TECHNICAL EVALUATION REPORT
UMETCO MINERALS CORPORATION
REQUEST FOR EXCLUSION OF CONSTITUENTS

DATE:	**March 17, 2010**
DOCKET NO.	**40-0299**
LICENSE:	**SUA-648**
LICENSEE:	**Umetco Minerals Corporation**
FACILITY:	**Gas Hills, Wyoming**
Project Manager:	**Richard Chang**
Technical Reviewer:	**George Alexander**

Summary and Conclusions

Umetco Minerals Corporation (Umetco) submitted a request to the U.S. Nuclear Regulatory Commission (NRC), dated September 22, 2009, to exclude cadmium from their groundwater monitoring program for the Gas Hills site, under Title 10, Code of Federal Regulations (10 CFR), Part 40, Appendix A, Criterion 5B(3). In addition, Umetco submitted a letter to NRC, dated November 19, 2009, discussing their belief that barium and lead do not need to be added to the groundwater monitoring program, as they do not pose a substantial present or potential hazard to health or the environment, and should be excluded as a hazardous constituent.

NUREG-1620 recommends a one-time, groundwater sampling and analysis of all constituents of concern, prior to license termination. NRC staff determined that barium, cadmium, chromium, and lead had not been sampled in the post-corrective action monitoring period and under 10 CFR 40, Appendix A, Criterion 5B(2), may meet the requirement as a hazardous constituent. Barium, cadmium, chromium, and lead were previously excluded by NRC staff by license amendment on the basis of being below groundwater protection standards and/or routinely at or below detection limits (NRC 1989, NRC 1992a, NRC 1992b).

In June 2009, sampling and analysis of barium, cadmium, chromium, and lead were conducted with all constituents being below the 10 CFR 40, Appendix A, Criterion 5C, Maximum Contaminant Levels (MCL), with the exception of cadmium in two of the Point of Compliance (POC) wells, as shown in Table 1. Based on the sampling results, not adding barium, chromium, and lead to the groundwater monitoring program is consistent with NUREG-1620 because these constituents are not at concentrations that would pose a hazard to human health and the environment. However, the previously approved basis for the exclusion of cadmium is no longer applicable and Umetco requested the exemption of cadmium based on 10 CFR 40, Appendix A, Criterion 5B(3).

Table 1. Analytical Results for One Time Measurement

POC	Date	Result	Analyte	Units	MCL 10 CFR, App A Table 5C	WDEQ Class III	Background Concentration
GW7	25-Jun-09	0.012	Barium	mg/L	1.00	N/A	N/A
GW8	25-Jun-09	0.021	Barium	mg/L	1.00	N/A	N/A
MW1	25-Jun-09	0.0076	Barium	mg/L	1.00	N/A	N/A
MW21A	25-Jun-09	0.0133	Barium	mg/L	1.00	N/A	N/A
GW7	25-Jun-09	0.0104	Cadmium	mg/L	0.01	0.05	0.01
GW8	25-Jun-09	0.0101	Cadmium	mg/L	0.01	0.05	0.01
MW1	25-Jun-09	0.0027	Cadmium	mg/L	0.01	0.05	0.01
MW21A	25-Jun-09	0.0004	Cadmium	mg/L	0.01	0.05	0.01
GW7	25-Jun-09	<0.01	Chromium	mg/L	0.05	0.05	0.05
GW8	25-Jun-09	<0.01	Chromium	mg/L	0.05	0.05	0.05
MW1	25-Jun-09	<0.005	Chromium	mg/L	0.05	0.05	0.05
MW21A	25-Jun-09	<0.005	Chromium	mg/L	0.05	0.05	0.05
GW7	25-Jun-09	0.0006	Lead	mg/L	0.05	0.1	0.05
GW8	25-Jun-09	0.0007	Lead	mg/L	0.05	0.1	0.05
MW1	25-Jun-09	< 0.0001	Lead	mg/L	0.05	0.1	0.05
MW21A	25-Jun-09	< 0.0001	Lead	mg/L	0.05	0.1	0.05

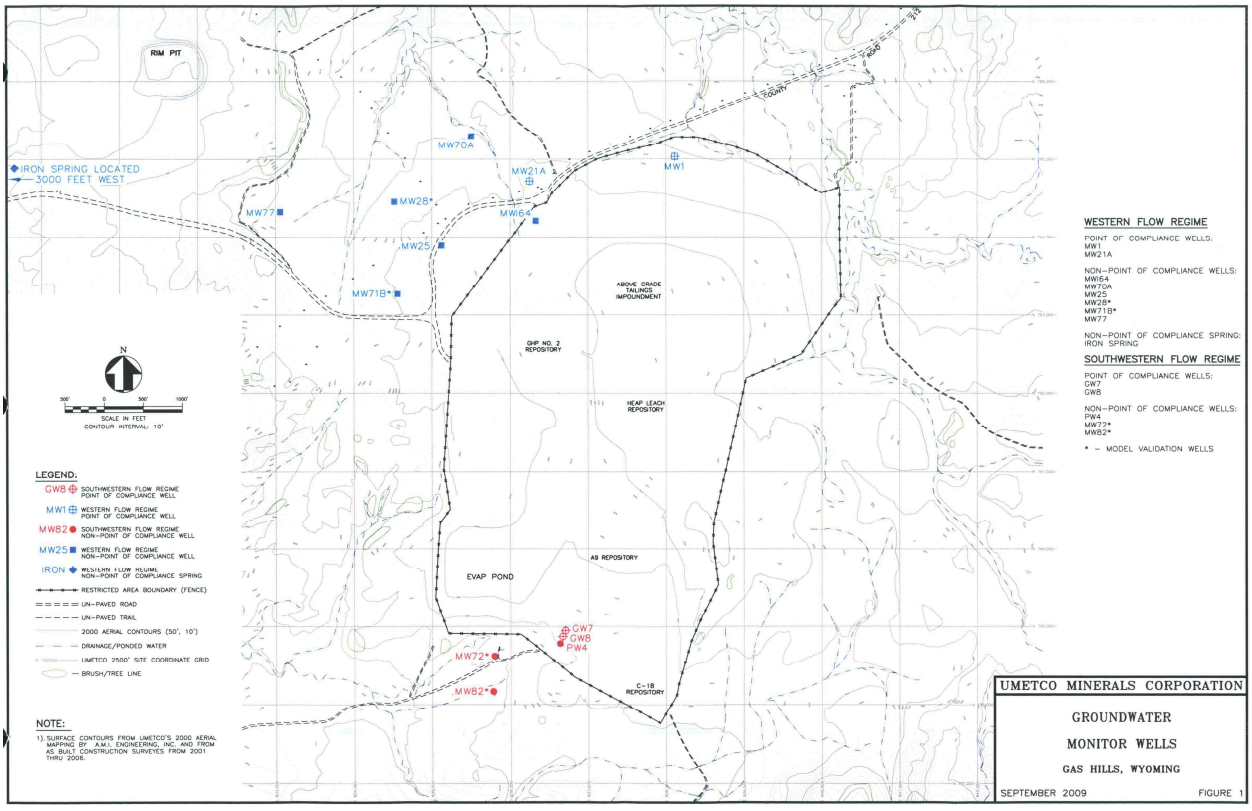

Figure 1. Groundwater monitoring wells at Gas Hills, Wyoming (Umetco, 2009c).

Based on NRC staff's review of the September 22, 2009, and November 19, 2009, submittals, Umetco has adequately demonstrated that barium, cadmium, chromium, and lead do not need to be included in the groundwater monitoring program. The concentrations are at such low levels at the Umetco Gas Hills site that these constituents will not pose a substantial present or potential future hazard to human health or the environment.

Background

The Umetco Gas Hills site is located in central Wyoming, in Fremont and Natrona Counties, as shown in Figure 1 (NRC 2008). Uranium milling was conducted at the Umetco Gas Hills site from 1960 to 1984, with reclamation of the site being completed in 2006 (NRC 2008).

Several companies have mined uranium from open pits in the Wind River Formation. Since surface water and groundwater have flowed through the open pit mines, mine spoils, and backfilled reclaimed pits, contamination of groundwater has occurred up-gradient, cross-gradient, within, and down-gradient of the Umetco facility (Umetco 2001). There are no perennial surface water bodies in the vicinity of the Umetco site (Umetco 2001). Consequently, any surface water drainage from the site is into ephemeral streams.

Hydrogeology

The Umetco site is situated on the Wind River Formation and located in the Wind River Basin of Central Wyoming (NRC 2002). The Wind River Formation was formed from the deposition of alluvial fans, stream channels, flood plains, lakes, and swamps, and is characterized as a sequence of alternating and discontinuous layers of sandstone, siltstone, claystone, and conglomerate.

Groundwater occurs in two flow regimes at the site that are separated by a mudstone unit (NRC 2002). The shallower Southwest Flow Regime includes the upper portion of the Wind River Formation and is characterized by more oxidizing conditions. The deeper Western Flow Regime includes the lower portion of the Wind River Formation, but is still part of the shallower aquifer. This aquifer is characterized by more reducing conditions. Regional groundwater flow is toward the northwest, with a western component north of the site. Groundwater 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.

Mining-related activities have affected groundwater quality as oxygenated surface water has percolated through open-pit mines, mine spoils, and backfill materials dissolving previously reduced minerals such as uranium and radium (Umetco 2001).

Current and Projected Land and Water Uses

The site is located in a sparsely populated area which, based on census projections, is expected to remain stable (NRC 2006). 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 Bureau of Land Management 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 (NRC 2002).

A water rights search showed that most of the rights are for groundwater quality monitoring purposes, with the remaining uses classified as miscellaneous, industrial, stock watering, and irrigation (Umetco 2009). All stock and irrigation uses correspond to surface water sources and not to groundwater wells. There are three, hydraulically connected springs located to the west of the Umetco site (Medicine Spring, Lincoln Spring, and Iron Spring). Water from these springs is used for stock watering and wildlife. However, these springs have not been impacted by site activities. There are no site-related water quality impacts to the aforementioned springs expected in the future (NRC 2002).

Widespread groundwater contamination from mining and milling has resulted in a groundwater quality that is compatible with a Wyoming Department of Environmental Quality (WDEQ) Class III (only suitable for livestock) use (Umetco 2001, WDEQ 2005). Accordingly, the U.S. Department of Energy (DOE) long-term surveillance and maintenance requirements will restrict any water supply well installation within the transferred area (NRC 2002).

Regulatory Framework

Under Criterion 5B(2) of 10 CFR 40, Appendix A, a constituent becomes a hazardous constituent subject to Criterion 5B(5) only when the constituent meets all three of the following tests:

(a) The constituent is reasonably expected to be in or derived from the byproduct material in the disposal area;
(b) The constituent has been detected in the groundwater in the uppermost aquifer; and
(c) The constituent is listed in Criterion 13 of 10 CFR 40, Appendix A.

Criterion 5B(3) states:

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 groundwater 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 groundwater flow;
(iv) The proximity and withdrawal rates of groundwater users;
(v) The current and future uses of groundwater in the area;
(vi) The existing quality of groundwater, including other sources of contamination and their cumulative impact on the groundwater quality;
(vii) The potential for health risks caused by human exposure to waste constituents;
(viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and
(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 hydrogeological characteristics of the facility and the surrounding land;
(iii) The quantity and quality of groundwater, and the direction of groundwater flow;
(iv) The patterns of rainfall in the region;
(v) The proximity of the 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 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 effects.

Technical Evaluation

As recommended by NUREG-1620, section E3.3.2 (1), Umetco completed a one-time measurement of all constituents of concern in anticipation of license termination. These constituents were defined 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." NRC staff determined that four constituents (barium, chromium, cadmium, and lead) were not analyzed in the post-corrective action monitoring period that were identified in the tailings liquor and listed in Criterion 13.

On April 14, 1989, NRC staff approved the exclusion of barium (NRC 1989) because it was not considered a hazardous constituent under 10 CFR Part 40, Appendix A, Criterion 5B(2). In a letter dated November 19, 1992, the NRC approved the deletion of cadmium, chromium, and lead from Umetco's monitoring program as these constituents were below regulatory standards as well as routinely at, or below, detection limits (NRC 1992a, NRC 1992b).

Samples from the POC wells were collected and analyzed for these four constituents. All of the constituent concentrations were below the MCL with the exception of cadmium in two of the POC wells, as shown in Table 1.

Barium

As stated in the letter dated November 19, 2009, the barium concentration in the tailing fluids ranged from <0.01milligrams per liter (mg/L) to 0.14 mg/L (Umetco 2009b). Section 4.1.3 (3)(a) of NUREG-1620 states:

"…NRC may decide to exclude a constituent if the dissolved concentration of the constituent in the tailing fluids is equal to or less than the maximum value for groundwater protection listed in 10 CFR Part 40, Appendix A, Table 5C."

Given that concentrations in the tailings fluid were no greater than 0.14 mg/L and based on the likelihood that barium will be diluted in the aquifer, it is reasonable to expect concentrations to remain below the maximum value for groundwater protection for barium of 1.0 mg/L in Table 5C of Appendix A of 10 CFR Part 40. Accordingly, NRC staff finds that barium should remain excluded from the set of hazardous constituents.

Cadmium

Under 10 CFR 40, Appendix A, Criterion 5B(2), cadmium may meet the requirement as a hazardous constituent as concentrations were above the MCL of 0.01 mg/L. The detected concentrations of cadmium were 0.0104 mg/L at POC well GW7 and 0.0101 mg/L at POC well GW8.

In consideration of 10 CFR 40, Appendix A, Criterion 5B(3), NRC staff believes that cadmium would not pose a substantial present or potential hazard to human health or the environment.

In a letter dated September 22, 2009, Umetco assessed the potential risks associated with cadmium based on a previously approved geochemical model, PHREEQC (NRC 2002, Umetco 2009, Umetco 2001). Independent analysis by NRC staff verified that retardation and attenuation are likely to result in cadmium concentrations well below the NRC approved background concentration of 0.01 mg/L (NRC, 1990) at the Point of Exposure for 1,000 years. In addition, using sampled concentrations from the tailings liquors and conservative parameters, NRC staff estimates that cadmium transport will not affect the Point of Exposure within 1,000 years [meeting 10 CFR 40, Appendix A, Criterion 5B(3)(a)(i), (ii), (vii), (ix)].

The Umetco Gas Hills site is located in an area that is expected to remain sparsely populated. The nearest down-gradient residence is located approximately 33 kilometers (20 miles) away. Natural mineralization and extensive mining operations in the vicinity of the site have resulted in ambient groundwater quality that is compatible with a WDEQ Class III designation that is suitable for livestock. Under provisions of the DOE's long term surveillance and maintenance requirements, installation of drinking water wells within the transfer area will be prohibited [meeting 10 CFR 40, Appendix A, Criterion 5B(3)(a)(iii), (iv), (v), (vi)].

As contaminated groundwater from the Umetco Gas Hills site is not hydraulically connected to any surface water bodies and any groundwater use will be limited to livestock watering, NRC staff finds that wildlife, crops, vegetation, and physical structures will not likely be exposed to cadmium concentrations derived from the site [meeting 10 CFR 40, Appendix A, Criterion 5B(3)(a)(viii)].

The nearest surface water body that is hydraulically connected to the groundwater is located 2 miles to the west of the site. It has been determined that no future contamination of these surface water bodies is expected (NRC 2002). Accordingly, NRC staff finds that potential adverse effects on hydraulically-connected surface water bodies, derived from the Umetco Gas Hills site, are highly unlikely. Therefore, NRC staff agrees with the request to exclude cadmium from the set of hazardous constituents since all criteria in 10 CFR 40, Appendix A, Criterion 5B(3)(b) are met.

Chromium and Lead

As stated in the letter submitted by Umetco on November 19, 2009, chromium and lead concentrations are below the established MCL set in Criterion 5C of 10 CFR 40, Appendix A. According to NUREG-1620, Section 4.1.3 (3)(a):

> New constituents will not be required at the time of the license termination monitoring submittal, unless the one-time, pre-termination groundwater sampling identifies constituents at concentrations that pose a hazard to human health and the environment.

As shown in Table 1, chromium and lead concentrations are significantly below the MCL, which have been determined to be protective of human health and the environment. Therefore, NRC staff finds that chromium and lead should remain excluded from the monitoring program.

Conclusion

Based on the NRC staff review of the September 22, 2009, and November 19, 2009, submittals, Umetco has demonstrated that groundwater concentrations of barium, cadmium, chromium, and lead at the Umetco Gas Hills site will not pose a substantial present or potential hazard to human health or the environment. NRC staff has determined that the previous exclusions for barium, chromium and lead are still applicable, and the exclusion from consideration of cadmium under 10 CFR 40, Appendix A, Criterion 5B(3) is acceptable. Therefore, no license amendment is required for this action.

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