

Umetco Minerals Corporation



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June 28, 2017

Mr. Dominic Orlando, Senior Project Manager
Decommissioning and Uranium Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Mail Stop T-8F5
11545 Rockville Pike
Rockville, Maryland 20852

Subject: Umetco Minerals Corporation, Gas Hills East, Wyoming
Response to Review of July 2015 through June 2016 Annual Report

Reference: License SUA-648, Docket No. 040-0299

Dear Mr. Orlando:

In response to your request in a letter dated June 6, 2017, please find an attached report that provides the results of the groundwater sampling performed in August 2016. Iso-concentration maps will be provided in the next Annual Report submitted by September 30, 2017.

We would also like to inform you that we are scheduled to start construction of the four additional monitoring wells in August.

If you have any questions please contact me at 970-243-3260 or by e-mail at gieckte@dow.com.

Sincerely,

Thomas E. Gieck
Reclamation Leader

Results of August 2016 Groundwater Sampling

Model Validation Sampling

As required by Table M-1 of Appendix M, the non-POC wells and POC wells MW21A and GW7 were sampled for chloride, sulfate, and natural uranium in August 2016 because of equipment problems. The analytical results are shown in Tables 1 and 2. Concentration trend plots of chloride, sulfate, and natural uranium for the Western Flow Regime are shown on Figures 1 through 3 and the Southwestern Flow Regime on Figures 4 through 6. Iso-concentration maps for chloride, sulfate, and natural uranium will be provided in the next Annual Report that will be submitted by September 30, 2017.

The results of the 2016 sampling of the model validation wells (MW28, MW71B, MW72, and MW82) were compared to the respective target level concentrations derived from the figures in *Attachment M-1, Target Level Derivation and Model Validation Approach for Chloride and Sulfate in Appendix M, Groundwater Monitoring Plan* (revised in October 2011) to ensure no unexpected changes had occurred. Table 3 indicates that none of the resultant chloride or sulfate concentrations exceeded their target values at their respective significant figures. The target levels and actual results for the 2002 to 2016 timeframe are shown in the attached Figures 7 through 14.

Table 1 Model Validation Sampling Results for the Western Flow Regime Wells

Monitor Well Location	Sampling Date	Analyte (milligrams per liter)		
		Chloride	Sulfate	Natural Uranium ⁽¹⁾
MW1 ⁽²⁾	06-24-16	30.8 J	1430 J	3.3600
MW21A	06-23-16	133 J	2620 J	0.0101 J
MW25	08-24-16	66.4	2580	0.0012
MW28 ⁽³⁾	08-23-16	103	1950	0.0004 J
MWI64	08-24-16	7.3 J	233 J	0.0877
MW70A	08-24-16	164 J	2490 J	3.0600 J
MW71B ⁽³⁾	08-23-16	67.2	1110	0.0018 J
MW77	08-24-16	12.8 J	964	0.0003 J
Iron Springs	08-24-16	14.8 J	827	0.0911

J indicates estimated result

¹ There are no action levels for natural uranium at the non-POC wells.

² Although not required by Appendix M, MW1 was sampled for model validation constituents.

³ MW28 and MW71B are the model validation wells for the Western Flow Regime.

Table 2 Model Validation Sampling Results for the Southwestern Flow Regime Wells

Monitor Well Location	Sampling Date	Analyte (milligrams per liter)		
		Chloride	Sulfate	Natural Uranium ⁽¹⁾
GW7	06-22-16	251 J	1080 J	12.90
GW8 ⁽²⁾	06-23-16	164 J	1830 J	7.800
MW72 ⁽³⁾	08-23-16	92.9	1130	0.5338
MW82 ⁽³⁾	08-23-16	68.2	791	0.1211

J indicates estimated result

¹ There are no action levels for natural uranium in non-POC wells.² Although not required by Appendix M, GW8 was sampled for model validation constituents.³ MW72 and MW82 are the model validation wells for the Southwestern Flow Regime.

J Estimated result

Table 3 Comparison of August 2016 Chloride and Sulfate Target Level Concentrations at the Model Validation Wells versus Actual Concentrations

Model Validation Well	Chloride Concentration (mg/L)		Sulfate Concentration (mg/L)	
	Target Value at 2 Significant Figures ^(1,2)	Actual	Target Value at 3 Significant Figures ^(1,2)	Actual
MW28	110	103	2090	1950
MW71B	100	67.2	1720	1110
MW72	150	92.9	1680	1130
MW82	110	68.2	1810	791

mg/L – milligrams per liter

¹ Target concentrations were derived from the simulation figures in the October 2011 revision of Attachment M-1, *Target Level Derivation and Model Validation Approach for Chloride and Sulfate in Appendix M, Groundwater Monitoring Plan*.² Target values presented with appropriate number of significant figures as provided for in Section 4.1 of Appendix M.**Alternate Concentration Limit Constituent Sampling in All Monitor Wells**

Trend plots of radium-226 plus -228 concentrations in all the monitor wells in the Western and Southwestern Flow Regimes are shown on Figures 15 and 16, respectively. A radium isotope concentration map will be provided in the next Annual Report.

A summary of the results of the additional ACL sampling performed between October 2012 and August 2016 is given in Tables 4 and 5.

Table 4 Summary of ACL Sampling Results in Non-Point of Compliance Wells in the Western Flow Regime

Analyte	Units	POE Value ¹	Sample Date	MW25 ²	MW28	MW70A ²	MW71B	MW77 ²	MWI64 ³	Iron Springs ²
Arsenic	mg/L	0.17	Oct 2012	---	0.0096	---	0.0084	---	---	---
			Jun 2013	---	0.0090	---	0.0067	---	0.0123	---
			Jun 2014	0.2150	0.0096	0.0408	0.0064	0.0067	0.0098	0.0027
			Sep/Oct 2014	0.208	0.0100	0.028	0.0074	0.0072	0.0091	0.0018
			Jun/Sep 2015	0.212	0.0096	0.0379	0.0067	0.0076	0.0098	0.0052
			Aug 2016	0.221	0.0092	0.0334 J	0.0071	0.0067	0.0083	0.0029
Beryllium	mg/L	0.01	Oct 2012	---	0.01036	---	0.00016	---	---	---
			Jun 2013	---	0.00965	---	0.00015	---	0.00297	---
			Jun 2014	0.0071 J	0.0106 J	0.035	0.00021 J	0.01132 J	0.00484	0.00515
			Sep/Oct 2014	0.0091	0.0116	0.0299	0.00014 J	0.01246	0.00440	0.00300
			Jun/Sep 2015	0.0084	0.0114	0.032	0.00018 J	0.01363	0.00401	0.00506
			Aug 2016	0.0096	0.0116	0.0269 J	0.0001 J	0.01426	0.00133	0.00215
Lead-210	pCi/L	6.1	Oct 2012	---	2.9 ± 1.6	---	8.3 ± 1.8	---	---	---
			Jun 2013	---	4.5 ± 1.9	---	-7.3 ± 2	---	-4.3 ± 2.4	---
			Jun 2014	-5.3 ± 1.4	3.3 ± 0.66	3.5 ± 1.4	-2.2 ± 0.65	-1.6 ± 0.56	-0.77 ± 0.66	-2 ± 0.81
			Sep/Oct 2014	1.58 ± 0.540	4.69 ± 0.610	19.5 ± 2.03	0.904 ± 0.406	0.667 ± 0.371	1.13 ± 0.412	0.482 ± 0.599
			Jun/Sep 2015	0.797 ± 0.610	5.68 ± 0.912	13.6 ± 1.51	0.653 ± 0.716	0.985 ± 0.584	1.66 ± 0.654	0.449 ± 0.532
			Aug 2016	1.22 ± 0.561	5.50 ± 0.825	7.57 ± 1.02	1.10 ± 0.588	1.41 ± 0.606	1.71 ± 0.593	1.18 ± 0.604
Nickel	mg/L	2.2	Oct 2012	---	0.56	---	< 0.01	---	---	---
			Jun 2013	---	0.55	---	< 0.01	---	0.09	---
			Jun 2014	2.140	0.552	1.75	< 0.008	0.531	0.078	0.146
			Sep/Oct 2014	2.11	0.58	1.9 J	< 0.008	0.514	0.059	0.153
			Jun/Sep 2015	2.16	0.54	1.79	< 0.008	0.566	0.055	0.160
			Aug 2016	2.35	0.59	1.68 J	< 0.02	0.586	0.013	0.132

Table 4 Summary of ACL Sampling Results in Non-Point of Compliance Wells in the Western Flow Regime, continued

Analyte	Units	POE Value ¹	Sample Date	MW25 ²	MW28	MW70A ²	MW71B	MW77 ²	MWI64 ³	Iron Springs ²
Radium 226 + 228	pCi/L	79	Oct 2012	---	156 ± 1.9	---	14.6 ± 0.8	---	---	---
			Jun 2013	---	199 ± 2.3	---	14.9 ± 1.1	---	15.6 ± 0.9	---
			Jun 2014	36 ± 1.5	163 ± 2.1	67 ± 1.9 J	14.5 ± 1.0	18.2 ± 1.3	16.7 ± 0.9 J	8.9 ± 0.7 J
			Sep/Oct 2014	45 ± 1.5 J	165 ± 1.8 J	78 ± 2.1 J	20.4 ± 1.1 J	18.3 ± 1.0 J	13.7 ± 0.8 J	5.9 ± 1.0 J
			Jun/Sep 2015	43 ± 1.5 J	185 ± 1.9 J	57 ± 1.6 J	19 ± 1.05 J	16.5 ± 0.93 J	11.7 ± 0.84 J	9.8 ± 0.9 J
			Aug 2016	±	±	±	±	±	±	±
			Oct 2012	---	0.0004	---	< 0.0001	---	---	---
Selenium	mg/L	0.01	Jun 2013	---	0.0002	---	< 0.0001	---	< 0.0001	---
			Jun 2014	0.0002 J	0.0002 J	0.0726	0.0001 J	< 0.0001	< 0.0001	0.0002 J
			Sep/Oct 2014	< 0.0005	0.0008	0.0553	< 0.0001	0.0002 J	< 0.0001	0.0001 J
			Jun/Sep 2015	< 0.0005	0.0007	0.0733	0.0002 J	0.0001	< 0.0001	0.0003
			Aug 2016	<0.0005	0.0005 J	0.0589 J	< 0.0002	0.0002 J	< 0.0001	0.0003 J
			Oct 2012	---	-0.15 ± 0.62	---	0.06 ± 0.43	---	---	---
			Jun 2013	---	-0.45 ± 0.4	---	-0.17 ± 0.46	---	6.5 ± 0.92	---
Thorium-230	pCi/L	0.5	Jun 2014	0.11 ± 0.09	0.09 ± 0.08	0.7 ± 0.16	0.05 ± 0.08	0.05 ± 0.07	0.13 ± 0.08	0.05 ± 0.07
			Sep/Oct 2014	-0.11 ± 0.3 J	0.02 ± 0.18 J	1.1 ± 0.2	-0.01 ± 0.07 J	0.21 ± 0.17 J	0.01 ± 0.07 J	0.15 ± 0.1
			Jun/Sep 2015	-0.3 ± 0.24 J	0.02 ± 0.09	0.94 ± 0.22	0.09 ± 0.23 J	-0.01 ± 0.08	0.0 ± 0.12 J	0.56 ± 0.15 J
			Aug 2016	0.03 ± 0.11 J	0.0 ± 0.07 J	0.73 ± 0.42 J	-0.03 ± 0.09 J	0.03 ± 0.08 J	-0.03 ± 0.07 J	-0.05 ± 0.24 J
			Oct 2012	---	0.0008	---	0.0014	---	---	---
			Jun 2013	0.0045	0.0004	2.980	0.0012	0.0007	0.5255	0.0149
			Jun 2014	0.0102	0.0014	2.840	0.0042	0.0008	0.2396	0.1963 J
Natural Uranium	mg/L	0.26	Sep/Oct 2014	0.0142	0.0005 J	2.890	0.0021	0.0005	0.1843	0.1238
			Jun/Sep 2015	0.0016 J	0.0017 J	2.870	0.0020 J	0.0027	0.1784	0.2728
			Aug 2016	0.0012 J	0.0004 J	3.0600 J	0.0018 J	0.0003 J	0.0877	0.0911

mg/L – milligrams per liter

pCi/L – picocuries per liter

J indicates estimated result

¹ POE value shown is the maximum value of the Background Range given in Table 2.10 of the *Alternate Concentration Limits Application*.

² MW25, MW70A, MW77 and Iron Springs were not sampled for ACL constituents in 2012 and 2013.

³ Monitor well MWI64 was not sampled for ACL constituents in 2012.

Table 5 Summary of ACL Sampling Results in Non-Point of Compliance Wells in the Southwestern Flow Regime

Analyte	Units	POE Value ¹	Sample Date	MW72	MW82
Arsenic	mg/L	1.26	Oct 2012	0.0105	0.0040
			Jun 2013	0.0072	0.0042
			Jun 2014	0.0153	0.0041
			Sep 2014	0.0043	0.0038
			Sep 2015	0.0201	0.0044
			Aug 2016	0.0103	0.0038
			Oct 2012	0.00028	0.00042
Beryllium	mg/L	---	Jun 2013	0.00020	0.00041
			Jun 2014	0.00020 J	0.00052 J
			Sep 2014	0.0007	0.00050
			Sep 2015	< 0.0003	0.00043 J
			Aug 2016	0.00098	0.00048 J
			Oct 2012	2.1 ± 1.6	9.2 ± 1.7
			Jun 2013	7.2 ± 1.9	5.2 ± 2.2
Lead-210	pCi/L	3.5	Jun 2014	3.3 ± 0.65	0.12 ± 0.48
			Sep 2014	3.54 ± 0.574	2.88 ± 0.507
			Sep 2015	5.2 ± 1.41 J	3.02 ± 0.774
			Aug 2016	4.44 ± 0.761	3.12 ± 0.684
			Oct 2012	0.02	0.02 J
			Jun 2013	0.01	0.02
			Jun 2014	< 0.008	0.027 J
Nickel	mg/L	0.28	Sep 2014	0.03 J	0.031 J
			Sep 2015	< 0.02	0.026 J
			Aug 2016	0.078	0.031 J
			Oct 2012	13.9 ± 0.68	22.1 ± 0.7
			Jun 2013	14.7 ± 0.89	19.7 ± 1.3
			Jun 2014	17.2 ± 0.9	27.1 ± 0.9
			Sep 2014	17 ± 0.9 J	27.5 ± 1.3 J
Radium-226 + 228	pCi/L	2070	Sep 2015	17.5 ± 0.88 J	27.9 ± 0.98 J
			Aug 2016	12.2 ± J	27.2 ± J
			Oct 2012	0.0048	0.0004
			Jun 2013	0.0032	0.0003
			Jun 2014	0.0026	0.0003
			Sep 2014	0.0097	0.0003
			Sep 2015	0.0026	0.0003
Selenium	mg/L	0.097	Aug 2016	0.0112	0.0003 J

Table 5 Summary of ACL Sampling Results in Non-Point of Compliance Wells in the Southwestern Flow Regime, continued

Analyte	Units	POE Value ¹	Sample Date	MW72	MW82
Thorium-230	pCi/L	8.2	Oct 2012	-0.57 ± 0.54	0.01 ± 0.48
			Jun 2013	-0.44 ± 0.51	0.01 ± 0.31
			Jun 2014	0.03 ± 0.06	-0.02 ± 0.07
			Sep 2014	0.07 ± 0.09 J	0.0 ± 0.07 J
			Sep 2015	0.01 ± 0.16	0.11 ± 0.11
			Aug 2016	0.04 ± 0.08 J	0.0 ± 0.07 J
Natural Uranium	mg/L	5.9	Oct 2012	0.3066	0.0657
			Jun 2013	0.3938	0.0773
			Jun 2014	0.4211	0.0912 J
			Sep 2014	0.4420	0.1045
			Sep 2015	0.5110	0.1332
			Aug 2016	0.5338	0.1211

mg/L – milligrams per liter

pCi/L – picocuries per liter

J indicates estimated result

¹ POE value shown is the highest value of the Background Range given in Table 2.10 of the *Alternate Concentration Limits Application*.

Figure 1 Chloride Trends in Western Flow Regime Monitor Wells

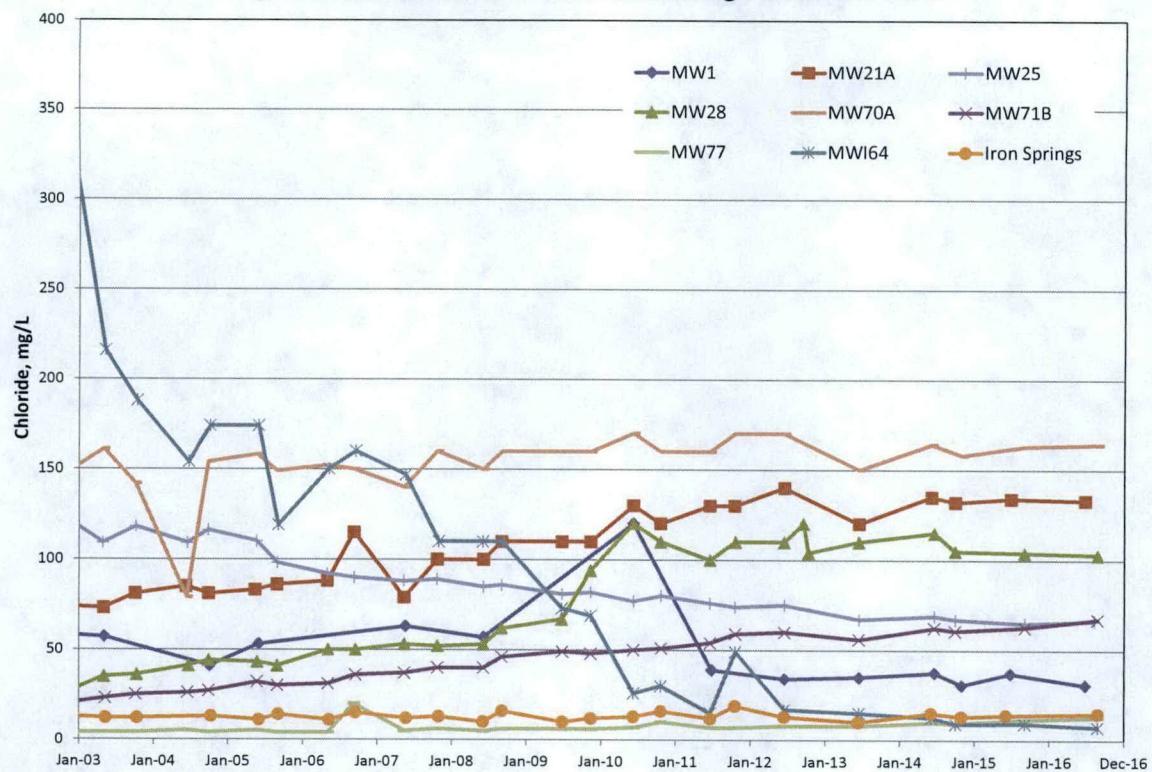


Figure 2 Sulfate Trends in Western Flow Regime Monitor Wells

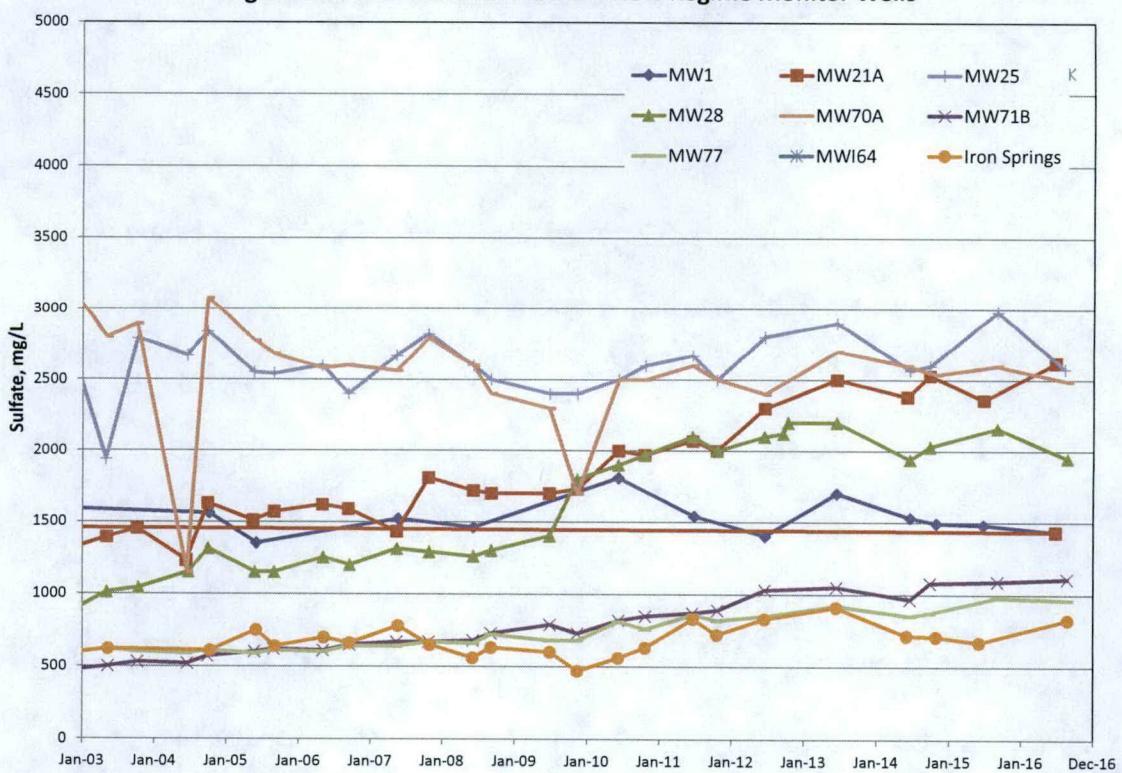


Figure 3 Natural Uranium Trends in Western Flow Regime Monitor Wells

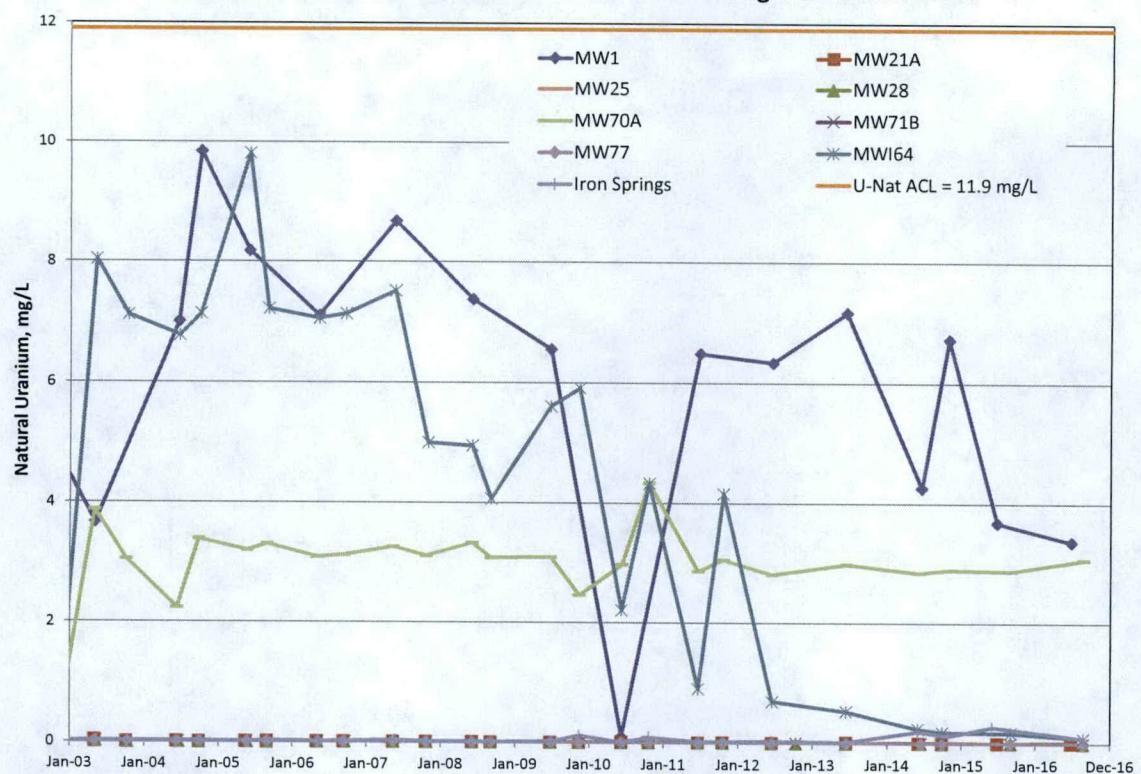


Figure 4 Chloride Trends in Southwestern Flow Regime Monitor Wells

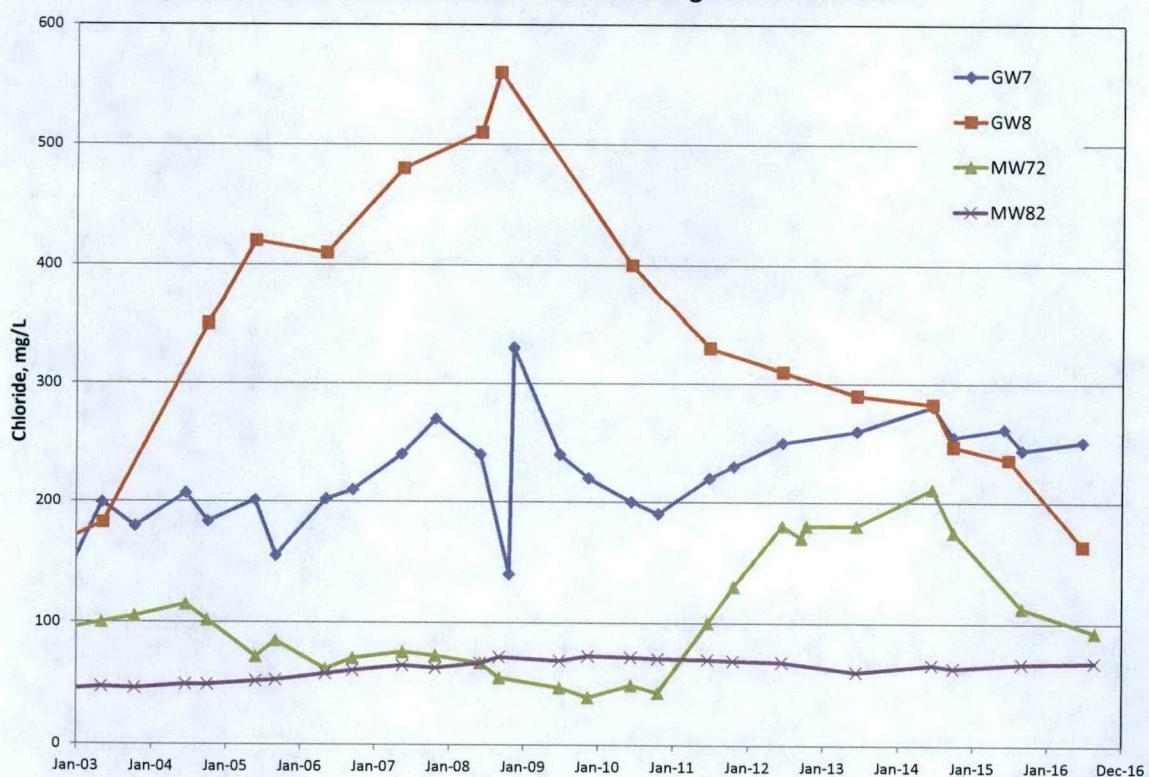


Figure 5 Sulfate Trends in Southwestern Flow Regime Monitor Wells

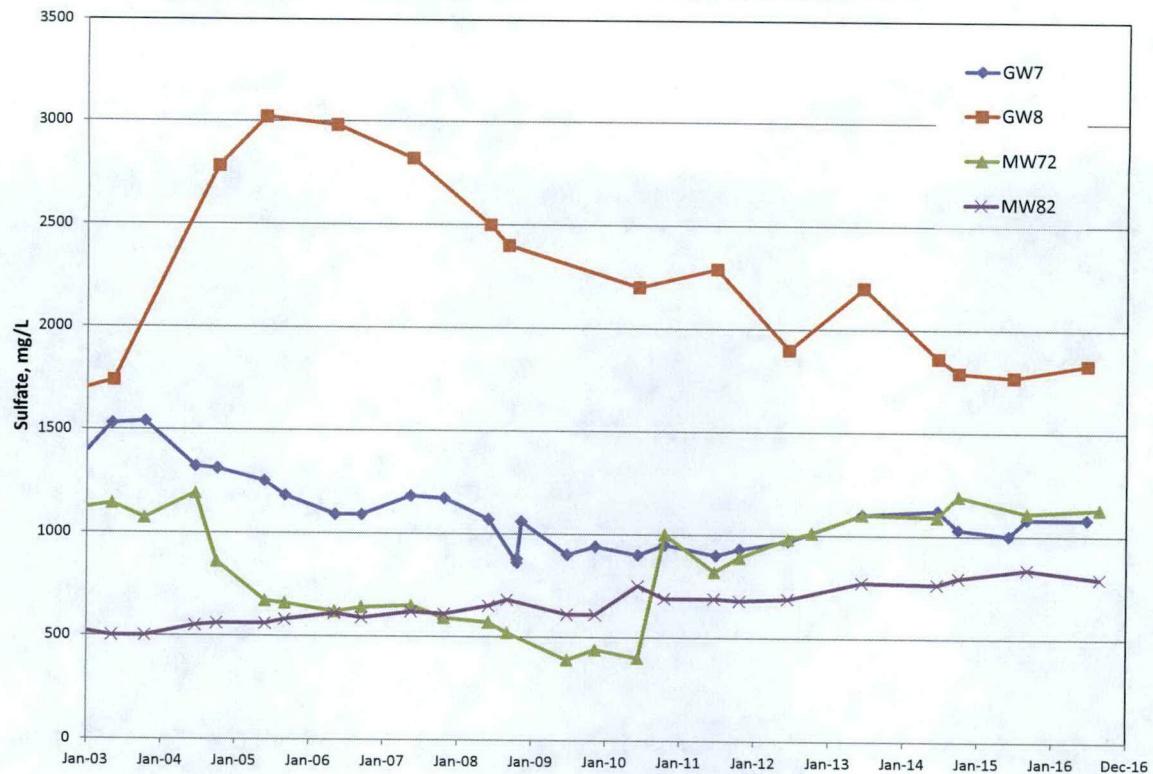


Figure 6 Natural Uranium Trends in the Southwestern Flow Regime Monitor Wells

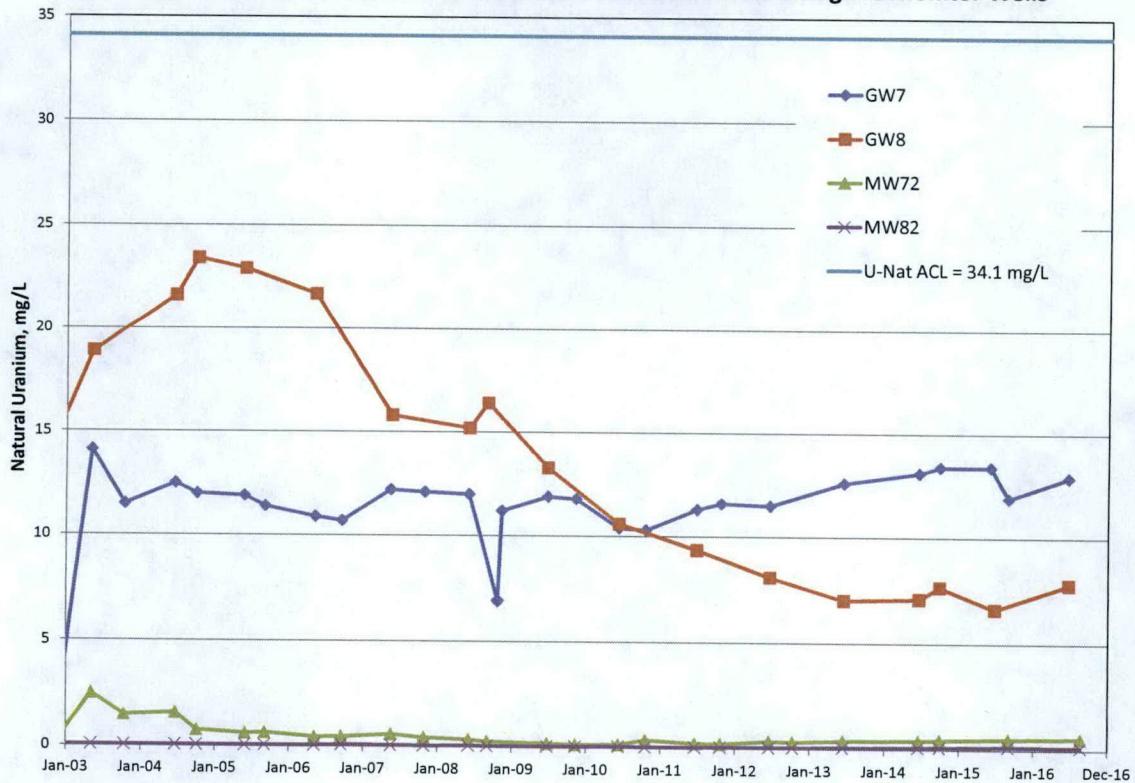


Figure 7 Simulated Chloride Trends at MW28 (50 Years) Versus Actual Data, Western Flow Regime

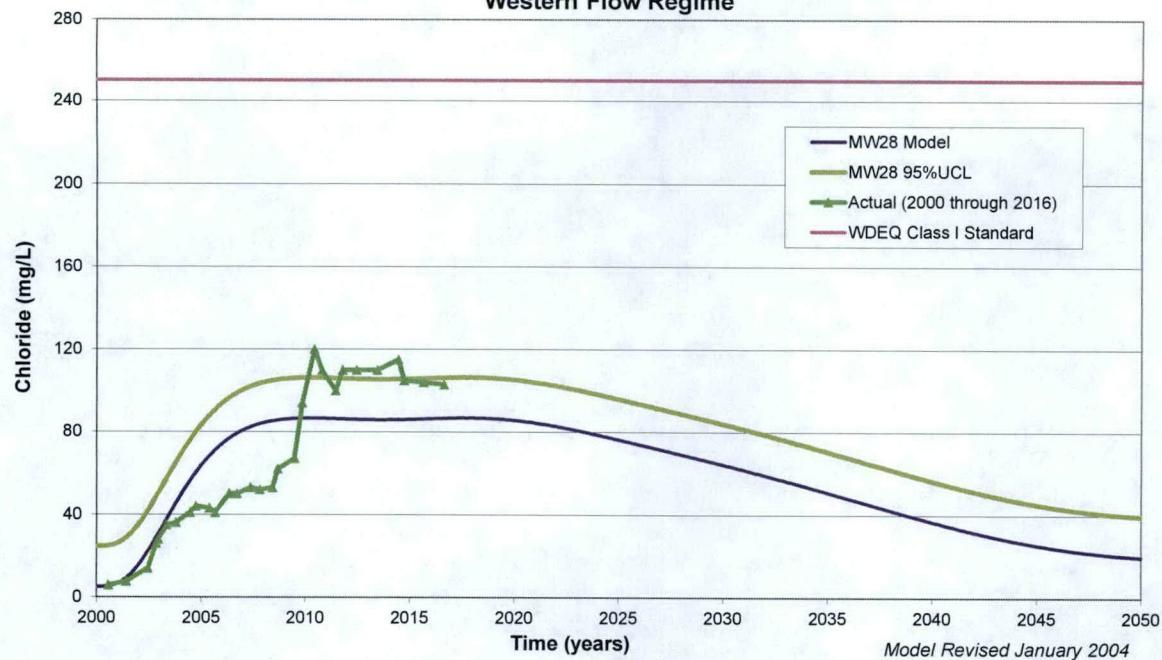


Figure 8 Simulated Chloride Trends at MW71B (50 Years) Versus Actual Data, Western Flow Regime

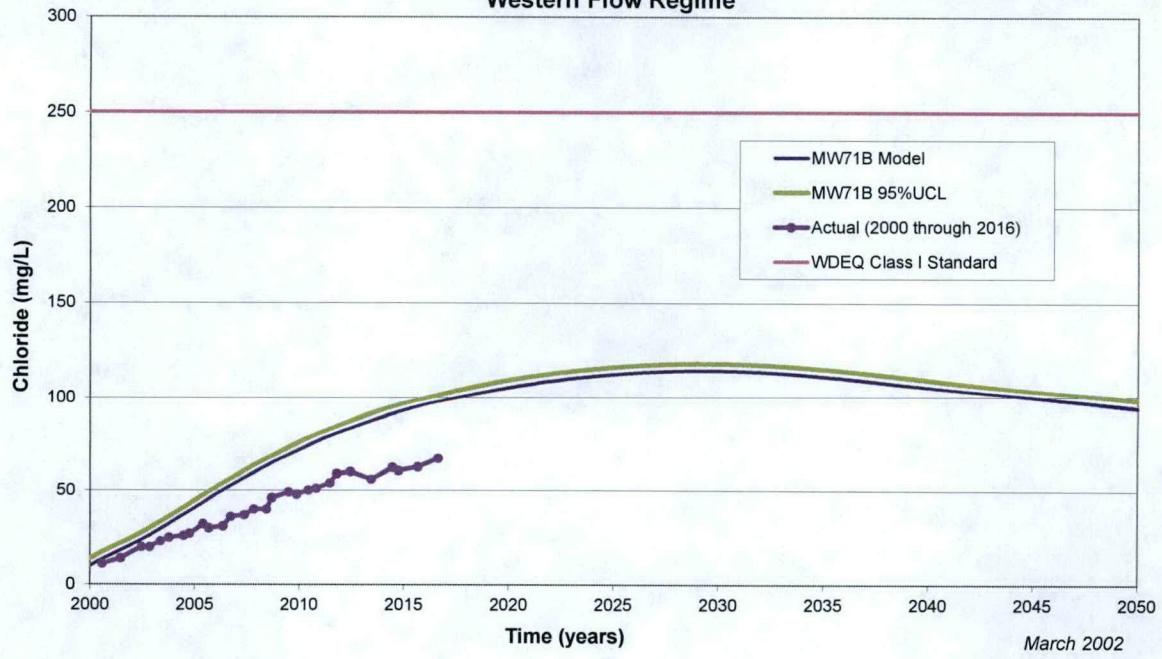


Figure 9 Simulated Chloride Trends at MW72 (50 Years) Versus Actual Data, Southwestern Flow Regime

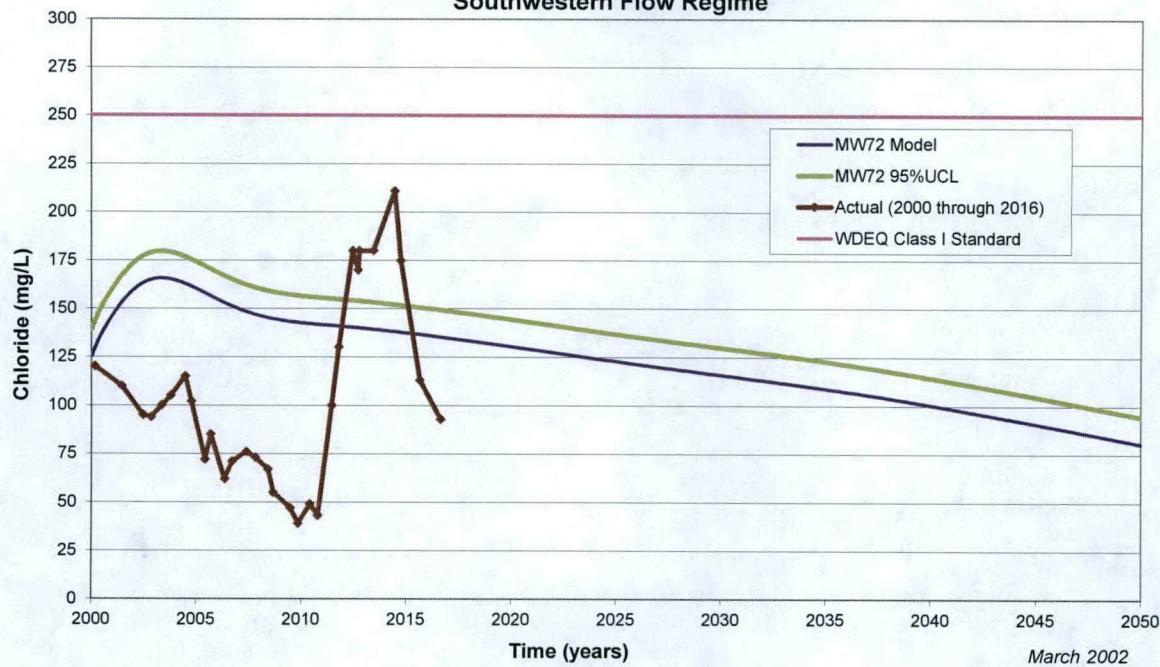


Figure 10 Simulated Chloride Trends at MW82 (50 Years) Versus Actual Data, Southwestern Flow Regime

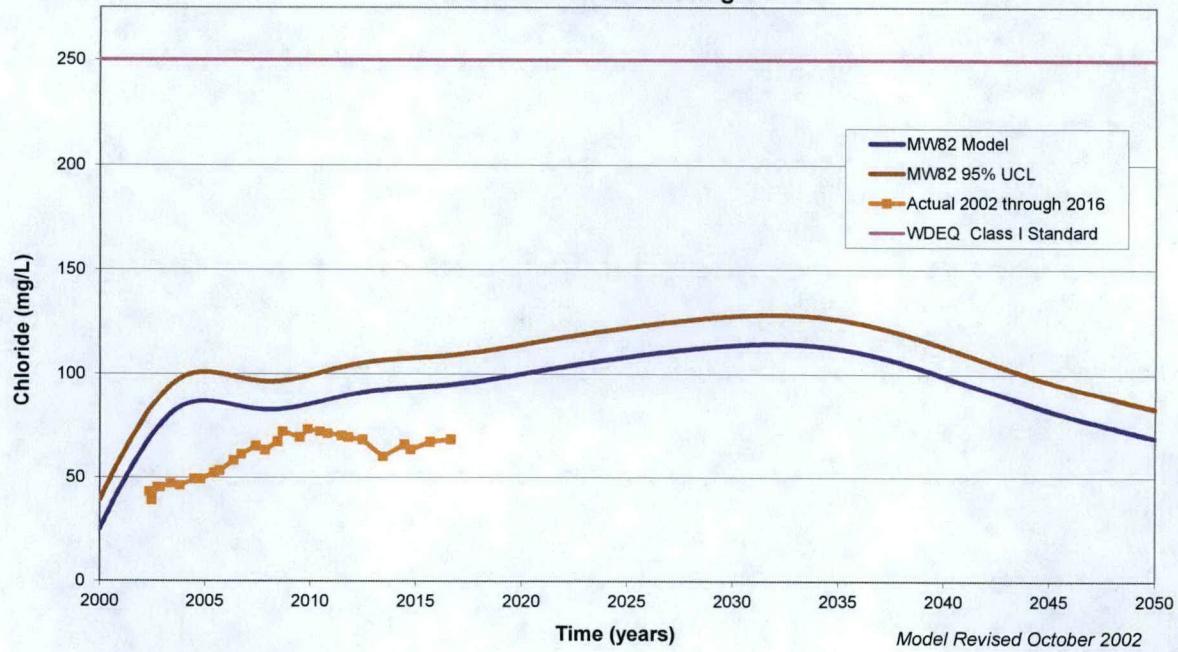


Figure 11 Simulated Sulfate Trends at MW28 (50 Years) Versus Actual Data, Western Flow Regime

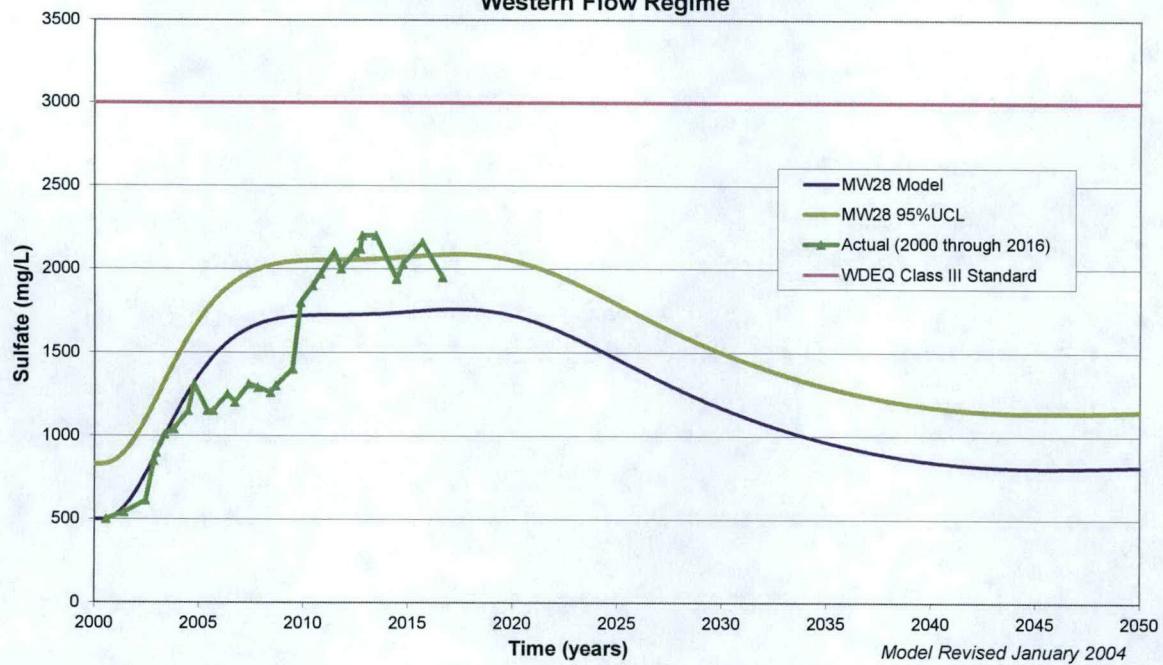


Figure 12 Simulated Sulfate Trends at MW71B (50 Years) Versus Actual Data, Western Flow Regime

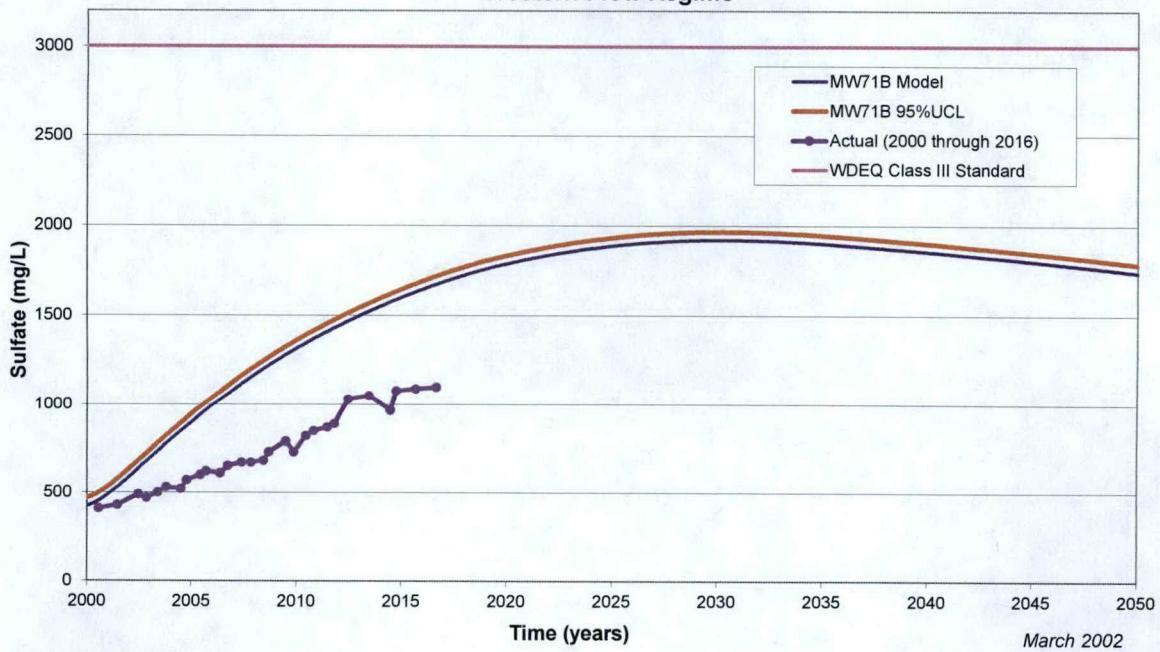
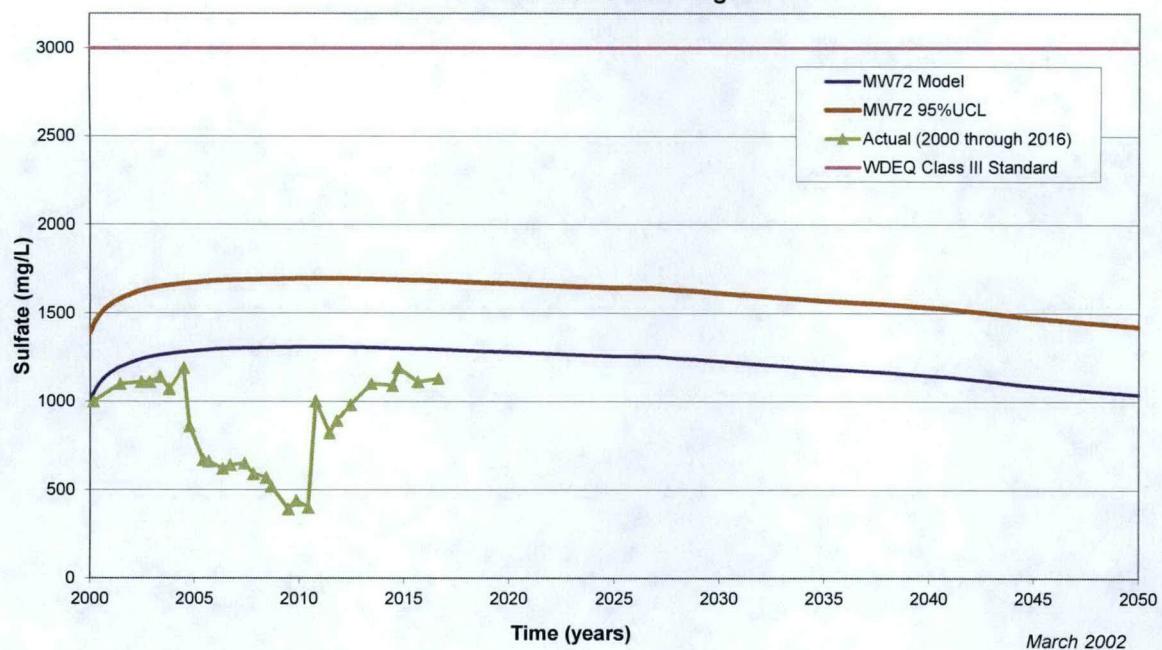
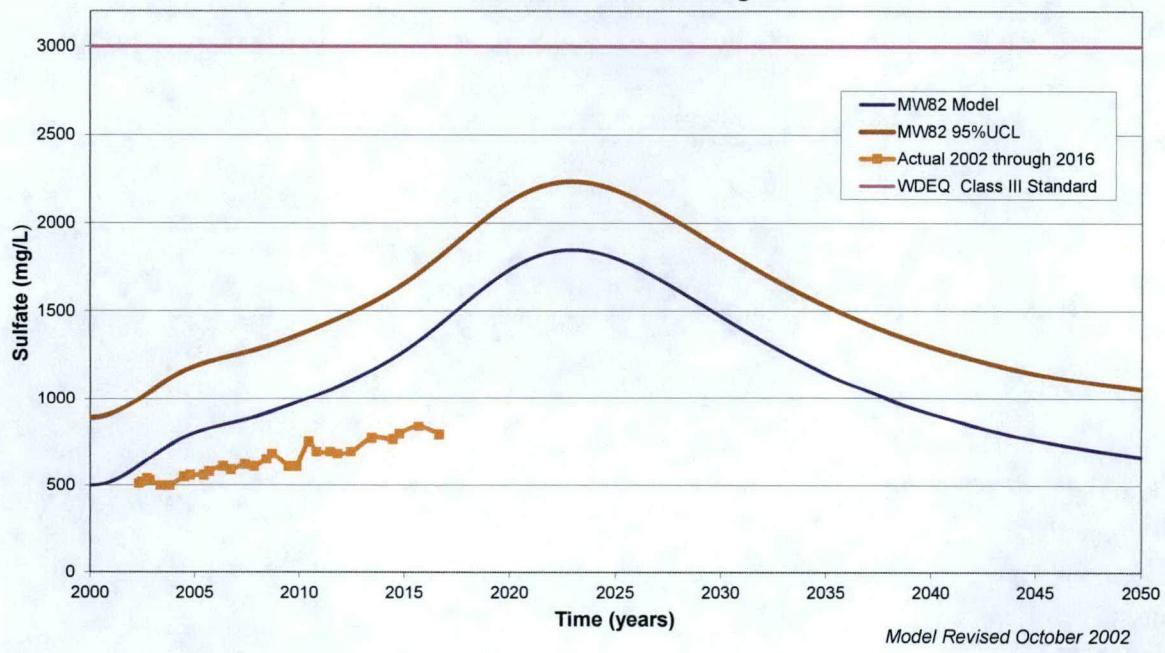


Figure 13 Simulated Sulfate Trends at MW72 (50 Years) Versus Actual Data, Southwestern Flow Regime



March 2002

Figure 14 Simulated Sulfate Trends at MW82 (50 Years) Versus Actual Data, Southwestern Flow Regime



Model Revised October 2002

Figure 15 Radium-226 plus -228 Trends in Western Flow Regime Monitor Wells

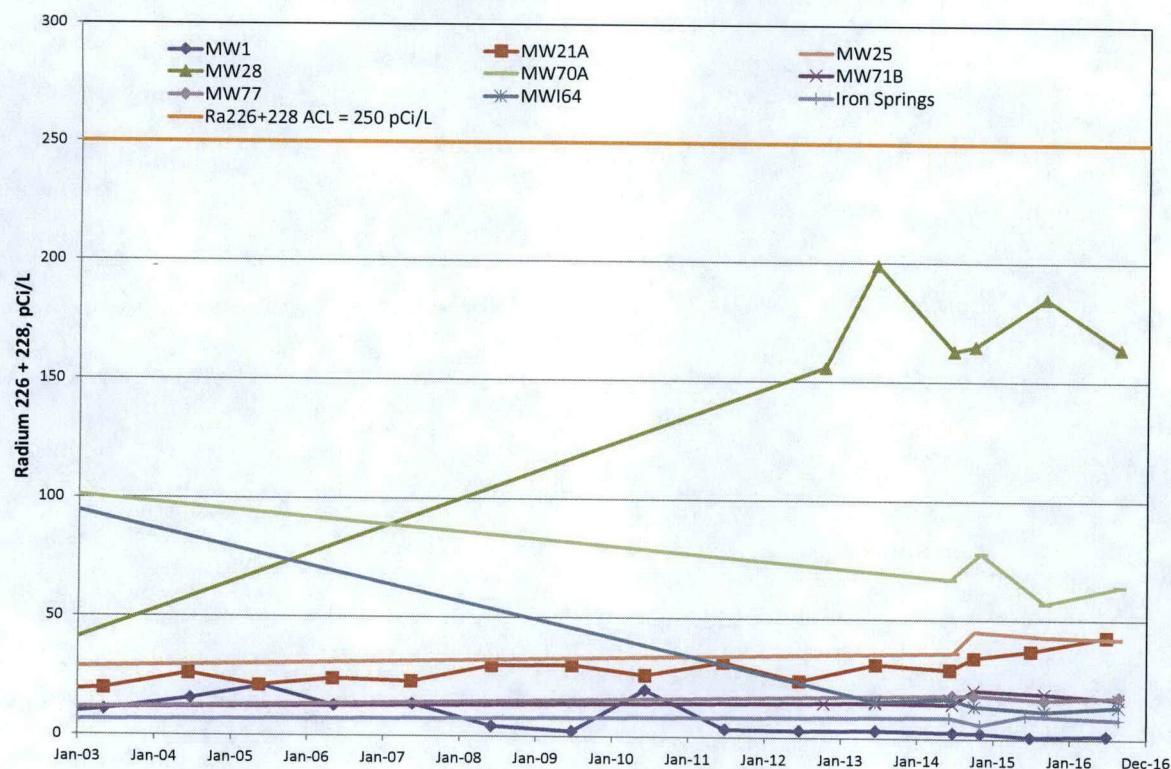


Figure 16 Radium-226 plus -228 Trends in Southwestern Flow Regime Monitor Wells

