

**Monitoring Report for
CSMRI Site
First Quarter 2008**

Prepared for:

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1. Introduction

This report presents the first quarter (January, February, and March) 2008 results for groundwater monitoring and surface water monitoring conducted at the Colorado School of Mines Research Institute (CSMRI) site in Golden, Colorado. The monitoring was conducted by the S.M. Stoller Corporation (Stoller).

2. Sampling and Analysis

Stoller obtained quarterly samples of groundwater and surface water on February 26, 27, and 28, 2008 from 10 groundwater monitoring wells and two surface water sample locations. Groundwater quality samples were obtained on February 26 (CSMRI-10 and CSMRI-11), February 27 (CSMRI-1, CSMRI-4, CSMRI-5, CSMRI-8, and CSMRI-9), and February 28 (CSMRI-1B, CSMRI-2, CSMRI-6B). Monitor well CSMRI-7B did not provide sufficient volume of water for sampling.

Surface water samples were collected from surface water location SW-1 on February 27 and from SW-2 on February 26. Aqueous samples were placed in iced coolers and couriered to Paragon Analytics Laboratory, Inc. of Fort Collins, Colorado for analysis.

The two air samplers located on the CSMRI site that were in place for monitoring airborne particulates during soil removal activities were removed in December 2007.

Figure 1 presents the monitor well and surface water sample locations. The figure also presents a groundwater potentiometric surface elevation map based on depth to groundwater relative to the surveyed top-of-casing for the time periods of February 26 through February 28, 2008. The elevation of the groundwater potentiometric surface at the time of sampling is posted adjacent to each monitor well location. The figure indicates a northeasterly component of flow for groundwater located on the bench terrace above the Clear Creek floodplain.

2.1 Groundwater Sampling

Groundwater samples were obtained from all monitoring wells except from CSMRI-7B. Monitor wells CSMRI-1B, CSMRI-6B, CSMRI-7B, CSMRI-8, CSMRI-9, CSMRI-10, and CSMRI-11 were installed in February 2007. Monitor well as-built construction diagrams and borehole lithology were provided in Appendix I of the March 2007 quarterly report.

Water quality samples were collected following the procedures outlined in Appendix A, Groundwater Sampling Procedures. All monitor wells have depth to water measured relative to top-of-casing to the nearest 1/100th of a foot (0.01) prior to sample purging. Graphs of water table elevation are presented as Figure 2 for monitor wells CSMRI-1, CSMRI-4, and CSMRI-5, and as Figure 3 for monitor well CSMRI-2. The hydrograph figures (Figures 2 and 3) present data for the four monitor wells that have been measured quarterly since March 2005. As potentiometric surface data are developed for the seven monitor wells that were installed in February 2007, the data will be incorporated into hydrographs.

The Figure 2 hydrograph reflects the seasonal trends of flow in Clear Creek due to the proximity of select monitor wells to the creek. Monitor well CSMRI-1 is located upstream of CSMRI-4

and CSMRI-5, which accounts for the difference in elevation of the water table between the wells as shown on Figure 2.

The Figure 3 hydrograph for monitor well CSMRI-2, located near the southeast corner of the freshman parking lot on West Campus Drive and the Welch Ditch, reflected the use of and leakage from the adjacent irrigation ditch during the summer months in 2005 and 2006 by a rise in the potentiometric surface. Since 2007 the seasonal variability previously observed appears to have diminished and the potentiometric surface has stabilized.

Sample collection field forms that record the water quality parameters of the monitor well water as it is purged and the volume removed are provided in Appendix B, Sample Collection Forms. After parameter stabilization, the water samples are filtered through a 0.45 micron (μ) filter, collected in laboratory-provided containers, and preserved in the field as appropriate for the analyte and analytical method.

2.2 Surface Water Sampling

Surface water samples from Clear Creek were collected from two locations: one upstream of the site and one downstream of the site as shown on Figure 1. Samples were collected on February 26, 2008 for SW-2 and February 27, 2008 for SW-1. The surface water samples were collected following the procedures outlined in Appendix C, Surface Water Sampling Procedures. Surface water samples are filtered through a 0.45 μ filter, collected in laboratory-provided containers, and preserved in the field as appropriate for the analyte and analytical method.

A graph of the stream flow in Clear Creek during the first quarter from January 2008 through March 2008 is attached as Figure 4. Tabular representation of the data indicates estimated values of flow between 45 and 48 cubic feet second (cfs) between the sample dates of February 26 through February 28 at the USGS Golden, Colorado Clear Creek gauging station (USGS Surface Water Online Database).

2.3 Analyses

All samples collected were analyzed using a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)-certified analytical laboratory. The results received from the laboratory were evaluated based on the following parameters:

- Data completeness
- Holding times and preservation
- Instrument initial calibrations
- Instrument performance checks
- Preparation blanks
- Duplicate sample results
- Laboratory control samples results
- Compound quantization and reporting limits (full validation only)

As a quality control/quality assurance (QA/QC) check, an equipment blank sample was collected in the field by pouring distilled water through a sample bailer and submitting the filtered aqueous sample for the identical analytical parameters as the groundwater and surface water samples.

The results of the equipment blank analyses did not identify any interferences or anomalies in the laboratory data.

Review of the radiological activity results indicate the isotopic thorium results are qualified as 'Rejected' due to a failure of the laboratory control sample (LCS) below the lower limit of 30 percent at 13.9 percent. The thorium (Th-232) method blank activity exceeded the minimal detectable concentration (MDC) in the aqueous batch; all Th-232 results are qualified as Estimated.

Correspondence from Paragon Analytics indicates a non-conformance with lab sample number 0802225-4. This lab sample number corresponds to CSMRI sample SW-2 and is the Clear Creek downstream surface water sample. The correspondence states that Detector 9 was below the lower beta control limit for the daily efficiency checks when this sample was analyzed. The non-conformance report further states that activity in the sample is potentially biased low by 3.17 percent. The slight biasing is not anticipated to significantly affect the activity results of this sample. A copy of the non-conformance report is presented in Appendix D, Data Validation Reports.

2.3.1 Groundwater Quality Analyses

Paragon Analytics Laboratory, Inc. conducted laboratory analyses of the aqueous samples. The groundwater and surface water samples were analyzed for the metals: Ag (silver), As (arsenic), Ba (barium), Ca (calcium), Cd (cadmium), Cr (chromium), Hg (mercury), K (potassium), Mg (magnesium), Mo (molybdenum), Na (sodium), Pb (lead), Se (selenium), V (vanadium), and Zn (zinc) as well as the radioisotopes: radium (Ra-226 and Ra-228), thorium (Th-228, Th-230, and Th-232), and U (uranium). Since the first quarter of monitoring in February 2005, the concentration of total uranium in micrograms per liter ($\mu\text{g/l}$) had been analyzed using Paragon method 714R9. In this method, the concentration of uranium is calculated based on the activity of the uranium isotopes U-234, U-235, and U-238. Effective with the first quarter 2007 sampling event, the concentration of uranium is now analyzed using mass spectrometry method EPA 6020, which analyzes for total uranium and not for the activity of the individual isotopes. The results of these analyses are presented in Appendix E on a compact disk as a series of Excel spreadsheets. Appendix F presents copies of the Chain-of-Custody for the CSMRI samples.

A summary of groundwater results for radioisotopes and metals is presented in Table 2-1 and Table 2-2, respectively. Groundwater parameters are reported as dissolved concentration in milligrams per liter (mg/l) for metals; picoCuries per liter (pCi/l) for radioisotopes; and micrograms per liter ($\mu\text{g/l}$) for uranium. Groundwater samples were measured onsite for temperature, pH, and specific conductance during the purging and sampling process. Onsite measurement parameters are presented on the sample collection forms in Appendix B.

2.3.2 Surface Water Analyses

A summary of Clear Creek surface water results for radioisotopes and metals is presented in Table 2-3 and Table 2-4, respectively. Surface water parameters are reported as dissolved concentration in mg/l for metals; pCi/l for radioisotopes; and $\mu\text{g/l}$ for uranium. Surface water samples were measured onsite for temperature, pH, and specific conductance as the sampling was conducted. Onsite measurement parameters are presented on the sample collection forms in Appendix B.

2.4 Health and Safety Program

Stoller developed a program to protect the health and safety of field personnel for implementation of the environmental monitoring at the CSMRI site. This program has been developed in accordance with requirements of 29 CFR 1910.120.

3. Results

Results from samples collected from the CSMRI site during the first quarter 2008 are summarized on Tables 2-1 through 2-4. Table 2-5 presents historical data collected by previous consultants for select contaminants of potential concern in groundwater at the site. The historical uranium data presented in Table 2-5 are presented in pCi/l as “activity” yet recent (2005 through 2008) analytical data are presented in µg/l as “mass concentration.” The December 7, 2000 Federal Register discusses the final uranium maximum contaminant level (MCL) and presents a conversion factor of a geometric average mass:activity ratio of 0.9 pCi/g for values near the National Primary Drinking Water Standards MCL, based on data from the National Inorganics and Radionuclides Survey.

Tables 2-6 and 2-7 present the quarterly historical groundwater radioisotopic and metals sample results, respectively, collected by Stoller since February 2005. Tables 2-8 and 2-9 present the quarterly historical Clear Creek surface water radioisotopic and metals sample results, respectively, collected by Stoller since February 2005.

3.1 Groundwater Conditions

Groundwater monitor wells are located in areas likely to detect impacts, if any, to groundwater emanating from the site as well as locations that represent background water quality. Wells CSMRI-4 and CSMRI-5 are located downgradient from the site in the Clear Creek flood plain. Well CSMRI-1 is located along Clear Creek upstream from the site, and well CSMRI-2 is located offsite on the southeast corner of the freshman parking lot on West Campus Drive.

In February 2007, seven new groundwater monitor wells were installed to assess the effectiveness of the source excavation and stockpile creation that were conducted during the summer of 2006. Monitor well CSMRI-8 is located along Clear Creek within the flood plain area; and monitor wells CSMRI-1B, CSMRI-6B, CSMRI-7B, CSMRI-9, CSMRI-10, and CSMRI-11 are located on the upland areas and essentially encircle the CSMRI site.

3.2 Groundwater Quality

Groundwater samples were collected from ten monitor wells and tested for the presence of metals and radioisotopes as identified in Section 2.3.1. No groundwater sample was collected from monitor well CSMRI-7B due to insufficient recharge.

The measured activities of Ra-226, Ra-228, Th-228, Th-230, and Th-232 for all groundwater monitor wells were below their respective MCL standards as shown in Table 2-1. Uranium was detected in monitor wells CSMRI-4 at 58 µg/l and CSMRI-8 at 1,200 µg/l at concentrations exceeding the MCL of 30 µg/l. Uranium was also detected in the remaining seven groundwater monitor wells but at concentrations well below the MCL.

The detected concentration of uranium in CSMRI-9 at 24 µg/l will be monitored since initial sampling at this location in March 2007 indicated a concentration of 7.9 µg/l. The concentration of uranium then spiked to 32 µg/l in the following quarterly sampling event but has steadily decreased in subsequent sampling events. This monitor well is located at the top of the slope that rises above the Clear Creek flood plain.

In the flood plain area, uranium was detected in monitor wells CSMRI-4 at 58 µg/l, CSMRI-5 at 6.6 µg/l, and CSMRI-8 at 1,200 µg/l. Uranium in monitor well CSMRI-4 has historically had elevated concentrations of uranium, but the values had been declining since 1991 until the last several quarterly sampling events. Figure 5 illustrates the decreasing concentration of uranium in CSMRI-4 since 1991. Historically, the concentration of uranium in this monitor well has spiked; once in 1999 and then again in 2003. The spike in the concentration of uranium in 2003 was attributed to precipitation effects at the CSMRI site and removal of the site asphalt and concrete as discussed in Section 4.2.2 of the New Horizons RI-FS (New Horizons 2004). Soil remediation activities in the flood plain area in December 2006 may have affected the recent rise in the concentration of uranium in this monitor well. This is commonly observed after soil remediation activities.

Figure 6 presents the uranium concentration and the elevation of the water table for 2005 through the first quarter (February) 2008 at monitor well CSMRI-4. The figure indicates the concentration of uranium had previously been fluctuating seasonally slightly above to below the MCL of 30 µg/l for seven quarterly sampling events in 2005 and 2006. The second quarter 2006 concentration of uranium of 26.8 µg/l for CSMRI-4 in Figure 6 may not be valid due to analytical laboratory tracer recoveries of less than 20 percent. A discussion regarding the validity of this data point was presented in the second quarter 2006 report. An ice chest from the fourth quarter 2007 (December) sampling event was lost by the courier service resulting in a gap in the analytical data for CSMRI-4.

The concentration of uranium in monitor well CSMRI-5 has decreased to 6.6 µg/l. Historical data from Tables 2-5 and 2-6 indicate concentrations of uranium between 2 µg/l and 4 µg/l. Beginning in September 2006, the concentration increased to a high of 11 µg/l. The slight increase can be attributed to the soil remediation efforts within the flood plain in the vicinity of CSMRI-5. The current value of 6.6 µg/l is still well below the MCL of 30 µg/l.

The concentration of uranium detected in CSMRI-8 decreased to 1,200 µg/l from a previous high of 1,300 µg/l. Monitor well CSMRI-8 was installed in February 2007, and quarterly monitoring will be continued to document seasonal variability and trends in the concentration of uranium at this location.

The groundwater at the CSMRI site will be monitored on a quarterly basis and the exceedances of uranium in monitoring wells CSMRI-4 and CSMRI-8 will continue to be evaluated as more data are made available. The relationship between the seasonal stream flow of Clear Creek and the exceedances of uranium for the monitor wells located on the flood plain will be assessed.

3.2.1 Comparison of Upgradient and Downgradient Groundwater Quality

Wells CSMRI-4, CSMRI-5, and CSMRI-8 are downgradient from the site and are located on the Clear Creek flood plain. Monitor wells CSMRI-7B and CSMRI-9 are located downgradient of

the CSMRI site at the top of a topographical slope above the flood plain; and CSMRI-6B, CSMRI-10, and CSMRI-11 are upgradient from the site.

Metals concentrations that are above detection limits vary widely regarding upgradient versus downgradient wells. The analytical data indicate the influence of Clear Creek to CSMRI-1 where Ca was detected in SW-1, SW-2, and CSMRI-1 at concentrations of 36 mg/l, 35 mg/l, and 36 mg/l, respectively. Six monitor wells within the immediate CSMRI site detected Ca at concentrations narrowly ranging from 97 to 110 mg/l. However, the analytical results indicate the presence of Ca at a concentration of 270 mg/l in monitor well CSMRI-8, over twice the concentration of most of the other monitor wells. The same observation for elevated concentrations of K, Mg, and Na in monitor well CSMRI-8 applies when compared to other monitor well analytical data.

Uranium was detected in monitor well CSMRI-4 at a concentration of 58 µg/l and in CSMRI-8 at a concentration of 1,200 µg/l, which exceed the MCL of 30 µg/l. As shown on Figure 6, until the most recent round of sampling, there appears to be a seasonal correlation between fluctuations of the water table elevation and the concentration of uranium in monitor well CSMRI-4. The recent slight rise in the concentration of uranium in CSMRI-4 will continue to be monitored to assess the variability of uranium in this monitor well and the interaction with the seasonal fluctuations of Clear Creek.

3.2.2 Comparison with Previous Groundwater Quality Analyses

Table 2-5 presents groundwater analytical results from past sampling events dating back to 1991 for radioisotopes of concern. The data indicate a slight decreasing trend in contaminant concentrations over time, indicating improving groundwater quality.

As additional data are collected and trends become more defined, graphs of concentration versus time will be produced and presented. This analytical data will be incorporated to show longer-term trends and correlation between the detected concentration of uranium in groundwater, the fluctuating water table, and seasonal variability if present.

3.2.3 Comparison with Colorado Groundwater Standards

The statewide dissolved concentration standard of 5 pCi/l for the sum of Ra-226 and Ra-228 in drinking water set by the State of Colorado Water Quality Control (WQC) Commission is not exceeded in any of the sampled monitoring wells. The statewide dissolved concentration standard for drinking water of 60 pCi/l for the sum of Th-230 and Th-232 was not exceeded in any of the sampled monitoring wells (these data were qualified as 'Rejected' due to LCS below the lower limit – see Section 2.3 Analyses). No exceedances of the MCL for tested metals were identified in any of the groundwater and surface water samples.

The EPA MCL for uranium in drinking water was exceeded in monitor wells CSMRI-4 at 58 µg/l and CSMRI-8 at 1,200 µg/l. In January 2008, CDPHE WQC Commission adopted the surface water quality standard of 30 µg/l as the groundwater quality standard in an effort to keep both standards consistent. There was previously no groundwater quality standard; the 30 µg/l standard will be effective on May 31, 2008.

The spike in the concentration of uranium in CSMRI-4 shown in Figure 5 may be attributed to the increased precipitation during the months of December 2006 through February 2007. This monitor well exhibited the same trend in 2003 during a prolonged high precipitation time period and when the asphalt cover and buildings associated with CSMRI had been removed.

The detected concentration of 1,200 µg/l at monitoring well CSMRI-8 may be due to:

- The well contains residual uranium from the former pond area on the flood plain.
- Uranium was disturbed and introduced into the monitor well during installation.
- The well contains residual uranium from the former Building 101 area at the top of the slope above the flood plain.
- Uranium is naturally occurring in the Fox Hills bedrock formation.
- The well is located in a zone where strong mixing between Clear Creek water and groundwater occurs, and the oxidizing conditions associated with creek water causes uranium to dissolve more readily.

Monitoring well CSMRI-8 will continue to be sampled on a quarterly basis along with the other site wells, and the reason for the elevated level of uranium will be evaluated.

3.3 Surface Water Quality

Surface water samples are collected from two locations at the site. Location SW-1 is located upstream from the site and the second location, SW-2, is downstream from the site. The metals detected above their respective detection limits include: Ca, K, Mg, Na, and Zn. The upstream and downstream surface-water concentrations of all metals and radionuclides detected at the CSMRI site from stations SW-1 and SW-2 are similar. No established MCLs were exceeded.

4. Activities for First Quarter 2008

First quarter 2008 activities at the site included reseeding portions of the flood plain area and the dirt road immediately south of monitor well CSMRI-8 that slopes down the bench terrace to the flood plain. These areas were affected by the soil removal action that had been conducted in 2006. Maintenance in the form of staking erosion control blankets and bio-logs on the on the dirt road was conducted to minimize storm water run-off. The erosion control measures were then inspected and approved by the City of Golden Stormwater program.

The site will be visited on a regular basis for inspection and maintenance of the storm water best management practices (BMPs) and scheduled quarterly monitor well groundwater and surface water sampling.

5. References

Colorado Department of Public Health and Environment, Water Quality Control Commission, Regulation No. 41, *The Basic Standards for Ground Water*. Amended: January 14, 2008, Effective: May 31, 2008.

New Horizons Environmental Consultants, Inc. Remedial Investigation/Feasibility Study and Proposed Plan, Colorado School of Mines Research Institute Site, Golden, CO, January 21, 2004.

Stoller, Final Site Characterization Work Plan, May 2006.

USGS Surface Water website: <http://nwis.waterdata.usgs.gov>

Table 2-1
Summary of Radioisotopes in Groundwater

Sample Station	Sample Date	Ra-226 (pCi/l)		Ra-228 (pCi/l)		Th-228 (pCi/l)		Th-230 (pCi/l)		Th-232 (pCi/l)		Total U (µg/l)
		Result	Uncertainty	Result	Uncertainty	Result	Uncertainty	Result	Uncertainty	Result	Uncertainty	Result
CSMRI-1	2/27/08	0.2	0.16	0.85	0.48	-0.044	0.062	0.062	0.072	0.01	0.022	1.5
CSMRI-1B	2/28/08	0.32	0.26	0.61	0.42	0.059	0.086	0.057	0.075	0.021	0.031	6.5
CSMRI-2	2/28/08	1.37	0.55	2.26	0.81	0.04	0.066	0.072	0.071	0.027	0.03	0.68
CSMRI-4	2/27/08	0.24	0.26	0.78	0.5	-0.026	0.056	-0.039	0.051	0	0.023	58
CSMRI-5	2/27/08	1.05	0.58	0.17	0.43	-0.028	0.064	-0.022	0.056	0.01	0.024	6.6
CSMRI-6B	2/28/08	0.26	0.22	1	0.49	-0.022	0.075	-0.026	0.06	-0.006	0.025	4.7
CSMRI-7B	2/27/08	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CSMRI-8	2/27/08	1.19	0.55	1.38	0.63	0.006	0.067	0.008	0.059	0.016	0.029	1,200
CSMRI-9	2/27/08	0.11	0.12	0.24	0.48	0.054	0.095	0.037	0.071	0.006	0.027	24
CSMRI-10	2/26/08	0.12	0.18	0.44	0.44	0.033	0.072	0.105	0.076	-0.003	0.026	9.2
CSMRI-11	2/26/08	0.28	0.23	-0.03	0.38	-0.002	0.072	0.046	0.069	0.018	0.027	8.7
MCL*		Total Ra = 5				NE		Th 230 + Th 232 = 60**				

*Maximum Contaminant Level – National Primary Drinking Water Regulations

**5 CCR 1002-41 Reg 41 – Colorado Groundwater Standards

NE - Not Established

NT – Not Tested

BOLD – All thorium results are rejected due to failure of the lower limit of laboratory control sample (LCS) at 13.9 percent.

Table 2-2
Summary of Metals in Groundwater
(All results in milligrams per liter)

Sample Station	Sample Date	Ag	As	Ba	Ca	Cd	Cr	Hg	K	Mg	Mo	Na	Pb	Se	V	Zn
CSMRI-1	2/27/08	ND	ND	0.08 (B)	36	ND	ND	ND	2.5	12	0.0013 (B)	22	ND	ND	ND	0.048
CSMRI-1B	2/28/08	ND	ND	0.11	97	ND	0.0015 (B)	ND	9.3	45	0.029	41	ND	0.0039 (B)	ND	0.0033 (B)
CSMRI-2	2/28/08	ND	ND	0.094 (B)	81	ND	0.0018 (B)	ND	6.6	38	ND	21	ND	ND	0.0017 (B)	0.0073 (B)
CSMRI-4	2/27/08	ND	ND	0.073 (B)	130	ND	ND	0.000016 (B)	8.2	58	0.015	45	ND	0.0034 (B)	ND	0.069
CSMRI-5	2/27/08	ND	ND	0.073 (B)	100	ND	ND	ND	4.3	40	ND	42	ND	ND	ND	0.094
CSMRI-6B	2/28/08	ND	ND	0.17	100	ND	ND	ND	5.8	43	0.004 (B)	49	ND	ND	ND	0.0048
CSMRI-7B	2/27/08	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CSMRI-8	2/27/08	ND	0.036 (B)	0.07 (B)	270	ND	ND	ND	15	82	0.019	100	ND	ND	ND	0.038
CSMRI-9	2/27/08	ND	ND	0.079 (B)	110	ND	ND	ND	5.4	56	ND	49	ND	0.0033 (B)	ND	0.011
CSMRI-10	2/26/08	ND	ND	0.09 (B)	110	ND	ND	ND	4.6	46	ND	41	ND	ND	ND	0.0052
CSMRI-11	2/26/08	ND	ND	0.11	110	ND	ND	ND	4.6	42	ND	44	ND	ND	ND	0.0048
Detection Limits		0.01	0.01	0.1	1	0.005	0.01	0.0002 (B)	1	1	0.01	1	0.003	0.005	0.01	0.02
MCL*		NE	0.010	2	NE	0.005	0.1	0.002 (B)	NE	NE	NE	NE	0.015	0.05	NE	NE

*Maximum Contaminant Level – National Primary Drinking Water Regulations

ND – Non Detect

NE – Not Established

NT – Not Tested

(B) – Detected above Instrument Detection Level but below Reported Detection Level

Table 2-3
Summary of Radioisotopes in Surface Water

Sample Station	Sample Date	Ra-226 (pCi/l)		Ra-228 (pCi/l)		Th-228 (pCi/l)		Th-230 (pCi/l)		Th-232 (pCi/l)		Total U (µg/l)
		Result	Uncertainty	Result	Uncertainty	Result	Uncertainty	Result	Uncertainty	Result	Uncertainty	Result
SW-1	2/27/08	0.1	0.23	0.48	0.46	-0.026	0.073	0.027	0.069	0.018	0.031	2
SW-2	2/26/08	0.1	0.16	0	0.38	0	0.071	0.033	0.064	0.003	0.022	2
MCL*		Total Ra = 5				NE		Th 230 + Th 232 = 60**				30

*Maximum Contaminant Level – National Primary Drinking Water Regulations

**5 CCR 1002-31 Reg 31 – Colorado Surface Water Standards

NE – Not Established

Table 2-4
Summary of Metals in Surface Water
(All results in milligrams per liter)

Sample Station	Sample Date	Ag	As	Ba	Ca	Cd	Cr	Hg	K	Mg	Mo	Na	Pb	Se	V	Zn
SW-1	2/27/08	ND	ND	0.042 (B)	36	ND	ND	ND	3.3	9.6	0.0022 (B)	19	ND	ND	ND	0.15
SW-2	2/26/08	ND	ND	0.051	35	0.0005 (B)	ND	ND	3.1	9.2	0.0023 (B)	21	ND	ND	ND	0.15
Detection Limits		0.01	0.01	0.1	1	0.005	0.01	0.0002	1	1	0.01	1	0.003	0.005	0.01	0.02
MCLs*		0.01	0.010	2	NE	0.005	0.1	0.002	NE	NE	NE	NE	0.015	0.05	NE	NE

*Maximum Contaminant Level – National Primary Drinking Water Regulations

ND – Non Detect

NE – Not Established

(B) – Detected above Instrument Detection Level but below Reported Detection Level

Table 2-5
CSMRI Historical Groundwater Data (Previous Consultants)
(All results in picoCuries per liter)

Well ID (d)	Analyte	1/1991 (a)	6/1991 (a)	3/1999 (b)	6/1999 (b)	6/1999 (b)	10/1999 (b)	2/2003 (c)	4/2003 (c)	7/2003 (c)	10/2003 (c)
CSMRI-1	Ra-226			0.1	0.3	0.3	0.2	<0.55	<0.45	ND (<0.38)	ND (<0.31)
	U Total			2.09	2.59	2.59	1.44	2.4	2.9	0.87	1.4
	Th-230			0.4	0.2	0.2	0.2	<0.19	0.21	ND (<0.13)	<0.15
CSMRI-2	Ra-226		1.9	1.9	1.4	1.4	1.4	1.4	2.8	2.1	1.7
	U Total	11	5.7	0.55	1.46	1.46	0.71	1.5	1.3	1.9	1.3
	Th-230		0	0.1	0.1	0.1	0.9	<0.17	0.43	0.20	0.31
CSMRI-3	Ra-226		0.6	1.5	1.2	1.2	1.6	<0.75	<0.81	ND (<0.49)	<0.98
	U Total	17	10.4	8.41	12.4	12.4	10	12	12	9	10
	Th-230		0	0.3	0.3	0.3	1.1	<0.12	ND (<0.15)	ND (<0.17)	ND (<0.14)
CSMRI-4	Ra-226		1	<0.4	0.6	0.6	0.4	<0.85	<0.42	<0.32	ND (<0.64)
	U Total	86	57.3	23.4	58.6	58.6	33.7	16	34.2	53	19
	Th-230		0	0.7	0.3	0.3	0.4	<0.099	ND (<0.15)	ND (<0.17)	ND (<0.12)
CSMRI-5	Ra-226		0.6	2.4	3.3	3.3	2.7	ND (<0.49)	1.1	2.6	1.59
	U Total	14	16.8	3.6	3.6	3.6	4	2.8	2.3	2.7	3.3
	Th-230		0	0.2	0.2	0.2	1.4	0.062	ND (<0.14)	ND (<0.19)	ND (<0.13)

Notes: ND = Not Detected

a - Samples collected by Grant and Associates and analyzed by Barringer Labs

b - Samples collected by URS Greiner Woodward Clyde and analyzed by CORE Labs

c - Samples collected by New Horizons Environmental Consultants and analyzed by Paragon Analytics; Total U activity (pCi/l) calculated from concentration (µg/l) reported by Paragon.

d - Well Identification numbers changed from the 1991 data to the 1999 data. Data presented account for this change

**Table 2-6
Historical Summary of Radioisotopes in Groundwater (Stoller)**

Sample Station	Sample Date	Ra-226 (pCi/l)	Ra-228 (pCi/l)	Th-228 (pCi/l)	Th-230 (pCi/l)	Th-232 (pCi/l)	U-234 (pCi/l)	U-235 (pCi/l)	U-238 (pCi/l)	Total U (µg/l)
CSMRI-1	2/25/05	-0.11	0.81	0.007	0.07	0.01	0.77	0.043	0.53	1.61
	6/14/05	0.16	0.44	0.018	-0.021	0.012	0.43	0.011	0.217	0.64
	9/7/05	0.1	0.63	0.068	0.167	0.114	0.85	0.053	0.43	1.3
	12/20/05	-0.19	0.59	-0.045	0.32	0.014	0.94	0.073	0.46	1.41
	3/15/06	-0.15	0.58	0.025	0.032	-0.004	1.76	0.11	0.92	2.8
	6/14/06	0.42	0.05	0.15	-0.06	0.062	0.18	0.18	0.08	0.31
	9/13/06	0.25	0.34	0.11	-0.079	0.027	0.45	0.051	0.25	0.77
	3/1/07	0.32	0.78	0.052	-0.031	0.012	NT	NT	NT	1.2
	6/27/07	0.51	0.91	0.17	0.064	-0.005	NT	NT	NT	0.88
	9/11/07	-0.3	0.53	-0.031	0.019	0.001	NT	NT	NT	0.72
11/27/07	-0.2	0.72	0.71	0.101	0.02	NT	NT	NT	1.2	
CSMRI-1B	3/8/07	0.13	1.19	-0.03	-0.09	0.02	NT	NT	NT	2.7
	6/26/07	0.09	0.3	0.001	0.002	0.012	NT	NT	NT	5
	9/11/07	-0.13	0.65	0.019	0.012	0.001	NT	NT	NT	6.3
	11/27/07	0.11	1.16	0.004	0.06	0.016	NT	NT	NT	6.9
CSMRI-2	2/25/05	0.8	1.85	0.07	-0.02	0.01	0.6	0.05	0.16	0.53
	6/14/05	1.47	3.0	0.14	0.003	0.026	0.68	0.025	0.299	0.89
	9/7/05	1.78	2.71	0.162	0.108	0.049	0.65	0.050	0.31	0.94
	12/20/05	1.35	1.62	0.108	0.285	0.024	0.83	0.002	0.35	1.06
	3/15/06	1.25	2.53	0.03	0.204	0.012	0.83	0.066	0.45	1.36
	6/14/06	0.99	1.79	0.25	0.22	0.049	0.69	0.04	0.25	0.76
	9/13/06	1.01	2.35	0.088	-0.039	-0.008	0.46	0.014	0.28	0.85
	3/8/07	0.76	2.15	0.022	-0.01	0.011	NT	NT	NT	0.72
	6/28/07	1.4	3.2	-0.075	-0.01	-0.007	NT	NT	NT	2
	9/11/07	0.78	3.2	0.016	0.101	0.014	NT	NT	NT	0.98
11/27/07	0.45	2.05	0.037	0.035	0.006	NT	NT	NT	1	
CSMRI-4	2/25/05	-0.03	0.16	0.019	-0.009	0.013	9.7	0.53	8.2	24.7
	6/14/05	0.26	0.34	0.013	0.014	0.005	11.4	0.49	10.6	31.4
	9/7/05	0.17	0.78	-0.013	0.164	0.086	6.4	0.33	6.4	19.3
	12/20/05	0.13	0.1	0.033	0.311	0.012	11.5	0.61	11.4	34.3
	3/15/06	0	0.38	0.004	0.174	0.007	9	0.43	9	27.1
	6/15/06	0.41	0.39	0.11	0.17	0.061	9.2	0.4	8.9	26.8
	9/13/06	-0.05	0.79	0.056	-0.015	0.007	6.5	0.35	6	17.9
	3/8/07	0.09	0.37	-0.034	-0.037	0.013	NT	NT	NT	48
	6/27/07	0.07	0.87	0.011	0.035	0.004	NT	NT	NT	66
	9/11/07	0.99	1.12	0.024	0.112	0.021	NT	NT	NT	49
11/26/07	0.33	0.73	0.029	0.149	0.016	NT	NT	NT	48	
CSMRI-5	2/25/05	1.06	0.53	0.009	0.007	0.034	1.22	0.056	0.93	2.8
	6/14/05	2.51	0.44	-0.018	0.039	0.011	1.51	0.086	1.2	3.57
	9/7/05	2.50	0.76	0.06	1.25	0.051	1.85	0.051	1.47	4.4

**Table 2-6
Historical Summary of Radioisotopes in Groundwater (Stoller)**

Sample Station	Sample Date	Ra-226 (pCi/l)	Ra-228 (pCi/l)	Th-228 (pCi/l)	Th-230 (pCi/l)	Th-232 (pCi/l)	U-234 (pCi/l)	U-235 (pCi/l)	U-238 (pCi/l)	Total U (µg/l)
	12/20/05	1.97	0.52	0.032	0.126	0.01	1.45	0.066	1.21	3.63
	3/15/06	0.57	0.45	0.038	0.144	0.019	1.81	0.058	1.38	4.1
	6/15/06	2.13	0.87	0.145	0.08	0.043	1.03	0.13	0.92	2.8
	9/13/06	2.29	0.56	0.053	-0.053	0.005	3.18	0.17	2.32	7
	3/8/07	1.78	0.39	-0.012	-0.061	0	NT	NT	NT	5.8
	6/27/07	2.22	0.86	0.008	-0.023	0.013	NT	NT	NT	10
	9/11/07	1.91	1.2	0.091	0.003	0.006	NT	NT	NT	11
	11/26/07	1.52	0.49	0.004	-0.008	0.01	NT	NT	NT	6.6
CSMRI-6B	2/27/07	NT	NT	NT	NT	NT	NT	NT	NT	NT
	6/26/07	0.46	0.63	-0.009	-0.006	0.024	NT	NT	NT	17
	9/10/07	0.15	0.91	0.046	0.025	0.023	NT	NT	NT	11
	11/27/07	-0.02	0.77	-0.002	0.069	0.004	NT	NT	NT	8.2
CSMRI-7B	2/27/07	NT	NT	NT	NT	NT	NT	NT	NT	NT
	6/26/07	0.65	0.22	0.036	0.054	0.027	NT	NT	NT	68
	9/10/07	NT	NT	NT	NT	NT	NT	NT	NT	NT
	--	NT	NT	NT	NT	NT	NT	NT	NT	NT
CSMRI-8	3/8/07	0.7	1.06	0.072	-0.031	0.016	NT	NT	NT	1,100
	6/27/07	0.8	0.4	0.039	0.046	0.008	NT	NT	NT	810
	9/10/07	1.31	0.9	0.031	0.05	0.009	NT	NT	NT	630
	11/27/07	1.27	1.2	-0.02	0.074	-0.003	NT	NT	NT	1300
CSMRI-9	2/27/07	0.12	0.53	-0.017	0.04	0.027	NT	NT	NT	7.9
	6/26/07	0.22	0.37	0.018	0.004	-0.015	NT	NT	NT	32
	9/10/07	0.5	1.01	0.04	-0.043	0.012	NT	NT	NT	35
	11/26/07	0.25	0.27	0.023	0.003	0.003	NT	NT	NT	28
CSMRI-10	3/1/07	0.19	0.63	0.014	-0.004	0.018	NT	NT	NT	7.8
	6/26/07	0.26	0.43	-0.008	0.03	-0.005	NT	NT	NT	8.8
	9/10/07	-0.04	0.48	0.103	0.05	0.005	NT	NT	NT	9.9
	11/26/07	-0.05	0.57	0.068	0.141	0.031	NT	NT	NT	10
CSMRI-11	3/1/07	0.16	0.46	0.051	0.085	0.007	NT	NT	NT	4.8
	6/26/07	0.37	0.43	0.084	0	0.008	NT	NT	NT	8.4
	9/10/07	-0.26	0.52	0.012	0.006	0.016	NT	NT	NT	10
	11/26/07	0.16	0.87	0.089	0.099	-0.012	NT	NT	NT	11
MCL*		Total Ra = 5		NE	Th 230 + Th 232 = 60**		NE	NE	NE	30

*Maximum Contaminant Level – National Primary Drinking Water Regulations

**5 CCR 1002-41 Reg 41 – Colorado Groundwater Standards

pCi/l - picocuries per liter

NE – Not Established

NT – not tested

µg/l – micrograms per liter

Table 2-7
Historical Summary of Metals in Groundwater (Stoller)
(All results in milligrams per liter)

Sample Station	Sample Date	Ag	As	Ba	Ca	Cd	Cr	Hg	K	Mg	Mo	Na	Pb	Se	V	Zn
CSMRI-1	2/25/05	ND	ND	ND	28	ND	ND	ND	2.8	9.4	ND	29	ND	ND	ND	0.032
	6/14/05	ND	ND	ND	17	ND	ND	ND	2.3	5.1	ND	16	ND	ND	ND	0.032
	9/7/05	ND	ND	.055 (B)	21	ND	ND	ND	2.9	6.3	0.0021 (B)	25	ND	0.0041 (B)	ND	.034
	12/20/05	ND	ND	0.067 (B)	32	ND	ND	0.000034 (B)	2.9	10	ND	26	ND	ND	ND	0.052
	3/15/06	ND	ND	0.064 (B)	33	ND	ND	0.00002 (B)	2.6	10	0.0013 (B)	24	ND	ND	ND	0.049
	6/14/06	ND	ND	0.031 (B)	10	ND	ND	ND	1.9	3	0.0051 (B)	9.2	ND	0.0035 (B)	ND	0.015 (B)
	9/13/06	ND	ND	0.061 (B)	20	ND	0.041 (B)	ND	2.7	6	0.0038 (B)	14	ND	ND	ND	0.03
	3/1/07	ND	ND	0.081 (B)	39	0.00045 (B)	0.00063 (B)	0.000017 (B)	3	12	0.0059 (B)	26	ND	0.0066	ND	0.048
	6/27/07	ND	ND	0.063 (B)	23	ND	ND	0.0000073 (B)	2.4	9	ND	21	ND	ND	ND	0.017 (B)
	9/11/07	ND	ND	0.065 (B)	23	ND	0.00061 (B)	0.000011 (B)	2.5	7.2	0.002 (B)	14	ND	ND	ND	0.038
11/27/07	ND	ND	0.075 (B)	31	ND	ND	0.000029 (B)	2.5	9.7	0.0014 (B)	18	ND	ND	ND	0.049	
CSMRI-1B	3/1/07	ND	ND	0.098 (B)	130	ND	0.00014 (B)	0.000017 (B)	52	47	0.17	91	ND	0.0058	0.0009 (B)	ND
	6/26/07	ND	ND	0.071 (B)	83	ND	ND	0.0000072 (B)	10	38	0.029	35	ND	ND	ND	ND
	9/11/07	ND	ND	0.1	93	ND	ND	0.0000094 (B)	8.4	43	0.031	36	ND	ND	ND	0.0012 (B)
	11/27/07	ND	ND	0.11	100	ND	ND	0.000029 (B)	9.4	46	0.024	42	ND	ND	0.00073 (B)	0.0039 (B)
CSMRI-2	2/25/05	ND	ND	0.11	72	ND	ND	ND	7.1	32	ND	19	ND	ND	ND	0.02
	6/14/05	ND	ND	0.1	76	ND	ND	ND	6.3	32	ND	18	ND	ND	ND	ND
	9/7/05	ND	ND	0.11	81	ND	ND	ND	7.1	35	ND	19	ND	ND	ND	0.011 (B)
	12/20/05	ND	ND	0.098 (B)	76	ND	ND	0.000031 (B)	6.7	33	ND	18	ND	ND	ND	0.0043 (B)
	3/15/06	ND	ND	0.09 (B)	74	ND	ND	0.000023 (B)	6.1	31	ND	17	ND	ND	ND	0.0059 (B)
	6/14/06	ND	ND	0.093 (B)	70	ND	ND	ND	6.3	31	0.0048 (B)	17	ND	0.0031 (B)	ND	0.0092 (B)
	9/13/06	ND	ND	0.11	81	ND	ND	ND	6.7	35	0.0014 (B)	19	ND	ND	ND	0.0092 (B)
	3/8/07	ND	0.0058 (B)	0.12	88	ND	ND	ND	8.3	39	ND	21	ND	0.03	ND	0.0011 (B)
	6/28/07	ND	ND	0.11	97	ND	ND	0.0000056 (B)	7.9	49	ND	26	ND	ND	0.002 (B)	0.0041 (B)
	9/11/07	ND	ND	0.1	91	ND	ND	0.000016 (B)	7.2	43	0.00085	23	ND	ND	0.00086 (B)	0.0082 (B)
11/27/07	ND	ND	0.093 (B)	83	ND	ND	0.000023 (B)	7	38	ND	22	ND	ND	0.001 (B)	0.0075 (B)	
CSMRI-4	2/25/05	ND	ND	ND	72	ND	ND	ND	5.1	31	0.017	29	ND	ND	ND	0.12
	6/14/05	ND	ND	ND	86	ND	ND	ND	6.6	34	0.038	34	ND	0.0063	ND	0.068
	9/7/05	ND	0.0035 (B)	0.055 (B)	82	ND	ND	ND	7.6	33	0.035	31	ND	0.0049 (B)	ND	0.097
	12/20/05	ND	ND	0.056 (B)	100	ND	ND	0.000045 (B)	6.8	43	0.024	34	ND	ND	ND	0.18
	3/15/06	ND	ND	0.042 (B)	81	ND	ND	0.000034 (B)	5	35	0.021	29	ND	ND	0.00056 (B)	0.21
	6/15/06	ND	0.0031 (B)	0.055 (B)	89	0.00085 (B)	ND	0.0000049 (B)	8.3	37	0.03	31	ND	ND	0.0011 (B)	0.11
	9/13/06	ND	ND	0.043 (B)	66	ND	ND	0.000016 (B)	8.3	27	0.038	30	ND	ND	ND	0.082
	3/8/07	ND	0.0057 (B)	0.072 (B)	120	0.00023 (B)	ND	0.000018 (B)	11	49	0.015	47	ND	0.019	ND	0.088
	6/27/07	ND	ND	0.067 (B)	110	ND	ND	0.000022 (B)	11	46	0.04	47	ND	ND	0.00073 (B)	0.14
	9/11/07	ND	0.0045 (B)	0.089 (B)	120	0.0011 (B)	0.0014 (B)	0.000037 (B)	12	49	0.05	41	ND	ND	0.0012 (B)	0.17
11/26/07	ND	ND	0.081 (B)	110	0.00049 (B)	ND	0.000035 (B)	10	50	0.024	43	ND	ND	0.0011 (B)	0.1	
CSMRI-5	2/25/05	ND	ND	ND	54	ND	ND	ND	3.4	22	ND	27	ND	ND	ND	0.067
	6/14/05	ND	ND	ND	63	ND	ND	ND	3.3	23	ND	28	ND	ND	ND	0.047
	9/7/05	ND	ND	0.085 (B)	85	ND	ND	ND	4.2	31	0.0042 (B)	35	ND	0.0037 (B)	0.0018 (B)	0.089

Table 2-7
Historical Summary of Metals in Groundwater (Stoller)
(All results in milligrams per liter)

Sample Station	Sample Date	Ag	As	Ba	Ca	Cd	Cr	Hg	K	Mg	Mo	Na	Pb	Se	V	Zn
	12/20/05	ND	ND	0.072 (B)	79	0.00071 (B)	ND	0.000048 (B)	4.1	30	0.002 (B)	31	ND	ND	0.0012 (B)	0.17
	3/15/06	ND	ND	0.058 (B)	70	0.00037 (B)	ND	0.000029 (B)	3.5	26	0.0031 (B)	29	ND	0.0035 (B)	0.00067 (B)	0.11
	6/15/06	ND	ND	0.052 (B)	51	ND	ND	0.000012 (B)	3.6	19	0.0028 (B)	26	ND	ND	ND	0.055
	9/13/06	ND	ND	0.087 (B)	110	ND	0.0022 (B)	ND	4.5	41	0.0027 (B)	50	ND	ND	0.001 (B)	0.11
	3/8/07	ND	0.0037 (B)	0.063 (B)	80	ND	ND	ND	4.5	31	0.0019 (B)	34	ND	0.015	ND	0.083
	6/27/07	ND	ND	0.066 (B)	98	ND	ND	0.0000091 (B)	4.5	40	0.006 (B)	40	ND	ND	0.0017 (B)	0.025
	9/11/07	ND	ND	0.13	110	ND	0.00082 (B)	0.000023 (B)	4.9	44	0.0042 (B)	47	ND	ND	0.0015 (B)	0.054
	11/26/07	ND	ND	0.087 (B)	110	ND	0.00089 (B)	0.000032 (B)	4.5	42	ND	47	ND	ND	0.0012 (B)	0.12
CSMR-6B	2/27/08	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	6/26/07	ND	ND	0.12	100	ND	ND	0.0000059 (B)	5.9	56	0.004 (B)	41	ND	ND	ND	ND
	9/10/07	ND	0.0046 (B)	0.15	110	ND	0.00088 (B)	0.000013 (B)	4.8	48	0.0022 (B)	46	ND	ND	0.00081 (B)	0.0051 (B)
	11/27/07	ND	0.0048 (B)	0.17	110	ND	ND	0.000025 (B)	6	49	0.0028 (B)	57	ND	0.0051	0.00066 (B)	ND
CSMR-7B	2/27/07	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	6/26/07	ND	ND	0.056 (B)	70	ND	ND	0.000006 (B)	5.5	37	0.024	53	ND	ND	0.00061 (B)	0.0041 (B)
	9/10/07	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	--	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CSMRI-8	3/8/07	ND	0.0053 (B)	0.068 (B)	230	ND	ND	ND	23	72	0.094	74	ND	0.034	ND	0.0024 (B)
	6/27/07	ND	ND	0.053 (B)	190	ND	ND	0.0000099 (B)	19	55	0.043	52	ND	ND	ND	0.069
	9/10/07	ND	0.0069 (B)	0.076 (B)	160	ND	0.00074 (B)	0.000027 (B)	15	49	0.034	54	0.0018 (B)	ND	ND	0.025
	11/27/07	ND	ND	0.091 (B)	230	ND	ND	0.000024 (B)	15	67	0.026	70	ND	0.0046 (B)	0.001 (B)	0.011 (B)
CSMRI-9	2/27/07	ND	ND	0.08 (B)	69	ND	0.0011 (B)	0.000024 (B)	12	31	0.045	33	ND	0.011	0.001 (B)	ND
	6/26/07	ND	ND	0.049 (B)	160	ND	ND	0.000002 (B)	8.5	77	0.0028	150	ND	0.0049 (B)	0.00096 (B)	0.0096 (B)
	9/10/07	ND	0.004 (B)	0.059 (B)	100	ND	0.0009 (B)	0.000016 (B)	6	51	0.0037 (B)	49	ND	ND	0.00071 (B)	0.0097 (B)
	11/26/07	ND	ND	0.078 (B)	110	0.00051 (B)	0.0011 (B)	0.000031 (B)	5.9	56	0.0023 (B)	52	ND	0.0054	0.0012 (B)	0.015 (B)
CSMRI-10	3/1/07	0.00051 (B)	ND	0.064 (B)	79	ND	0.0013 (B)	0.000024 (B)	7.3	33	0.01	36	ND	0.01	0.0011 (B)	ND
	6/26/07	ND	ND	0.079 (B)	100	ND	ND	0.0000063 (B)	4.7	44	ND	37	ND	0.0044 (B)	0.00055 (B)	ND
	9/10/07	ND	0.0039 (B)	0.071 (B)	89	ND	0.0012 (B)	0.00002 (B)	4.2	38	0.0014 (B)	36	ND	ND	0.00099 (B)	0.0042 (B)
	11/26/07	ND	ND	0.085 (B)	110	ND	ND	0.000026 (B)	4.7	43	ND	41	ND	ND	ND	ND
CSMRI-11	2/27/07	ND	ND	0.073 (B)	75	ND	0.00013 (B)	0.000023 (B)	9.7	29	0.033	33	ND	0.013	0.00073 (B)	0.0023 (B)
	6/26/07	ND	ND	0.096 (B)	110	ND	0.0012 (B)	0.0000071 (B)	5.4	44	0.0014 (B)	39	ND	0.0064	0.00059 (B)	ND
	9/10/07	ND	0.004 (B)	0.071 (B)	96	ND	0.00083 (B)	0.000016 (B)	4.5	39	0.0016 (B)	44	ND	ND	0.00078(B)	0.0033 (B)
	11/26/07	ND	ND	0.11	110	ND	ND	0.000028 (B)	4.9	44	0.0012 (B)	40	ND	ND	0.0013 (B)	ND
Detection Limits		0.01	0.01	0.1	1	0.005	0.01	0.0002	1	1	0.01	1	0.003	0.005	0.01	0.02
MCL*		NE	0.01	2	NE	0.005	0.1	0.002	NE	NE	NE	NE	0.015	0.05	NE	NE

*Maximum Contaminant Level – National Primary Drinking Water Regulations

ND – non detect

NE – not established

NT – not tested

(B) – Detected above Instrument Detection Level but below Reported Detection Level

**Table 2-8
Historical Summary of Radioisotopes in Surface Water (Stoller)**

Sample Station	Sample Date	Ra-226 (pCi/l)	Ra-228 (pCi/l)	Th-228 (pCi/l)	Th-230 (pCi/l)	Th-232 (pCi/l)	U-234 (pCi/l)	U-235 (pCi/l)	U-238 (pCi/l)	Total U (µg/l)
SW-1	2/25/05	0	0.58	0.018	-0.026	-0.001	0.89	0.083	0.65	1.97
	6/14/05	0.14	0.05	0.05	-0.025	0.016	0.246	0.021	0.251	0.75
	9/7/05	0.18	0.42	0.041	0.25	0.102	0.35	0.031	0.35	1.04
	12/20/05	-0.31	0.47	0.028	0.197	-0.005	0.64	0.041	0.7	2.11
	3/15/06	-0.16	0.35	0.059	0.125	0.005	0.6	0.029	0.53	1.59
	6/14/06	0.13	0.45	0.16	0.53	0.062	0.11	0.08	0.19	0.61
	9/13/06	-0.03	0.25	-0.019	-0.035	0.01	0.37	-0.005	0.34	1
	3/1/07	-0.1	0.25	-0.038	0.15	0.026	NT	NT	NT	1.7
	6/27/07	0.13	0.77	0.006	0.016	0.014	NT	NT	NT	0.6
	9/11/07	0.15	0.74	0.063	0.088	0.012	NT	NT	NT	0.94
11/27/07	0.2	0.24	0.026	0.049	0.025	NT	NT	NT	1.8	
SW-2	2/25/05	0.45	0.06	0.011	-0.016	0.033	0.8	0.066	0.42	1.29
	6/14/05	0.04	0.29	0.071	-0.028	0.007	0.259	0.032	0.23	0.69
	9/7/05	-0.08	0.24	-0.013	0.107	0.051	0.54	0.014	0.54	1.62
	12/20/05	0.09	0.07	-0.003	0.126	0	0.71	0.067	0.49	1.5
	3/15/06	-0.04	-0.15	0.009	0.184	0.01	0.79	0.004	0.51	1.52
	6/14/06	0.03	0.04	0.172	0.24	0.1	0.39	0	0.48	1.44
	9/13/06	0.11	0.35	0.009	-0.03	0.01	0.43	-0.006	0.3	0.89
	3/8/07	0.12	0.73	0.047	-0.055	0	NT	NT	NT	1.7
	6/28/07	0.02	0.78	0.028	0.014	0	NT	NT	NT	0.57
	9/11/07	0.1	0.27	0.066	0.068	0.002	NT	NT	NT	0.97
11/26/07	0.11	0.36	0.007	0	0.012	NT	NT	NT	1.7	
MCL*		Total Ra = 5		NE	Th 230 + Th 232 = 60**		NE	NE	NE	30

*Maximum Contaminant Level – National Primary Drinking Water Regulations

**5 CCR 1002-31 Reg 31 – Colorado Surface Water Standards

pCi/l - picoCuries per liter

µg/l – micrograms per liter

Table 2-9
Historical Summary of Metals in Surface Water (Stoller)
(All results in milligrams per liter)

Sample Station	Sample Date	Ag	As	Ba	Ca	Cd	Cr	Hg	K	Mg	Mo	Na	Pb	Se	V	Zn
SW-1	2/25/05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2
	6/14/05	ND	ND	ND	11	ND	ND	ND	1.1	2.8	ND	5.2	ND	ND	ND	0.09
	9/7/05	ND	0.0037 (B)	0.029 (B)	20	ND	ND	ND	2.2	4.4	0.0044 (B)	8.5	ND	0.0045 (B)	ND	0.063
	12/20/05	ND	ND	0.042 (B)	35	0.00057 (B)	ND	0.000034 (B)	3.7	7.6	0.004 (B)	19	ND	ND	ND	0.22
	3/15/06	ND	ND	0.04 (B)	37	0.00084 (B)	0.00047 (B)	0.000024 (B)	3.7	8.5	0.0048 (B)	23	ND	ND	0.00067 (B)	0.19
	6/14/06	0.0012 (B)	0.0032 (B)	0.011 (B)	8.2	ND	ND	ND	1	1.9	0.0042 (B)	3.1	ND	ND	ND	0.029
	9/13/06	ND	ND	0.03 (B)	21	ND	ND	ND	2.1	4.4	0.0049 (B)	8.6	ND	ND	ND	0.053
	3/1/07	ND	ND	0.049 (B)	44	0.0011 (B)	0.00092 (B)	0.000023 (B)	4.3	11	0.0046 (B)	26	ND	ND	ND	0.22
	6/27/07	ND	ND	0.018 (B)	10	ND	ND	0.0000068 (B)	0.93 (B)	2.5	0.0017 (B)	3.2	ND	ND	ND	0.067
	9/11/07	ND	ND	0.032 (B)	21	ND	ND	0.000019	1.7	5	0.0029 (B)	7.4	ND	ND	ND	0.078
11/27/07	ND	ND	0.042 (B)	33	0.00076 (B)	ND	0.00027 (B)	2.8	8.2	0.0032 (B)	15	ND	ND	ND	0.18	
SW-2	2/25/05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.17
	6/14/05	ND	ND	ND	11	ND	ND	ND	1.1	2.8	ND	4.8	ND	ND	ND	0.085
	9/7/05	ND	ND	0.028 (B)	20	ND	ND	ND	2.1	4.4	0.0037 (B)	8.7	ND	0.0037 (B)	ND	0.051
	12/20/05	ND	ND	0.042 (B)	35	0.00043 (B)	ND	0.000034 (B)	3.8	8	0.0038 (B)	19	ND	ND	ND	0.21
	3/15/06	ND	ND	0.042 (B)	39	0.00053 (B)	0.00055 (B)	0.000022 (B)	3.8	8.9	0.0046 (B)	25	ND	ND	0.00053 (B)	0.2
	6/14/06	ND	0.0022 (B)	0.011 (B)	8.4	ND	ND	ND	1	1.9	0.0045 (B)	3	ND	ND	ND	0.031
	9/13/06	ND	ND	0.03 (B)	21	ND	ND	ND	2.1	4.4	0.0048 (B)	8.5	ND	ND	ND	0.04
	3/8/07	ND	0.0053 (B)	0.049 (B)	39	0.00064 (B)	ND	ND	4.2	9.8	0.0014 (B)	22	ND	ND	ND	0.17
	6/28/07	ND	ND	0.019 (B)	10	ND	ND	0.0000056 (B)	0.93 (B)	2.6	ND	3.3	ND	ND	ND	0.075
	9/11/07	ND	ND	0.033 (B)	21	ND	ND	0.00001	1.7	5.1	0.0035 (B)	7.5	ND	ND	ND	0.084
11/26/07	ND	ND	0.044 (B)	35	0.0005 (B)	ND	0.00027 (B)	2.9	8.6	0.0027 (B)	15	ND	ND	ND	0.19	
Detection Limits		0.01	0.01	0.1	1	0.005	0.01	0.0002	1	1	0.01	1	0.003	0.005	0.01	0.02
MCL*		0.01	0.01	2	NE	0.005	0.1	0.002	NE	NE	NE	NE	0.015	0.05	NE	NE

*Maximum Contaminant Level – National Primary Drinking Water Regulations
 ND – Non Detect
 NE – Not Established
 (B) – Detected above Instrument Detection Level but below Reported Detection Level

Figure 1 Site Location

Figure 2

Figure 3
Hydrograph CSMRI-2

Figure 4
Clear Creek Gauging Graph

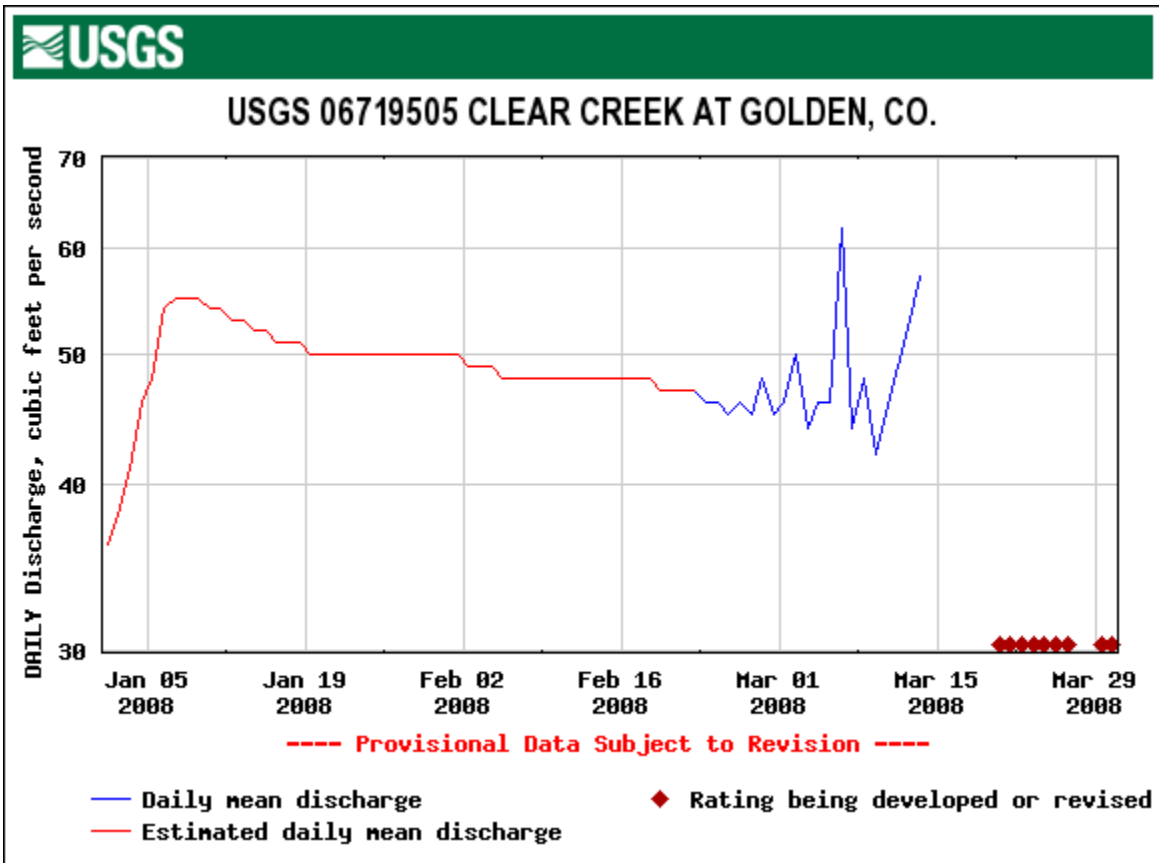


Figure 5
CSMRI MW-4 Historical Uranium Results

Figure 6
CSMRI MW-4 2005 Uranium Concentration

Appendix A

Groundwater Sampling Procedures

Appendix B
Sample Collection Forms

Appendix C

Surface Water Sampling Procedures

Appendix D

Data Validation Reports

Appendix E
Results of Analyses CD

Appendix F

Chains of Custody