Umetco Minerals Corporation

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September 30, 2009

Mr. Richard Chang, Project Manager
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: **Nuclear Regulatory Commission Annual Report**
Umetco Minerals Corporation Gas Hills, Wyoming Site
For the report period July 2008 through June 2009

Reference: **License SUA-648, Docket No. 40-0299**

Dear Mr. Chang,

Umetco Minerals Corporation hereby submits two copies of the Gas Hills, Wyoming Annual Report prepared in accordance with License SUA-648. This document is submitted in accordance with License Conditions 10B, 16, 32, 35, and 39 for the above report period.

If you or your staff have any questions, please call me at (970) 256-8889.

Sincerely,

Thomas E. Gieck

Reclamation Leader

Enclosures

cc: NRC Region IV (Arlington, TX)
Wyoming Department of Environmental Quality (Lander)
Bureau of Land Management (Casper Field Office)
Bureau of Land Management (Lander Field Office)

09-061

U. S. Nuclear Regulatory Commission

Annual Report
for
Gas Hills, Wyoming

July 2008 through June 2009

License SUA-648
Docket Number 40-0299

Umetco Minerals Corporation
2754 Compass Drive, Suite 280
Grand Junction, Colorado 81506

September 2009

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1.0 INTRODUCTION

This document is submitted in accordance with U.S. Nuclear Regulatory Commission (NRC) License No. SUA-648 Amendment Number 62, Conditions 10B, 16, 32, 35, and 39, Docket Number 40-0299, for the former uranium mill site at Gas Hills, Wyoming. The report includes the Umetco Minerals Corporation (Umetco) organizational structure, environmental monitoring report, land use survey and groundwater monitoring review for the period between July 1, 2008 and June 30, 2009.

2.0 ORGANIZATIONAL CHART

In accordance with License Condition 10B, the authority and responsibilities of each management level for Umetco are presented in Table 2.1 and are described below. Because reclamation of the site has been completed, Umetco has no on-site employees.

Umetco is a wholly owned subsidiary of Union Carbide Corporation which is a wholly owned subsidiary of the Dow Chemical Company (Dow).

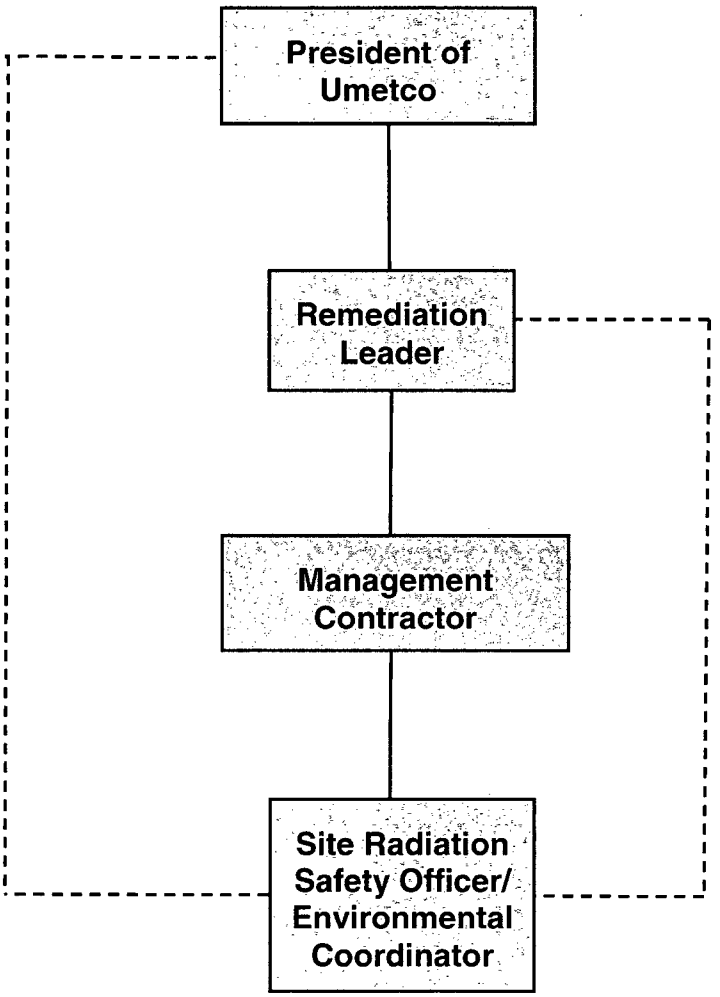
The President of Umetco is responsible for all practices and decisions made by the personnel reporting to him and reports to the Vice President of Environmental, Health and Safety at Dow.

The Remediation Leader reports to the President of Umetco and provides site management.

Umetco has retained the services of a management contractor who is responsible for compliance with the corporation's operational, health, radiation, safety and environmental practices and standards and conducts site maintenance and environmental monitoring. The management contractor is responsible for the day-to-day operating decisions at the site. The contractor reports to the Remediation Leader.

The Radiation Safety Officer/Environmental Coordinator is responsible for conducting activities that ensure the site radiation safety program meets applicable standards. This involves monitoring, evaluating personnel exposure and area surveys, overseeing the radiation protection program, providing appropriate training, maintaining monitoring equipment, and reporting. The Radiation Safety Officer/Environmental Coordinator develops and coordinates procedure modifications for radiological protection and ALARA policy adherence. The Radiation Safety Officer/Environmental Coordinator is authorized to address concerns to the President of Umetco and the Remediation Leader. In routine matters of radiation safety, the Radiation Safety Officer/Environmental Coordinator reports directly to the management group.

Table 2.1 2009 Organization Chart for Umetco Minerals Corporation



3.0 ALARA AUDIT

As required by License Condition 16, an ALARA audit was performed on September 29, 2008. The 2009 audit is scheduled for October 2009. A copy of the annual ALARA audit report is retained at the Umetco office in Grand Junction, Colorado and is available for NRC review.

Current site conditions have reduced radiation exposures to essentially background levels. The dose to a member of the general public is based on historical data which indicate that radon-222 levels are below background levels. Gamma dose to the public historically is approximately 58 millirem which is below the 100 millirem standard.

4.0 ANNUAL LAND USE SURVEY

The annual land use survey was prepared in accordance with License Condition 32. Mining, mine reclamation, mineral exploration (for oil and gas), recreational use and seasonal grazing are the primary land uses within the five-mile radius of the Gas Hills site. Three changes in land use have occurred within the survey area since the 2008 annual report was submitted and are listed below:

1. Umetco completed reclamation, including seeding, of the former office complex at the East Gas Hills site in August 2008. In addition, Umetco performed maintenance activities in the drainage channels within the Wyoming Department of Environmental Quality – Land Quality Division (WDEQ-LQD) East Gas Hills mine permit area.

2. WDEQ-LQD terminated Umetco's Limited Mining Operation permit number 930ET for the Dutton Quarry on September 30, 2008.

3. Drilling activities for oil and gas have decreased since 2008; however limited activity has been observed.

The following sections document current land uses.

4.1 Private Residences

The East Gas Hills site is located in a sparsely populated area within Natrona and Fremont counties in central Wyoming. The majority of the land within five miles of the site is public domain under Bureau of Land Management jurisdiction.

The nearest residence, the JE Ranch, is approximately five miles northeast of the site. It is occupied for one to two weeks per year. The nearest full-time residents are located approximately eight miles to the west-southwest at the Puddle Spring Ranch.

4.2 Grazing

Cattle are the primary livestock in the area and normally graze between April and October. Sheep graze in the early winter months. Native grazing species include antelope, deer, and elk.

4.3 Private and Public Potable Water and Agricultural Wells

The results of the groundwater and surface water rights search are given in Appendix A. No new water rights have been granted within the five-mile radius of the East Gas Hills site since the last report. Umetco is in the process of cancelling unnecessary water rights and transferring the water rights for wells to be kept for long term monitoring to the U. S. Department of Energy.

4.4 Other Operations

Umetco has two permitted mines within the five-mile radius of the Gas Hills site. One of these mines, the Rattlesnake Quarry (inactive), produced rock for the reclamation activities at the East Gas Hills site. The other permitted mine, the Clay Borrow (reclaimed), produced clay for reclamation use at the site. The Clay Borrow Mine Permit is in the process of being terminated.

Power Resources, Inc. is in the permitting stage of an *in-situ* uranium mining operation, approximately 2.5 miles south of the site. Activities have increased at the site with site personnel observed at the Carroll Shop.

Rock Springs Minerals continued to mine bentonite near the Clay Borrow site located approximately six miles west of the East Gas Hills site.

The Kinder Morgan continued to use its compressor station located approximately 2.5 miles north of the East Gas Hills site.

5.0 GROUNDWATER MONITORING REVIEW

Groundwater monitoring was performed in accordance with the *Groundwater Monitoring Plan, Appendix M,* dated March 2002, and revisions dated October 2002, January 2004 and June 2005, as required by License Condition 35A.

5.1 Annual Sampling

The Point of Compliance (POC) wells (MW1, MW21A, GW7 and GW8) were sampled for the Alternate Concentration Limit (ACL) constituents identified in License Conditions 35B and 35C. The POC wells, shown on Figure 1, were sampled in June 2009. The analytical results are shown in Tables 5.1 and 5.2 and Figure 2.

Table 5.1 Annual Sampling Results for the Western Flow Regime Collected in June 24, 2009

Analyte	Units	ACL	MW1	MW21A
Arsenic	mg/L	1.8	0.0028	0.0548
Beryllium	mg/L	1.64	0.0012	0.0216
Lead-210	pCi/L	35.4	0.93 ± 0.39	1.4 ± 0.53
Nickel	mg/L	13.0	0.42	0.57
Radium-226 + -228	pCi/L	250	2.22 ± 0.58	30 ± 1.24
Selenium	mg/L	0.161	0.0544	<0.0001
Thorium-230	pCi/L	57.4	0.0 ± 0.08	-0.03 ± 0.06
Natural Uranium	mg/L	11.9	6.560	0.0039

Table 5.2 Annual Sampling Results for the Southwestern Flow Regime Collected in June 25, 2009

Analyte	Units	ACL	GW7	GW8
Arsenic	mg/L	1.36	0.0031	0.0183
Beryllium	mg/L	1.70	0.0243	0.191
Lead-210	pCi/L	189	34.0 ± 1.1	25.0 ± 1.0
Nickel	mg/L	9.34	0.92	2.02
Radium-226 + -228	pCi/L	353	213 ± 2.1	100.8 ± 1.4
Selenium	mg/L	0.53	0.0005	0.0007
Thorium-230	pCi/L	44.8	0.12 ± 0.1	0.8 ± 0.193
Natural Uranium	mg/L	34.1	11.9	13.3

The isoconcentration map for natural uranium is given in Figure 3. Concentration trend plots for the ACL constituents were developed for the POC wells. Concentration trend plots for MW1 and MW21A (Western Flow Regime) are shown in Figures 4 through 11. The concentration trend plots for GW7 and GW8 (Southwestern Flow Regime) are shown in Figures 12 through 19. The ACL value for each constituent is indicated in the applicable concentration plots for comparison. No constituents exceeded the ACL values during the past year.

In the letter dated January 6, 2009, Umetco discussed the inadvertent placement of bentonite in POC well GW7 and its subsequent removal. A copy of the letter is attached as Appendix C.

As noted in the letter, after the bentonite was removed, GW7 was sampled for a full suite of analytes on October 21 and November 11, 2008 to determine if the well cleaning had been successful. The first round of sampling indicated that field parameters were within the range of GW7's historical values, however, the laboratory results did not correlate well with its historical values. Analysis of the initial post cleaning sampling indicated the presence of water used during well cleaning, i.e., dilution of the formation water. The second round of sampling (November 11, 2008) indicated a very good correlation with GW7's historical values.

The tables and concentration trend plots attached to the January 6, 2009 letter show the historic sample results as well as the most recent, November 11, 2008, post well cleaning sample results.

5.2 Semi-Annual Sampling

As required by Table M-1 of Appendix M, POC wells MW21A and GW7 and the non-POC wells were sampled semiannually in September 2008 and June 2009 for natural uranium, chloride and sulfate and measured for water levels.

A water level elevation map is provided in Figure 20. Hydrographs for Western Flow Regime POC and non-POC wells are shown in Figures 21 and 22. The Southwestern Flow Regime hydrographs are shown in Figures 23 and 24. The analytical results are shown in Tables 5.3 and 5.4.

Isoconcentration maps for natural uranium, chloride and sulfate are shown in Figures 3, 25 and 26, respectively. Comprehensive isoconcentration maps for each of the ACL constituents developed from data collected prior to ACL monitoring can be found in Appendix G of the *Final Application for ACLs for Gas Hills, Wyoming,* (Umetco May 2001). The Appendix G isoconcentration maps provide a baseline assessment of the distribution of ACL constituents. Concentration trend plots of chloride and sulfate for the POC wells are shown in Figures 27 through 30. Chloride, sulfate and natural uranium trends for the non-POC wells are shown in Figures 31 through 37.

The chloride and sulfate results of the four groundwater model verification wells (MW71B, MW28, MW72 and MW82) were compared with the target levels for June 2009 given in Tables 2 through 5 of Appendix M and its subsequent revisions. The sulfate and chloride target levels were not exceeded in any of the model verification wells.

Table 5.3 Semi-Annual Sampling Results for the Western Flow Regime

Monitoring Location	Sampling Date	Analyte (mg/L)		
		Chloride	Sulfate	Natural Uranium[1]
MW21A	9-3-08	110 J	1700	0.0035
	6-24-09	110	1700	0.0039
MW25	9-4-08	86 J	2500	0.006
	6-26-09	81	2400	0.0035
MW28[2] [3]	9-3-08	62 J	1300	0.0013
	6-25-09	67	1400	0.0023
MWI64	9-4-08	110 J	3000	4.070
	6-24-09	73	2200	5.610
MW70A	9-4-08	160 J	2400	3.080
	6-24-09	160	2300	3.090
MW71B[2]	9-3-08	46 J	730	0.0019
	6-26-09	49	790	0.0025
MW77	9-3-08	6 J	720	0.0016
	6-26-09	6	680	0.0033
Iron Springs	9-4-08	16 J	630	0.0110
	6-26-09	10	600	0.0212

(1) There are no action levels for natural uranium at the non-POC wells.
(2) MW28 and MW71B are Model Validation Wells for Western Flow Regime.
(3) Revised target levels given in the January 2004 revision to Appendix M.

J notation indicates estimated value

Table 5.4 Semi-Annual Sampling Results for the Southwestern Flow Regime

Monitoring Location	Sampling Date	Analyte (mg/L)		
		Chloride	Sulfate	Natural Uranium[1]
GW7	6-25-09	240	900	11.90
GW8	9-4-08	560 J	2400	16.40
PW4	9-4-08	260 J	1300	0.2460
	6-25-09	270	1400	0.2530
MW72[2]	9-4-08	55 J	520	0.2570
	6-25-09	47	390	0.1850
MW82[2]	9-4-08	72 J	680	0.0468
	6-25-09	69	610	0.0533

(1) There are no action levels for natural uranium in non-POC wells.
(2) MW72 and MW82 are Model Validation Wells for the Southwestern Flow Regime.
J notation indicates estimated value

5.3 One-Time Sampling of Constituents of Concern

As recommended by Section E3.3.2(1), NUREG 1620, one-time sampling of the constituents of concern was conducted at the POC wells. Sampling was conducted for the four previously identified constituents of concern identified in the Gas Hills tailing liquor that are listed in 10 CFR 40, Appendix A, Criterion 13 but that are not included in the Gas Hills monitoring program under the NRC approved ACL application. These four analytes are barium, cadmium, chromium and lead.

As detailed in the letter dated September 22, 2009, the four POC wells were sampled on June 24 and 25, 2009 and the results, shown in Table 5.5, indicate that the four identified constituents of concern are below the Maximum Contaminate Levels (MCL) established in Table 5C 10 CFR 40, Appendix A, with the exception of cadmium in two of the POC wells (GW7 and GW8). The cadmium concentrations in the two POC wells are erratically detected and not consistent with groundwater contamination from seepage. A copy of the September 22, 2009 letter requesting to exclude cadmium as a hazardous constituent in groundwater is given in Appendix D.

Table 5.5 One-Time Sampling Results

Analyte	Units	MW1	MW21A	GW7	GW8
Barium	mg/L	0.0076	0.0133	0.012	0.021
Cadmium	mg/L	0.0027	0.0004 J	0.0104	0.0101
Chromium	mg/L	< 0.0005	< 0.0005	< 0.01	< 0.01
Lead	mg/L	< 0.0001	< 0.0001	0.0006	0.0007

J notation indicates estimated value

6.0 REFERENCES

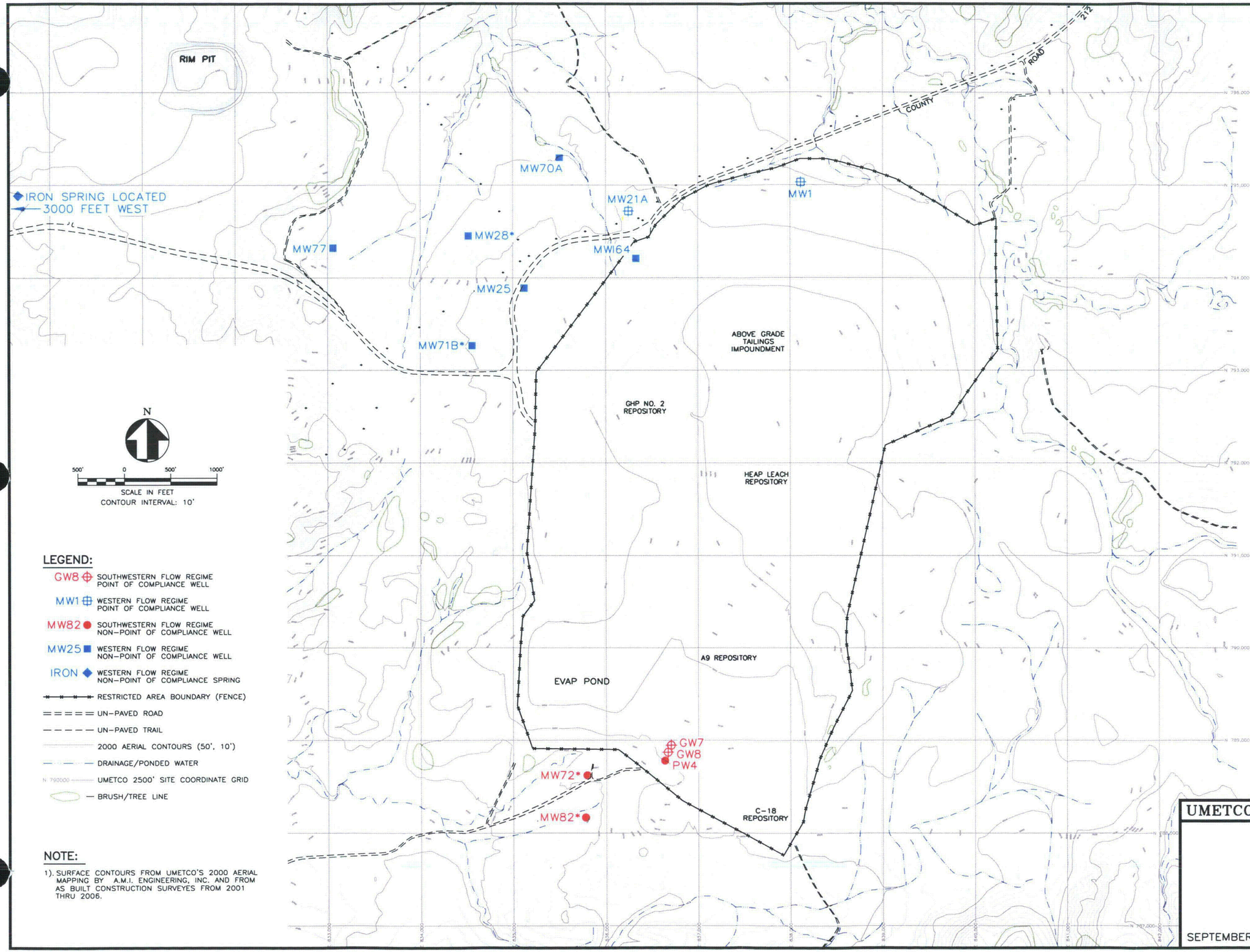
Umetco Minerals Corporation. March 2002. *Application for Alternate Concentration Limits for Gas Hills, Wyoming, Appendix M - Groundwater Monitoring Plan.*

Umetco Minerals Corporation. October 2002. *Application for Alternate Concentration Limits for Gas Hills, Wyoming, Appendix M – Groundwater Monitoring Plan*; Revised Table M-1 and Table 5.

Umetco Minerals Corporation. January 2004. *Application for Alternate Concentration Limits for Gas Hills, Wyoming, Appendix M – Groundwater Monitoring Plan*; Revised Table 3.

Umetco Minerals Corporation. June 2005. *Application for Alternate Concentration Limits for Gas Hills, Wyoming, Appendix M – Groundwater Monitoring Plan*; Revised Table M-1.

U.S. Nuclear Regulatory Commission. August 11, 2009. License Condition Changes for License SUA-648-Amendment No. 62.



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
- 2000 AERIAL CONTOURS (50', 10')
- DRAINAGE/PONDED WATER
- N 790000 — UMETCO 2500' SITE COORDINATE GRID
- BRUSH/TREE LINE

NOTE:

1). SURFACE CONTOURS FROM UMETCO'S 2000 AERIAL MAPPING BY A.M.I. ENGINEERING, INC. AND FROM AS BUILT CONSTRUCTION SURVEYES 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:
PW4
MW72*
MW82*

* – MODEL VALIDATION WELLS

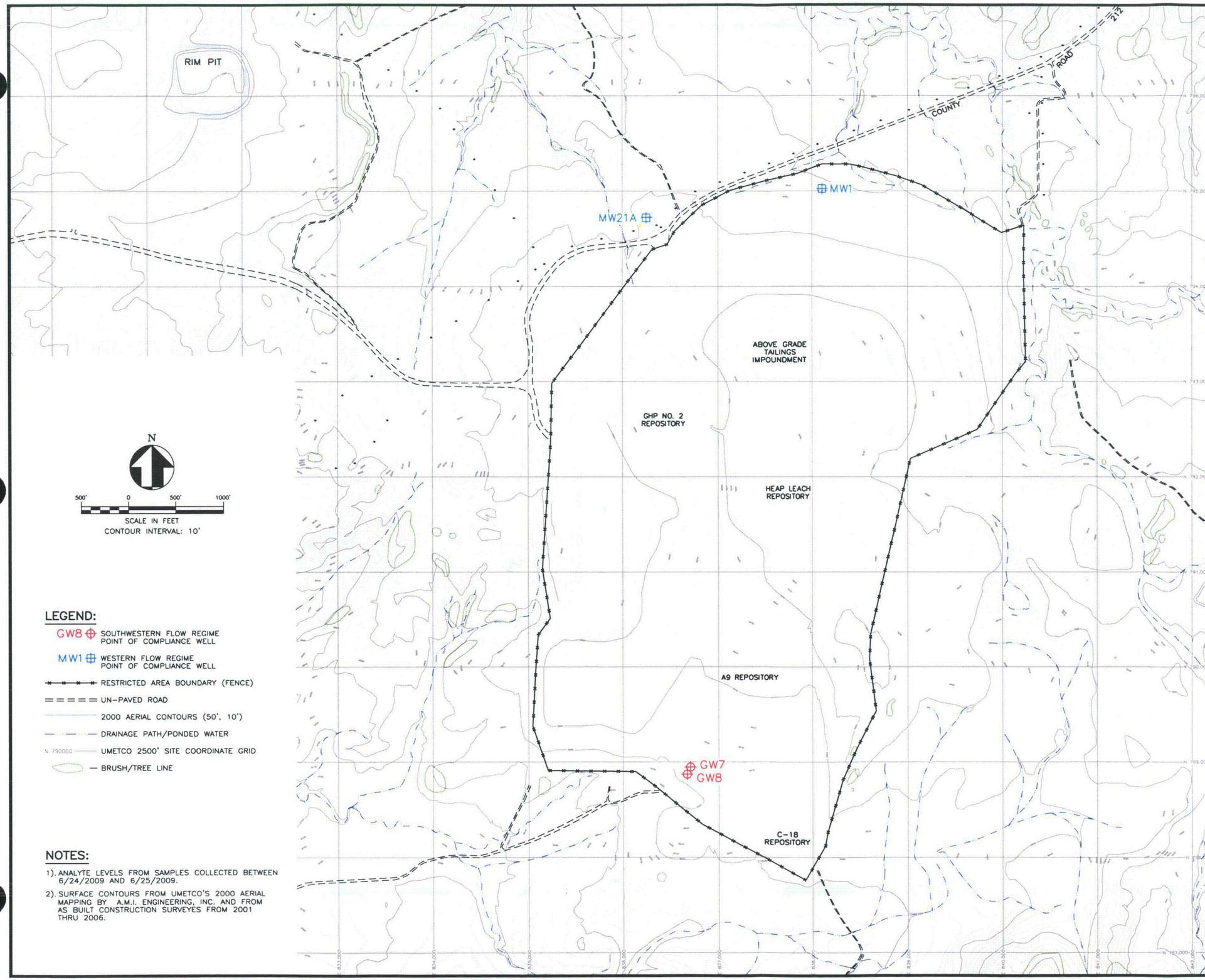
UMETCO MINERALS CORPORATION

GROUNDWATER MONITOR WELLS

GAS HILLS, WYOMING

SEPTEMBER 2009 FIGURE 1

FIG1-09-09.DWG



WESTERN FLOW REGIME ANALYTE DATA

WELL ID	ANALYTE	LEVEL/UNIT	DATE
MW1	ARSENIC	0.0028 mg/L	6/24/2009
MW1	BERYLIUM	0.0012 mg/L	6/24/2009
MW1	LEAD 210	0.93 pCi/L	6/24/2009
MW1	NAT. URANIUM	6.56 mg/L	6/24/2009
MW1	NICKEL	0.42 mg/L	6/24/2009
MW1	RADIUM 226	1.4 pCi/L	6/24/2009
MW1	RADIUM 228	0.82 pCi/L	6/24/2009
MW1	SELENIUM	0.0544 mg/L	6/24/2009
MW1	THORIUM 230	0 pCi/L	6/24/2009
MW21A	ARSENIC	0.0548 mg/L	6/24/2009
MW21A	BERYLIUM	0.0216 mg/L	6/24/2009
MW21A	LEAD 210	1.4 pCi/L	6/24/2009
MW21A	NAT. URANIUM	0.0039 mg/L	6/24/2009
MW21A	NICKEL	0.57 mg/L	6/24/2009
MW21A	RADIUM 226	17 pCi/L	6/24/2009
MW21A	RADIUM 228	13 pCi/L	6/24/2009
MW21A	SELENIUM	0.0001 mg/L	6/24/2009
MW21A	THORIUM 230	−0.03 pCi/L	6/24/2009

SOUTHWESTERN FLOW REGIME ANALYTE DATA

WELL ID	ANALYTE	LEVEL/UNIT	DATE
GW7	ARSENIC	0.0031 mg/L	6/25/2009
GW7	BERYLIUM	0.0243 mg/L	6/25/2009
GW7	LEAD 210	34 pCi/L	6/25/2009
GW7	NAT. URANIUM	11.9 mg/L	6/25/2009
GW7	NICKEL	0.92 mg/L	6/25/2009
GW7	RADIUM 226	200 pCi/L	6/25/2009
GW7	RADIUM 228	13 pCi/L	6/25/2009
GW7	SELENIUM	0.0005 mg/L	6/25/2009
GW7	THORIUM 230	0.12 pCi/L	6/25/2009
GW8	ARSENIC	0.0183 mg/L	6/25/2009
GW8	BERYLIUM	0.191 mg/L	6/25/2009
GW8	LEAD 210	25 pCi/L	6/25/2009
GW8	NAT. URANIUM	13.3 mg/L	6/25/2009
GW8	NICKEL	2.02 mg/L	6/25/2009
GW8	RADIUM 226	95 pCi/L	6/25/2009
GW8	RADIUM 228	5.8 pCi/L	6/25/2009
GW8	SELENIUM	0.0007 mg/L	6/25/2009
GW8	THORIUM 230	0.8 pCi/L	6/25/2009

LEGEND:

- GW8 — SOUTHWESTERN FLOW REGIME POINT OF COMPLIANCE WELL
- MW1 — WESTERN FLOW REGIME POINT OF COMPLIANCE WELL
- RESTRICTED AREA BOUNDARY (FENCE)
- UN-PAVED ROAD
- 2000 AERIAL CONTOURS (50', 10')
- DRAINAGE PATH/PONDED WATER
- UMETCO 2500' SITE COORDINATE GRID
- BRUSH/TREE LINE

NOTES:

1). ANALYTE LEVELS FROM SAMPLES COLLECTED BETWEEN 6/24/2009 AND 6/25/2009.

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

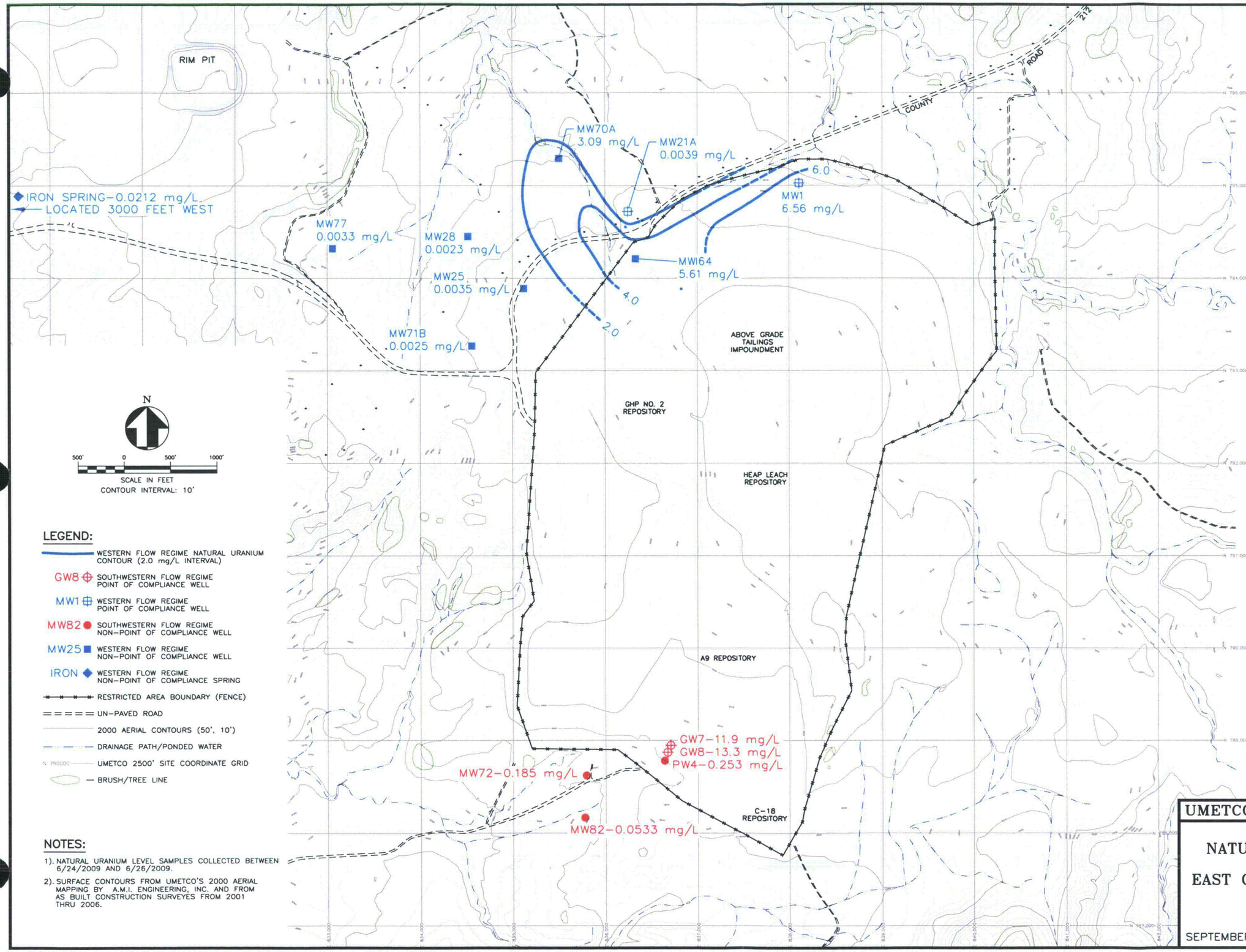
UMETCO MINERALS CORPORATION

ANALYTE DATA FOR POINT OF COMPLIANCE WELLS

GAS HILLS, WYOMING

SEPTEMBER 2009 FIGURE 2

GH-ACL-ANALYTE.DWG



WESTERN FLOW REGIME

POINT OF COMPLIANCE WELLS:
MW1 – 6.56 mg/L
MW21A – 0.0039 mg/L

NON–POINT OF COMPLIANCE WELLS:
MW164 – 5.61 mg/L
MW70A – 3.09 mg/L
MW25 – 0.0035 mg/L
MW77 – 0.0033 mg/L
MW28 – 0.0023 mg/L
MW71B – 0.0025 mg/L

NON–POINT OF COMPLIANCE SPRING:
IRON SPRING – 0.0212 mg/L

SOUTHWESTERN FLOW REGIME

POINT OF COMPLIANCE WELLS:
GW8 – 13.3 mg/L
GW7 – 11.9 mg/L

NON–POINT OF COMPLIANCE WELLS:
MW72 – 0.185 mg/L
PW4 – 0.253 mg/L
MW82 – 0.0533 mg/L

LEGEND:

- WESTERN FLOW REGIME NATURAL URANIUM CONTOUR (2.0 mg/L INTERVAL)
- 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
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- N 790000 — UMETCO 2500' SITE COORDINATE GRID
- BRUSH/TREE LINE

NOTES:

1). NATURAL URANIUM LEVEL SAMPLES COLLECTED BETWEEN 6/24/2009 AND 6/26/2009.

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

UMETCO MINERALS CORPORATION

NATURAL URANIUM DATA FOR
EAST GAS HILLS MONITOR WELLS

GAS HILLS, WYOMING

SEPTEMBER 2009 FIGURE 3

GH–ACL–NU.DWG

Figure 4 Arsenic Trends in the Western Flow Regime POC Wells

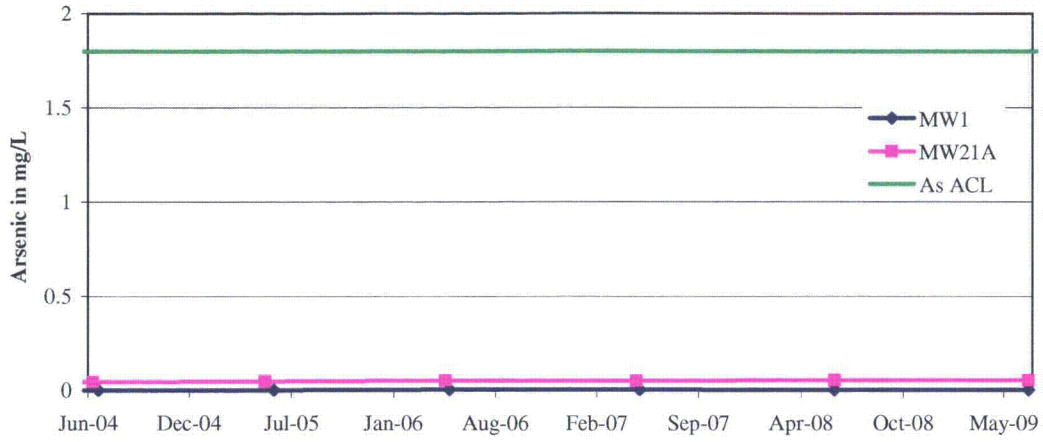


Figure 5 Beryllium Trends in the Western Flow Regime POC Wells

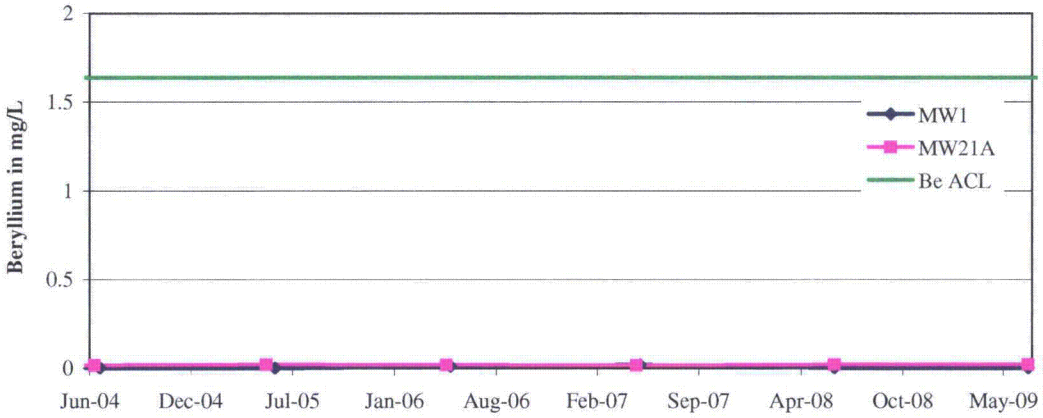


Figure 6 Lead-210 Trends in the Western Flow Regime POC Wells

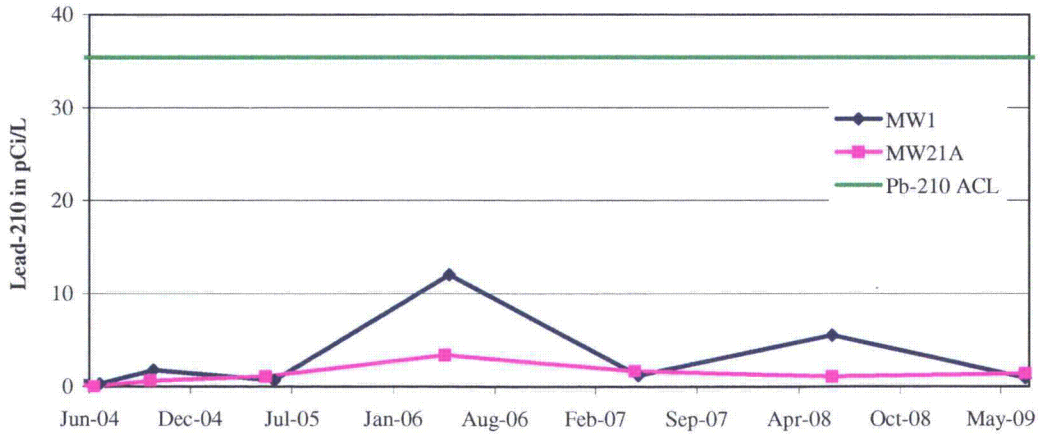


Figure 7 Nickel Trends in the Western Flow Regime POC Wells

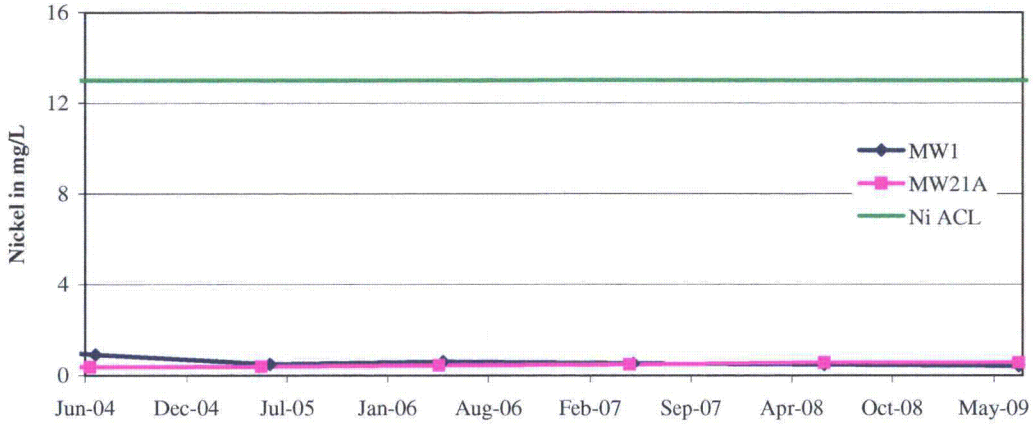


Figure 8 Combined Radium-226 & 228 Trends in the Western Flow Regime POC Wells

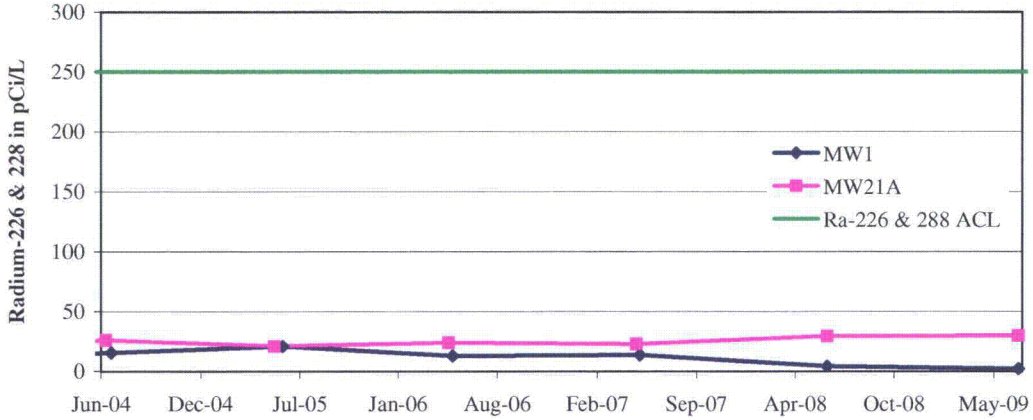


Figure 9 Selenium Trends in the Western Flow Regime POC Wells

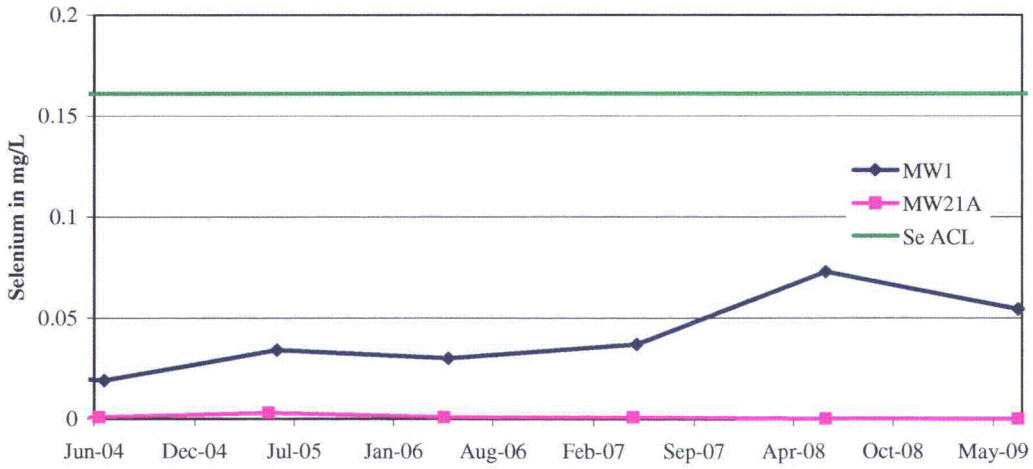


Figure 10 Thorium-230 Trends in the Western Flow Regime POC Wells

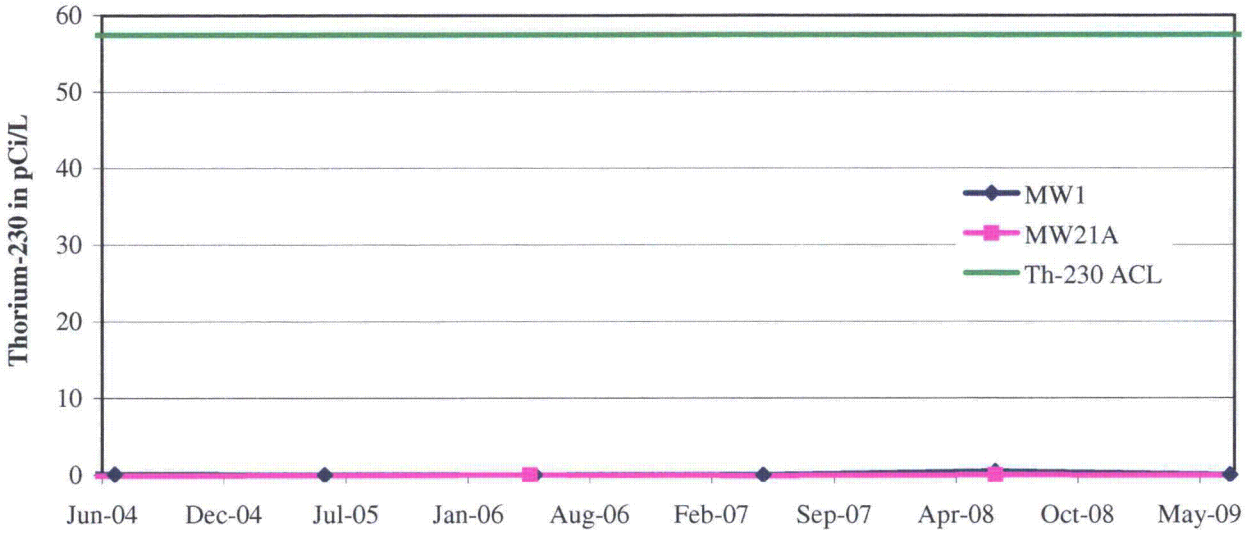


Figure 11 Natural Uranium Trends in the Western Flow Regime POC Wells

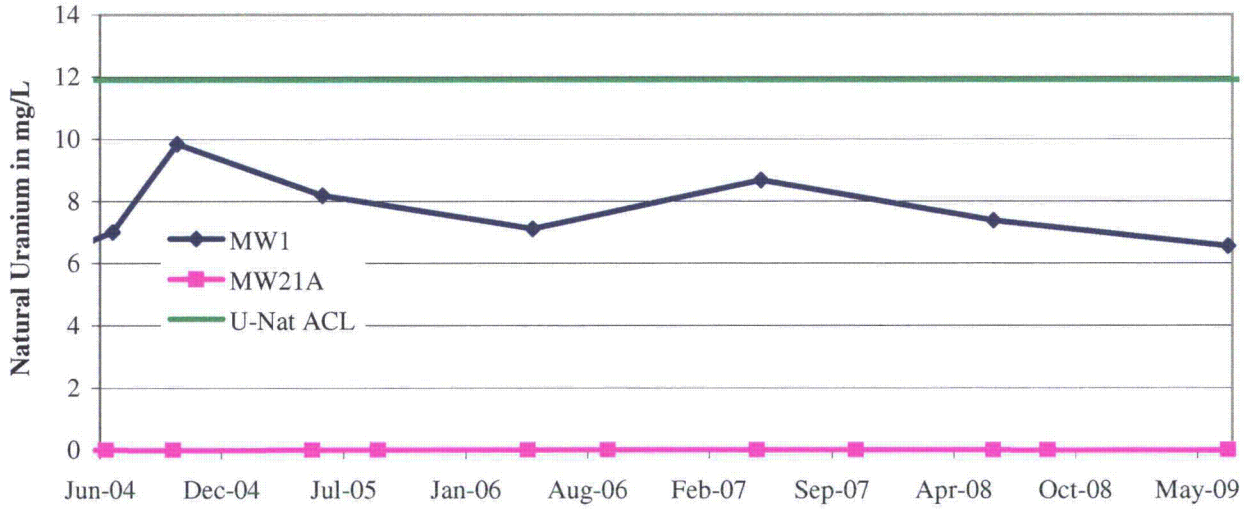


Figure 12 Arsenic Trends in the Southwestern Flow Regime POC Wells

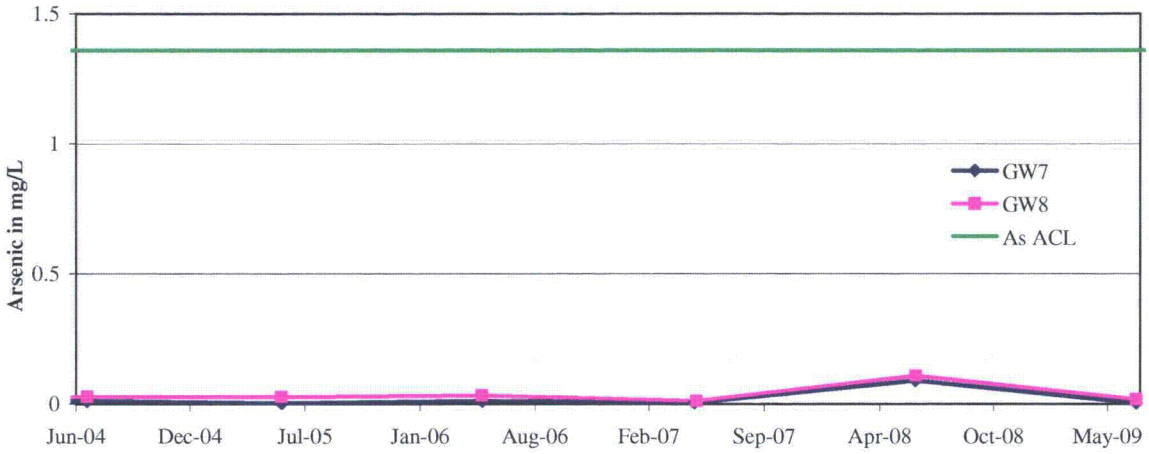


Figure 13 Beryllium Trends in the Southwestern Flow Regime POC Wells

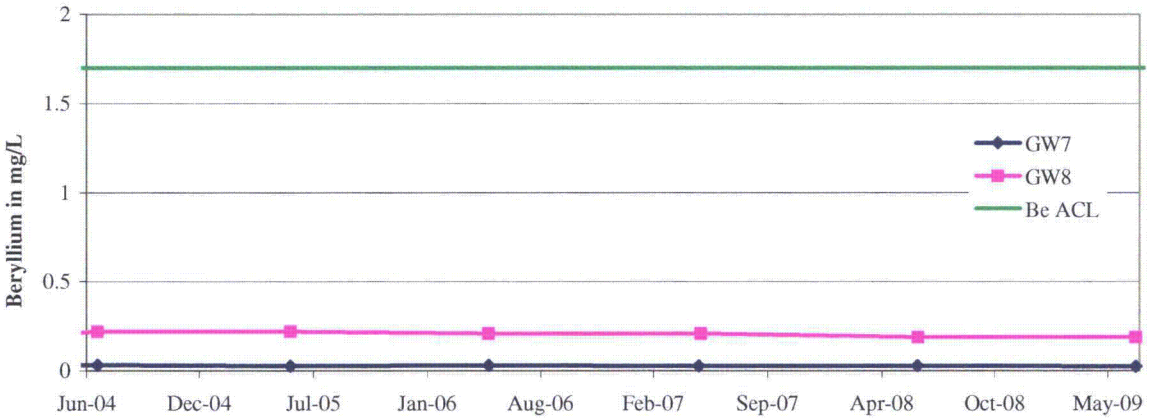


Figure 14 Lead-210 Trends in the Southwestern Flow Regime POC Wells

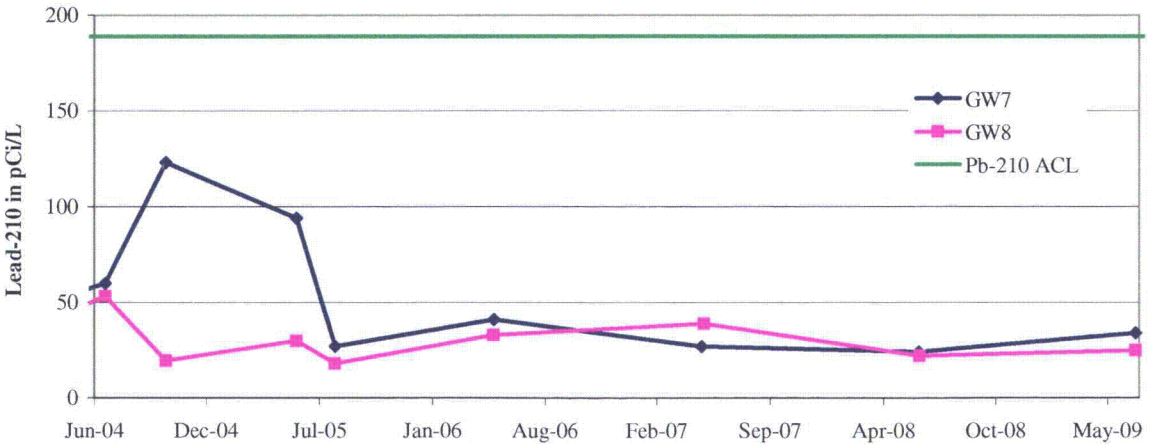


Figure 15 Nickel Trends in the Southwestern Flow Regime POC Wells

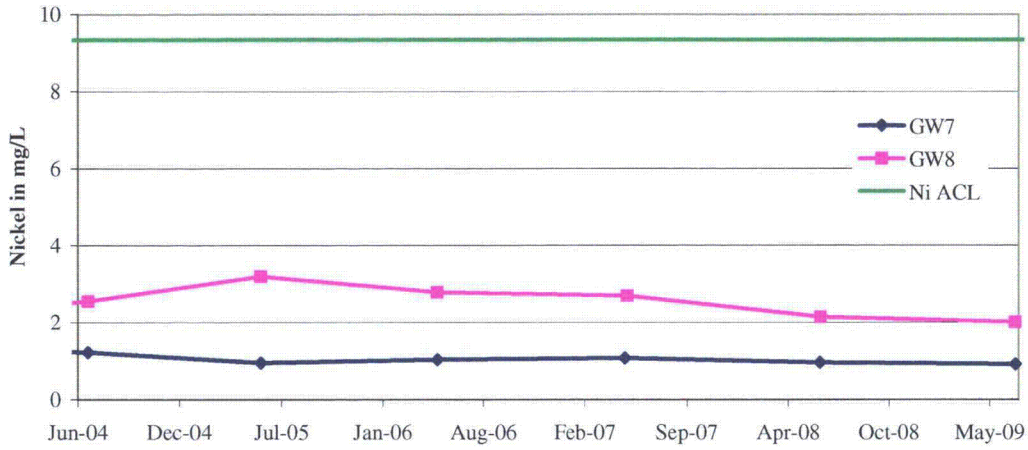


Figure 16 Combined Radium-226 & 228 Trends in the Southwestern Flow Regime POC Wells

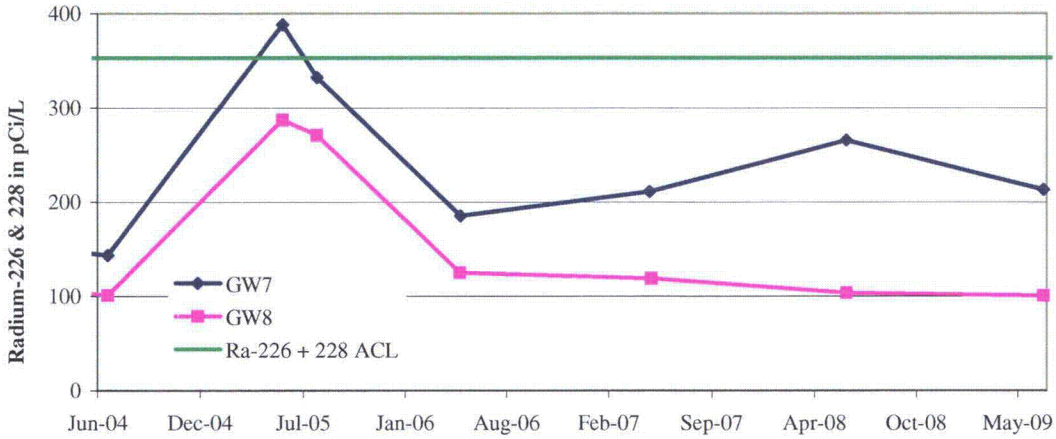


Figure 17 Selenium Trends in the Southwestern Flow Regime POC Wells

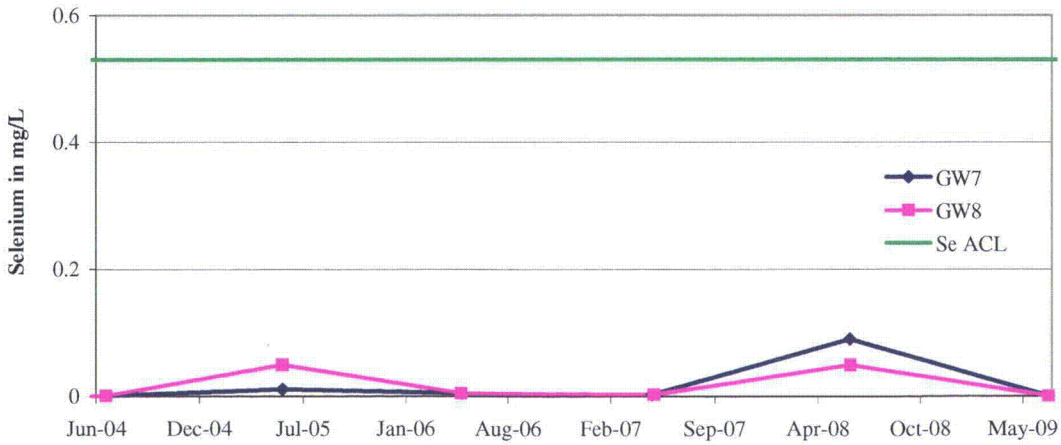


Figure 18 Thorium-230 Trends in the Southwestern Flow Regime POC Wells

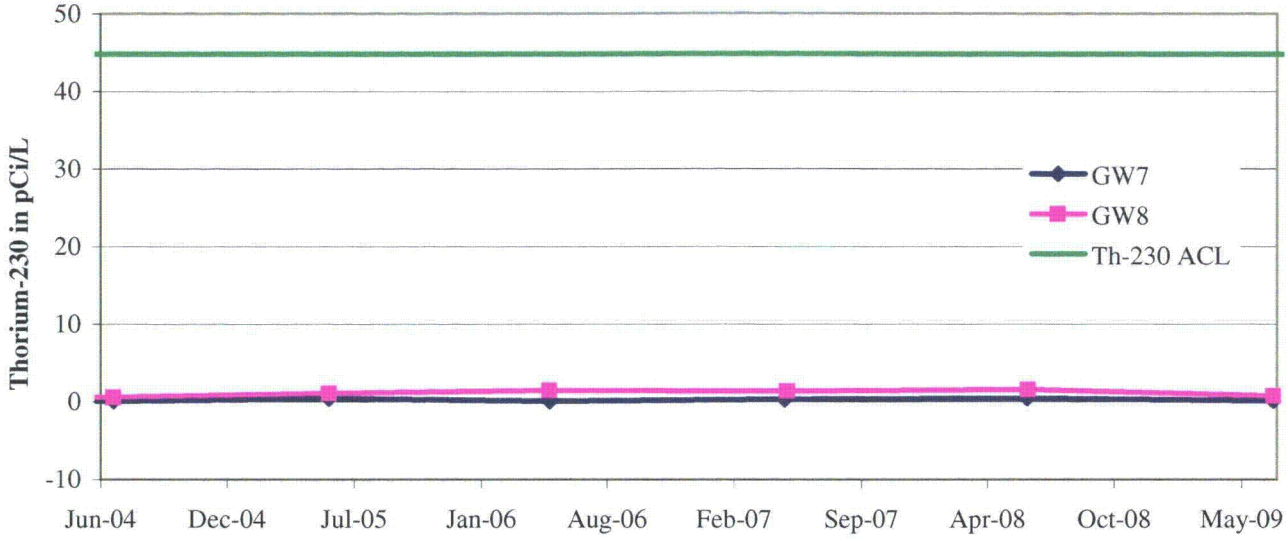
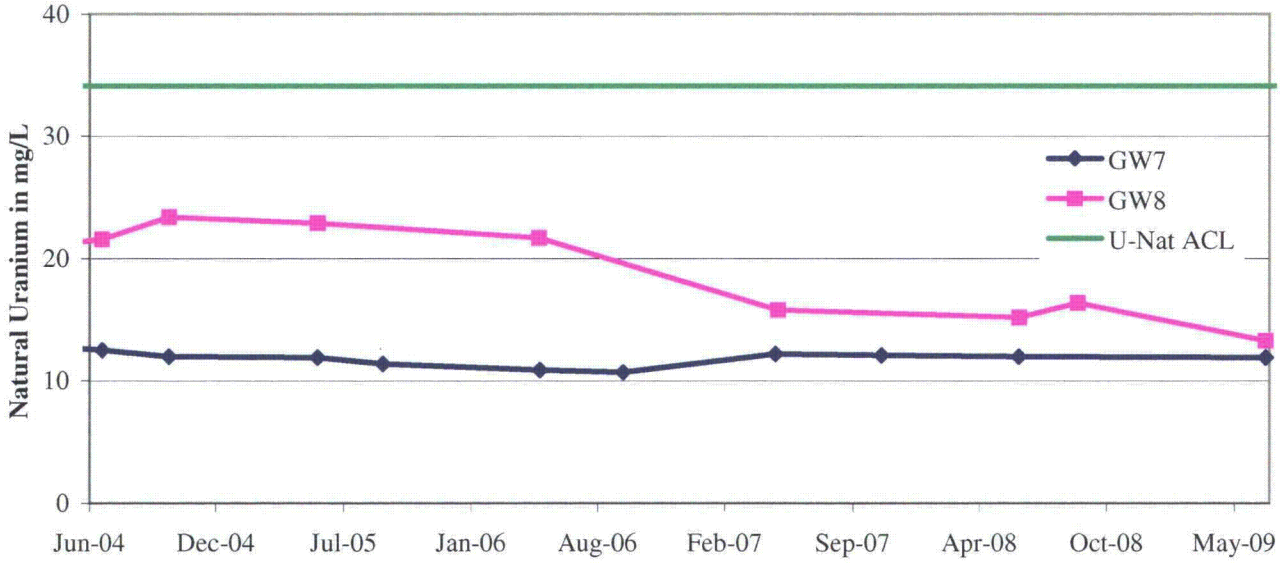
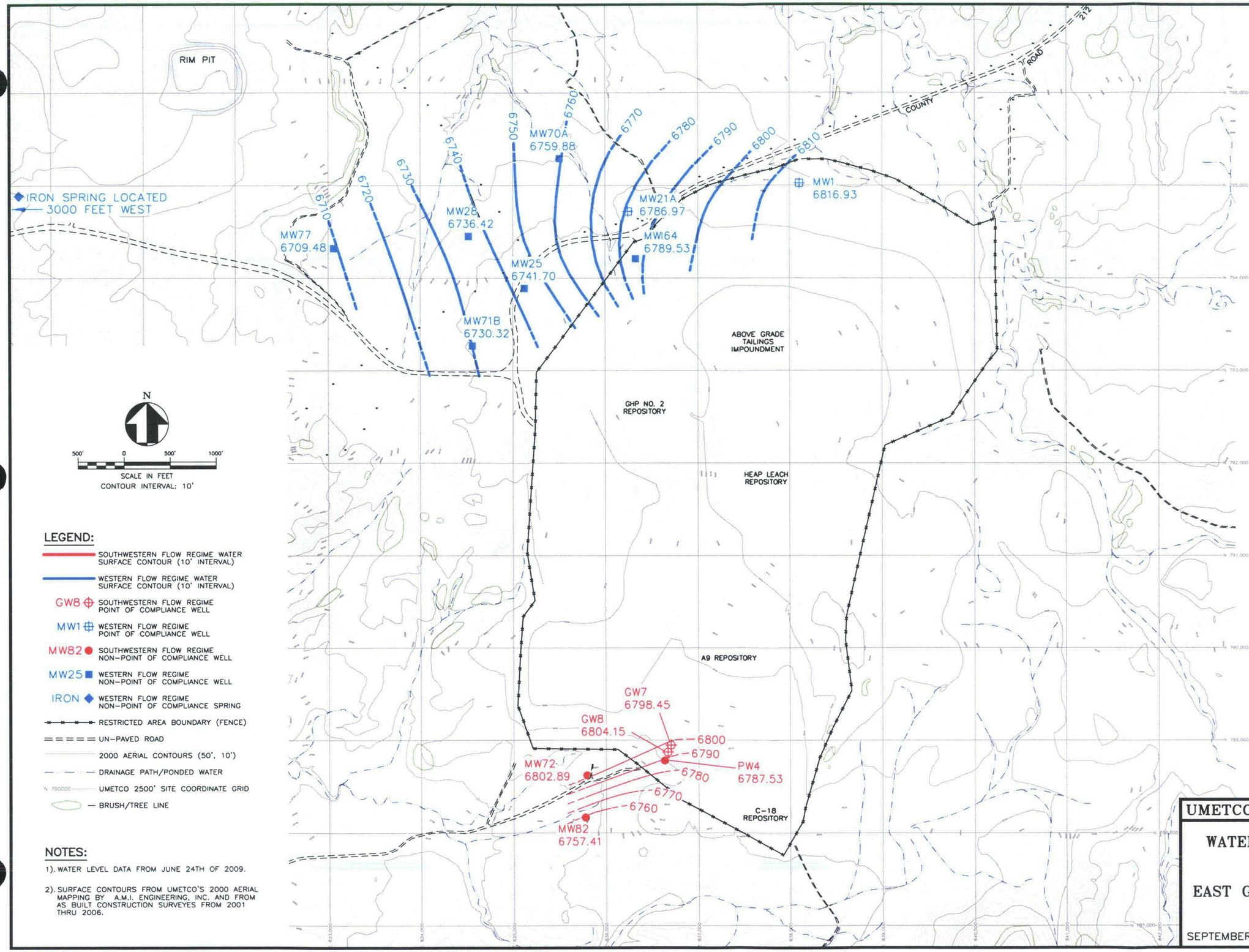


Figure 19 Natural Uranium Trends in the Southwestern Flow Regime POC Wells





WESTERN FLOW REGIME

POINT OF COMPLIANCE WELLS:
MW1 – 6816.93
MW21A – 6786.97

NON-POINT OF COMPLIANCE WELLS:
MW164 – 6789.53
MW70A – 6759.88
MW25 – 6741.70
MW28 – 6736.42
MW71B – 6730.32
MW77 – 6709.48

NON-POINT OF COMPLIANCE SPRING:
IRON SPRING – SURFACE

SOUTHWESTERN FLOW REGIME

POINT OF COMPLIANCE WELLS:
GW7 – 6798.45
GW8 – 6804.15

NON-POINT OF COMPLIANCE WELLS:
MW72 – 6802.89
PW4 – 6787.53
MW82 – 6757.41

LEGEND:

- SOUTHWESTERN FLOW REGIME WATER SURFACE CONTOUR (10' INTERVAL)
- WESTERN FLOW REGIME WATER SURFACE CONTOUR (10' INTERVAL)
- 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
- 2000 AERIAL CONTOURS (50', 10')
- DRAINAGE PATH/PONDED WATER
- N 790000 — UMETCO 2500' SITE COORDINATE GRID
- BRUSH/TREE LINE

NOTES:

1). WATER LEVEL DATA FROM JUNE 24TH OF 2009.

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

UMETCO MINERALS CORPORATION

WATER LEVEL ELEVATION MAP
JUNE 2009
EAST GAS HILLS MONITOR WELLS
GAS HILLS, WYOMING

SEPTEMBER 2009 FIGURE 20

GH-ACL-W.DWG

Figure 21 Phreatic Elevations in the Western Flow Regime POC Wells

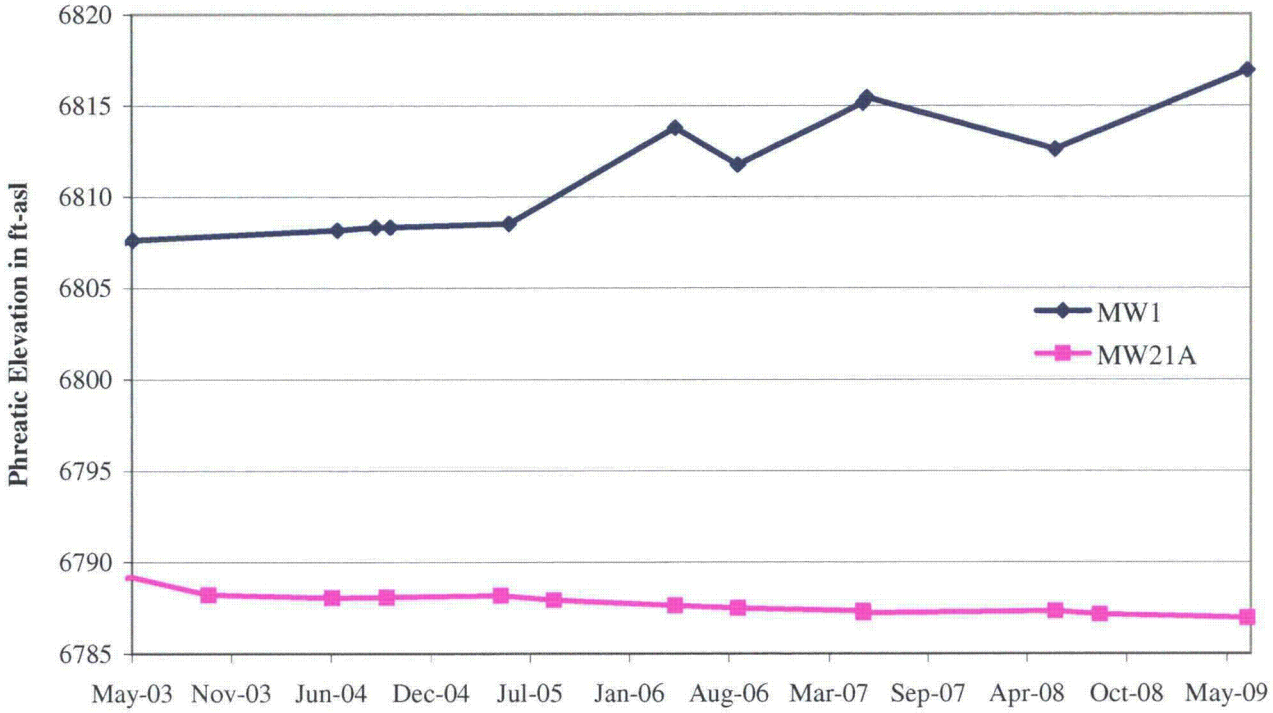


Figure 22 Phreatic Elevations in the Western Flow Regime Monitoring Wells

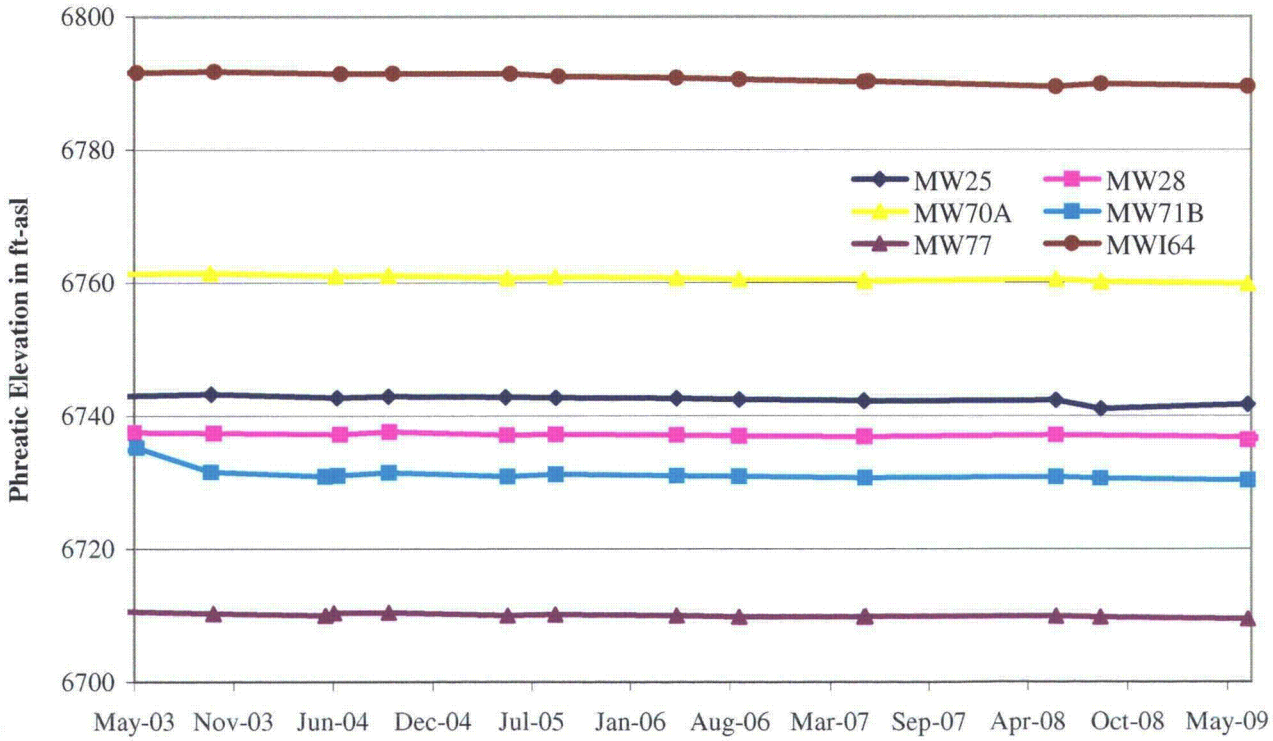


Figure 23 Phreatic Elevations in the Southwestern Flow Regime POC Wells

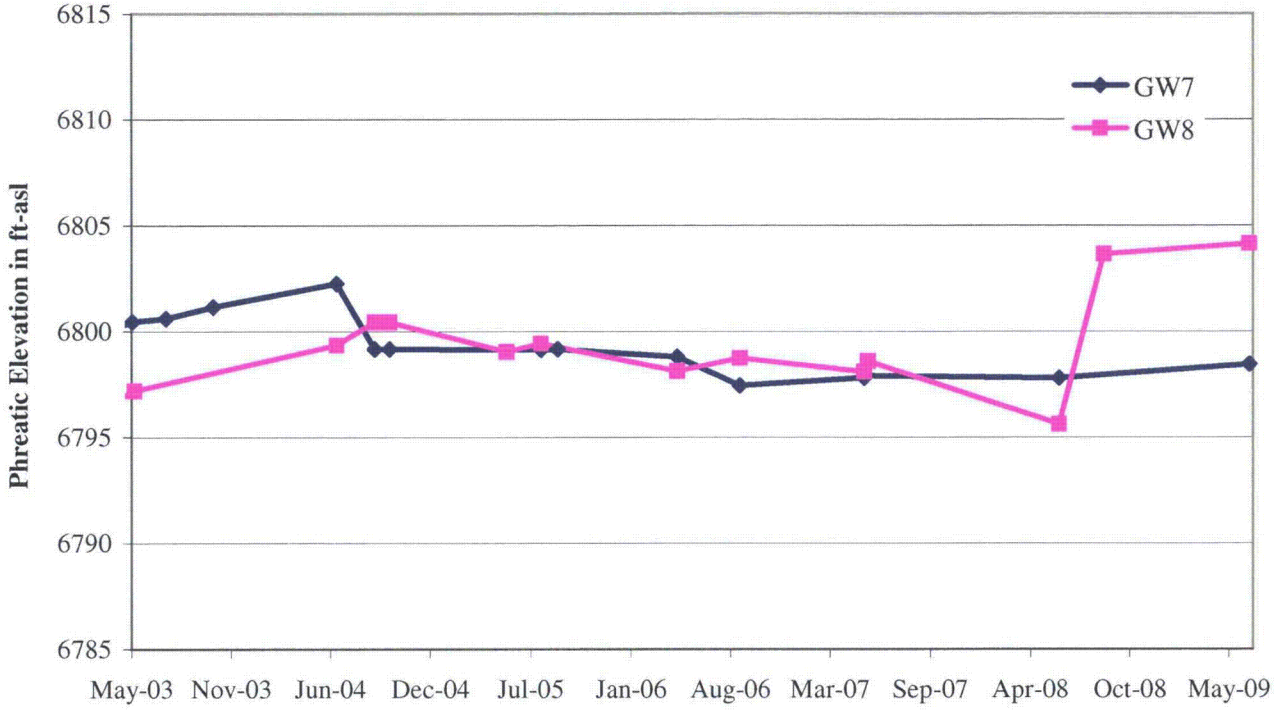
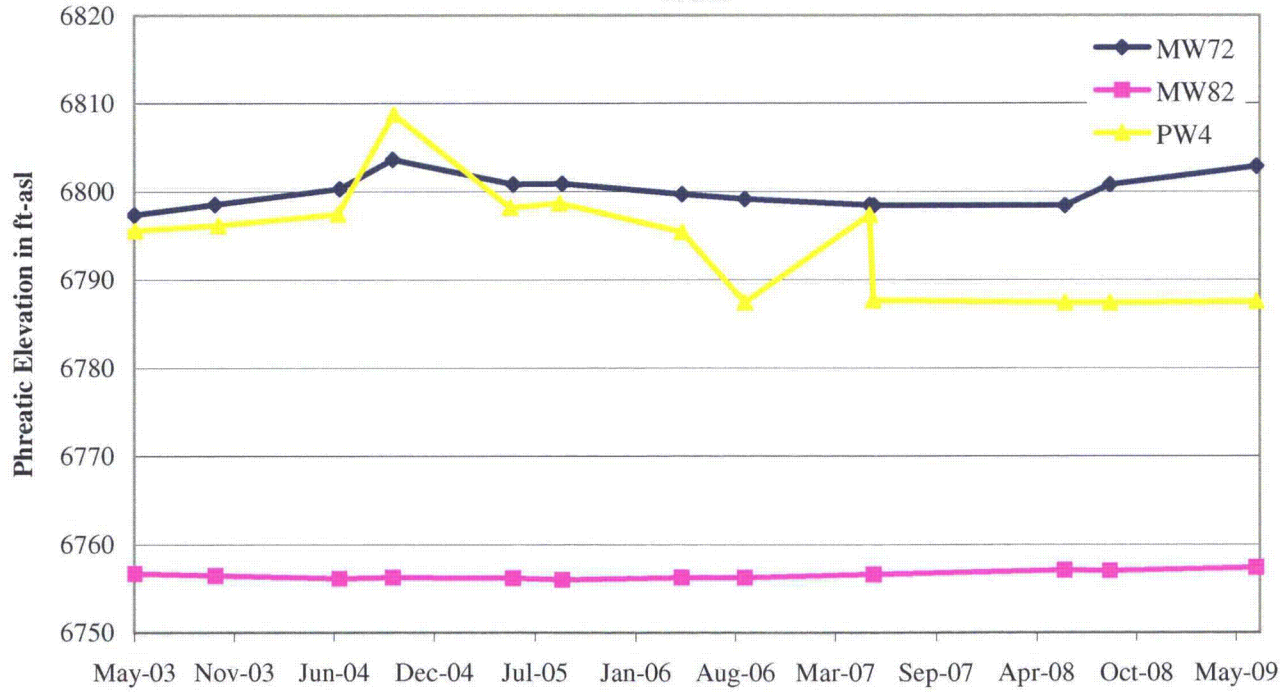
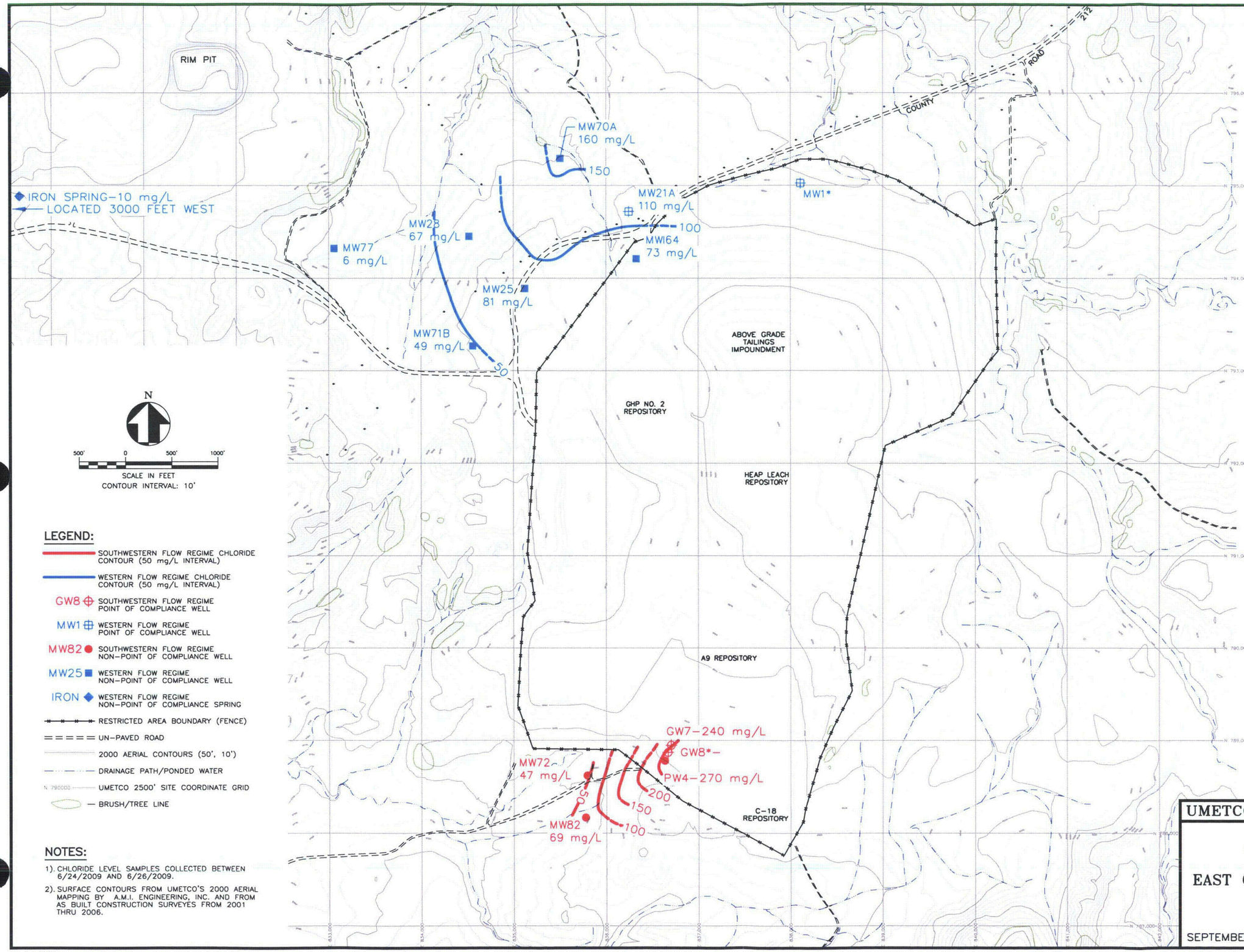


Figure 24 Phreatic Elevations in the Southwestern Flow Regime Monitoring Wells





WESTERN FLOW REGIME

POINT OF COMPLIANCE WELLS:
MW21A – 110 mg/L
MW1* –

NON–POINT OF COMPLIANCE WELLS:
MW70A – 160 mg/L
MW164 – 73 mg/L
MW25 – 81 mg/L
MW28 – 67 mg/L
MW71B – 49 mg/L
MW77 – 6 mg/L

NON–POINT OF COMPLIANCE SPRING:
IRON SPRING – 10 mg/L

SOUTHWESTERN FLOW REGIME

POINT OF COMPLIANCE WELLS:
GW8* –
GW7 – 240 mg/L

NON–POINT OF COMPLIANCE WELLS:
PW4 – 270 mg/L
MW72 – 47 mg/L
MW82 – 69 mg/L

* AS PER ACL APPLICATION, ANALYSIS FOR CHLORIDE IS NOT REQUIRED FOR POINT OF COMPLIANCE WELLS MW1 AND GW8.

LEGEND:

- SOUTHWESTERN FLOW REGIME CHLORIDE CONTOUR (50 mg/L INTERVAL)
- WESTERN FLOW REGIME CHLORIDE CONTOUR (50 mg/L INTERVAL)
- 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
- 2000 AERIAL CONTOURS (50', 10')
- DRAINAGE PATH/PONDED WATER
- UMETCO 2500' SITE COORDINATE GRID
- BRUSH/TREE LINE

NOTES:

1). CHLORIDE LEVEL SAMPLES COLLECTED BETWEEN 6/24/2009 AND 6/26/2009.

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

UMETCO MINERALS CORPORATION

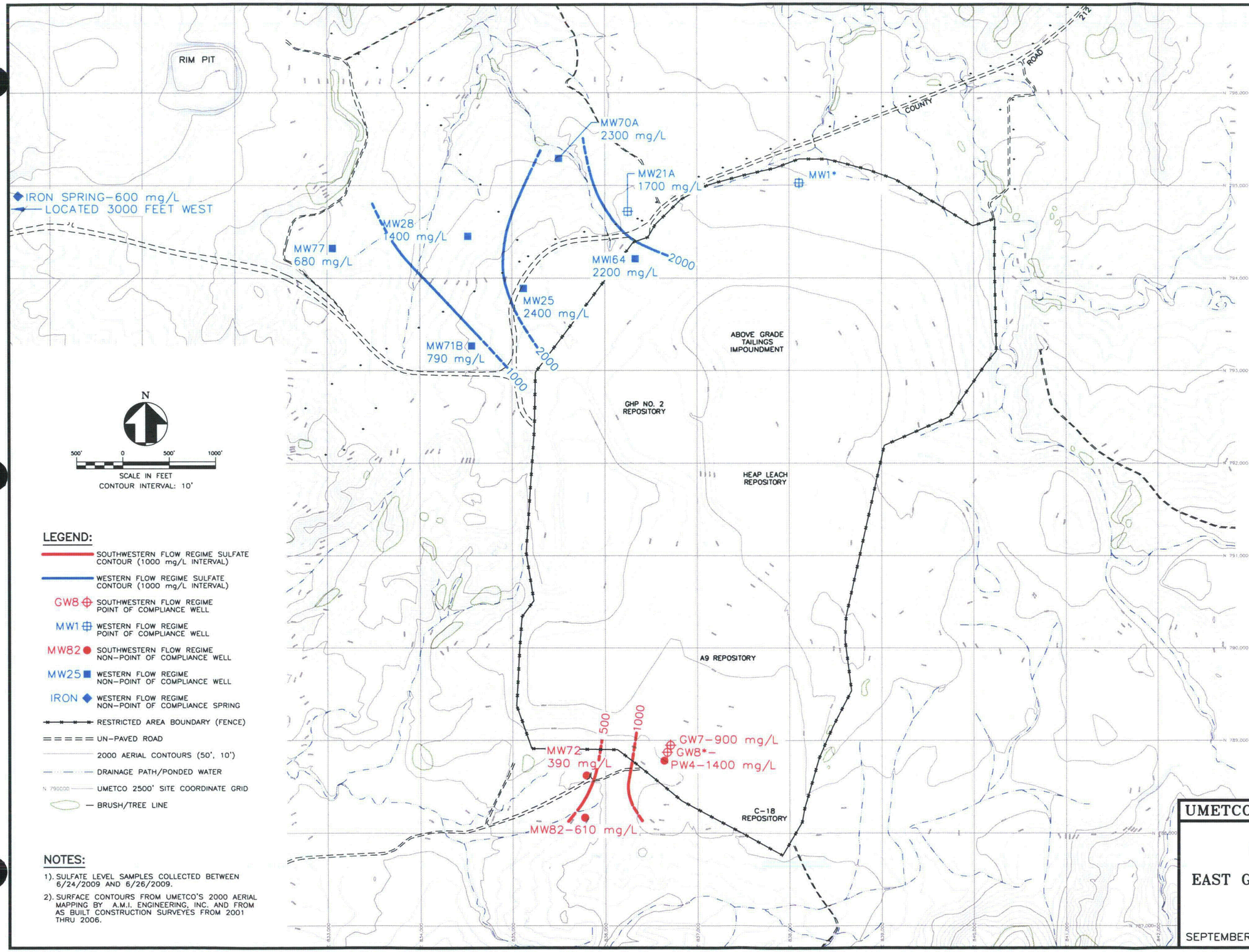
CHLORIDE DATA FOR

EAST GAS HILLS MONITOR WELLS

GAS HILLS, WYOMING

SEPTEMBER 2009 FIGURE 25

GH–ACL–C.DWG



WESTERN FLOW REGIME

POINT OF COMPLIANCE WELLS:
MW21A – 1700 mg/L
MW1* –

NON–POINT OF COMPLIANCE WELLS:
MW164 – 2200 mg/L
MW25 – 2400 mg/L
MW70A – 2300 mg/L
MW28 – 1400 mg/L
MW71B – 790 mg/L
MW77 – 680 mg/L

NON–POINT OF COMPLIANCE SPRING:
IRON SPRING – 600 mg/L

SOUTHWESTERN FLOW REGIME

POINT OF COMPLIANCE WELLS:
GW8* –
GW7 – 900 mg/L

NON–POINT OF COMPLIANCE WELLS:
PW4 – 1400 mg/L
MW82 – 610 mg/L
MW72 – 390 mg/L

* AS PER ACL APPLICATION, ANALYSIS FOR SULFATE IS NOT REQUIRED FOR POINT OF COMPLIANCE WELLS MW1 AND GW8.

LEGEND:

- SOUTHWESTERN FLOW REGIME SULFATE CONTOUR (1000 mg/L INTERVAL)
- WESTERN FLOW REGIME SULFATE CONTOUR (1000 mg/L INTERVAL)
- 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
- 2000 AERIAL CONTOURS (50', 10')
- DRAINAGE PATH/PONDED WATER
- N 790000 UMETCO 2500' SITE COORDINATE GRID
- BRUSH/TREE LINE

NOTES:

1). SULFATE LEVEL SAMPLES COLLECTED BETWEEN 6/24/2009 AND 6/26/2009.

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

UMETCO MINERALS CORPORATION

SULFATE DATA FOR

EAST GAS HILLS MONITOR WELLS

GAS HILLS, WYOMING

SEPTEMBER 2009 FIGURE 26

GH–ACL–SU.DWG

Figure 27 Chloride Trends in the Western Flow Regime POC Wells

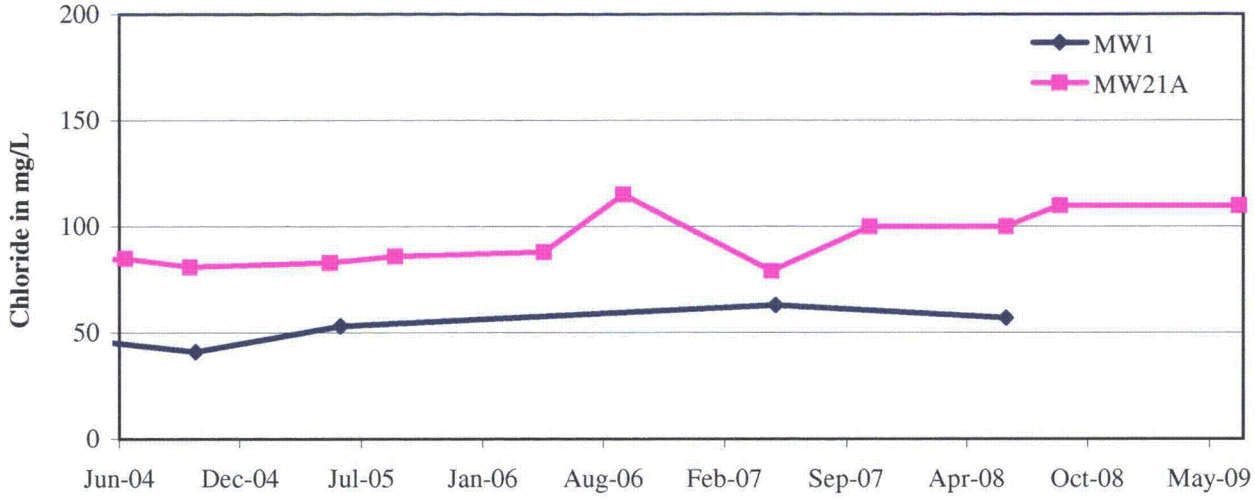


Figure 28 Sulfate Trends in the Western Flow Regime POC Wells

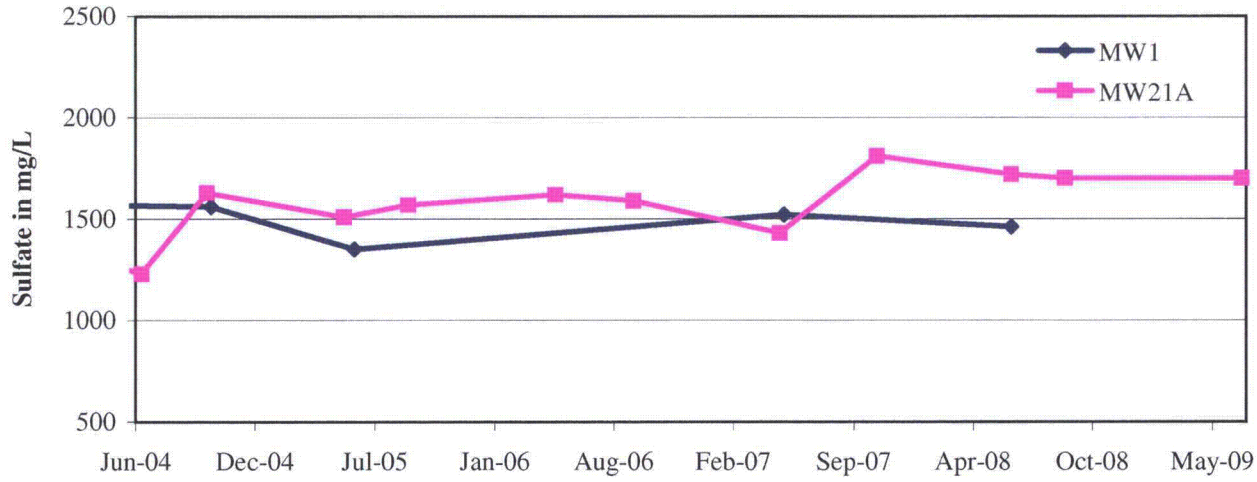


Figure 29 Chloride Trends in the Southwestern Flow Regime POC Wells

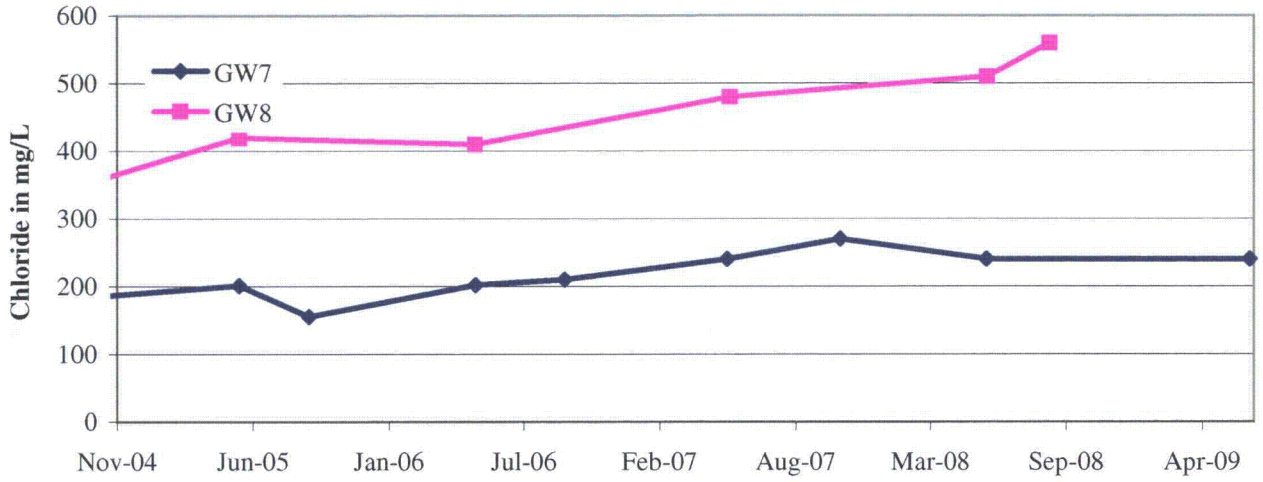


Figure 30 Sulfate Trends in the Southwestern Flow Regime POC Wells

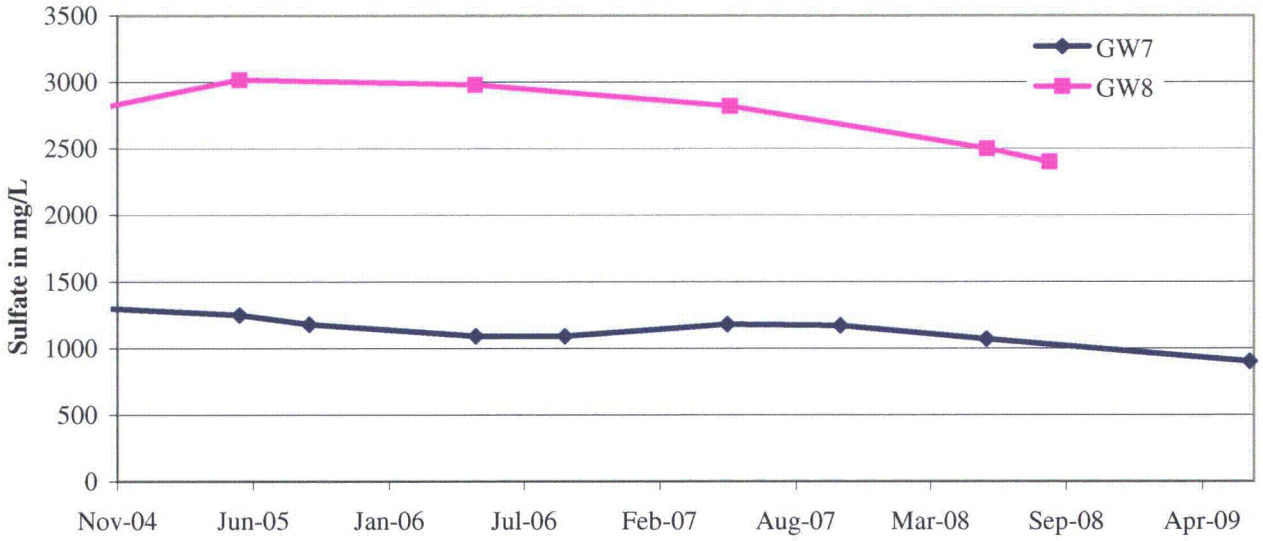


Figure 31 Chloride Trends in the Western Flow Regime Monitoring Wells

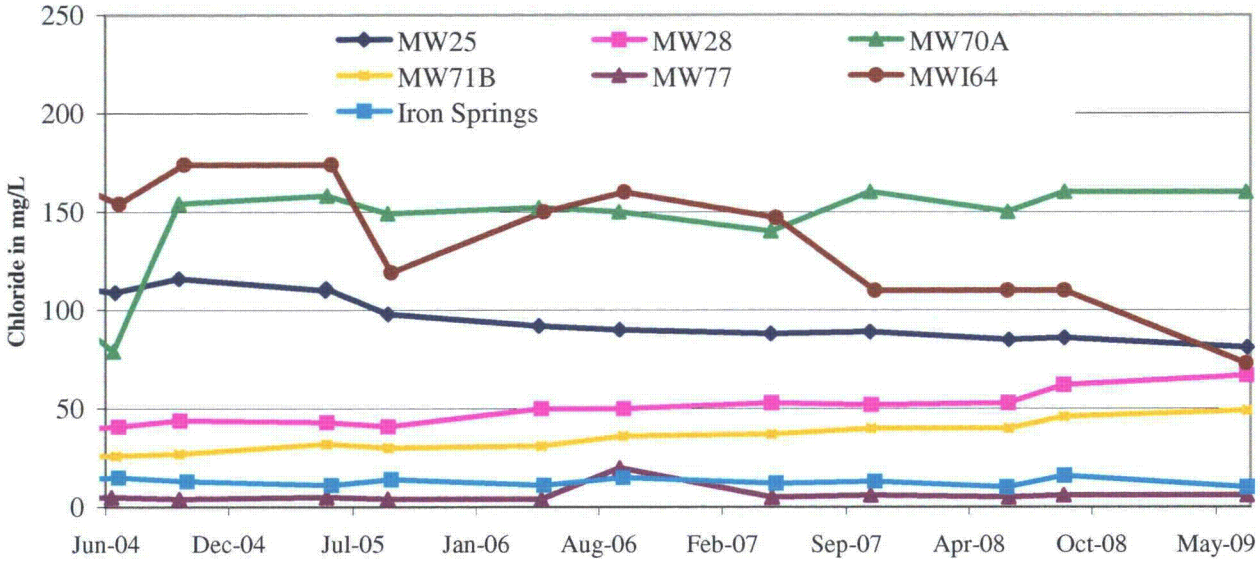


Figure 32 Sulfate Trends in the Western Flow Regime Monitoring Wells

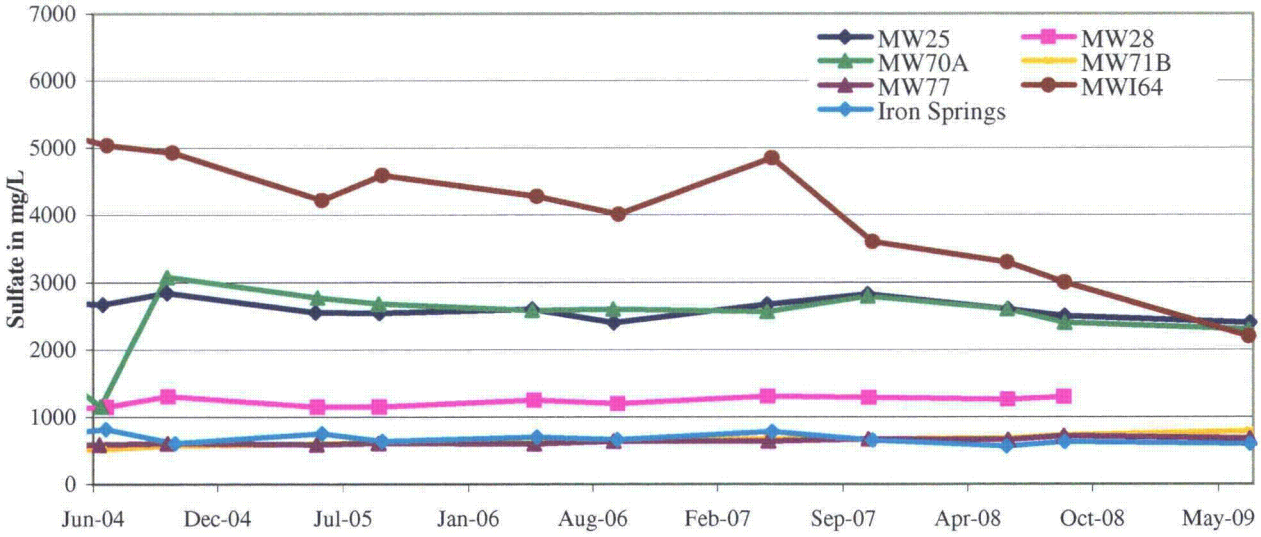


Figure 33 Natural Uranium Trends in the Western Flow Regime Monitoring Wells

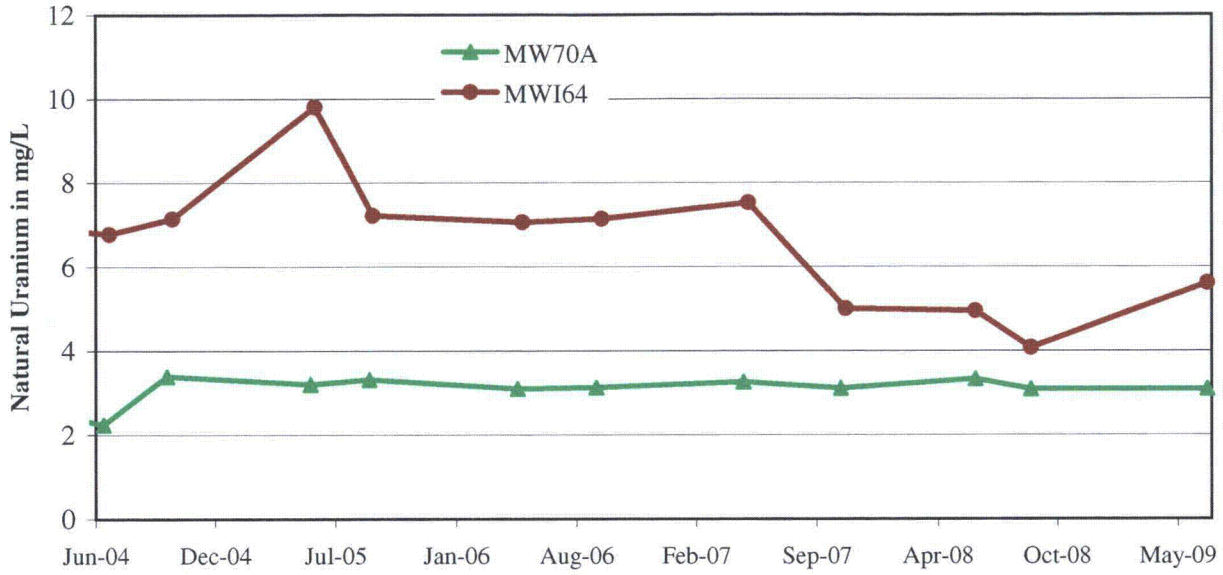


Figure 34 Natural Uranium Trends in the Western Flow Regime Monitoring Wells

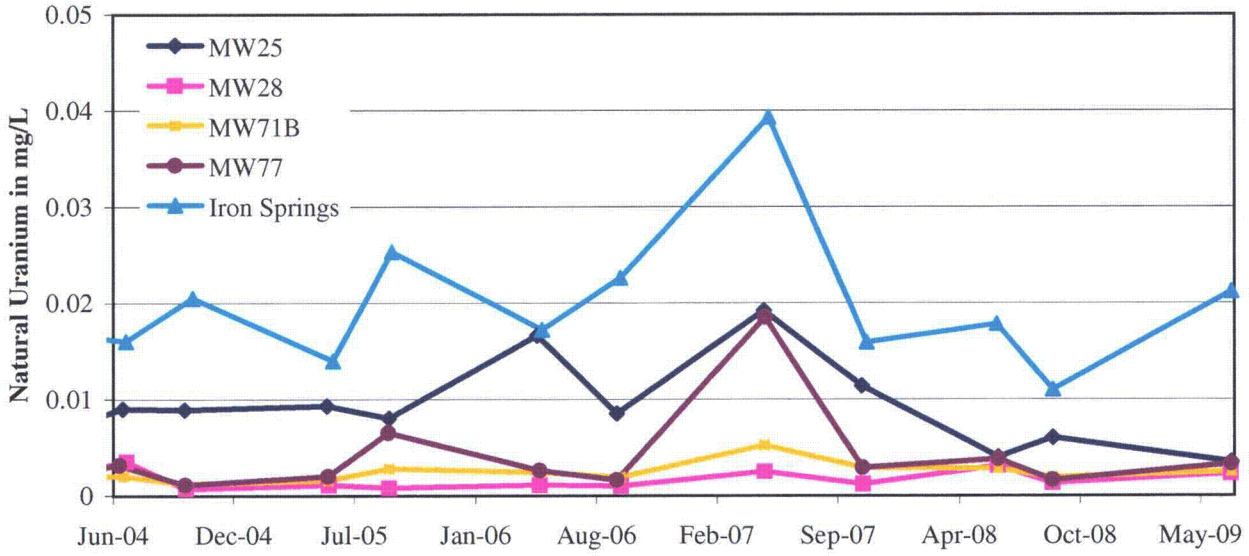


Figure 35 Chloride Trends in the Southwestern Flow Regime Monitoring Wells

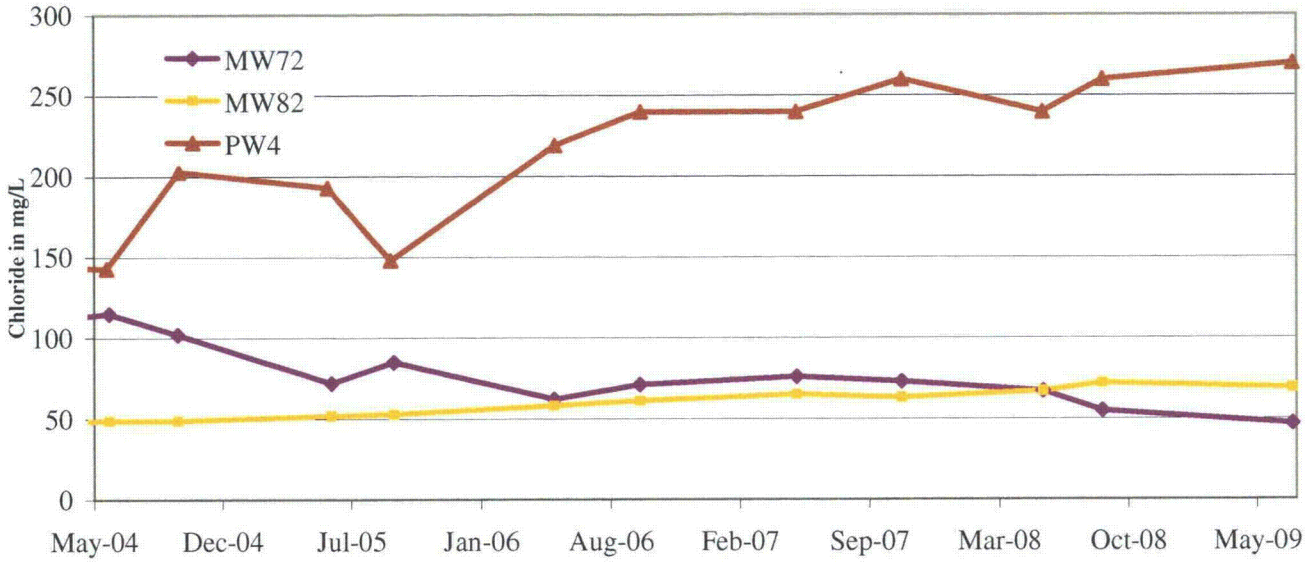


Figure 36 Sulfate Trends in the Southwestern Flow Regime Monitoring Wells

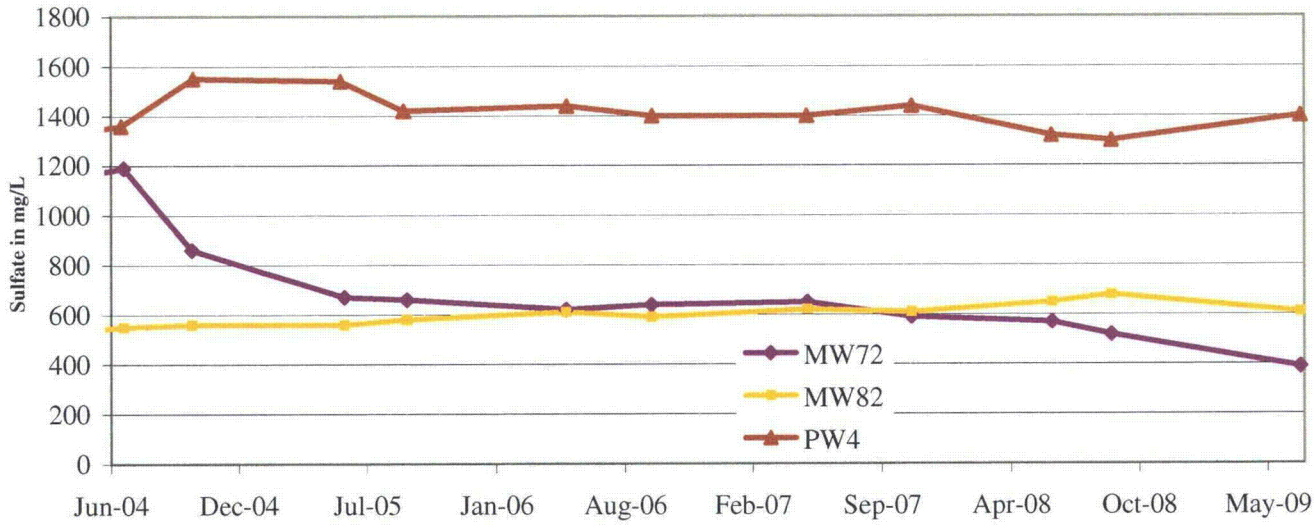
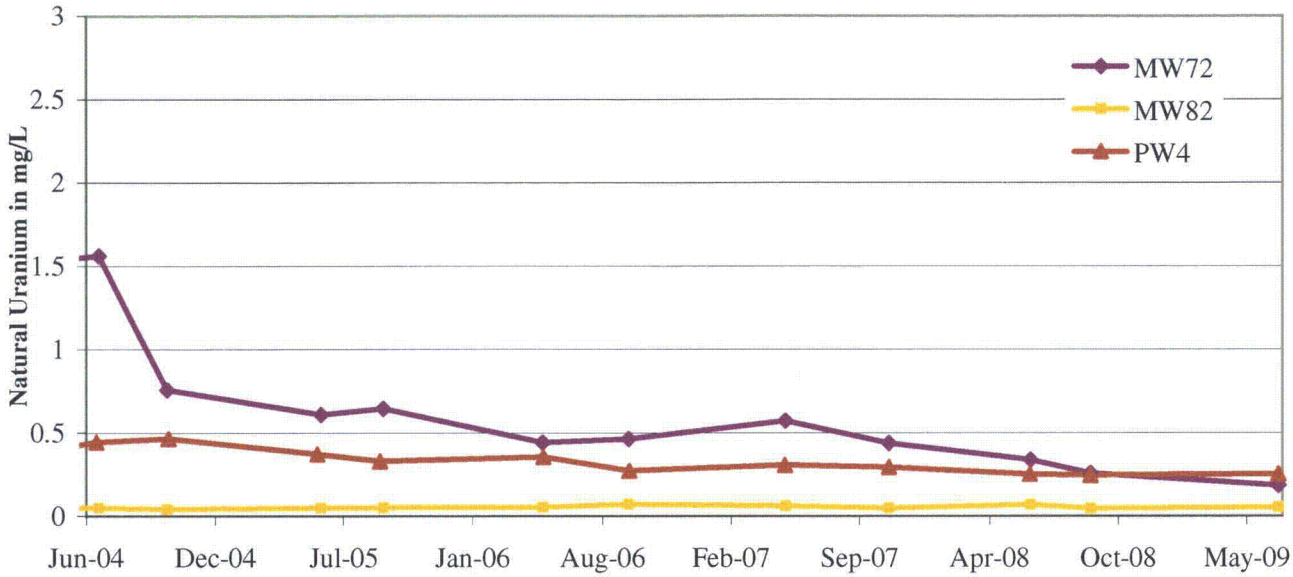


Figure 37 Natural Uranium Trends in the Southwestern Flow Regime Monitoring Wells



Appendix A
Water Rights Within Five-Mile Radius of East Gas Hills Site

Permit Number (Appropriation)	Facility Name	Permit Applicant	Tns		Rng		Section	Qtrqtr	Lots	Additional Description	Acres	Head Gate-Outlet-Well	Status	Supply type	Uses	Priority	Amount	Unit	Source	Permit Well Depth	Permit Static Well Depth
21/2/264W			33	N	89	W	15	NWNW		X		X	UNA	ORI							
21/3/264W			33	N	89	W	10	SWSW		X		X	UNA	ORI							
22/6/316W			33	N	89	W	15	NESW				X	UNA	ORI							
25/1/58W			33	N	89	W	32	NENW				X	UNA	ORI							
25/10/102W			33	N	89	W	14	NESW				X	UNA	ORI							
25/10/299W			33	N	89	W	22	NESW				X	UNA	ORI							
25/11/207W			33	N	89	W	10	SWSW				X	UNA	ORI							
25/11/299W			33	N	89	W	22	NESW				X	UNA	ORI							
25/12/57W			33	N	89	W	32	NENW				X	UNA	ORI							
25/2/58W			33	N	89	W	32	NENW				X	UNA	ORI							
25/3/58W			33	N	89	W	32	NENW				X	UNA	ORI							
25/4/58W			33	N	89	W	32	NENW				X	UNA	ORI							
25/5/58W			33	N	89	W	32	NENW				X	UNA	ORI							
25/6/58W			33	N	89	W	32	NENW				X	UNA	ORI							
25/7/207W			33	N	89	W	10	SWSW				X	UNA	ORI							
25/7/299W			33	N	89	W	22	NESW				X	UNA	ORI							
25/8/207W			33	N	89	W	10	SWSW				X	UNA	ORI							
25/8/299W			33	N	89	W	22	NESW				X	UNA	ORI							
25/9/102W			33	N	89	W	14	NESW				X	UNA	ORI							
25/9/207W			33	N	89	W	10	SWSW				X	UNA	ORI							
25/9/299W			33	N	89	W	22	NESW				X	UNA	ORI							
26/4/21W			33	N	89	W	15	SESW				X	UNA	ORI							
27/5/280R			33	N	90	W	36	SWSW				X	UNA	ORI							
28/6/373S	Reservoir #7	USDI BLM	33	N	89	W	14	NENW		P		X	REJ	ORI	STO	11/1/1982	1	ACFT			
40/5/489W	CAROL WELL #1	POWER RESOURCES, INC. d/b/a CAMECO RESOURCES	33	N	89	W	28	NESW			0	X	UNA	ORI	MIS	1/7/2008					
C33/360A	Holliday Ditch	John J. Holliday	33	N	88	W	7		L5	Proof P11692/1314D	28		PUD,ADJ	ORI	IRR	08/27/1896			Deer Creek		
C44/698A	C. B. C. Ditch	C. B. Cunningham	33	N	89	W	4	NWNW	L4	Proof P 18903/15179D	8		PUD,ADJ	ORI	IRR,STO,DOM	8/9/1918			Canyon Creek		
C77/017A	Cross Ell Ditch, Enlargement No. 3 of the	Clear Creek Cattle Company	33	N	89	W	1	SENE		Proof P34969/4483E	7.8		ADJ,DSC	ORI	IRR	3/18/1926			Deer Creek		
C77/025A	Cross Ell Ditch	Clear Creek Cattle Company	33	N	89	W	1	SESE		Proof P34977/9431D			ADJ,DSC	ORI	IRR	10/11/1909			Deer Creek		
C77/041A	Diamond Ring Ditch No. 5	Wyoming State Board of Land Commissioners (Owners); Clear Creek Cattle Company (Lessee)	33	N	89	W	1	SENE		Proof P34998/17093D		X	PUD,ADJ	ORI	IRR	3/18/1926			Deer Creek		
CR15/077A	Buss I Reservoir		33	N	89	W	27	NWSW		Proof P37599/10039R	0				STO	3/31/1994	1026	ACFT	Buss Draw (A closed Basin) drainage of		
CR15/079A	Cap Pit Reservoir		33	N	89	W	27	SENW		Proof P37601/10041R	0				STO	3/31/1994	50.86	ACFT	CH. 4 Draw		
CR15/374A	Area 4 Reclamation Reservoir	Pathfinder Mines Corporation; State Lands and Investments	33	N	90	W	0		M610	Proof P38228/9722R MS610	0		ADJ	STR	STO,WIL	12/24/1991	6787.5	ACFT	Fraser Draw		
CR15/375A	2R Reclamation Reservoir	Pathfinder Mines Corporation	32	N	90	W	0		M654	Proof P38229/9442R MS610	0		ADJ	STR	STO,WIL	11/23/1988	987.45	ACFT	Dry Coyote Creek		
CU10/160A	Lucky Mc #11	Pathfinder Mines Corporation; State Board of Land Commissioners; USDI Bureau of Reclamation	32	N	90	W	0			Proof P3811/2395W X M.S. 610			ADJ	ORI	IND	12/6/1968					
CU10/187A	Lucky Mc #8	Pathfinder Mines Corporation; Wyoming State Board of Land Commissioners; USDI, Bureau of Land Management	32	N	90	W	0			Proof P3838/3W X M.S. 610			ADJ	ORI	IND	3/14/1958					

Appendix A
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Permit Number (Appropriation)	Facility Name	Permit Applicant	Tns		Rng		Section	Qtrqtr	Lots	Additional Description	Acres	Head Gate-Outlet-Well	Status	Supply type	Uses	Priority	Amount	Unit	Source	Permit Well Depth	Permit Static Well Depth
CU10/404A	Buss I Reservoir	1) Power Resources, Incorporated; 2) USDI, Bureau of Land Management	33	N	89	W	27	SWNW		Proof P4041/95290W	0		ADJ	RES	MIS	4/26/1994	-0.0001	GPM			
P10039R	Buss I Reservoir	Power Resources Inc.**USDI BLM	33	N	89	W	27	SWNW		P		X	UNA	ORI	STO	3/31/1994	1026	ACFT	Buss Draw (A closed Basin) drainage of		
P10040R	Buss III Reservoir	Power Resources Inc.**USDI BLM	33	N	89	W	27	NESW		P		X	UNA	ORI	STO	3/31/1994	14.9	ACFT	Buss Draw (A closed Basin) drainage of		
P10041R	Cap Pit Reservoir	Power Resources Inc.**USDI BLM	33	N	89	W	27	SWNE		P			UNA	ORI	STO	3/31/1994	50.86	ACFT	CH. 4 Draw		
P10075S	Rim Stock Reservoir	USDI, Bureau of Land Management Casper District	33	N	89	W	35	NESW		Proof P 0/10075S P		X	GST	ORI	STO	1/27/1987	6.78	ACFT	Middle Sage Hen Creek		
P10166D	Crane Ditch	J. J. Holliday	33	N	88	W	7	NWSE				X	PUD	ORI	IRR	9/26/1910	0.36	CFS	Deer Creek		
P102340W	Philps #1	Philp's Sheep Co.	33	N	89	W	4	NESE		S		X	ABA	ORI	STO	5/13/1996	25	GPM			
P103584W	BS 96 M-1	Power Resources Inc.	33	N	89	W	32	NENW				X	UNA	ORI	MON	8/29/1996	0	GPM		305	194.1
P103586W	WSL96M-1	Power Resources Inc.	33	N	89	W	28	NESE				X	UNA	ORI	MON	8/29/1996	0	GPM		365	175.25
P103587W	MU 96 M-2	Power Resources Inc.	33	N	89	W	31	NESW				X	UNA	ORI	MON	8/29/1996	0	GPM		475	256.7
P103588W	MU 96 M-1	Power Resources Inc.	33	N	89	W	31	NESW				X	UNA	ORI	MON	8/29/1996	0	GPM		465	244.5
P103591W	WSL96MP1	Power Resources Inc.	33	N	89	W	28	NWSE				X	UNA	ORI	MON	8/29/1996	0	GPM		275	148.25
P103982W	Lucky Mc #14	USDI, BLM**Barnhart Drilling Company, Inc.	33	N	90	W	24	SWNE				X	UNA	ORI	MIS	9/17/1996	400	GPM		1505	70
P103983W	Lucky Mc #12	USDI, BLM**Barnhart Drilling Company, Inc.	33	N	90	W	24	SWSW		X			UNA	ORI	MIS	9/17/1996	310	GPM		1451	64
P104183W	MW 75	Umetco Minerals Corporation	33	N	89	W	14	NESW				X	A&C	ORI	MON	10/15/1996	0	GPM		205	120.93
P104184W	MW 76	Umetco Minerals Corporation	33	N	89	W	8	NESE				X	A&C	ORI	MON	10/15/1996	0	GPM		142	95.55
P104185W	MW 77	Umetco Minerals Corporation	33	N	89	W	9	SWSE				X	UNA	ORI	MON	10/15/1996	0	GPM		279	231.01
P10444R	GHP No. 2 Evaporation Reservoir	Umetco Minerals Corporation	33	N	89	W	15	SENW		P			CAN	ORI	IND,TEM	11/21/1996	199.36	ACFT	Canyon Creek		
P104718W	C-18 Pit	Umetco Minerals Corporation	33	N	89	W	22	NENW				X	UNA	ORI	MIS,DEW,RES	11/21/1996	500	GPM		85	80
P104730W	ALJOB #2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	NESW		X			UNA	ORI	MIS	11/25/1996	45	GPM		537	270
P105492W	MW 70A	Umetco Minerals Corporation	33	N	89	W	10	SWSW				X	UNA	ORI	MON	4/11/1997	0	GPM		151	141
P105493W	MW 70B	Umetco Minerals Corporation	33	N	89	W	10	SWSW				X	A&C	ORI	MON	4/11/1997	0	GPM		265	138
P105494W	MW 71A	Umetco Minerals Corporation	33	N	89	W	16	NENE				X	A&C	ORI	MON	4/11/1997	0	GPM		237	224
P105495W	MW 71B	Umetco Minerals Corporation	33	N	89	W	16	NENE				X	UNA	ORI	MON	4/11/1997	0	GPM		329	223
P105496W	MW 72	Umetco Minerals Corporation	33	N	89	W	22	NWNW				X	UNA	ORI	MON	4/11/1997	0	GPM		85	56
P105497W	MW 73	Umetco Minerals Corporation	33	N	89	W	22	NENW				X	A&C	ORI	MON	4/11/1997	0	GPM		153	104
P105498W	MW 74	Umetco Minerals Corporation	33	N	89	W	22	NWNW				X	A&C	ORI	MON	4/11/1997	0	GPM		60	21
P106684W	PIX MO 97-1	Power Resources Inc.	33	N	89	W	22	NESW				X	UNA	ORI	MON	7/1/1997	0	GPM		185	90
P106685W	PIX MU 97-1	Power Resources Inc.	33	N	89	W	22	NESW				X	UNA	ORI	MON	7/1/1997	0	GPM		310	90
P106686W	PIX MU 97-1	Power Resources Inc.	33	N	89	W	22	NESW				X	UNA	ORI	MON	7/1/1997	0	GPM		245	90
P106687W	BUMP 97-1	Power Resources Inc.	33	N	89	W	34	NENW				X	UNA	ORI	MON	7/1/1997	0	GPM		620	352
P106688W	BUMO 97-1	Power Resources Inc.	33	N	89	W	34	NENW				X	UNA	ORI	MON	7/1/1997	0	GPM		370	314
P106689W	BUMU 97-1	Power Resources Inc.	33	N	89	W	34	NENW				X	UNA	ORI	MON	7/1/1997	0	GPM		720	354
P106690W	GW 10	Power Resources Inc.	33	N	89	W	21	SESE				X	UNA	ORI	MON	7/1/1997	0	GPM		312	200
P107839W	MUMP 97-1	Power Resources Inc.	33	N	89	W	31	NESE				X	UNA	ORI	MON	10/6/1997	0	GPM		440	237
P108001W	MW78	Umetco Minerals Corporation	33	N	89	W	15	SESW				X	A&C	ORI	MON	11/4/1997	0	GPM		150	111.45
P108002W	MW79	Umetco Minerals Corporation	33	N	89	W	15	SESW				X	A&C	ORI	MON	11/4/1997	0	GPM		150	118.83
P108003W	MW80	Umetco Minerals Corporation	33	N	89	W	15	SESW				X	A&C	ORI	MON	11/4/1997	0	GPM		155	117.48
P108004W	MW81	Umetco Minerals Corporation	33	N	89	W	10	SWSW				X	A&C	ORI	MON	11/4/1997	0	GPM		240	171
P108233W	GH97WW-1	Power Resources Inc.	32	N	89	W	2	NESW		X			UNA	ORI	MIS	11/17/1997	100	GPM		1325	425
P10858D	Dew Drop Ditch	The Diamond Ring Co.	33	N	89	W	7	SENE				X	PUD	ORI	STO,IRR	7/17/1911	0.07	CFS	Dew Drop Spring		
P10859D	Iron Spring Ditch	The Diamond Ring Co.	33	N	89	W	8	SESW				X	PUD	ORI	STO,IRR	7/17/1911	0.28	CFS	Iron Spring		
P10860D	Medicine Spring Ditch	The Diamond Ring Co.	33	N	89	W	7	NWNW				X	PUD	ORI	STO,IRR	7/17/1911	0.06	CFS	Medicine Spring		
P10861D	Pine Tree Ditch	The Diamond Ring Co.	33	N	89	W	8	SWNW				X	PUD	ORI	STO,IRR	7/17/1911	0.07	CFS	Pine Tree Spring		
P112329W	BSPW-1	Power Resources Inc.	33	N	89	W	32	SENW			0	X			MON	10/8/1998	0			425	257.4
P112330W	BSMU-1	Power Resources Inc.	33	N	89	W	32	NENW			0	X			MON	10/8/1998	0			485	266.9
P112331W	BSMP-1	Power Resources Inc.	33	N	89	W	32	NENW			0	X			MON	10/8/1998	0			376	212

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P112332W	BSMP-2	Power Resources Inc.	33	N	89	W	32	NENW			0	X			MON	10/8/1998	0			410	230
P112333W	BSMP-3	Power Resources Inc.	33	N	89	W	32	NENW			0	X			MON	10/8/1998	0			372	221
P114511W	MW10D	Umetco Minerals Corporation	33	N	89	W	15	SWNE			0	X	A&C	ORI	MON	3/10/1999	0			265	214.41
P114512W	MW24D	Umetco Minerals Corporation	33	N	89	W	15	SESW			0	X	A&C	ORI	MON	3/10/1999	0			210	131.51
P114513W	MW7D	Umetco Minerals Corporation	33	N	89	W	15	NESW			0	X	A&C	ORI	MON	3/10/1999	0			266	185.87
P114514W	MW6D	Umetco Minerals Corporation	33	N	89	W	15	NWSE			0	X	A&C	ORI	MON	3/10/1999	0			270	231.7
P1209D	Ervay Nos. 1 & 2	Mrs. M. E. Ervay	33	N	89	W	1	SWNE		X			PU,PUD	ORI	IRR	05/11/1896	1.78	CFS	Deer Creek		
P1226D	O. K. Ditch	Josie P. Biggs	33	N	88	W	17	NWNW				X	PUD	ORI	IRR	05/11/1896	1.14	CFS	Deer Creek		
P13001R	B-Spoils Reservoir	Umetco Minerals Corporation	33	N	89	W	15	NESE			0	X	UNA	STR	IND	8/27/2007	63.4	ACFT	Canyon Creek		
P130987W	HW4EX	Umetco Minerals Corporation	33	N	89	W	15	SWNW			0	X	UNA	ORI	MIS	11/28/2000	0				
P1314D	Holliday Ditch	John J. Holliday	33	N	88	W	7		L5		7		ELI,PUD,ADJ	ORI	STO,IRR,DOM	08/27/1896	0.57	CFS	Deer Creek		
P13527S	Lilly Pad Stock Reservoir	USDI, Bureau of Land Management	34	N	89	W	19	NWSW	L3	Proof P0/13527S	0	X	ADJ	ORI	STO	11/1/1982	3.8	ACFT	Imaginary Draw		
P13528S	Lilly Pad Stock Reservoir / East Canyon Stock Reservoir	USDI, Bureau of Land Management	34	N	89	W	29	NESW		Proof P0/13528S	0	X	ADJ	ORI	STO	11/1/1982	1.5	ACFT	Jackrabbit Draw		
P144110W	MW82	Umetco Minerals Corporation** USDI, Bureau of Land Management	33	N	89	W	22	NWNW			0	X	GST	ORI	MON	4/26/2002				115	86
P14468D	Dulton Pipe Line No. 1 Ditch	Ben M. & B. B. Wood	33	N	90	W	2	NWSW				X	PUD	ORI	STO,MIN,DOM,DRI	10/16/1916	0.06	CFS	Spring		
P15179D	C. B. C. Ditch	Charles B. Cunningham	33	N	89	W	4	NWNW	L4		8		ADJ,DSC,PU,PUD	ORI	STO,IRR,DOM	8/9/1918	0.17	CFS	Canyon Creek		
P162305W	Process Water Well #6	Umetco Minerals Corporation	33	N	89	W	15	NENW			0		GST	ORI	IND	8/16/2004				1685	90
P1626R	Asbell Reservoir	Starling P. Asbell	32	N	89	W	10	SESW		P			PU	ORI	STO,IRR,DOM	9/24/1909	49.1	ACFT	Sage Hen Creek		
P169586W	Liam	Glenn H. Burgett	34	N	90	W	36	NENE			0	X	GSI	ORI	STO	8/25/2005					
P17093D	Diamond Ring Ditch No. 5	Diamond Ring Co.	33	N	89	W	1	SENE				X	PUD,ADJ	ORI	IRR	3/18/1926	0.21	CFS	Deer Creek		
P174546W	Burgett #1	Glenn H. Burgett	34	N	89	W	31	SENE			0		GSI	ORI	STO	5/4/2006					
P175221W	Gunnel #1	BRS Inc.	33	N	90	W	25	NENW			0		GSI	ORI	MIS	6/26/2006					
P179593W	GAS HILLS WATER WELL-1	POWER RESOURCES, INC** USDI - BLM	33	N	89	W	32	SENW			0	X	GSI	ORI	MIS	2/14/2007					
P182674W	CROSS MEADOWS 12-1	CLEAR CREEK CATTLE CO** USDI - BLM	33	N	89	W	12	SWSW			0	X	GSI	ORI	STO	7/9/2007					
P182751W	RYDER OIL & GAS NO 10-1 & BLM	RYDER OIL & GAS, LLC** USDI - BLM	33	N	90	W	11, 14				0		GSI	ORI	IND	6/26/2007					
P182956W	LUCKY MC14	Barnhart Drilling Co., Inc.** WYOMING STATE BOARD OF LAND COMMISSIONERS** USDI - BLM	33	N	90	W	24	NESW			0	X	GSI	ORI	MIS	8/15/2007				1505	50
P183419W	LUCKY MC #12	Barnhart Drilling Co., Inc.** USDI - BLM** WYOMING STATE BOARD OF LAND COMMISSIONERS	33	N	90	W	24	SENW			0	X	GSI	ORI	MIS	9/13/2007				1451	64
P215W	Water Well #3	Globe Mining Co.	33	N	89	W	15	NENW		X			UNA	ORI	IND	8/24/1959	250	GPM		1668	20
P23192D	Lucky Mac Sump No. 2 Pipeline	Wyoming State Highway Department	33	N	90	W	35	SESW				X	CAN	ORI	TEM,IND	10/14/1969	1.11	CFS	Lucky Mac Sump No. 2 (in drainage of)		
P2395W	Lucky Mc #11	Pathfinder Mines Corporation	32	N	90	W	0			X MS 610			ADJ	ORI	IND	12/6/1968	100	GPM		2140	186
P24172P	JE Ranch #12-5	Matador Cattle Company	34	N	88	W	32	NENW		SD			PUW	ORI	DOM,STO	8/13/1973	5	GPM		175	35
P25540D	Hydrostatic Test - North Pipeline Pump Point	Colorado Interstate Gas Company	32	N	89	W	0			X			CAN	ORI	TEM,IND	10/19/1977	2.23	CFS	Sweetwater River		
P2575D	Merriam Ditch	Frank A. Merriam	33	N	89	W	8	SWNW				X	PUD	ORI	IRR	3/30/1900	0.11	CFS	Iron Spring		
P26230D	Coyote Water Hole #1	D. H. Branson	33	N	90	W	11	NWNE		X			CAN	ORI	TEM,IND,MIN,DRI	6/26/1979	0.28	CFS	Coyote Creek		
P2754E	Cross Ell Ditch - Permit 9431 {Enl. of}	Grieve Brothers	33	N	89	W	1		L2				DSC,PUD	ORI	IRR	2/5/1913			Deer Creek		
P30310D	AML 16-C-2 Water Haul	Roth Trucking	33	N	89	W	32	NWNW		X			CAN	ORI	IND,TEM	11/6/1989	0.166	CFS	Lucky Mac Draw		
P30542W	BS 12 1024W	Inc. Western Nuclear	33	N	89	W	32	SWNE		X			PUW	ORI	DEW,MIS	7/25/1975	0	GPM		751	360
P30698W	UPZ Well #1	Federal-American Partners	33	N	89	W	33	NWNW		X			PUW	ORI	MON	7/30/1975	-1	GPM		925	470
P30735W	Lucky Mc Well #12	Pathfinder Mines Corporation	33	N	90	W	24	SENW			0	X	CAN	ORI	IND	8/8/1975	310	GPM		1451	64
P31252W	UPZ Well #2	Federal-American Partners	33	N	89	W	32	SENE		X			PUW	ORI	MON	9/22/1975	0	GPM		806	440

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P31496W	BS12-1025P	Federal-American Partners	33	N	89	W	32	SWNE		X			PUW	ORI	MON	11/12/1975	0	GPM		777	345
P31497W	BS12-1026P	Federal-American Partners	33	N	89	W	32	SWNE		X			PUW	ORI	MON	11/12/1975	0	GPM		640	345
P31498W	BS12-1027P	Federal-American Partners	33	N	89	W	32	SWNE				X	PUW	ORI	MON	11/12/1975	0	GPM		565	325
P31499W	BS12-1028P	Federal-American Partners	33	N	89	W	32	NWSE		X			PUW	ORI	MON	11/12/1975	0	GPM		827	440
P31500W	BS12-1029P	Federal-American Partners	33	N	89	W	32	NWSE		X			PUW	ORI	MON	11/12/1975	0	GPM		735	440
P31501W	BS12-1030P	Federal-American Partners	33	N	89	W	32	NWSE		X			PUW	ORI	MON	11/12/1975	0	GPM		640	435
P31504W	UPZ 417P	Federal-American Partners	33	N	89	W	33	SWNW		X			PUW	ORI	MIS	11/12/1975	0	GPM		650	460
P31919W	ENL BS12-1024W	Federal-American Partners	33	N	89	W	32	SWNE		X			PUW	ORI	MIS	11/19/1975	0	GPM		751	360
P32404W	ENL UPZ #1	Federal-American Partners	33	N	89	W	33	SWNW				X	PUW,PU	ORI	MIS	1/26/1976	-1	GPM		925	470
P33517W	Cayias #1	Inc. Hills Gas	33	N	89	W	18	NWSW		X			PUW	ORI	IND	4/9/1976	0	GPM			
P33518W	Cayias #2	Inc. Hills Gas	33	N	89	W	18	SESW		X			PUW	ORI	IND	4/9/1976	0	GPM			
P3369R	Dutton Reservoir	Ben M. Wood**B. B. Ward	33	N	90	W	2	SWSE		P			PU,PUO	ORI	STO,DOM,DRI	10/16/1916	0.86	ACFT	Spring		
P34361W	Blackstone #1	Western Nuclear Inc.	33	N	89	W	32	SWNE		X			PUW	ORI	MON	7/22/1976	0	GPM			
P3W	Lucky Mc #8	Pathfinder Mines Corporation	32	N	90	W	0			X MS 610			ADJ	ORI	IND	3/14/1958	80	GPM		1500	392
P40467W	RHW-1	Mullen Mining Company	33	N	89	W	9	SESW		X			PUW	ORI	MON	8/5/1977	0	GPM		160	154
P40468W	RHW-2	Mullen Mining Company	33	N	89	W	9	NESW		X			PUW	ORI	MON	8/5/1977	0	GPM		134	-7
P41021W	RHW-4	Mullen Mining Company	33	N	89	W	9	SWNE		X			PUW	ORI	MON	11/16/1977	0	GPM		280	0
P41022W	RHW-3	Mullen Mining Company	33	N	89	W	9	SESE		X			PUW	ORI	MON	11/16/1977	0	GPM		310	257
P41023W	RHW-5	Mullen Mining Company	33	N	89	W	9	SWSW				X	PUW	ORI	MON	11/16/1977	0	GPM		180	0
P43111W	CEE #1	Union Carbide Corporation	33	N	89	W	17	NWNE		X			PU	ORI	MIS	3/10/1978	500	GPM		130	55
P43159W	Lucky Mc #14	Pathfinder Mines Corporation	33	N	90	W	24	NESW			0	X	CAN	ORI	IND	3/31/1978	500	GPM		1505	70
P43745W	ADOBE #1	USDI, BLM** Mullen Engineering	33	N	89	W	9	SWSW		X			PUW	ORI	IND,MIS	6/9/1978	50	GPM			
P438G	Lucky Mc 1	Pathfinder Mines Corporation	33	N	90	W	23	NWSE		D		X	UNA	ORI	DOM	5/1/1956	10	GPM		90	30
P439G	Lucky Mc 2	Pathfinder Mines Corporation	33	N	90	W	26	NENW		D		X	UNA	ORI	DOM	5/1/1956	350	GPM		110	20
P44612W	Carol Well #1	Power Resources Inc.	33	N	89	W	28	NESW		X		X	UNA	ORI	MIS	11/25/1977	50	GPM		400	200
P44796W	Rattlesnake #1	The Matador Cattle Company	33	N	88	W	7	NENE		Proof P0/44796W		X	PUW	ORI	STO	9/1/1978	1	GPM		2	-4
P44797W	Rattlesnake #2	The Matador Cattle Company	33	N	88	W	8	SENE		Proof P0/44797W S			PUW	ORI	STO	9/1/1978	0.5	GPM		4	-4
P44798W	Rattlesnake #3	The Matador Cattle Company	33	N	88	W	8	SWNE		Proof P0/44798W S			PUW	ORI	STO	9/1/1978	25	GPM		5	-4
P44799W	Rattlesnake #4	The Matador Cattle Company	33	N	88	W	8	SWSW		Proof P0/44799W S			PUW	ORI	STO	9/1/1978	4	GPM		5	-4
P44800W	Rattlesnake #5	The Matador Cattle Company	33	N	88	W	17	NENE		Proof P0/44800W S			PUW	ORI	STO	9/1/1978	2	GPM		3	-4
P4483E	Cross Ell Ditch, Enlargement No. 3 of the	Diamond Ring Co.	33	N	89	W	1	SENE			7.8		ADJ	ORI	IRR	3/18/1926	0.19	CFS	Deer Creek		
P45368W	Monitor Well GW 7	Power Resources Inc.	33	N	89	W	27	NESE		X		X	UNA	ORI	MON	9/26/1978	0	GPM		660	82
P45369W	Monitor Well GW 8	Silver King Mines, Inc.	33	N	89	W	27	NENE				X	UNA	ORI	MON	9/26/1978	0	GPM		360	98
P45370W	Monitor Well GW 9	Silver King Mines, Inc.	33	N	89	W	28	NESE				X	UNA	ORI	MON	9/26/1978	0	GPM		325	111
P45371W	Monitor Well GW 10	Power Resources Inc.	33	N	89	W	21	SESE				X	A&C	ORI	MON	9/26/1978	0	GPM		475	153
P45502W	Barrel Springs #1	USDI, BLM	32	N	89	W	8	NWSW		S			PUW,PU	ORI	STO	10/20/1978	25	GPM			
P46378W	Sage Hen #1	Matador Cattle Company	33	N	89	W	26	SESE		S			PUW	ORI	STO	8/14/1978	1	GPM		5	-4
P46384W	Holiday #1	The Matador Cattle Company	33	N	88	W	19	SWSW		Proof P0/446384W S			PUW	ORI	STO	8/14/1978	10.5	GPM		5	-4
P46385W	Cole #80	Matador Cattle Company	33	N	89	W	18	SWNW		S			ADJ	ORI	STO	8/14/1978	0.75	GPM		2	-4
P46387W	Little X-L #1	The Matador Cattle Company	33	N	88	W	6	NWSW		Proof P0/46387W S			PUW	ORI	STO	8/14/1978	3	GPM		2	-4
P46388W	Medicine Springs #1	The Matador Cattle Company	33	N	89	W	7	NWNW		Proof P0/46388W		X	ADJ	ORI	STO	8/14/1978	4	GPM		6	-4
P46389W	Iron Spring #1	The Matador Cattle Company	33	N	89	W	8	SESW		Proof P0/46389W S			PUW	ORI	STO	8/14/1978	3	GPM		3	-4
P46771W	BS 1051	American Nuclear Corporation	32	N	90	W	1	SESE		X			PUW,PU	ORI	MIS	1/13/1978	110	GPM			

Appendix A
Water Rights Within Five-Mile Radius of East Gas Hills Site

Permit Number (Appropriation)	Facility Name	Permit Applicant	Tns		Rng		Section	Qtrqtr	Lots	Additional Description	Acres	Head Gate-Outlet-Well	Status	Supply type	Uses	Priority	Amount	Unit	Source	Permit Well Depth	Permit Static Well Depth
P46772W	Muskrat Well #1	American Nuclear Corporation	32	N	90	W	1	SESE		X			PUW,PU	ORI	DEW,MIS	2/22/1978	120	GPM			
P46773W	Muskrat P 3	Silver King Mines, Inc.	33	N	89	W	31	SESW				X	UNA	ORI	MON	2/22/1978	0	GPM		515	194
P46774W	Muskrat P 4	Silver King Mines, Inc.	33	N	89	W	31	NESW				X	UNA	ORI	MON	2/22/1978	0	GPM		530	244
P46775W	Muskrat P 2	Silver King Mines, Inc.	33	N	89	W	31	SWSE				X	UNA	ORI	MON	2/22/1978	0	GPM		530	134
P46776W	Muskrat P 1	Silver King Mines, Inc.	33	N	89	W	31	NWSE		X		X	UNA	ORI	MON	2/22/1978	0	GPM		440	201
P47060W	ENL Lucky Mc #8	Pathfinder Mines Corp. Lucky Mc Mine	33	N	90	W	23			MS582			UNA	RES	RES,IND,MIS	9/18/1979	80	GPM		1500	392
P47061W	ENL Lucky Mc #11	Pathfinder Mines Corp. Lucky Mc Mine	33	N	90	W	23			MS582			PU,DSC	ORI	RES,IND,MIS	9/18/1978	0	GPM		2140	186
P49121W	Lincoln Springs #1	The Matador Cattle Company	33	N	89	W	7	SENE		Proof P0/49121W S			PUW	ORI	STO	7/11/1979	3	GPM		5	-4
P49333W	Barrel Springs #1	Matador Cattle Company	32	N	89	W	8	SWSW		S			PUW,PU	ORI	STO	8/6/1979	1	GPM		4	-4
P501G	Lucky Mc #3	Pathfinder Mines Corporation	33	N	90	W	0			DX			UNA	ORI	IND,DOM	12/3/1956	300	GPM		218	95
P502G	Lucky Mc #4	Pathfinder Mines Corporation	33	N	90	W	0			DX			UNA	ORI	IND,DOM	12/3/1956	150	GPM		112	28
P530G	JAY #1	Vitro Minerals Corporation	33	N	90	W	26	SWNE		X		X	UNA	ORI	IND	1/29/1957	100	GPM		206	80
P53366W	Bates Springs #1	The Matador Cattle Company	33	N	89	W	8	SWSW		S			PUW	ORI	STO	8/8/1980					
P56W	ALJOB #1	Globe Mining Co.	33	N	89	W	15	NENW		X			ABA	ORI	IND,DOM	8/29/1958	45	GPM		484	256
P57999W	Pay #1	Union Carbide Corporation	33	N	89	W	22	NENE		X			PUW	ORI	MIS	5/4/1981	1200	GPM		200	97
P60146W	Bengal Well #1	USDI, BLM** Federal-American Partners	33	N	89	W	27	NENE		X			PUW	RES	RES,MIS	11/25/1977	0	GPM		-1	0
P60147W	Bengal Well #2	USDI, BLM** Federal-American Partners	33	N	89	W	27	NENE				X	PUW	RES	MIS	11/25/1977	0	GPM		-1	0
P64404W	ALLEGRETTI #1	USDI, BLM** Adobe Oil & Gas Corporation	32	N	89	W	5	NWSE		X			PUW,PU	ORI	MIS	6/2/1983	20	GPM			
P66157W	Guard Well 3A	USDI, BLM** Union Carbide Corporation	33	N	89	W	15	SESW			0	X	GST	ORI	MON	4/1/1983	10	GPM		158	101
P67075W	Guard Well 3B	USDI, BLM** Union Carbide Corporation	33	N	89	W	15	SWSW		X			A&C	RES	RES,IND,MIS	2/16/1984	7	GPM		159	114.1
P67076W	Guard Well 3C	USDI, BLM** Union Carbide Corporation	33	N	89	W	15	NWNW		X			A&C	ORI	RES,IND,MIS	2/16/1984	10	GPM		159	105
P67077W	HDW-1	Union Carbide Corporation	33	N	89	W	15	NWSW		X			PUW	RES	RES,IND,MIS	2/8/1984	1	GPM		35	-4
P67146W	MW1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SWSE		X			PUW	ORI	MON	4/23/1984	0	GPM		79	58.24
P67147W	MW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SWSW				X	A&C	ORI	MON	4/23/1984	0	GPM		170	125
P67148W	MW4	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SWSE				X	A&C	ORI	MON	4/23/1984	0	GPM		140	82
P67149W	MW6	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	NWSE			0	X	A&C	ORI	MON	4/23/1984	0	GPM		220	162
P67150W	MW7	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	NESW			0	X	A&C	ORI	MON	4/23/1984	0	GPM		220	145
P67151W	MW8	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWNE				X	A&C	ORI	MON	4/23/1984	0	GPM		159	57.15
P67152W	MW10	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWNE			0	X	A&C	ORI	MON	4/23/1984	0	GPM		160	95
P67153W	MW16	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SWSW				X	ABA	ORI	MON	4/23/1984	0	GPM		200	-7
P67154W	MW17	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	NESW				X	A&C	ORI	MON	4/23/1984	0	GPM		160	105
P67155W	MW18	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	NWSE				X	A&C	ORI	MON	4/23/1984	0	GPM		80	53
P67156W	MW19	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SESE				X	A&C	ORI	MON	4/23/1984	0	GPM		110	67
P67157W	MW20	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	NENE				X	A&C	ORI	MON	4/23/1984	0	GPM		90	65
P67158W	MW21	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SWSW			0	X	A&C	ORI	MON	4/23/1984	0	GPM		159	-7
P67159W	MW23	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	NWSE				X	A&C	ORI	MON	4/23/1984	0	GPM		140	80
P67160W	GW1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SESW				X	A&C	ORI	MON	4/23/1984	0	GPM		160	105
P67161W	GW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SESW				X	A&C	ORI	MON	4/23/1984	0	GPM		158	114
P67162W	GW3	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SESW			0	X	A&C	ORI	MON	4/23/1984	0	GPM		160	107
P67163W	GW4	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NENW				X	A&C	ORI	MON	4/23/1984	0	GPM		165	112.42
P67164W	GW5	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWSE				X	A&C	ORI	MON	4/23/1984	0	GPM		160	100
P67165W	GW6	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNE				X	A&C	ORI	MON	4/23/1984	0	GPM		121	86.18
P67166W	GW7	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SESW		X			PUW,PU	ORI	MON	4/23/1984	0	GPM		190	0.3
P67167W	GW8	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NENW		X			PUW,PU	ORI	MON	4/23/1984	0	GPM		172	125
P67168W	PW1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	NESW				X	A&C	ORI	MON	4/23/1984	0	GPM		220	168
P67169W	PW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWSW				X	A&C	ORI	MON	4/23/1984	0	GPM		220	192
P67170W	PW3	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWSW				X	A&C	ORI	MON	4/23/1984	0	GPM		220	148
P67171W	PW4	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NENW		X			PUW,PU	ORI	MON	4/23/1984	0	GPM		230	100
P67172W	PW5	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NENW				X	A&C		MON	4/23/1984	0	GPM		160	120.72
P67173W	PW6	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NENW				X	A&C	ORI	MON	4/23/1984	0	GPM		136	122.39

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P67174W	PW7	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWSE				X	A&C	ORI	MON	4/23/1984	0	GPM		260	-7
P67175W	EPW1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	16	SESE				X	A&C	ORI	MON	4/23/1984	0	GPM		155	110
P67176W	EPW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNW				X	A&C	ORI	MON	4/23/1984	0	GPM		115	89
P67177W	EPW3	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNW				X	A&C	ORI	MON	4/23/1984	0	GPM		110	70
P67178W	DW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SESW				X	ABA	ORI	MON	4/23/1984	0	GPM		260	140
P67179W	DW3	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWNW				X	A&C	ORI	MON	4/23/1984	0	GPM		228	210
P67180W	MW30026	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNW				X	A&C	ORI	MON	4/23/1984	0	GPM		193	77
P67181W	RW1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNW			0	X	A&C	ORI	MON	4/23/1984	0	GPM		130	87.04
P67182W	RW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNW				X	A&C	ORI	MON	4/23/1984	0	GPM		120	76
P67183W	HW1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWSW			0	X	A&C	ORI	MON	4/23/1984	0	GPM		267.6	152.35
P67184W	HW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	16	NESE				X	A&C	ORI	MON	4/23/1984	0	GPM		117	104.72
P67185W	HW3	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWNW				X	A&C	ORI	MON	4/23/1984	0	GPM		135.5	113.34
P67186W	HW4	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWNW				X	A&C	ORI	MON	4/23/1984	0	GPM		155.4	123.85
P67187W	RIM 1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	9	SWSW		X		X	ABA	ORI	MON	4/23/1984	0	GPM		300	179
P67188W	RIM 2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	9	SENW		X		X	ABA	ORI	MON	4/23/1984	0	GPM		260	78
P67189W	RIM 3	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	8	NESE		X		X	ABA	ORI	MON	4/23/1984	0	GPM		196	87
P682G	Lucky Mc #5	Pathfinder Mines Corporation	33	N	90	W	23			X			UNA	ORI	IND,DOM	7/2/1957	200	GPM		995	100
P716G	Lucky Mc #6	Pathfinder Mines Corporation	33	N	90	W	23			DX			UNA	ORI	IND,DOM	11/21/1957	350	GPM		1340	53
P71755W	Cross L #2 Spring	Clear Creek Cattle Co.	33	N	88	W	7	NWNE		Proof P0/71755W		X	PUW,PU	ORI	DOM,STO	9/13/1984	5	GPM		3	-4
P71757W	Little Cross L #1 Spring	Clear Creek Cattle Co.	33	N	88	W	6	NWSW	L11	Proof P0/71757W S			PUW	ORI	STO	9/13/1984	10	GPM		4	-4
P71758W	McKenzie Spring	Clear Creek Cattle Co.	33	N	88	W	19	SWSW	L7	Proof P0/71758W S			PUW	ORI	STO	9/13/1984	20	GPM		5	-4
P71762W	Roberts Spring	Clear Creek Cattle Co.	34	N	88	W	31	NWNE		Proof P0/71762W S			PUW	ORI	STO	9/13/1984	10	GPM		5	-4
P71764W	Government #1 West (Rattlesnake)	Clear Creek Cattle Co. and BLM Casper District	33	N	88	W	6	SESE		Proof P0/71764W S			PUW	ORI	STO	10/9/1984	4	GPM		5	-4
P71766W	Beaver Rim #2	USDI BLM Casper District**Clear Creek Cattle Co.	33	N	89	W	27	NENE		S			PUW	ORI	STO	1/17/1986	15	GPM		10	-4
P717G	Lucky Mc #7	Pathfinder Mines Corporation	33	N	90	W	23			DX			A&C	ORI	IND,DOM	11/21/1957	150	GPM		1720	28
P76332W	MW25	Umetco Minerals Corporation	33	N	89	W	15	NWNW		X			PUW,PU	ORI	MON	2/19/1988	0	GPM		256	227.5
P76333W	MW26	Umetco Minerals Corporation	33	N	89	W	10	NWSW				X	A&C	ORI	MON	2/19/1988	0	GPM		160	90
P76334W	MW27	Umetco Minerals Corporation	33	N	89	W	11	SWSW				X	A&C	ORI	MON	2/19/1988	0	GPM		121	41
P76996W	JGW 1	WYDEQ	33	N	90	W	26	SENE				X	PUW	ORI	MON	5/23/1988	0	GPM		300	136.9
P76997W	4WW 1	WYDEQ	33	N	90	W	26	NWSE		X			PUW,PU	ORI	MON	5/23/1988	0	GPM		300	206.07
P76998W	JGW 3	WYDEQ	33	N	90	W	26	SWSE		X			PUW,PU	ORI	MON	5/23/1988	0	GPM		200	175.75
P77793W	MW 28	Umetco Minerals Corporation	33	N	89	W	9	SESE		X		X	UNA	ORI	MON	8/3/1988	0	GPM		282	178.4
P78994W	2R Reservoir	Pathfinder Mines Corporation	32	N	90	W	0						POU, POW, ADJ	ORI	RES,STO,MIS	11/23/1988	60	GPM		250	200
P7951R	Lagoon 1 Reservoir	Pathfinder Mines Corporation	33	N	90	W	23	NWSE		MINERAL SURVEY 582			DSC,PUO,PU	ORI	IND	5/17/1978	6.6	ACFT	Fraser Draw		
P7952R	Lagoon 2 Reservoir	Pathfinder Mines Corporation	33	N	90	W	23	NWSE		MINERAL SURVEY 582			DSC,PUO,PU	ORI	IND	5/17/1978	0.22	ACFT	Fraser Draw		
P7964R	Area 7 Settling Reservoir	Pathfinder Mines Corporation	33	N	90	W	25	NESW		P			PU,PUO	ORI	IND	9/14/1978	23.25	ACFT	Fraser Draw		
P80432W	MW 29	Umetco Minerals Corporation	33	N	89	W	15	NESW				X	ABA	ORI	MON	8/4/1989	0	GPM		195	188
P80433W	MW 31	Umetco Minerals Corporation	33	N	89	W	15	NESW				X	ABA	ORI	MON	8/4/1989	3	GPM		180	130.77
P80434W	MW 32	Umetco Minerals Corporation	33	N	89	W	15	SESW				X	A&C	ORI	MON	8/4/1989	0	GPM		160	102
P80484W	LA 1	Lidstone & Anderson Inc.	33	N	89	W	14	SWNW		X		X	UNA	ORI	MON	8/14/1989	0	GPM		60	43
P80485W	LA 2	Lidstone & Anderson Inc.	33	N	89	W	14	SWSW		X		X	UNA	ORI	MON	8/14/1989	0	GPM		165	128.5
P80486W	LA 3	Lidstone & Anderson Inc.	33	N	89	W	15	SESE		X		X	UNA	ORI	MON	8/14/1989	0	GPM		195	183
P80487W	LA 4	Lidstone & Anderson Inc.	33	N	89	W	14	SWSW		X		X	A&C	ORI	MON	8/14/1989	0	GPM		184.5	145

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P80488W	LA 5	Lidstone & Anderson Inc.	33	N	89	W	22	NWNE		X		X	UNA	ORI	MON	8/14/1989	0	GPM		128	115
P80489W	LA 6	Lidstone & Anderson Inc.	33	N	89	W	22	NENE		X		X	UNA	ORI	MON	8/14/1989	0	GPM			
P80490W	LA 7	Lidstone & Anderson Inc.	33	N	89	W	23	NWNW		X		X	UNA	ORI	MON	8/14/1989	0	GPM		105	71.5
P8108R	Lucky MC Reclamation Reservoir	Pathfinder Mines Corporation	33	N	90	W	2, 35	NWNW, NESE, SESE	L4	P, MS610			CAN	ORI	WIL,STO	2/26/1980	1940.45	ACFT	Fraser Draw		
P8122R	A-9 Pit Subgrade Tailings Disposal Reservoir	Union Carbide Corporation	33	N	89	W	15	SWSE		P			CAN	ORI	IND	4/3/1980	1107.73	ACFT	Union Draw		
P8208R	Adobe Oil & Gas Corporation Evaporation Pond Reservoir	Adobe Oil & Gas Corporation	33	N	89	W	9	NESE				X	PUO,PU	ORI	IND,MIS	3/2/1979	25.82	ACFT	East Draw		
P82562W	MWC-33	Umetco Minerals Corporation	33	N	89	W	15	NENW		X		X	ABA	ORI	MIS	4/27/1990	2	GPM		210	121.81
P82563W	MWC-34	Umetco Minerals Corporation	33	N	89	W	10	SWSW		X			ABA		MIS	4/27/1990	3	GPM		200	157.06
P82564W	MWC-35	Umetco Minerals Corporation	33	N	89	W	15	NENW		X			ABA	ORI	MIS	4/27/1990	5	GPM		190	148.03
P82565W	MWC-36	Umetco Minerals Corporation	33	N	89	W	15	NENW		X			ABA	ORI	MIS	4/27/1990	12	GPM		200	143.41
P82566W	MWI-37	Umetco Minerals Corporation	33	N	89	W	10, 15	SWSW, NWNW		X		X	ABA, UNA	ORI	MON	4/27/1990	0	GPM		240	222.9
P82567W	MWI-38	Umetco Minerals Corporation	33	N	89	W	10	SWSW				X	ABA	ORI	MON	4/27/1990	0	GPM		230	195.88
P82568W	MWI-39	Umetco Minerals Corporation	33	N	89	W	10	SWSW				X	ABA	ORI	MON	4/27/1990	0	GPM		253	222
P82823W	MUSKRAT-MO	Power Resources Inc.	33	N	89	W	31	NESW		X		X	UNA	ORI	MON	6/28/1990	0	GPM		381	198
P82824W	Muskrat Pump	Power Resources Inc.	33	N	89	W	31	NWSE		X		X	UNA	ORI	MON	6/28/1990	0	GPM		455	266
P82825W	Muskrat MP	Power Resources Inc.	33	N	89	W	31	NWSE		X		X	UNA	ORI	MON	6/28/1990	0	GPM		453	249
P83055W	MW-21A	Umetco Minerals Corporation	33	N	89	W	10	NWSW		X		X	UNA	ORI	MON	7/23/1990	0	GPM		200	165.87
P83269W	MWC-42	Umetco Minerals Corporation	33	N	89	W	10	SESW		X		X	ABA	ORI	MIS	8/15/1990	10	GPM		240	138
P8461R	Rim #1 Settling Reservoir	Umetco Minerals Corporation	33	N	89	W	9	NWSW		P			CAN	ORI	TEM,IND	9/14/1981	15.63	ACFT	Rim Draw		
P8462R	Rim #2 Settling Reservoir	Umetco Minerals Corporation	33	N	89	W	8	NESE		P			CAN	ORI	TEM,IND	9/14/1981	1.14	ACFT	Iron Springs Draw		
P8463R	Rim #3 Settling Reservoir	Umetco Minerals Corporation	33	N	89	W	8	NESE		P			CAN	ORI	TEM,IND	9/14/1981	13.48	ACFT	Iron Springs Draw		
P84648W	MWI 43	Umetco Minerals Corporation	33	N	89	W	15	NWNW				X	A&C	ORI	MON	3/18/1991	0	GPM		240	194.8
P84650W	MWI-50	Umetco Minerals Corporation	33	N	89	W	15	NENE				X	ABA	ORI	MON	3/18/1991	0	GPM		240	171
P84651W	MWI-51	Umetco Minerals Corporation	33	N	89	W	15	NENE				X	ABA	ORI	MON	3/18/1991	0	GPM		240	159
P84652W	MWI-52	Umetco Minerals Corporation	33	N	89	W	15	NENE				X	ABA	ORI	MON	3/18/1991	0	GPM		245	144
P84751W	MWC-45	Umetco Minerals Corporation	33	N	89	W	15	NENW		X			ABA	ORI	MIS	3/18/1991	15	GPM		240	195.24
P84753W	MWC-47	Umetco Minerals Corporation	33	N	89	W	15	NWNW		X			ABA	ORI	MIS	3/18/1991	15	GPM		255	188
P84754W	MWC-48	Umetco Minerals Corporation	33	N	89	W	15	NWNE				X	ABA	ORI	MIS	3/18/1991	15	GPM		245	177.92
P84755W	MWC-49	Umetco Minerals Corporation	33	N	89	W	15	NENE		X			ABA	ORI	MIS	3/18/1991	15	GPM		240	156.35
P85776W	ENL MWC-42	Umetco Minerals Corporation	33	N	89	W	15	NENW					A&C	ORI	MIS	7/24/1991	8	GPM		240	180.58
P8599S	Canyon Creek #1 Stock Reservoir	Matador Cattle Company	33	N	89	W	9	NENE		P			PUO	ORI	STO	8/6/1979	0.13	ACFT	Canyon Creek		
P8641R	A-9 Pit Tailings Disposal Reservoir	Umetco Minerals Corporation	33	N	89	W	15	NESW		P			CAN	ORI	TEM,IND	7/27/1983	966.77	ACFT	Union Draw		
P87214W	Area 4 Reclamation Reservoir	Pathfinder Mines Corp.	33	N	90	W	35	SWNE		X			UNA	ORI	MIS	12/24/1991	12	GPM		460	270
P87215W	Area 5 Reclamation Reservoir	Pathfinder Mines Corp.	33	N	90	W	26	NWNW					UNA	ORI	MIS	12/24/1991	66	GPM		250	95
P89541W	DW-4	Umetco Minerals Corporation	33	N	89	W	10	SWSW		X			UNA	ORI	MIS	9/3/1992	8	GPM		260	135
P91081W	MW-63	Umetco Minerals Corporation	33	N	89	W	15	NESW				X	UNA	ORI	MON	3/19/1993	0	GPM		180	120
P91082W	MW-64	Umetco Minerals Corporation	33	N	89	W	10	SWSW				X	UNA	ORI	MON	3/19/1993	0	GPM		260	160
P91083W	MW-65	Umetco Minerals Corporation	33	N	89	W	15	SWNW				X	UNA	ORI	MON	3/19/1993	0	GPM		180	120
P91277W	MWC 55	Umetco Minerals Corporation	33	N	89	W	15	NWNW		X			ABA	ORI	MIS	3/19/1993	7	GPM		171.78	112.5
P91278W	MWC 56	Umetco Minerals Corporation	33	N	89	W	15	NENW		X		X	ABA	ORI	MIS	3/19/1993	5	GPM		261	171
P91279W	MWC 57	Umetco Minerals Corporation	33	N	89	W	15	NENE		X			ABA	ORI	MIS	3/19/1993	6	GPM		252	165
P91280W	MWC 58	Umetco Minerals Corporation	33	N	89	W	15	NWNW					A&C	ORI	MIS	3/19/1993	6	GPM		250	154
P91281W	MWC 59	Umetco Minerals Corporation	33	N	89	W	10	SWSW		X			ABA	ORI	MIS	3/19/1993	6	GPM		250	147
P91282W	MWC 60	Umetco Minerals Corporation	33	N	89	W	15	NENW					A&C	ORI	MIS	3/19/1993	4	GPM		160	111
P91283W	MWC 61	Umetco Minerals Corporation	33	N	89	W	15	NENW					A&C	ORI	MIS	3/19/1993	3.5	GPM		150	116
P91284W	MWC 62	Umetco Minerals Corporation	33	N	89	W	15	NWNW					A&C	ORI	MIS	3/19/1993	4	GPM		165	107
P92098W	MWC-66	Umetco Minerals Corporation	33	N	89	W	15	NENE		X			UNA	ORI	MIS	6/18/1993	15	GPM		190	120

Appendix A
Water Rights Within Five-Mile Radius of East Gas Hills Site

Permit Number (Appropriation)	Facility Name	Permit Applicant	Tns		Rng		Section	Qtrqtr	Lots	Additional Description	Acres	Head Gate-Outlet-Well	Status	Supply type	Uses	Priority	Amount	Unit	Source	Permit Well Depth	Permit Static Well Depth
P92914W	PRI #1	PRI Environmental Inc.	33	N	89	W	28	SENE				X	UNA	ORI	MON	10/1/1993	0	GPM		275	153.58
P93567W	LA-8	Lidstone & Anderson Inc.	33	N	89	W	22	NENE				X	UNA	ORI	MON	12/10/1993	0	GPM		163	72.9
P93801W	PWR #107 Spring (77)	USDI, BLM	33	N	89	W	18	NESW		S		X	ADJ	ORI	STO	4/17/1926	10	GPM		-1	-1
P94133W	Upper Mac Spring	USDI, BLM	33	N	88	W	30	NWNW	L1	Proof P0/94133W			ADJ	ORI	STO	4/17/1926	1	GPM		-1	-1
P94134W	Spring #7	USDI, BLM	33	N	88	W	19	NWSW	L3	Proof P0/94134W S		X	ADJ	ORI	STO	4/17/1926	5	GPM		-1	-1
P94135W	Spring #8	USDI, BLM	33	N	88	W	19	SWSW	L4	Proof P0/94135W S		X	ADJ	ORI	STO	4/17/1926	5	GPM		-1	-1
P9431D	Cross Ell Ditch	Leonidas Clayton	33	N	89	W	1		L2		5		ADJ,ELI	ORI	IRR	10/11/1909	1.21	CFS	Deer Creek		
P9442R	2R Reclamation Reservoir	Pathfinder Mines Corp. Lucky Mc Mine	32	N	90	W	0		M654	MS654	0	X	ADJ	STR	WIL,STO	11/23/1988	987.45	ACFT	Dry Coyote Creek		
P95290W	Buss I Reservoir	USDI, BLM** Power Resources Inc.	33	N	89	W	27	SESE		X	0		UNA,ADJ	ORI	MIS,DEW,RES	4/26/1994	2000	GPM		210	171
P9573R	Veca Pond Reservoir	Bureau of Land Management	33	N	89	W	23	NENW		P			UNA	ORI	STO,WIL	1/23/1990	55.55	ACFT	Veca Draw		
P96884W	Herbst Ervay Basin #1	Herbst Lazy Ty Land Co.	34	N	89	W	23	SWSW		S		X	UNA	ORI	STO	8/25/1994	5	GPM		75	30
P9722R	Area 4 Reclamation Reservoir	Pathfinder Mines Corp.**State Land and Farm Loan Office	33	N	90	W	36		M610	MS610	0		ADJ	STR	STO,WIL	12/24/1991	6787.5	ACFT	Fraser Draw		
P9723R	Area 5 Reclamation Reservoir	Pathfinder Mines Corporation	33	N	90	W	26			P MS 589		X	UNA	ORI	STO,WIL	12/24/1991	3202.22	ACFT	Fraser Draw		
P98996W	Herbst Ervay Basin #2	Herbst Lazy Ty Land Co.	34	N	89	W	23	NESW		S		X	UNA	ORI	STO	4/20/1995	4	GPM		3378	-6

Appendix A
Water Rights Within Five-Mile Radius of East Gas Hills Site
Abbreviations

Additional Description:

D	Ditch or Pipeline Permit
E	Enlargement of a Ditch or Pipeline Permit
P	Stock and Domestic Use Wells completed prior to May 24, 1969 and registered with the State Engineer's Office prior to December 31, 1972
R	Reservoir Permit
S	Stock Reservoir Permit
W	Permits are for wells with a priority date for the date of filing with the State Engineer

For Status:

A&C	Abandoned and Cancelled
ABA	Abandoned
ADJ	Adjudicated
DSC	Description
ELI	Eliminated
GST	Good Standing
PU	Point of Use Non Irrigation (Not Actual Status)
PUD	Point of Diversion (Not Actual Status)
PUO	Point of Reservoir Outlet (Not Actual Status)
PUW	Location of Well (Not Actual Status)
REJ	Rejected by the State Engineer
UNA	Un-adjudicated

For Supply Type:

ORI	Original Supply
STR	Storage Supply (for Reservoir and Stock Reservoir Permits – May not appear on older permits)

For Uses:

DEW	Dewatering
DOM	Domestic
DRI	Drilling
IND	Industrial
IRR	Irrigation
MIN	Mining
MIS	Miscellaneous
MON	Monitoring
RES	Reservoir Supply
STO	Stock
TEM	Temporary Use
WIL	Wildlife

Appendix B
Water Rights Within Proposed Land Transfer Boundary

Appropriation	Permit Facility Name	Permit Applicant	Tns		Rng		Section	Quarter	Status	Current Status from Umetco Documents	Supply type	Permit Uses	Permit Priority	Permit Amount	Unit	Permit Source	Permit Well Depth	Permit Static Well Depth
21/2/264W			33	N	89	W	15	NWNW	Unadjudicated		Original Supply							
21/3/264W			33	N	89	W	10	SWSW	Unadjudicated		Original Supply							
22/6/316W			33	N	89	W	15	NESW	Unadjudicated		Original Supply							
25/11/207W			33	N	89	W	10	SWSW	Unadjudicated		Original Supply							
25/7/207W			33	N	89	W	10	SWSW	Unadjudicated		Original Supply							
25/8/207W			33	N	89	W	10	SWSW	Unadjudicated		Original Supply							
25/9/207W			33	N	89	W	10	SWSW	Unadjudicated		Original Supply							
26/4/21W			33	N	89	W	15	SESW	Unadjudicated		Original Supply							
P104185W	MW 77	Umetco Minerals Corporation	33	N	89	W	9	SWSE	Unadjudicated	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	10/15/1996	0	GPM		279	231.01
P10444R	GHP No. 2 Evaporation Reservoir	Umetco Minerals Corporation	33	N	89	W	15	SENW	Cancelled		Original Supply	Industrial, Temporary Use	11/21/1996	199.36	ACFT	Canyon Creek		
P104718W	C-18 Pit	Umetco Minerals Corporation	33	N	89	W	22	NENW	Unadjudicated	The pit was backfilled and turned into a repository. Will request termination of water rights from State Engineers Office.	Reservoir, Original Supply	Miscellaneous, Dewatering, Reservoir	11/21/1996	500	GPM		85	80
P104730W	ALJOB #2	USDI, BLM**Umetco Minerals Corporation	33	N	89	W	15	SENE,SW	Unadjudicated	Previously permits 57 & 67078. Water rights will be automatically cancelled 12-31-2011. Well and water rights to be transferred to Department of Energy.	Original Supply	Miscellaneous	11/25/1996	45	GPM		537	270
P105492W	MW 70A	Umetco Minerals Corporation	33	N	89	W	10	SWSW	Unadjudicated	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	4/11/1997	0	GPM		151	141
P105493W	MW 70B	Umetco Minerals Corporation	33	N	89	W	10	SWSW	Abandoned & Cancelled	Abandoned 8-5-2003, Cancelled 9-21-2004	Original Supply	Monitoring	4/11/1997	0	GPM		265	138
P105494W	MW 71A	Umetco Minerals Corporation	33	N	89	W	16	NENE	Abandoned & Cancelled	Abandoned 5-8-2001, Cancelled 9-21-2004	Original Supply	Monitoring	4/11/1997	0	GPM		237	224
P105495W	MW 71B	Umetco Minerals Corporation	33	N	89	W	16	NENE	Unadjudicated	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	4/11/1997	0	GPM		329	223
P105496W	MW 72	Umetco Minerals Corporation	33	N	89	W	22	NWNW	Unadjudicated	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	4/11/1997	0	GPM		85	56
P105497W	MW 73	Umetco Minerals Corporation	33	N	89	W	22	NENW	Abandoned & Cancelled	Abandoned 6-26-2002, Cancelled 9-28-2004	Original Supply	Monitoring	4/11/1997	0	GPM		153	104
P105498W	MW 74	Umetco Minerals Corporation	33	N	89	W	22	NWNW	Abandoned & Cancelled	Abandoned 8-11-2003, Cancelled 9-21-2004	Original Supply	Monitoring	4/11/1997	0	GPM		60	21
P108001W	MW78	Umetco Minerals Corporation	33	N	89	W	15	SESW	Abandoned & Cancelled	Abandoned 6-11-2002, Cancelled 9-28-2004	Original Supply	Monitoring	11/4/1997	0	GPM		150	111.45
P108002W	MW79	Umetco Minerals Corporation	33	N	89	W	15	SESW	Abandoned & Cancelled	Abandoned 6-10-2002, Acknowledged 9-28-2004	Original Supply	Monitoring	11/4/1997	0	GPM		150	118.83
P108003W	MW80	Umetco Minerals Corporation	33	N	89	W	15	SESW	Abandoned & Cancelled	Abandoned 5-30-2002, Acknowledged 9-28-2004	Original Supply	Monitoring	11/4/1997	0	GPM		155	117.48
P108004W	MW81	Umetco Minerals Corporation	33	N	89	W	10	SWSW	Abandoned & Cancelled	Abandoned 8-13-2003, Acknowledged 9-21-2004	Original Supply	Monitoring	11/4/1997	0	GPM		240	171
P108233W	GH97WW-1	Power Resources Inc.	33	N	89	W	22	N1/2	Unadjudicated	Well not located within boundary but permit allows for use within boundary. Not owned by Umetco Minerals Corporation	Original Supply	Miscellaneous	11/17/1997	100	GPM		1325	425
P114511W	MW10D	Umetco Minerals Corporation	33	N	89	W	15	SWNE	Abandoned & Cancelled	Abandoned 6-24-2002	Original Supply	Monitoring	3/10/1999	0			265	214.41
P114512W	MW24D	Umetco Minerals Corporation	33	N	89	W	15	SESW	Abandoned & Cancelled	Abandoned 6-4-2002	Original Supply	Monitoring	3/10/1999	0			210	131.51
P114513W	MW7D	Umetco Minerals Corporation	33	N	89	W	15	NESW	Abandoned & Cancelled	Abandoned 5-20-2002	Original Supply	Monitoring	3/10/1999	0			266	185.87
P114514W	MW6D	Umetco Minerals Corporation	33	N	89	W	15	NWSE	Abandoned & Cancelled	Abandoned 6-20-2002	Original Supply	Monitoring	3/10/1999	0			270	231.7
P13001R	B-Spoils Reservoir	Umetco Minerals Corporation	33	N	89	W	15	NESE	Unadjudicated	Water rights to be transferred to Department of Energy	Storage Supply	Industrial	8/27/2007	63.4	ACFT	Canyon Creek		
P130987W	HW4EX	Umetco Minerals Corporation	33	N	89	W	15	SWNW, SENW	Unadjudicated	Will request termination of water rights from State Engineers Office.	Reservoir, Original Supply	Miscellaneous	11/28/2000	0				
P144110W	MW82	Umetco Minerals Corporation** USDI, Bureau of Land Management	33	N	89	W	22	NWNW	Good Standing	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	4/26/2002				115	86
P162305W	Process Water Well #6	Umetco Minerals Corporation	33	N	89	W	10,(15)	SWSW, SESW, (NENW)	Good Standing	Well not located within boundary but permit allows for use within boundary	Original Supply	Industrial	8/16/2004				1685	90
P215W	Water Well #3	Globe Mining Co.	33	N	89	W	15	NW	Unadjudicated	Well not located within boundary but permit allows for use within boundary. Quit claim deeded to the Philp Sheep Company.	Original Supply	Industrial	8/24/1959	250	GPM		1668	20
P41022W	RHW-3	Mullen Mining Company	33	N	89	W	9	SESE	Point of Use Non Irrigation, Location of Well	Not owned by Umetco Minerals Corporation	Original Supply	Monitoring	11/16/1977	0	GPM		310	257
P43111W	CEE #1	Union Carbide Corporation	33	N	89	W	9, (10), (15), (21), (22)	NWSE, SWSE, SESE, (S1/2), (NENE, SWNE, SENE, NW, NESW, NWSW, SESW, SE), (NE), (N1/2)	Point of Use Non Irrigation	Cancelled 3-5-1984	Original Supply	Miscellaneous	3/10/1978	500	GPM		130	55
P43745W	ADOBE #1	USDI, BLM** Mullen Engineering	33	N	89	W	9	SE	Point of Use Non Irrigation, Location of Well	Not owned by Umetco Minerals Corporation	Original Supply	Miscellaneous, Industrial	6/9/1978	50	GPM			
P46771W	BS 1051	American Nuclear Corporation	33	N	89	W	21	NE	Point of Use Non Irrigation	Well not located within boundary but permit allows for use within boundary. Not owned by Umetco Minerals Corporation	Original Supply	Miscellaneous	1/13/1978	110	GPM			

Appendix B
Water Rights Within Proposed Land Transfer Boundary

Appropriation	Permit Facility Name	Permit Applicant	Tns		Rng		Section	Quarter	Status	Current Status from Umetco Documents	Supply type	Permit Uses	Permit Priority	Permit Amount	Unit	Permit Source	Permit Well Depth	Permit Static Well Depth
P46772W	MUSKRAT WELL #1	American Nuclear Corporation	33	N	89	W	21	NE	Point of Use Non Irrigation	Well not located within boundary but permit allows for use within boundary. Not owned by Umetco Minerals Corporation	Original Supply	Dewatering, Miscellaneous	2/22/1978	120	GPM			
P56W	ALJOB #1	Globe Mining Co.	33	N	89	W	15	NENW, NWNW, SWNW	Abandoned	Abandoned 11-11-80	Original Supply	Industrial, Domestic	8/29/1958	45	GPM		484	256
P57999W	PAY #1	Union Carbide Corporation	33	N	89	W	15, (22)	All, (NENE, NWNE, NENW, NWNW)	Point of Use Non Irrigation, Location of Well	Expired 12-31-85. Permit replaced by 81601, which was letter cancelled after the pit was backfilled. Refiling to replace 57999 on 1-11-1990 was necessary to change applicants' name from Union Carbide Corporation to its new subsidiary Umetco Minerals Corporation. The pit became the A-8 Pit Well.	Original Supply	Miscellaneous	5/4/1981	1200	GPM		200	97
P66157W	GUARD WELL 3A, Aka GW-3A	USDI, BLM** Union Carbide Corporation	33	N	89	W	15	SESW	Good Standing	The pump was pulled on 5-17-1983 and the well replaced by Guard Well 3B.	Original Supply	Monitoring	4/1/1983	10	GPM		158	101
P67075W	GUARD WELL 3B, Aka GW-3B	USDI, BLM** Union Carbide Corporation	33	N	89	W	15	NENW, NWNW, SW, SWSE	Abandoned & Cancelled	Abandoned 5-27-1999	Reservoir, Original Supply	Reservoir, Industrial, Miscellaneous	2/16/1984	7	GPM		159	114.1
P67076W	GUARD WELL 3C, Aka GW-3C	USDI, BLM** Union Carbide Corporation	33	N	89	W	15	NENW, NWNW, SW, SWSE	Abandoned & Cancelled	Abandoned 5-26-1999	Reservoir, Original Supply	Reservoir, Industrial, Miscellaneous	2/16/1984	10	GPM		159	105
P67077W	HDW-1	Union Carbide Corporation	33	N	89	W	15	NENE, NENW, NWNW, SW, SWSE	Point of Use Non Irrigation, Location of Well	Cancelled 10-5-1998	Reservoir, Original Supply	Reservoir, Industrial, Miscellaneous	2/8/1984	1	GPM		35	-4
P67146W	MW1, Aka MW-1A, MW-1B	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SWSE	Point of Use Non Irrigation, Location of Well	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	4/23/1984	0	GPM		79	58.24
P67147W	MW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SWSW	Abandoned & Cancelled	Abandoned 8-5-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		170	125
P67148W	MW4	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SWSE	Abandoned & Cancelled	Abandoned 7-10-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		140	82
P67149W	MW6, Aka MW6A	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	NWSE	Abandoned & Cancelled	Abandoned 6-4-99	Original Supply	Monitoring	4/23/1984	0	GPM		220	162
P67150W	MW7, Aka MW7A, MW7B	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	NESW	Abandoned & Cancelled	Abandoned 6-4-99	Original Supply	Monitoring	4/23/1984	0	GPM		220	145
P67151W	MW8	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWNE	Abandoned & Cancelled	Abandoned 6-28-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		159	57.15
P67152W	MW10, Aka MW10A, MW10B	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWNE	Abandoned & Cancelled	Abandoned 6-6-99	Original Supply	Monitoring	4/23/1984	0	GPM		160	95
P67153W	MW16, Aka MW16A	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SWSW	Abandoned	Abandonment approved 4-2-93	Original Supply	Monitoring	4/23/1984	0	GPM		200	-7
P67154W	MW17, Aka MW17A	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	NESW	Abandoned & Cancelled	Abandoned 5-18-99 and again 8-5-03!!	Original Supply	Monitoring	4/23/1984	0	GPM		160	105
P67155W	MW18	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	NWSE	Abandoned & Cancelled	Abandoned 8-6-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		80	53
P67156W	MW19	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SESE	Abandoned & Cancelled	Abandoned 8-8-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		110	67
P67157W	MW20	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	NENE	Abandoned & Cancelled	Abandoned 5-9-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		90	65
P67158W	MW21	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	SWSW	Abandoned & Cancelled	Abandoned 5-17-99	Original Supply	Monitoring	4/23/1984	0	GPM		159	-7
P67159W	MW23	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	10	NWSE	Abandoned & Cancelled	Abandoned 8-6-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		140	80
P67160W	GW1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SESW	Abandoned & Cancelled	Abandoned 5-12-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		160	105
P67161W	GW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SESW	Abandoned & Cancelled	Abandoned 5-6-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		158	114
P67162W	GW3	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SESW	Abandoned & Cancelled	Abandoned 6-12-02	Original Supply	Monitoring	4/23/1984	0	GPM		160	107
P67163W	GW4, Aka GW-4A, GW-4B	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NENW	Abandoned & Cancelled	Abandoned 6-14-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		165	112.42
P67164W	GW5	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWSE	Abandoned & Cancelled	Abandoned 5-24-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		160	100
P67165W	GW6	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNE	Abandoned & Cancelled	Abandoned 5-24-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		121	86.18
P67166W	GW7	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SESW	Point of Use Non Irrigation, Location of Well	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	4/23/1984	0	GPM		190	0.3
P67167W	GW8	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NENW	Point of Use Non Irrigation, Location of Well	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	4/23/1984	0	GPM		172	125
P67168W	PW1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	NESW	Abandoned & Cancelled	Abandoned 5-12-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		220	168
P67169W	PW2, Aka PW2A	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWSW	Abandoned & Cancelled	Abandoned May-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		220	192
P67170W	PW3, Aka PW3A	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWSW	Abandoned & Cancelled	Abandoned 5-16-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		220	148
P67171W	PW4	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NENW	Point of Use Non Irrigation, Location of Well	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	4/23/1984	0	GPM		230	100
P67172W	PW5, Aka PW5A	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NENW	Abandoned & Cancelled	Abandoned 6-27-02, Acknowledged 9-28-04		Monitoring	4/23/1984	0	GPM		160	120.72
P67173W	PW6, Aka PW6A	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NENW	Abandoned & Cancelled	Abandoned 8-14-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		136	122.39
P67174W	PW7	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWSE	Abandoned & Cancelled	Abandoned 7-8-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		260	-7
P67175W	EPW1, Aka EW-1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	16	SESE	Abandoned & Cancelled	Abandoned 8-14-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		155	110
P67176W	EPW2, Aka EW-2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNW	Abandoned & Cancelled	Abandoned 8-11-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		115	89
P67177W	EPW3, Aka EW-3	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNW	Abandoned & Cancelled	Abandoned 8-12-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		110	70

Appendix B
Water Rights Within Proposed Land Transfer Boundary

Appropriation	Permit Facility Name	Permit Applicant	Tns		Rng		Section	Quarter	Status	Current Status from Umetco Documents	Supply type	Permit Uses	Permit Priority	Permit Amount	Unit	Permit Source	Permit Well Depth	Permit Static Well Depth
P67178W	DW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SESW	Abandoned	Abandoned 6-22-92	Original Supply	Monitoring	4/23/1984	0	GPM		260	140
P67179W	DW3	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWNW	Abandoned & Cancelled	Abandoned 7-12-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		228	210
P67180W	MW30026, Aka MW30	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNW	Abandoned & Cancelled	Abandoned 8-7-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		193	77
P67181W	RW1	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNW	Abandoned & Cancelled	Abandoned 6-2-99	Original Supply	Monitoring	4/23/1984	0	GPM		130	87.04
P67182W	RW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	22	NWNW	Abandoned & Cancelled	Abandoned 8-11-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		120	76
P67183W	HW1, Aka Heap Well	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWSW	Abandoned & Cancelled	Abandoned 7-25-99 (see letter 12-18-00)	Original Supply	Monitoring	4/23/1984	0	GPM		267.6	152.35
P67184W	HW2	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	16	NESE	Abandoned & Cancelled	Abandoned 8-14-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		117	104.72
P67185W	HW3	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWNW	Abandoned & Cancelled	Abandoned 8-14-03, Acknowledged 9-21-04	Original Supply	Monitoring	4/23/1984	0	GPM		135.5	113.34
P67186W	HW4	USDI, BLM** Umetco Minerals Corporation	33	N	89	W	15	SWNW	Abandoned & Cancelled	Abandoned 7-13-02, Acknowledged 9-28-04	Original Supply	Monitoring	4/23/1984	0	GPM		155.4	123.85
P76332W	MW25	Umetco Minerals Corporation	33	N	89	W	15	NWNW	Point of Use Non Irrigation, Location of Well	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	2/19/1988	0	GPM		256	227.5
P76333W	MW26	Umetco Minerals Corporation	33	N	89	W	10	NWSW	Abandoned & Cancelled	Abandoned 8-7-03, Acknowledged 9-21-04	Original Supply	Monitoring	2/19/1988	0	GPM		160	90
P77793W	MW 28	Umetco Minerals Corporation	33	N	89	W	9	SESE	Unadjudicated	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	8/3/1988	0	GPM		282	178.4
P80432W	MW 29, Aka MWI-29	Umetco Minerals Corporation	33	N	89	W	15	NESW	Abandoned	Abandoned 9-25-96	Original Supply	Monitoring	8/4/1989	0	GPM		195	188
P80433W	MW 31, Aka MWI-31	Umetco Minerals Corporation	33	N	89	W	15	NESW	Abandoned	Abandoned 10-3-96	Original Supply	Monitoring	8/4/1989	3	GPM		180	130.77
P80434W	MW 32	Umetco Minerals Corporation	33	N	89	W	15	SESW	Abandoned & Cancelled	Abandoned 5-8-02, Acknowledged 9-28-04	Original Supply	Monitoring	8/4/1989	0	GPM		160	102
P80486W	LA 3	Lidstone & Anderson Inc.	33	N	89	W	15	SESE	Unadjudicated	Not owned by Umetco Minerals Corporation	Original Supply	Monitoring	8/14/1989	0	GPM		195	183
P80488W	LA 5	Lidstone & Anderson Inc.	33	N	89	W	22	NWNE	Unadjudicated	Not owned by Umetco Minerals Corporation	Original Supply	Monitoring	8/14/1989	0	GPM		128	115
P80489W	LA 6	Lidstone & Anderson Inc.	33	N	89	W	22	NENE	Unadjudicated	Not owned by Umetco Minerals Corporation	Original Supply	Monitoring	8/14/1989	0	GPM			
P8122R	A-9 Pit Subgrade Tailings Disposal Reservoir	Union Carbide Corporation	33	N	89	W	15	NESW, SESW, SWSE	Cancelled		Original Supply	Industrial	4/3/1980	1107.73	ACFT	Union Draw		
P8208R	Adobe Oil & Gas Corporation Evaporation Pond Reservoir	Adobe Oil & Gas Corporation	33	N	89	W	9	NESE, NWSE	Point of Use Non Irrigation, Point of Reservoir Outlet	Not owned by Umetco Minerals Corporation	Original Supply	Industrial, Miscellaneous	3/2/1979	25.82	ACFT	East Draw		
P82562W	MWC-33	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENW, NWNW)	Abandoned	Dry hole, Abandoned 8-25-93, Acknowledged 4-28-94	Original Supply	Miscellaneous	4/27/1990	2	GPM		210	121.81
P82563W	MWC-34	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENW, NWNW)	Abandoned	Dry hole, Abandoned 8-25-93, Acknowledged 4-28-94	Original Supply	Miscellaneous	4/27/1990	3	GPM		200	157.06
P82564W	MWC-35	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, SESW, (NENW, NWNW)	Abandoned	Dry hole, Abandoned 8-24-93, Acknowledged 4-28-94	Original Supply	Miscellaneous	4/27/1990	5	GPM		190	148.03
P82565W	MWC-36	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, SESW, (NENW, NWNW)	Abandoned	Dry hole, Abandoned 8-25-93, Acknowledged 4-28-94	Original Supply	Miscellaneous	4/27/1990	12	GPM		200	143.41
P82566W	MWI-37	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NWNW)	Abandoned	Abandoned 10-10-96	Original Supply	Monitoring	4/27/1990	0	GPM		240	222.9
P82567W	MWI-38	Umetco Minerals Corporation	33	N	89	W	10	SWSW	Abandoned	Abandoned 10-9-96	Original Supply	Monitoring	4/27/1990	0	GPM		230	195.88
P82568W	MWI-39	Umetco Minerals Corporation	33	N	89	W	10	SWSW	Abandoned	Abandoned 10-8-97	Original Supply	Monitoring	4/27/1990	0	GPM		253	222
P83055W	MW-21A	Umetco Minerals Corporation	33	N	89	W	10	NWSW	Unadjudicated	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	7/23/1990	0	GPM		200	165.87
P83269W	MWC-42	Umetco Minerals Corporation	33	N	89	W	10	SESW	Abandoned	Abandoned 9-20-96	Original Supply	Miscellaneous	8/15/1990	10	GPM		240	138
P84648W	MWI 43	Umetco Minerals Corporation	33	N	89	W	15	NWNW	Abandoned & Cancelled	Abandoned 7-11-02, Acknowledged 9-28-04	Original Supply	Monitoring	3/18/1991	0	GPM		240	194.8
P84650W	MWI-50	Umetco Minerals Corporation	33	N	89	W	15	NENE	Abandoned	Abandoned 9-25-96	Original Supply	Monitoring	3/18/1991	0	GPM		240	171
P84651W	MWI-51	Umetco Minerals Corporation	33	N	89	W	15	NENE	Abandoned	Abandoned 9-26-96	Original Supply	Monitoring	3/18/1991	0	GPM		240	159
P84652W	MWI-52	Umetco Minerals Corporation	33	N	89	W	15	NENE	Abandoned	Abandoned 9-27-96	Original Supply	Monitoring	3/18/1991	0	GPM		245	144
P84751W	MWC-45	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NWNE, NENW, NWNW)	Abandoned	Abandoned 9-26-96	Original Supply	Miscellaneous	3/18/1991	15	GPM		240	195.24
P84753W	MWC-47	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NWNE, NENW, NWNW)	Abandoned	Abandoned 10-1-96	Original Supply	Miscellaneous	3/18/1991	15	GPM		255	188
P84754W	MWC-48	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NWNE, NENW, NWNW)	Abandoned	Abandoned 9-24-96	Original Supply	Miscellaneous	3/18/1991	15	GPM		245	177.92
P84755W	MWC-49	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NWNE, NENW, NWNW)	Abandoned	Abandoned 9-24-96	Original Supply	Miscellaneous	3/18/1991	15	GPM		240	156.35
P85776W	ENL MWC-42, Aka MW-42	Umetco Minerals Corporation	33	N	89	W	10, (15)	NESW, SWSW, (NENW, NWNW)	Abandoned & Cancelled	Letter, dated 12-18-00, shows permit expired but backup information shows different permit numbers.	Original Supply	Miscellaneous	7/24/1991	8	GPM		240	180.58
P8641R	A-9 Pit Tailings Disposal Reservoir	Umetco Minerals Corporation	33	N	89	W	15	NESW, SESW, SWSE	Cancelled		Original Supply	Temporary, Industrial	7/27/1983	966.77	ACFT	Union Draw		
P89541W	DW-4	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NWNW, SESW)	Unadjudicated	Abandoned 5-31-02	Original Supply	Miscellaneous	9/3/1992	8	GPM		260	135
P91081W	MW-63, Aka MWI63	Umetco Minerals Corporation	33	N	89	W	15	NESW	Unadjudicated	Abandoned 10-3-96	Original Supply	Monitoring	3/19/1993	0	GPM		180	120
P91082W	MW-64, Aka MWI64	Umetco Minerals Corporation	33	N	89	W	10	SWSW	Unadjudicated	POC/ACL Well. Water rights to be transferred to Department of Energy.	Original Supply	Monitoring	3/19/1993	0	GPM		260	160
P91083W	MW-65, Aka MWI65	Umetco Minerals Corporation	33	N	89	W	15	SWNW	Unadjudicated	Abandoned 10-7-96	Original Supply	Monitoring	3/19/1993	0	GPM		180	120
P91277W	MWC 55	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, NESE, (NENE, NENW, NWNW)	Abandoned	Abandoned 10-1-96	Original Supply	Miscellaneous	3/19/1993	7	GPM		171.78	112.5

Appendix B
Water Rights Within Proposed Land Transfer Boundary

Appropriation	Permit Facility Name	Permit Applicant	Tns		Rng		Section	Quarter	Status	Current Status from Umetco Documents	Supply type	Permit Uses	Permit Priority	Permit Amount	Unit	Permit Source	Permit Well Depth	Permit Static Well Depth
P91278W	MWC 56	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NENW, NWNW)	Abandoned	Abandoned 9-20-96	Original Supply	Miscellaneous	3/19/1993	5	GPM		261	171
P91279W	MWC 57	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NENW, NWNW)	Abandoned	Abandoned 9-20-96	Original Supply	Miscellaneous	3/19/1993	6	GPM		252	165
P91280W	MWC 58	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW,SESW, (NENE, NENW, NWNW)	Abandoned & Cancelled	Abandoned 5-25-02, Acknowledged 9-28-04	Original Supply	Miscellaneous	3/19/1993	6	GPM		250	154
P91281W	MWC 59	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW,SESW, (NENE, NENW, NWNW)	Abandoned	Abandoned 9-23-04	Original Supply	Miscellaneous	3/19/1993	6	GPM		250	147
P91282W	MWC 60	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NENW, NWNW, SESW)	Abandoned & Cancelled	Abandoned 6-13-02, Acknowledged 9-28-04	Original Supply	Miscellaneous	3/19/1993	4	GPM		160	111
P91283W	MWC 61	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NENW, NWNW, SESW)	Abandoned & Cancelled	Abandoned 6-7-02, Acknowledged 9-28-04	Original Supply	Miscellaneous	3/19/1993	3.5	GPM		150	116
P91284W	MWC 62	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NENW, NWNW, SESW)	Abandoned & Cancelled	Abandoned 5-8-02, Acknowledged 9-28-04	Original Supply	Miscellaneous	3/19/1993	4	GPM		165	107
P92098W	MWC-66	Umetco Minerals Corporation	33	N	89	W	10, (15)	SWSW, (NENE, NWNE, NENW, NWNW)	Unadjudicated	Abandoned 9-25-96	Original Supply	Miscellaneous	6/18/1993	15	GPM		190	120
P93567W	LA-8	Lidstone & Anderson Inc.	33	N	89	W	22	NENE	Unadjudicated	Not owned by Umetco Minerals Corporation	Original Supply	Monitoring	12/10/1993	0	GPM		163	72.9

file

Umetco Minerals Corporation

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January 6, 2009

Mr. Keith I. McConnell, Deputy Director
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Two White Flint North
11545 Rockville Pike
Mail Stop T7E18
Rockville, Maryland 20855-2738

Subject: **Umetco Gas Hills Wyoming, POC Well GW7**
Reference: **Materials License SUA-648; Docket No. 40-0299**

Dear Mr. McConnell:

By letter dated September 9, 2008 and phone conversations with Mr. Richard Chang (NRC Project Manager) on September 4 and 8, 2008, Umetco Minerals Corporation (Umetco) informed the NRC of an issue associated with Point of Compliance (POC) well GW 7 at Umetco's Gas Hills, Wyoming site. As previously described contract workers at the site inadvertently placed bentonite in POC well GW7. This letter describes actions that have been taken to correct the issue and to provide post correction sample data for GW7.

As stated in Umetco's September 9, 2008 letter, Umetco believed that there was a reasonably good chance that the bentonite could be removed from the well and monitoring in accordance with license condition 35 could be resumed. Well cleaning was conducted by Atnip Well and Pump Service (Atnip) on October 19 and 20, 2008. This work was supervised by Umetco's consultant URS Corporation (URS) with radiological monitoring performed RSO Scott Schierman.

Well cleaning was accomplished by filling the polyvinyl chloride (PVC) well casing with a mixture of water and a small amount (about 1 liter) of a phosphate-free dispersant, Aqua Clear PFD® and the flushing of the well began. Clean water was pumped down a central pipe into the well at a rate of 100 to 150 gallons per minute (gpm) that dispersed the bentonite and brought it to the surface. The water used to clean the well had a pH of 6.0 and conductivity of 2,150 micro mhos per centimeter (μmhos/cm).

Well flushing continued and the top of the bentonite plug was reached in about 20 minutes. The top of the well screen was reached about 30 minutes later. URS observed that most of the bentonite chips were flushed to the surface. About one hour later, the bottom of the screen was reached at approximately 155 feet below the ground surface (bgs). The water/bentonite mix pumped out of the well had a pH of 8.08 and a conductivity of 2,665 μmhos/cm.

A jet cleaning tool was then inserted into the well casing and lowered in interval stages to approximately 155 feet bgs. Pressurized water was forced out of the jet cleaning tool to clean the well screen. Jet tool cleaning continued until the color of the water flowing out of the well changed from gray (indicating some bentonite mixed with water) to rusty brown (typical of groundwater at this location). A brush tool was inserted into the PVC well casing but it did not result in the flushing of any noticeable bentonite material.

Next, the well screen was purged with compressed air. The air purging process consisted of inserting a 1-inch diameter metal pipe fitted with a spade bit into the well and forcing air down the pipe at a pressure of approximately 125 to 150 pounds per square inch (psi). The compressed air entered the water column through the bottom of the pipe and agitated the water, thus further cleaning out the screen. The air purging process was performed along the entire length of the well screen and water column at a rate that did not pump the well dry. Similar to the water jet cleaning observations, the water coming out of the well initially was light gray (indicating some bentonite mixed with water) to a rusty brown (potentially indicating iron oxides being removed from the casing and annulus) and eventually to clear/colorless in appearance.

Next, as submersible well pump was placed in the well casing and groundwater was pumped from variable locations along the well screen for several hours. The water quality parameters of pH and conductivity dropped during the purging process and readings in the initially rusty colored waster were closed to a pH of 5 and conductivity readings greater than 2,000 μmhos/cm. At the end of the day on October 20th, the water quality field readings were averaging a pH of 4.5 and conductivity of less than 2,000 μmhos/cm, indicating pre-disturbance field parameters.

On October 21 2008, GW7 was sampled for a full suite of analyses to determine if the monitoring well cleaning had been successful. The first round of sample results indicated that field parameters were within the range of historical values, however, initial laboratory results did not correlate well with historical values obtained from this well. Data analysis of the initial post cleaning sampling of GW7 indicates the presence of water used in the well cleaning, i.e., dilution of formational water. Accordingly the well was sampled again on November 11, 2008. Results of the second (November 11, 2008) indicate a very good correlation to historical values from this well as noted on the attachment indicating that well cleaning was successful and accurate formational groundwater samples are being obtained from GW7.

The attached tables and time vs. concentration plots show historic sample results from GW7 as well as the most recent, November 11, 2008, post well cleaning sample results. Data from the November 11, 2008 sample event has been validated and the data set does not contain any qualifiers.

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

Sincerely,

Thomas E. Gieck
Remediation Leader

TEG/jfc
Enclosures: As stated

cc: Scott Surovchak, DOE
Steve Hall, Stoller
Karen Maestas, URS

Analyte:	Arsenic				
LocCode	Date	NDFlag	Result	Analyte	Units
GW7	17-Feb-99		0.007	Arsenic	mg/L
GW7	18-Aug-99		0.005	Arsenic	mg/L
GW7	01-Mar-00	<	0.003	Arsenic	mg/L
GW7	27-Jul-00		0.0053	Arsenic	mg/L
GW7	24-Jan-01	<	0.003	Arsenic	mg/L
GW7	20-Jul-01	<	0.003	Arsenic	mg/L
GW7	11-Jun-02		0.0018	Arsenic	mg/L
GW7	07-May-03		0.003	Arsenic	mg/L
GW7	21-Jun-04		0.0114	Arsenic	mg/L
GW7	27-May-05		0.0028	Arsenic	mg/L
GW7	11-May-06		0.0114	Arsenic	mg/L
GW7	17-May-07		0.005	Arsenic	mg/L
GW7	03-Jun-08		0.09	Arsenic	mg/L
GW7	11-Nov-08		0.0055	Arsenic	mg/L

Analyte:	Beryllium				
LocCode	Date	NDFlag	Result	Analyte	Units
GW7	17-Feb-99		0.04	Beryllium	mg/L
GW7	18-Aug-99		0.04	Beryllium	mg/L
GW7	01-Mar-00		0.046	Beryllium	mg/L
GW7	27-Jul-00		0.029	Beryllium	mg/L
GW7	24-Jan-01		0.028	Beryllium	mg/L
GW7	20-Jul-01		0.032	Beryllium	mg/L
GW7	11-Jun-02		0.028	Beryllium	mg/L
GW7	07-May-03		0.031	Beryllium	mg/L
GW7	21-Jun-04		0.0326	Beryllium	mg/L
GW7	27-May-05		0.0273	Beryllium	mg/L
GW7	11-May-06		0.03	Beryllium	mg/L
GW7	17-May-07		0.027	Beryllium	mg/L
GW7	03-Jun-08		0.0279	Beryllium	mg/L
GW7	11-Nov-08		0.0234	Beryllium	mg/L

Analyte:	Lead-210				
LocCode	Date	NDFlag	Result	Analyte	Units
GW7	17-Feb-99		20	Lead-210	pCi/L
GW7	18-Aug-99		20	Lead-210	pCi/L
GW7	01-Mar-00		28	Lead-210	pCi/L
GW7	27-Jul-00		20	Lead-210	pCi/L
GW7	24-Jan-01		20	Lead-210	pCi/L
GW7	20-Jul-01		26.8	Lead-210	pCi/L
GW7	11-Jun-02		18.1	Lead-210	pCi/L
GW7	14-Jul-03		28.8	Lead-210	pCi/L
GW7	21-Jun-04		59.8	Lead-210	pCi/L
GW7	06-Oct-04		123	Lead-210	pCi/L
GW7	27-May-05		94	Lead-210	pCi/L
GW7	03-Aug-05		27	Lead-210	pCi/L
GW7	11-May-06		41	Lead-210	pCi/L
GW7	17-May-07		27	Lead-210	pCi/L
GW7	03-Jun-08		24	Lead-210	pCi/L
GW7	11-Nov-08		21	Lead-210	pCi/L

Analyte:	Natural Uranium				
LocCode	Date	NDFlag	Result	Analyte	Units
GW7	17-Feb-99		20	Natural Uranium	mg/L
GW7	18-Aug-99		14	Natural Uranium	mg/L
GW7	01-Mar-00		19	Natural Uranium	mg/L
GW7	27-Jul-00		11	Natural Uranium	mg/L
GW7	24-Jan-01		9.7	Natural Uranium	mg/L
GW7	20-Jul-01		9.02	Natural Uranium	mg/L
GW7	11-Jun-02		10.2	Natural Uranium	mg/L
GW7	04-Nov-02	<	0.00005	Natural Uranium	mg/L
GW7	07-May-03		14.1	Natural Uranium	mg/L
GW7	21-Jun-04		12.5	Natural Uranium	mg/L
GW7	06-Oct-04		12	Natural Uranium	mg/L
GW7	27-May-05		11.9	Natural Uranium	mg/L
GW7	06-Sep-05		11.4	Natural Uranium	mg/L
GW7	11-May-06		10.9	Natural Uranium	mg/L
GW7	20-Sep-06		10.7	Natural Uranium	mg/L
GW7	17-May-07		12.2	Natural Uranium	mg/L
GW7	30-Oct-07		12.1	Natural Uranium	mg/L
GW7	03-Jun-08		12	Natural Uranium	mg/L
GW7	11-Nov-08		11.2	Natural uranium	mg/L

Analyte:	Nickel				
LocCode	Date	NDFlag	Result	Analyte	Units
GW7	17-Feb-99		0.78	Nickel	mg/L
GW7	18-Aug-99		0.7	Nickel	mg/L
GW7	01-Mar-00		0.92	Nickel	mg/L
GW7	27-Jul-00		0.74	Nickel	mg/L
GW7	24-Jan-01		0.89	Nickel	mg/L
GW7	20-Jul-01		1.05	Nickel	mg/L
GW7	11-Jun-02		1.02	Nickel	mg/L
GW7	07-May-03		1.39	Nickel	mg/L
GW7	21-Jun-04		1.23	Nickel	mg/L
GW7	27-May-05		0.957	Nickel	mg/L
GW7	11-May-06		1.04	Nickel	mg/L
GW7	17-May-07		1.08	Nickel	mg/L
GW7	03-Jun-08		0.96	Nickel	mg/L
GW7	11-Nov-08		0.95	Nickel	mg/L

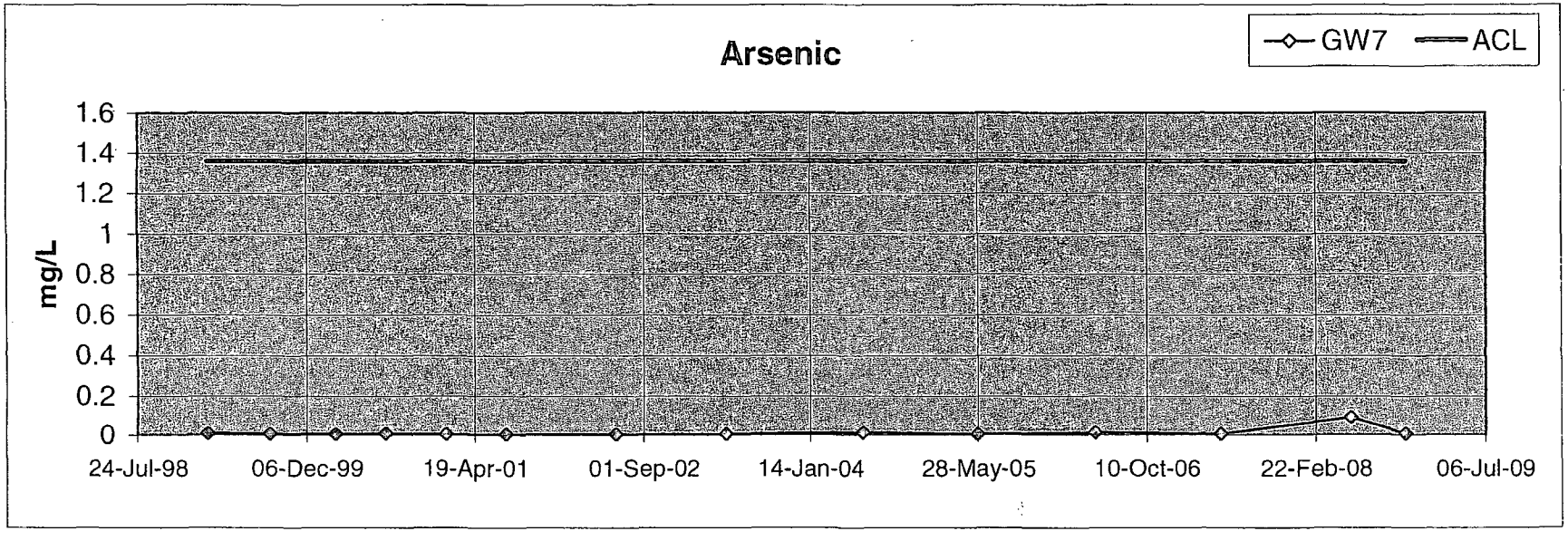
Analyte:	Radium-226 + -228				
LocCode	Date	NDFlag	Result	Analyte	Units
GW7	17-Feb-99		178.5	Radium-226 + -228	pCi/L
GW7	18-Aug-99		153	Radium-226 + -228	pCi/L
GW7	01-Mar-00		245	Radium-226 + -228	pCi/L
GW7	27-Jul-00		143.7	Radium-226 + -228	pCi/L
GW7	24-Jan-01		97.2	Radium-226 + -228	pCi/L
GW7	20-Jul-01		94.37	Radium-226 + -228	pCi/L
GW7	11-Jun-02		85.83	Radium-226 + -228	pCi/L
GW7	07-May-03		169.33	Radium-226 + -228	pCi/L
GW7	21-Jun-04		143.61	Radium-226 + -228	pCi/L
GW7	27-May-05		388.2	Radium-226 + -228	pCi/L
GW7	03-Aug-05		332	Radium-226 + -228	pCi/L
GW7	11-May-06		185.4	Radium-226 + -228	pCi/L
GW7	17-May-07		211	Radium-226 + -228	pCi/L
GW7	03-Jun-08		265.7	Radium-226 + -228	pCi/L
GW7	11-Nov-08		191	Radium-226 + -228	pCi/L

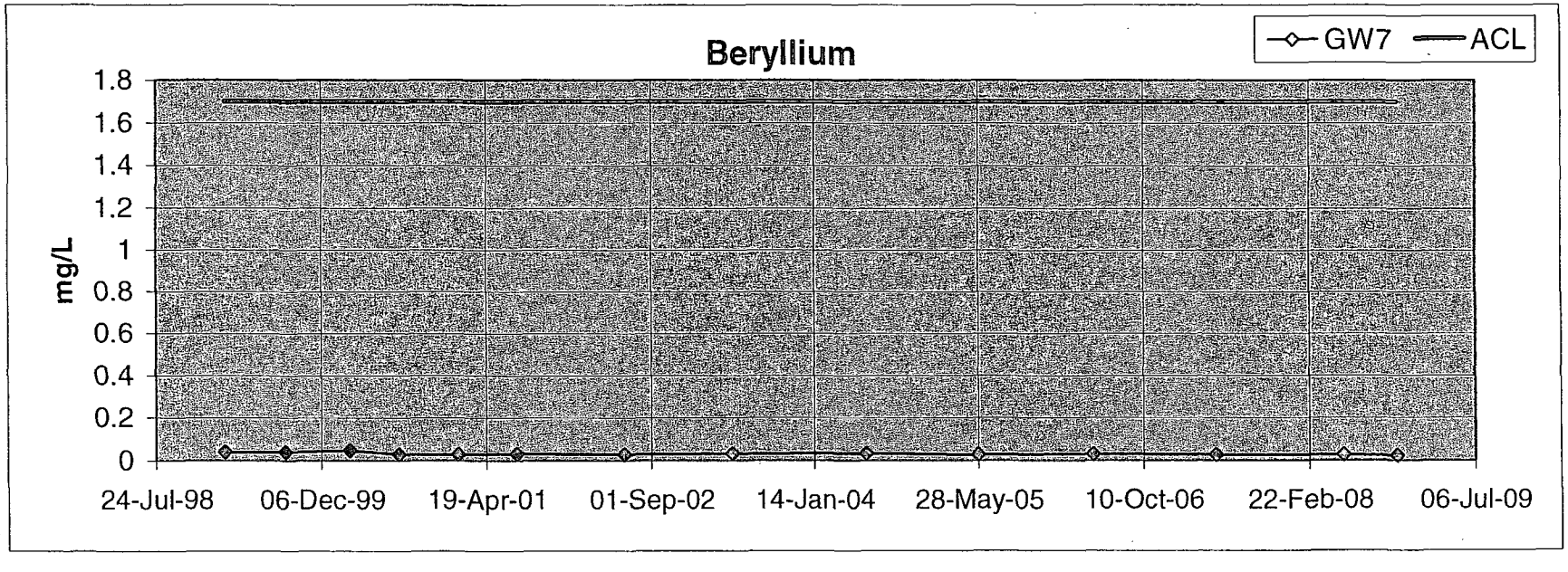
Analyte:	Selenium				
LocCode	Date	NDFlag	Result	Analyte	Units
GW7	17-Feb-99	<	0.005	Selenium	mg/L
GW7	18-Aug-99	<	0.005	Selenium	mg/L
GW7	01-Mar-00	<	0.005	Selenium	mg/L
GW7	27-Jul-00	<	0.005	Selenium	mg/L
GW7	24-Jan-01	<	0.001	Selenium	mg/L
GW7	20-Jul-01	<	0.001	Selenium	mg/L
GW7	11-Jun-02		0.002	Selenium	mg/L
GW7	07-May-03	<	0.001	Selenium	mg/L
GW7	21-Jun-04	<	0.001	Selenium	mg/L
GW7	27-May-05		0.011	Selenium	mg/L
GW7	11-May-06		0.005	Selenium	mg/L
GW7	17-May-07		0.003	Selenium	mg/L
GW7	03-Jun-08		0.09	Selenium	mg/L
GW7	11-Nov-08		0.0031	Selenium	mg/L

Analyte:	Thorium-230				
LocCode	Date	NDFlag	Result	Analyte	Units
GW7	17-Feb-99		0.9	Thorium-230	pCi/L
GW7	18-Aug-99		0.3	Thorium-230	pCi/L
GW7	01-Mar-00		-0.028	Thorium-230	pCi/L
GW7	27-Jul-00		0.48	Thorium-230	pCi/L
GW7	24-Jan-01		0.59	Thorium-230	pCi/L
GW7	20-Jul-01		0.08	Thorium-230	pCi/L
GW7	11-Jun-02		0.07	Thorium-230	pCi/L
GW7	07-May-03		0.33	Thorium-230	pCi/L
GW7	21-Jun-04		0.07	Thorium-230	pCi/L
GW7	27-May-05		0.42	Thorium-230	pCi/L
GW7	11-May-06		0.07	Thorium-230	pCi/L
GW7	17-May-07		0.35	Thorium-230	pCi/L
GW7	03-Jun-08		0.44	Thorium-230	pCi/L
GW7	11-Nov-08		1.3	Thorium-230	pCi/L

Analyte:	Chloride				
LocCode	Date	NDFlag	Result	Analyte	Units
GW7	17-Feb-99		118	Chloride	mg/L
GW7	18-Aug-99		81	Chloride	mg/L
GW7	01-Mar-00		150	Chloride	mg/L
GW7	27-Jul-00		97	Chloride	mg/L
GW7	24-Jan-01		100	Chloride	mg/L
GW7	20-Jul-01		147	Chloride	mg/L
GW7	04-Nov-02		133	Chloride	mg/L
GW7	07-May-03		199	Chloride	mg/L
GW7	21-Jun-04		207	Chloride	mg/L
GW7	06-Oct-04		183	Chloride	mg/L
GW7	27-May-05		201	Chloride	mg/L
GW7	06-Sep-05		155	Chloride	mg/L
GW7	11-May-06		202	Chloride	mg/L
GW7	20-Sep-06		210	Chloride	mg/L
GW7	17-May-07		240	Chloride	mg/L
GW7	30-Oct-07		270	Chloride	mg/L
GW7	03-Jun-08		240	Chloride	mg/L
GW7	11-Nov-08		330	Chloride	mg/L

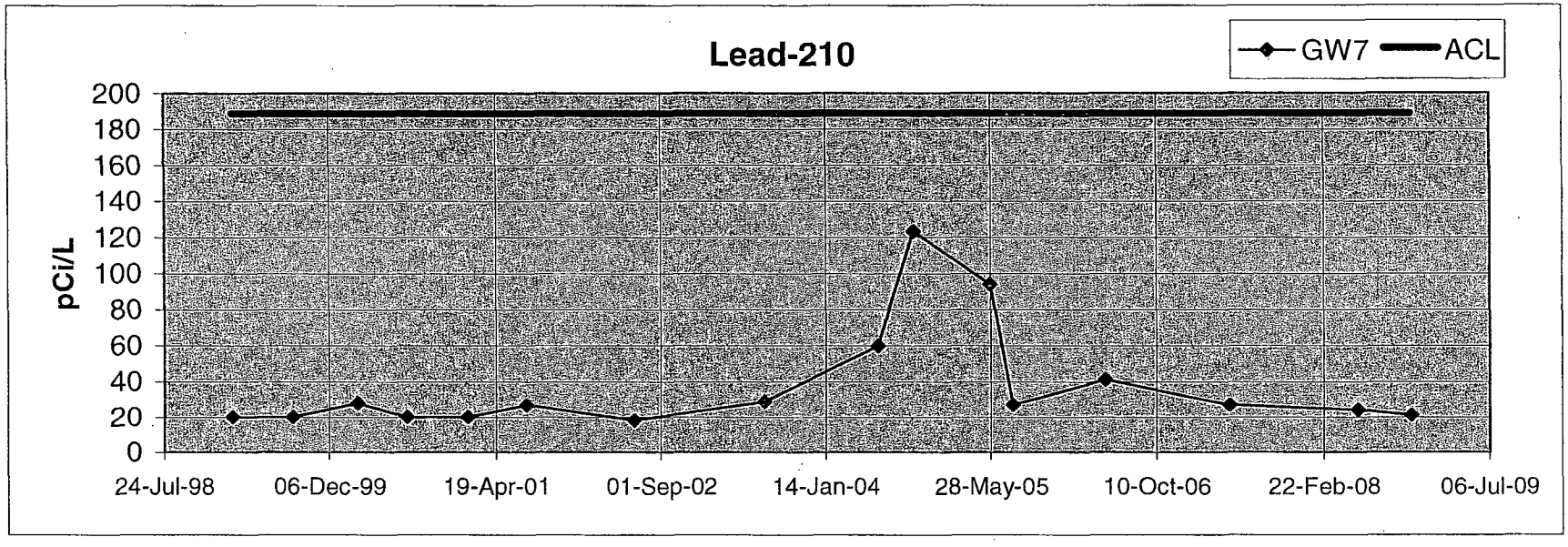
Analyte:	Sulfate				
LocCode	Date	NDFlag	Result	Analyte	Units
GW7	17-Feb-99		1660	Sulfate	mg/L
GW7	18-Aug-99		1740	Sulfate	mg/L
GW7	01-Mar-00		1900	Sulfate	mg/L
GW7	27-Jul-00		1400	Sulfate	mg/L
GW7	24-Jan-01		1210	Sulfate	mg/L
GW7	20-Jul-01		1520	Sulfate	mg/L
GW7	04-Nov-02		1330	Sulfate	mg/L
GW7	07-May-03		1530	Sulfate	mg/L
GW7	21-Jun-04		1320	Sulfate	mg/L
GW7	06-Oct-04		1310	Sulfate	mg/L
GW7	27-May-05		1250	Sulfate	mg/L
GW7	06-Sep-05		1180	Sulfate	mg/L
GW7	11-May-06		1090	Sulfate	mg/L
GW7	20-Sep-06		1090	Sulfate	mg/L
GW7	17-May-07		1180	Sulfate	mg/L
GW7	30-Oct-07		1170	Sulfate	mg/L
GW7	03-Jun-08		1070	Sulfate	mg/L
GW7	11-Nov-08		1060	Sulfate	mg/L

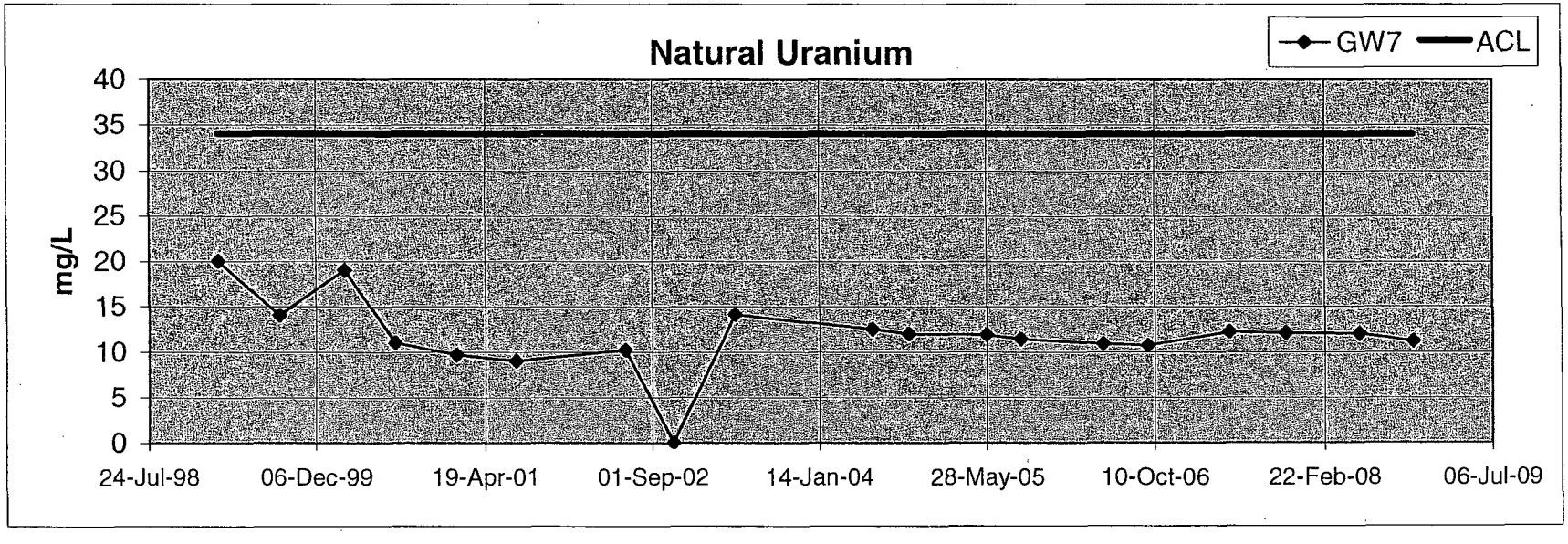




Umetco Minerals Corporation
Gas Hills, Wyoming

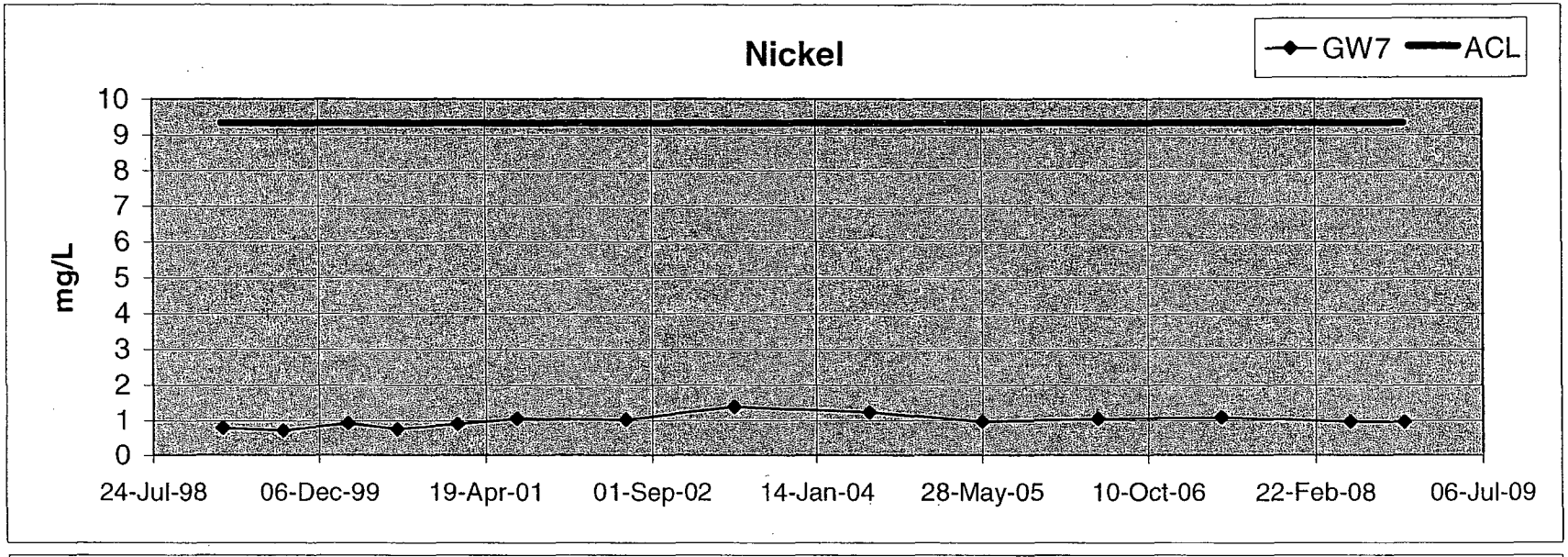
POC Well GW7
Time vs. Concentration Plots

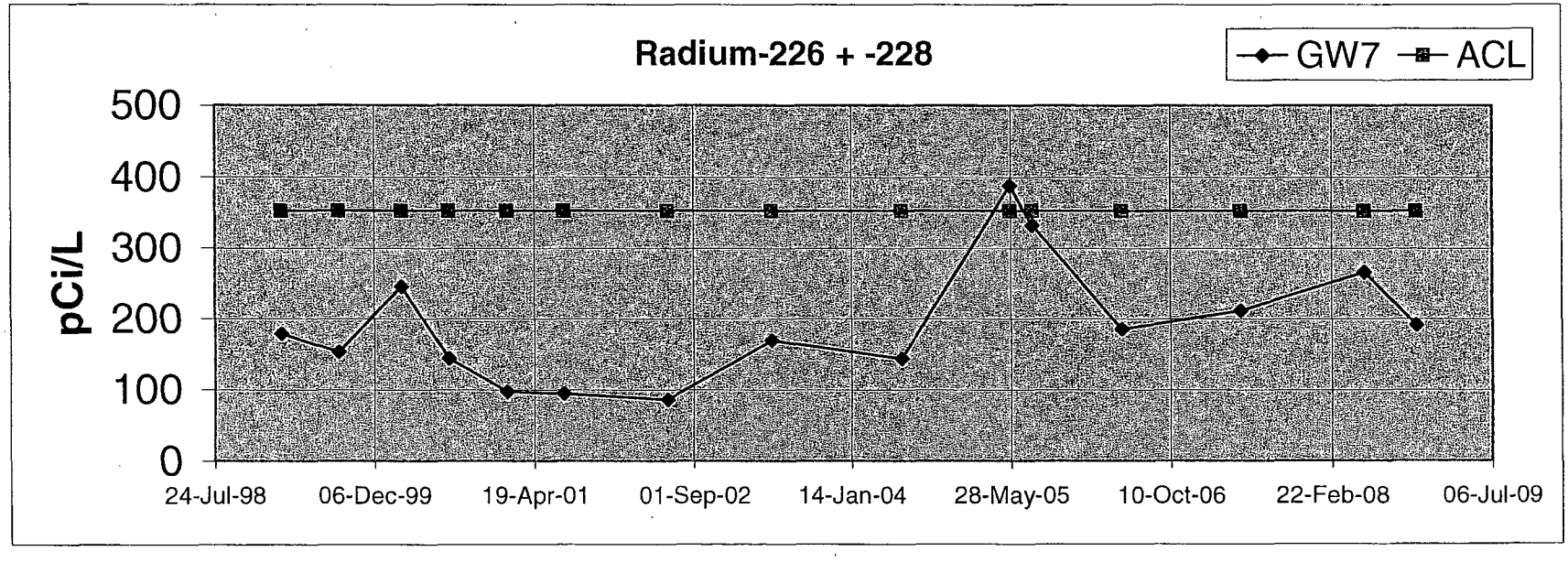


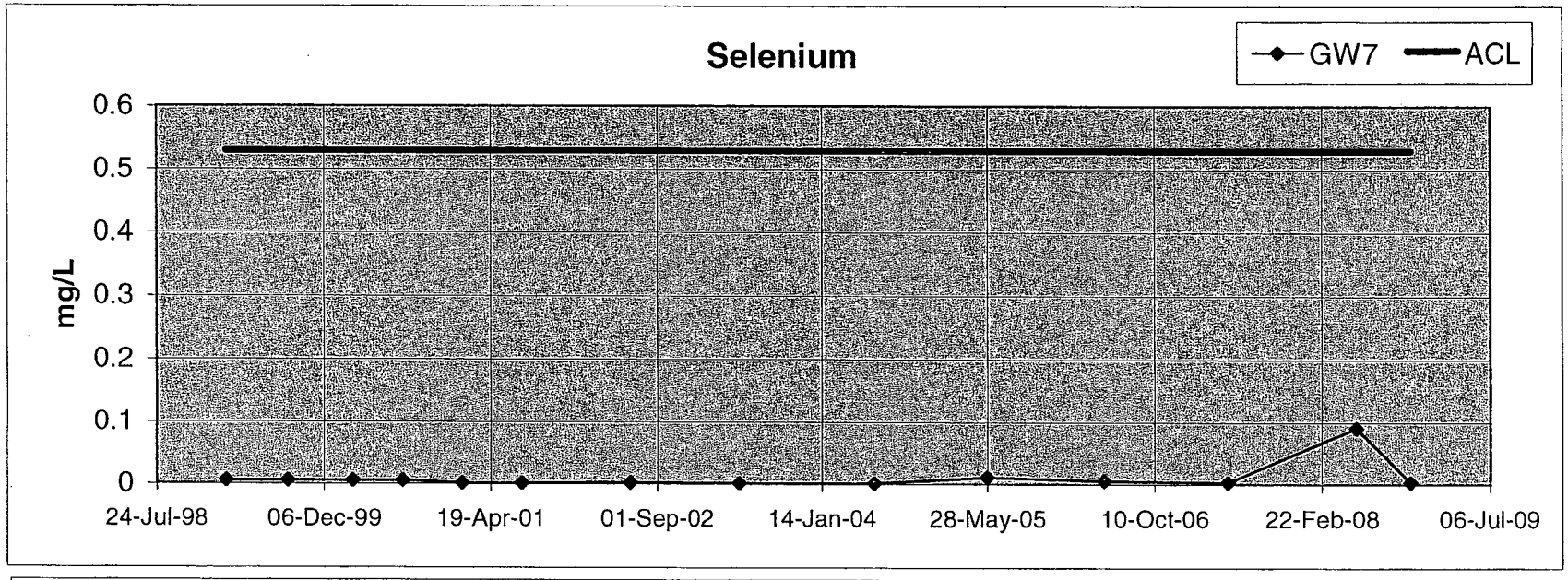


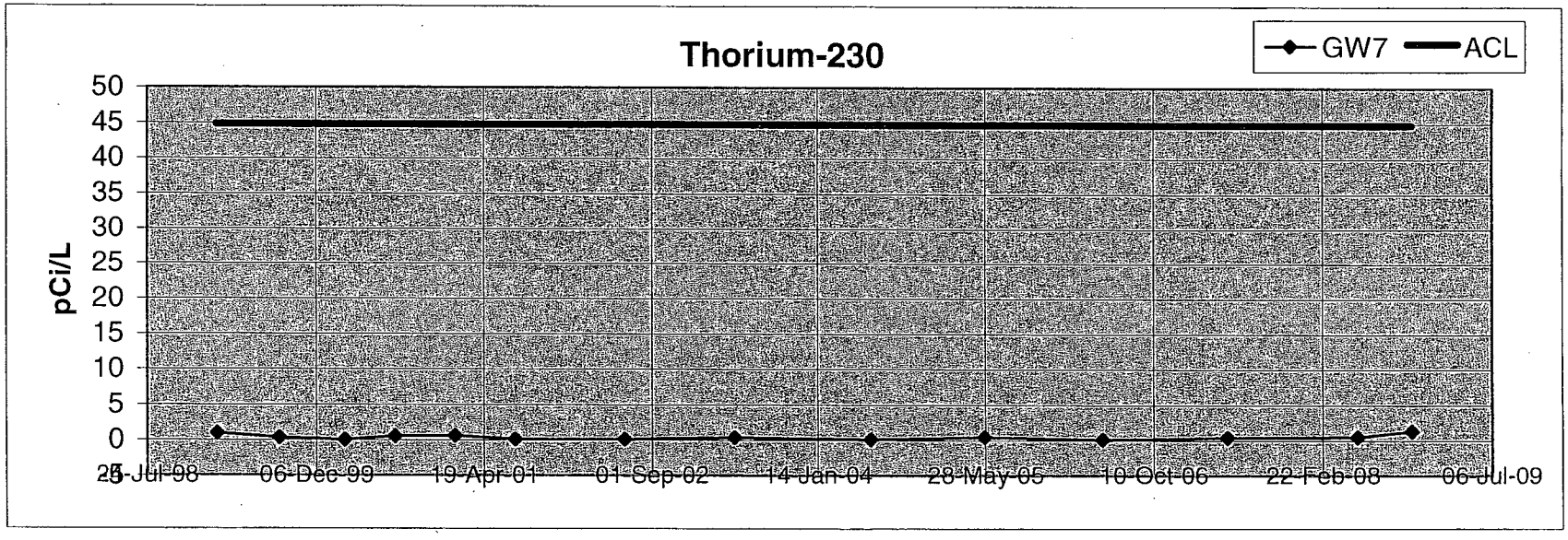
Umetco Minerals Corporation
Gas Hills, Wyoming

POC Well GW7
Time vs. Concentration Plots


Nickel
GW7
ACL
mg/L
10
9
8
7
6
5
4
3
2
1
0
24-Jul-98
06-Dec-99
19-Apr-01
01-Sep-02
14-Jan-04
28-May-05
10-Oct-06
22-Feb-08
06-Jul-09

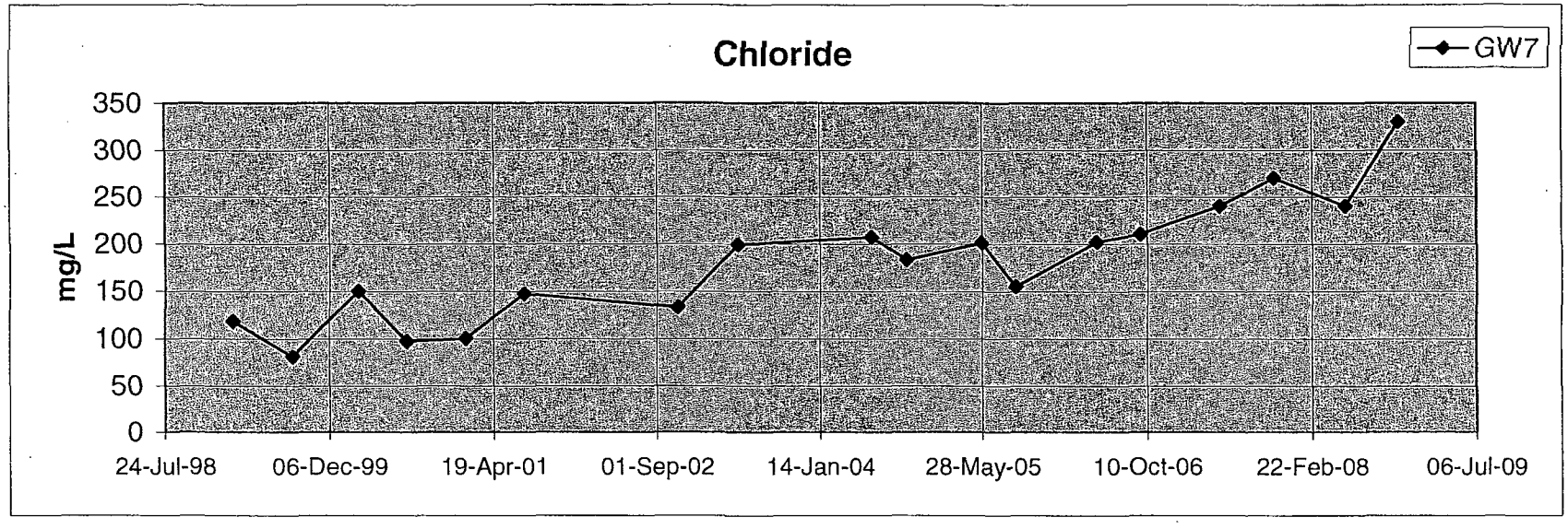

Radium-226 + -228
GW7
ACL
pCi/L
500
400
300
200
100
0
24-Jul-98
06-Dec-99
19-Apr-01
01-Sep-02
14-Jan-04
28-May-05
10-Oct-06
22-Feb-08
06-Jul-09

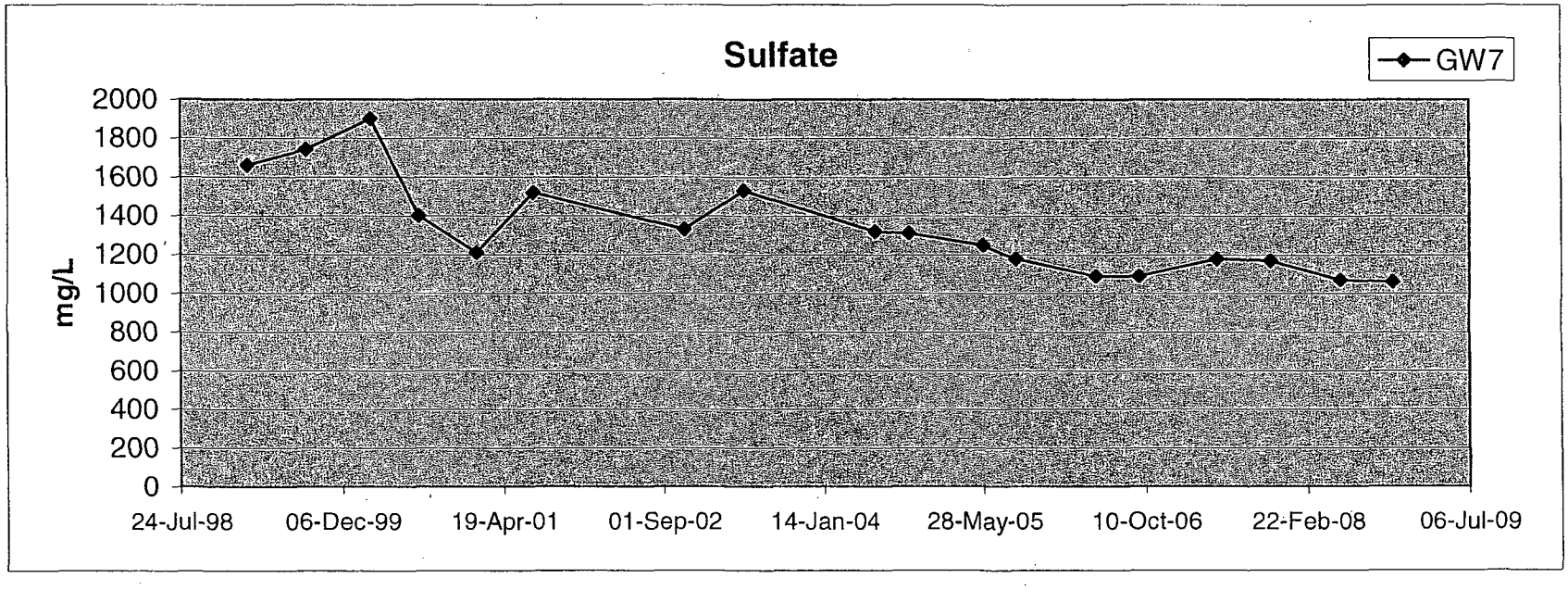




Umetco Minerals Corporation
Gas Hills, Wyoming

POC Well GW7
Time vs. Concentration Plots





Umetco Minerals Corporation
Gas Hills, Wyoming

POC Well GW7
Time vs. Concentration Plots

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

RECEIVED

JAN 27 2009

BY:_____

January 19, 2009

Mr. Thomas Gieck, Remediation Leader
Umetco Minerals Corporation
PO Box 1029
Grand Junction, CO 81502

SUBJECT: UMETCO MINERALS CORPORATION, GAS HILLS, WYOMING; MATERIALS LICENSE SUA-648; POINT OF COMPLIANCE WELL GW7

Dear Mr. Gieck:

The review of the January 6, 2009, report on the correction of point of compliance well GW7 at Umetco Minerals Corporation's Gas Hills facility has been completed. There are no further comments or concerns about this report at this time. If you have any questions, feel free to contact me at (301) 415-7188, or by e-mail at richard.chang@nrc.gov.

In accordance with 10 CFR 2.390 of the NRC "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Sincerely,

Richard Chang, Project Manager
Special Projects Branch
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No.: 40-0299
License No.: SUA-648

cc: M. Moxley, WYDEQ

RAP

Umetco Minerals Corporation

P.O. BOX 1029
GRAND JUNCTION, COLORADO 81502
☎ (970) 245-3700

September 22, 2009

Keith I. McConnell, Deputy Director
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Two White Flint North
11545 Rockville Pike
Mail Stop T7E18
Rockville, Maryland 20855-2738

Attn: Richard Chang

Reference: **Umetco Gas Hills, Wyoming; Materials License SUA-648; Docket No. 40-0299**
Subject: **One-time Groundwater Sample Event**

Dear Mr. McConnell:

Umetco Minerals Corporation (Umetco) has completed a one-time measurement of constituents of concern prior to license termination as described in NUREG-1620. The results of this sample event indicate that all of the identified constituents are well below the Maximum Contaminate Levels (MCL) established in 10 CFR 40, Appendix A, with the exception of cadmium in two of the four Point of Compliance (POC) wells. Umetco believes that the cadmium concentrations detected in two of the POC wells are erratically detected, not consistent with groundwater contamination and exclusion from the set of hazardous groundwater constituents at this site is appropriate. Accordingly, the purpose of this submittal is to provide the basis for selection of constituents for the one-time measurement, submittal of the results for the sample event and request exclusion of cadmium from the set of hazardous groundwater constituents at the Umetco Gas Hills, Wyoming site.

Results of One-Time Measurement

As recommended by Section E3.3.2(1), NUREG 1620, Umetco has completed a one-time measurement of all constituents of concern. This sample event consisted of sampling all POC wells for the four previously identified constituents of concern in the Gas Hills tailing liquor that are listed in 10 CFR 40, Appendix A, Criterion 13 but that were not included in the Gas Hills monitoring program under the NRC approved ACL application.

NUREG 1620 E3.3.2(1) identifies Constituents of Concern as "one that is (a) either (i) currently identified in 10 CFR Part 40, Appendix A, Criterion 13; or (ii) is not listed in Criterion 13, but is placed in a license condition as part of the staff review of the Corrective Action Plan; and (b) has been identified in the tailings liquor."

Umetco determined that from the list of identified constituents in the tailings liquor reported in Table 2.1 of the 2001 ACL application, that eleven constituents are also listed in 10 CFR 40, Appendix A, Criterion 13. Of these eleven, four have not been sampled in the post corrective action monitoring period. These analytes were excluded from the monitoring program with approval of NRC in Source License Amendments preceding approval of the ACL in Amendment 48. These analytes are barium, cadmium, chromium and lead.

Samples from the POC wells were collected in June 2009, and analyzed for these constituents. Results of this sampling (Table 1) indicate that all analyte concentrations are at or below the established Maximum Contaminant Level (MCL) set in Table 5C of 10 CFR 40, Appendix A.

Table 1: Analytical Results for One Time Measurement

POC	Date	Result	Analyte	Units	MCL[1] 10 CFR 40, App A Table 5C	Background Concentration
GW7	25-Jun-09	0.012	Barium	Mg/L	1	N/A
GW8	25-Jun-09	0.021	Barium	Mg/L	1	N/A
MW1	24-Jun-09	0.0076	Barium	Mg/L	1	N/A
MW21A	24-Jun-09	0.0133	Barium	Mg/L	1	N/A
GW7	25-Jun-09	0.0104	Cadmium	Mg/L	0.01	0.01
GW8	25-Jun-09	0.0101	Cadmium	Mg/L	0.01	0.01
MW1	24-Jun-09	0.0027	Cadmium	Mg/L	0.01	0.01
MW21A	24-Jun-09	0.0004	Cadmium	Mg/L	0.01	0.01
GW7	25-Jun-09	< 0.01	Chromium	Mg/L	0.05	0.05
GW8	25-Jun-09	< 0.01	Chromium	Mg/L	0.05	0.05
MW1	24-Jun-09	< 0.0005	Chromium	Mg/L	0.05	0.05
MW21A	24-Jun-09	< 0.0005	Chromium	Mg/L	0.05	0.05
GW7	25-Jun-09	0.0006	Lead	Mg/L	0.05	0.05
GW8	25-Jun-09	0.0007	Lead	Mg/L	0.05	0.05
MW1	24-Jun-09	< 0.0001	Lead	Mg/L	0.05	0.05
MW21A	24-Jun-09	< 0.0001	Lead	Mg/L	0.05	0.05

N/A – No Background Concentration Set
[1] Maximum Contaminant Level from Title 10 Code of Federal Regulations, Chapter 40, Appendix A, Table 5C
[2] Background concentrations established in Source Material License SUA-648, Amendment 15

As indicated by the sample results in Table 1, barium, chromium, lead and cadmium in the Western Flow Regime (POC Wells MW 1 and MW 21A) are well below the Maximum Contaminate Level (MCL) set in Table 5C of 10 CFR 40, Appendix A and therefore meet the requirement found in 10 CFR 40, Appendix A, 5B(5).

Sample results for cadmium in the Southwest Flow Regime (POC wells GW7 and GW 8) indicate concentrations at the MCL and accordingly warrant further discussion. It should be noted at the onset of this discussion that historical analyses for cadmium were completed using Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES). Laboratory analysis for cadmium during the one time sample event utilized ICP-Mass Spectrometry (ICP-MS). ICP-MS has typically two to three orders of magnitude better detection limits than ICP-AES. To be consistent with historical observations additional analysis utilizing the ICP-AES methodology for cadmium was conducted on the June 2009 samples from GW7 and GW8 with the following results.

Cadmium results for GW7 and GW8 using ICP-AES (method 200.7)

POC	Date	Result	Unit	Qualifiers
GW7	25-Jun-09	0.008	Mg/L	Value is between MDL and the PQL
GW8	25-Jun-09	0.012	Mg/L	Value is between MDL and the PQL

Utilizing ICP-AES (method 200.7) these two cadmium results were between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL) and as such the analysis does not reliably indicate that cadmium is in fact present in the samples. The practical quantitation limit, or PQL, is the lowest concentration at which reliable measurements can be made. The PQL is defined as *"the lowest concentration of an analyte that can be reliably measured within specified limits of precision and accuracy during routine laboratory operation conditions"* (52 FR 25690, July 8, 1987). Another way of looking at the PQL is to say that just because we can differentiate between an analyte signal and instrument noise does not mean that we can necessarily know how much of the analyte there actually is.

This result is similar to what was found in the past at the Gas Hills site. Cadmium had been found to be erratically detected and not consistent with other more confidently detected constituents in the groundwater.

Furthermore historic data for cadmium contains a significant number of data points at the detection limit making it impossible to complete any meaningful trend analysis using the recently acquired data.

Historic Evaluation of Cadmium and Hazardous Constituents:

An evaluation of background concentrations for the Upper Wind River Aquifer (aka, Southwest Flow Regime, POC wells, GW7 and GW8) was conducted on data from 1988 through 1990. Data associated with this evaluation are contained in various submittals to the NRC including:

- Second-Stage Detection Monitoring at the Umetco Minerals Corporation East Gas Hills, Wyoming Site, October, 1988. (SSDM)
- Letter Report, Proposed Site Standards for the Upper Wind River Formation, June 30, 1990.

The SSDM report provides some valuable information with respect to the occurrence of cadmium at the site. In this evaluation, Umetco proposed seven monitor wells to define background conditions of the Upper Wind River aquifer (aka, Southwest Flow Regime). This report also recommended/proposed a background concentration of cadmium of 0.01 mg/L but also reported a maximum observed concentration of 0.02 mg/L. This evaluation concluded that cadmium, silver, beryllium, barium, chromium, mercury, lead, and vanadium concentrations were detected but generally were encountered in only a few wells and did not fit the overall pattern exhibited by better-verified constituents, i.e., sample results were inconsistent from sample event to sample event.

Based on information contained in the SSDM report which evaluated 26 wells (not including the seven proposed background wells) there were two detections of cadmium as shown below. It should be noted that neither of these wells currently exist, GW4 was located in very close proximity to the existing GW7 and GW8 POC wells.

Well No.	Q1-1 3/9/1988	Q1-2 3/9/1988	Q2-1 5/18/1988	Q2-2 5/18/1988
GW4	<0.01	<0.01	0.09	0.09
PW1	<0.01	<0.01	0.11	0.13

License Amendment No. 15 (September 10, 1990) established a background value for cadmium at 0.01 mg/L and also required monitoring of cadmium as a hazardous constituent at POC wells GW7 and GW8.

In accordance with license condition 35A (Amendment 15) cadmium was sampled on a semi-annual frequency for a number of years as part of the groundwater compliance monitoring program. All subsequent sample events, except for one sample in PW1 immediately following the 5/18/1988 sample shown above, resulted in non-detection at 0.005 mg/L detection limit. These data support the conclusion in the SSDM report that cadmium, along with silver, beryllium, barium, chromium, mercury, lead, and vanadium, either were not detected or are erratically distributed and do not conform to patterns indicative of contamination from seepage.

As a result of the groundwater compliance monitoring program required by license condition 35A (Amendment 15), Umetco proposed removal of specific hazardous constituents from the groundwater monitoring program. The NRC cover letter (Attachment 1) transmitting License Amendment No. 21, dated November 1992 states in part:

"Our review of the specific hazardous constituents that are monitored indicate that cadmium, chromium, lead, molybdenum, silver, and vanadium are routinely at or below laboratory detection limits. Due to this your proposal to remove these constituents from your groundwater monitoring program will be implemented as requested."

Historic data indicate that cadmium was present in the tailings solution at a concentration ranging from 0.15 to 0.31 mg/L (Table 2.1, Umetco ACL Application). Given the close proximity of the POC wells to the repository, as shown on Figure M-1, and extent of previous sampling contained in the SSDM evaluation it is apparent that cadmium is not a mobile constituent at this site.

10 CFR 40, Appendix A, Criterion 5B(3) Evaluation:

To support Umetco's request to exclude cadmium as a hazardous constituent in groundwater at the Gas Hills site an evaluation of 10 CFR 40, Appendix A, Criterion 5B(3) was undertaken.

This evaluation is considered as cadmium may meet the requirements under Criterion 5B(2) as a hazardous constituent, it is reasonably expected to be in the byproduct material, it has been detected in the groundwater in the uppermost aquifer; and the constituent is listed in Criterion 13 of 10 CFR 40, Appendix A.

Section 5B(3) States:

5B(3) --- Even when constituents meet all three tests in paragraph 5B(2) of this criterion, the Commission may exclude a detected constituent from the set of hazardous constituents on a site specific basis if it finds that the constituent is not capable of posing a substantial present or potential hazard to human health or the environment. In deciding whether to exclude constituents, the Commission will consider the following:

(a) Potential adverse effects on ground-water quality, considering ---

- *(i) The physical and chemical characteristics of the waste in the licensed site, including its potential for migration;*
- *(ii) The hydrogeological characteristics of the facility and surrounding land;*
- *(iii) The quantity of groundwater and the direction of ground-water flow;*
- *(iv) The proximity and withdrawal rates of ground-water users;*
- *(v) The current and future uses of ground water in the area;*

(vi) The existing quality of groundwater, including other sources of contamination and their cumulative impact on the ground-water quality
(vii) The potential for health risk caused by human exposure to waste constituents
(viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents
(ix) The persistence and permanence of the potential adverse effects

(b) Potential adverse effects on hydraulically-connected surface water quality, considering ---

(i) The volume and physical and chemical characteristics of the waste in the licensed site;
(ii) The hydrological characteristics of the facility and surrounding land;
(iii) The quantity and quality of ground water, and the direction of ground-water flow;
(iv) The patterns of rainfall in the region;
(v) The proximity of the licensed site to surface waters;
(vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;
(vii) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality;
(viii) The potential for health risks caused by human exposure to waste constituents;
(ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and
(x) The persistence and permanence of the potential adverse affects.

A concise summary of the physical, chemical, hydrogeological, and flow characteristics of the Gas Hills site can be found in the NRC Technical Evaluation Report (TER) associated with Umetco's Alternate Concentration Limit Application, License Amendment 48 (March 29, 2002) which states in part:

Background:

Uranium was mined from open pits in the Wind River Formation ground water up-gradient, cross-gradient, within, and down-gradient of the Umetco facility. These mines were developed by several companies and involve approximately 684 acres. They have impacted the ground water quality as surface and ground water has flowed through the open pit mines, mine spoils, and backfilled reclaimed pits.

The mill is located within the Canyon Creek drainage, a sub-basin of the Wind River Surface Water Basin. With the exception of manmade impoundments for evaporation ponds, there are no perennial surface water bodies in the vicinity of the Umetco site. Consequently, any surface water drainage from the site is into ephemeral streams.

Current and Projected Land and Water Uses

The site is located is a sparsely populated area. The principal land use surrounding the site is uranium mining with some land used for livestock grazing and hunting on a seasonal basis. Most of the land within 8 km (5 miles) of the Umetco site is public domain under BLM jurisdiction. Only a small percentage of the land is privately owned. The nearest residence is located 8 km (5 miles) northeast and up-gradient from the site and is only inhabited on a seasonal basis. The nearest down-gradient residence is approximately 33 km (20 miles) from the Umetco site.

A water rights search showed that most of the water rights are for ground water quality monitoring purposes, with the remaining uses classified as miscellaneous, industrial, stock watering, and irrigation. All stock and irrigation uses correspond to surface water sources and not to ground water wells. With the exception of three springs located more than 2 miles west of the Umetco site (e.g., Medicine Spring, Lincoln Spring, Iron Spring) no municipal, domestic, irrigation, or stock uses of ground water in the area were identified. Water from these springs are used for stock watering and wildlife.

Widespread groundwater contamination from mining and milling has resulted in a ground water quality that is not compatible with either domestic or agricultural ground water uses. Umetco's comparison of ambient levels of constituents with Wyoming Department of Environmental Quality (WDEQ ground water quality standards indicate that background levels are compatible with a Class III (livestock) designation.

Power Resources Inc. plans to build and in situ leach facility to extract uranium from the upper aquifer south of the A-9 Repository. Since the sparse population in the Gas Hills area is expected to remain stable, the most likely future use of the ground water in this area is mining, and livestock and wildlife watering.

Hydrogeology

The Umetco site is located in the Wind River Basin of Central Wyoming. The Wind River Basin is a large sediment filled, northwest-trending structural depression that was formed as a result of Late Cretaceous and Early Cenozoic tectonic activity. The Wind River Formation was formed from the deposition of alluvial fans, stream channels, flood plains, lakes, and swamps; and is comprised of alternating and discontinuous layers of sandstone, siltstone, claystone, and conglomerate. Thickness ranges from a few feet near the basal margin to several thousand feet in the northern part of the basin. Beneath the site, the Wind River Formation is approximately 91.4 m (300 feet) thick.

Uranium occurs naturally in the Wind River Formation as roll-front deposits at the interface between oxidized and reduced rock. This deposit occurs in the Gas Hills in a section approximately 8 km (5 miles) wide by 32 km (20 miles) long in three north-trending belts.

Groundwater, for the purposes of compliance by Umetco, occurs in two flow regimes of the Wind River (upper) aquifer. The shallowest ground water beneath the A-9 Repository is defined as the Southwest Flow Regime (SWFR) and includes the upper portion of the Wind River Formation. This regime is characterized by more oxidizing conditions. The Western Flow Regime (WFR) is characterized by deeper, more reducing conditions. A mudstone unit separates the two flow regimes. In the vicinity of the site, ground water is constrained by pre Wind River deposits made up of granite, gneiss, and schist. East of the site, ground water pinches out against these deposits. Regional ground water flow is toward the northwest, with a western component north of the site. Ground water flows toward the Pathfinder Lucky Mc Uranium Mill site (Source Materials License SUA-672) which is located 8 km (5 miles) from the Umetco site.

Natural widespread ambient contamination and mill-related impacts are limited to the uppermost occurrence of ground water where oxidizing conditions predominate. As mentioned earlier, uranium was mined from open pits in the Wind River Formation up-gradient, cross-gradient, within, and down-gradient of the site. Geochemical processed related to mining and reclamation have affected ground water quality because oxygenated surface water has percolated through open-pit mines, mine spoils, and backfill materials dissolving previously reduced minerals such as uranium and radium.

To provide a conservative evaluation of the potential adverse effects on groundwater quality and potential for health risk caused by human exposure to waste constituents at the Point of Exposure (POE), Umetco utilized the geochemical model PHREEQC (Parkhurst and Appelo, 1999) which was utilized to develop ACLs for this site. This geochemical code was previously used to develop a geochemical reactive transport model which predicted that constituent concentrations would be protective of human health and the environment at the POE for 1,000-years. To be conservative in this analysis the source concentration for cadmium in the SWFR was input as 0.312 mg/L, which is the maximum observed historical concentration in the waste from the A-9 Tailings Impoundment. This source term concentration is approximately 3 to 4 times the maximum concentrations historically detected at POC wells and/or historical SSDM programs. Results of this evaluation indicate that potential cadmium in the groundwater system is expected attenuate to well below the MCL of 0.01 mg/L during the 1,000-year compliance period. Details associated with the geochemical model and results performed by Tetra Tech are provided in Attachment 2.

The POE at the Gas Hills site is the transfer boundary. The only current uses of groundwater at the Gas Hills site are for monitoring water quality with the exception of the Aljob #2 well which is being utilized for Livestock watering. The well, Aljob #2, is upgradient of the Inactive Tailings Impoundment and is therefore not impacted by waters from the tailings impoundment. There are no groundwater uses that are within the transfer area <u>and</u> down gradient of the tailings impoundment.

The 2001 ACL application notes that the range of background values indicates that ambient groundwater quality for the area is, at best, Class III. Wyoming DEQ, Water Quality Rules and Regulations, Chapter 8, Quality Standards for Wyoming Groundwaters, defines Class III waters as "suitable for livestock. The ambient quality of underground water of this suitability does not have a concentration in excess of any of the standards for Class III Groundwater of the State". The Class III concentration for cadmium is 0.05 mg/L which is well above the cadmium MQL as listed in Criterion 5C of 10 CFR 40, App. A.

There are no potential human health risks posed by cadmium exposure in groundwater at the Gas Hills site given that there are no consumptive uses of groundwater within the transfer boundary and that the model shows no cadmium concentration above the MCL at the POE.

All potential surface water receptors for the Gas Hills site are outside of the transfer boundary and therefore beyond the POE used to determine the modeled concentration for cadmium. Since cadmium at the POE is not expected to exceed the MCL there are no expected exposures at any off-site surface water receptor.

If you have any questions or require additional information regarding this submittal and request please contact me at 970-256-889 or by e-mail at gieckte@dow.com.

Regards,

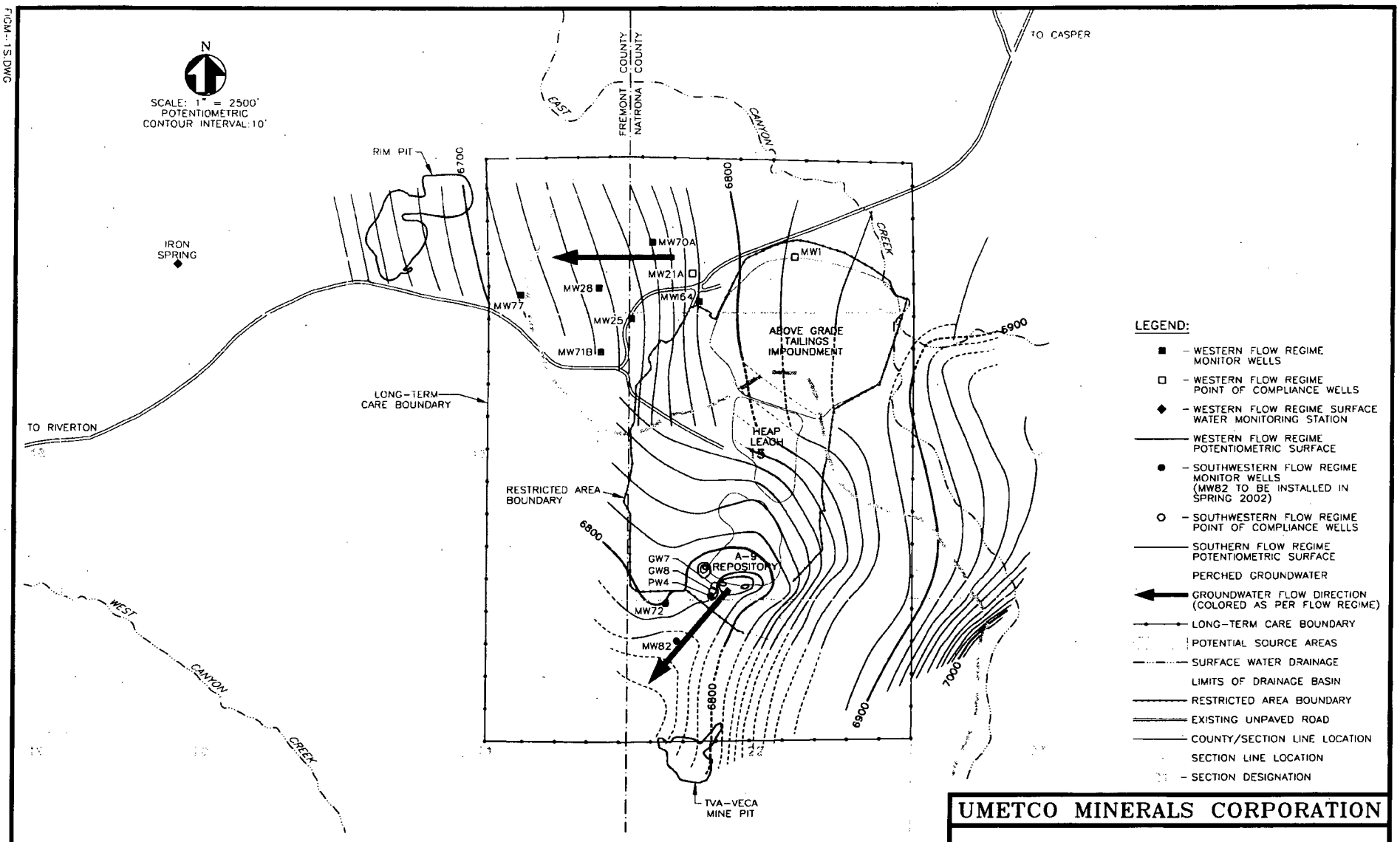
Thomas E. Gieck

Thomas E. Gieck
Remediation Leader

TEG/jfc
cc: Mr. Richard Chang, NRC Project Manager

Attachments: As stated

FIGM-1S.DWG



UMETCO MINERALS CORPORATION

MONITORING LOCATIONS

EAST GAS HILLS, WYOMING

FEBRUARY 2002

FIGURE M-1

Attachment 1

NRC Amendment 21 Approval Letter

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
URANIUM RECOVERY FIELD OFFICE
BOX 25325
DENVER, COLORADO 80225

NOV 19 1992

O-C FILE
X C JTM
JLC
BRH
COS
JSH
JFF

Docket No. 40-0299
SUA-648, Amendment No. 21

NOV 24 1992
UMETCO MINERAL CORP.
Gas Hills, Wyoming

Umetco Minerals Corporation
ATTN: Pat J. L. Lyons
General Superintendent
P.O. Box 151
Riverton, Wyoming 82501

Dear Mr. Lyons:

Our office is in receipt of your February 19, 1992, and October 1, 1992, submittals. Accordingly, we have reviewed the data contained in these submittals and have determined that the corrective action program is having a favorable effect on the ground-water levels as well as the ground-water chemistry at the site.

Our review of the specific hazardous constituents that are monitored indicated that cadmium, chromium, lead, molybdenum, silver, and vanadium are routinely at or below laboratory detection limits. Due to this, your proposal to remove these constituents from your ground-water monitoring program will be implemented as requested.

An environmental assessment for this action is not required since this action is categorically excluded under 10 CFR 51.22(c)(11), and an environmental report from the licensee is not required by CFR 51.60(b)(2).

Our review of your monitoring data and well completion details indicate that well MW-21A is in a satisfactory location to serve as a point of compliance. Due to this, a modification will be made in your license to reflect the designation of this well.

In consideration of this discussion and pursuant to Title 10, Code of Federal Regulations, Part 40, Source Material License SUA-648 is hereby amended by revising License Condition No. 35 to read as follows:

35. The licensee shall implement a ground-water compliance monitoring program containing the following:

    A. Sample Lower Wind River wells MW-1, 2, 4, 6, 7, 10, 16, 17, 18, 19, 20, 23, 24, 25, 26, 27, 30; DW-2, 3; and Upper Wind River wells EW-1, 2, 3; GW-1, 2, 3, 4, 5, 6, 7, 8; HW-2, 3, 4; PW-1, 2, 3, 4, 5, 6; and RW-2 on a semiannual frequency for arsenic,

beryllium, nickel, selenium, natural uranium, combined radium-226 and 228, thorium-230, lead-210, gross alpha, field pH, total dissolved solids, field conductivity, sulfate, iron, nitrate and chloride.

B. Comply with the following ground-water protection standards in mg/l (except where otherwise specified):

At Lower Wind River point of compliance wells MW-1 and MW-21A with background being recognized in well MW-2: arsenic = 0.05, beryllium = 0.05, nickel = 0.06, selenium = 0.01, natural uranium = 89.0 pCi/l, combined radium-226 and 228 = 31.5 pCi/l, thorium-230 = 6.6 pCi/l, lead-210 = 5.0 pCi/l, and gross alpha = 146.0 pCi/l.

At Upper Wind River point of compliance Wells GW-7 and GW-8 with background being recognized in well LA-2: arsenic = 0.05, beryllium = 0.01, nickel = 0.04, selenium = 0.01, natural uranium = 199 pCi/l, combined radium-226 and 228 = 24.9 pCi/l, thorium-230 = 4.8 pCi/l, lead-210 = 4.6 pCi/l, and gross alpha = 17.8 pCi/l.

C. Implement the Lower Wind River corrective action program described in the December 4, 1989 submittal and the Upper Wind River Corrective Action Program described in the August 28, 1989 submittal due to exceeding ground-water protection standards with the objective of returning the concentrations of hazardous constituents to the ground-water protection standards specified in Subsection (B). Additionally, a leak detection system shall be installed in the proposed Lower Wind River evaporation pond.

The corrective action program shall be fully operational as soon as practicable, but in no event later than December 15, 1990. Additionally, the licensee shall on a semiannual frequency, submit a ground-water monitoring report as well as submit a corrective action program review by September 30 of each year that describes the progress towards attaining ground-water protection standards.

D. The licensee shall use, at a minimum, the following lower limits of detection for water quality analysis in mg/l, unless otherwise noted:

arsenic = 0.01, beryllium = 0.01, nickel = 0.01, selenium = 0.005, total dissolved solids = 1.0, sulfate = 0.1, chloride = 0.1, iron = 0.1, pH = 0.1 (standard units), natural uranium = 1.0 pCi/l, combined radium-226 and 228 = 1.0 pCi/l, thorium-230 = 1.0 pCi/l, lead-210 = 1.0 pCi/l and gross alpha = 5.0 pCi/l.

[Applicable Amendments: 6, 8, 11, 15, 21]

All other conditions of this license shall remain the same. The license is being reissued to incorporate these modifications. The effect of this amendment is to modify the hazardous constituents in your monitoring program and designate well MW-21A as a lower Wind River point of compliance well.

This amendment was discussed between Mr. Moore of Umetco and Mr. Konwinski of my staff on November 9 and 10, 1992.

Sincerely,

Ramon E. Hall
Director

Enclosure:
Source Material License SUA-648

cc:
J. Hough, RCPD, WY
WDEQ

Attachment 2

Tetra Tech PHREEC Model R

TETRA TECH

3801 Automation Way, Ste [illegible]
Fort Collins, CO [illegible]
Tel 970 223 9600 Fax 970 [illegible]
www.tetratech.com

Technical Memorandum

To:	Tom Gieck, Remediation Leader	**From:**	David Levy, Ph.D.
Company:	Umetco Minerals Corporation	**Date:**	September 10, 2009
Re:	Cadmium Transport in Groundwater, East Gas Hills, Wyoming	**Project #:**	114-181939

INTRODUCTION

In March 2002, the U.S. Nuclear Regulatory Commission (NRC) authorized the amendment of Umetco Minerals Corporation (Umetco) License SUA-648 to include Alternate Concentration Limits (ACLs) for licensed constituents in groundwater at the Gas Hills Uranium Facility. The licensed constituents included As, Be, Ni, Se, U, Ra-226+228, Pb-210, Th-230, and Gross Alpha in the Western Flow Regime (WFR, Lower Wind River Aquifer) and the Southwestern Flow Regime (SWFR, Upper Wind River Aquifer). The geochemical code PHREEQC (Parkhurst and Appelo, 1999) was used to develop a geochemical reactive transport model which predicted that constituent concentrations would be protective of human health and the environment at the Point of Exposure (POE) for 1,000-years (Umetco, 2001).

In 2002, Umetco initiated a monitoring plan in accordance with revised License Condition 35, which stipulates that Umetco implement a groundwater compliance monitoring program and identify appropriate actions if the ACLs for groundwater are exceeded. Subsequent monitoring results from 2003 and 2004 showed that the ACL for Pb-210 was exceeded at SWFR Point of Compliance (POC) Well GW-7, and an evaluation of GW-7 water quality suggested that natural groundwater fluctuations were responsible for the increase in Pb-210 (Telesto, 2005a). The NRC approved a license amendment to increase the ACL for Pb-210 in the SWFR (NRC, 2006), based on results obtained using the original geochemical transport model (Umetco, 2001) with the revised Pb-210 input (Telesto, 2005b).

Soon following the approved license amendment for Pb-210 in the SWFR, the NRC requested that Umetco evaluate the sensitivity of modeled Pb-210 activities to elevated sulfate, due to observed increases in sulfate concentrations at Well GW-8. The geochemical transport model was revised a second time to reflect the higher sulfate concentrations at GW-8 (increased from 1,540 to 3,020 mg/L), and the model was run using sulfate concentrations up to 15,000 mg/L to test the sensitivity of increasing sulfate on predicted Pb-210 activity at the POE. Although the modified model indicated increased Pb-210 mobility with increasing sulfate concentrations, the predicted activity of Pb-210 remained protective of human health and the environment at the POE (Telesto, 2006).

Recently, results from groundwater monitoring have identified cadmium (Cd) at concentrations exceeding the MCL for groundwater protection (0.01 mg/L) in SWFR POC wells. In June 2009, the dissolved Cd concentrations were 0.0104 mg/L at Well GW-7 and 0.0101 mg/L at Well GW-8. However, these measured Cd concentrations are not expected to pose a significant threat to human health and the environment at the POE due to geochemical attenuation of Cd. To assess potential risks associated with Cd at the POC, the original geochemical model which was used in support of the initial ACL Application (Umetco, 2001), and modified for the subsequent license amendment, was used to evaluate Cd transport in groundwater at Gas Hills.

TETRA TECH

GEOCHEMICAL MODEL DESCRIPTION

Details of the geochemical model are presented in the original ACL Application (Umetco, 2001), however, the important components are briefly described in this section. The PHREEQC model (Parkhurst and Appelo, 1999) was originally chosen because it is a well-established code applicable to a wide range of geochemical conditions. The U.S. EPA supported MINTEQ database was used in conjunction with PHREEQC because it contains an extensive thermodynamic compilation of solubility products and solution species that is adequate for addressing a broad range of geochemical conditions involving Cd and other metals (Allison and others, 1991). Modeling of ion exchange and surface complexation of Cd and other metals utilized exchange coefficients from Appelo and Postma (1993) and surface complexation constants from Dzombak and Morel (1990).

Revisions to the existing revised model included the incorporation of otavite ($CdCO_3$), $Cd(OH)_2(a)$, and $Cd_3(OH)_4SO_4$ as solid phases which could potentially form upon oversaturation. Model runs were performed using the conservative flow rate of 0.28 ft/day (Umetco, 2001). Additional Cd inputs to the model consisted of: (1) Initial source term, (2) decreasing source term, (3) POC concentration, and (4) downgradient concentration (Umetco, 2001). The PHREEQC input file used to calculate the decreasing source term is provided in Attachment 1, and the PHREEQC transport file is provided in Attachment 2.

Source Cadmium Concentration

The source concentration for Cd in the SWFR was input as 0.312 mg/L, which is the maximum observed historical concentration from the A-9 Tailings Impoundment (Umetco, 2001).

Decreasing Cadmium Source Term

The Gas Hills geochemical model incorporates a decreasing source term to account for dewatering of the tailings impoundment and mixing with native groundwater. The decreasing source term is calculated by mixing of the A-9 tailings water with native groundwater (represented by Well LA-2) (Umetco, 2001). The Cd concentrations at LA-2 between 1989 and 1996 were less than the detectable concentration (<0.01 mg/L), therefore Cd was input into the model at ½ the detection limit value (0.005 mg/L). The PHREEQC input file used to calculate the decreasing Cd source term is provided in Attachment 1.

POC Cadmium Concentration

The input Cd concentration for the POC is the recent observed dissolved Cd concentration of 0.0101 mg/L from POC Well GW-8, measured on June 25, 2009.

Downgradient Cadmium Concentration

Well MW-72 was previously used to represent downgradient SWFR groundwater conditions in the original geochemical model. No historic Cd data are available for Well MW-72, and therefore similar to Well LA-2, a Cd concentration of 0.05 mg/L was used to represent downgradient conditions.

GEOCHEMICAL MODELING RESULTS

The geochemical modeling results for Cd are presented on Figure 1, which shows the predicted Cd concentrations at the POE for the 1,000-year simulation period. The model results indicate that attenuation of Cd in the groundwater system will be protective of human health and the environment because Cd concentrations are expected to remain below the MCL of 0.01 mg/L during the 1,000-year compliance period.

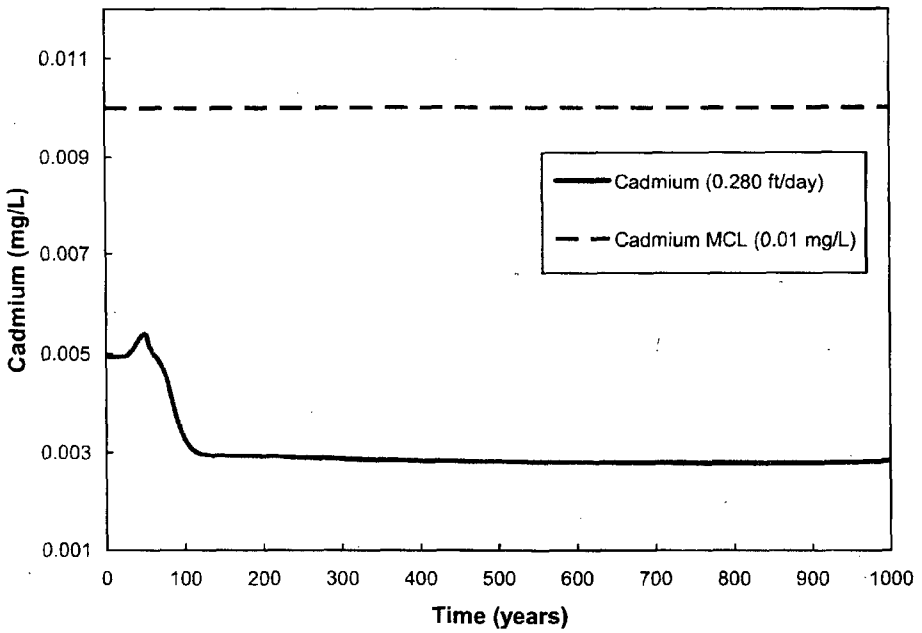


Figure 1: Modeled Cd Concentrations at the POE for the 1,000 year Simulation Period.

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Umetco Minerals Corporation (Umetco). 2001. Final Application for Alternate Concentration Limits for Gas Hills, Wyoming. November.

U.S. Nuclear Regulatory Commission (NRC). 2006. Environmental Assessment for Umetco Minerals Corporation's Uranium Mill Site, East Gas Hills, Wyoming in Consideration of an Amendment to Source Materials License SUA-648 for an Alternate Concentration Limit for Ground Water. January.

ATTACHMENT 1
PHREEQC INPUT FILE FOR DECREASING SOURCE TERM

```
#pH and Alkalinity for Source Terms: FILE: SWFRsources.in
#Mixing of A-9 Tailing Waters With LA-2

SOLUTION 1 A-9 Water

units               ppm
pe                  8
pH                  4.33
Ca                  1050
Mg                  925
Na                  652
K                   518
Cl                  161
Alkalinity  2.44 as HCO3
S                   15000
Fe                  1883
Th                  2.22e-6
Pb                  2.44e-9 #revised ACL in 2006 (189 pCi/L)
Ra                  3.57e-7
U                   34.1
As                  1.36
Se                  0.53
Ni                  9.34
Be                  1.7
Si                  56.4
Cd                  0.312 #Maximum from Table 2.1 in ACL Application
END

SOLUTION 2 LA-2

units               ppm
pe                  6
pH                  6.8
Ca                  292
Mg                  62.5
Na                  48.7
K                   18.5
Cl                  23.4
Alkalinity  7.02 as HCO3
S                   660
Fe                  8.41
Th                  1.09e-8           #neg value + uncertainty
Pb                  3.93e-11
Ra                  1.4e-8
U                   0.0817
As                  0.00025           #1/2 DL
Se                  0.0005            #1/2 DL
Ni                  0.02
Be                  0.001             #1/2 DL
Cd                  0.005             #1/2 DL
END

SELECTED_OUTPUT

      -file c:\SWFRsources.dat

USER_PUNCH

      -headings Ca Mg Na K Cl SO4 Fe Th Pb Ra U As Se Ni Be Si
      -headings USiO4(c) Uraninite RaSO4 Th(OH)4(am) Cd
```

```
10 PUNCH TOT("Ca")*40.08*1000
20 PUNCH TOT("Mg")*24.312*1000
30 PUNCH TOT("Na")*22.9898*1000
40 PUNCH TOT("K")*39.102*1000
50 PUNCH TOT("Cl")*35.453*1000
60 PUNCH TOT("S(6)")*96.0616*1000
70 PUNCH TOT("Fe")*55.847*1000
80 PUNCH TOT("Th")*232.038*1000
90 PUNCH TOT("Pb")*207.19*1000
100 PUNCH TOT("Ra")*226*1000
110 PUNCH TOT("U")*238.029*1000
120 PUNCH TOT("As")*74.9216*1000
130 PUNCH TOT("Se")*78.96*1000
140 PUNCH TOT("Ni")*58.71*1000
150 PUNCH TOT("Be")*9.0122*1000
160 PUNCH TOT("Si")*96.1155*1000
170 PUNCH SI("USiO4(c)")
180 PUNCH SI("Uraninite")
190 PUNCH SI("RaSO4")
200 PUNCH SI("Th(OH)4(am)")
210 PUNCH TOT("Cd")*112.399*1000
end


MIX 1 #33% Reduction

      1     0.66
      2     0.34
END

Mix 2 #50% Reduction

      1     0.50
      2     0.5
END

Mix 3 #75% reduction

      1     0.25
      2     0.75
END
Mix 4 #90% reduction

      1     0.10
      2     0.90

END
```

ATTACHMENT 2
PHREEQC INPUT FILE FOR CADMIUM CONCENTRATION VS. TIME AT THE POE

```
TITLE  A-9 area (SW flow regime). FILE: SWFR2td_sulfate_Cd.in
#Concentration vs Time (0 to 1000 years) at the POE
#Using flow rate of 0.28 ft/d - DECREASING SOURCE TERM TO 90% REDUCTION
#DISPERSIVITY = 50
#SOLID PHASES ALLOWED
#Revised in 2005/2006 for Pb-210/Solutions in Cells 6-54
#Sulfate in Initial Source Term and GW-8 at 3020 mg/L
#Modified Sept_09 to include Cd

PRINT
      -reset      false

KNOBS
      -iterations 100
      -tolerance 1.00E-13
      -step_size 100
      -pe_step_size 10
      -diagonal_scale TRUE
      -debug_prep FALSE
      -debug_set FALSE
      -debug_model FALSE
      -debug_inverse FALSE
      -logfile FALSE

SELECTED_OUTPUT
      -file C:\SWFR2td_sulfate_Cd.dat

USER_PUNCH

      -headings As Be Cl Pb U Ni Se SO4 Th Ra sOPb+
      -headings wOPb+ PbX2 Anglesite sOHUO2+2
      -headings wOUO2+ USiO4(C) Uraninite sONi+ wONi+
      -headings NiSe sOHRa+2 wORa+ RaX2 RaSO4 wSeO4-
      -headings wOHSeO4-2 wSeO3- wOHSeO3-2 Se(A)
      -headings FeSe2 sSO4- wSO4- sOHSO4-2 wOHSO4-2
      -headings gypsum wOTh+3 wOTh(OH)+2 wOTh(OH)2+
      -headings wOTh(OH)3 wOTh(OH)4- sH2AsO3 wH2AsO3
      -headings sH2AsO4 wH2AsO4 sHAsO4- wHAsO4- sAsO4-2
      -headings wAsO4-2 sOHAsO4-3 wOHAsO4-3 sOBe+ wOBe+
      -headings Calcite Ca Mg Na K HCO3 SO4 Cl TDS Cd
      -start
      10  REM Convert to ppm and show molalities
      20  PUNCH TOT("As")*74.9216*1000
      30  PUNCH TOT("Be")*9.0122*1000
      40  PUNCH TOT("Cl")*35.453*1000
      50  PUNCH TOT("Pb")*207.19*1000/1.29e-11
      60  PUNCH TOT("U")*238.029*1000
      70  PUNCH TOT("Ni")*58.71*1000
      80  PUNCH TOT("Se")*78.96*1000
      90 PUNCH TOT("S(6)")*96.0616*1000
      100 PUNCH TOT("Th")*232.038*1000/4.96e-8
      110 PUNCH TOT("Ra")*226*1000/1.01e-9
      120 PUNCH MOL("Hfo_sOPb+")
      130 PUNCH MOL("Hfo_wOPb+")
      140 PUNCH MOL("PbX2")
      150 PUNCH EQUI("Anglesite")
      160 PUNCH MOL("Hfo_sOHUO2+2")
      170 PUNCH MOL("Hfo_wOUO2+")
      180 PUNCH EQUI("USiO4(C)")
      190 PUNCH EQUI("Uraninite")
      200 PUNCH MOL("Hfo_sONi+")
      210 PUNCH MOL("Hfo_wONi+")
      220 PUNCH EQUI("NiSe")
```

```
      230 PUNCH MOL("Hfo_sOHRa+2")
      240 PUNCH MOL("Hfo_wORa+")
      250 PUNCH MOL("RaX2")
      260 PUNCH EQUI("RaSO4")
      270 PUNCH MOL("Hfo_wSeO4-")
      280 PUNCH MOL("Hfo_wOHSeO4-2")
      290 PUNCH MOL("Hfo_wSeO3-")
      300 PUNCH MOL("Hfo_wOHSeO3-2")
      310 PUNCH EQUI("Se(A)")
      320 PUNCH EQUI("Ferroselite")
      330 PUNCH MOL("Hfo_sSO4-")
      340 PUNCH MOL("Hfo_wSO4-")
      350 PUNCH MOL("Hfo_sOHSO4-2")
      360 PUNCH MOL("Hfo_wOHSO4-2")
      370 PUNCH EQUI("gypsum")
      380 PUNCH MOL("Hfo_wOTh+3")
      390 PUNCH MOL("Hfo_wOTh(OH)+2")
      400 PUNCH MOL("Hfo_wOTh(OH)2+")
      410 PUNCH MOL("Hfo_wOTh(OH)3")
      420 PUNCH MOL("Hfo_wOTh(OH)4-")
      430 PUNCH MOL("Hfo_sH2AsO3")
      440 PUNCH MOL("Hfo_wH2AsO3")
      450 PUNCH MOL("Hfo_sH2AsO4")
      460 PUNCH MOL("Hfo_wH2AsO4")
      470 PUNCH MOL("Hfo_sHAsO4-")
      480 PUNCH MOL("Hfo_wHAsO4-")
      490 PUNCH MOL("Hfo_sAsO4-2")
      500 PUNCH MOL("Hfo_wAsO4-2")
      510 PUNCH MOL("Hfo_sOHAsO4-3")
      520 PUNCH MOL("Hfo_wOHAsO4-3")
      530 PUNCH MOL("Hfo_sOBe+")
      540 PUNCH MOL("Hfo_wOBe+")
      550 PUNCH EQUI("Calcite")
      560 PUNCH TOT("Ca")*40.08*1000
      570 PUNCH TOT("Mg")*24.312*1000
      580 PUNCH TOT("Na")*22.9898*1000
      590 PUNCH TOT("K")*39.102*1000
      600 PUNCH MOL("HCO3-")*61.018*1000
      610 PUNCH TOT("S(6)")*96.0616*1000
      620 PUNCH TOT("Cl")*35.453*1000
      630 A = (TOT("Ca")*40.08*1000)+(TOT("Mg")*24.312*1000)
      640 B = (TOT("Na")*22.9898*1000)+(TOT("K")*39.102*1000)
      650 C = MOL("HCO3-")*61.018*1000
      660 D = TOT("S(6)")*96.0616*1000
      670 E = TOT("Cl")*35.453*1000
      680 PUNCH A+B+C+D+E
      690 PUNCH TOT("Cd")*112.399*1000
      -end
PRINT
      -selected_output  false

SOLUTION 0 # Initial Source Term

      units       ppm
      pe          8
      pH          4.33
      Th          2.22e-6
      Pb          2.44e-9   #Revised ACL 2006 (189 pCi/L)
      Be          1.7
      Ca          675   #Increased to achieve charge balance with SO4
      Mg          167   #Increased to achieve charge balance with SO4
      Na          78.7  #Increased to achieve charge balance with SO4
      K           30.1  #Increased to achieve charge balance with SO4
```

```
      Fe(2)        143   #Increased to achieve charge balance with SO4
      Cl           89
      As           1.36
      Ni           9.34
      Se           0.53
      Si           56.4
      U            34.1
      Alkalinity 2.44 as HCO3
      S(6)        3020 #recent GW-8 data, previously 2650
      Ra          3.57e-7
      Cd           0.312

SOLUTION 1-5 GW8 #2005 data replaces January 2001 data

      units        ppm
      pe           7
      pH           4.41 #Aug-05
      S(6)         3020 #May-05
      Cl           420  #May-05
      #Alkalinity 2.0   as HCO3 (no carbonate alkalinity at pH 4.4)
      Ca           675 #No recent data - increased to achieve SO4 balance
      Na           78.7 #No recent data - increased to achieve SO4 balance
      Mg           167 #No recent data - increased to achieve SO4 balance
      K            30.1  #No recent data- increased to achieve SO4 balance
      Fe(2)        143 #No recent data-increased to achieve SO4 balance
      As           0.0272 #May-05
      Be           0.22 #May-05
      Th           5.46e-8 #May-05
      Pb           2.32e-10 #May-05
      Ra           2.63e-7 #Aug-05
      Ni           3.2 #May-05
      Se           0.05 #May-05
      U            22.9 #May-05
      Cd           0.0101 #2009

SOLUTION 6-54 MW-72 # Data from MW-72 replaces MW-74 January 2001
      units        ppm
      pe           6
      pH           6.48        #Jun-04
      S(6)         1190        #Jun-04
      Cl           115         #Jun-04
      Alkalinity   400 as HCO3  #Jan-01
      Ca           580         #Jan-01
      Na           25          #Jan-01
      Mg           63          #Jan-01
      K            17          #Jan-01
      Fe(2)        4           #Jan-01
      As           0.0081      #Jun-05
      Be           0.0001      #Jun-05
      #Th          negative value reported
      Pb           2.97e-11  #Jan-01 (2.3 pCi/L)
      Ra           2.42e-8     #Jan-01
      Ni           0.0179      #Jun-05
      Se           0.017       #Jun-05
      U            0.609       #Jun-05
      #S(-2)       not measured
      Cd           0.005 #1/2/ DL

EQUILIBRIUM_PHASES 1-54
      Calcite            0.0         0.0
      Gypsum             0.0         0.0
      USiO4(c)           0.0         0.0
      Ferroselite 0.0         0.0
```

```
      Se(A)              0.0          0.0
      RaSO4              0.0          0.0
      NiSe               0.0          0.0
      Anglesite          0.0          0.0
      Otavite            0.0          0.0
      Cd(OH)2(A)         0.0          0.0
      Cd3(OH)4SO4        0.0          0.0

SURFACE 1-5
      -equilibrate 1
      Hfo_wOH    0.086      600     45.9
      Hfo_sOH    0.0021

SURFACE 6-54
      -equilibrate 6
      Hfo_wOH    0.086      600     45.9
      Hfo_sOH    0.0021

EXCHANGE 1-5
      -equilibrate 1
      X     1.2

EXCHANGE 6-54
        -equilibrate 6
      X       1.2

TRANSPORT
      -lengths           54*30.5
      -dispersivities    54*50
      -cells             54
      -shifts            6
      -punch_cells       54

PRINT
      -selected_output  true

END

PRINT
      -selected_output  false

SOLUTION 0 #33% REDUCTION

      units        ppm
      pe           5.6
      pH           4.47
      Th           1.47e-6
      Pb           1.63e-9      #Revised ACL 2006
      Ra           2.41E-07
      U            22.62
      Be           1.13
      Ca           547
      Mg           132
      Na           69
      K            98
      Fe(2)        109
      Cl           114.6
      As           0.90
      Ni           6.20
      Se           0.35
      Si           37.4
      Alkalinity 4.0 as HCO3
      S(6)         2227
```

```
      Cd          0.212

TRANSPORT
      -lengths           54*30.5
      -dispersivities    54*50
      -cells             54
      -shifts            3
      -punch_cells       54

PRINT
      -selected_output  true

END

PRINT
      -selected_output  false

SOLUTION 0 #50% Reduction

      units       ppm
      pe          5.5
      pH          4.57
      Th          1.12e-6
      Pb          1.22e-9      #Revised ACL 2006
      Ra          1.86E-07
      U           17.16
      Be          0.85
      Ca          485
      Mg          115
      Na          64
      K           24.3
      Fe(2)       76
      Cl          92.5
      As          0.68
      Ni          4.7
      Se          0.27
      Si          28.31
      Alkalinity 4.73 as HCO3
      S(6)        1847
      Cd          0.162

TRANSPORT
      -lengths           54*30.5
      -dispersivities    54*50
      -cells             54
      -shifts            7
      -punch_cells       54

PRINT
      -selected_output  true

END

PRINT
      selected_output   false

SOLUTION 0 #75% Reduction

      units       ppm
      pe          5.1
      pH          4.85
      Th          5.65E-07
      Pb          6.1e-10      #Revised ACL 2006
```

```
      Ra          1.0E-07
      U           8.62
      Be          0.43
      Ca          389
      Mg          88.9
      Na          56
      K           21.4
      Fe(2)       42
      Cl          58
      As          0.34
      Ni          2.36
      Se          0.13
      Si          14.2
      Alkalinity 5.88 as HCO3
      S(6)        1254
      Cd          0.0834

TRANSPORT
      -lengths          54*30.5
      -dispersivities   54*50
      -cells            54
      -shifts           19
      -punch_cells      54

PRINT
      selected_output   true

END

PRINT
      selected_output   false

SOLUTION 0 #90% Reduction

      units       ppm
      pe          4.4
      pH          5.27
      Th          2.33E-07
      Pb          2.45e-10    #Revised ACL 2006
      Ra          4.84e-8
      U           3.5
      Be          0.17
      Ca          331
      Mg          73.1
      Na          51.8
      K           19.7
      Fe(2)       22
      Cl          37.3
      As          0.14
      Ni          0.96
      Se          0.05
      Si          5.66
      Alkalinity 6.56 as HCO3
      S(6)        898
      Cd          0.0364

TRANSPORT
      -lengths          54*30.5
      -dispersivities   54*50
      -cells            54
      -shifts           987
      -punch_cells      54
```

```
PRINT
      -selected_output  true
END

PRINT
      -selected_output   false
```