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September 18, 2013

Mr. Dominick Orlando
U.S. Nuclear Regulatory Commission
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards
Mail Stop T-8-A-33
Two White Flint North, 11545 Rockville Pike
Rockville, Maryland 20852-2738

Subject: **Umetco Minerals Corporation, Gas Hills, Wyoming, Site June 2013 Groundwater Sampling Results and Evaluation**
Reference: **Materials License SUA-648; Docket No. 40-0299**

Dear Mr. Orlando:

The purpose of this letter is to provide the results of the additional Alternate Concentration Limits (ACL) sampling performed in June 2013 as recommended by the Nuclear Regulatory Commission's letter of September 24, 2012. The September 2012 letter recommended that the model validation wells (i.e., MW28, MW71B, MW72 and MW82) be sampled for the ACL constituents until the Gas Hills Site is transferred to the Department of Energy. The letter also requested that the results of the additional sampling be evaluated for trends in ACL constituent concentrations since there were exceedances of the model-predicted concentrations of chloride and sulfate observed at the model validation wells. Umetco Minerals Corporation (Umetco) submitted its initial evaluation on March 7, 2013. In the March evaluation, Umetco stated that monitoring well MWI64 would also be sampled for ACL constituents during the June 2013 sampling event to help evaluate the plume migration trends.

The additional ACL constituent sampling was performed between June 12 and 14, 2013, in conjunction with the annual sampling required by License Condition 35 of Materials License SUA-648. This is now the second time since 2001 that the full suite of ACL constituents has been sampled in the model validation wells and the first time that they have all been sampled in monitoring well MWI64. The sampling results, shown in the attached Tables 1 and 2, indicate that the ACL constituents at the sampled wells are less than the ACL values for the applicable flow regime. Trend plots for the ACL constituents plus chloride and sulfate in both flow regimes are shown on Figures 1 to 20. As noted in the March evaluation, most of the ACL constituent concentrations are very low and have remained consistently low since the late 1980s.

NMSS01

Recent exceptions occurred in the Western Flow Regime (WFR) for radium-226 plus radium-228 in model validation well MW28 and for selenium and natural uranium in MW1 (Figures 5, 6 and 10). The only exception in the Southwestern Flow Regime (SWFR) occurred for radium-226 plus radium-228 in POC well GW7 (Figure 15). These exceptions are detailed as follows:

- Radium-226 plus radium-228 values in WFR model validation well MW28 (Figure 5) increased to 199 picocuries per liter (pCi/L) from 18 pCi/L in 2001 and from 156 pCi/L in 2012. This is an indication that the plume has reached MW28. The graph also shows that the radium portion of the plume has migrated from MWI64 to MW28 in approximately 10 years as radium concentrations have decreased in MWI64 from a peak of 215 pCi/L in 2001 to less than 20 pCi/L subsequent to construction of the reclamation cover.
- The selenium concentration in MW1 has been increasing since the mid-2000s but recently appears to be remaining constant at around 30 percent of the ACL (Figure 6). Selenium levels in the other wells have remained very low.
- Natural uranium concentrations in MW1 have remained fairly constant since the mid-2000s at 50 to 60 percent of the ACL and, also since then, appear to be decreasing (Figure 10).
- The radium concentrations in SWFR wells GW7 are highly variable but fluctuate between 40 and 80 percent of the ACL (Figure 15).

As noted above, monitoring well MWI64 was also sampled for the ACL constituents to help evaluate the location of the contamination plume. The results of the sampling show that between 2001 and 2013 the concentrations of arsenic, selenium and lead-210 in MWI64 have remained low. Between 2005 and 2013, the concentrations of beryllium, nickel, natural uranium and radium have decreased dramatically. Only thorium-230 appears to be increasing, but the apparent increase is based on only two data points and the thorium-230 concentration remains well below the ACL.

Umetco's March 2013 analysis of the general chloride, sulfate and natural uranium trends, when shown spatially, indicated that the groundwater plume has passed the POC wells and is approaching the model validation wells. The data from the June 2013 sampling event continues to show this trend (Figure 21). The dramatic decrease in ACL constituent concentrations at MWI64 corroborates that the plume has passed MWI64 and has moved to the west and should be passing MW21A in the near future.

Umetco continues to believe that the groundwater plume is also migrating downgradient in the Southwest Flow Regime (SWFR), as the general trends are very similar to those in the WFR. Chloride and sulfate trends are decreasing in POC well GW8 while they are increasing in model validation well MW72. The natural uranium concentration in GW8 continues to decrease, while concentrations in POC well GW7 are staying the same but remain significantly below the ACL limit. No increases in ACL constituents have been seen in either of the SWFR model validation wells.

Overall, concentration trends in the WFR and SWFR continue to suggest that the plumes are migrating as expected based on Umetco's conceptual understanding of the Site and the groundwater model predictions. Recent sampling data have shown that constituent concentrations remain well below the ACLs at the model validation wells, despite sulfate results at MW28 and chloride results at MW72 that have been slightly higher than anticipated.

During the next annual event, Umetco will again sample MWI64 for the ACL constituents to help confirm the plume migration trends. Furthermore, Umetco believes the intent of this additional sampling negates the need to resample model validation wells that exceed the chloride and sulfate model-predicted target levels, since the ACL constituents provide a more definitive picture of plume migration, whereas chloride and sulfate are sampled mainly as indicators of overall groundwater movement.

Please contact me at 970-256-8889 or by e-mail at gieckte@dow.com if you have any questions or concerns.

Regards,

Thomas E. Gieck

Thomas E. Gieck
Remediation Leader

TEG/ESH

Enclosures: As stated

cc: T. King, WDEQ-LQD
S. Surovchak, DOE

Table 1 ACL Sampling at Western Flow Regime Wells, June 2013

Analyte	Units	ACL	MW1	MW21A	MW28	MW71B	MWI64
Arsenic	mg/L	1.8	0.0011	0.0537	0.0090	0.0067	0.0123
Beryllium	mg/L	1.64	0.00163	0.02265	0.00965	0.00015	0.00297
Lead-210	pCi/L	35.4	1.3 ± 2.2	0.0 ± 1.9	4.5 ± 1.9	-7.3 ± 2	-4.3 ± 2.4
Nickel	mg/L	13.0	0.13	0.63	0.55	< 0.01	0.09
Radium-226 + -228	pCi/L	250	3.2 ± 0.63	31 ± 1.4	199 ± 2.3	14.9 ± 1.1	15.6 ± 0.92
Selenium	mg/L	0.161	0.0524	0.0002	0.0002	< 0.0001	< 0.0001
Thorium-230	pCi/L	57.4	0.71 ± 0.4	-0.39 ± 0.39	-0.45 ± 0.4	-0.17 ± 0.46	6.5 ± 0.92
Natural Uranium	mg/L	11.9	7.170	0.0120	0.0004	0.0012	0.5255

mg/L – milligrams per liter pCi/L – picocuries per liter

Table 2 ACL Sampling at Southwestern Flow Regime Wells, June 2013

Analyte	Units	ACL	GW7	GW8	MW72	MW82
Arsenic	mg/L	1.36	0.0104	0.0217	0.0072	0.0042
Beryllium	mg/L	1.70	0.03193	0.11650	0.00020	0.00041
Lead-210	pCi/L	189	45 ± 4.2	15 ± 2.8	7.2 ± 1.9	5.2 ± 2.2
Nickel	mg/L	9.34	0.77	1.31	0.01	0.02
Radium-226 + -228	pCi/L	353	280 ± 2.2	83.3 ± 1.4	14.7 ± 0.89	19.7 ± 1.3
Selenium	mg/L	0.53	0.0009	0.0005	0.0032	0.0003
Thorium-230	pCi/L	44.8	-0.01 ± 0.36	1.3 ± 0.43	-0.44 ± 0.51	0.01 ± 0.31
Natural Uranium	mg/L	34.1	12.60	7.030	0.3938	0.0773

mg/L – milligrams per liter pCi/L – picocuries per liter

Figure 1 Arsenic Trends in Western Flow Regime Wells

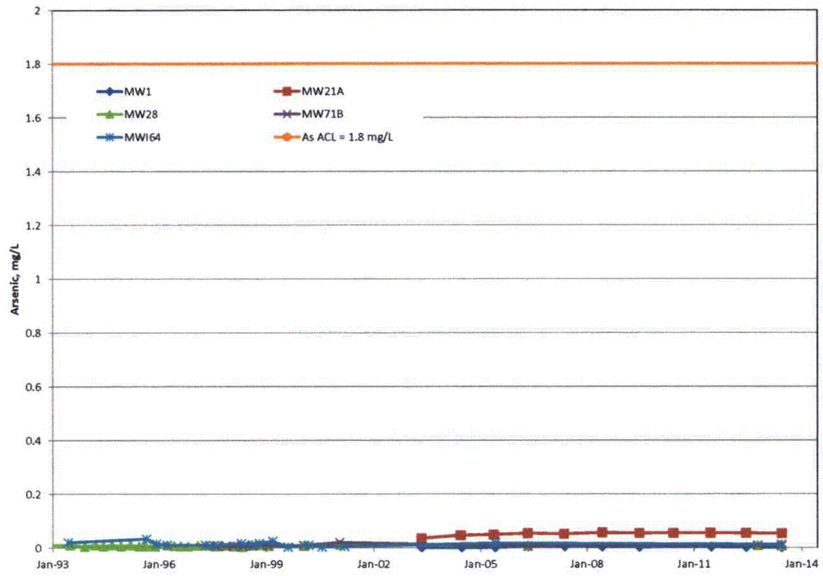


Figure 2 Beryllium Trends in Western Flow Regime Wells

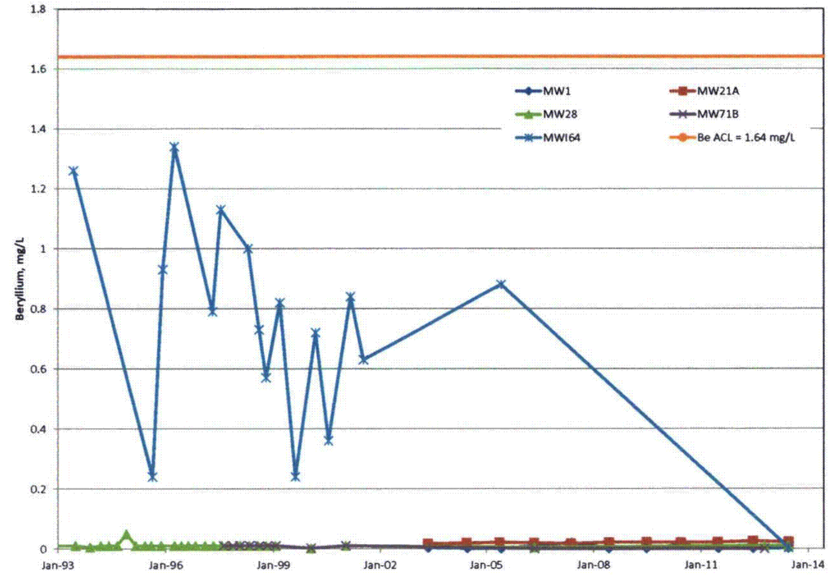


Figure 3 Lead-210 Trends in Western Flow Regime Wells

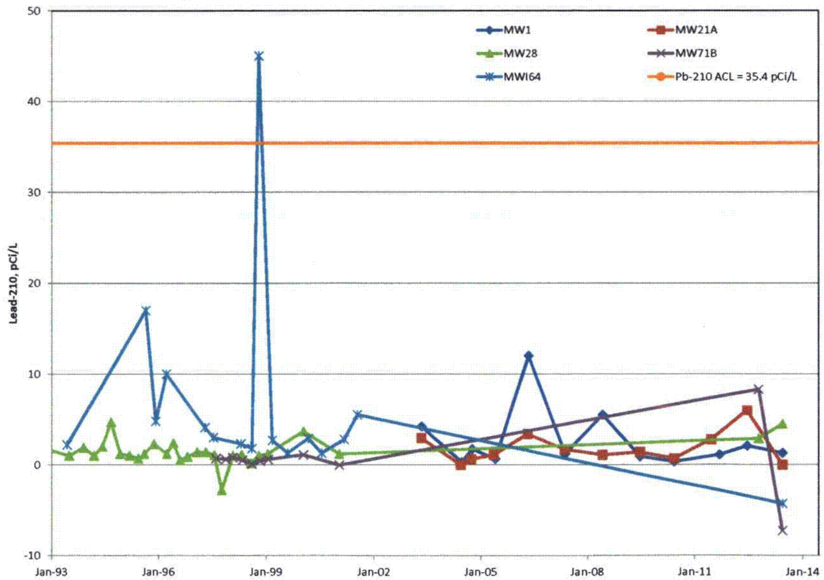


Figure 4 Nickel Trends in Western Flow Regime Wells

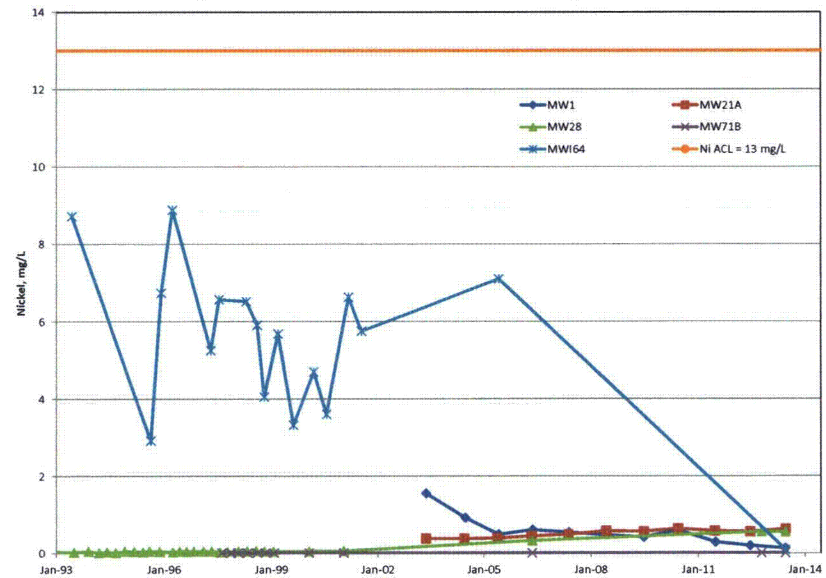


Figure 5 Radium-226 plus Radium-228 Trends in Western Flow Regime Wells

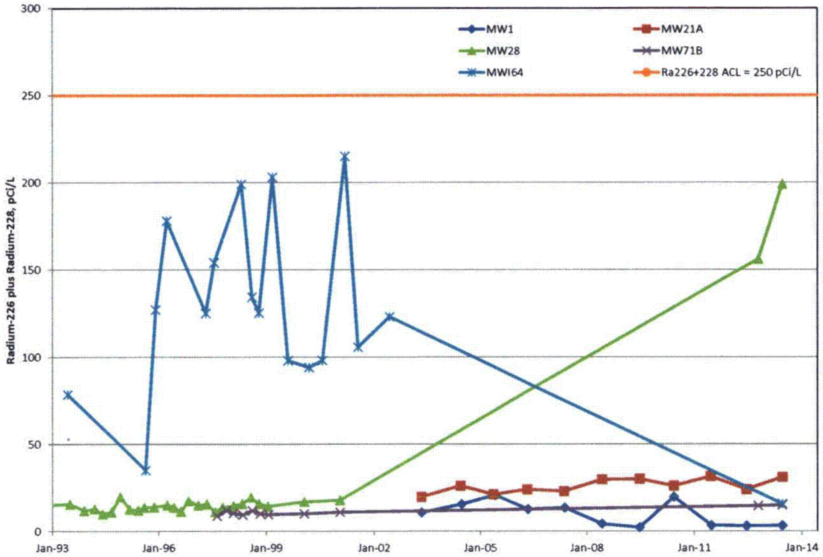


Figure 6 Selenium Trends in Western Flow Regime Wells

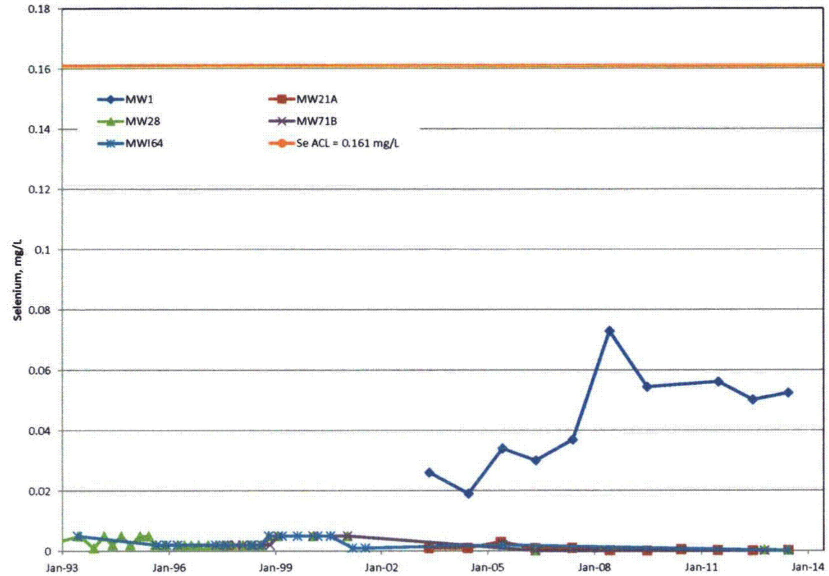


Figure 7 Thorium-230 Trends in Western Flow Regime Wells

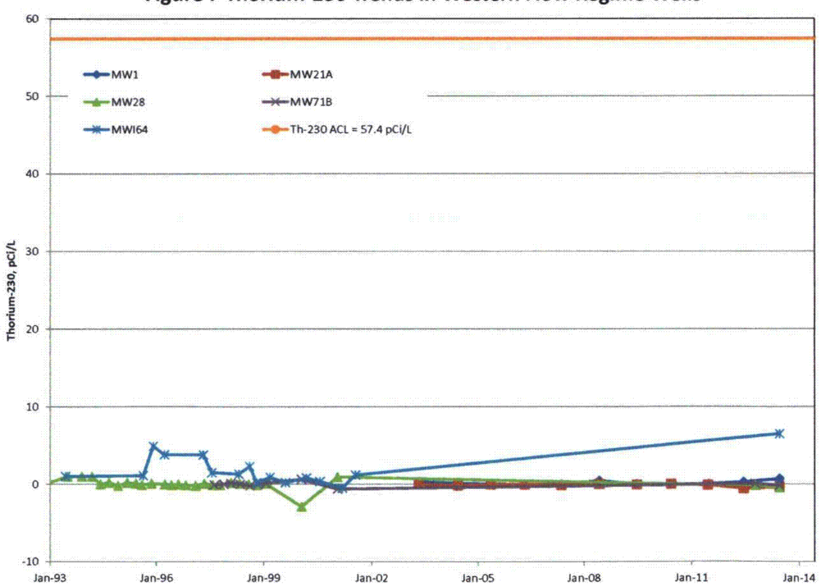


Figure 8 Chloride Trends in Western Flow Regime Wells

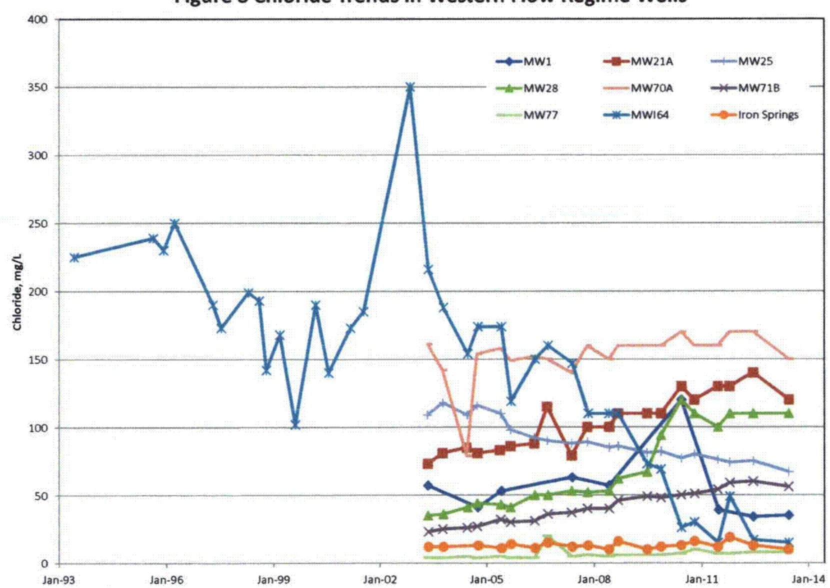


Figure 9 Sulfate Trends in Western Flow Regime Wells

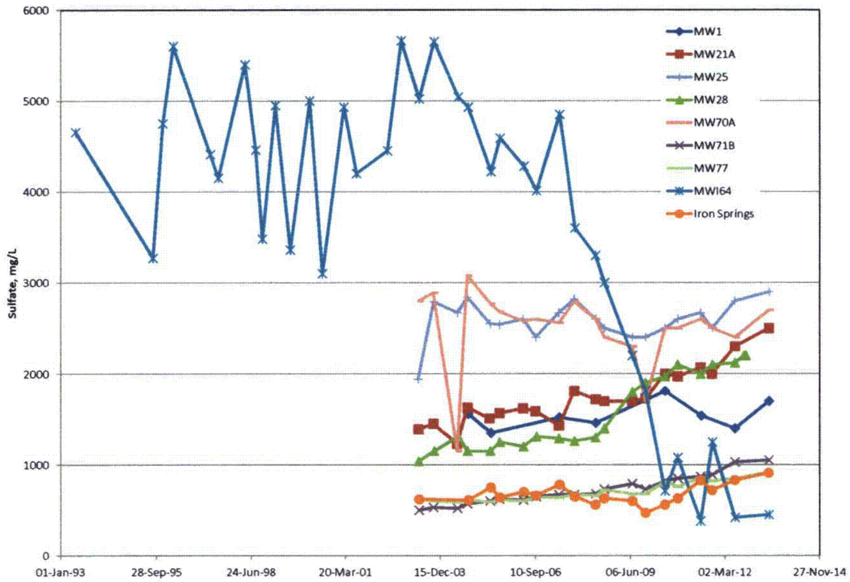


Figure 10 Natural Uranium Trends in Western Flow Regime Wells

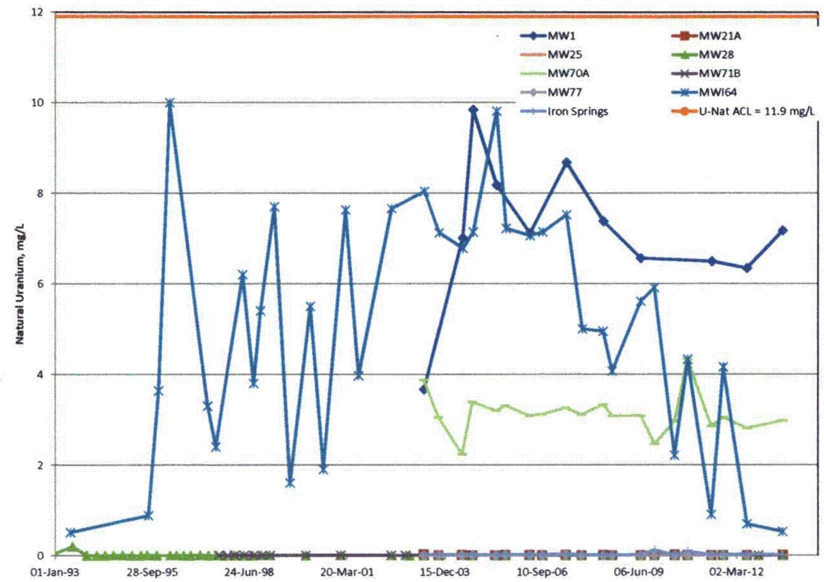


Figure 11 Arsenic Trends in Southwestern Flow Regime Wells

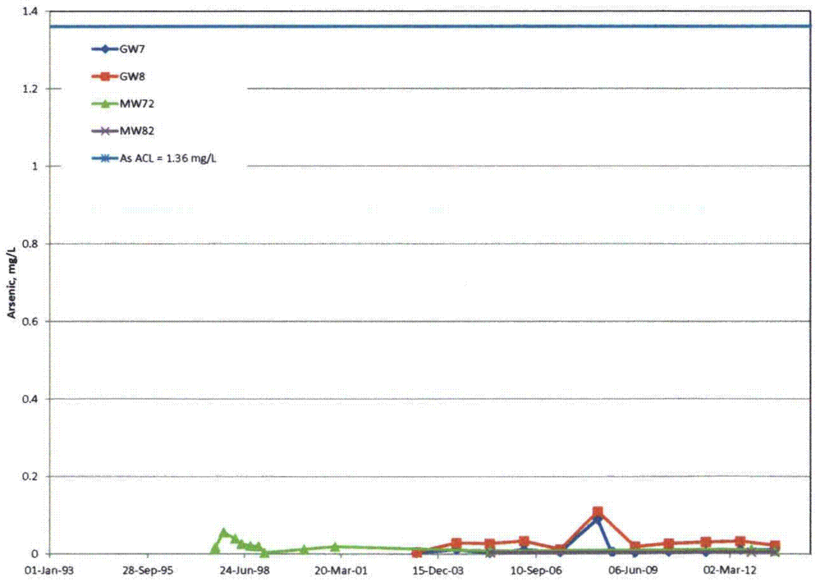


Figure 12 Beryllium Trends in Southwestern Flow Regime Wells

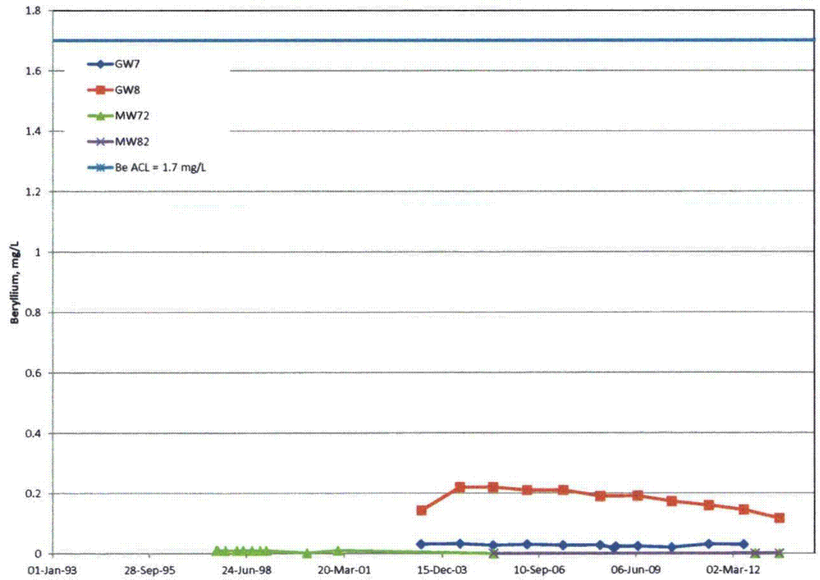


Figure 13 Lead-210 Trends in Southwestern Flow Regime Wells

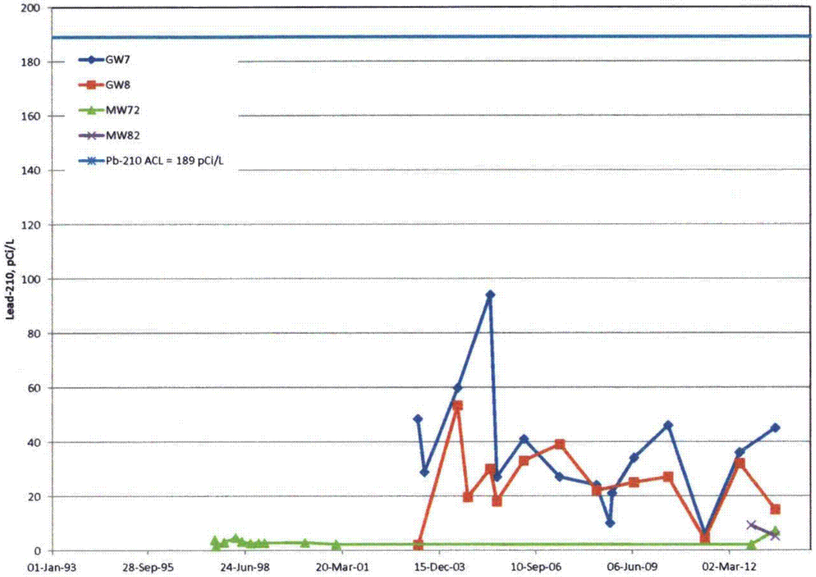


Figure 14 Nickel Trends in Southwestern Flow Regime Wells

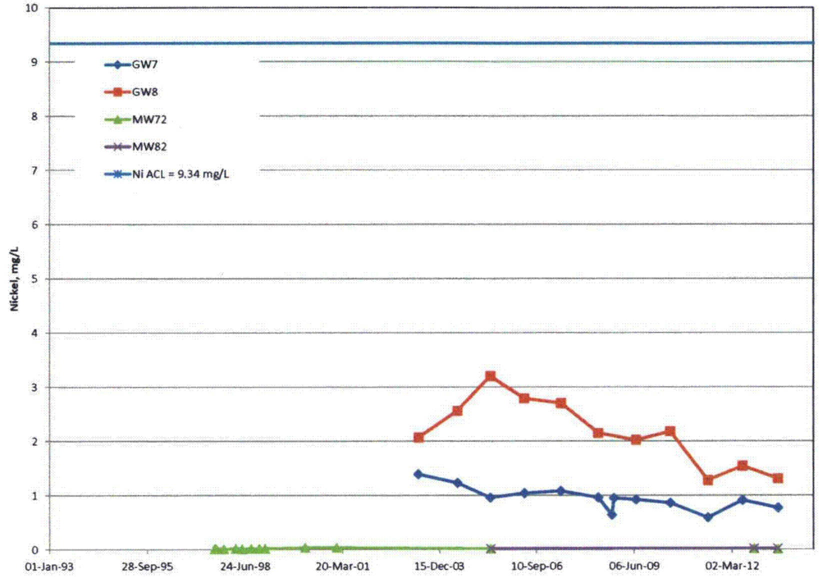


Figure 15 Radium-226 plus Radium-228 Trends in Southwestern Flow Regime Wells

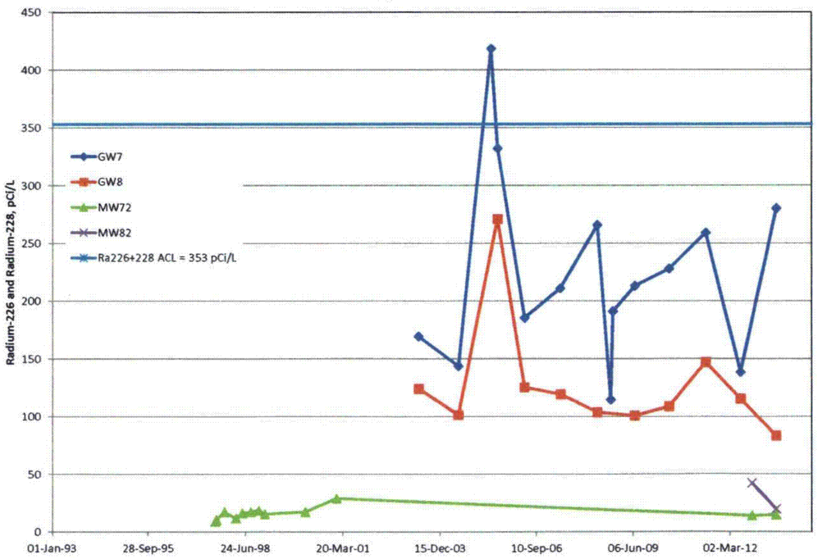


Figure 16 Selenium Trends in Southwestern Flow Regime Wells

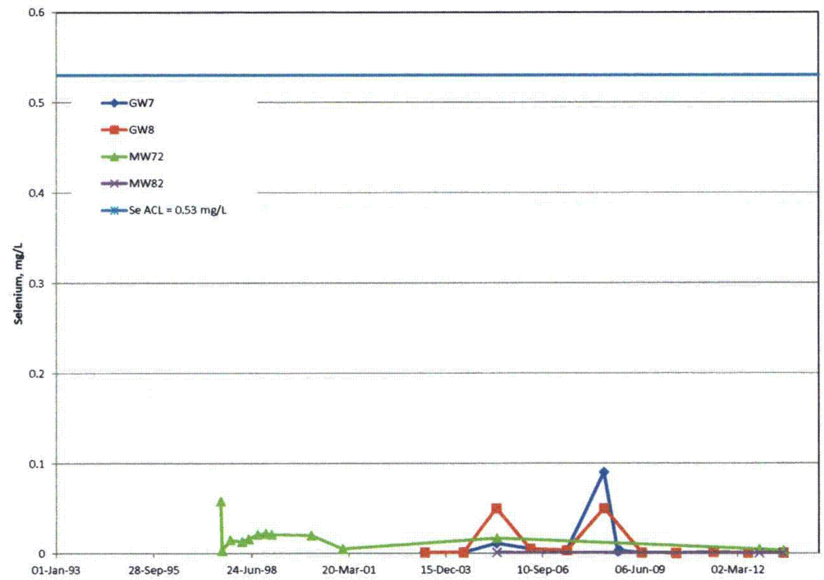


Figure 17 Thorium-230 Trends in Southwestern Flow Regime Wells

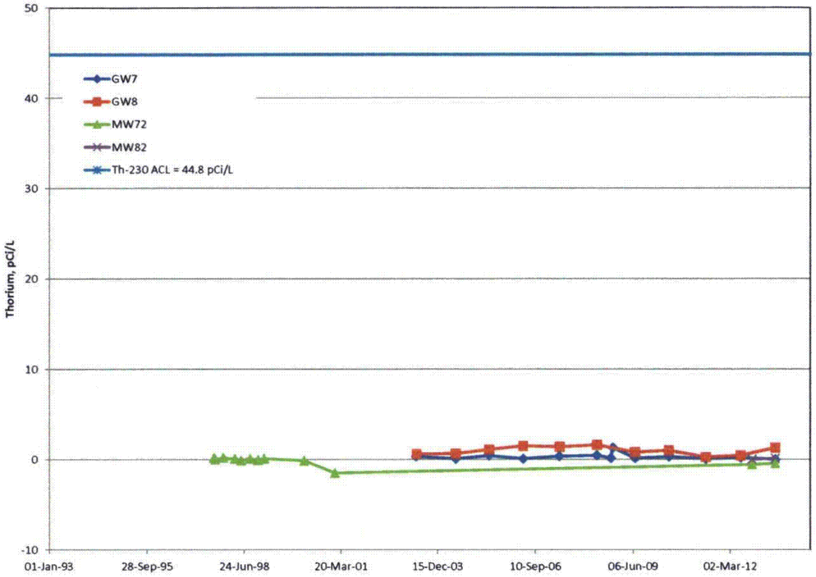


Figure 18 Chloride Trends in Southwestern Flow Regime Wells

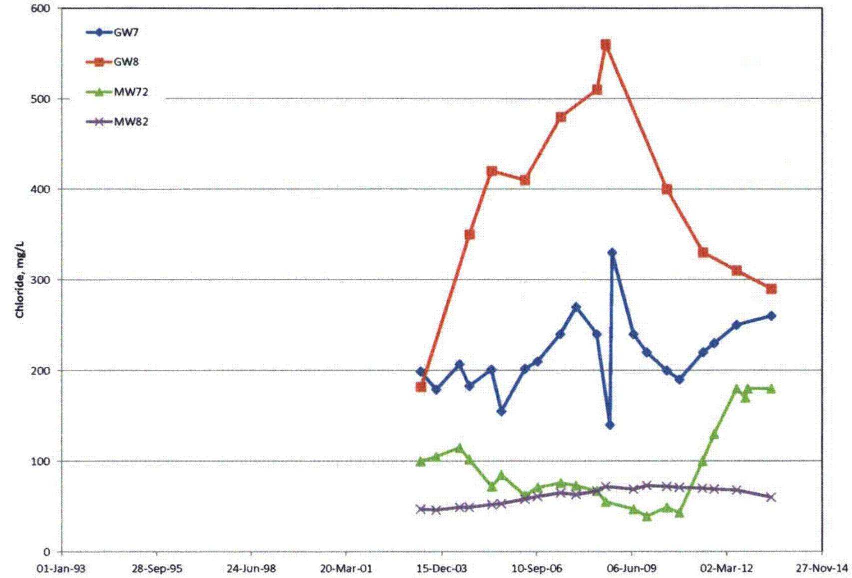


Figure 19 Sulfate Trends in Southwestern Flow Regime Wells

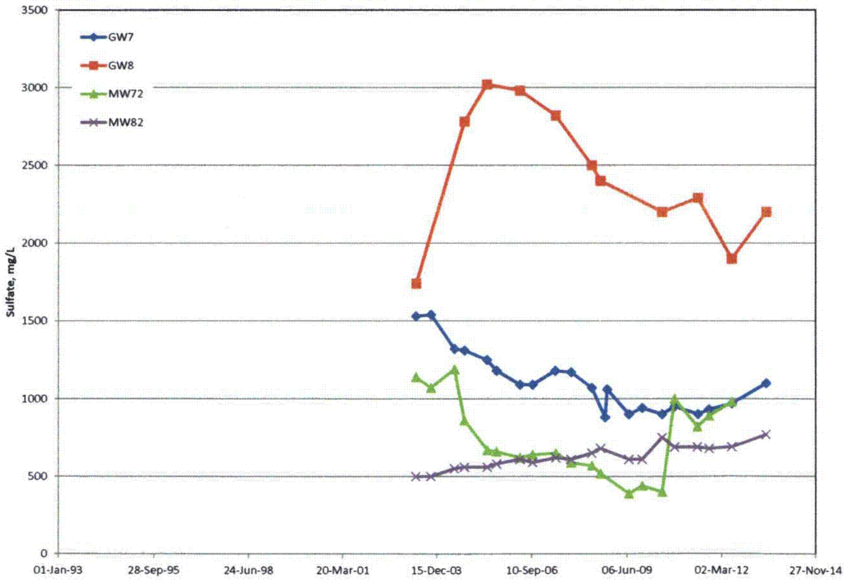
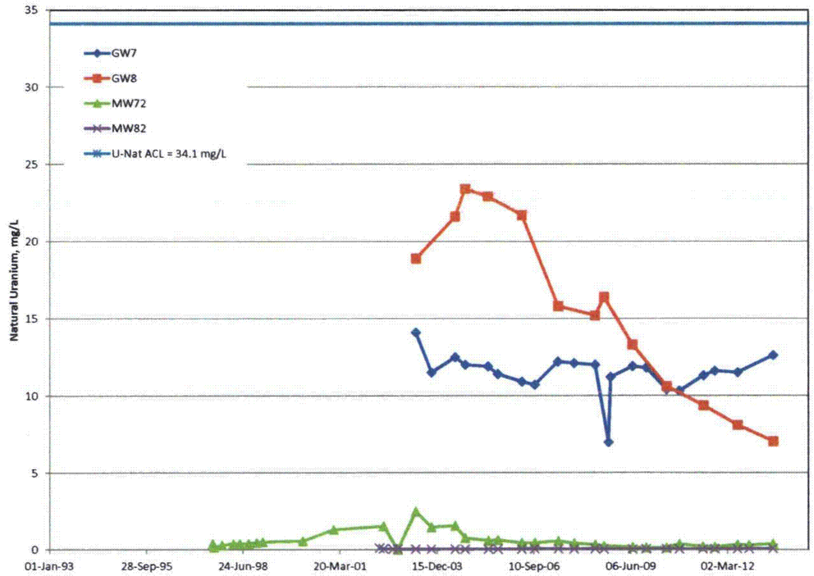
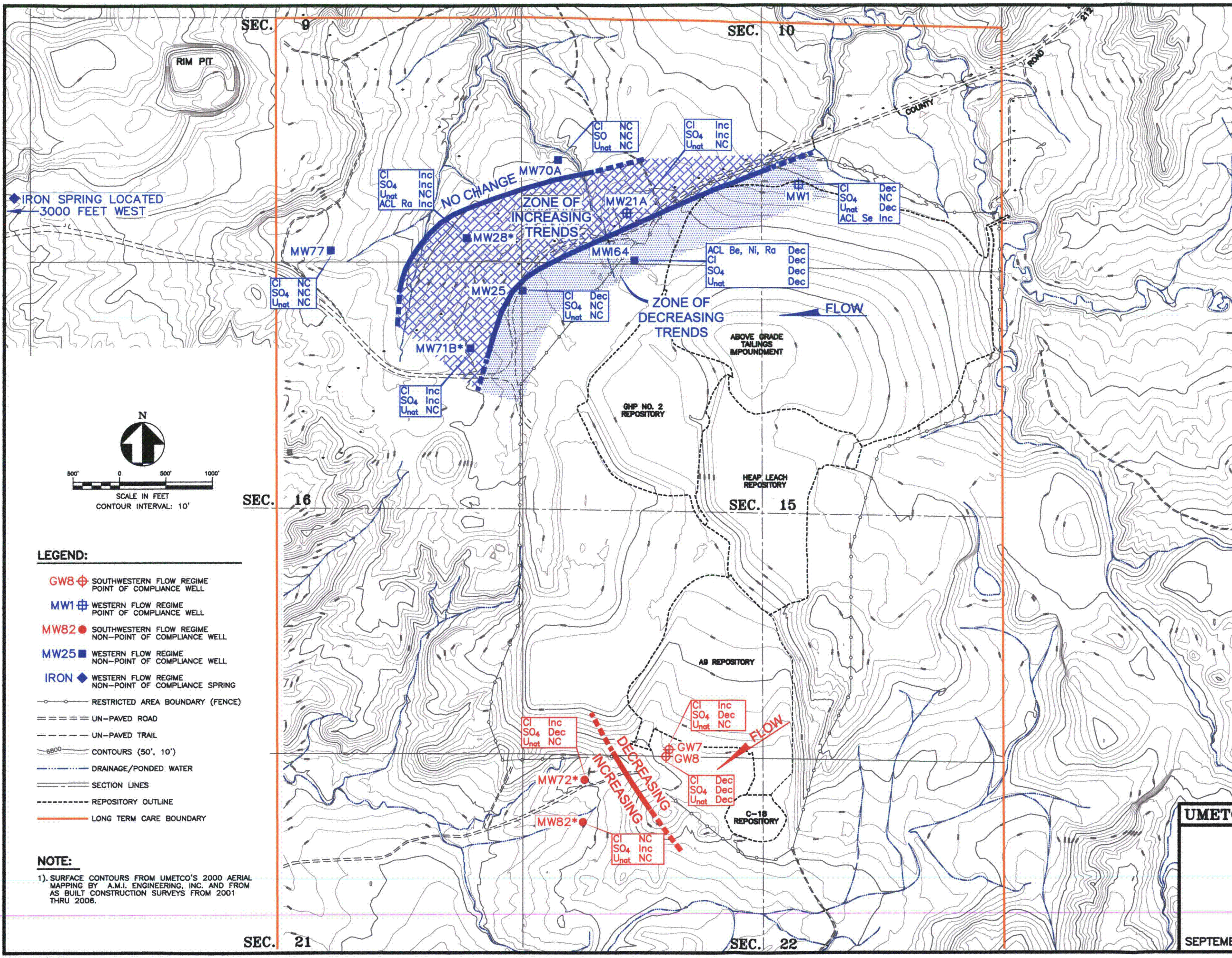


Figure 20 Natural Uranium Trends in Southwestern Flow Regime Wells





WESTERN FLOW REGIME

POINT OF COMPLIANCE WELLS:
MW1
MW21A

NON-POINT OF COMPLIANCE WELLS:
MW164
MW70A
MW25
MW28*
MW71B*
MW77

NON-POINT OF COMPLIANCE SPRING:
IRON SPRING

SOUTHWESTERN FLOW REGIME

POINT OF COMPLIANCE WELLS:
GW7
GW8

NON-POINT OF COMPLIANCE WELLS:
MW72*
MW82*

* – MODEL VALIDATION WELLS

Cl	=	Chloride
SO_4	=	Sulfate
U_{nat}	=	Uranium Natural
ACL Be	=	Beryllium
ACL Ni	=	Nickel
ACL Ra	=	Radium 226+228
ACL Se	=	Selenium
Inc	=	Increase
Dec	=	Decrease
NC	=	No Change

ZONE OF INCREASE

ZONE OF DECREASE

UMETCO MINERALS CORPORATION

MONITOR WELLS

TREND ANALYSIS

GAS HILLS, WYOMING

SEPTEMBER 2013

FIGURE 21

TREND-ANALYSIS.DWG