	NS
1103	D	0.355	2002	0.36	NS
1104	D	0.194	2002	0.19	NS
1105	D	2.1	2002	0.73	NS

Table C-5 (continued). Baseline, August 2005 and February 2006 Uranium Concentrations

Well Number	Horizon	Baseline Uranium Concentration (mg/L)	Year Sampled, Baseline	Aug 2005 Uranium Concentration (mg/L)	Feb 2006 Uranium Concentration (mg/L)
1106	D	2.1	2002	0.6	NS
1107	D	0.118	2002	0.053	NS
1108	D	0.646	2002	0.27	NS
1109	D	0.565	2002	0.21	NS
1110	D	0.0528	2002	0.065	NS
1111	D	0.161	2002	0.17	NS
1112	D	0.13	2002	0.039	NS
1113	D	0.0149	2002	0.012	NS
1114	D	0.0277	2002	0.047	NS
1115	D	0.41	2002	0.095	NS
1119	D	0.555	2002	0.28	NS
1120	D	1.3	2002	0.64	NS
1121	D	0.857	2002	0.25	NS
1122	D	0.878	2002	0.72	NS
1123	D	0.261	2002	0.045	NS
1124	D	0.171	2002	0.07	NS
1125	D	0.0176	2002	0.011	NS
0251	E	0.0481	2002	0.0017	0.0017
0268	E	0.0014	2002	0.02	0.028
0920	E	0.0017	2001	0.0012	NS
0911	F			0.0012	NS
0913	G	0.0016	2001	0.0011	NS
0916	G	0.0014	2001	0.000046BU	NS
0919	G			NS	NS
0902	H			NS	NS
0252	I	0.0024	2002	0.0018	0.0018
0921	I	0.0047	2001	0.0045	NS

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## **Appendix D**

### **Monitor Well Water Level Hydrographs**

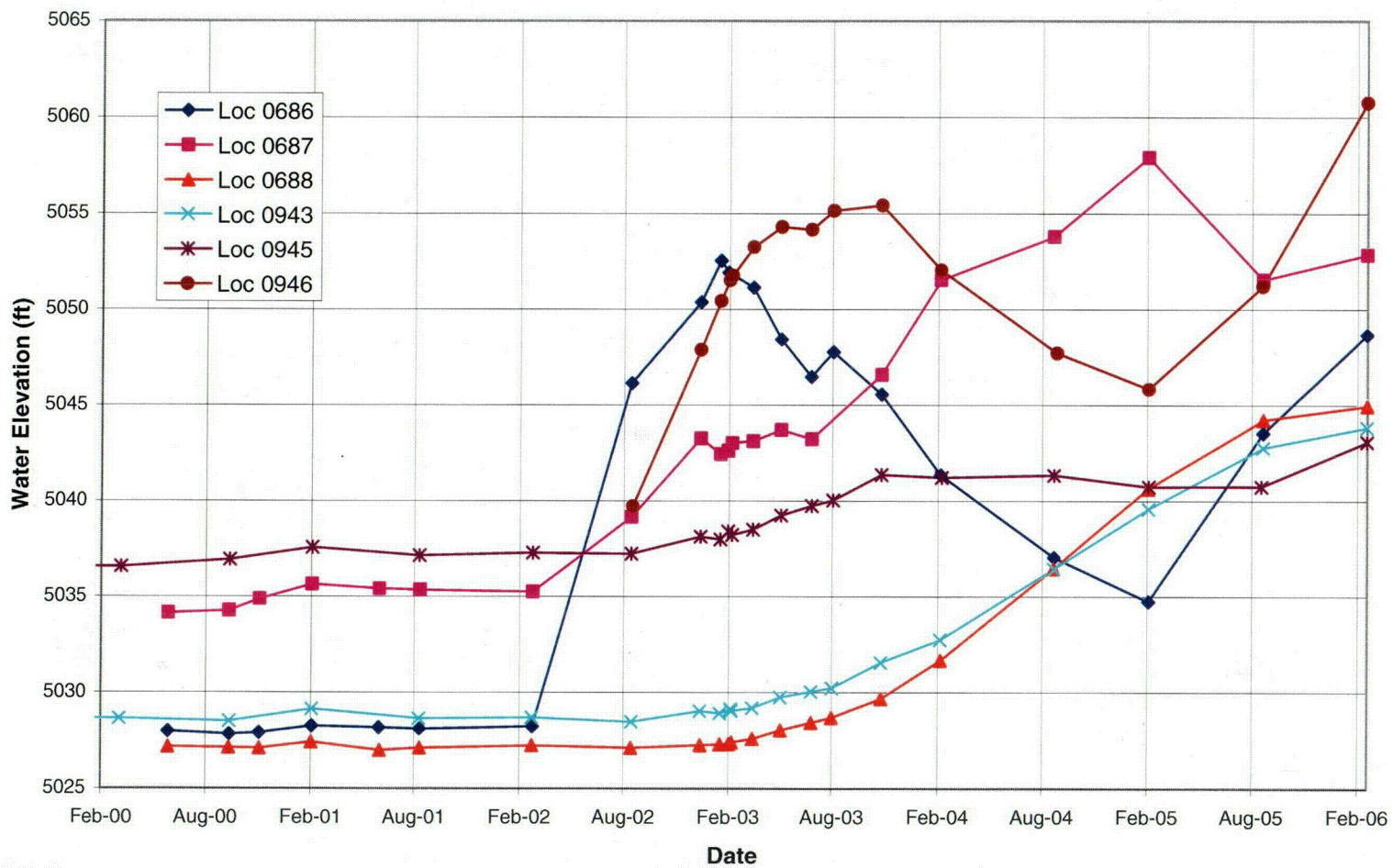


Figure D-1. Monitor Wells at Infiltration Trench



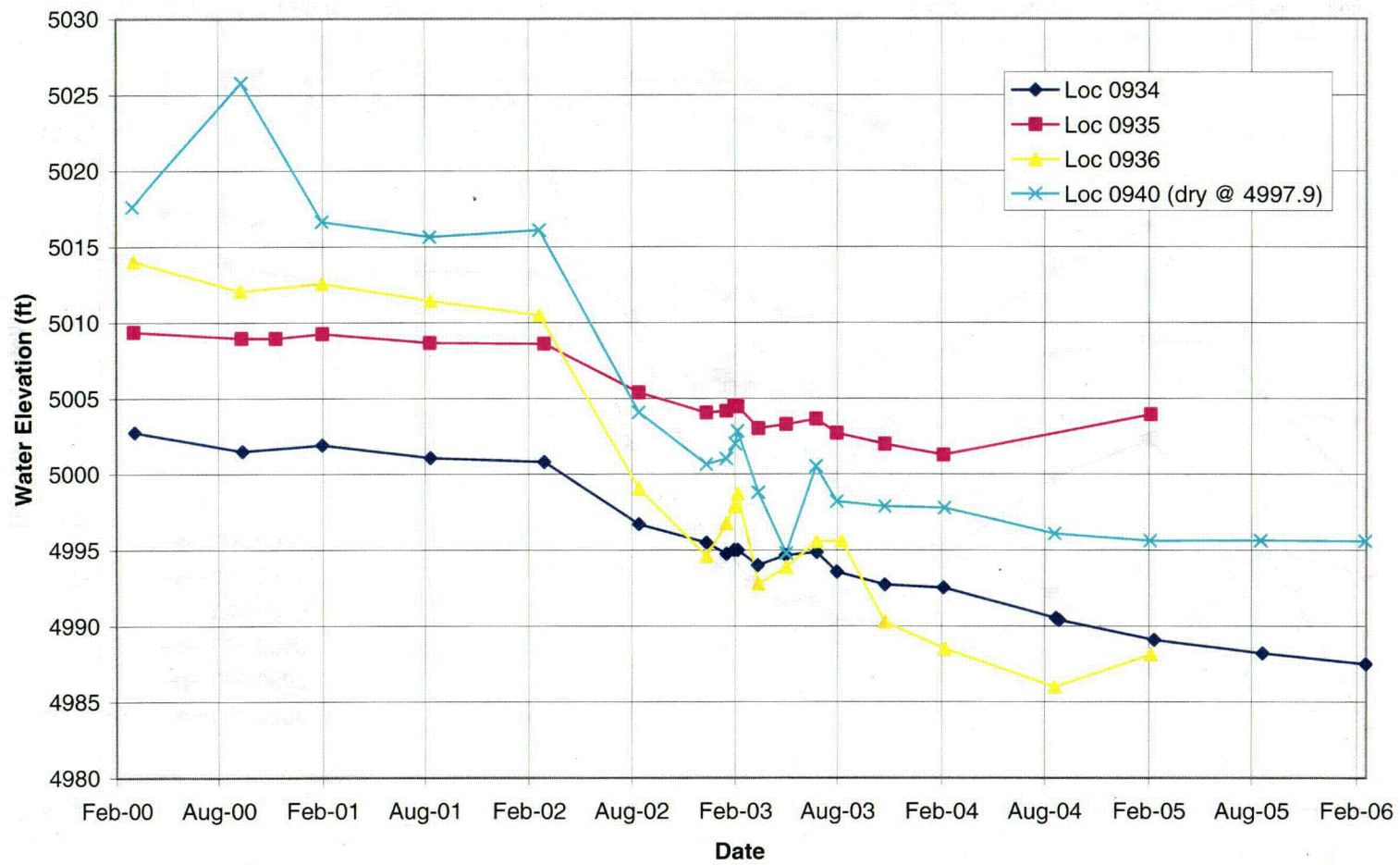


Figure D-2. Selected Horizon A and B Monitor Wells

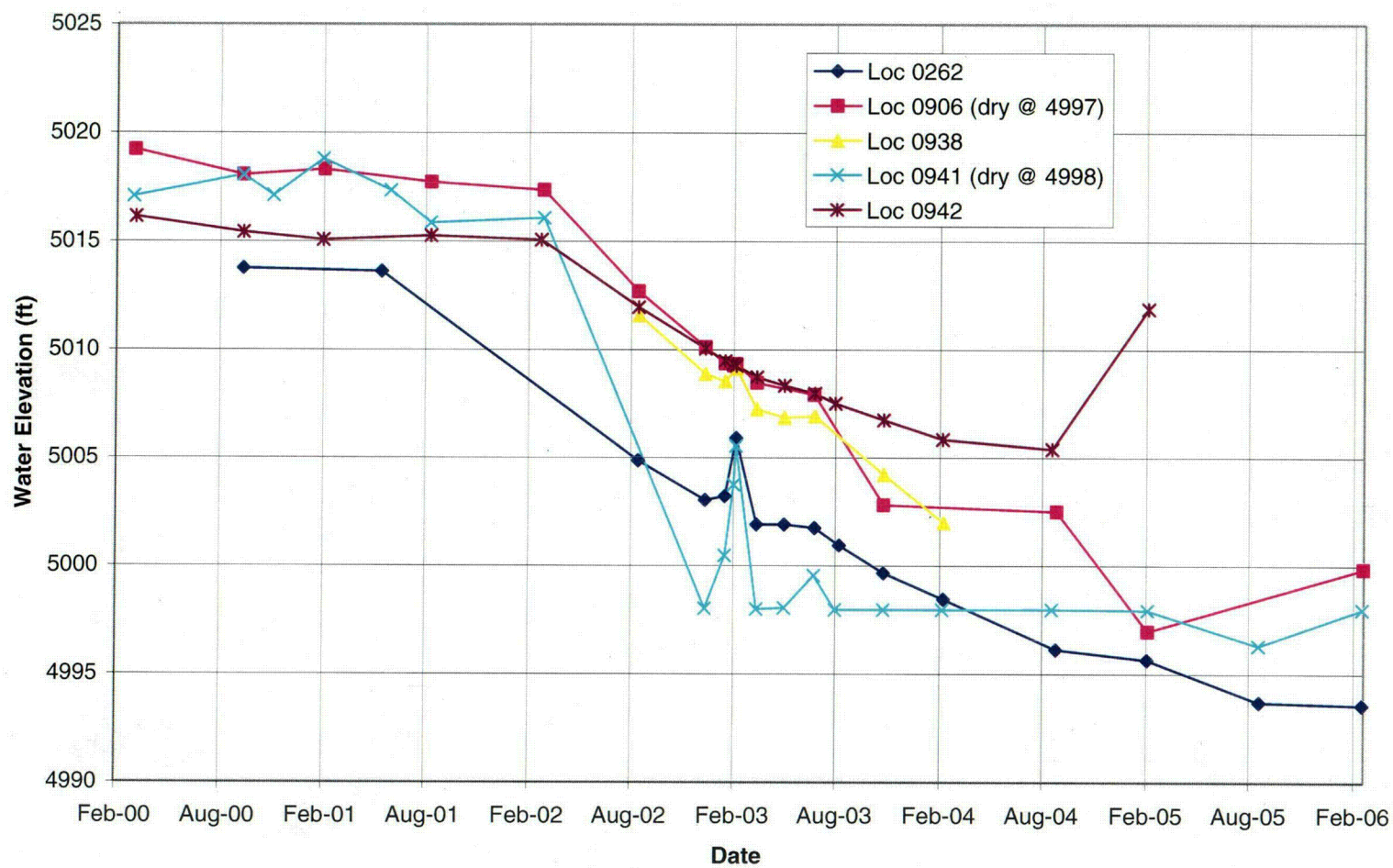


Figure D-3. Selected Horizon A and B Monitoring Wells



Figure D-4. Middle Terrace Well Pair



Figure D-5. Middle Terrace Well Pair



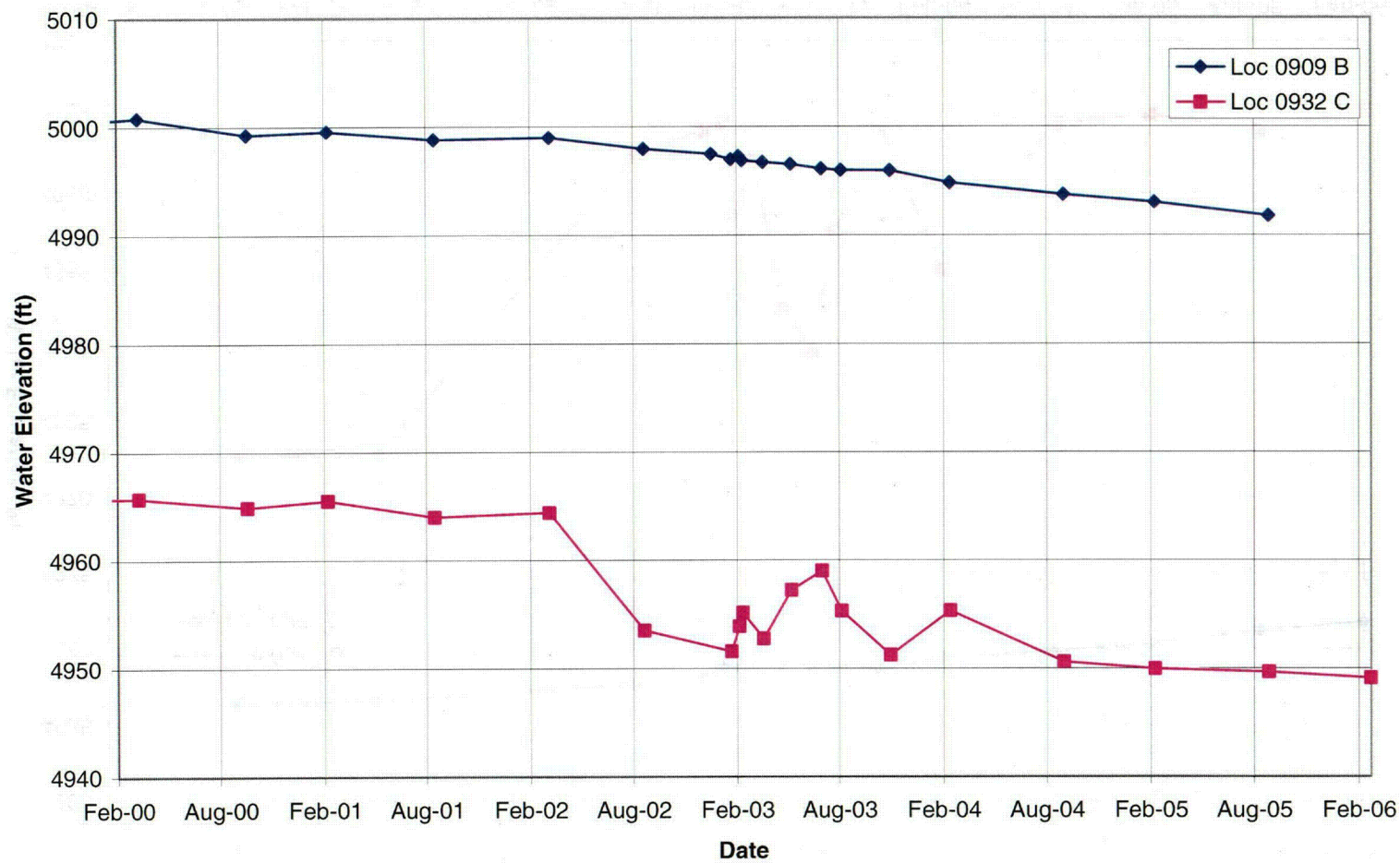


Figure D-6. Middle Terrace Well Pair

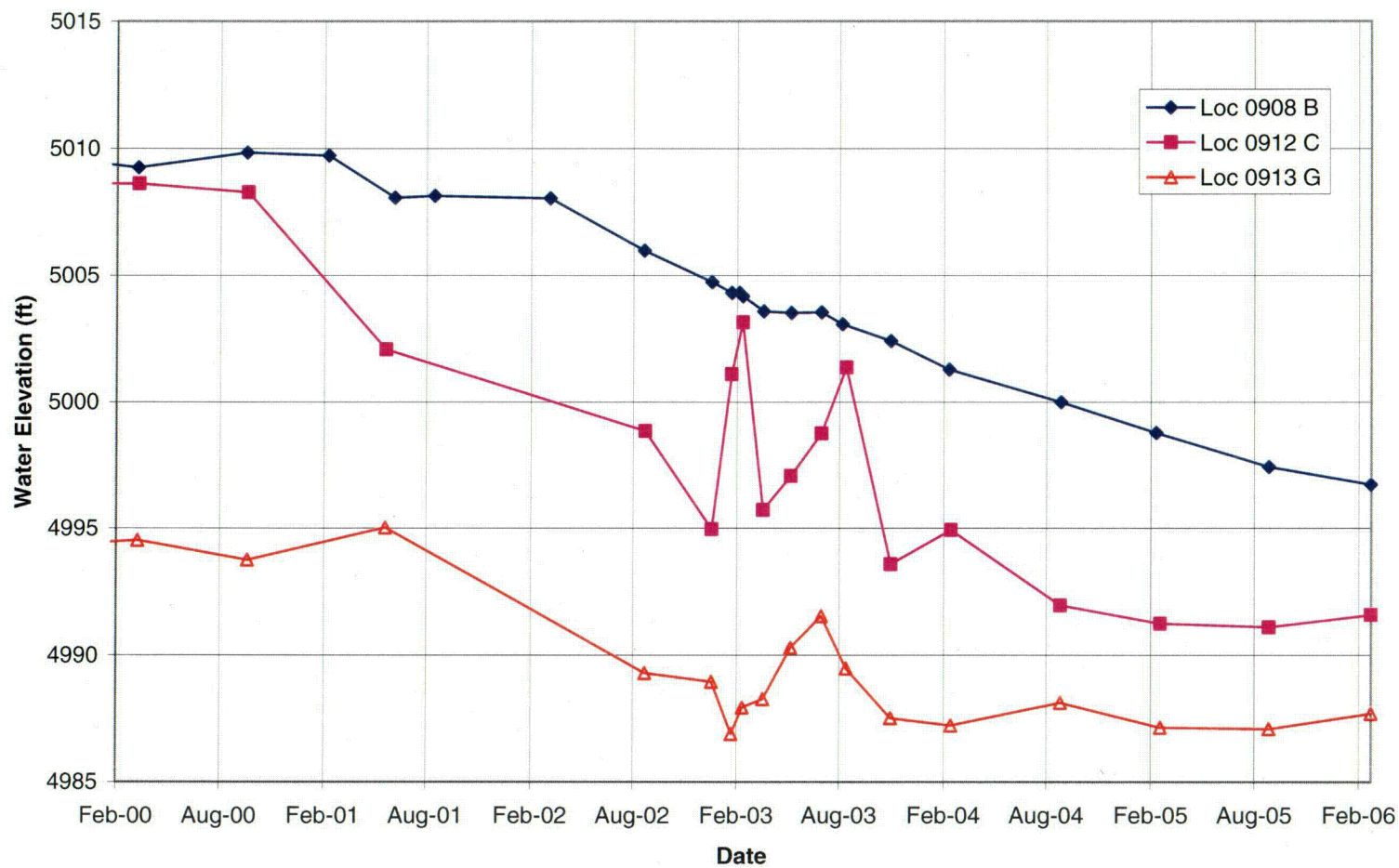


Figure D-7. Middle Terrace Well Cluster



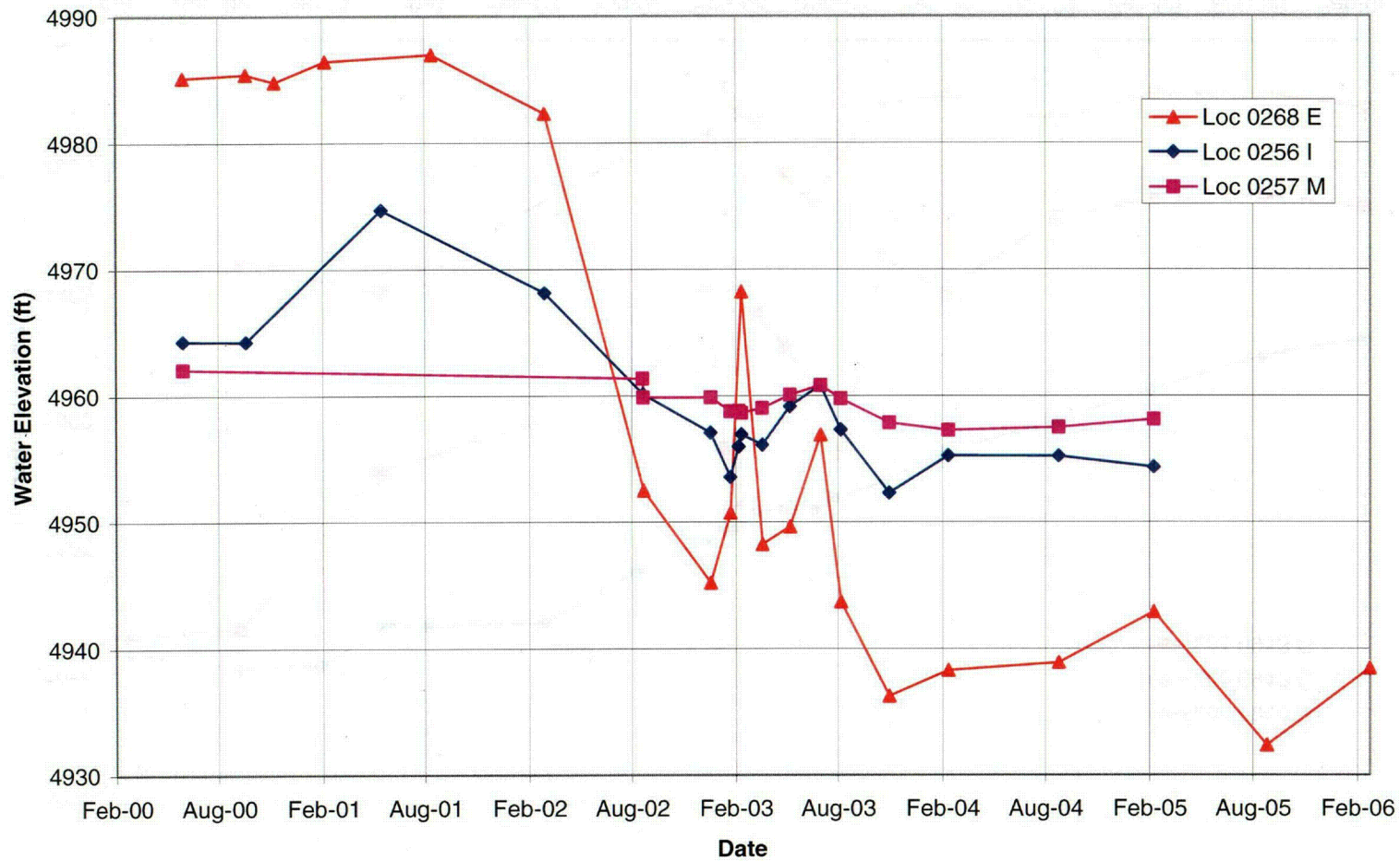


Figure D-8. Middle Terrace Well Cluster

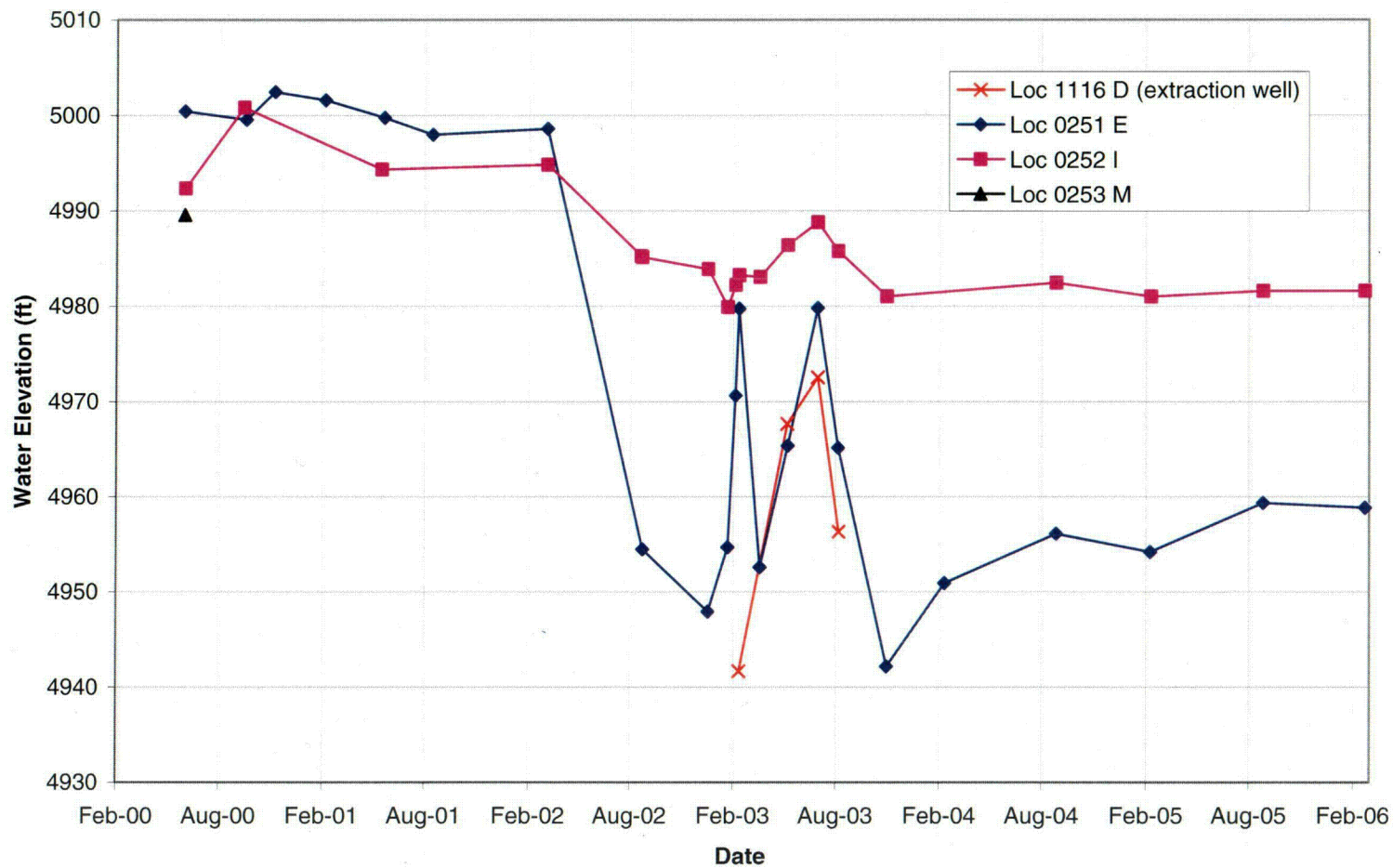


Figure D-9. Middle Terrace Well Cluster

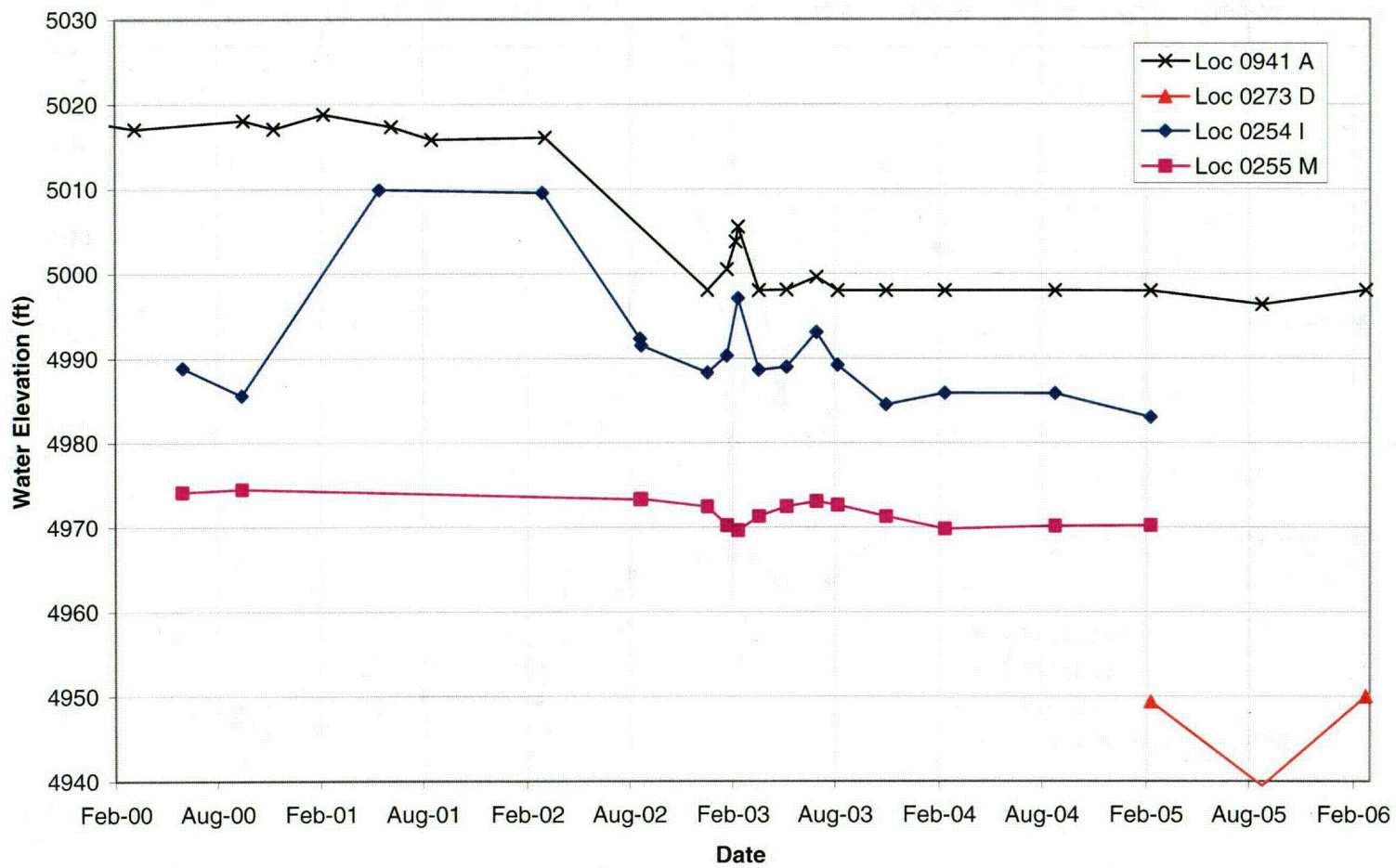


Figure D-10. Middle Terrace Well Cluster

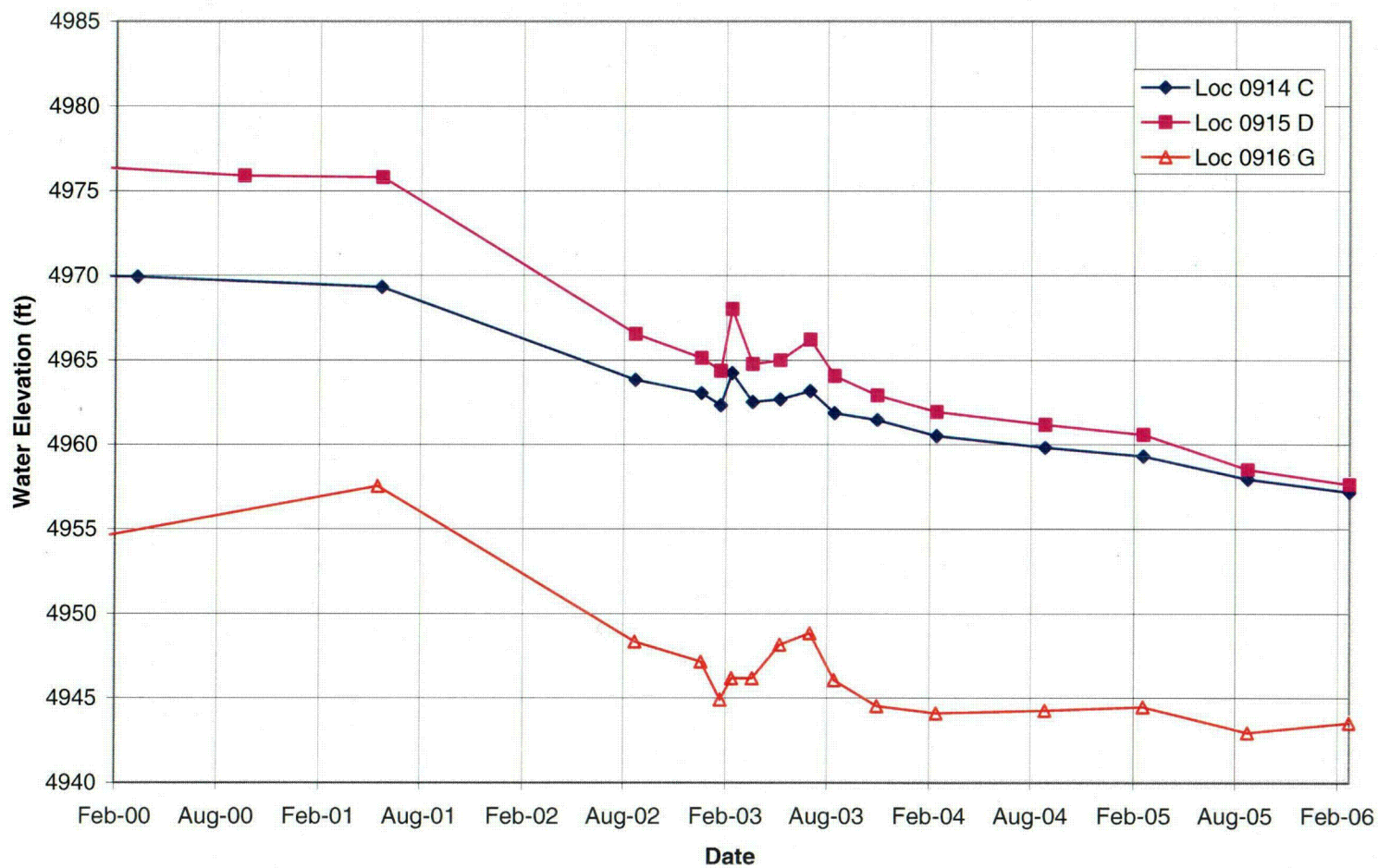


Figure D-11. Middle Terrace Well Cluster



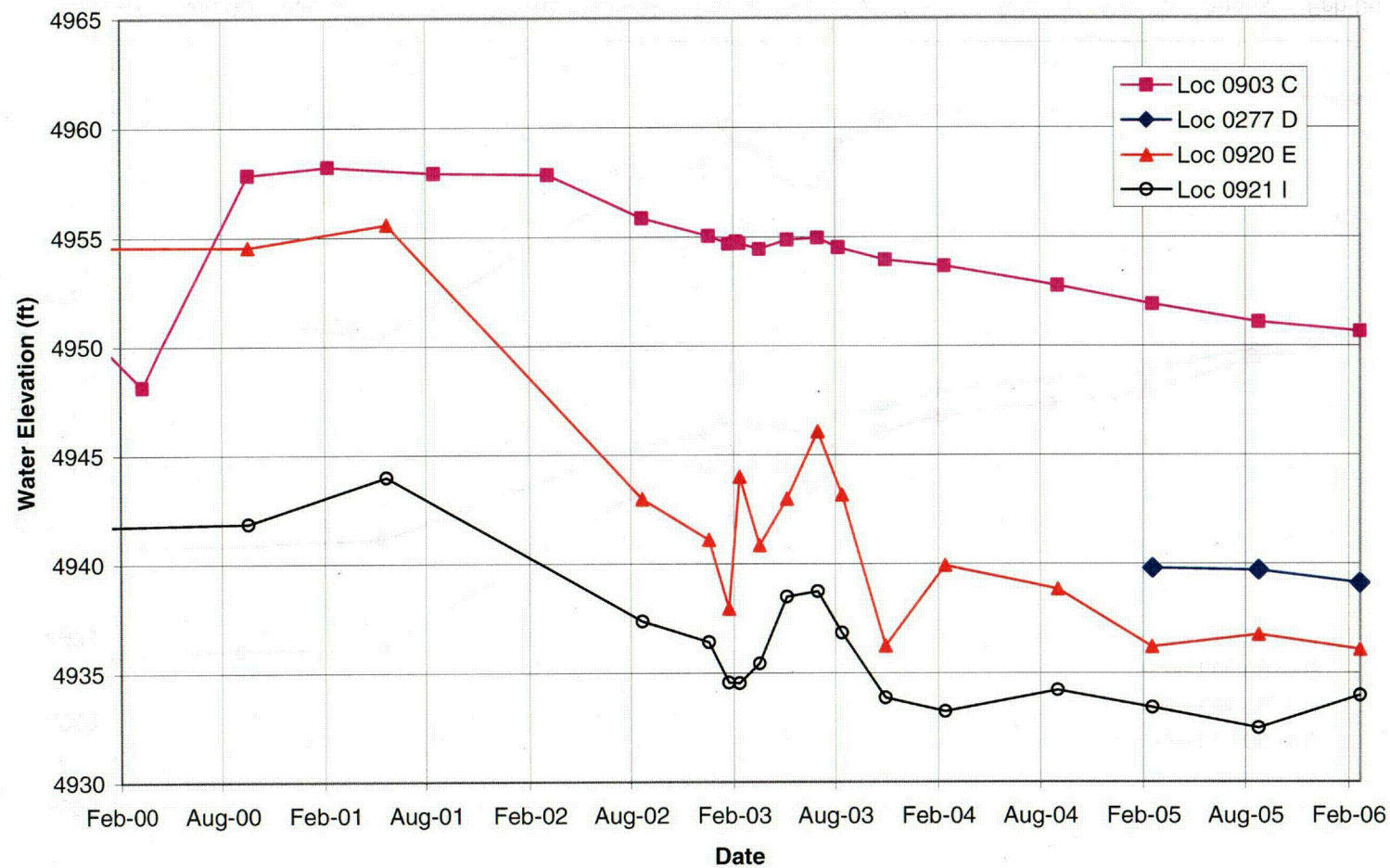


Figure D-12. Lower Terrace Well Cluster

## **Appendix E**

### **Contaminant Concentration Trends at Monitor Wells**



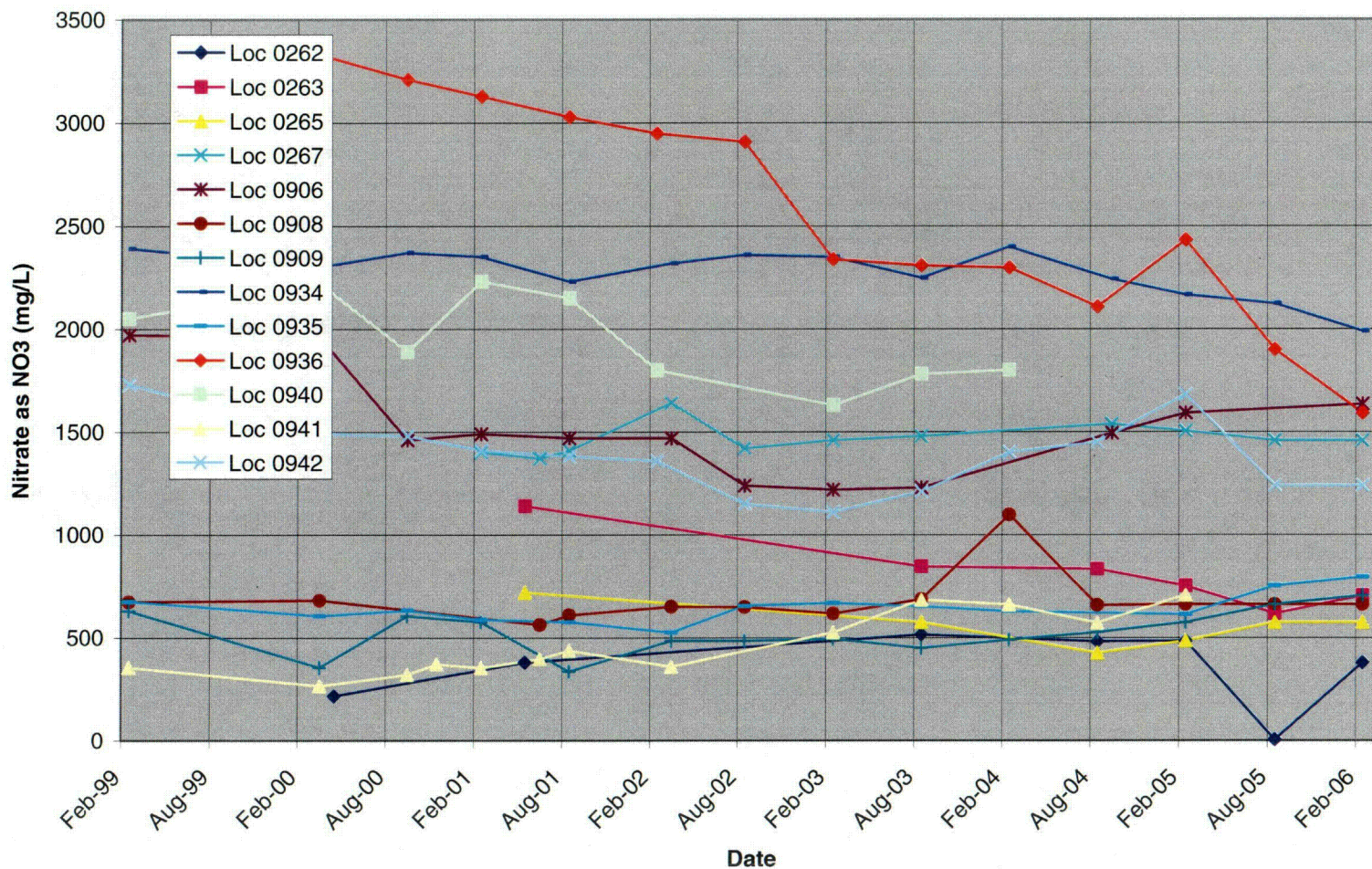


Figure E-1. Horizons A and B Monitor Wells, Nitrate as NO<sub>3</sub> Concentration



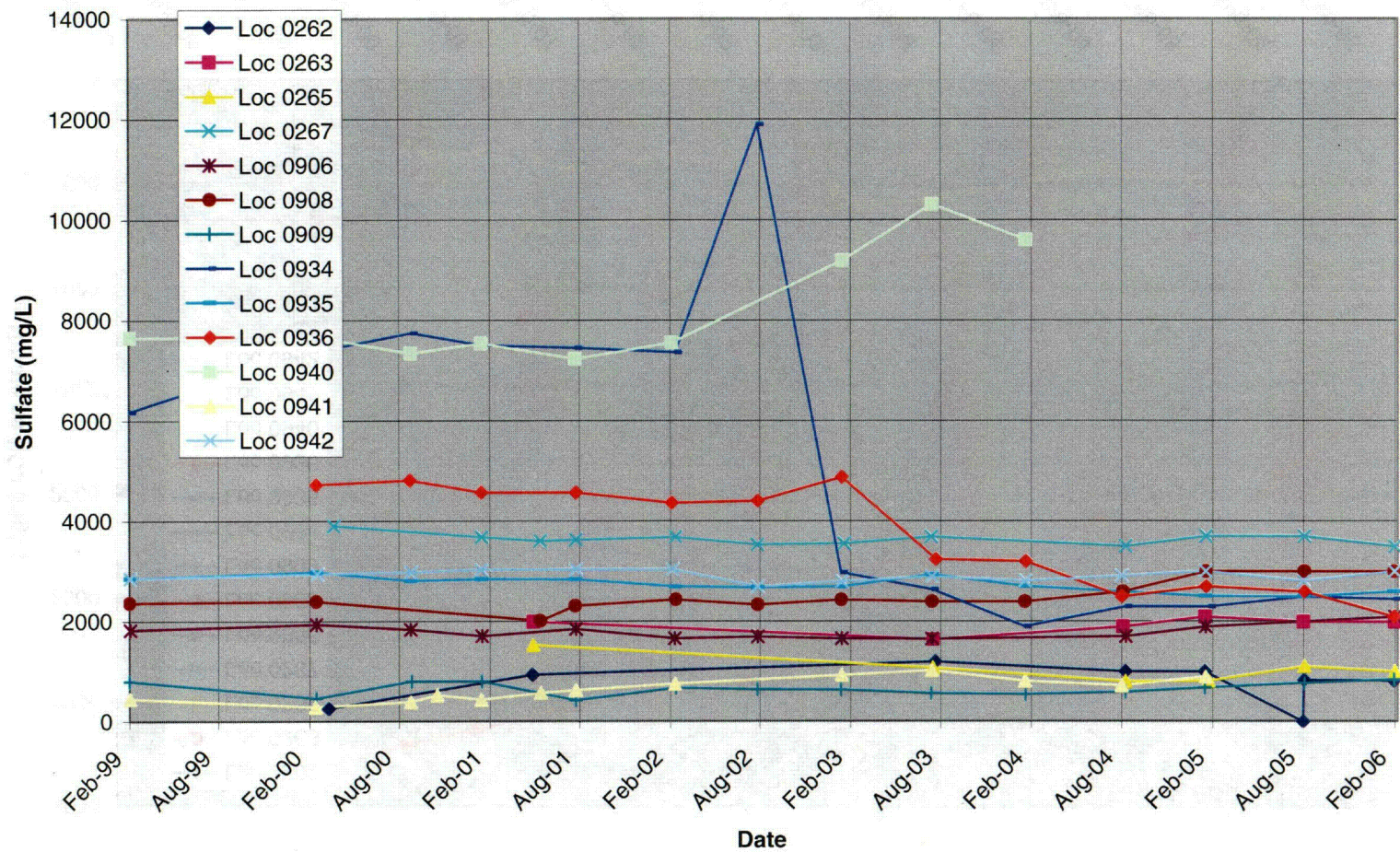


Figure E-2. Horizons A and B Monitor Wells, Sulfate Concentration



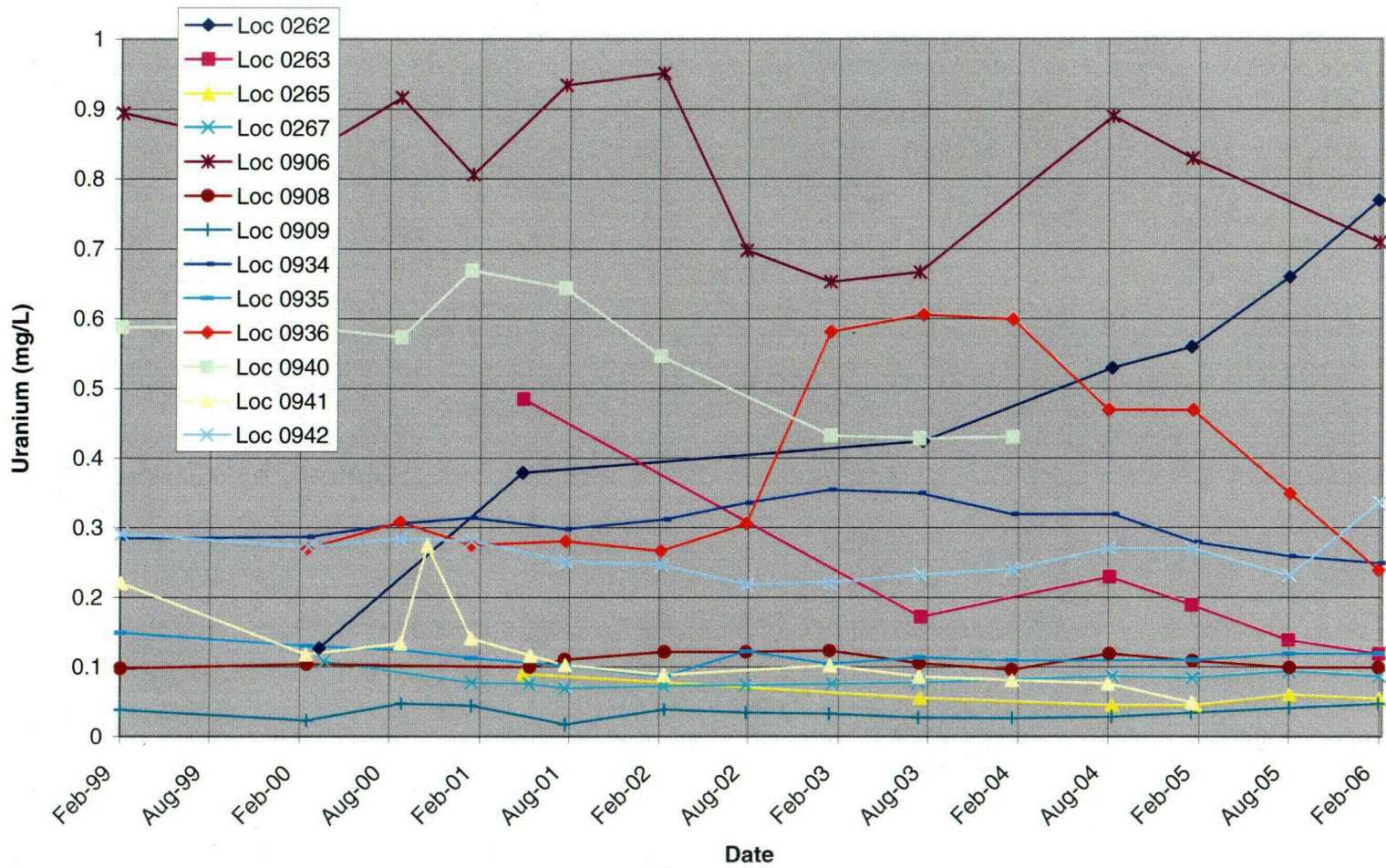


Figure E-3. Horizons A and B Monitor Wells, Uranium Concentration



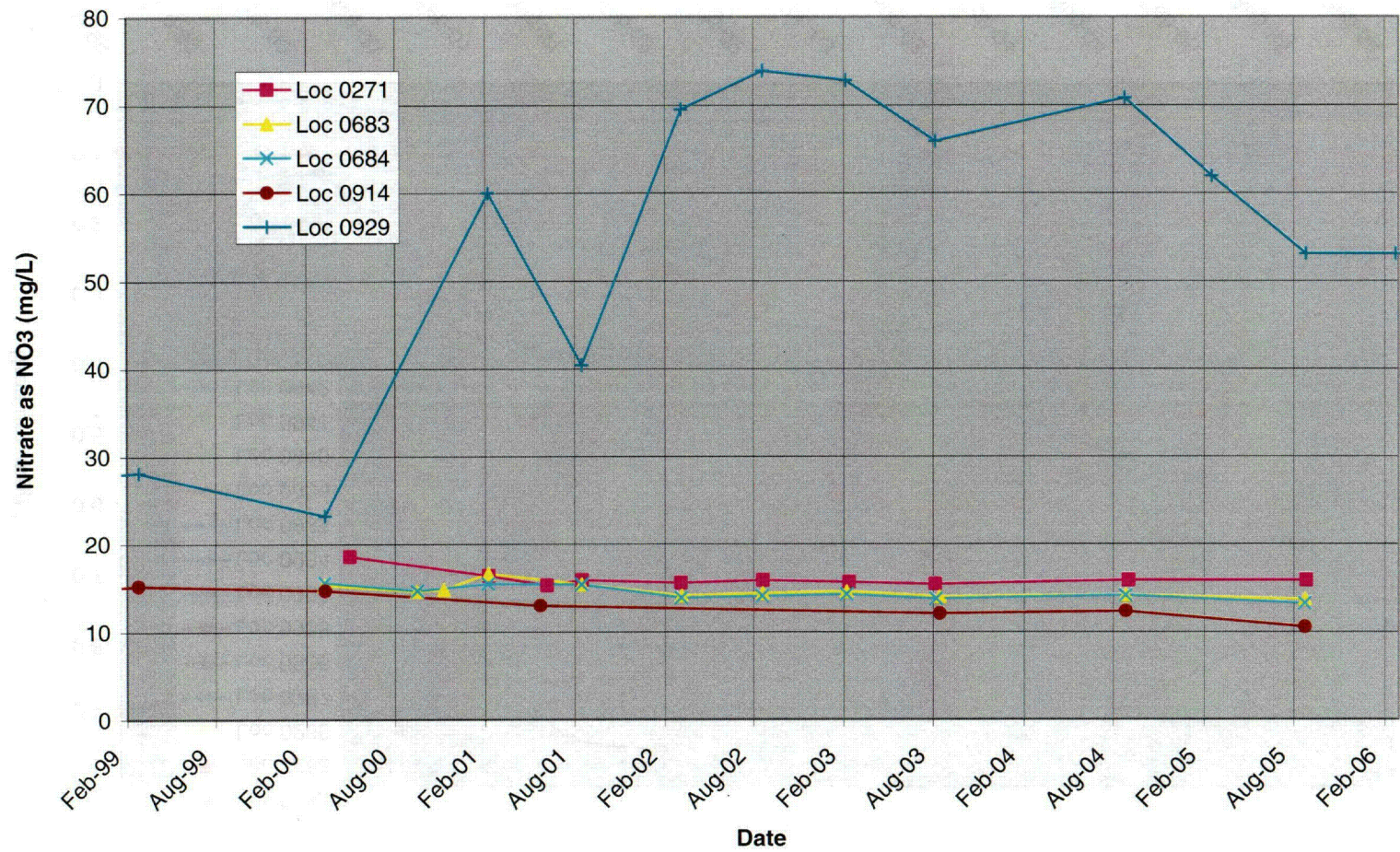


Figure E-4. Horizons A and B Sentinel Wells, Nitrate as NO<sub>3</sub> Concentration



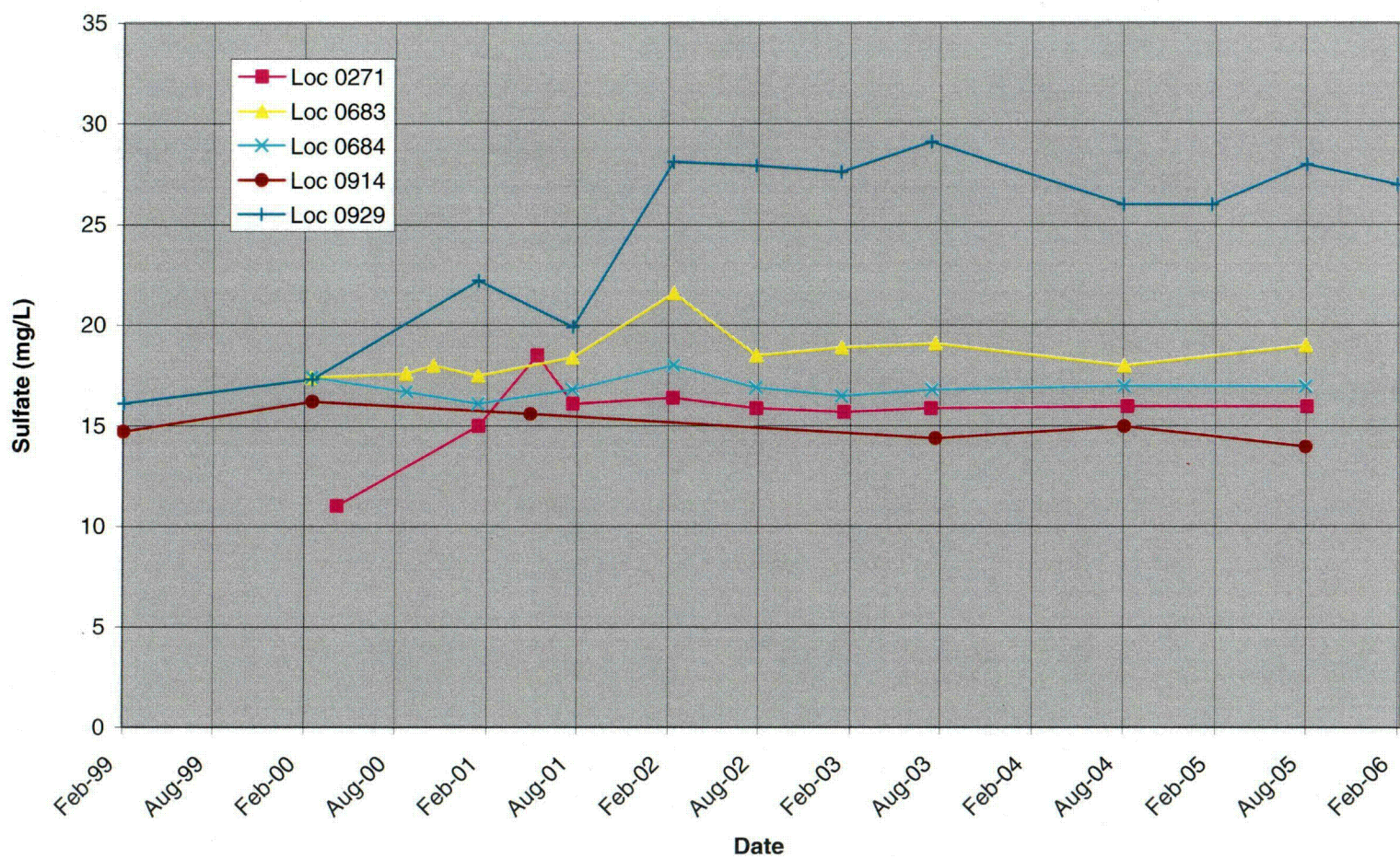


Figure E-5. Horizons A and B Sentinel Wells, Sulfate Concentration



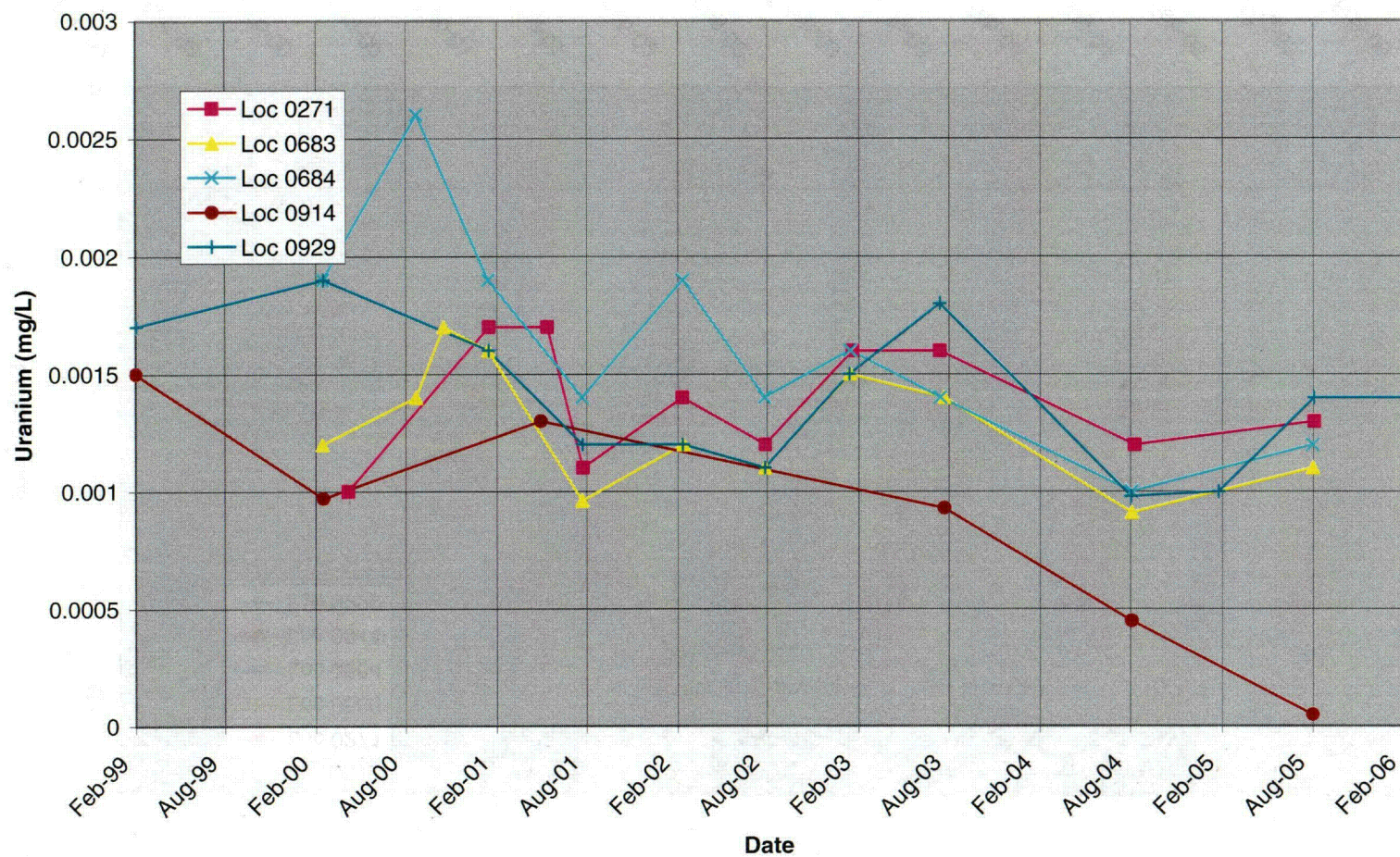


Figure E-6. Horizons A and B Sentinel Wells, Uranium Concentration



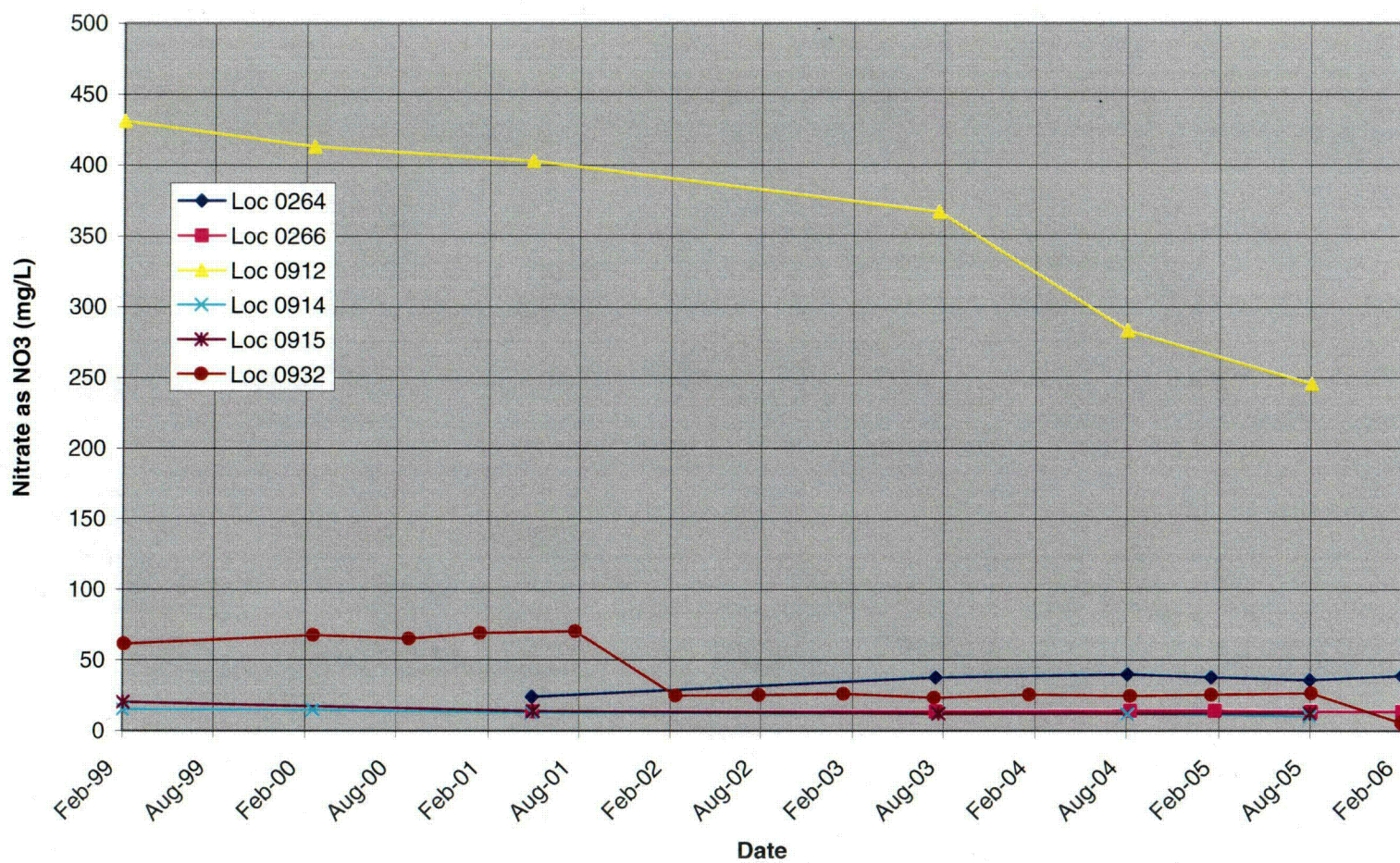


Figure E-7. Horizons C and D Monitor Wells, Nitrate as NO<sub>3</sub> Concentration



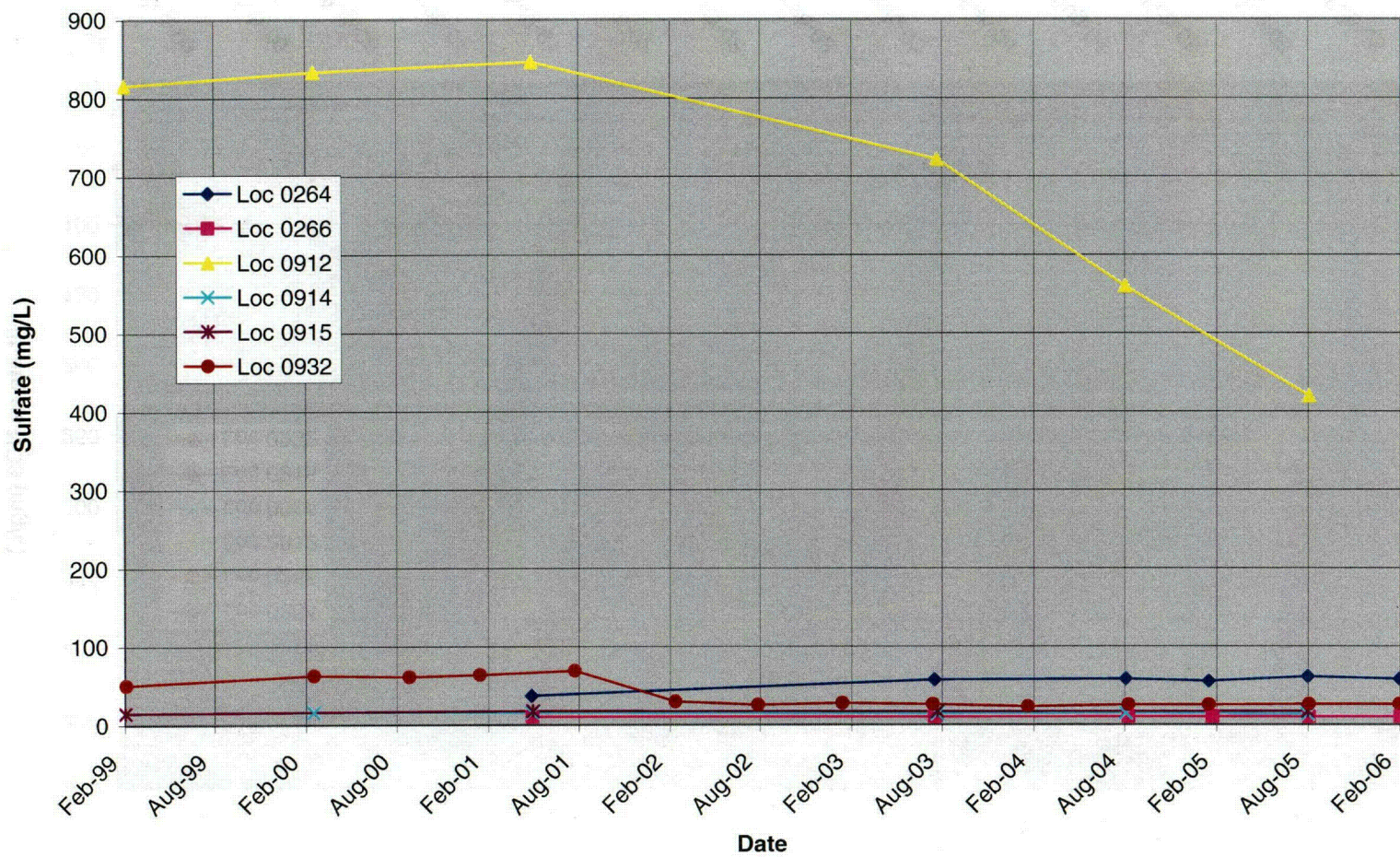


Figure E-8. Horizons C and D Monitor Wells, Sulfate Concentration



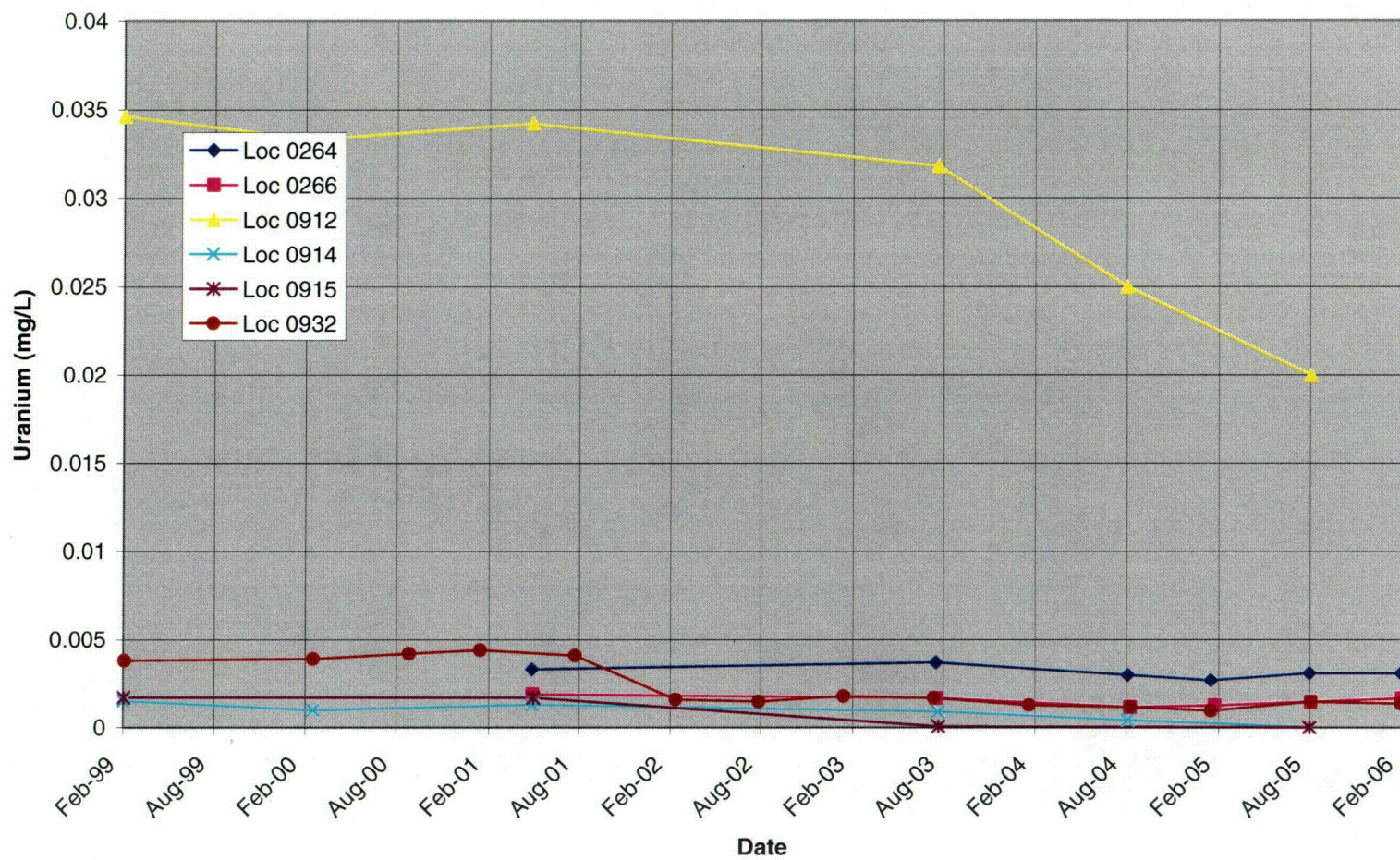


Figure E-9. Horizons C and D Monitor Wells, Uranium Concentration



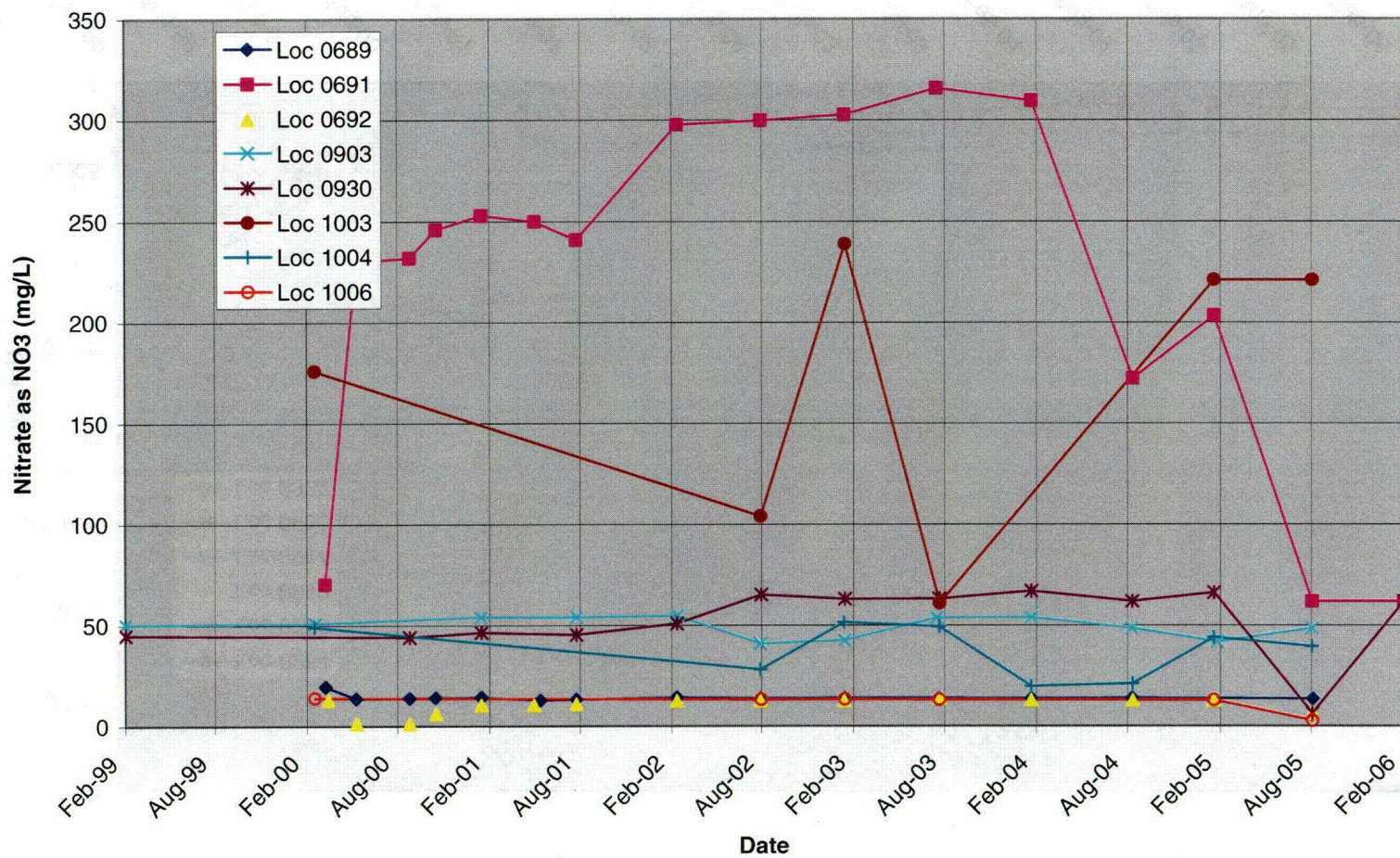


Figure E-10. Lower Terrace Monitor Wells, Nitrate as NO<sub>3</sub> Concentration



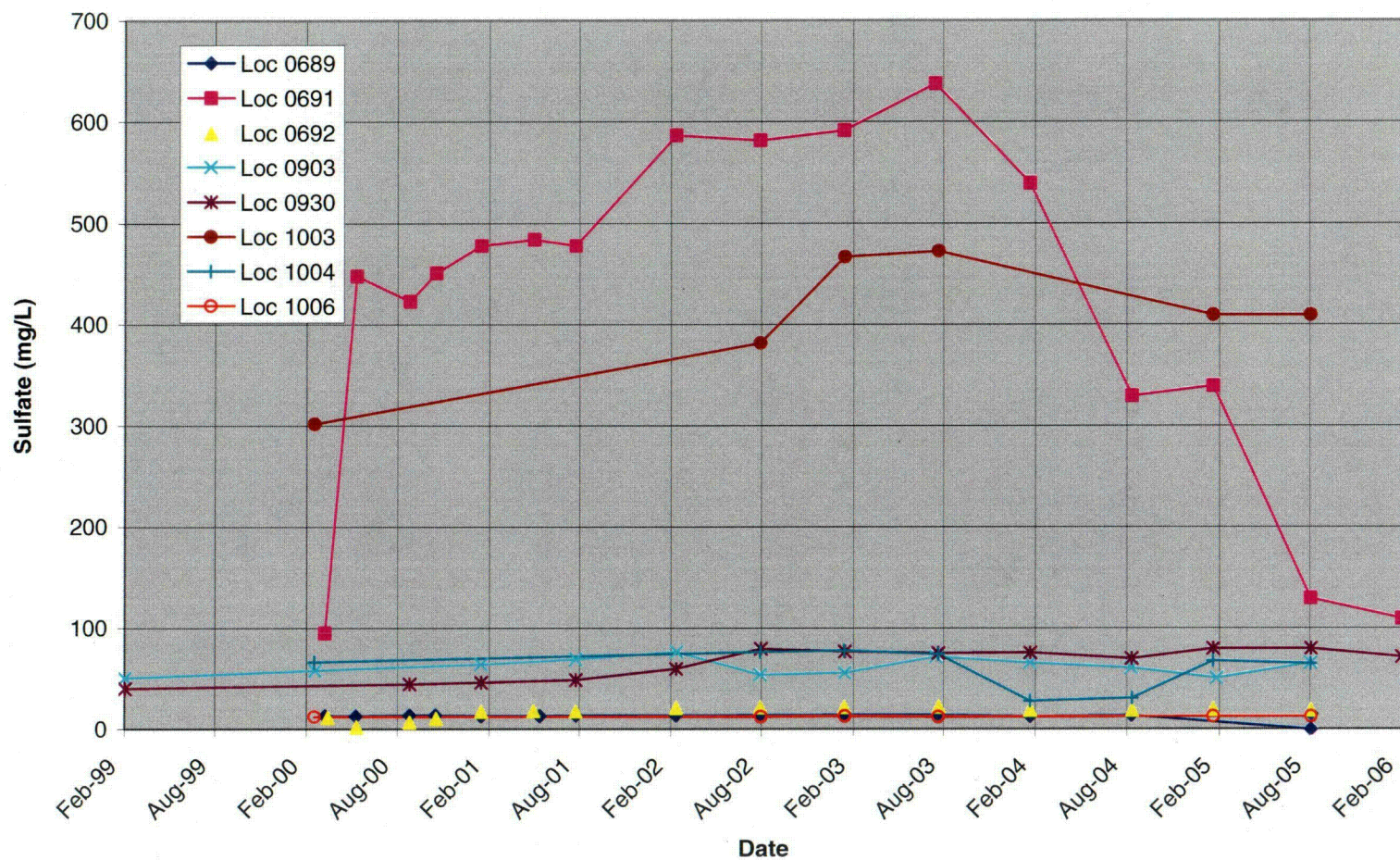


Figure E-11. Lower Terrace Monitor Wells, Sulfate Concentration



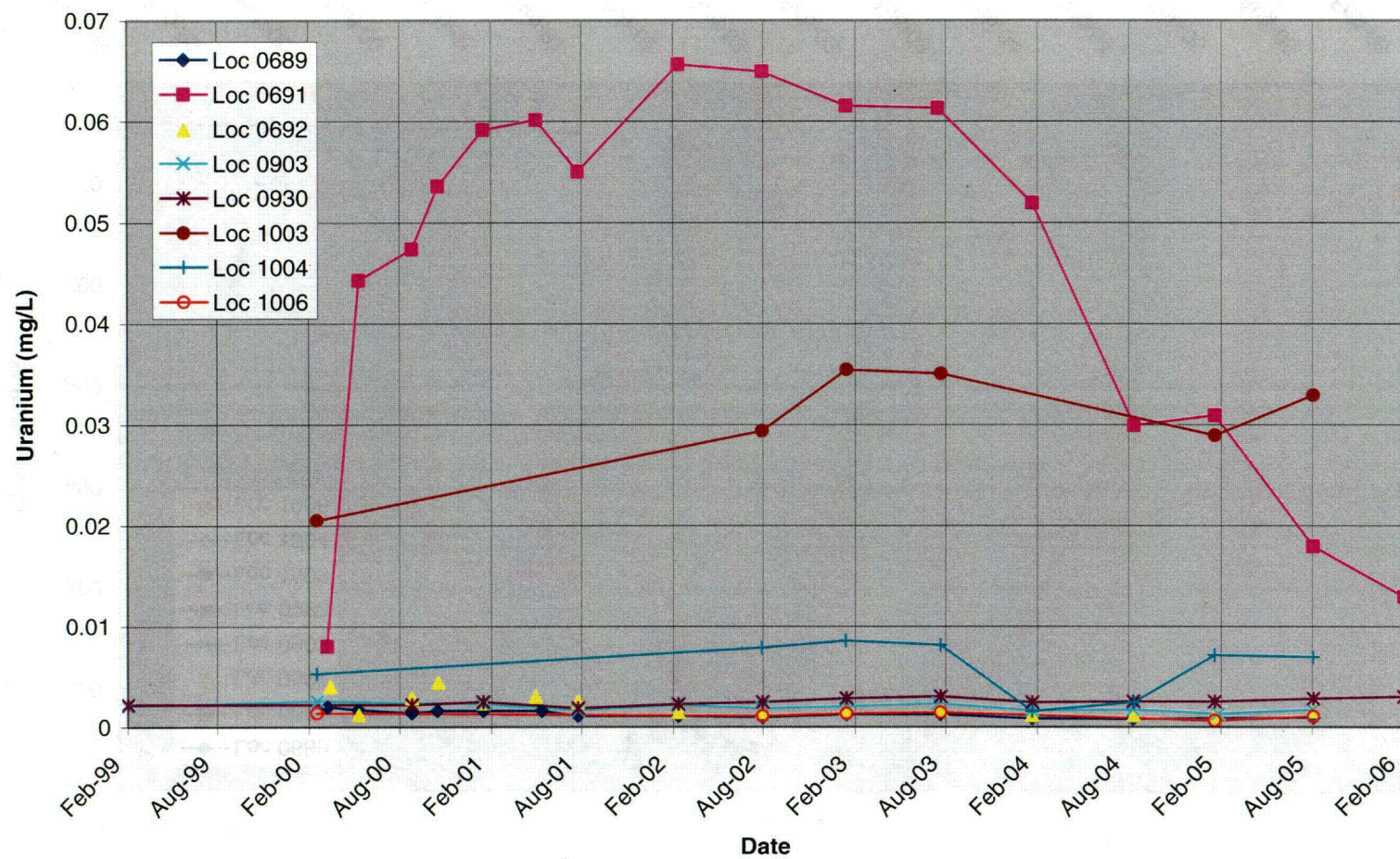


Figure E-12. Lower Terrace Monitor Wells, Uranium Concentration



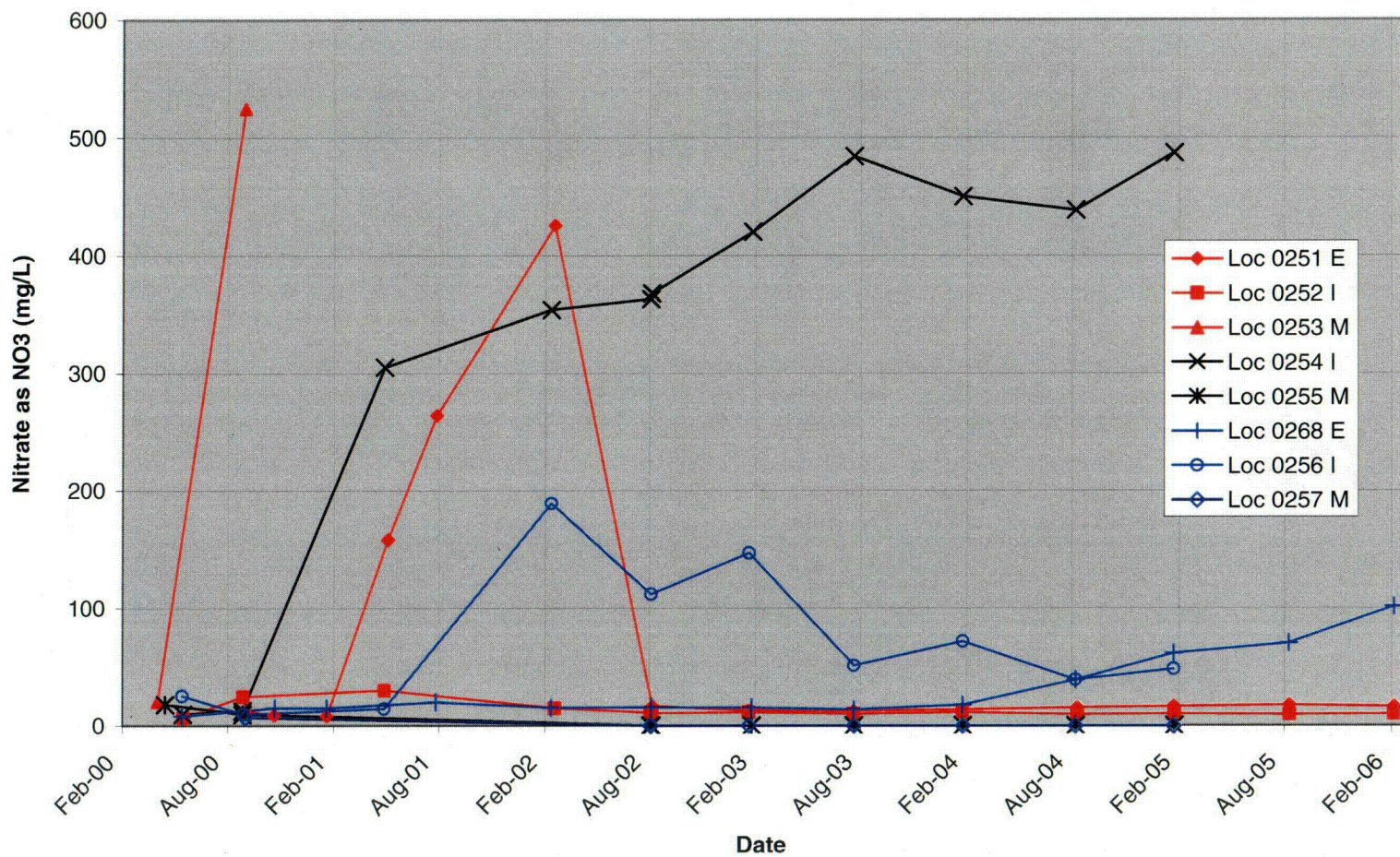


Figure E-13. Deep Monitor Wells, Nitrate as NO<sub>3</sub> Concentration



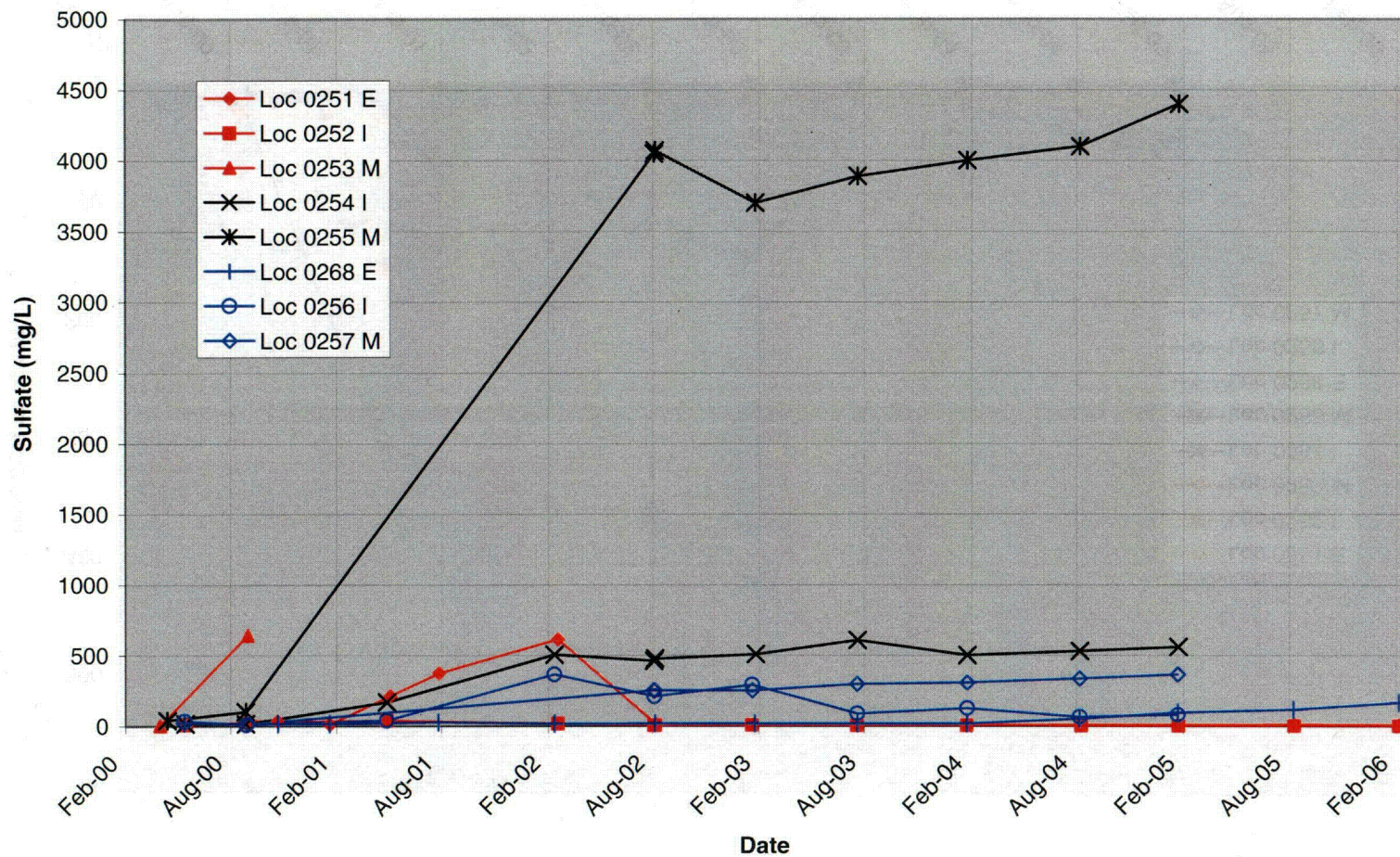


Figure E-14. Deep Monitor Wells, Sulfate Concentration



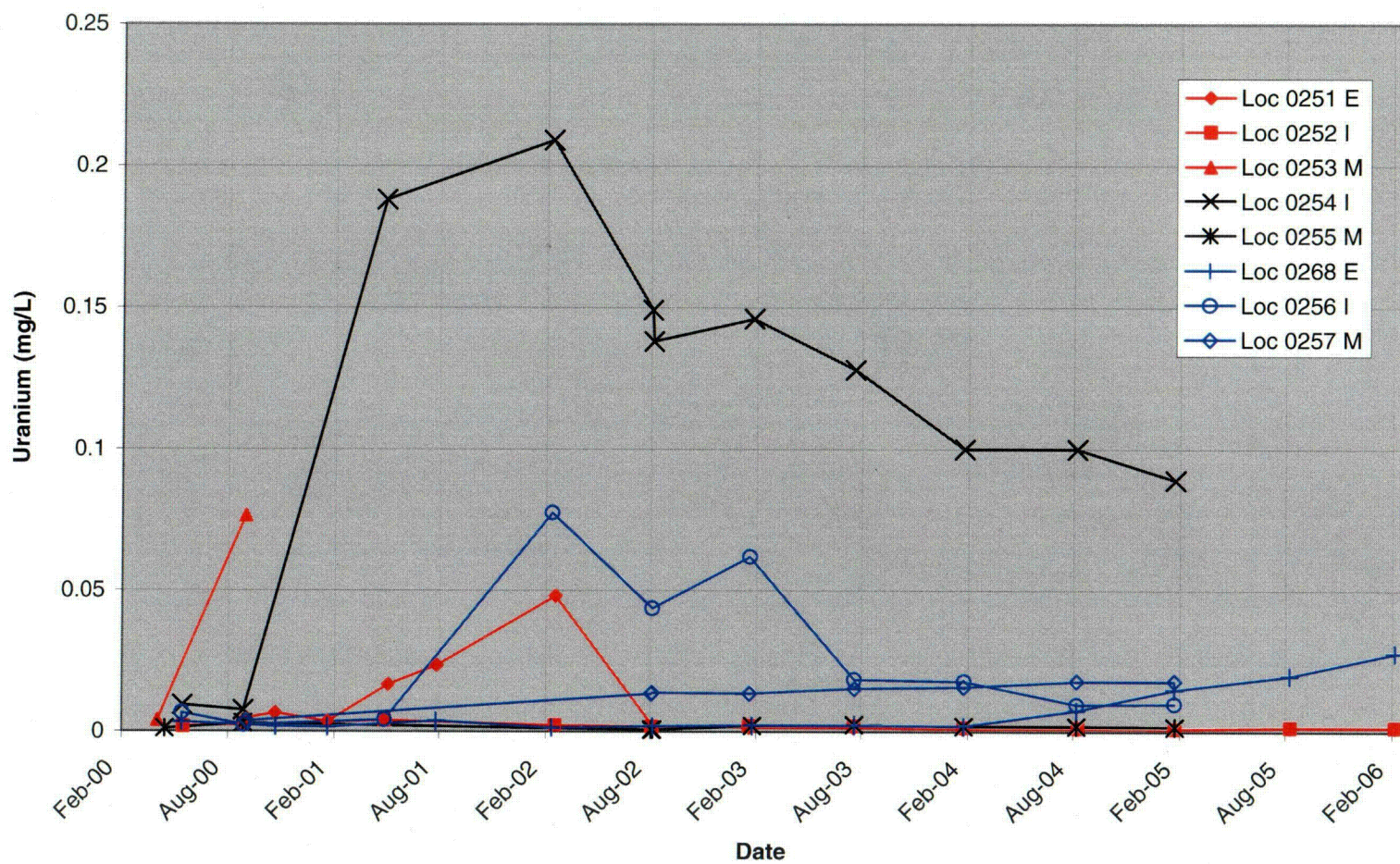


Figure E-15. Deep Monitor Wells, Uranium Concentration

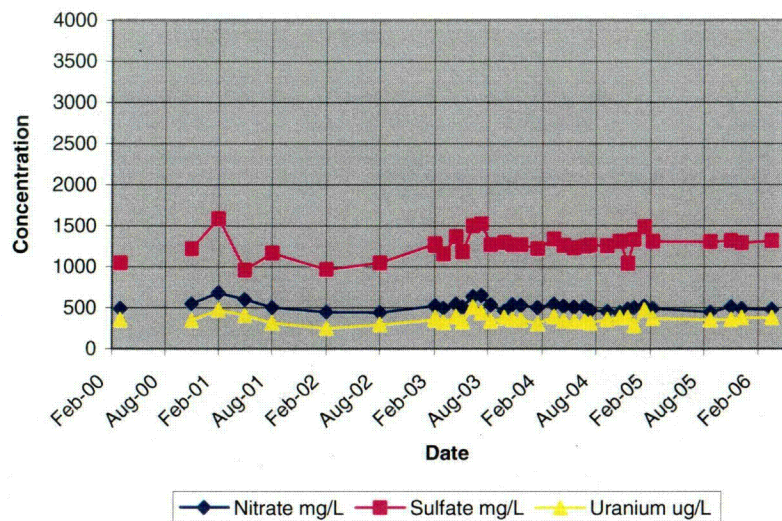
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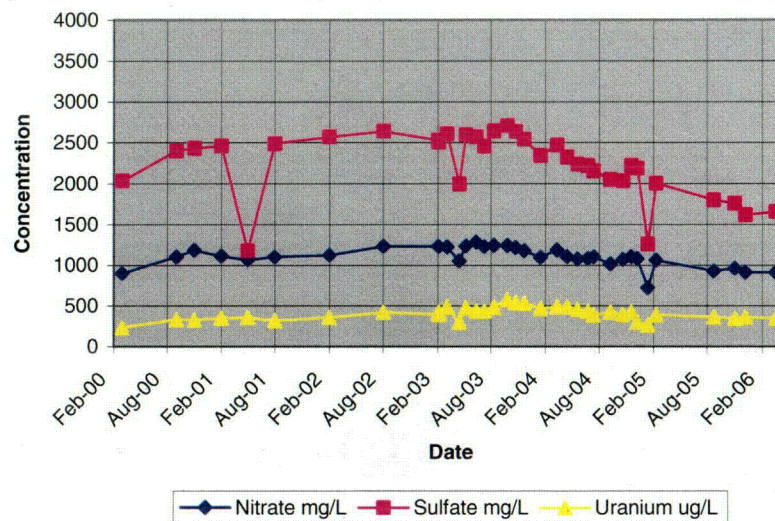
## **Appendix F**

### **Contaminant Concentrations at Extraction Wells**

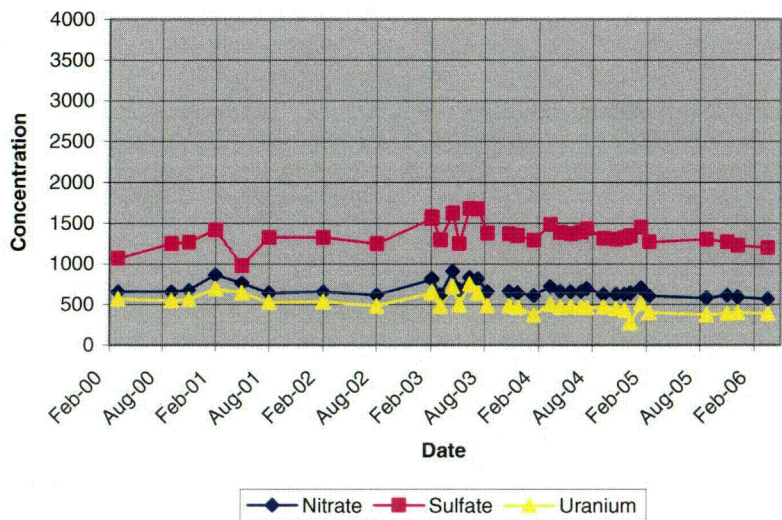
Well 1101



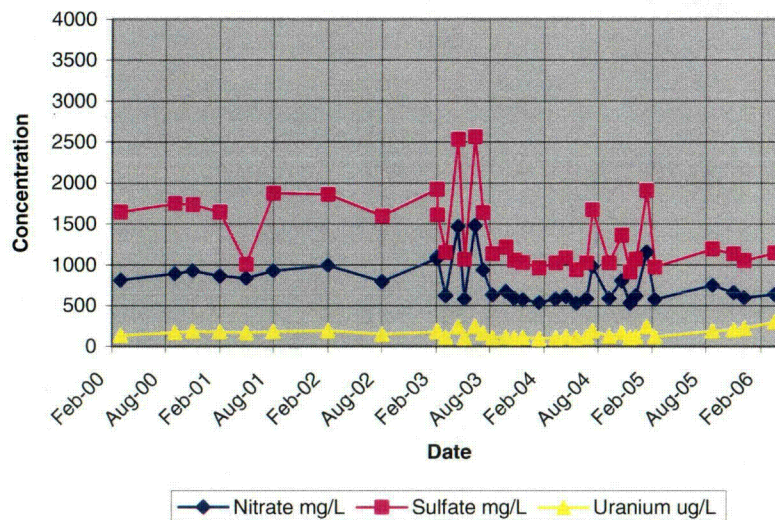
Well 1103



Well 1102

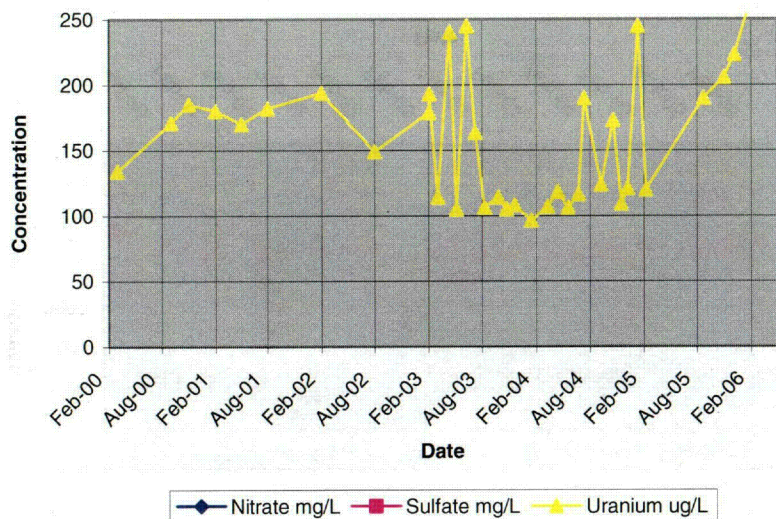


Well 1104

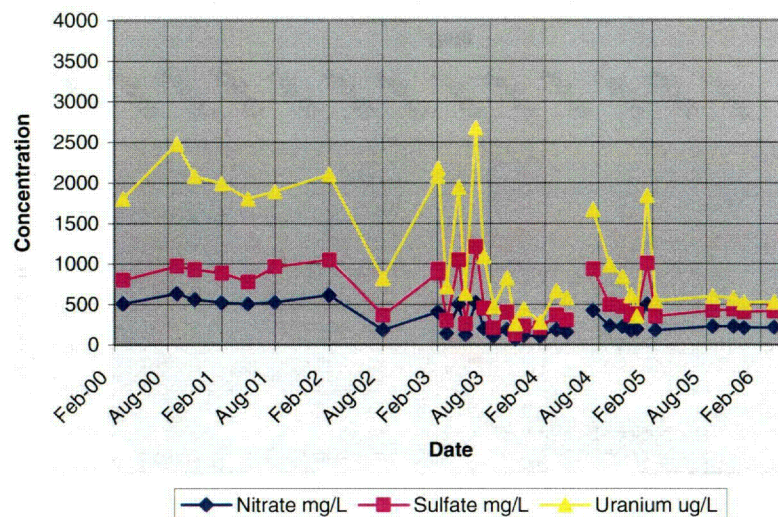




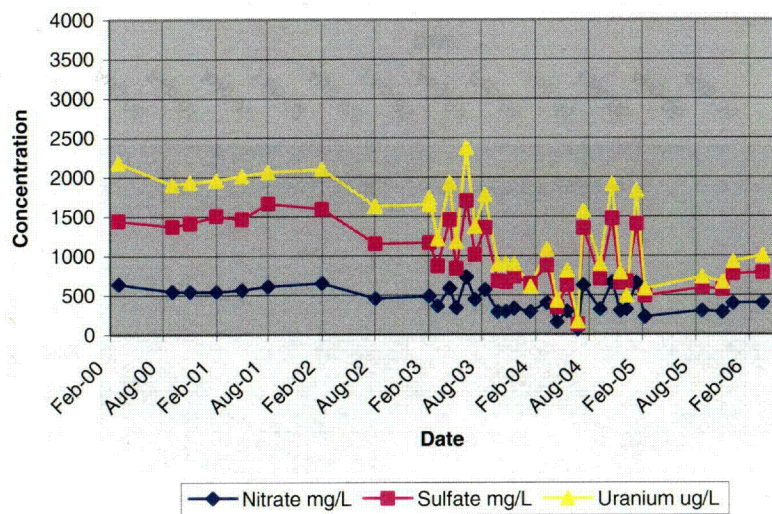
Well 1104



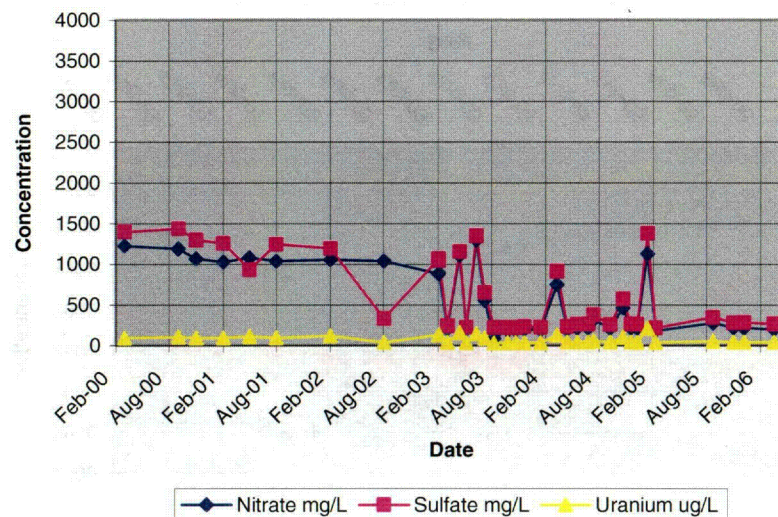
Well 1106



Well 1105

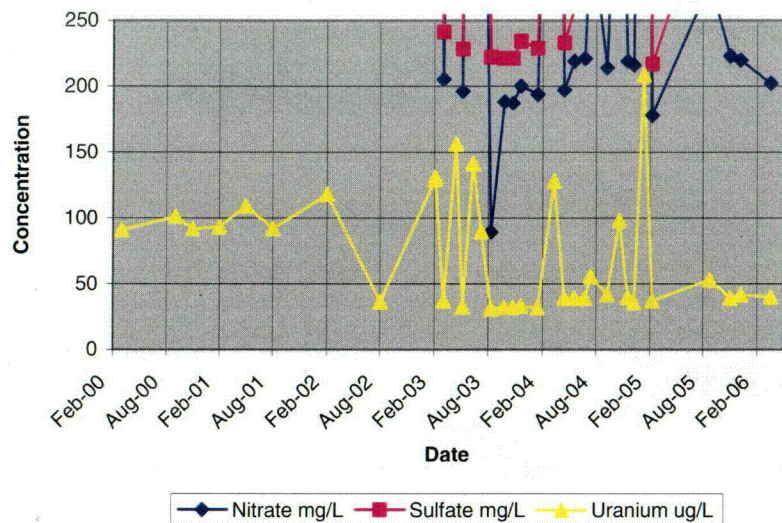


Well 1107

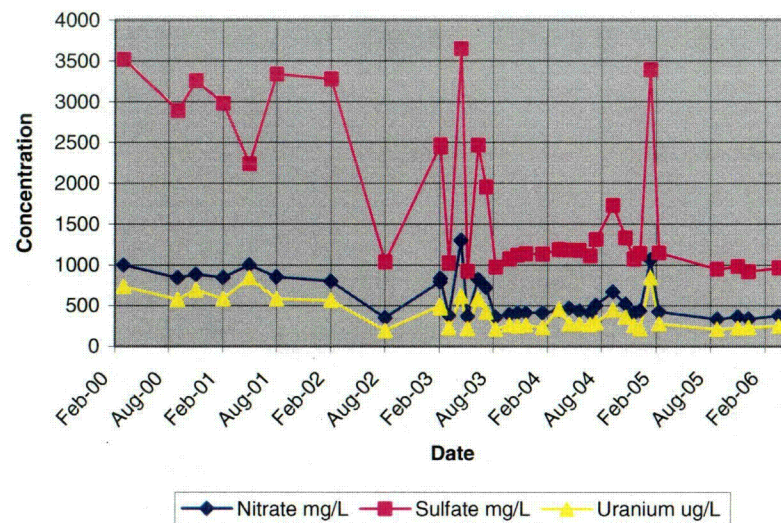




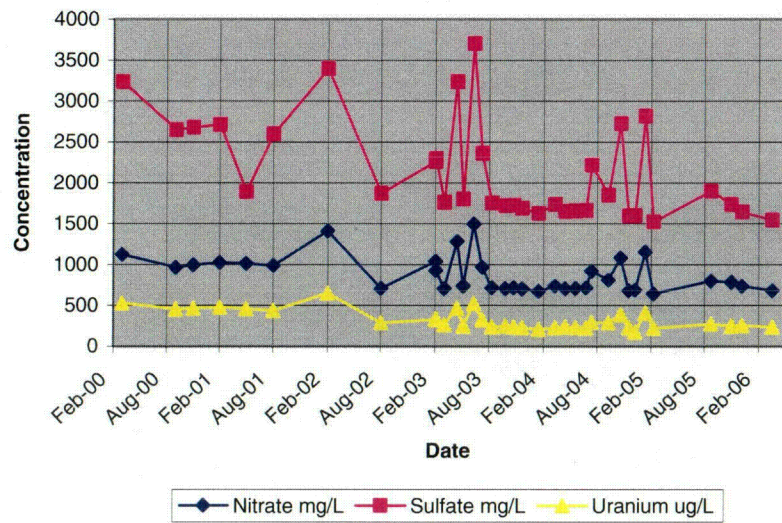
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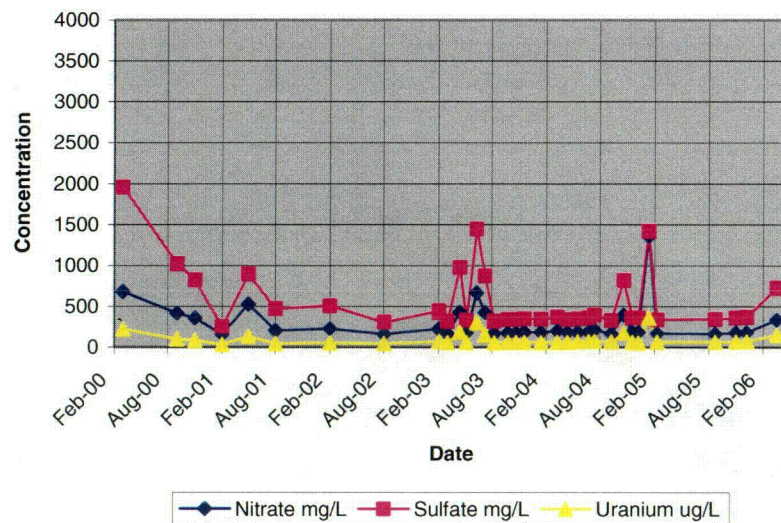
Well 1109



Well 1108

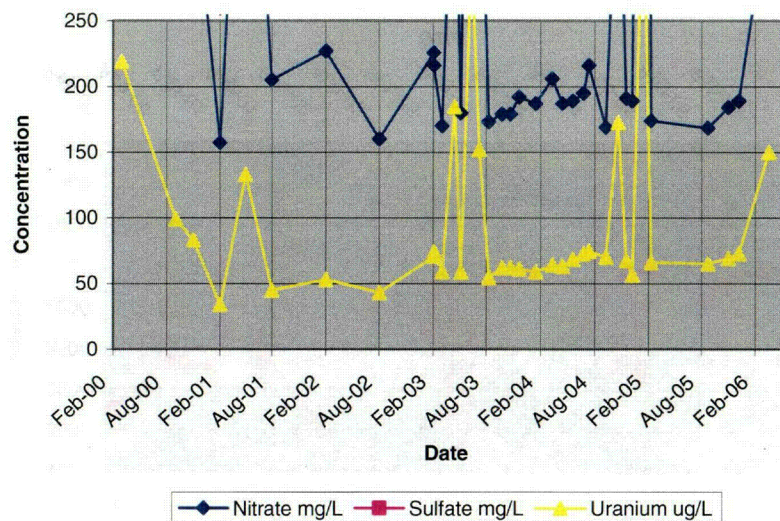


Well 1110

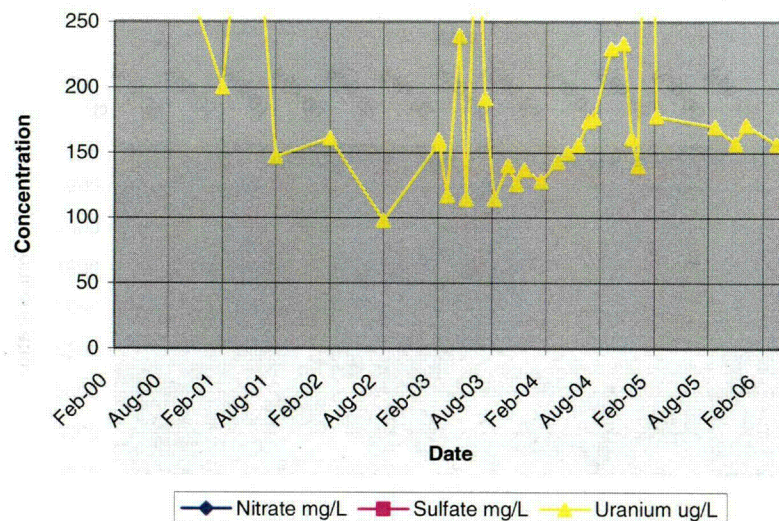




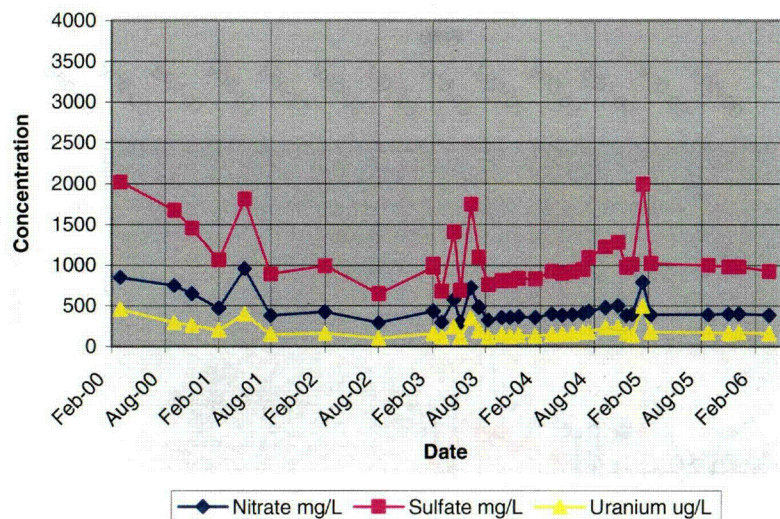
Well 1110



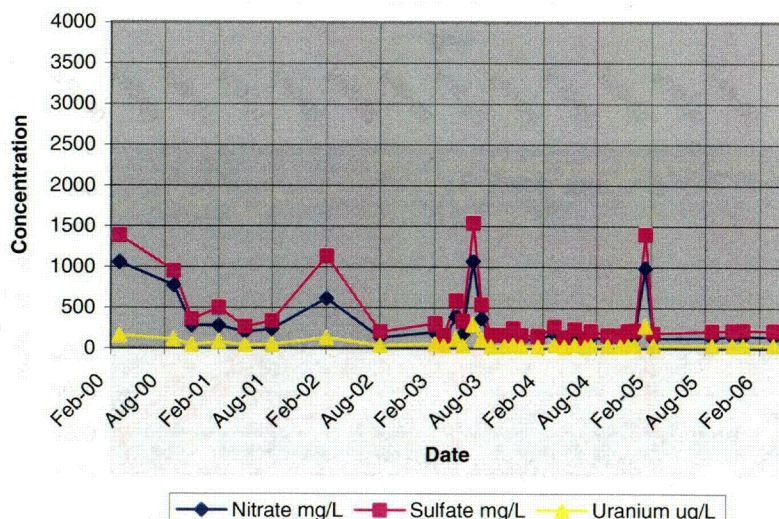
Well 1111



Well 1111

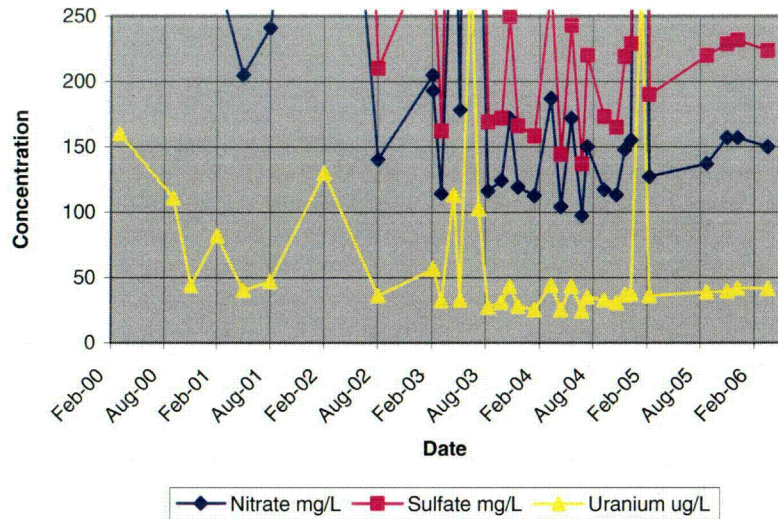


Well 1112

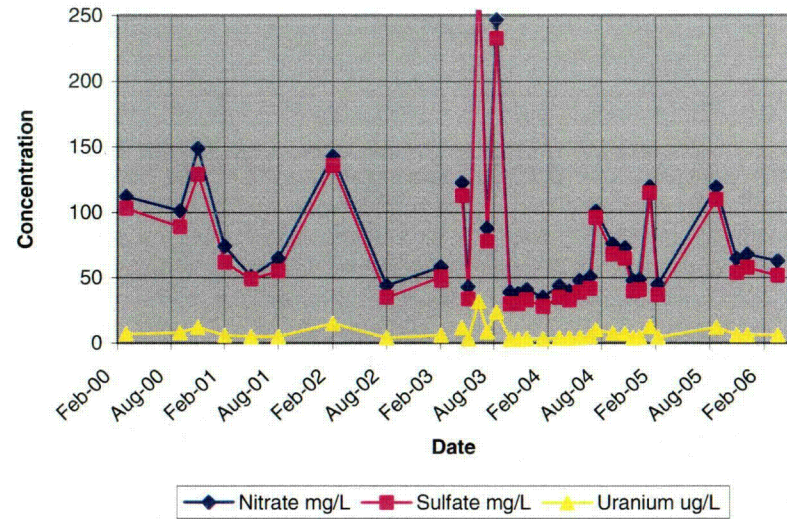




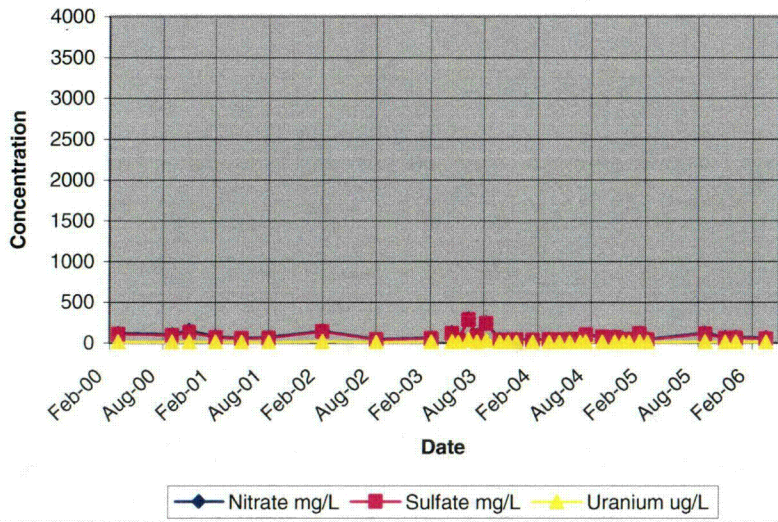
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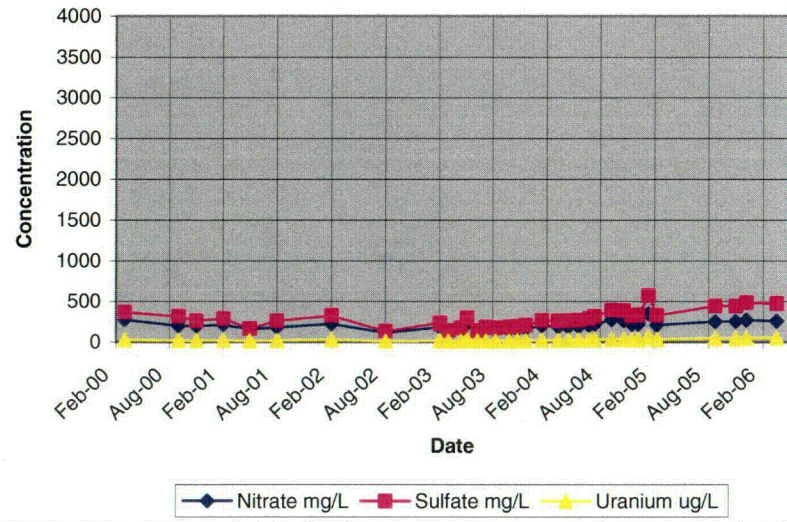
Well 1113



Well 1113

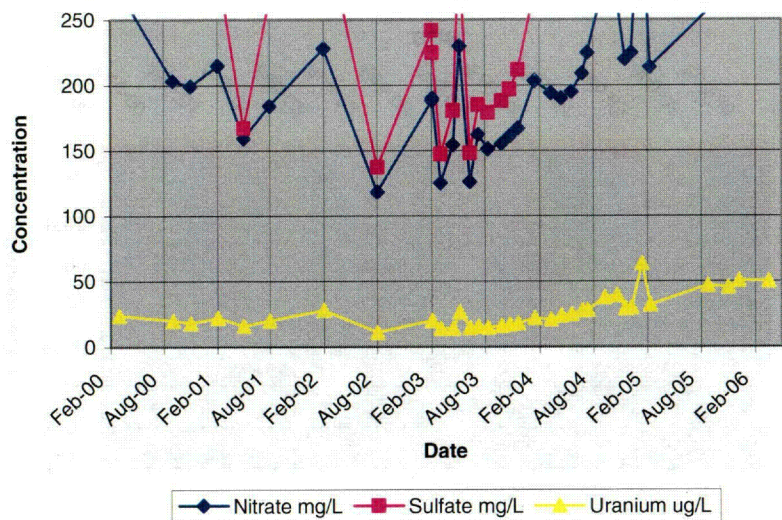


Well 1114

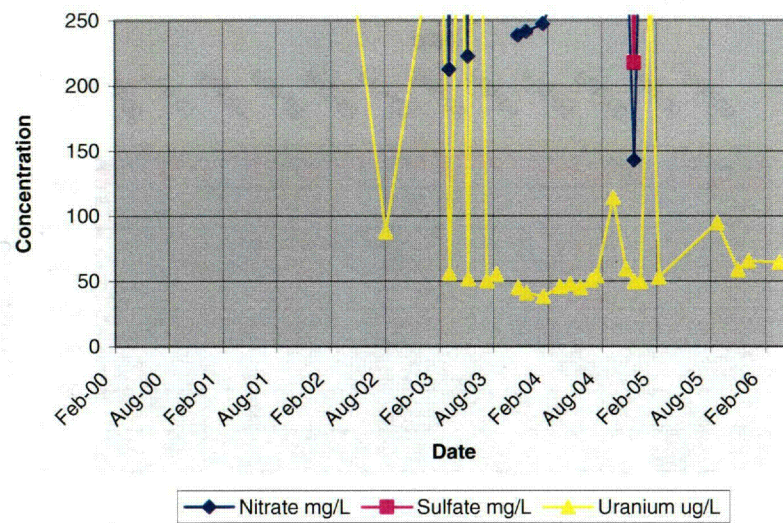




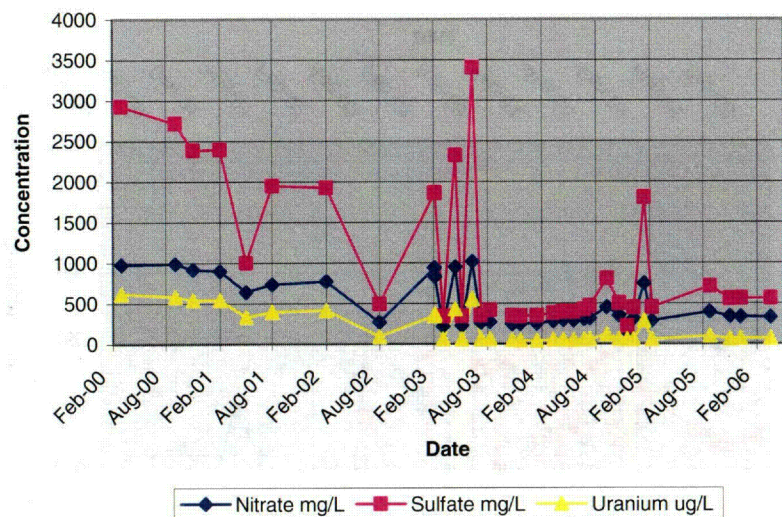
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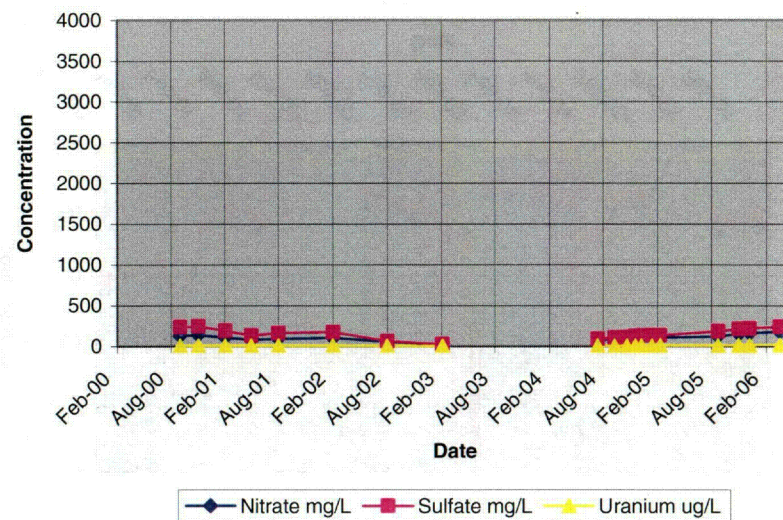
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Well 1115

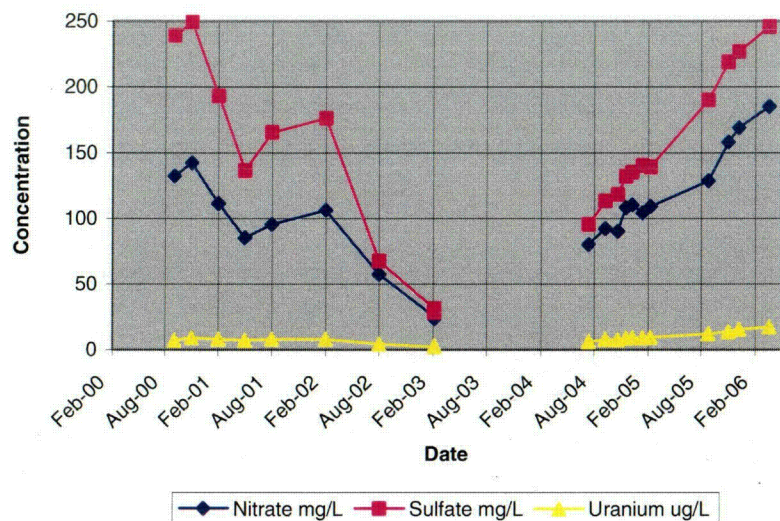


Well 1116

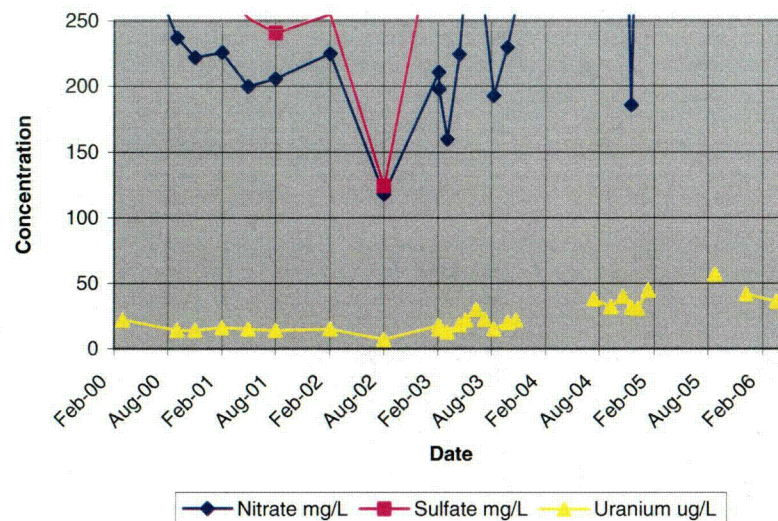




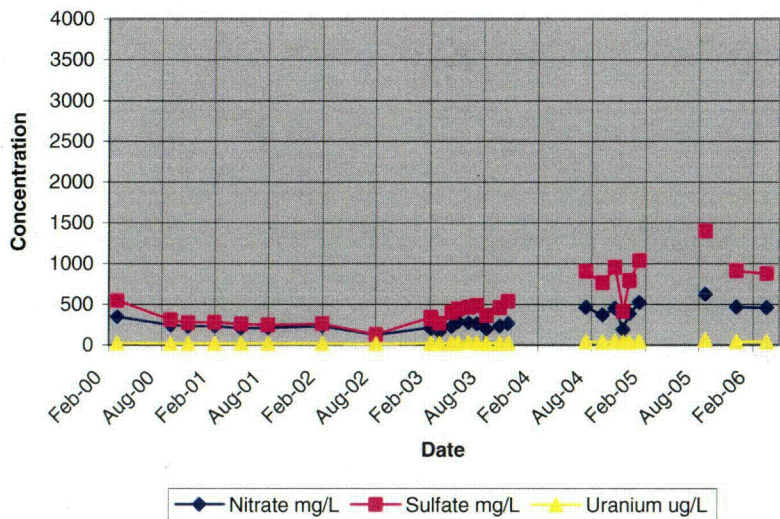
Well 1116



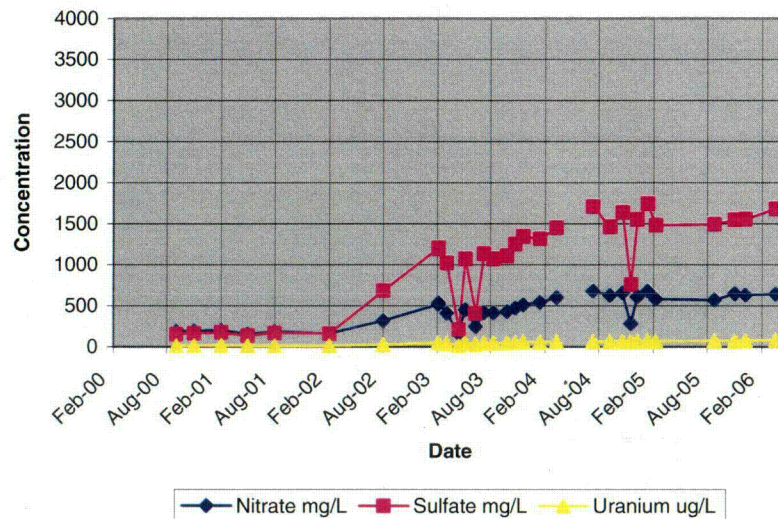
Well 1117



Well 1117

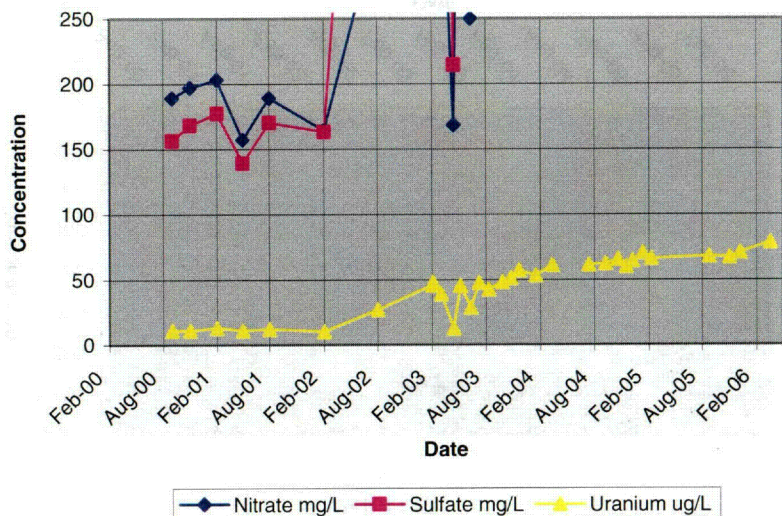


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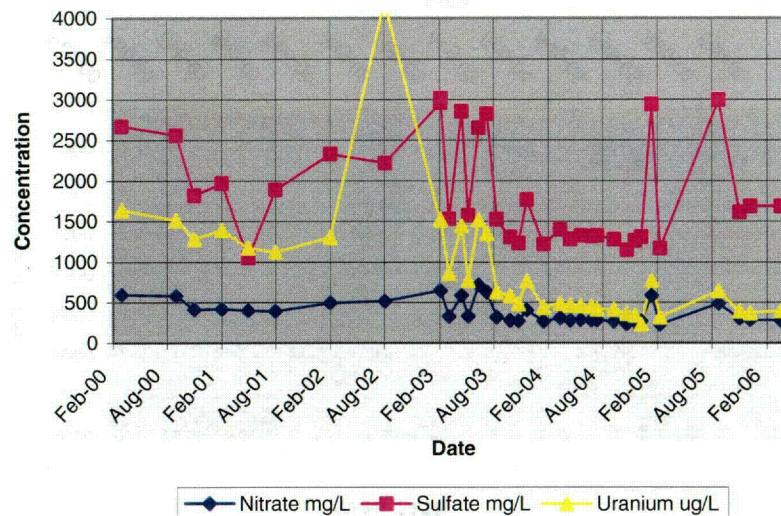




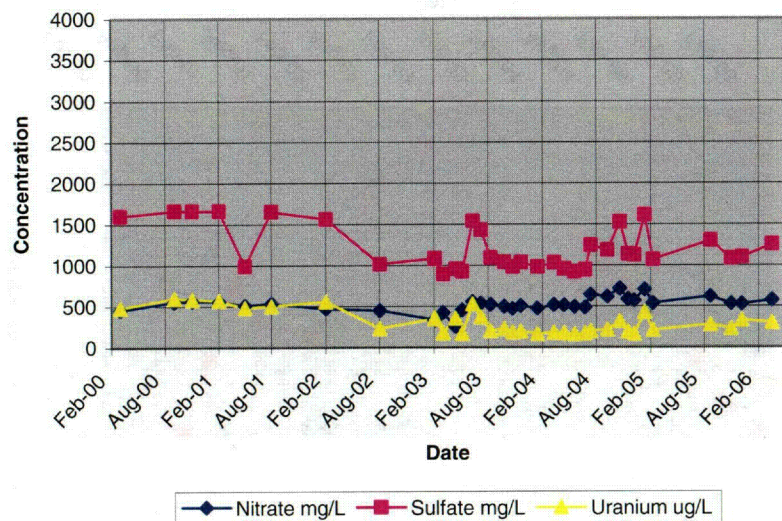
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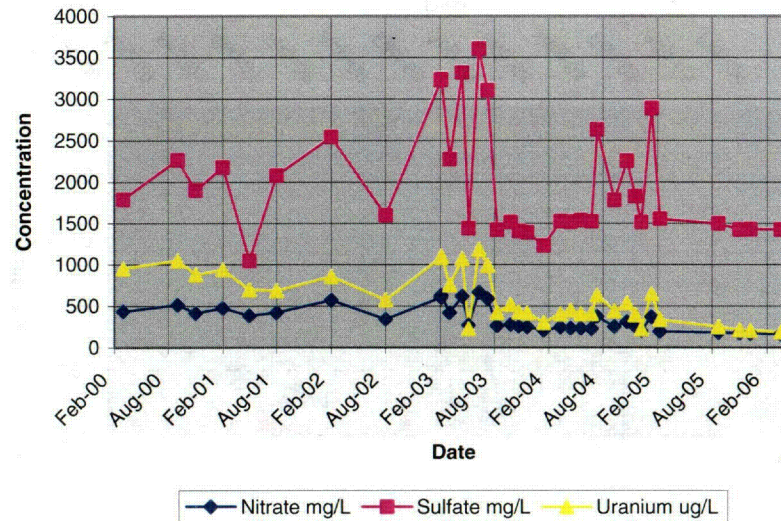
Well 1120



Well 1119

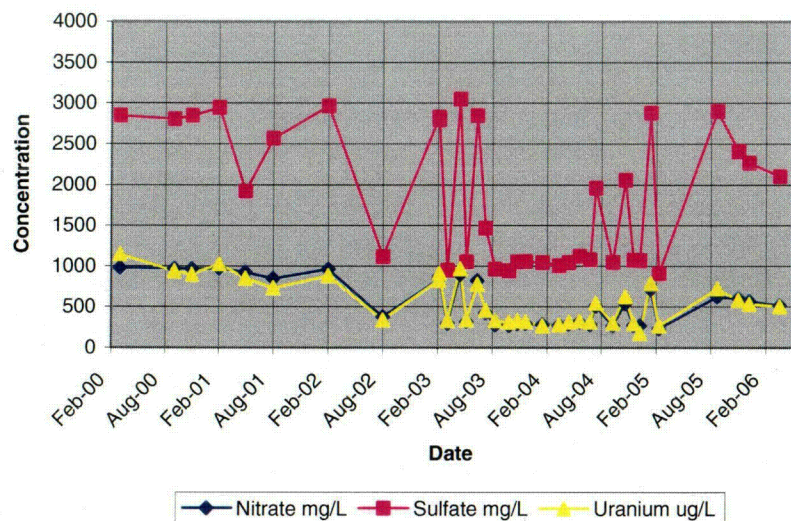


Well 1121

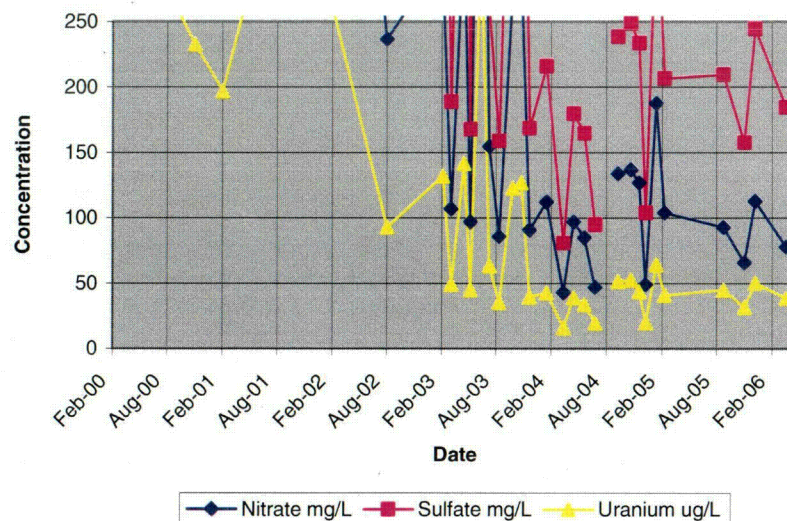




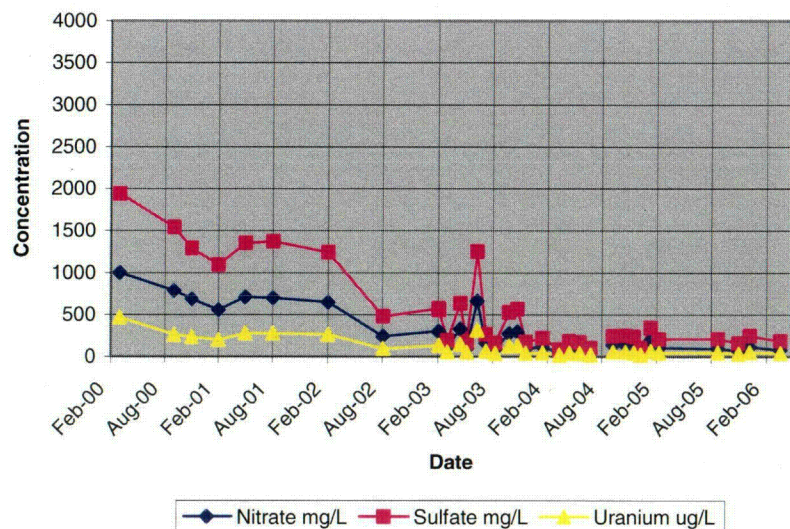
Well 1122



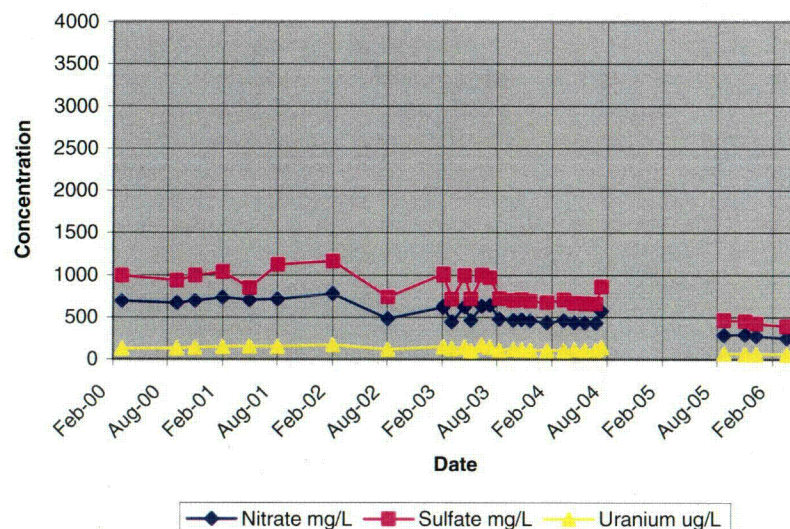
Well 1123



Well 1123

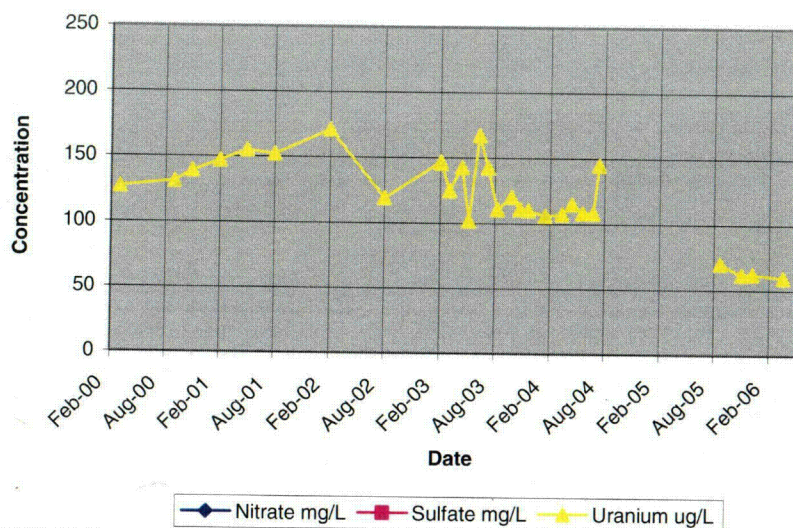


Well 1124

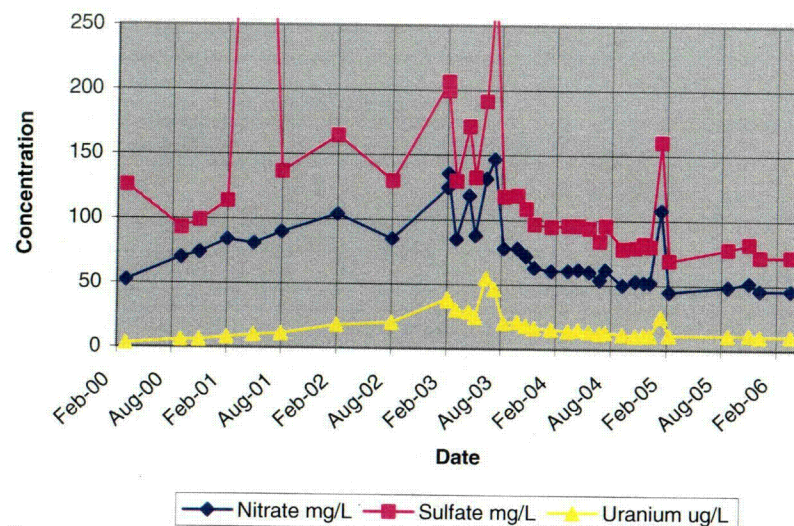




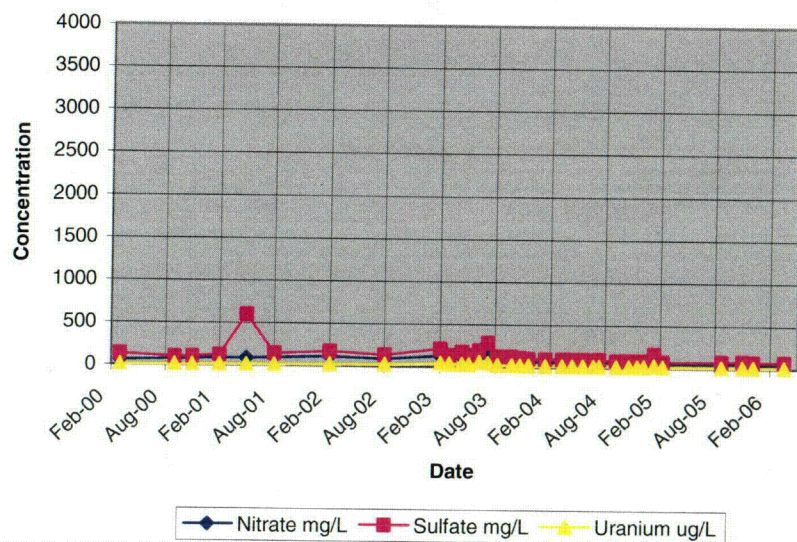
Well 1124



Well 1125



Well 1125



**Appendix G**  
**Calculation Sets**



## **Calculation 1**

### **Estimated Volume and Mass of Ground Water Contamination for the Baseline Period**

Calculation Set #1: Estimated Mass and volume of ground water contamination for the baseline period (originally included in July 2005 annual report)										
Tuba City, AZ, Disposal Site										
Objective:	estimate the baseline volume of contaminated groundwater of the Middle Terrace; estimate the baseline mass of dissolved nitrate,sulfate, and uranium in the groundwater									
Method:	1) estimate the area of the plume from baseline contaminant maps separately for Horizons A and B combined and Horizons C and D combined 2) estimate the vertical thickness of contamination for Horizons A and B combined and Horizons C and D combined 3) assume 25% porosity and compute the separate plume volumes for Horizons A and B combined and Horizons C and D combined 4) compute separate concentration averages for sulfate and uranium for Horizons A and B combined and Horizons C and D combined from baseline contaminant maps 5) multiply concentration average by plume volume to determine contaminant mass for Horizons A and B combined and Horizons C and D combined 6) sum the volume and mass estimates									
Calculation:										
1) map area of contaminant plume										
Horizons A and B		plume length (northeast to southwest)	4,000 ft							
		plume width	1,800 ft							
		area	7,200,000 ft^2							
Horizons C and D		plume length (northeast to southwest)	2,500 ft							
		plume width	1,800 ft							
		area	4,500,000 ft^2							
2) thickness of contamination										
Horizons A and B						Horizons C and D				
thickness Horizon A		25 ft					thickness Horizon C			
thickness Horizon B		50 ft					thickness Horizon D			
A&B combined thickness		75 ft					C&D combined thickness			
assumptions										
*approximately the upper half of Horizon A not saturated during baseline period						*entire thickness of Horizon C contaminated				
*Horizon B is fully saturated						*Horizon D not contaminated at many locations, assume 50% contaminated thickness				
3) plume volumes										
Horizons A and B		volume of contaminated groundwater	135,000,000 ft^3	135,000,000 ft^3						
			1,012,500,000 gal	1,013,000,000 gal						
			3,832,312,500 L	3,832,000,000 L						
Horizons C and D		volume of contaminated groundwater	28,125,000 ft^3	28,000,000 ft^3						
			210,937,500 gal	211,000,000 gal						
			798,398,438 L	798,000,000 L						
4) baseline concentrations										
Horizons A and B					Horizons C and D					
well	Horizon	U mg/L	sulfate mg/L	nitrate mg/L as NO3	well	Horizon	U mg/L	sulfate mg/L	N mg/L as NO3	
262	B	0.379	931	380	1101	D	0.245	960	438	
263	B	0.485	1990	1140	1102	D	0.533	1320	650	
265	B	0.090	1520	720	1103	D	0.355	2570	1120	
267	B	0.073	3680	1640	1104	D	0.194	1870	993	
906	A	0.951	1660	1470	1105	D	2.100	1590	648	
908	B	0.122	2430	651	1106	D	2.100	1050	614	
909	B	0.040	666	485	1107	D	0.118	1200	1060	
934	B	0.312	7360	2320	1108	D	0.646	3400	1410	
936	B	0.267	4360	2950	1109	D	0.565	3280	798	
940	A	0.546	7550	1800	1110	D	0.053	512	227	
941	A	0.089	745	358	1111	D	0.161	988	421	
942	B	0.246	3030	1360	1112	D	0.130	1140	617	
944	B	0.950	1590	1010	1113	D	0.053	250	143	
geometric mean mg/L		0.231	2174	1028	1114	D	0.040	328	228	
					1115	D	0.410	1930	766	
					1116	D	0.040	250	106	
					1117	D	0.040	255	225	
					1118	D	0.040	250	164	
					1119	D	0.555	1560	468	
					1120	D	1.3	2330	493	
					1121	D	0.849	2590	535	
					1122	D	0.878	2960	954	
					1123	D	0.261	1240	643	
					1124	D	0.171	1170	781	
					1125	D	0.04	250	104	
					912	C	0.04	846	403	
					geometric mean mg/L		0.214	1020	464	
5) mass calculation										
Horizons A and B		mass uranium	884 kg	6) total volume and masses						
				total volume contaminated groundwater		163,000,000 ft^3				

Figure G-1. Calculation Set, Estimated Mass and Volume of Ground Water Contamination, Tuba City, Arizona, Disposal Site



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## **Calculation 2**

**Estimated Aquifer Restoration Time  
Based on Mass and Volume Removal Rates**



Calculation Set #2: Estimated aquifer restoration time based on mass and volume removal rates									
Tuba City, AZ, Disposal Site									
Objective:	estimate aquifer cleanup times								
Method:	compare mass and volume removed as of April 1, 2006 to estimates of initial contaminant inventory; predict cleanup time calculated removal rates to date								
Calculation:	estimate #1: initial contaminant volume and mass estimates from DOE Baseline Performance Evaluation, May 2003.								
	estimate #2: initial contaminant volume and mass estimates recalculated for July 2005 Performance Evaluation Report - see attached Calculation Set #1								
Estimate #1									
	initial mass lb	cumulative removed lb	% removed			initial vol gal	cumulative removed gal	# pore vols removed	% plume vol removed
Nitrate	12,400,000	607,800	5			3.40E+09	179,900,000	0.053	5
Sulfate	17,900,000	1,490,000	8			2.70E+09	179,900,000	0.067	7
Uranium	2,800	412	15			3.00E+09	179,900,000	0.060	6
	mass removal			# yrs		pore volume		1-pore volume	1-pore volume
	rate % per yr	cleanup time, yrs	cleanup date	until cleanup		removal rate % / yr		cleanup time, yrs	cleanup date
Nitrate	1.3	77	2079	74		1.4		72	2074
Sulfate	2.2	46	2048	42		1.8		57	2059
Uranium	3.9	26	2028	22		1.6		63	2065
t1=	15-Jun-02								
t2=	01-Apr-06								
t2 - t1=	3.8 yrs								
Estimate #2									
	initial mass lb	cumulative removed lb	% removed			initial vol gal	cumulative removed gal	# pore vols removed	% plume vol removed
Nitrate	9,500,000	607,800	6			1.20E+09	179,900,000	0.150	15
Sulfate	20,000,000	1,490,000	7			1.20E+09	179,900,000	0.150	15
Uranium	2,300	412	18			1.20E+09	179,900,000	0.150	15
	mass removal			# yrs		pore volume		1-pore volume	1-pore volume
Projection	rate % per yr	cleanup time, yrs	cleanup date	until cleanup		removal rate % / yr		cleanup time, yrs	cleanup date
Nitrate	1.7	59	2061	56		3.9		25	2027
Sulfate	2.0	51	2053	47		3.9		25	2027
Uranium	4.7	21	2023	17		3.9		25	2027
t1=	15-Jun-02								
t2=	1-Apr-06								
t2 - t1=	3.8 yrs								

Figure G-2. Calculation Set 2, Estimated Aquifer Restoration Time Based on Mass and Volume Removal Rates

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### **Calculation 3**

**Calculate a Bulk Index of Aquifer Restoration for Sulfate**

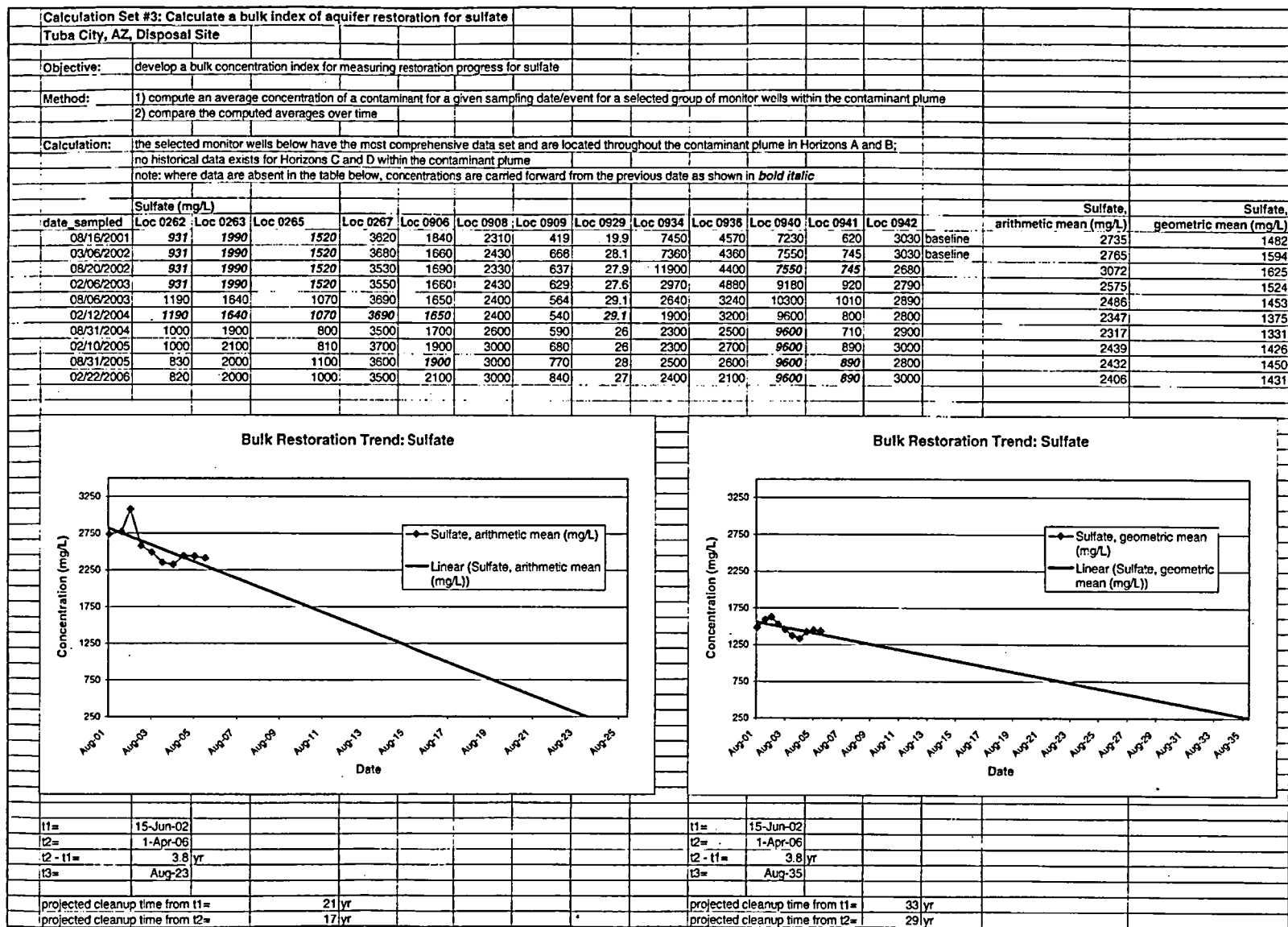


Figure G-3. Calculation Set 3, Calculate a Bulk Index of Aquifer Restoration for Sulfate



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#### **Calculation 4**

**Calculate a Bulk Index of Aquifer Restoration for Uranium**

**Calculation Set #4: Calculate a bulk index of aquifer restoration for uranium**  
**Tuba City, AZ, Disposal Site**

**Objective:** develop a bulk concentration index for measuring restoration progress for uranium

**Method:** 1) compute an average concentration of a contaminant for a given sampling date/event for a selected group of monitor wells within the contaminant plume  
2) compare the computed averages over time

**Calculation:** the selected monitor wells below have the most comprehensive data set and are located throughout the contaminant plume in Horizons A and B;  
no historical data exists for Horizons C and D within the contaminant plume  
note: where data are absent in the table below, concentrations are carried forward from the previous date as shown in **bold italic**

date sampled	Uranium mg/L												Uranium,		Uranium,	
	Loc 0262	Loc 0263	Loc 0265	Loc 0267	Loc 0906	Loc 0908	Loc 0909	Loc 0929	Loc 0934	Loc 0935	Loc 0940	Loc 0941	Loc 0942	arithmetic mean (mg/L)	geometric mean (mg/L)	
08/16/2001	0.3790	0.4850	0.0897	0.0696	0.9340	0.1110	0.0178	0.0012	0.2980	0.2910	0.6430	0.1030	0.2510	baseline	0.2818	0.1316
03/06/2002	0.3790	0.4850	0.0897	0.0731	0.9510	0.1220	0.0389	0.0012	0.3120	0.2670	0.5480	0.0886	0.2460	baseline	0.2769	0.1378
08/20/2002	0.3790	0.4850	0.0897	0.0742	0.6980	0.1220	0.0349	0.0011	0.3360	0.3060	0.5460	0.0886	0.2180		0.2599	0.1336
02/06/2003	0.3790	0.4850	0.0897	0.0765	0.6530	0.1240	0.0333	0.0015	0.3550	0.5820	0.4320	0.1020	0.2210		0.2718	0.1428
08/06/2003	0.4250	0.1730	0.0551	0.0784	0.6870	0.1060	0.0279	0.0018	0.3500	0.6060	0.4280	0.0858	0.2320		0.2489	0.1261
02/12/2004	0.4250	0.1730	0.0551	0.0784	0.6870	0.0970	0.0270	0.0018	0.3200	0.6000	0.4300	0.0810	0.2400		0.2458	0.1238
08/31/2004	0.5300	0.2300	0.0450	0.0880	0.8900	0.1200	0.0290	0.0010	0.3200	0.4700	0.4300	0.0760	0.2700		0.2692	0.1256
02/10/2005	0.5600	0.1900	0.0450	0.0850	0.8300	0.1100	0.0350	0.0010	0.2800	0.4700	0.4300	0.0490	0.2700		0.2581	0.1191
08/31/2005	0.8600	0.1400	0.0600	0.0950	0.8300	0.1000	0.0420	0.0014	0.2600	0.3500	0.4300	0.0490	0.2300		0.2498	0.1205
02/22/2006	0.7700	0.1200	0.0540	0.0880	0.7100	0.1000	0.0480	0.0014	0.2500	0.2400	0.4300	0.0490	0.3300		0.2454	0.1181

**Bulk Restoration Trend: Uranium**

**Bulk Restoration Trend: Uranium**

t1= 15-Jun-02  
t2= 1-Apr-06  
t2 - t1= 3.8 yr  
t3= Aug-37

projected cleanup time from t1= 35 yr  
projected cleanup time from t2= 31 yr

t1= 15-Jun-02  
t2= 1-Apr-06  
t2 - t1= 3.8 yr  
t3= Aug-23

projected cleanup time from t1= 21 yr  
projected cleanup time from t2= 17 yr

**Figure G-4. Calculation Set 4, Calculate a Bulk Index of Aquifer Restoration for Uranium**



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