Umetco Minerals Corporation

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March 7, 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 Groundwater Sampling
Reference: Materials License SUA-648; Docket No. 40-0299

Dear Mr. Orlando:

The purpose of this letter is twofold: firstly, to inform you of the results of the verification sampling performed by Umetco Minerals Corporation (Umetco) on the two model validation wells that exceeded target values, and secondly, to submit the results and an evaluation of the additional sampling recommended by the Nuclear Regulatory Commission (NRC) in your letter of September 24, 2012.

Model Validation Verification Sampling

The *Groundwater Monitoring Plan, Appendix M* of the Alternate Concentration Limit (ACL) application identifies four of the non-Point of Compliance (POC) wells (MW28, MW71B, MW72 and MW82) as model validation wells. The results of the chloride and sulfate sampling at the model validation wells are required to be compared to well and time dependent target values given in *Target Level Derivation and Model Validation Approach for Chloride and Sulfate, Attachment M-1* to Appendix M. During the June 2012 annual sampling event, two of the model validation wells exceeded sulfate (MW28) and chloride (MW72) target levels. As required by Appendix M, verification sampling of the two model validation wells was performed in September and October 2012. The results of the verification sampling events are shown in the attached Table 1, and indicate that concentrations of sulfate in MW28 and chloride in MW72 have not changed significantly from the June 2012 values and remain slightly elevated above the target levels.

NMSS01

Additional Recommended Sampling

NRC's letter dated September 24, 2012, provided a staff review of the technical memorandum, *Gas Hills Groundwater Model and Data Review,* submitted by Umetco on June 25, 2012. The memorandum evaluated Umetco's groundwater modeling approach and the chloride and sulfate target levels that had been developed to provide an indication of whether the modeled groundwater velocity accurately represents current Site conditions. The groundwater velocity from the calibrated groundwater flow model was used in the PHREEQC model to predict attenuation of the ACL constituents.

In the September 24 letter, NRC recommended that all ACL constituents be sampled at the model validation wells until the Site is transferred to the Department of Energy. The letter also requested that the results of this sampling be evaluated for trends in ACL constituent concentrations since there have been exceedances of the indicator parameters (i.e., chloride and sulfate) observed at the model validation wells.

The recommended additional ACL sampling was performed in October 2012. Since this is the first time that ACL constituents have been sampled in the model validation wells since 2001, any trend over the last 11 years cannot be evaluated. However, the October sampling results, shown in the attached Tables 2 and 3, indicate that the ACL constituents at each model validation well are less than the ACL values for the applicable flow regime. In fact, most of the ACL constituent concentrations are very low and have remained consistently low since the late 1980s (Figures 1 to 14). Exceptions have occurred for lead-210 and radium-226 plus -228 in the Western Flow Regime (WFR) model validation wells as detailed below and shown in the attached graphs (Figures 15 and 16).

- The lead-210 concentration in MW71B (Figure 15) has increased to 8 pCi/L, which is still less than 25 percent of the ACL. It should be noted that the lead-210 concentration in POC well MW21A is also increasing, but remains less than 20 percent of the ACL.
- Radium-226 plus -228 values in MW28 (Figure 16) increased to 156 pCi/L in 2012 from 18 pCi/L in 2001. However, radium concentrations in MW71B have remained consistently low (around 15 pCi/L).

An analysis of the general chloride, sulfate and natural uranium trends, when shown spatially (Figure 17), indicates that the groundwater plume has passed the POC wells and is approaching the model validation wells. This can be seen by noting in the WFR that the chloride and sulfate trends are decreasing in MW1 and MWI64 and increasing in downgradient wells MW28 and MW71B, while the ACL constituent concentrations (except lead-210 in MW71B and radium in MW28) are low and not changing. In addition, natural uranium concentrations in MW1 and MWI64 have declined considerably. This may indicate that natural uranium is attenuating at these wells as the plume moves west. It should also be noted that the elevated concentrations of sulfate in MW28 are reasonably stable and are less than 50 percent of the sulfate concentration observed at upgradient well MWI64 in 2003. The chloride concentration at MW28 is also about 50 percent of the concentration at MWI64 in 2003.

In order to test the hypothesis that the plume in the WFR has moved to the west beyond POC well MW1 and will be passing MW21A in the near future, Umetco proposes sampling MWI64

during the next annual sampling event for the ACL constituents. MWI64 lies between the POC and the model validation wells in the upgradient portion of the plume. This well should be one of the first to show decreases in ACL constituent concentrations as the plume moves downgradient, and should provide a good representation of plume migration for the WFR.

Umetco believes 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 has decreased by 60 percent from approximately 20 pCi/L in 2006 to around 8 pCi/L in 2012, while natural uranium in GW7 has decreased slightly and is now less than 10 pCi/L (i.e., 30 percent of ACL limit). No increases in ACL constituents have been seen in the model validation wells.

Overall, concentration trends in the WFR and SWFR suggest that the plume is 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 sample MWI64 for the ACL constituents to help confirm the plume migration trends. It is Umetco's hope that these actions will fulfill the recommendations set forth in NRC's September 24, 2012, letter.

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
Remediation Leader

cc: M. Moxley, WDEQ-LQD
S. Surovchak, DOE

13-012

Table 1 2012 Results of Verification Sampling at Model Validation Wells

Model Validation Well	Chloride Concentration (mg/L)				Sulfate Concentration (mg/L)			
	Target Value at 2 Significant Figures[1]	June Actual	September Actual	October Actual	Target Value at 3 Significant Figures*	June Actual	September Actual	October Actual
MW28	110	110	NA	NA	2060	2100	2120	2200
MW72	150	180	170	180	1690	980	NA	NA

mg/L – milligrams per liter
NA – Not Analyzed

1 Target values for each model validation well are derived from the graphs given the Attachment M-1 to the Groundwater Monitoring Plan, Appendix M of the ACL application.
2 Western Flow Regime model validation well
3 Southwestern Flow Regime model validation well

Table 2 ACL Sampling at Western Flow Regime Model Validation Wells October 2012

Analyte	Units	ACL	MW28	MW71B
Arsenic	mg/L	1.8	0.0096	0.0084
Beryllium	mg/L	1.64	0.01036	0.00016
Lead-210	pCi/L	35.4	2.9 ± 1.6	8.3 ± 1.8
Nickel	mg/L	13.0	0.56	< 0.01
Radium-226 + -228	pCi/L	250	156 ±	14.6 ±
Selenium	mg/L	0.161	0.0004	< 0.0001
Thorium-230	pCi/L	57.4	-0.15 ± 0.62	0.06 ± 0.43
Natural Uranium	mg/L	11.9	0.0008	0.0014

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

Table 3 ACL Sampling at Southwestern Flow Regime Model Validation Wells October 2012

Analyte	Units	ACL	MW72	MW82
Arsenic	mg/L	1.36	0.0105	0.0040
Beryllium	mg/L	1.70	0.00028	0.00042
Lead-210	pCi/L	189	2.1 ± 1.6	9.2 ± 1.7
Nickel	mg/L	9.34	0.02	0.02
Radium-226 + -228	pCi/L	353	13.9 ±	22.1 ±
Selenium	mg/L	0.53	0.0048	0.0004
Thorium-230	pCi/L	44.8	-0.57 ± 0.54	0.01 ± 0.48
Natural Uranium	mg/L	34.1	0.3066	0.0657

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

ACL Constituent Concentrations in Western Flow Regime at POC and Model Validation Wells

Figure 1 Arsenic Trends in the Western Flow Regime POC and Model Validation Well

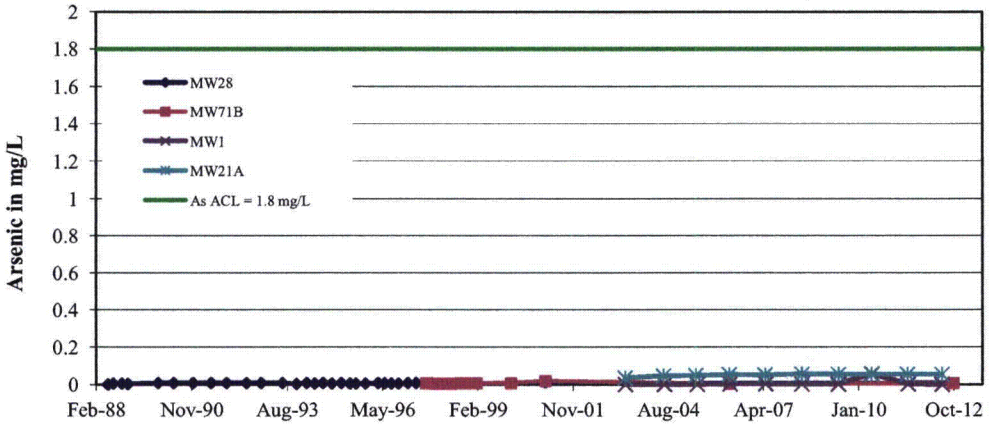


Figure 2 Beryllium Trends in the Western Flow Regime POC and Model Validation Wells

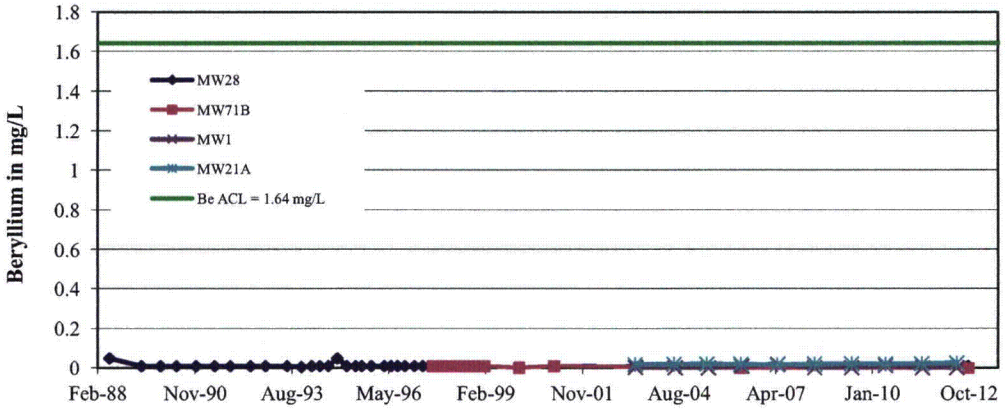
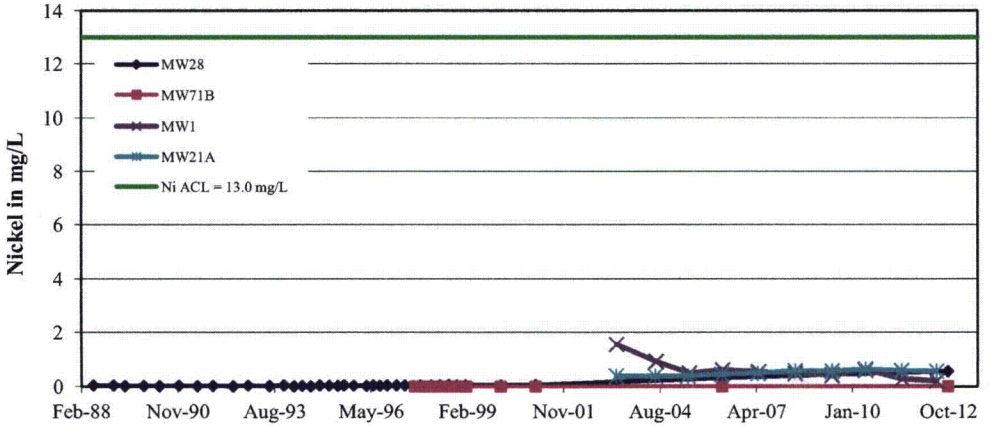


Figure 3 Nickel Trends in the Western Flow Regime POC and Model Validation Wells



ACL Constituent Concentrations in Western Flow Regime at POC and Model Validation Wells

Figure 4 Selenium Trends in the Western Flow Regime POC and Model Validation Wells

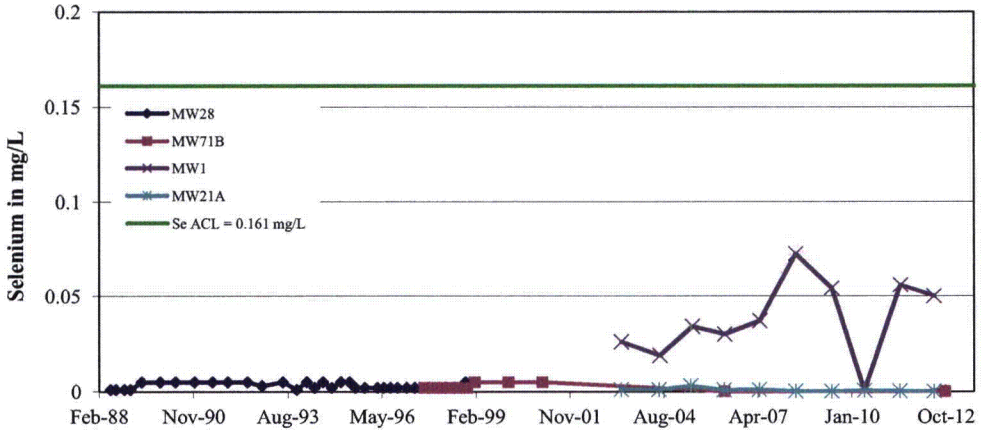


Figure 5 Thorium-230 Trends in the Western Flow Regime POC and Model Validation Wells

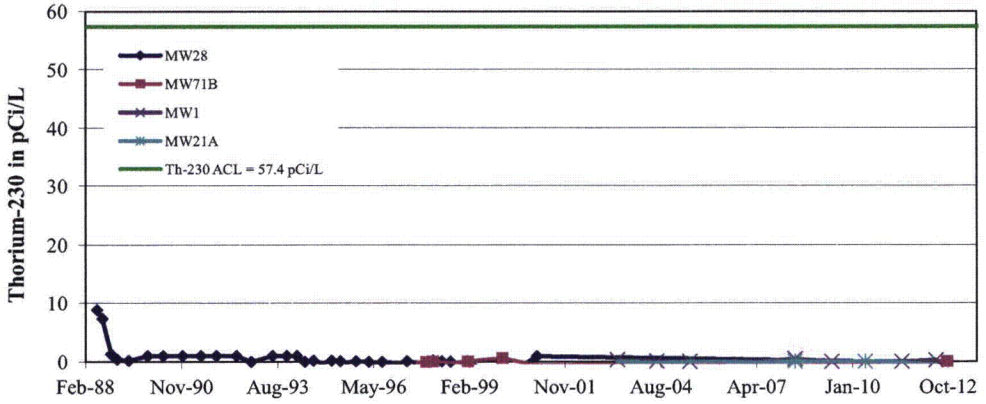


Figure 6 Natural Uranium Trends in the Western Flow Regime POC and Model Validation Wells

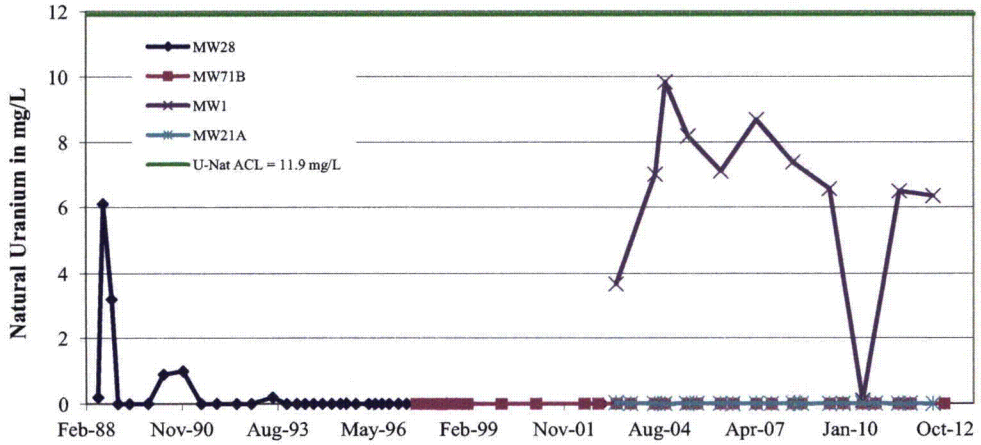


Figure 7 Arsenic Trends in the Southwestern Flow Regime POC and Model Validation Wells

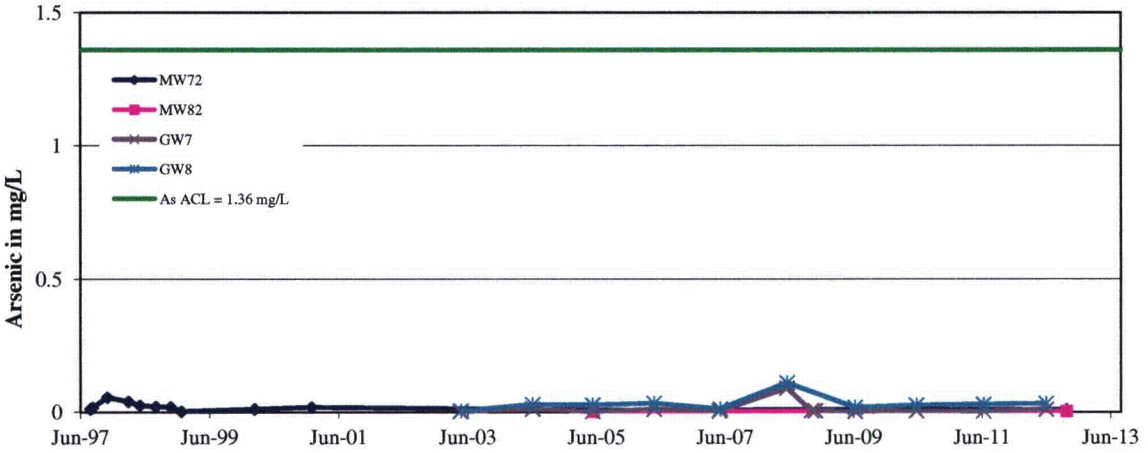


Figure 8 Beryllium Trends in the Southwestern Flow Regime POC and Model Validation Wells

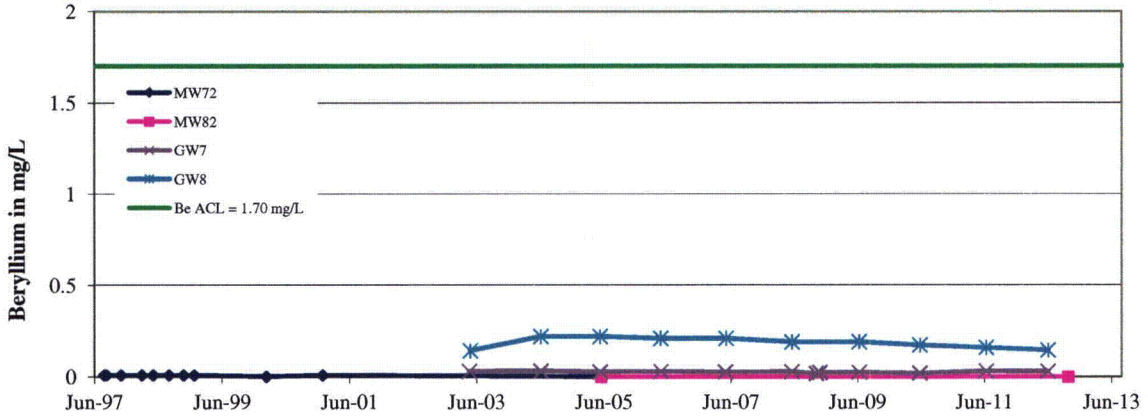


Figure 9 Lead-210 Trends in the Southwestern Flow Regime POC and Model Validation Wells

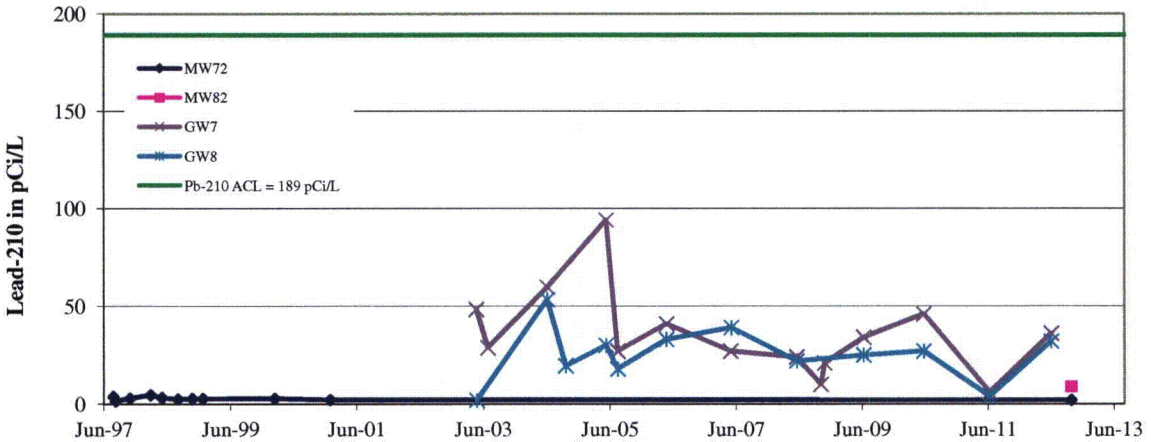


Figure 10 Nickel Trends in the Southwestern Flow Regime POC and Model Validation Wells

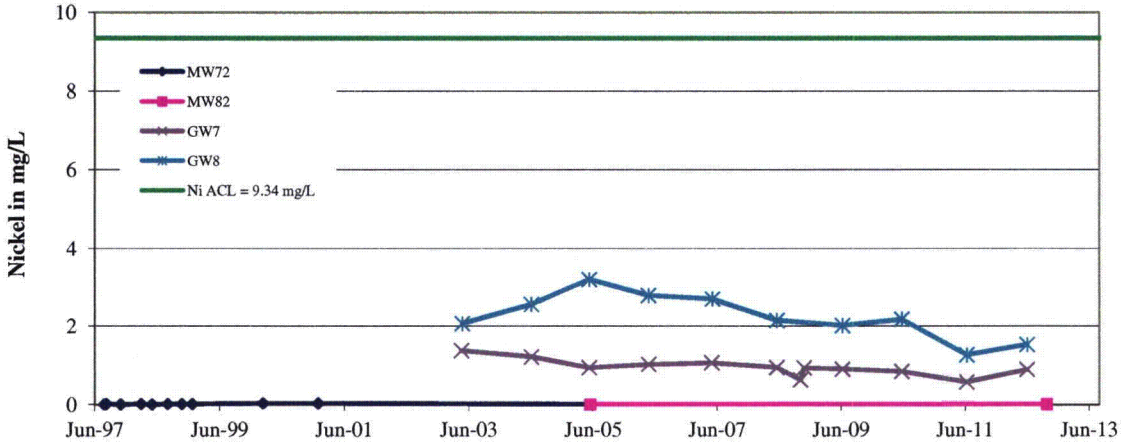


Figure 11 Combined Radium-226 & 228 Trends in the Southwestern Flow Regime POC and Model Validation Wells

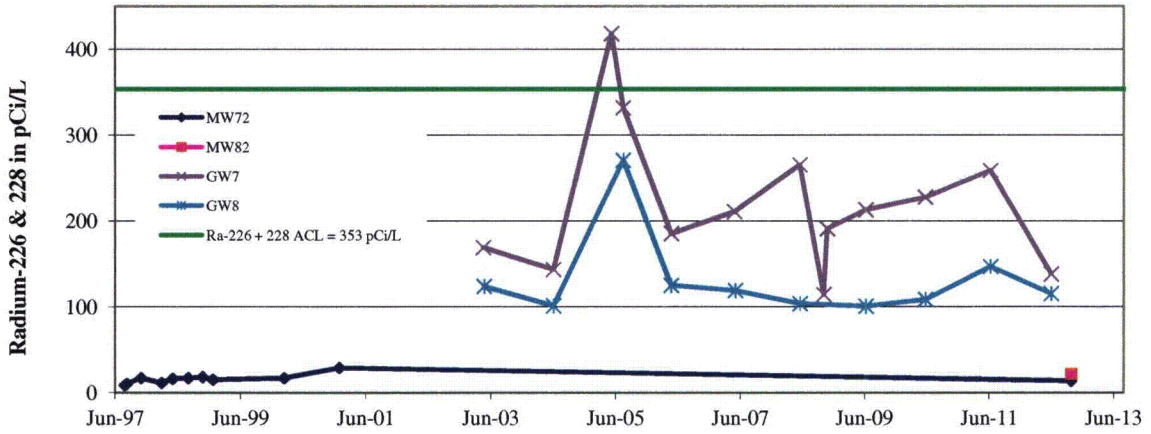
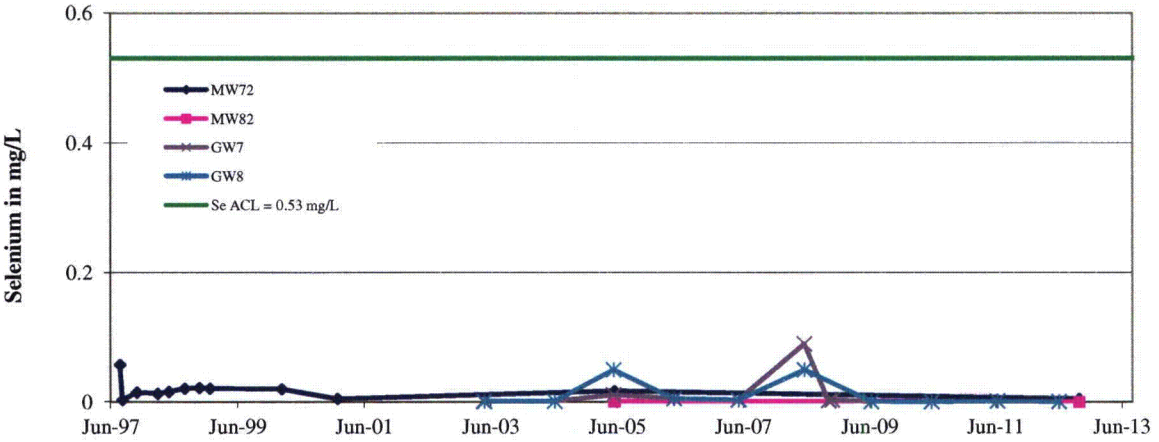


Figure 12 Selenium Trends in the Southwestern Flow Regime POC and Model Validation Wells



ACL Constituent Concentrations in Southwestern Flow Regime at POC and Model Validation Wells

Figure 13 Thorium-230 Trends in the Southwestern Flow Regime POC and Model Validation Wells

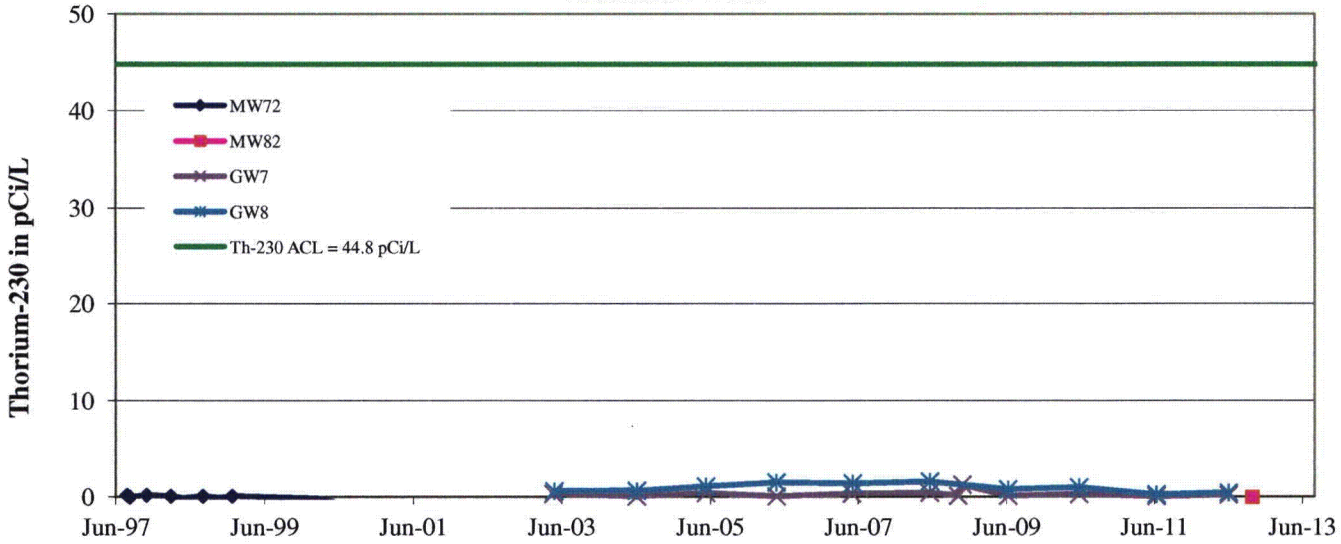


Figure 14 Natural Uranium Trends in the Southwestern Flow Regime POC and Model Validation Wells

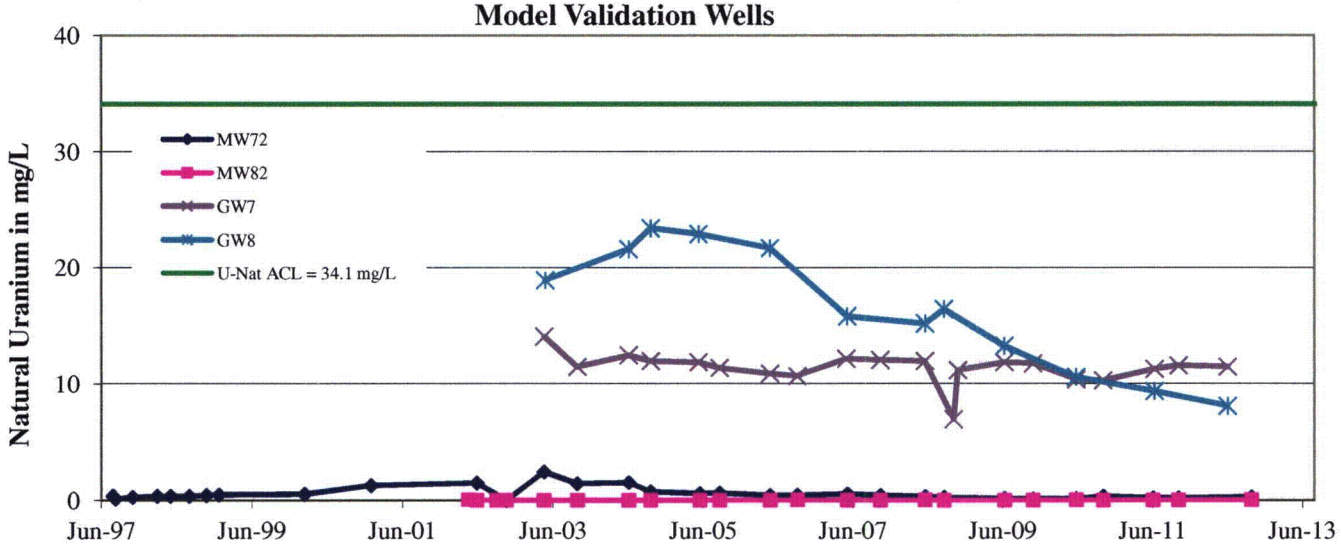


Figure 15 Lead-210 Trends in the Western Flow Regime POC and Model Validation Wells

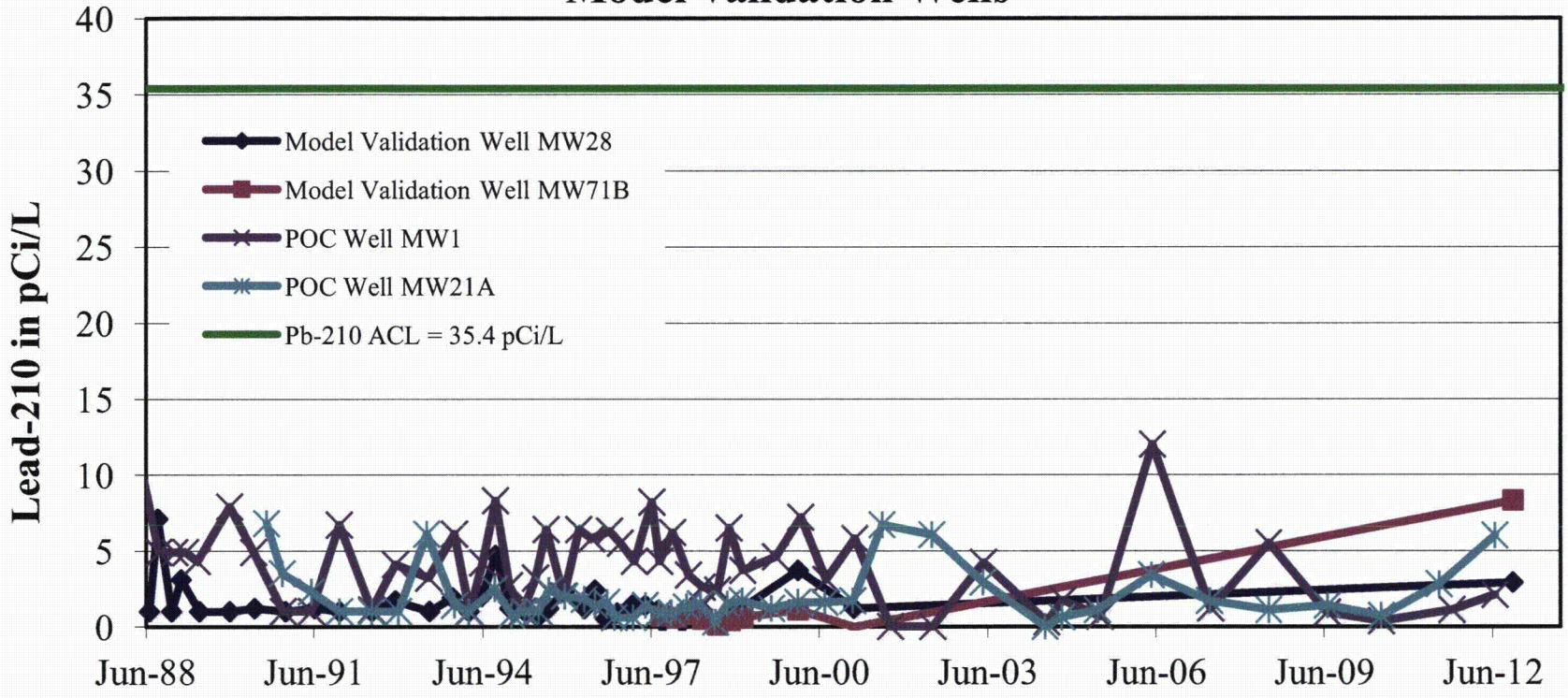
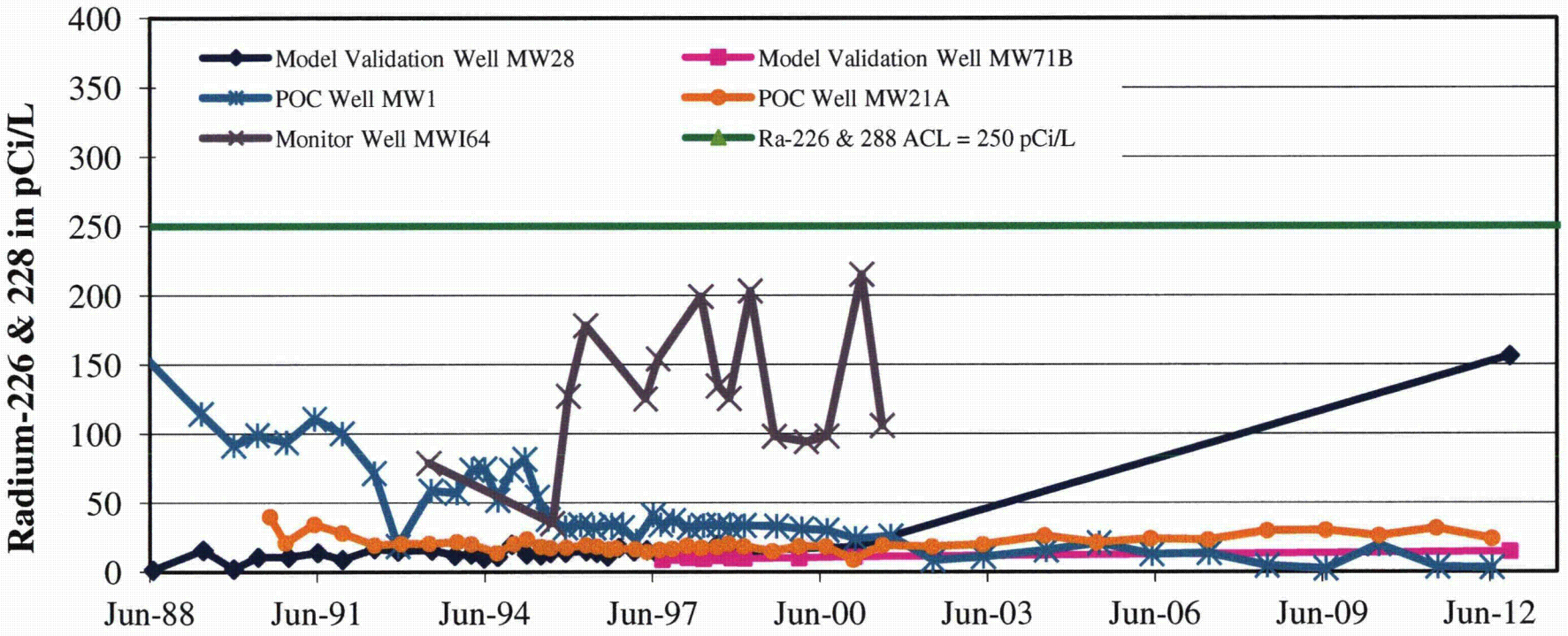


Figure 16 Combined Radium-226 & -228 Trends in the Western Flow Regime POC and Model Validation Wells



SEC. 9

SEC. 10

SEC. 16

SEC. 15

SEC. 21

SEC. 22

RIM PIT

IRON SPRING LOCATED 3000 FEET WEST

COUNTY ROAD 212

MW70A

MW21A

MW1

MW28*

MW77

MW164

MW25

MW71B*

NO CHANGE

ZONE OF INCREASING TRENDS

ZONE OF DECREASING TRENDS

FLOW

Cl	NC	Cl	Inc
SO_4	NC	SO_4	Inc
U_{nat}	NC	U_{nat}	NC
		ACL Pb	Inc

Cl	Inc	Cl	Dec
SO_4	Inc	SO_4	Dec
U_{nat}	NC	U_{nat}	Dec
ACL Ra	Inc		

Cl	NC	Cl	Dec
SO_4	NC	SO_4	Dec
U_{nat}	NC	U_{nat}	Dec

Cl	NC	Cl	Dec
SO_4	NC	SO_4	NC
U_{nat}	NC	U_{nat}	NC

Cl	Inc	Cl	Inc
SO_4	Inc	SO_4	Inc
U_{nat}	NC	U_{nat}	NC
ACL Pb	Inc	ACL Pb	Inc

ABOVE GRADE TAILINGS IMPOUNDMENT

GHP NO. 2 REPOSITORY

HEAP LEACH REPOSITORY

A9 REPOSITORY

C-18 REPOSITORY

Cl	S.Inc	Cl	S.Inc
SO_4	S.Dec	SO_4	Dec
U_{nat}	NC	U_{nat}	S.Dec

GW7
GW8

FLOW

DECREASING
INCREASING

Cl	Dec	Cl	NC
SO_4	Dec	SO_4	S.Inc
U_{nat}	Dec	U_{nat}	NC

MW72*

MW82*

N

500' 0 500' 1000'

SCALE IN FEET
CONTOUR INTERVAL: 10'

LEGEND:

- GW8 ⊕ SOUTHWESTERN FLOW REGIME POINT OF COMPLIANCE WELL
- MW1 ⊞ WESTERN FLOW REGIME POINT OF COMPLIANCE WELL
- MW82 ● SOUTHWESTERN FLOW REGIME NON-POINT OF COMPLIANCE WELL
- MW25 ■ WESTERN FLOW REGIME NON-POINT OF COMPLIANCE WELL
- IRON ◆ WESTERN FLOW REGIME NON-POINT OF COMPLIANCE SPRING
- RESTRICTED AREA BOUNDARY (FENCE)
- UN-PAVED ROAD
- UN-PAVED TRAIL
- 6800 CONTOURS (50', 10')
- DRAINAGE/PONDED WATER
- SECTION LINES
- REPOSITORY OUTLINE
- LONG TERM CARE BOUNDARY

NOTE:

1). SURFACE CONTOURS FROM UMETCO'S 2000 AERIAL MAPPING BY A.M.I. ENGINEERING, INC. AND FROM AS BUILT CONSTRUCTION SURVEYS FROM 2001 THRU 2006.

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 Pb	=	Lead
ACL Pb	=	Radium 226+228
Inc	=	Increase
S.Inc	=	Slight Increase
Dec	=	Decrease
S.Dec	=	Slight Decrease
NC	=	No Change

ZONE OF INCREASE

ZONE OF DECREASE

UMETCO MINERALS CORPORATION

MONITOR WELLS
TREND ANALYSIS
GAS HILLS, WYOMING

MARCH 2013 FIGURE 17

TREND-ANALYSIS.DWG