COLORADO GEOLOGICAL SURVEY

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Technical Memorandum
Baseline Radiological Study Year 1: Wet Mountains, Colorado

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ABOUT THIS REPORT

Funded through a grant from the Colorado Department of Public Health & Environment (CDPHE) the CGS is conducting a five-year baseline study of naturally occurring radionuclides and metals in groundwater samples obtained from privately owned residential water wells throughout Colorado. This report presents the methodology and available results from the first year of the study (2022) that focused on the Wet Mountains of south-central Colorado. It also includes supplementally funded well-water sampling conducted in 2023.

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RE: Baseline Groundwater Study, Wet Mountains, Contract 2022*3461, Year 1 Report Updated through December 2023

The Colorado Geological Survey (CGS), a department of the Colorado School of Mines, has been funded through a grant from the Colorado Department of Public Health & Environment (CDPHE) to conduct a 5-year study of baseline naturally occurring radionuclides and metals in groundwater obtained from privately owned residential water wells throughout Colorado. This report presents the methodology and available results of Year 1 conducted in 2022. It also includes supplementally funded well water sampling conducted in 2023.

Purpose: Per CDPHE, the primary purpose is as follows: "Ambient monitoring of groundwater will give scientists and the people of Colorado an idea of background conditions of radionuclides and metals in groundwater in Colorado. This information will help decision makers make informed decisions regarding the care and use of groundwater in these regions of the state. This project will help the state build a baseline water quality dataset for groundwater." CDPHE also stated that the study was to be education focused for homeowners on wells.

Background: The Wet Mountain Valley in Fremont and Custer Counties was selected for Year 1 of this study based on known deposits of thorium and to a lesser extent uranium associated with three alkaline intrusive complexes with associated dikes and faults[1]. The complexes are in the central portion of the valley, generally at or near the Fremont-Custer County line, as shown in **Figure 1**. Associated dikes and faults extend further to the southeast.

The central area of the Wet Mountain Valley is part of a multi-year on-going CGS "EarthMRI" study focused on occurrences of rare earth elements (REEs) along with select metals (including thorium) in rock. The EarthMRI study consists of geologic mapping combined with associated rock sample testing. Most of the elevated concentrations in rock samples collected in the Wet Mountains alkaline complexes are associated with dikes, fracture zones, veins, and irregular masses[1]. As shown in Figure 1, they have an overall northwest to southeast trend. Observations of residences near thorium-containing deposits during the EarthMRI study contributed to the selection of this area for Year 1.

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[1] O'Keeffe, M.K., Peretyatko, A.I., and A.A. Mahatma. 2021, "OF-20-11 Alkaline Complexes of the Wet Mountains Area, Colorado: A Geological Summary, Bibliography, and Data Compilation of Critical Mineral Laboratory Results.": Colorado Geological Survey, Golden, CO. https://coloradogeologicalsurvey.org/publications/alkaline-complexes-critical-mineral-wet-mountains-colorado/.

Historic uranium data in groundwater wells and springs are shown in **Figure 2**. These data are sourced from the National Water Quality Monitoring Council Water Quality Portal (WQP) and the National Uranium Resource Evaluation (NURE) Neither the WQP nor NURE databases had thorium groundwater data. Also, no uranium or thorium data existed within the Colorado Department of Agriculture groundwater database.

Exceedances of the 0.30 milligram per liter (mg/L) drinking water standard are shown in red on Figure 2. No exceedances were noted in the NURE dataset. The cluster of high groundwater uranium concentrations (exceedances) on Figure 2 is located at the Canon City Mill Superfund site, also referred to as the Lincoln Park Superfund Site. This is the site of the former Cotter Corporation's 2,600-acre uranium mill and areas of mill-associated contamination, including part of the Lincoln Park community near the mill. As there is an existing groundwater monitoring program for the Superfund site, an effort was made to stay outside of the monitored area.

Baseline Groundwater Study Methodology for 2022: The Year 1 contract initially included a total of 58 samples, which was expanded to a maximum of 85 samples with additional funding on August 29, 2022. To obtain representative coverage over the two counties, a sampling grid was created using existing 1:24,000 scale geologic map boundaries. The sample grid is shown in **Figure 3**. Grid creation was refined using the Colorado Division of Water Resources (DWR) completed residential wells downloaded on July 15th, 2022, and updated on October 30, 2022. Specifically, if there were only a couple residential wells present in a grid area, then a numbered grid space was not created due to the low likelihood of obtaining volunteers. A total of 41 grid spaces were numbered, as shown in Figure 3.

To assist in identifying which grids to target for more samples, existing rock sample thorium data was evaluated from the previously referenced O'Keefe et al. (2020) study or available from the ongoing "EarthMRI" study. Grids with significant detected thorium in rock samples were assigned more water samples, up to a potential maximum of 4. As these complexes were centrally located, the sample density was then stepped outward to a minimum of 1 sample per grid on the outer county fringes (Figure 3).

The overall sampling approach was for the CGS to solicit volunteers whose water supply was from privately owned residential use wells, send them sampling kits to fill and ship (pre-paid) back to the CGS. Received groundwater samples were assigned anonymizing samples numbers and kept until there were enough to ship in batches of at least 10 samples to the analytical laboratory. Sample numbers were generated as follows: the year was listed first (2022) followed by the Federal Information Processing System (FIPS) code for the county (027 for Custer County and 043 for Fremont County), then the FIPS Colorado code (08) and finally a sequential sample number within the county. For example, 20220270801 is the first sample number assigned in Custer County, Colorado during 2022.

ACZ Laboratories of Steamboat Springs, Colorado was contracted by the CDPHE for this Year 1 project. Upon receipt of the data, individual results were sent to the homeowners, either by email or regular mail depending on the well owner's preference.

The CGS created sampling kits, which included 9x9x9 inch cardboard boxes lined with a plastic bag, two laboratory (ACZ) supplied sample containers pre-preserved with a small amount of nitric acid, and a large Ziploc bag containing a pair of nitrile sampling gloves, sampling instructions, a sample form to be completed by the homeowner, tape for repackaging the box, and a prepaid FedEx Ground return shipping label. The homeowners had only to collect the sample, fill out the sample form and seal it inside the Ziplock bag, repackage the box, and drop it off at the local FedEx shipping office or drop box or arrange with FedEx to have it picked up.

The sample form included their contact information, sample date and time, and they were asked to provide on a voluntary basis well information (if known) such as well depth, DWR permit number, geology – overburden versus bedrock, and if there was a house water treatment system installed.

If the homeowner had a filtration system, they were asked in the sample instructions to bypass it to obtain "raw" water. All were asked to run their water long enough to obtain fresh water from the well rather than water that may have been sitting in the piping or water tanks. A few residents had cisterns and they were asked to take the sample from before the cistern, rather than water that had been sitting in the cistern, if possible. This could be collected from near the well head (some had outdoor yard hydrants) or from the pipe that flowed into the cistern. This information was documented on the sample form.

2022 Volunteer Solicitation: The CGS contacted the two county health departments. Dr. Clifford Brown of Custer County was very helpful in that he assisted in soliciting volunteers. The Fremont County Health Department placed an announcement on their website but were unable to do more as they could not spare health department staff and then experienced an incapacitating cyber-attack that shut down all government services for about one month.

Jay Temple, a CGS contract employee who is a local Custer County resident doing geologic mapping for the EarthMRI study, was also very helpful in obtaining volunteers from his prior contacts with residents in Custer County. He and Dr. Clifford Brown divvied up the Custer County grids and then attempted to obtain volunteers from those grids.

Next, newspaper ads for soliciting volunteers were placed in the Canon City Daily Record and Shopper (for Fremont County residents), and the Wet Mountain Tribune (for Custer County residents). These ads explained the grant funded study and included a grid map showing the allotted well samples per numbered grid. Volunteers were asked to email Lesley Sebol at the CGS with their physical address, phone number (needed for FedEx shipping) and what grid number they thought they might be located within.

The Fremont County weekly ad in the Canon City Daily Record and Shopper was run for four consecutive weeks. As volunteers were obtained, the grid map was updated to reflect the remaining grid samples available for the next week's ad. Completed grids were progressively removed from the updated map. Similarly, the weekly ad in the Wet Mountain Tribune for Custer County was repeated twice with an updated map for the second week. The shorter time frame for this newspaper was because less volunteers were needed in this county. If too many volunteers were obtained from a grid space, they were notified that they had been placed on reserve.

A spreadsheet was used to track incoming volunteer requests, the extra volunteers placed on reserve, the status of sample kit shipments, address location coordinates, and the well-specific information. Volunteers were also tracked using their addresses in Google Earth Pro into which the grid had been imported, as it provided necessary information confirming which grid an address was located within, and relative proximity to other volunteers.

On the sampling form, many volunteers were able to fill out their well information at least partially, with well depth being the most common well item completed. For wells without DWR permit numbers on the sample form, the DWR database was queried. If found, then the provided well depth on the sample form was verified, and where different was adjusted in the project data table.

It was observed that the outer fringes of both counties had less population and a corresponding lack of newspaper coverage. Thus, to fill remaining available grid spaces, CGS staff went door-to-door for three consecutive days in mid-October targeting grid areas still needing volunteers. To accomplish this, the local CGS staff person, Jay Temple, accompanied Lesley Sebol for safety and known contact reasons. This effort also proved to be quite effective as almost all contacted agreed to the water sample. Some areas had gated communities which could not be entered. Other areas tended to have residences or small ranches with closed gates and no trespassing signs. Thus, volunteers could not be solicited at these locations. This left a few incomplete grids.

To fill final remaining gaps in grid sample locations, some of the previously reserved volunteers from the core area corresponding to the known intrusive complexes and rock thorium data were contacted. All contacted said yes, and these were "assigned" to fill the grid gaps. However, one of these never shipped back the sample. This left a grand total of 84 samples collected out of the possible 85 samples. Sampled well locations are shown on **Figure 4**. A total of 48 well water samples were obtained in Fremont County and 36 in Custer County.

Afterwards, 37 additional residents remained on the reserve list. After obtaining CDPHE approval, these residents were notified that they could not be accommodated, but that if additional funding could be obtained in the next year there was a small possibility of including them in 2023. They were told that they would be notified in about March or April of 2023 based on CDPHE's anticipated timing for possible additional funds.

2022 Sample Shipping to ACZ: The 84 water samples were shipped in batches by prepaid UPS to ACZ Laboratories on September 2nd (10 samples), September 22nd (10 samples), October 13th (10 samples), October 22nd (30 samples), November 4th (10 samples), November 10th (10 samples), and November 28 (4 samples). Each shipment was logged in by the lab and each sample was assigned a unique lab ID number. ACZ subcontracted some of the radionuclide testing (Radium-226 and/or Radium-228) to Summit Environmental Technologies, Inc. (Summit) in Ohio. Either the sample number or the ACZ assigned lab ID was used by Summit as the sample ID and then they assigned their own lab ID to those data.

Baseline Groundwater Study Methodology for 2023

Supplemental funding was provided by the CDPHE in late summer 2023. As a result, 29 of 37 residents on the long-term reserve list were able to be included during 2023. The remainder could not be included for the following reasons:

- declined to participate,
- did not respond to repeated emails notifying them of their inclusion,
- one was deemed unsuitable after confirming that city water was their primary water supply,
- had well problems such as insufficient water supply resulting in city water being placed into the well or had an electrically nonfunctional well pump.

The supplemental funding for these 8 samples was transferred to the 2023 Gunnison County sampling program.

The sample collection and shipping procedure was the same as in 2023 with minor exceptions as follows:

(1) An alternate lab (Eurofins of St. Louis, MO) had been contracted by the CDPHE for 2023, and they only needed one large sample container instead of one large and one small container.
(2) The sample coolers were dropped off using standard chain of custody procedures at the local Eurofins (TestAmerica) Denver laboratory, who then shipped it to their St. Louis laboratory for analysis.
(3) The list of analytes was the same except that three metals rarely detected were excluded from the 2023 program for cost reasons (cesium, scandium, and tellurium).

Two homeowners in 2023 never returned their samples to the CGS even with repeated reminders. A third homeowner provided their sample three months after receiving their sample kit. This was received on December 5th and was submitted to the laboratory on December 6th. Due to the late arrival of this last sample, there was insufficient time to analyze for Radium-226 prior to the end-of-year contract expiration.

2022 and 2023 Analytical Results

Analytical results from the 2022 and 2023 sampling efforts are summarized in **Tables 1 and 2,** respectively. These tables include the assigned sample number for all sampled wells, their location coordinates, well depth information (as available), and water quality data. It also includes the laboratory-assigned ID number for each sample. The applicable drinking water guidelines are also listed for the analytes. Results with concentrations greater than the applicable drinking water guidelines are bolded.

2022 lab results: The first 2022 laboratory data were received on December 12th. This included 50 samples shipped to the lab on September 2nd (10 samples), September 22nd (10 samples), and October 22nd (30 samples). The remaining data submitted to the lab on October 13th (10 samples), November 4th (10 samples), November 10th (10 samples), and November 28th (4 samples) were not received until after the 2022 report was submitted on the contractual due date of December 16, 2022. Due to the incomplete data set, a geographic evaluation of the received data was not conducted at that time. The remaining lab data were subsequently received on January 20, 2023, and February 21 and 28, 2023. This data and their evaluation were included in the updated Year 1 report dated March 3, 2023.

2023 lab results: The supplemental 2023 Eurofins laboratory data from the reserves samples are included in this updated Year 1 report. As water samples were received by the CGS, they were included in the Year 2 sample batches submitted on September 13, 29; October 6, 11, 24; November 3; and December 5, 2023. Laboratory data were received on October 13; November 7, 10, 13, 27; and December 6 and 27, 2023.

Data Evaluation

Figures 5 through 15 show the spatial distribution of the groundwater quality data combined from both 2022 and 2023 for radionuclides having drinking water guidelines or metals exhibiting exceedances of the applicable drinking water guidelines. This included Uranium (Figure 5), Thorium (Figure 6), Gross Alpha (Figure 7), Gross Beta (Figure 8), Radium-226 plus Radium-228 (Figure 9), Thorium-230 plus Thorium-232 (Figure 10), Arsenic (Figure 11), Lead (Figure 12), Manganese (Figure 13), Molybdenum (Figure 14), and Zinc (Figure 15). Although Thorium has no applicable drinking water guideline, a figure was generated due to it being a contributor to the gross radionuclide measurements. In Figures 5 through 15, sample locations with no detections were shown with light gray, small circles. Concentrations at or below the drinking water guideline (including detected estimated values below the reporting limit) were shown in blue, with guideline exceedances being shown in red. Figures were not generated for non-radioactive metals with (1) detections but no exceedances of their respective water quality guidelines or alternatively having no water quality guidelines, or (2) no detections above the reporting limit.

Analytes exhibiting exceedances of the applicable drinking water guidelines are listed with the number of exceedances from most to least: Lead (38), Gross Alpha (28), Uranium (13), Radium 226+228 (12), Molybdenum (4), Gross Beta (2), Arsenic (2), Manganese (2), and Zinc (1). The following bulleted list presents observations for the various analytes:

- Data obtained during this study showed considerably more guideline exceedances for Uranium (Figure 5) than was present in the historic water quality data (Figure 2).
- Uranium and Radium-226+228 exceedances were predominately located in Fremont County (Figures 5 and 9, respectively).
- Thorium was detected in the mg/L range at ten locations with the majority being in Fremont County north of the known intrusive complexes (Figure 6). The remainder were in Custer County near the known thorium dikes. Isotopic Thorium-230+232 was detected in the pCi/L range at most locations with concentrations being slightly higher in Custer County, although there were no exceedances of the 60 pCi/L guideline (Figure 10).

- Although Gross Alpha and Gross Beta were measurable at most locations, exceedances were predominately in Fremont County (Figures 7 and 8, respectively).
- Arsenic groundwater concentrations were generally higher in central Custer County which included one exceedance; however, the other exceedance was in Fremont County (Figure 11).
- Lead was detected above the reporting limit at concentrations ranging from 0.00052 to 0.0159 which is considered "present", making it an exceedance (Figure 12).
- The two manganese exceedances were in central Custer County (Figure 13).
- Although molybdenum was measurable at most locations, no discernable pattern of concentrations or exceedances was observable (Figure 14).
- No discernable zinc concentration pattern was observed and only one exceedance occurred in northern Fremont County (Figure 15).

Best Regards,

Lesley Sebol, PhD
Senior Hydrogeologist

Attachments:

Table 1. 2022 Wet Mountains Water Quality Data
Table 2. 2023 Supplemental Wet Mountains Water Quality Data

Figure 1. Residential water wells and historic thorium rock data in Fremont and Custer Counties
Figure 2. Historic uranium in groundwater wells and springs in Fremont and Custer Counties
Figure 3. Sampling grid and residential water wells in Fremont and Custer Counties
Figure 4. Sampled residential water wells in Fremont and Custer Counties
Figure 5. Uranium concentrations in milligrams per liter (mg/L) from water wells in Fremont and Custer Counties
Figure 6. Thorium concentrations in mg/L from water wells in Fremont and Custer Counties
Figure 7. Gross Alpha concentrations in picocuries per liter (pCi/L) from water wells in Fremont and Custer Counties
Figure 8. Gross Beta concentrations in picocuries per liter (pCi/L) from water wells in Fremont and Custer Counties
Figure 9. Radium 226+228 concentrations in pCi/L from water wells in Fremont and Custer Counties
Figure 10. Thorium 230+232 concentrations in pCi/L from water wells in Fremont and Custer Counties
Figure 11. Arsenic concentrations in mg/L from water wells in Fremont and Custer Counties
Figure 12. Lead concentrations in mg/L from water wells in Fremont and Custer Counties
Figure 13. Manganese concentrations in mg/L from water wells in Fremont and Custer Counties
Figure 14. Molybdenum concentrations in mg/L from water wells in Fremont and Custer Counties
Figure 15. Zinc concentrations in mg/L from water wells in Fremont and Custer Counties

Table 1. 2022 Wet Mountains Water Quality Data

Sample ID	Lab ID	Latitude	Longitude	Sample Date	Time	Well Depth	Geology[1]	Gross Alpha (pCi/L)	(±)[2]	Gross Beta (pCi/L)	(±)	Radium-226 (pCi/L)	(±)	Radium-228 (pCi/L)	(±)	Ra-226+228 (pCi/L)	Thorium-228 (pCi/L)	(±)	Thorium-230 (pCi/L)	(±)	Thorium-232 (pCi/L)	(±)	Th-230+232 (pCi/L)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)
							DWG[3]:	*15*		*50*		*-->*		*-->*		*5*	*-->*		*-->*		*-->*		*60*	*7*	*0.006*	*0.01*	*2*
20220270801	*L75607-01*	38.19	-105.43	8/11/2022	10:30	260	gabbro	10	4.5	3.2	3.2	0.16	0.9	ND	0.76	0.16	-0.135	0.44	0.273	0.37	0.07	0.12	0.343	<0.015	<0.002	0.00114	0.021
20220270802	*L75607-02*	38.12	-105.31	8/11/2022	17:42	420	granite	3.4	2.4	3.8	3.4	0.97	0.13	ND	0.57	0.97	0.335	0.47	1.1	0.43	-0.101	0.15	1.1	0.0065 B	<0.002	0.00029 B	0.109
20220270803	*L75607-03*	38.05	-105.31	8/14/2022	12:00	450	granite	4.1	2.7	13	3.7	0.29	0.1	ND	0.54	0.29	0.224	0.57	0.462	0.41	-0.0888	0.15	0.462	<0.015	<0.002	0.00552	0.0682
20220270804	*L75607-04*	38.16	-105.36	8/15/2022	12:00	226	granite	11	4.2	7.6	3.4	0.2	0.08	ND	0.67	0.2	-0.1	0.29	0.616	0.39	0.0692	0.12	0.6852	<0.015	<0.002	0.00837	0.0634
20220270805	*L75607-05*	38.17	-105.25	8/17/2022	10:00	35	overburden	2	1.9	1.9	2.9	0.12	0.08	ND	0.54	0.12	0.0854	0.73	-0.0892	1.2	-0.15	0.86	ND	<0.015	<0.002	<0.001	0.112
20220270806	*L75607-06*	38.17	-105.29	8/19/2022	15:00	40	overburden	1.7	2.2	4.5	3.6	0.32	0.1	ND	0.54	0.32	-1.76	2.6	2.55	2	-0.38	0.94	2.55	<0.015	<0.002	<0.001	0.265
20220270807	*L75607-07*	38.10	-105.35	8/23/2022	9:47	360	granite	6.7	3.5	3.8	3.1	0.41	0.1	ND	0.58	0.41	-0.105	0.9	0.408	0.81	0.00531	0.38	0.41331	<0.015	0.00049 B	0.00043 B	0.0949
20220270808	*L76175-02*	38.06	-105.52	9/9/2022	9:30	90	granite	1.8	1.9	2.7	3	ND	0.05	3.59	0.91	3.59	-0.371	0.4	1.51	0.58	0.0538	0.13	1.5638	0.0118 B	<0.002	<0.001	0.108
20220270809	*L76175-03*	38.05	-105.27	9/12/2022	7:05	125	granite	3.8	2.7	5	3.4	ND	0.08	ND	0.6	ND	-0.0638	0.27	0.44	0.28	0.175	0.16	0.615	<0.005	<0.002	0.00205	0.152
20220270810	*L76175-07*	38.24	-105.28	9/15/2022	10:35	330	granite	1.6	2.3	3.8	3.5	ND	0.05	ND	0.45	ND	0.0875	0.24	0.338	0.47	-0.273	0.3	0.338	<0.005	<0.002	0.00242	0.108
20220270811	*L76175-08*	38.12	-105.16	9/14/2022	13:50	unknown	unknown	1.7	1.8	3.4	3	ND	0.09	ND	0.4	ND	-0.233	0.24	0.232	0.45	-0.075	0.21	0.232	<0.005	<0.002	0.00084 B	0.0102
20220270812	*L76871-06*	37.98	-105.28	10/7/2022	16:45	500	volcanic	1.9	1.7	6.5	3.5	ND	0.12	ND	0.54	ND	-0.0746	0.2	0.368	0.34	-0.0743	0.15	0.368	<0.015	<0.002	0.00453	0.0155
20220270813	*L76871-05*	38.21	105.09	10/11/2022	11:00	240	sandstone	14	4.7	11	3.8	ND	0.13	ND	0.56	ND	0.145	0.33	1.37	0.52	0.0318	0.14	1.4018	<0.015	<0.002	0.00029 B	0.131
20220270814	*L76871-07*	38.15	-105.50	10/19/2022	10:15	60	overburden	0.97	1.2	2.5	2.7	ND	0.06	ND	0.56	ND	0.0251	0.22	0.578	0.49	-0.279	0.28	0.578	<0.015	<0.002	<0.001	0.078
20220270815	*L76871-08*	38.26	-105.29	10/21/2022	10:20	84	granite	1.4	5	9.4	7	ND	0.09	3.08	0.85	3.08	-0.0444	0.25	0.3	0.43	-0.12	0.18	0.3	<0.015	<0.002	0.0007 B	0.57
20220270816	*L76871-09*	38.16	-105.25	10/21/2022	8:30	198	granite	2.4	1.9	4.6	3.3	ND	0.05	ND	0.6	ND	-0.0219	0.32	1.18	0.63	0.163	0.32	1.343	0.011 B	<0.002	<0.001	0.0283
20220270817	*L76871-10*	38.10	-105.18	10/21/2022	12:25	40	overburden/sandst.	0.33	1.2	2.7	10	ND	0.06	ND	0.45	ND	-0.0417	0.26	0.947	0.34	-0.0423	0.12	0.947	<0.015	<0.002	<0.001	0.15
20220270818	*L76871-11*	38.21	-105.24	10/21/2022	14:25	280	granite	2.4	2	6.8	3.5	ND	0.06	1.69	0.7	1.69	0.096	0.38	4.54	0.93	0.0323	0.13	4.5723	0.0087 B	<0.002	0.00057 B	0.0919
20220270819	*L76871-12*	38.24	-105.10	10/21/2022	16:45	80	overburden/shale	3.7	2.7	3.4	3	ND	0.08	1.00	0.67	1.00	-0.0158	0.32	0.724	0.41	-0.0724	0.16	0.724	<0.75	<0.002	<0.001	0.081
20220270820	*L76871-13*	38.20	-105.46	10/18/2022	9:07	140	granite	8.4	0.61	3.4	4.9	ND	0.07	ND	0.56	ND	-0.118	0.26	1.11	0.42	0.00	0.18	1.11	<0.015	<0.002	0.00108	0.154
20220270821	*L76871-14*	38.04	-105.38	10/20/2022	7:35	325	granite	1.4	1.6	5.7	3.4	ND	0.07	ND	0.56	ND	-0.349	0.86	1.62	0.61	0.0725	0.14	1.6925	0.325	<0.002	0.00153	0.0742
20220270822	*L77097-03*	38.23	-105.42	10/24/2022	10:00	323	granite	3.6	2.8	8.6	3.7	ND	0.1	ND	0.64	ND	0.178	0.73	0.0777	0.67	-0.388	0.33	0.0777	<0.015	<0.002	<0.001	0.0367
20220270823	*L77097-04*	38.15	-105.56	10/24/2022	16:30	90	overburden	0.45	1.8	-0.26	2.6	ND	0.06	ND	0.53	ND	0.00254	0.25	1.07	0.46	0.0543	0.18	1.1243	<0.015	<0.002	<0.001	0.064
20220270824	*L77097-05*	38.19	-105.35	10/23/2022	8:30	204	granite	0.16	1.6	3.6	3.2	ND	0.1	ND	0.62	ND	0.0732	0.27	0.889	0.57	-0.0837	0.3	0.889	0.0095 B	<0.002	<0.001	0.105
20220270825	*L77097-06*	38.23	-105.53	10/28/2022	9:30	200	granite	**32**	7.8	15	3.9	ND	0.15	1.19	0.53	1.19	0.0605	0.36	0.732	0.49	-0.0132	0.26	0.732	0.0338	<0.002	0.00035 B	0.169
20220270826	*L77097-08*	38.21	-105.26	10/30/2022	11:45	300	granite	-6.1	1.7	8.6	6	ND	0.08	ND	0.61	ND	-0.127	0.46	0.747	0.52	-0.197	0.26	0.747	0.496	<0.002	0.00021 B	0.249
20220270827	*L77097-09*	37.97	-105.30	10/30/2022	13:00	300	granite	-0.05	1.9	2.9	2.9	ND	0.07	ND	0.56	ND	-0.0231	0.3	0.38	0.32	-0.157	0.16	0.38	0.125	<0.002	0.00332	0.0732
20220270828	*L77097-10*	38.16	-105.47	11/1/2022	12:00	255	sandstone	0.53	5.8	4.5	5	ND	0.08	ND	0.58	ND	0.0685	0.4	0.274	0.43	0.0	0.53	0.274	0.0088 B	<0.002	0.00066 B	0.0141
20220270829	*L77209-05*	38.22	-105.28	11/2/2022	11:00	unknown	granite	2.6	2.2	4.2	3	ND	0.07	1.14	0.6	1.14	0.159	0.34	0.567	0.62	-0.0189	0.37	0.567	<0.015	<0.002	0.00094 B	0.0753
20220270830	*L77209-06*	38.12	-105.35	11/2/2022	12:05	424	granite	-0.25	1.2	0.69	2.6	ND	0.08	ND	0.54	ND	-0.00388	0.43	0.887	0.6	-0.102	0.31	0.887	<0.015	<0.002	0.00091 B	0.0444
20220270831	*L77209-07*	38.09	-105.35	11/3/2022	9:30	145	granite	0.55	2.1	6.7	3.2	ND	0.19	ND	0.45	ND	-0.07	0.32	0.0662	0.31	-0.127	0.14	0.0662	0.112	<0.002	0.00689	0.122
20220270832	*L77209-08*	38.09	-105.32	11/2/2022	13:00	150	granite	2.4	3.1	11	3.7	ND	0.18	2.38	0.67	2.38	0.306	0.36	0.805	0.4	-0.193	0.16	0.805	0.016	<0.002	**0.0285**	0.116
20220270833	*L77209-09*	38.11	-105.31	11/1/2022	11:30	300	granite	**23**	8.7	16	5.6	3.09	0.31	2.23	0.78	**5.32**	0.709	1.2	1.6	1.1	-0.143	0.5	1.6	0.247	<0.002	0.00503	0.124
20220270834	*L77209-10*	38.14	-105.36	11/2/2022	17:37	493	granite	**37**	7.5	7.7	3.2	ND	0.09	ND	0.48	ND	-0.188	0.38	0.63	0.45	-0.209	0.24	0.63	0.0116 B	<0.002	0.00658	0.0183
20220270835	*L77424-01*	38.13	-105.55	11/6/2022	10:50	118	overburden	6.4	2.8	6.3	2.9	ND	0.08	ND	0.46	ND	-1.43	1.3	0.255	1.3	-0.17	0.58	0.255	0.0375	<0.002	<0.001	0.0985
20220270836	*L77424-03*	38.04	-105.31	11/15/2022	14:30	285	volcanic	4.6	3.1	16	4	ND	0.09	ND	0.55	ND	-0.707	0.74	0.163	0.7	-0.0408	0.28	0.163	<0.015	<0.002	0.00399	0.0412
20220430801	*L75607-08*	38.56	-105.54	8/29/2022	17:30	605	volcanic	**18**	6.4	6.5	3.8	2.9	0.19	ND	0.55	2.9	-0.149	0.77	0.749	0.63	-0.0496	0.43	0.749	0.0058 B	<0.002	<0.001	0.128
20220430802	*L75607-09*	38.27	-105.32	8/31/2022	10:00	280	granite	1.8	2.1	6.7	3.7	0.38	0.09	1.3	0.53	1.68	0.167	0.99	1.54	1.2	-0.307	0.38	1.54	0.0233	<0.002	0.00044 B	0.1
20220430803	*L75607-10*	38.62	-105.59	8/31/2022	8:40	165	volcanic	1.6	1.9	1.6	2.9	0.07	0.07	ND	0.5	0.07	-0.849	1.2	0.512	1.2	-0.393	0.61	0.512	<0.015	<0.002	<0.001	0.0839
20220430804	*L76175-01*	38.26	-105.65	8/31/2022	14:00	unknown	unknown	3.2	2.3	1.8	2.9	ND	0.05	ND	0.51	ND	-0.14	0.32	0.67	0.41	0.0824	0.14	0.7524	<0.005	<0.002	<0.001	0.151
20220430805	*L76175-04*	38.61	-105.49	9/11/2022	17:10	710	granite	**65**	9.7	24	4.4	4.44	0.3	4.00	0.94	**8.44**	0.611	0.36	0.457	0.28	-0.101	0.11	0.457	0.0098 B	<0.002	0.00022 B	0.0604
20220430806	*L76175-05*	38.69	-105.43	9/10/2022	6:45	309	granite	1.7	1.8	1.7	2.8	ND	0.06	4.76	1.01	4.76	-0.0246	0.28	1.58	0.54	-0.00245	0.11	1.58	<0.005	<0.002	0.00197	0.0658
20220430807	*L76175-06*	38.47	-104.97	9/12/2015	12:00	195	shale/sandstone	5.4	5.6	12	5.1	1.34	0.17	4.84	1.06	**6.18**	0.0998	0.24	0.656	0.38	0.0188	0.17	0.656	0.0415	<0.002	<0.001	0.011
20220430808	*L76175-09*	38.49	-104.96	9/19/2022	7:35	500	granite	2.8	8.4	12	8.6	1.24	0.16	1.32	0.68	2.56	0.0935	0.25	0.523	0.41	-0.0162	0.2	0.523	0.0176	<0.002	<0.001	0.00799
20220430809	*L76175-10*	38.36	-105.47	9/17/2022	9:00	300	granite	3.6	2.9	5.7	3.5	ND	0.07	1.16	0.61	1.16	-0.204	0.35	0.835	0.41	-0.155	0.15	0.835	0.0482	<0.002	0.00063 B	0.0406
20220430810	*L76695-01*	38.31	-105.16	9/17/2022	11:37	200	sandstone	0.45	2.5	3.3	4.3	ND	0.07	ND	0.37	ND	-0.917	0.74	0.516	0.67	-0.165	0.34	0.351	<0.015	<0.002	<0.001	0.0445
20220430811	*L76695-02*	38.50	-105.34	9/26/2022	7:30	400	granite	9.8	5.3	16	5.2	ND	0.07	1.69	0.57	1.69	-0.0599	0.27	0.459	0.38	-0.0714	0.11	0.3876	0.0079 B	<0.002	0.00023 B	0.0304
20220430812	*L76695-03*	38.45	-105.38	9/27/2022	11:00	285	unknown	**59**	18	40	11	ND	0.1	ND	0.53	ND	0.0665	0.29	0.905	0.35	0.0488	0.12	0.9538	0.0106 B	<0.002	0.00088 B	0.0363

Table 1. 2022 Wet Mountains Water Quality Data

Sample ID	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Cesium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Scandium (mg/L)	Selenium (mg/L)	Silver (mg/L)	Tellurium (mg/L)	Thallium (mg/L)	Thorium (mg/L)	Tin (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
	0.004	*1.4*	*0.005*	*n/a*	*0.01*	*0.006*	*1.3*	*14*	*present*	*0.3*	*0.035*	*0.1*	*n/a*	*0.05*	*0.035*	*n/a*	*0.002*	*n/a*	*2.1*	*0.03*	*0.07*	*2*
20220270801	<0.00025	0.0238	<0.00025	<0.001	<0.002	0.000257	0.0538	<0.02	**0.00069**	0.00165 B	0.00361	0.00146	0.00012 B	0.00379	<0.0005	<0.005	<0.0005	0.0013 B	<0.0025	0.00927	0.0107	0.0108 B
20220270802	<0.00025	0.0139	<0.00025	<0.001	<0.002	0.000304	0.0175	0.0595	**0.00326**	0.125	0.00655	<0.001	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	0.0011 B	<0.0025	0.00121	<0.002	0.0187
20220270803	<0.00025	0.0209	<0.00025	0.0018	<0.002	0.000097 B	0.0321	<0.02	**0.00067**	0.0119	0.00233	<0.001	0.00013 B	0.00105	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00316	0.00702	0.0251
20220270804	<0.00025	0.0467	<0.00025	0.00039 B	<0.002	0.000114 B	0.00198 B	<0.02	<0.0005	0.00346	0.0142	0.00224	<0.0005	0.00048	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00606	<0.002	<0.015
20220270805	<0.00025	0.0129	<0.00025	<0.001	<0.002	0.000146 B	0.00187 B	0.132	<0.0005	0.0067	0.00469	0.00041 B	<0.0005	0.00087	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00172	0.00105 B	0.0082
20220270806	<0.00025	0.0211	<0.00025	<0.001	0.0015 B	0.000207 B	0.0147	0.0122 B	**0.00065**	0.0009 B	0.00229	0.00151	<0.0005	0.00099	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00328	0.00125 B	0.0976
20220270807	<0.00025	0.0152	<0.00025	0.00029 B	<0.002	0.000142 B	0.0433	0.0087 B	**0.00107**	0.0045	0.0027	<0.001	<0.0005	0.00037	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0103	<0.002	0.0551
20220270808	<0.00025	0.0079	<0.00025	<0.001	0.00111 B	0.000104 B	0.00951	0.0715	**0.00253**	0.002	<0.0005	<0.001	<0.0005	0.00026	<0.0005	<0.005	<0.0005	<0.005	0.00391	0.00178	<0.002	0.0107 B
20220270809	<0.00025	0.019	<0.00025	<0.001	<0.002	0.000097 B	0.0592	<0.02	0.00013 B	<0.002	0.00237	<0.001	<0.0005	0.00402	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00269	0.00799	<0.015
20220270810	<0.00025	0.0347	<0.00025	<0.001	0.00682	0.000143 B	0.0765	0.0095 B	<0.0005	<0.002	0.00505	0.00061 B	<0.0005	0.00264	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00237	0.016	0.0194
20220270811	<0.00025	0.0152	0.000085 B	<0.001	0.00079 B	0.000398	0.00696	0.0073 B	0.00039 B	0.172	0.00125	0.00085 B	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00015 B	0.00053 B	0.0933
20220270812	<0.00025	0.0206	<0.00025	0.00044 B	<0.002	0.000081 B	0.048	<0.02	**0.00076**	<0.002	0.00127	<0.001	<0.0005	0.00137	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00145	0.017	0.0092 B
20220270813	<0.00025	0.0142	<0.00025	<0.001	<0.002	0.000154 B	0.00621	0.0145 B	0.00018 B	<0.002	0.00178	<0.001	0.00011 B	0.0018	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0135	0.00118 B	0.0129 B
20220270814	<0.00025	0.0076 B	<0.00025	<0.001	0.00103 B	0.000067 B	0.157	0.0251	<0.0005	0.0014 B	<0.0005	0.00569	<0.0005	0.00017 B	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00033 B	0.00127 B	0.037
20220270815	<0.00025	0.0231	<0.00025	<0.001	0.00077 B	0.00062	0.0155	0.0095 B	**0.00389**	<0.002	0.00126	<0.001	<0.0005	0.00088	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00212	0.00501	0.0288
20220270816	<0.00025	0.0119	<0.00025	<0.001	<0.002	0.000183 B	1.17	0.0176 B	**0.00134**	0.00074 B	0.00112	0.00298	<0.0005	0.00036	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00152	0.00254	0.204
20220270817	<0.00025	0.0093 B	<0.00025	<0.001	<0.002	0.000095 B	0.187	0.0219	**0.0054**	0.00258	0.00066	0.00438	<0.0005	0.00058	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00072	0.00193 B	0.202
20220270818	<0.00025	0.0153	<0.00025	<0.001	0.00214	0.000123 B	0.00254	<0.02	0.00012 B	<0.002	0.00144	<0.001	<0.0005	0.0009	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00116	0.00605	0.007 B
20220270819	<0.00025	0.528	<0.00025	<0.001	<0.002	<0.00025	0.00308	0.0091 B	**0.00125**	<0.002	0.00258	<0.001	<0.0005	<0.00025	<0.025	<0.005	<0.0005	<0.005	<0.0025	0.00041 B	0.00062 B	<0.75
20220270820	<0.00025	0.179	0.000202 B	<0.001	<0.002	0.00145	0.407	0.0392	**0.0106**	0.00301	0.00027 B	0.00415	<0.0005	0.00075	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00388	0.00659	0.773
20220270821	<0.00025	0.0173	0.00006 B	<0.001	0.00055 B	0.00014 B	0.0261	0.0456	0.00049 B	0.00346	0.00181	<0.001	<0.0005	0.00104	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00148	0.00488	0.159
20220270822	<0.00025	0.0139	<0.00025	<0.001	0.00075 B	0.000300	0.0125	<0.02	0.00037 B	<0.002	0.00056	<0.001	<0.0005	0.00156	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00759	0.00377	0.0471
20220270823	<0.00025	0.0098	<0.00025	<0.001	0.00083 B	0.000171 B	0.0138	<0.02	0.00014 B	<0.002	0.00038 B	<0.001	<0.0005	0.00021 B	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00167	<0.002	<0.015
20220270824	<0.00025	0.0211	<0.00025	<0.001	0.00064 B	0.000286	0.0433	0.0491	**0.00126**	0.0337	0.00757	<0.001	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00280	<0.002	0.0684
20220270825	<0.00025	0.0276	<0.00025	<0.001	0.00064 B	0.000572	0.0347	0.0557	**0.00194**	0.00086 B	0.0120	<0.001	<0.0005	0.00232	<0.0005	<0.005	<0.0005	<0.005	<0.0025	**0.0455**	0.00502	0.0529
20220270826	<0.00025	0.0100	0.000105 B	<0.001	0.00245	0.00169	0.308	0.782	**0.00126**	0.0132	0.00164	0.00242	0.00022 B	0.00069	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00086	0.00507	0.0287
20220270827	<0.00025	0.0182	<0.00025	<0.001	0.00093 B	0.000286	0.0043	0.0383	0.00017 B	0.00161 B	0.00078	<0.001	0.00020 B	0.00398	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00078	0.0135	0.0097 B
20220270828	<0.00025	0.0333	0.000249 B	<0.001	0.00063 B	0.00168	0.154	0.134	**0.0032**	0.00998	0.00110	0.00254	<0.0005	0.00228	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00484	<0.002	0.537
20220270829	<0.00025	0.0181	<0.00025	<0.001	0.00067 B	0.000325	0.0513	<0.02	**0.00052**	<0.002	0.00200	<0.001	<0.0005	0.00107	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00107	0.00380	0.0082 B
20220270830	0.000402	0.0220 B	<0.00025	0.00023 B	<0.002	0.00161	0.117	3.24	**0.0159**	**3.52**	0.00086	0.00139	0.00015 B	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.05	<0.0005	0.00211	0.194
20220270831	<0.00025	0.0340	<0.00025	0.00332	<0.002	0.000423	0.00620	0.0117 B	0.00027 B	0.0130	0.00270	<0.001	0.00012 B	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00074	<0.002	0.0081 B
20220270832	0.000155 B	0.0985	<0.00025	0.00241	<0.002	0.000568	0.00921	1.84	**0.00074**	0.132	0.00989	0.00049 B	0.00020 B	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00158	<0.002	0.0175
20220270833	0.000171 B	0.0148	<0.00025	0.00420	0.00358	0.00317	0.336	2.25	**0.00498**	**0.955**	0.00174	0.00281	0.00083	0.00019 B	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00069	0.00189	0.0955
20220270834	<0.00025	0.0512	<0.00025	0.00190	<0.002	0.000270	0.00418	0.02	0.00014 B	0.00068 B	0.0102	0.00113	<0.0005	0.00185	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0173	<0.002	0.0207
20220270835	<0.00025	0.0050	<0.00025	<0.001	0.00398	0.000164 B	0.0144	10.6	**0.00196**	0.194	0.00026 B	0.00123	<0.0005	0.00013 B	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00042	0.00152 B	0.0318
20220270836	<0.00025	0.0510	<0.00025	0.00096 B	<0.002	0.000148 B	0.106	0.011	0.00037 B	0.0295	0.00688	<0.001	0.00033 B	0.00031	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00314	0.00059 B	0.0133 B
20220430801	<0.00025	0.137	<0.00025	<0.001	<0.002	0.000062 B	<0.002	1.37	<0.0005	0.0619	0.00387	<0.001	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00475	<0.002	<0.015
20220430802	<0.00025	0.0301	<0.00025	<0.001	0.00094 B	0.000175 B	0.0151	0.0431	0.00043 B	0.00655	0.0057	0.00055 B	<0.0005	0.00087	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0017	0.00302	0.0152
20220430803	<0.00025	0.0117	<0.00025	<0.001	<0.002	0.00011 B	0.00676	<0.02	<0.0005	<0.002	0.00029 B	<0.001	<0.0005	0.00076	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0006	0.00361	0.0123 B
20220430804	<0.00025	0.0038 B	<0.00025	<0.001	0.00087 B	0.000091 B	0.0735	0.0113 B	**0.00893**	<0.002	0.00028 B	<0.001	<0.0005	0.00036	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00202	<0.002	0.0205
20220430805	0.000083 B	0.0469	<0.00025	<0.001	<0.002	0.000057 B	0.00264	0.0294	<0.0005	0.00147 B	0.00109	<0.001	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0289	<0.002	<0.015
20220430806	<0.00025	0.0133	<0.00025	<0.001	<0.002	0.000061 B	0.0878	<0.02	0.0003 B	<0.002	0.00024 B	<0.001	<0.0005	0.00114	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00037 B	0.00483	0.0135 B
20220430807	<0.00025	0.0658	<0.00025	<0.001	<0.002	0.000690	0.00283	0.183	0.00032 B	0.0284	0.001	0.00434	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0004 B	<0.002	0.0366
20220430808	<0.00025	0.133	0.000143 B	<0.001	<0.002	0.000447	0.096	0.024	**0.00401**	0.0162	0.0199	0.00721	<0.0005	0.00025 B	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00049 B	<0.002	0.185
20220430809	<0.00025	0.0408	<0.00025	<0.001	0.00081 B	0.000149 B	0.0155	0.205	0.00025 B	0.00764	0.00596	0.00054 B	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00114	<0.002	0.0148 B
20220430810	<0.00025	0.053	<0.00025	<0.001	<0.002	0.000306	0.0169	0.104	**0.00214**	0.278	0.00359	0.00043 B	0.00011 B	<0.00025	<0.0005	<0.005	<0.0005	<0.005	0.00121 B	<0.0005	<0.002	0.0589
20220430811	<0.00025	0.120	<0.00025	<0.001	<0.002	0.000323	0.00805	0.0088 B	0.00027 B	0.00463	0.00184	<0.001	<0.0005	0.00055	<0.0005	0.0013 B	<0.0005	<0.005	<0.0025	0.0063	<0.002	0.0147 B
20220430812	<0.00025	0.456	0.000062 B	<0.001	<0.002	0.00103	0.00427	0.0137 B	0.00043 B	0.0134	0.0130	0.00629	<0.0005	0.0484	<0.0005	0.0022 B	0.00012 B	<0.005	<0.0025	**0.0825**	0.00336	0.101

Table 1. 2022 Wet Mountains Water Quality Data

Sample ID	Lab ID	Latitude	Longitude	Sample Date	Time	Well Depth	Geology[1]	Gross Alpha (pCi/L)	(±)[2]	Gross Beta (pCi/L)	(±)	Radium-226 (pCi/L)	(±)	Radium-228 (pCi/L)	(±)	Ra-226+228 (pCi/L)	Thorium-228 (pCi/L)	(±)	Thorium-230 (pCi/L)	(±)	Thorium-232 (pCi/L)	(±)	Th-230+232 (pCi/L)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)
							DWG[3]:	*15*		*50*		-->		-->		*5*	-->		-->		-->		*60*	*7*	*0.006*	*0.01*	*2*
20220430813	*L76695-04*	38.39	-105.11	9/26/2022	16:15	45	overburden/shale	5.9	3.5	8.1	3.3	ND	0.04	1.02	0.5	1.02	-0.305	0.36	0.519	0.37	0.0252	0.16	0.5442	<0.015	<0.002	0.00039 B	0.0545
20220430814	*L76695-05*	38.51	-105.25	9/29/2022	11:30	260	sandstone	3.2	3	13	4.1	1.71	0.19	1.06	0.5	2.77	0.204	0.24	0.112	0.32	-0.0811	0.16	0.0309	<0.015	<0.002	<0.001	0.0209
20220430815	*L76695-06*	38.43	-105.25	10/5/2022	11:20	unknown	shale	**16**	5.4	18	4	3.32	0.27	ND	0.53	3.32	0.139	0.23	0.0689	0.5	-0.0126	0.32	0.0563	0.375	<0.002	0.00154	0.0458
20220430816	*L76695-07*	38.60	-105.45	10/6/2022	11:00	440	granite	**43**	7.1	29	4.4	ND	0.26	1.15	0.53	1.15	-0.342	0.43	0.198	0.46	-0.0757	0.15	0.1223	0.0076 B	0.00049 B	0.0007 B	0.0465
20220430817	*L76695-08*	38.55	-105.05	10/5/2022	14:39	300	sandstone/granite	7.2	3.4	7.2	3.3	ND	0.08	1.06	0.5	1.06	-0.124	0.44	0.25	0.49	0.123	0.18	0.373	0.0114 B	<0.002	0.0004 B	0.211
20220430818	*L76695-09*	38.27	-105.07	10/11/2022	8:16	12	overburden	5.4	3.7	9.6	4	7.56	0.08	ND	0.5	**7.56**	-0.533	0.49	0.274	0.42	0.0	0.30	0.274	<0.015	<0.002	0.00046 B	0.118
20220430819	*L76695-10*	38.62	-105.52	10/10/2022	16:15	775	volcanic	**55**	8	36	4.6	ND	0.39	4.94	0.85	4.94	0.14	0.61	0.425	0.57	-0.169	0.21	0.256	<0.015	<0.002	0.00031 B	0.0585
20220430820	*L76871-01*	38.48	-105.17	10/10/2022	15:15	375	shale/sandstone	**52**	12	**68**	8	11.7	0.52	23.1	1.99	**34.8**	0.914	0.43	0.688	0.37	0.162	0.16	0.85	<0.015	<0.002	**0.012**	0.00933
20220430821	*L76871-02*	38.44	-104.99	10/10/2022	11:00	100	volcanic (?)	14	5.9	16	5	ND	0.09	ND	0.44	ND	-0.136	0.42	1.25	0.54	0.12	0.15	1.369	0.0241	<0.002	<0.001	0.0186
20220430822	*L76871-03*	38.56	-105.19	10/11/2022	15:30	200	unknown	**27**	6.1	20	4	ND	0.14	ND	0.5	ND	0.0701	0.25	0.665	0.29	0.0	0.16	0.665	<0.015	<0.002	<0.001	0.0433
20220430823	*L76871-04*	38.65	-105.36	10/12/2022	10:00	420	unknown	**21**	8.6	8.3	9	1.02	0.15	1.39	0.59	2.41	-0.00673	0.29	0.464	0.31	-0.0868	0.13	0.464	<0.015	<0.002	0.0029	0.0541
20220430824	*L76871-15*	38.38	-105.52	10/19/2022	12:07	400	granite	**34**	7.4	22	4.2	1.48	0.18	1.78	0.75	3.26	-0.199	0.31	1.6	0.52	0.0909	0.16	1.6909	0.0064 B	<0.002	<0.001	0.0786
20220430825	*L76871-16*	38.39	-105.51	10/19/2022	13:10	270	granite	**31**	6.3	10	3.4	1.42	0.18	4.79	1.11	**6.21**	0.374	0.32	1.95	0.55	0.0229	0.11	1.9729	0.0325	<0.002	0.00243	0.0523
20220430826	*L76871-17*	38.37	-105.50	10/19/2022	14:25	250	granite	11	4.1	9.7	3.7	ND	0.09	2.53	0.91	2.53	0.172	0.31	0.843	0.39	0.0409	0.12	0.8839	<0.015	<0.002	<0.001	0.054
20220430827	*L76871-18*	38.34	-105.47	10/19/2022	15:36	380	granite	**18**	8	9.7	5.3	ND	0.1	ND	0.64	ND	-0.0749	0.2	0.825	0.41	-0.0249	0.16	0.825	0.011 B	<0.002	0.0003 B	0.14
20220430828	*L76871-19*	38.44	-105.38	10/19/2022	16:45	150	sandstone	**16**	7.9	13	6.9	ND	0.11	ND	0.47	ND	0.0668	0.22	0.846	0.48	-0.129	0.28	0.846	<0.015	<0.002	0.00033 B	0.0308
20220430829	*L76871-20*	38.41	-105.60	10/19/2022	17:35	72	granite	**160**	22	**58**	8.3	ND	0.11	ND	0.47	ND	-0.0894	0.27	0.9	0.54	-0.126	0.21	0.9	<0.3	<0.002	0.00035 B	0.0279
20220430830	*L76871-21*	38.27	-105.55	10/20/2022	10:55	50 (?)	unknown	2.6	2.6	3.7	3.2	ND	0.05	ND	0.67	ND	0.158	0.36	0.91	0.44	-0.0229	0.1	0.91	0.0051 B	<0.002	0.00053 B	0.0381
20220430831	*L76871-22*	38.35	-105.52	10/20/2022	12:10	140	granite	**75**	11	14	3.7	ND	0.08	ND	0.56	ND	0.146	0.32	0.2	0.31	-0.0656	0.14	0.2	<0.015	<0.002	0.00021 B	0.00083 B
20220430832	*L76871-23*	38.39	-105.46	10/20/2022	13:30	120	bedrock	6.8	3.4	10	3.4	ND	0.13	ND	0.64	ND	-0.115	0.26	0.129	0.27	0.0686	0.12	0.1976	<0.015	<0.002	0.00027 B	0.0404
20220430833	*L76871-24*	38.49	-105.35	10/20/2022	15:00	360	granite	**190**	25	28	6.6	8.48	0.42	2.16	0.87	**10.64**	-0.553	0.35	1.64	0.57	0.128	0.24	1.768	0.201	<0.002	0.00094 B	0.0126
20220430834	*L76871-25*	38.38	-105.69	10/18/2022	20:50	250	granite	**39**	8.6	20	4.1	ND	0.09	1.52	0.74	1.52	-0.203	0.31	1.13	0.45	-0.0309	0.29	1.13	<0.015	<0.002	<0.001	0.0135
20220430835	*L76871-26*	38.35	-105.75	10/17/2022	16:55	200	sandstone	**25**	6.5	5.9	3.6	ND	0.1	ND	0.61	ND	0.374	0.31	0.996	0.4	-0.00205	0.1	0.996	<0.015	<0.002	<0.001	0.0123
20220430836	*L76871-27*	38.27	-105.32	10/17/2022	14:31	575	volcanic	0.74	1.6	5.3	3.2	ND	0.08	ND	0.51	ND	0.248	0.33	0.682	0.38	-0.0282	0.1	0.682	<0.015	<0.002	<0.001	0.0491
20220430837	*L76871-28*	38.52	-105.69	10/11/2022	13:00	300	shale (?)/volcanic	9.7	5.2	13	4.7	ND	0.08	ND	0.64	ND	0.102	0.25	0.51	0.37	-0.0704	0.15	0.51	0.0715	<0.002	0.00315	0.0452
20220430838	*L76871-29*	38.41	-105.16	10/17/2022	16:30	85	overburden	**18**	6.6	7.5	3.7	ND	0.09	ND	0.71	ND	-0.048	0.2	0.118	0.42	-0.189	0.29	0.118	<0.015	<0.002	0.00028 B	0.0553
20220430839	*L76871-30*	38.44	-105.87	10/18/2022	10:00	110	bedrock	4	2.6	3.2	2.9	ND	0.05	ND	0.66	ND	-0.186	0.29	-0.0083	0.49	-0.14	0.23	ND	<0.015	<0.002	<0.001	0.14
20220430840	*L77097-01*	38.38	-105.23	10/19/2022	10:30	170	sandstone/shale	6.3	4	9.9	3.6	1.07	0.02	2.97	0.9	4.04	0.518	0.56	0.76	0.54	-0.11	0.31	0.76	<0.015	<0.002	<0.001	0.0680
20220430841	*L77097-02*	38.45	-105.73	10/25/2022	8:45	84	granite	1.6	2	4	3.2	ND	0.06	ND	0.62	ND	0.0632	0.39	0.176	0.41	-0.126	0.14	0.176	<0.015	<0.002	<0.001	0.00534
20220430842	*L77097-07*	38.47	-104.99	10/28/2022	13:00	242	unknown	1.4	3.2	16	4.1	1.02	0.2	3.55	0.77	4.57	-0.45	1.6	-0.315	1.2	-0.194	0.71	ND	<0.015	<0.002	<0.001	0.0117
20220430843	*L77209-01*	38.28	-105.48	11/1/2022	18:00	175	granite	8.8	3.4	5	3.1	ND	0.06	ND	0.47	ND	0.13	0.27	0.665	0.35	0.0	0.23	0.665	<0.015	<0.002	0.00494	0.0735
20220430844	*L77209-02*	38.43	-105.82	11/3/2022	11:00	50	overburden	8.6	4	4.9	3.5	ND	0.03	ND	0.6	ND	-0.078	0.3	3.73	0.82	-0.114	0.18	3.73	0.0054	<0.002	0.00040 B	0.0613
20220430845	*L77209-03*	38.28	-105.53	11/3/2022	8:00	120	granite	10	9.5	12	7.8	ND	0.08	ND	0.72	ND	0.099	0.34	0.379	0.37	-0.0517	0.19	0.379	<0.015	<0.002	0.00067 B	0.103
20220430846	*L77209-04*	38.27	-105.45	11/1/2022	8:00	450	granite	7	3.7	10	3.4	ND	0.1	ND	0.68	ND	0.312	0.36	1.59	0.65	-0.13	0.16	1.59	0.0072	<0.002	0.00096 B	0.195
20220430847	*L77424-02*	38.61	-105.47	11/15/2022	16:45	377	Proterozoic	**56**	14	36	7.1	7.5	0.48	5.27	0.96	**12.77**	0.62	0.52	0.175	0.47	0.0	0.28	0.175	<0.015	<0.002	0.00036 B	0.0964
20220430848	*L77424-04*	37.94	-105.29	11/18/2022	11:05	300	unknown	8	4.4	7.6	3.3	ND	0.08	1.28	0.55	1.28	-0.229	0.44	0.121	0.54	-0.204	0.25	0.121	0.398	<0.002	0.00182	0.0481

NOTES:

[1] Geology is based on well driller's log where available or homeowner self-reported information.

[2] Radionuclide uncertainty value shown as (±).

[3] DWG are drinking water guidelines. Results greater than these values are bolded.

Value qualified with "B" indicates estimated between method detection limit (MDL) and practical quantitation limit (PQL).

Value preceded by "<" indicates not detected at the MDL; subcontracted lab reported non-detects as ND.

Thorium-228, -230, and -232 values preceded by minus sign "-" are equivalent to ND.

Table 1. 2022 Wet Mountains Water Quality Data

Sample ID	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Cesium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Scandium (mg/L)	Selenium (mg/L)	Silver (mg/L)	Tellurium (mg/L)	Thallium (mg/L)	Thorium (mg/L)	Tin (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
	0.004	*1.4*	*0.005*	*n/a*	*0.01*	*0.006*	*1.3*	*14*	*present*	*0.3*	*0.035*	*0.1*	*n/a*	*0.05*	*0.035*	*n/a*	*0.002*	*n/a*	*2.1*	*0.03*	*0.07*	*2*
20220430813	<0.00025	0.0737	<0.00025	<0.001	0.00059 B	0.00022 B	0.0012 B	0.120	<0.0005	0.00784	0.00419	<0.001	0.00011 B	0.00147	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0105	0.00099 B	0.0065 B
20220430814	<0.00025	0.06	<0.00025	<0.001	<0.002	0.000272	0.0403	0.101	0.00036 B	0.0197	0.00194	<0.001	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00018 B	<0.002	0.0128 B
20220430815	<0.00025	0.0311	0.000635	<0.001	0.00075 B	0.00051	0.00304	0.500	**0.00566**	0.0416	0.00783	0.0013	0.00012 B	0.00019 B	<0.0005	<0.005	<0.0005	<0.005	0.00083 B	0.00556	0.00147 B	0.576
20220430816	<0.00025	0.013	<0.00025	<0.001	0.00058 B	0.000281	0.00242	0.129	0.00039 B	0.0873	**0.141**	0.00048 B	<0.0005	0.00016 B	<0.0005	<0.005	<0.0005	<0.005	<0.0025	**0.0495**	<0.002	0.0418
20220430817	<0.00025	0.0322	<0.00025	<0.001	0.00083 B	0.000155 B	0.0135	0.0792	0.00014 B	0.00107 B	0.00191	0.00047	<0.0005	0.00160	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0103	0.0107	<0.015
20220430818	<0.00025	0.0381	<0.00025	<0.001	<0.002	0.000418	0.00153 B	0.0595	0.00024 B	0.135	0.00241	0.00102	<0.0005	0.00014 B	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0115	0.00161 B	0.0204
20220430819	<0.00025	0.0437	<0.00025	<0.001	<0.002	0.000058 B	0.00587	0.438	0.00036 B	0.0331	0.00554	<0.001	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00723	<0.002	0.0637
20220430820	0.000623	0.11	<0.00025	<0.001	0.00053 B	0.000265	0.00545	9.14	**0.0018**	0.0665	<0.0005	<0.001	0.00122	0.00012 B	<0.0005	<0.005	<0.0005	0.001 B	<0.0025	<0.0005	<0.002	0.0115 B
20220430821	<0.00025	0.0878	<0.00025	<0.001	<0.002	0.000397	0.00225	0.0432	**0.00062**	0.0037	0.00544	0.00263	<0.0005	0.0115	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0123	<0.002	<0.015
20220430822	<0.00025	0.0343	0.000056 B	<0.001	<0.002	0.000107 B	0.00145 B	0.119	0.00013 B	0.00403	0.00313	<0.001	<0.0005	0.00089	<0.0005	<0.005	<0.0005	<0.005	<0.0025	**0.0352**	<0.002	0.0182
20220430823	<0.00025	0.0355	0.000214 B	<0.001	<0.002	0.000150 B	0.006	0.0107 B	**0.00298**	0.00044 B	0.00033 B	<0.001	<0.0005	0.00551	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00139	0.0102	**2.22**
20220430824	<0.00025	0.0298	<0.00025	<0.001	<0.002	0.000201 B	0.00172 B	0.0142 B	0.00025 B	0.00069 B	0.012	<0.001	<0.0005	0.00063	<0.0005	<0.005	<0.0005	<0.005	<0.0025	**0.0507**	<0.002	0.0518
20220430825	<0.00025	0.0308	<0.00025	<0.001	<0.002	0.000184 B	0.0399	<0.02	0.00018 B	<0.002	0.00452	<0.001	0.00016 B	0.0028	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0173	0.00931	<0.015
20220430826	<0.00025	0.0464	<0.00025	<0.001	<0.002	0.00013 B	0.00485	<0.02	**0.00015**	0.00416	0.0109	<0.001	<0.0005	0.0008	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00548	<0.002	0.0072 B
20220430827	<0.00025	0.0537	<0.00025	<0.001	<0.002	0.000859	0.00703	0.0252	**0.00095**	0.00064 B	0.00324	0.00066 B	<0.0005	0.00095	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0137	0.00201	0.0215
20220430828	<0.00025	0.165	<0.00025	<0.001	<0.002	0.000381	0.0152	<0.02	0.00035 B	0.00184 B	0.00746	0.00159	<0.0005	0.0321	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0219	0.00066 B	0.0396
20220430829	<0.00025	0.39	<0.00025	<0.001	<0.002	0.000244 B	0.00092 B	<0.02	<0.0005	<0.002	0.0282	<0.001	<0.0005	0.00263	<0.01	<0.005	<0.0005	<0.005	<0.0025	**0.202**	<0.002	<0.3
20220430830	<0.00025	0.0188	<0.00025	<0.001	0.00135 B	0.00029	0.00346	0.0654	**0.00066**	0.00206	**0.0353**	0.0006 B	<0.0005	0.00632	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00281	0.00484	0.048
20220430831	<0.00025	0.0481	<0.00025	<0.001	0.0009 B	0.000152 B	0.0198	<0.02	**0.0025**	<0.002	0.00936	0.00132	<0.0005	0.00326	<0.0005	<0.005	<0.0005	<0.005	<0.0025	**0.0482**	0.00314	0.0214
20220430832	<0.00025	0.0375	<0.00025	<0.001	<0.002	0.000089 B	0.00111 B	0.0331	0.00013 B	0.00408	0.0228	<0.001	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00743	<0.002	<0.015
20220430833	0.000305	0.558	<0.00025	0.00023 B	<0.002	0.00053	0.00851	0.0381	**0.00061**	0.0311	0.0316	0.00059 B	<0.0005	0.00153	<0.0005	<0.005	<0.0005	<0.005	<0.0025	**0.0571**	<0.002	0.0303
20220430834	<0.00025	0.0389	<0.00025	<0.001	<0.002	0.000153 B	0.0309	<0.02	0.00045 B	<0.002	0.00986	<0.001	<0.0005	0.00237	<0.0005	<0.005	<0.0005	<0.005	<0.0025	**0.0742**	<0.002	0.0137 B
20220430835	<0.00025	0.0662	<0.00025	<0.001	<0.002	0.000203 B	0.00369	0.0733	**<0.0005**	0.00062 B	0.00909	<0.001	<0.0005	0.0125	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.025	0.00947	0.0205
20220430836	<0.00025	0.0589	<0.00025	<0.001	<0.002	<0.00025	<0.002	1.48	0.00013 B	0.0347	0.0135	<0.001	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00028 B	0.00055 B	<0.015
20220430837	<0.00025	0.0224	<0.00025	0.00879	0.0008 B	0.000286	0.0294	0.514	**0.00367**	0.0103	0.00021 B	0.00069 B	0.00024 B	0.00231	<0.0005	<0.005	<0.0005	<0.005	0.00123 B	0.0109	0.00088 B	0.0602
20220430838	<0.00025	0.0787	<0.00025	<0.001	<0.002	0.000356	0.002	3.97	0.00018 B	0.128	0.00248	<0.001	<0.0005	0.00012 B	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.012	<0.002	<0.015
20220430839	<0.00025	0.0108	0.000084 B	<0.001	<0.002	0.000112 B	0.0143	<0.02	0.00018 B	<0.002	0.00225	<0.001	<0.0005	0.00029	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00262	0.00054 B	0.0979
20220430840	0.000216 B	0.0631	<0.00025	<0.001	<0.002	0.000392	0.00166 B	1.76	<0.0005	0.111	**0.103**	<0.001	0.00012 B	0.00016 B	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00344	<0.002	0.0113 B
20220430841	0.000132 B	0.0151	<0.00025	<0.001	<0.002	0.000191 B	0.0309	<0.02	**0.00137**	<0.002	0.0018	<0.001	<0.0005	0.00030	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00600	0.0011 B	0.0174
20220430842	<0.00025	0.0602	<0.00025	<0.001	<0.002	0.000505	<0.002	0.873	0.00018 B	0.0445	0.00225	<0.001	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00046 B	<0.002	0.0441
20220430843	<0.00025	0.0270	<0.00025	<0.001	0.00105 B	0.000320	0.0237	<0.02	0.00026 B	<0.002	0.00446	0.00461	0.00012 B	0.00312	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00592	0.0363	0.108
20220430844	0.000146 B	0.0466	<0.00025	<0.001	0.00051 B	0.000408	0.00594	0.0166 B	0.00031 B	<0.002	0.00463	<0.001	0.0002 B	0.00106	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0108	0.00231	0.0298
20220430845	<0.00025	0.0567	<0.00025	<0.001	<0.002	0.00154	0.0754	<0.02	0.00033 B	<0.002	0.00562	0.00058 B	0.00014 B	0.00969	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.0120	0.00421	<0.015
20220430846	<0.00025	0.0229	<0.00025	<0.001	0.00066 B	0.000552	0.0518	0.0101 B	0.00046 B	0.00073 B	0.00199	0.00071 B	<0.0005	0.00655	<0.0005	<0.005	<0.0005	<0.005	<0.0025	0.00518	0.00208	0.0142 B
20220430847	<0.00025	0.111	<0.00025	<0.001	<0.002	0.000339	0.0251	0.258	**0.00218**	0.0486	0.00388	0.00067 B	<0.0005	<0.00025	<0.0005	<0.005	<0.0005	<0.005	<0.0025	**0.0349**	<0.002	0.0275
20220430848	<0.00025	0.152	0.000052 B	<0.001	0.00060 B	0.000184 B	0.0256	0.400	**0.00222**	0.0164	**0.141**	0.00048 B	0.00035 B	<0.00025	<0.0005	<0.005	<0.0005	<0.005	0.0700	0.00122	<0.002	0.210

NOTES:

[1] Geology is based on well driller's log where available or homeowner self-reported information.

[2] Radionuclide uncertainty value shown as (±).

[3] DWG are drinking water guidelines. Results greater than these values are bolded.

Value qualified with "B" indicates estimated between method detection limit (MDL) and practical quantitation limit (PQL).

Value preceded by "<" indicates not detected at the MDL; subcontracted lab reported non-detects as ND.

Thorium-228, -230, and -232 values preceded by minus sign "-" are equivalent to ND.

Table 2. 2023 Supplemental Wet Mountains Water Quality Data

Sample ID	Lab ID	Sample Date	Time	Latitude	Longitude	Well Depth	Geology[1]	Gross Alpha (pCi/L)	(±)[2]	Gross Beta (pCi/L)	(±)	Radium-226 (pCi/L)	(±)	Radium-228 (pCi/L)	(±)	Ra-226+228 (pCi/L)	Thorium-228 (pCi/L)	(±)	Thorium-230 (pCi/L)	(±)	Thorium-232 (pCi/L)	(±)	Th-230+232 (pCi/L)
							DWG[3]:	*15*		*50*		*-->*		*-->*		*5*	*-->*		*-->*		*-->*		*60*
20230270801	*160-51445-17*	9/10/2023	17:00	38.17	-105.47	184	granite	**38.8**	8.8	20.8	4.0	3.45	0.46	6.46	0.97	**9.91**	-0.0298 U	0.14	0.160 U	0.14	-0.0247 U	0.02	ND
20230270802	*160-51445-18*	9/9/2023	13:00	38.22	-105.47	215	granite	3.52	2.2	3.42	1.0	0.152	0.09	0.278 U	0.31	0.152	0.112 U	0.14	0.200	0.14	0.0439 U	0.06	0.200
20230270803	*160-51445-19*	9/9/2023	7:00	38.06	-105.37	400	granite	5.26	2.5	4.06	1.3	0.175	0.09	0.908	0.41	1.083	0.0192 U	0.13	0.506	0.26	-0.0172 U	0.02	0.506
20230270804	*160-51445-20*	9/11/2023	7:00	38.02	-105.34	140	granite	12.3	3.1	5.62	1.3	1.20	0.23	4.30	0.77	**5.50**	0.167 U	0.21	0.212	0.17	-0.00859 U	0.06	0.212
20230270805	*160-51552-3*	9/9/2023	10:40	38.00	-105.32	525	unknown	2.90 U	2.2	6.45	1.3	0.148	0.10	0.825	0.43	0.97	-0.0955 U	0.13	-0.0292 U	0.17	-0.0328 U	0.03	ND
20230270806	*160-51552-4*	9/14/2023	9:40	38.22	-105.55	20	hand dug alluvial	2.76	1.6	1.78	0.8	0.0630 U	0.07	0.384 U	0.31	ND	-0.00464 U	0.14	0.253 U	0.24	0.0298 U	0.07	ND
20230270807	*160-51552-8*	9/17/2023	18:00	38.19	-105.42	365	unknown	2.80 U	2.5	4.8	1.3	0.176	0.10	0.448 U	0.34	0.176	-0.0266 U	0.14	0.110 U	0.20	0.0477	0.05	ND
20230270808	*160-51552-9*	9/15/2023	10:25	38.21	-105.23	125	granite	14	3.4	8.5	1.5	0.180	0.09	0.649	0.40	0.829	-0.0417 U	0.15	0.195 U	0.23	-0.0189 U	0.03	ND
20230270809	*160-51552-10*	9/18/2023	12:30	38.00	-105.34	550	granite	**21.8**	6.6	15.6	3.0	1.28	0.24	2.61	0.59	3.890	0.102 U	0.17	-0.0214 U	0.17	-0.0118 U	0.05	ND
20230270810	*160-51678-3*	9/18/2023	14:30	38.25	-105.55	450	granite	7.08 G	4.1	5.96	1.7	0.688	0.22	3.41	0.68	4.098	-0.0203 U	0.17	0.0679 U	0.19	0.0166 U	0.05	ND
20230270811	*160-51678-4*	9/20/2023	9:00	38.05	-105.36	425	granite	3.45	2.1	3.93	1.0	0.418	0.18	1.58	0.47	1.998	-0.0239 U	0.13	0.0726 U	0.19	0.0106 U	0.05	ND
20230270812	*160-51678-7*	9/21/2023	10:00	38.04	-105.34	250	granite	4.49 G	2.6	0.248 U	0.6	0.0102 U	0.10	0.368 U	0.32	ND	-0.0257 U	0.12	0.243 U	0.23	0.0152 U	0.06	ND
20230270813	*160-51678-8*	9/13/2023	12:00	38.23	-105.62	60	gravel	0.678 U	1.1	0.862 U	0.6	-0.00675 U	0.09	0.0688 U	0.24	ND	0.0100 U	0.15	0.351	0.24	0.113	0.10	0.464
20230270814	*160-51747-2*	9/27/2023	10:15	38.24	-105.48	285	granite	3.19	1.9	4.97	1.3	0.507	0.16	1.74	0.57	2.247	0.148 U	0.20	0.0405 U	0.21	-0.00858 U	0.06	ND
20230270815	*160-51794-3*	10/5/2023	10:15	38.13	-105.53	195	andy clay/sand&boulder	2.07	1.2	1.95	0.8	0.0382 U	0.08	0.92	0.45	0.920	-0.0997 U	0.13	0.000494 U	0.17	-0.0239 U	0.03	ND
20230270816	*160-51960-3*	10/10/2023	13:18	38.03	-105.32	440	granite	**31.7**	5.9	8.65	1.6	0.569	0.16	1.63	0.50	2.199	-0.133 U	0.14	0.309 U	0.27	-0.0709 U	0.07	ND
20230270817	*160-52460-1*	12/1/2023	11:45	38.12	-105.41	240	granite	**78.7 G**	12.8	2.39 U	2.7	n/a	n/a	0.498 U	0.50	ND*	-0.0300 U	0.13	0.188 U	0.23	0.0372 U	0.07	ND
20230430801	*160-51552-1*	9/11/2023	8:40	38.57	-105.22	560	sandstone	**49.1**	12.1	3.26 U	3.0	0.136	0.09	-0.00666 U	0.25	0.14	-0.0987 U	0.12	0.0583 U	0.19	-0.0247 U	0.27	ND
20230430802	*160-51552-2*	9/11/2023	5:30	38.31	-105.17	255	shale/sandstone	3.65 U	2.9	-0.0262 U	1.2	-0.0130 U	0.08	-0.219 U	0.26	ND	-0.131 U	0.08	0.269 U	0.24	0.00427 U	0.05	ND
20230430803	*160-51552-5*	9/12/2023	9:00	38.26	-105.46	150	granite	8.82	3.2	6.11	1.3	0.481	0.16	1.05	0.46	1.53	-0.0412 U	0.15	0.0755 U	0.19	-0.0180 U	0.03	ND
20230430804	*160-51747-1*	9/26/2023	11:20	38.61	-105.47	204	volcanic	**52.4 G**	10.4	10.5	2.8	0.133 U	0.11	0.0392 U	0.31	ND	-0.111 U	0.12	-0.0803 U	0.16	0.0129 U	0.05	ND
20230430805	*160-51747-4*	9/29/2023	10:30	38.26	-105.30	300	granite	**19.7**	4.3	3.92	1.1	0.248	0.12	0.200 U	0.31	0.248	0.0582 U	0.18	0.123 U	0.24	-0.0155 U	0.03	ND
20230430806	*160-51747-5*	10/2/2023	9:00	38.55	-105.22	210	sandstone	**40.1 G**	7.9	10.2	2.1	0.172 U	0.13	-0.0176 U	0.37	ND	0.104 U	0.21	0.119 U	0.26	0.107 U	0.15	ND
20230430807	*160-51747-14*	10/5/2023	9:30	38.56	-105.52	1100	granite	**276 G**	39.8	-5.12 UG	5.2	0.205	0.13	0.663 U	0.50	0.205	-0.0534 U	0.15	0.186 U	0.25	0.00131 U	0.03	ND
20230430808	*160-51747-15*	10/3/2023	9:00	38.50	-105.21	200	above Dakota Ss	3.30 UG	14.0	14.4 G	7.0	0.929	0.21	4.48	0.82	**5.409**	0.102 U	0.23	-0.0157 U	0.24	-0.0233 U	0.03	ND
20230430809	*160-51794-2*	10/5/2023	11:45	38.25	-105.42	318	granite	13.9	2.9	3.63	1.2	0.31	0.12	0.575 U	0.41	0.31	0.0197 U	0.20	-0.0535 U	0.22	-0.00956 U	0.08	ND
20230430810	*160-51960-4*	10/12/2023	15:00	38.27	-105.57	700	granite	4.45	2.0	6.53	1.2	0.232	0.11	2.55	0.58	2.782	0.113 U	0.18	0.144 U	0.22	-0.00554 U	0.02	ND
20230430811	*160-52080-3*	10/24/2023	11:30	38.47	-104.98	205	granite	**150 G**	22.1	38.5 G	6.2	51.4	4.90	4.31	0.78	**55.71**	-0.100 U	0.16	0.216 U	0.20	-0.0842 U	0.31	ND

NOTES:

[1] Geology is based on well driller's log where available or homeowner self-reported information.

[2] Radionuclide total uncertainty value (2 sigma) shown as (±).

[3] DWG are drinking water guidelines. Results greater than these values are bolded.

U = Result is less than the sample detection limit.

ND* =Partial analysis, unable to analyze for Radium-226 due to time constraints.

Value qualified with "J" indicates estimated between method detection limit (MDL) and practical quantitation limit (PQL).

Value qualified with "B" indicates compound found in the lab blank and sample.

Radionuclide data values preceded by minus sign "-" are equivalent to ND.

Table 2. 2023 Supplemental Wet Mountains Water Quality Data

Sample ID	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Thallium (mg/L)	Thorium (mg/L)	Tin (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
	7	*0.006*	*0.01*	*2*	*0.004*	*1.4*	*0.005*	*0.01*	*0.006*	*1.3*	*14*	*present*	*0.3*	*0.035*	*0.1*	*0.05*	*0.035*	*0.002*	*n/a*	*2.1*	*0.03*	*0.07*	*2*
20230270801	ND	ND	0.0023 J	0.042	ND	0.16	ND	ND	ND	0.0028 J	0.19	ND	0.073	0.0033 J	ND	ND	ND	ND	ND	ND	0.0091	ND	0.035
20230270802	ND	ND	ND	0.120	ND	ND	ND	ND	ND	0.011	0.023 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0039	0.0062 J	0.034
20230270803	ND	ND	0.0033 J	0.052	ND	0.083 J	ND	ND	ND	0.012	0.35	ND	0.01	0.017	ND	0.0012 J	ND	ND	ND	ND	0.0029	0.0098 J	0.009 J
20230270804	ND	ND	ND	0.071	ND	0.028 J	ND	ND	ND	0.016	ND	ND	ND	0.013	ND	0.001 J	ND	ND	ND	ND	0.0036	ND	0.015 J
20230270805	ND	ND	0.0045 J	0.050	ND	0.099 J	0.000074 J	ND	ND	0.038	0.028 J	0.0016 J	0.0094	0.0025 J	ND	0.00099 J	ND	ND	ND	ND	0.003	0.015	0.077
20230270806	ND	ND	ND	0.094	ND		ND	0.0018 J	ND	0.05	ND	ND	ND	0.002 J	ND	ND	ND	ND	ND	ND	0.0019	ND	0.01 J
20230270807	ND	ND	0.003 J	0.057	ND	0.049 J	ND	ND	ND	0.037	ND	ND	ND	0.0029 J	0.00092 JB	ND	ND	ND	ND	ND	0.0034	ND	0.017 J
20230270808	ND	ND	ND	0.046	ND		ND	0.0028 J	ND	0.0054	ND	ND	ND	0.0055	ND	ND	ND	ND	ND	ND	0.014	0.0049 J	0.0079 J
20230270809	ND	ND	**0.029**	0.037	ND	0.33	ND	ND	ND	0.0069	0.06	ND	0.096	**0.051**	ND	ND	ND	ND	ND	ND	0.0044	ND	0.019 J
20230270810	ND	ND	ND	0.450	ND	ND	ND	ND	ND	0.022	0.046 JB	**0.0079**	ND	ND	0.0022 JB	0.0041 J	ND	ND	ND	ND	0.0034	ND	0.034
20230270811	ND	ND	ND	0.047	ND	0.027 J	ND	ND	ND	0.0089	0.026 JB	ND	0.0023 JB	ND	0.00067 J	ND	ND	ND	ND	ND	0.0023	ND	0.019 J
20230270812	ND	ND	ND	0.058	ND	0.023 J	ND	ND	ND	0.020	ND	ND	ND	ND	ND	0.0014 J	ND	ND	ND	ND	0.0026	0.0060 J	0.015 J
20230270813	ND	ND	ND	0.08	0.00035 J	ND	ND	ND	ND	0.0024 J	0.049 JB	ND	ND	ND	0.0015 JB	ND	ND	ND	ND	ND	0.00031 J	ND	0.067
20230270814	ND	ND	ND	0.100	ND	0.022 J	0.000066 J	ND	ND	0.004	ND	ND	0.0048 J	0.0079	ND	ND	ND	ND	0.00077 JB	ND	0.00044 J	ND	ND
20230270815	ND	ND	ND	0.085	ND	ND	ND	0.0017 J	ND	0.027	1.0	0.0018 J	0.014	ND	ND	ND	ND	ND	ND	ND	0.00041 J	ND	0.035
20230270816	ND	ND	ND	0.063	ND	0.073 J	ND	ND	ND	0.0094	ND	ND	ND	0.015	ND	0.0029 J	ND	ND	ND	ND	0.014	ND	0.015 J
20230270817	ND	ND	0.0033 J	0.0035	ND	0.098 J	0.00016 J	ND	ND	0.029	ND	ND	0.0085	0.019	ND	0.0014 J	ND	ND	0.00071 J	ND	**0.033 B**	ND	0.028 B
20230430801	ND	ND	ND	0.011	ND	**2.1**	0.00015 J	ND	ND	0.0013 J	0.022 J	ND	ND	**0.17**	ND	ND	ND	ND	0.0011 J	ND	0.02	ND	0.0083 J
20230430802	0.18	ND	ND	0.021	ND	0.1	0.00015 J	0.0027 J	0.00064 J	0.068	0.14	0.0025 J	0.0044 J	ND	0.0013 JB	ND	ND	ND	0.00076 J	ND	ND	ND	0.02
20230430803	ND	ND	0.0026 J	0.140	ND	0.043 J	ND	ND	ND	0.0089	ND	ND	ND	ND	ND	0.002 J	ND	ND	ND	ND	0.011	0.018	0.0076 J
20230430804	ND	ND	ND	0.0086	ND	0.023 J	0.00032 J	ND	ND	0.011	0.099	ND	0.011	0.0049 J	0.0092 B	0.0062	ND	ND	0.0019 JB	0.00077 J	**0.052**	ND	0.027
20230430805	ND	ND	ND	0.044	ND	0.026 J	ND	ND	ND	0.0048	ND	ND	ND	0.007	ND	0.0025 J	ND	ND	ND	ND	0.007	ND	ND
20230430806	ND	ND	ND	0.070	ND	0.042 J	ND	ND	ND	0.0063	0.050	ND	0.0043 J	0.0041 J	ND	0.0015 J	ND	ND	ND	ND	**0.039**	ND	0.012 J
20230430807	ND	ND	ND	0.028	ND	0.24	ND	ND	ND	0.0096	0.38 B	ND	0.025	0.10	0.0012 B	ND	ND	ND	0.0014 J	ND	**0.034**	ND	0.0097 J
20230430808	ND	ND	ND	0.012	ND	0.37	ND	ND	ND	0.0016 J	0.74 B	ND	0.021	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.20
20230430809	ND	ND	ND	0.027	ND	ND	0.00011 J	0.0021 J	ND	0.065	ND	ND	ND	0.0069	ND	0.0018 J	ND	ND	0.0011 JB	ND	0.0059	ND	0.011 J
20230430810	ND	ND	ND	0.071	ND	0.044 J	ND	0.0025 J	ND	0.025	0.057	ND	0.018	0.022	0.0035 J	0.0029 J	ND	ND	ND	ND	0.0027	ND	0.017 J
20230430811	ND	ND	ND	0.021	ND	0.064 J	0.00012 J	ND	ND	0.018	0.14	0.0011 J	0.0098	0.0031 J	ND	0.0021 J	ND	ND	0.0010 J	ND	0.020	ND	0.026 B

NOTES:

[1] Geology is based on well driller's log where available or homeowner self-reported information.

[2] Radionuclide total uncertainty value (2 sigma) shown as (±).

[3] DWG are drinking water guidelines. Results greater than these values are bolded.

U = Result is less than the sample detection limit.

ND* =Partial analysis, unable to analyze for Radium-226 due to time constraints.

Value qualified with "J" indicates estimated between method detection limit (MDL) and practical quantitation limit (PQL).

Value qualified with "B" indicates compound found in the lab blank and sample.

Radionuclide data values preceded by minus sign "-" are equivalent to ND.

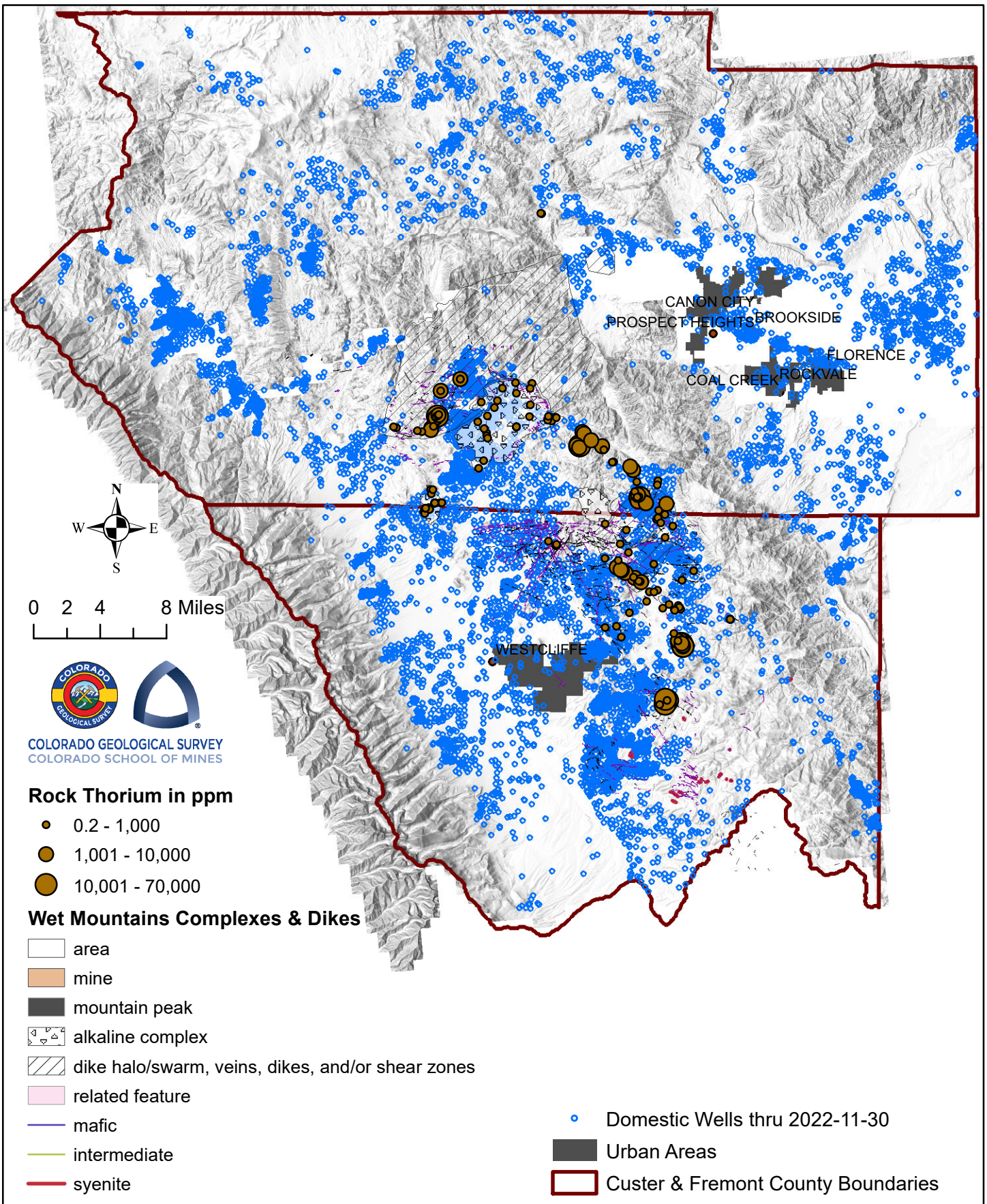
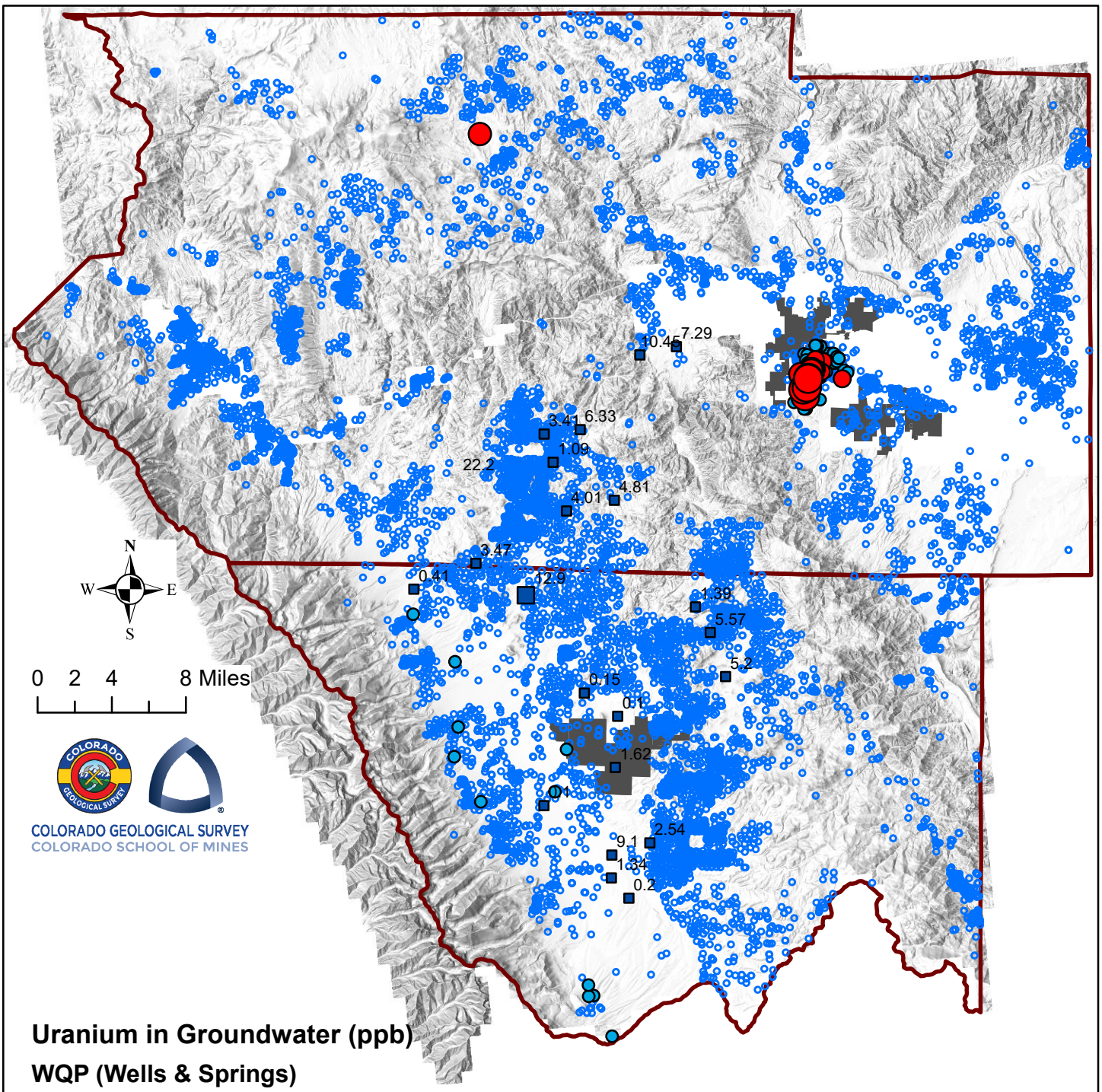


Figure 1. Residential water wells and historic thorium rock data in Fremont and Custer Counties. The historic rock thorium data and associated alkaline intrusive complexes and dikes are from CGS OF-20-11.



Uranium in Groundwater (ppb)

WQP (Wells & Springs)

- 0.1 - 30.0
- 30.1 - 100
- 101 - 3,000
- 3,001 - 5,720

NURE (Wells & Springs)

- 0.1 - 11.0
- 11.1 - 22.2

- Domestic Wells thru 2022-11-30
- Urban Areas
- Custer & Fremont County Boundaries

Figure 2. Historic uranium in groundwater wells and springs in Fremont and Custer Counties. Exceedances of the 30 ug/L drinking water standard are shown in red. Data sources are the Water Quality Portal (WQP) and NURE. The high concentration area is the Canon City Mill Superfund site.

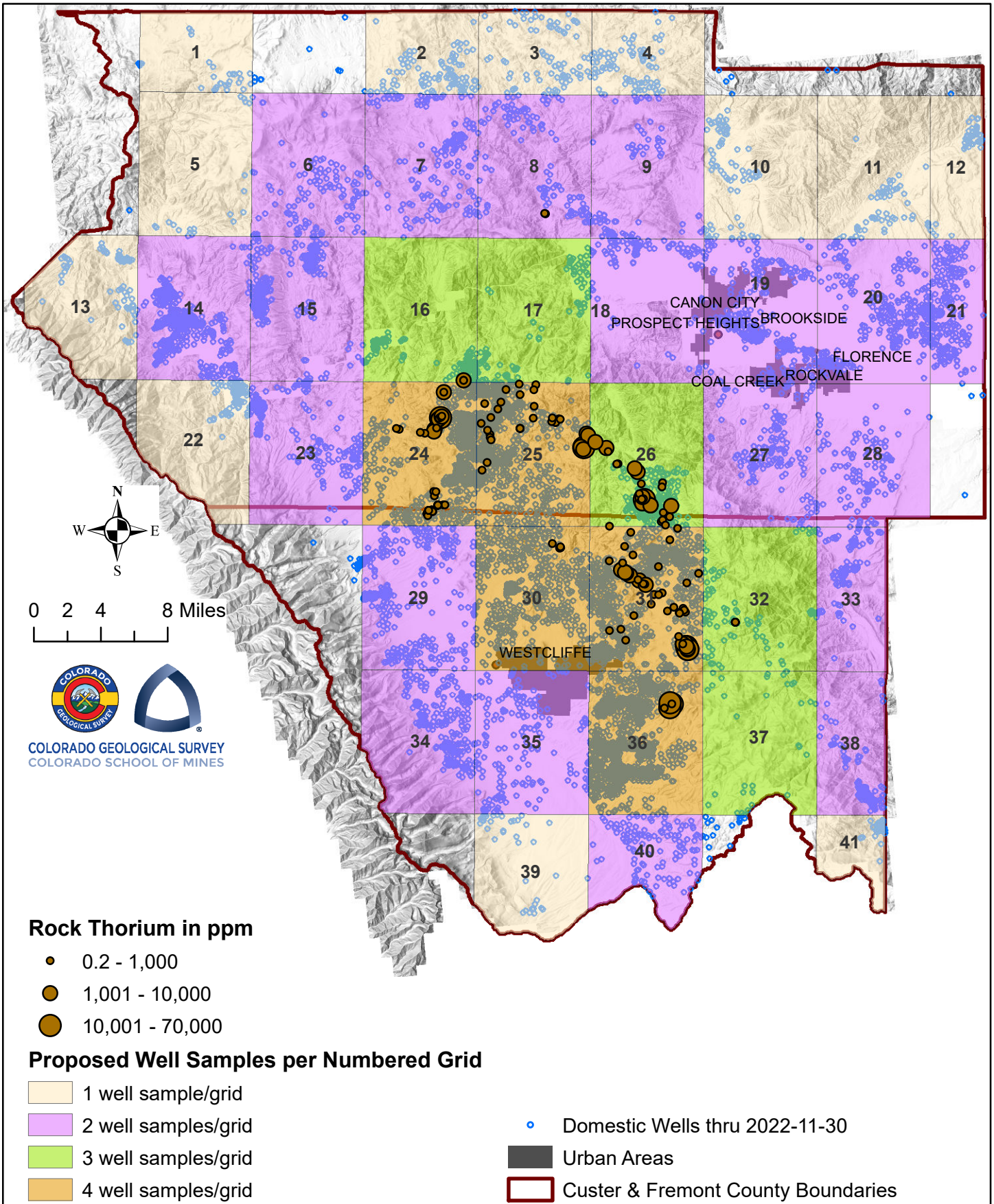


Figure 3. Sampling grid and residential water wells in Fremont and Custer Counties. The sample grid was designed using CGS OF-20-11 historic rock thorium data and the associated alkaline intrusive complexes and dikes.

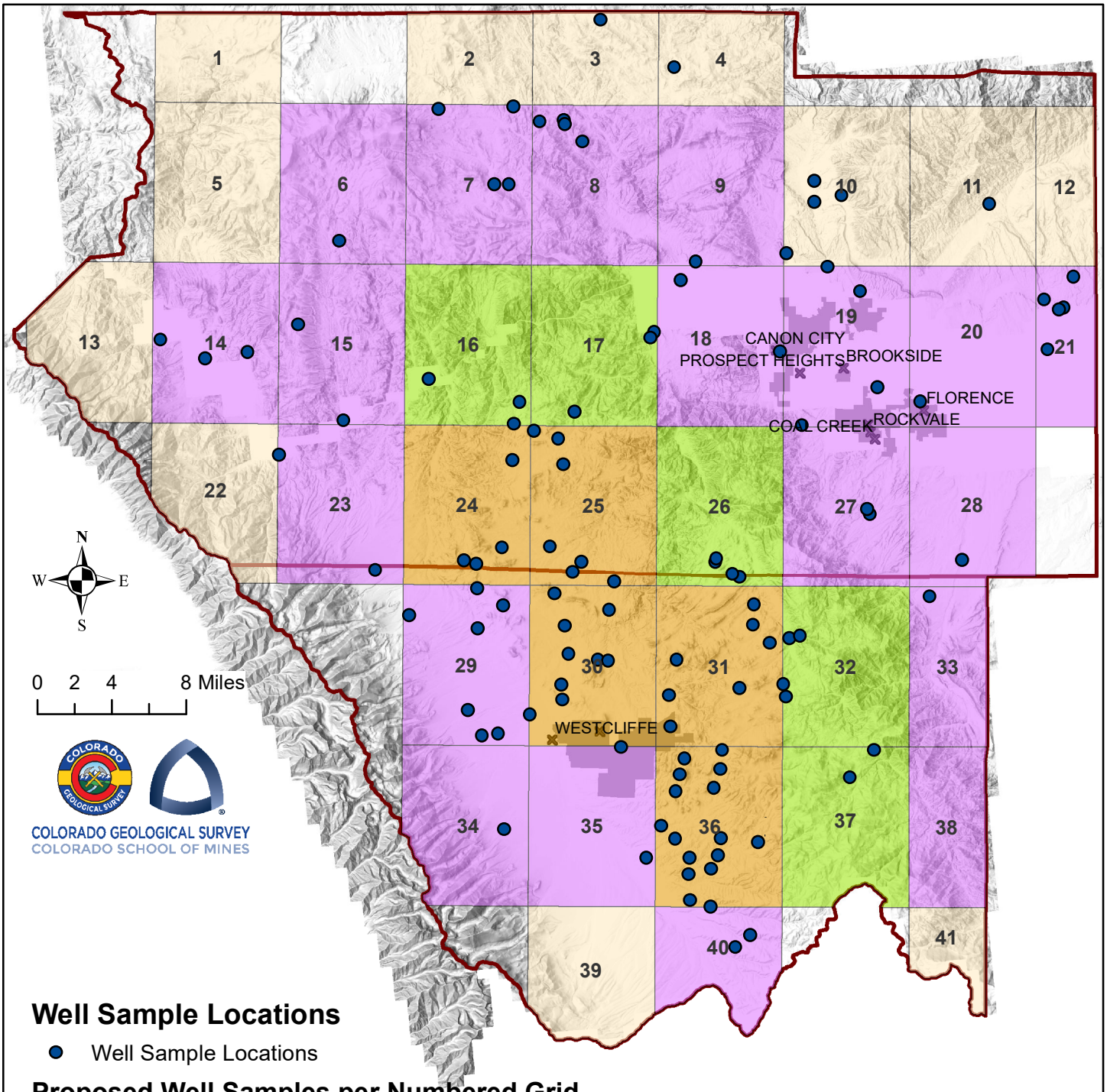


Figure 4. Residential water wells sampled during 2022 and 2023 in Fremont and Custer Counties.

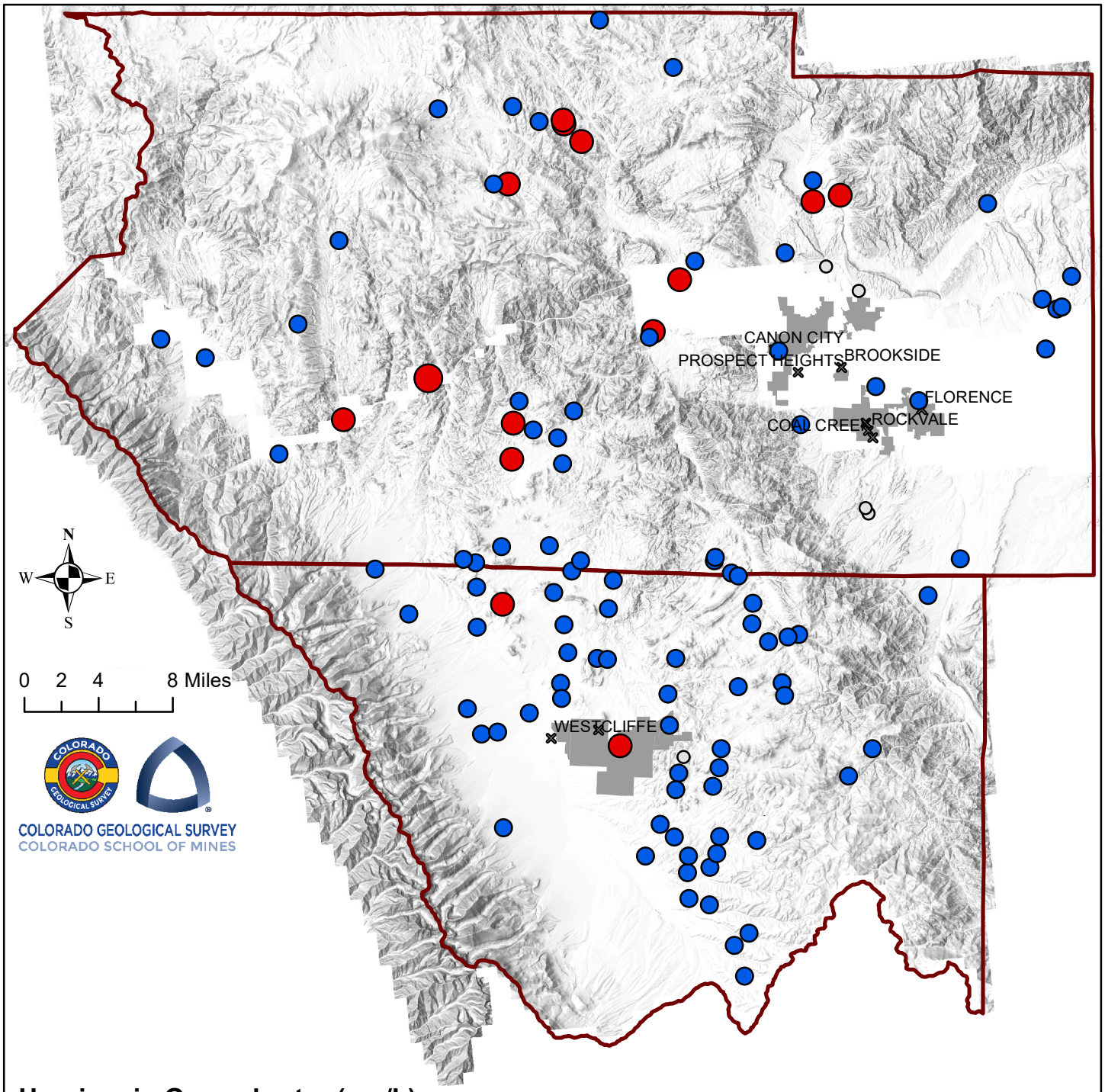


Figure 5. Uranium concentrations in milligrams per liter (mg/L) from water wells in Fremont and Custer Counties. Locations where values were above the drinking water guideline of 0.03 mg/L are shown in red.

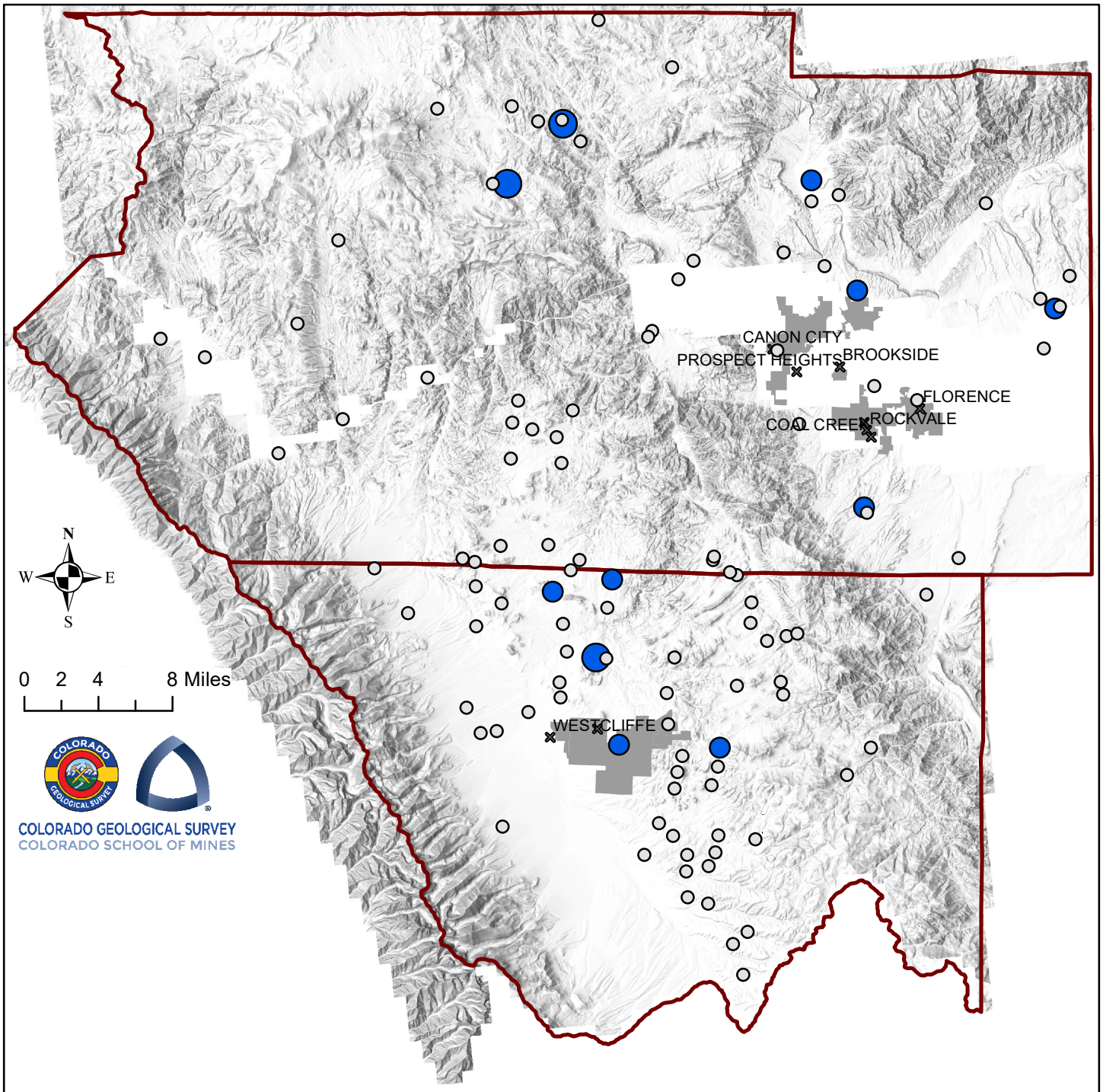


Figure 6. Thorium concentrations in milligrams per liter (mg/L) from water wells in Fremont and Custer Counties. Thorium does not have a drinking water guideline, but it does contribute to other gross radionuclide measurements.

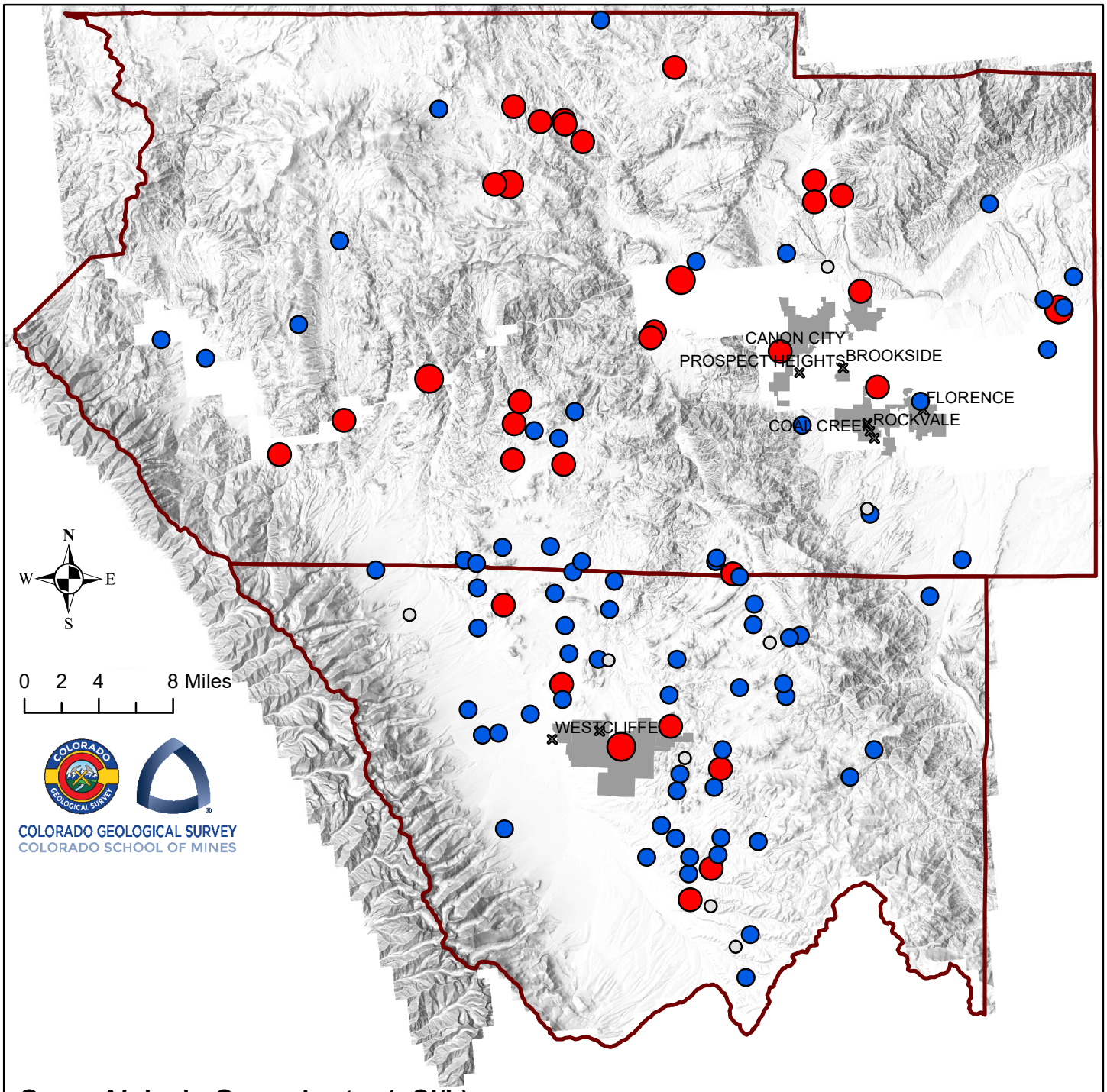


Figure 7. Gross Alpha concentrations in picocuries per liter (pCi/L) from water wells in Fremont and Custer Counties. Locations where values were above the drinking water guideline of 15 pCi/L are shown in red.

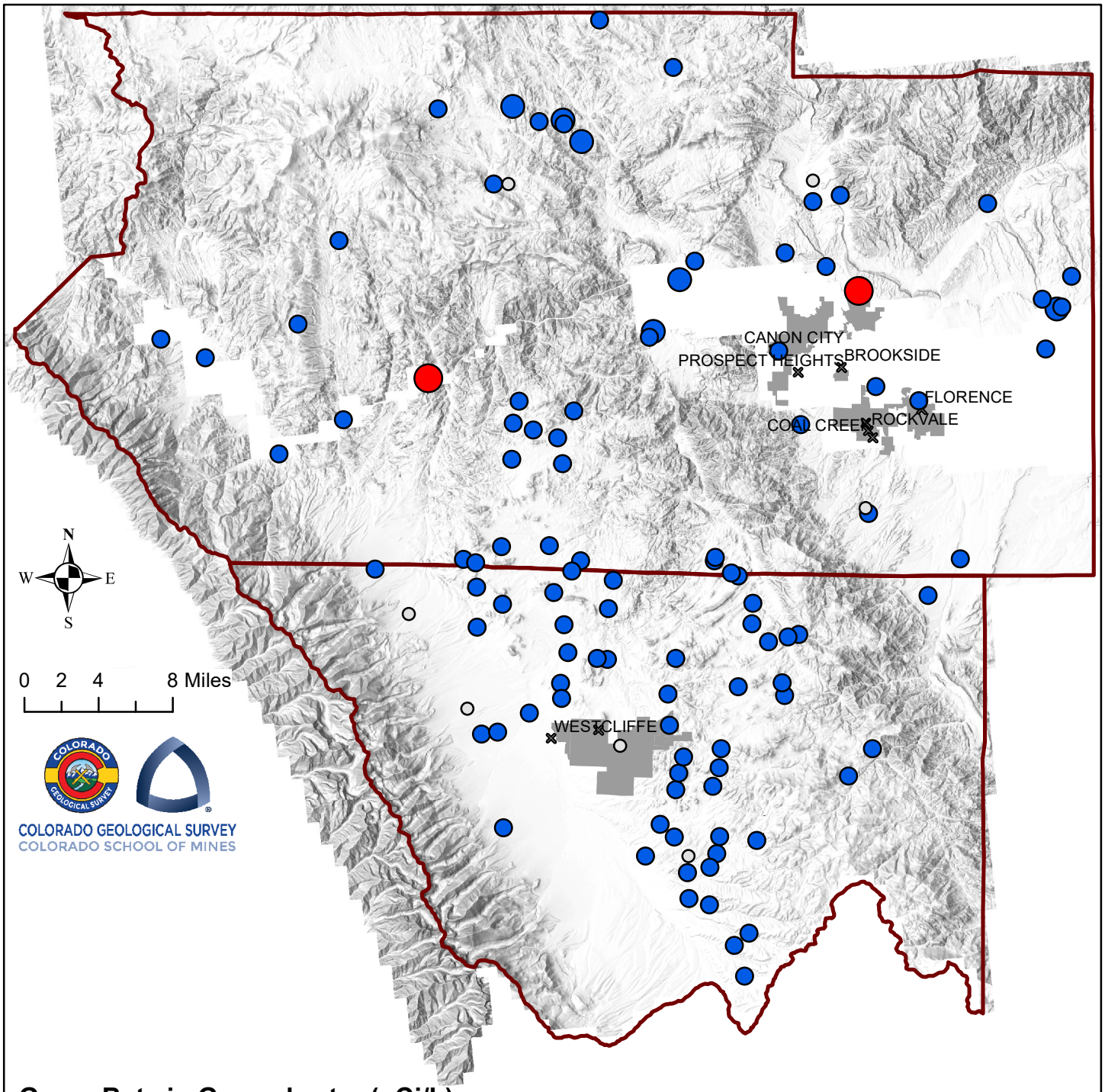


Figure 8. Gross Beta concentrations in picocuries per liter (pCi/L) from water wells in Fremont and Custer Counties. Locations where values were above the drinking water guideline of 50 pCi/L are shown in red.

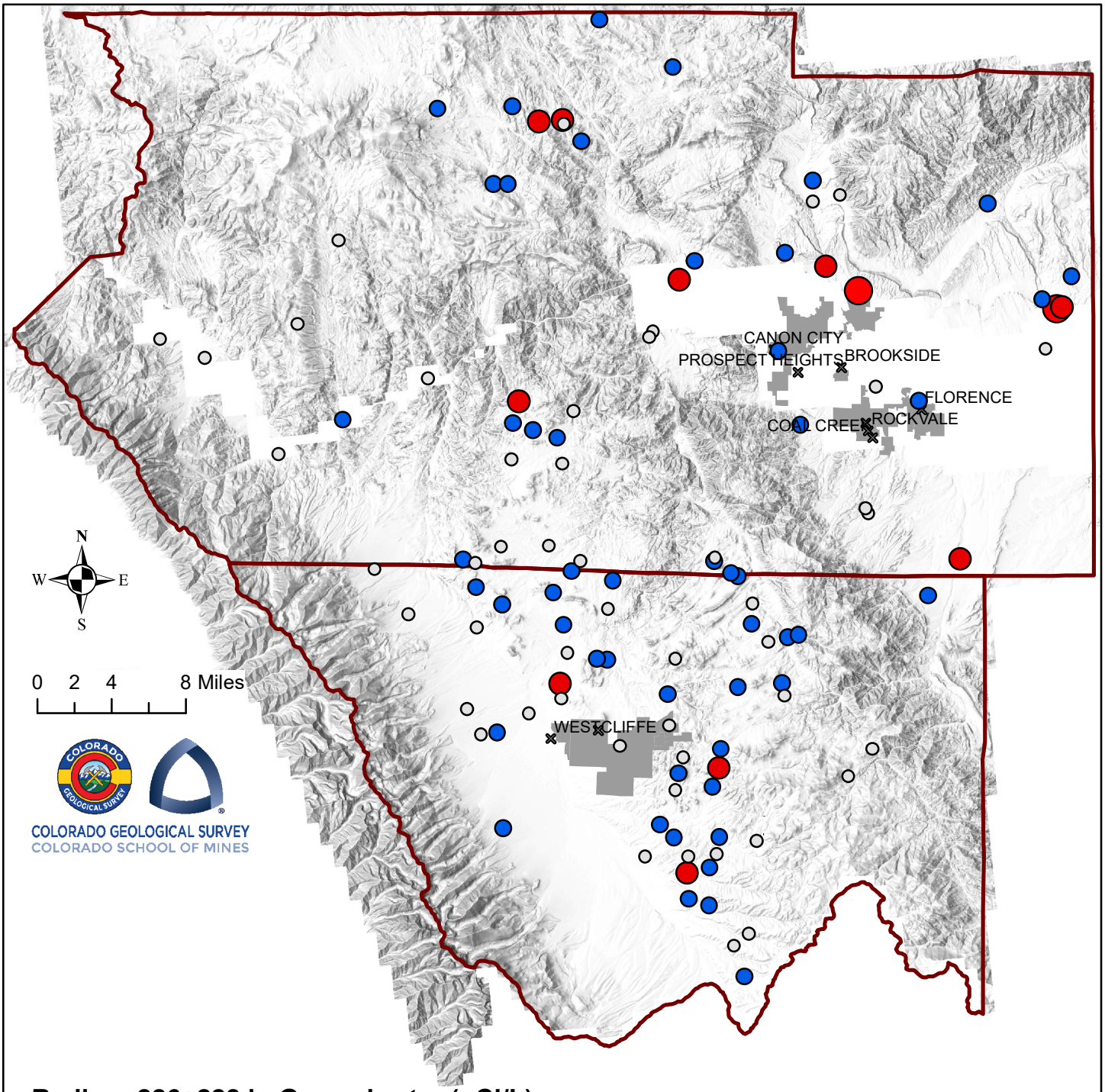


Figure 9. Radium 226+228 concentrations in picocuries per liter (pCi/L) from water wells in Fremont and Custer Counties. Locations where values were above the drinking water guideline of 5 pCi/L are shown in red.

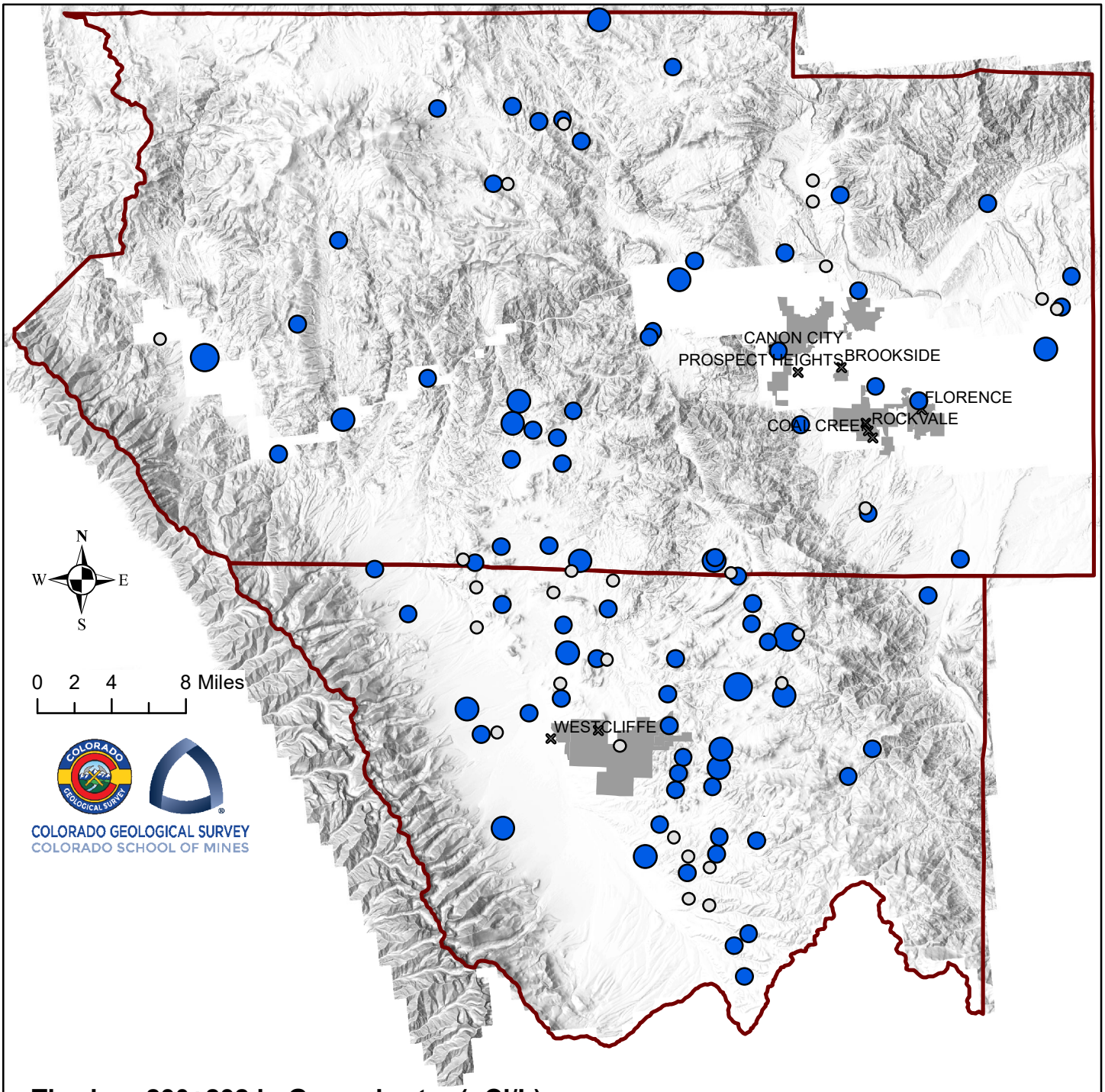


Figure 10. Thorium 230+232 concentrations in picocuries per liter (pCi/L) from water wells in Fremont and Custer Counties. Locations where values were above the drinking water guideline of 60 pCi/L are shown in red (if present).

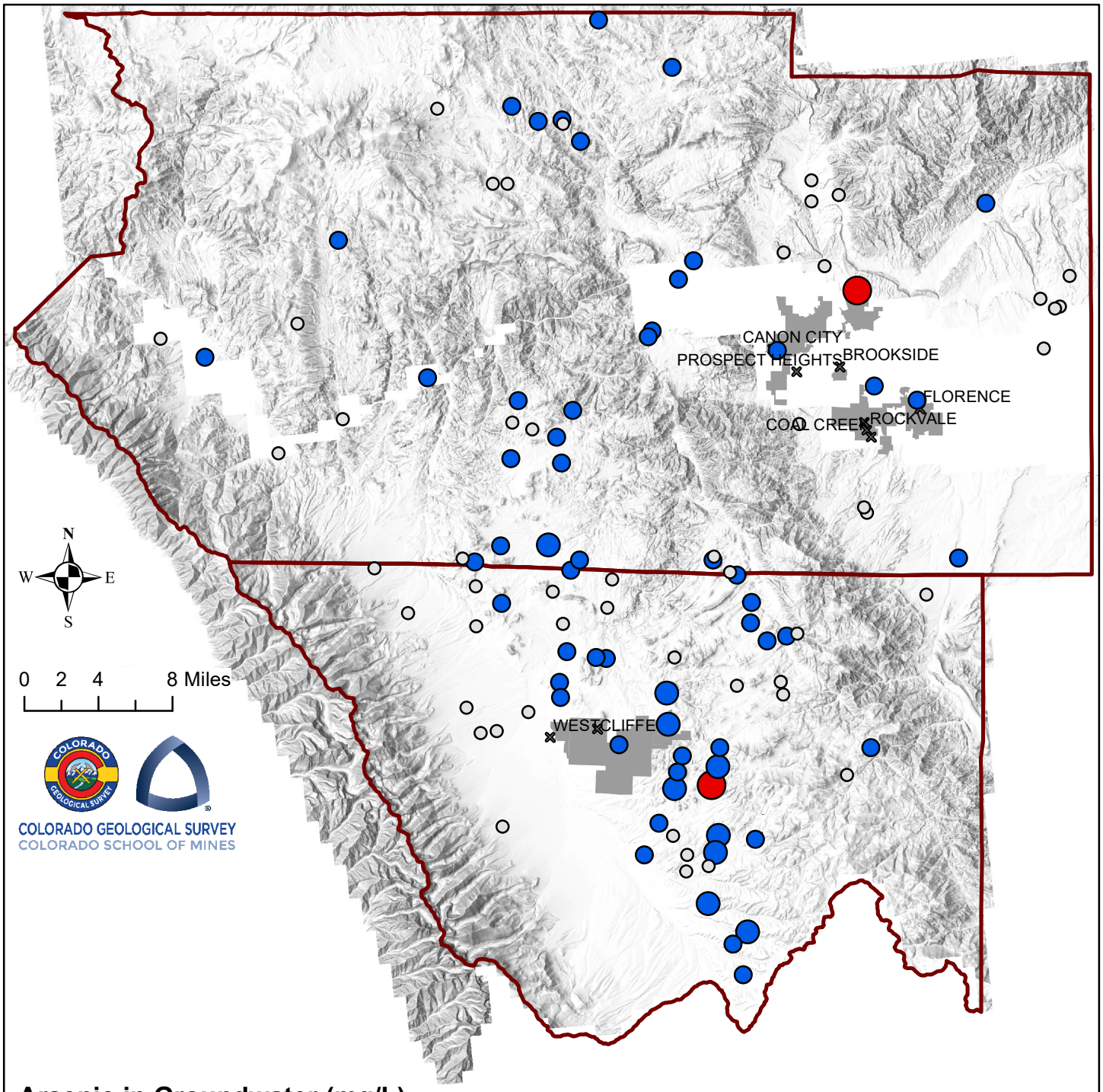


Figure 11. Arsenic concentrations in milligrams per liter (mg/L) from water wells in Fremont and Custer Counties. Locations where values were above the drinking water guideline of 0.01 mg/L are shown in red.

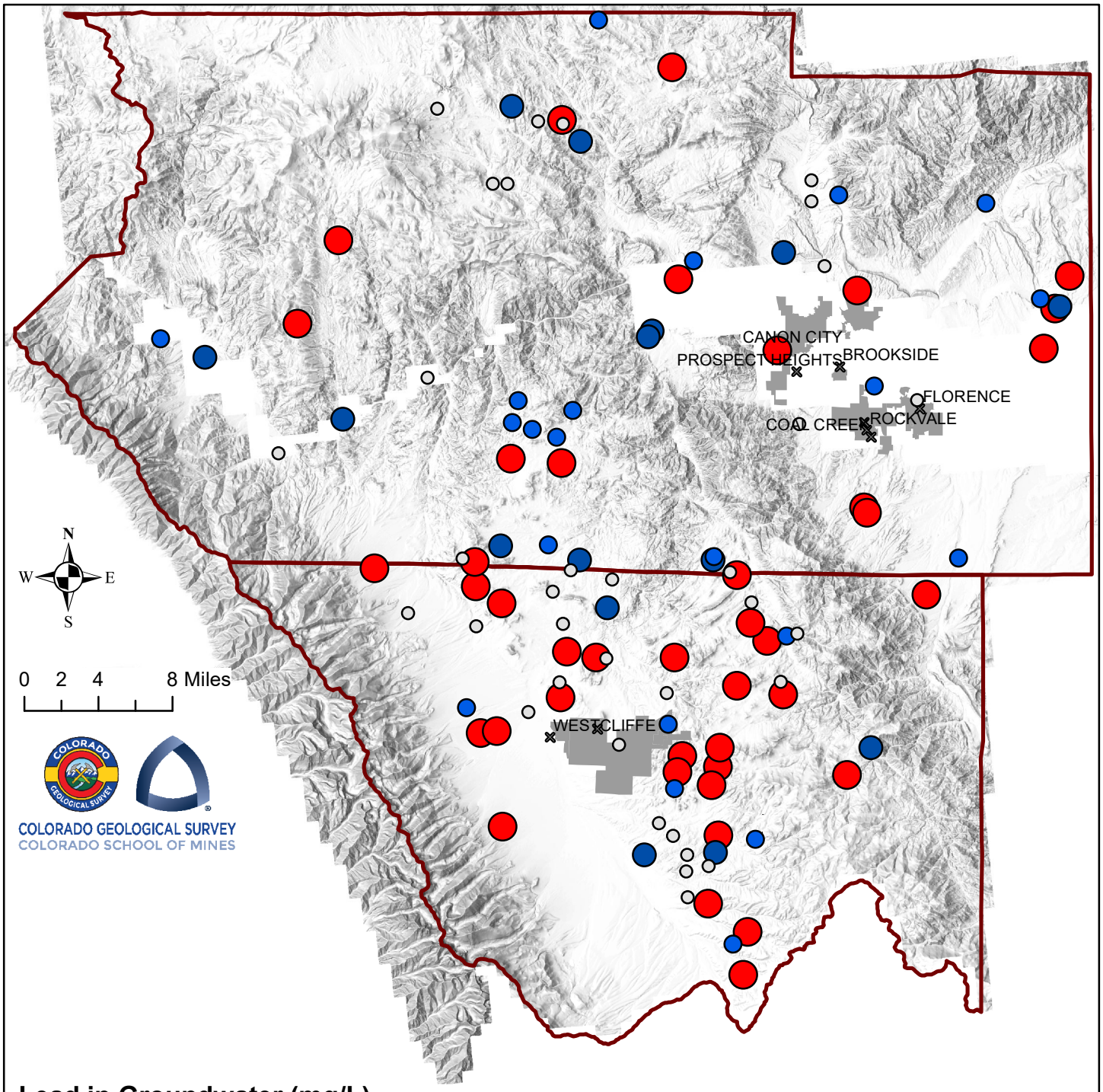


Figure 12. Lead concentrations in milligrams per liter (mg/L) from water wells in Fremont and Custer Counties. Locations with estimated values (below the reporting limit) are shown in blue. Only values above the RL are considered above the drinking water guideline of "Present" and are shown in red.

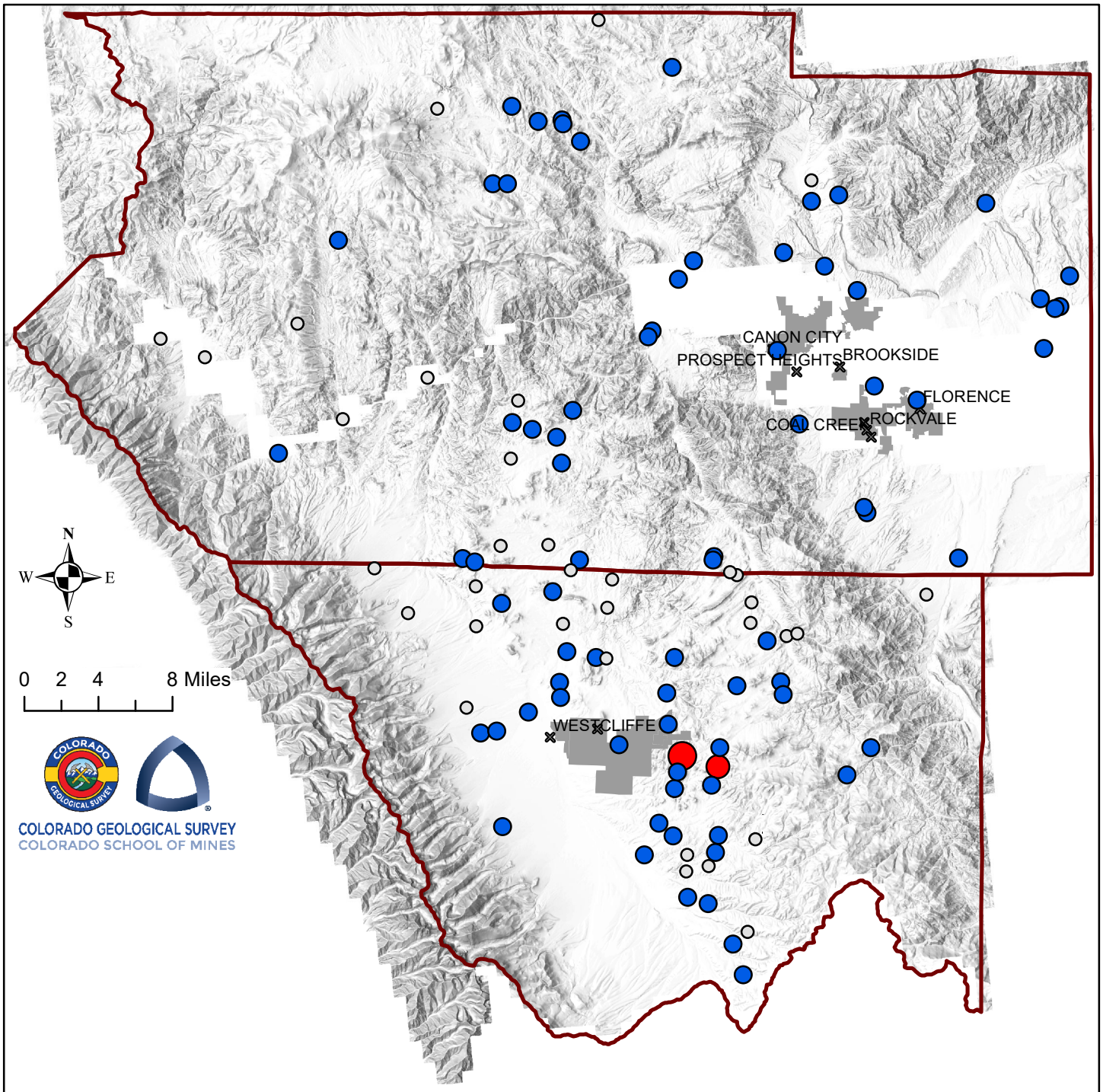


Figure 13. Manganese concentrations in milligrams per liter (mg/L) from water wells in Fremont and Custer Counties. Locations where values were above the drinking water guideline of 0.3 mg/L are shown in red.

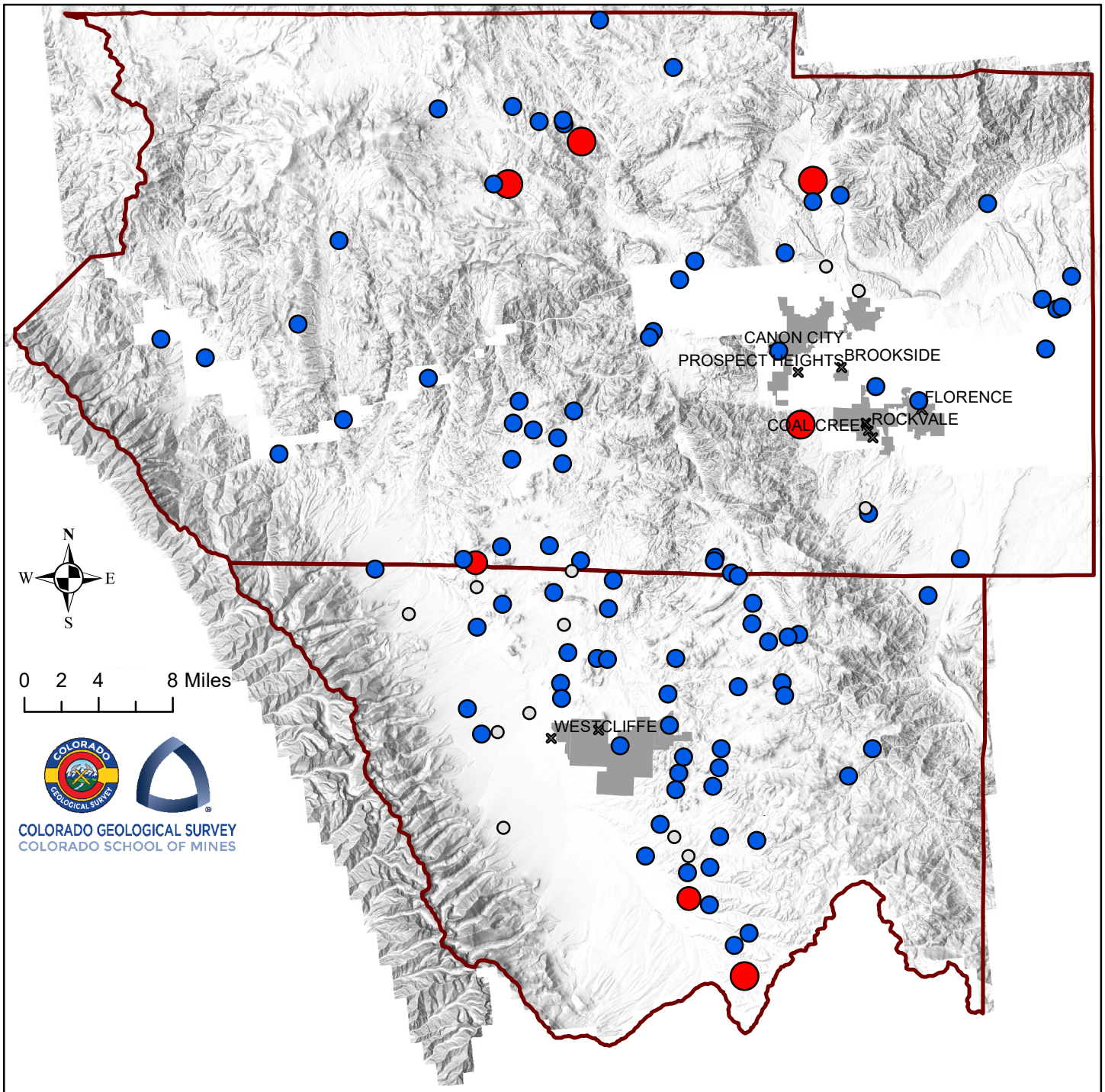


Figure 14. Molybdenum concentrations in milligrams per liter (mg/L) from water wells in Fremont and Custer Counties. Locations where values were above the drinking water guideline of 0.035 mg/L are shown in red.

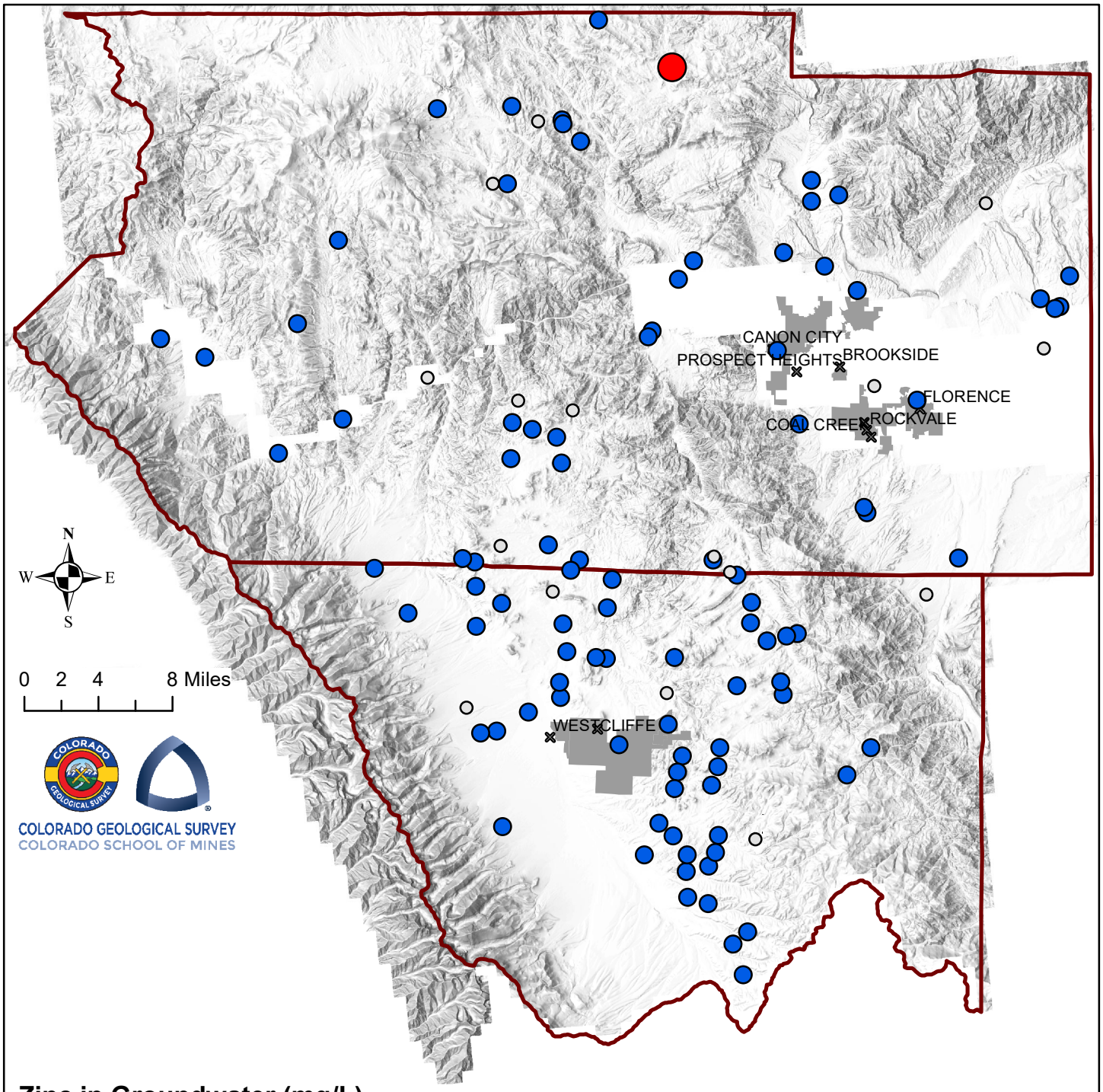


Figure 15. Zinc concentrations in milligrams per liter (mg/L) from water wells in Fremont and Custer Counties. Locations where values were above the drinking water guideline of 2 mg/L are shown in red.