COLORADO GEOLOGICAL SURVEY

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Technical Memorandum
Baseline Radiological Study Year 2: Gunnison County, 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 second year of the study (2023) that focused on Gunnison County, in west-central Colorado.

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RE: Baseline Groundwater Study Year 2 Report, Gunnison County, Contract 2022*3461

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 2 conducted in 2023 in Gunnison County located in western-central Colorado.

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: Gunnison County is predominately rural with only one city (Gunnison), and four towns (Crested Butte, Mount Crested Butte, Pitkin, and Marble). Gunnison is the county seat and much of the population is centered in this area. This county was selected for Year 2 of this study based on known deposits of uranium and to a lesser extent thorium within vein deposits, which were historically mined predominately in the southeastern portion of the county[1]. Additionally, throughout the county there are both energy/alloy metal and industrial mineral and precious and base metal mining districts with some overlap (**Figure 1**). The energy/alloy metal and industrial minerals mining districts were sources for uranium, thorium, beryllium, columbium-tantalum, feldspar, gold, iron, lithium, marble, mercury, mica, molybdenum, niobium, perlite, rare earth elements, silver, sulfur, tungsten, and vanadium. The precious and base metal mining districts were sources for arsenic, copper, gold, iron, lead, manganese, molybdenum, silver, tungsten, and zinc. Five districts with known radioactive minerals include the Big Red Claims (part of or near Whitepine), Cochetopa, Marshal Pass, Powderhorn, and Quartz Creek Pegmatite whose location is shown in Figure 1. These deposits were associated with exposed Proterozoic crystalline and Paleozoic sedimentary rocks that are part of the Laramide Sawatch Uplift[1].

[1] Streufert, R.K., Eakins, W., Hemborg, H.T., and Morgan, M.L., 1999, "RS-37 Geology and Mineral Resources of Gunnison County, Colorado": Colorado Geological Survey, Division of Minerals and Geology, Department of Natural Resources, Denver, CO, Resource Series 37. https://coloradogeologicalsurvey.org/publications/geology-mineral-resources-gunnison-colorado/.

Historic groundwater uranium data in wells and springs are shown in **Figure 2**. These data are sourced from the National Water Quality Monitoring Council Water Quality Portal (WQP), the Colorado Energy & Carbon Management (CECM) Commission (formerly known as the Colorado Oil and Gas Conservation Commission), and the National Uranium Resource Evaluation (NURE). No groundwater quality data existed for Gunnison County within the Colorado Department of Agriculture (CDA) database.

Exceedances of the uranium 0.030 milligram per liter (mg/L) drinking water guideline for the groundwater data are shown in red in Figure 2. The NURE water dataset within Gunnison County only had spring-sourced groundwater data, no data from wells. No exceedances were noted in the NURE dataset, although uranium was detected in the springs throughout the county.

Gunnison County has a complex geology (**Figure 3**) and includes some unusual deposits such as the Iron Hill alkalic intrusive suite (carbonatite complex) located near Powderhorn in the southern portion of the county. Streufert and others (1999) state that uranium is most often closely associated with fault and shear zones in brittle host formations of Paleozoic and Mesozoic age. They also state that some uranium is associated with alkalic rocks of the Cambrian Powderhorn carbonatite complex, and with rare-earth bearing pegmatites of the Quartz Creek pegmatite district. Thorium occurs in the Powderhorn district and is associated with the alkalic igneous rocks[2].

2023 Methodology

The Year 2 contract included a total of 50 samples, which was expanded to 59 samples with supplemental funding on August 1, 2023. To obtain representative coverage, a sampling grid was created using existing 1:24,000 scale geologic map boundaries (**Figure 4**). Grid creation was refined using the Colorado Division of Water Resources (DWR) completed residential wells downloaded on July 7, 2023. Specifically, if there were only a few residential wells present in a grid area which would result in a low likelihood of obtaining volunteers, then either (1) a numbered grid space was not created along the county edges or (2) multiple geologic map quadrangle areas were combined to create a larger numbered grid space. A total of 38 grid spaces were created (Figure 4).

To assist in distributing the initial 50 samples in the 38 grid spaces, the mining districts having radioactive minerals were targeted for a potential maximum of 2 samples. The extra 9 samples were filled from Gunnison County grids having too many volunteers who had been placed on reserve.

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 to the analytical laboratory in batches of typically 10 or 20 samples. Sample numbers were generated as follows: the year was listed first (2023) followed by the Federal Information Processing System (FIPS) code for the county (51 for Gunnison County), then the FIPS Colorado code (08) and finally a sequential sample number within the county. For example, 2023510801 is the first sample number assigned in Gunnison County during 2023.

Eurofins St. Louis of Earth City, MO was contracted by the CDPHE for this project in 2023. Upon receipt of the data, individual results were sent by email to the homeowners.

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[2] Olson J.C. and Wallace S.R., 1954, "Thorium and Rare Earth Minerals in the Powderhorn District, Gunnison County, Colorado": U.S. Geological Survey, Trace Elements Investigations Report 353, 58 p.

The CGS created sampling kits, which included 9x9x9 inch cardboard boxes lined with a plastic bag, a laboratory supplied sample container 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. 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 on a voluntary basis to provide well information (if known) such as well depth, DWR permit number, and whether the well was completed in overburden or bedrock.

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.

Volunteer Solicitation: The CGS contacted the Gunnison County government and health departments to ask that they place information about the sampling program on their websites or Facebook pages. Both agencies willingly placed notices on Facebook, using information provided by the CGS about the sampling program.

Newspaper ads for soliciting volunteers were placed in the Gunnison County Times for four weeks and the Crested Butte News for two weeks. These ads explained the grant funded study and included a grid map showing the allotted number of 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. As volunteers were obtained, the grid map was updated to reflect the remaining grid samples available for next week's ad. Completed grids were progressively removed from the updated map. 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 well 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. Also, the geologic formation from the driller's well log was obtained or verified, where available.

To fill remaining gaps in grids with insufficient numbers of volunteers, some of the previously reserved volunteers 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 58 samples collected out of the possible 59 samples. Sampled well locations are shown in **Figure 5**. Afterwards, 44 additional residents remained on the reserve list and were notified in November that they could not be accommodated. The majority were within centrally located grid number 20, where the county population was greatest.

Sample Shipping to Eurofins St. Louis: As samples were received, they were stockpiled at the CGS until there were sufficient numbers (five per cooler) to drop them off at the local Eurofins Denver laboratory using standard chain of custody procedures, who then shipped it to their St. Louis laboratory. Thus, samples were submitted on September 13, 20 and 29; October 6, 11, and 24; and November 3, 2023. Each shipment was logged in by the St. Louis lab where each water sample was assigned a unique lab ID number. Laboratory data were received on October 13th and 23rd, November 7, 10, and 27; and December 6, 2023.

The list of metal and radionuclide analytes was the same as Year 1 (2022) except that three metals rarely detected were excluded from the program for cost reasons in 2023 (cesium, scandium, and tellurium). Thus, the final set of 2023 analytes included:

- Metals (aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, selenium, silver, thallium, thorium, tin, uranium, vanadium, and zinc),
- Gross alpha and gross beta,
- Isotopic radium-226 and radium-228, and
- Isotopic thorium-228, thorium-230, and thorium-232.

Homeowners were emailed their individual lab reports along with the CDPHE provided 2023 Fact Sheet entitled "Private well water and your health, potential health impacts from select metals and radionuclides". This Fact Sheet contained guidance criteria and potential health impacts for the above analyte list, along with water treatment related information.

2023 Lab Results

Table 1 summarizes all sampled wells in Gunnison County, including their assigned sample numbers, location coordinates, well depth information (where available), and water quality data. It also includes the laboratory-assigned ID number for each sample. Results in Table 1 with concentrations greater than the applicable drinking water guidelines are bolded.

The spatial distribution of the groundwater quality data for specific metals and radionuclides that exhibited exceedances of their applicable drinking water guidelines is shown in **Figures 6 through 15**. Also included are radionuclides that either have no drinking water guideline (thorium) or exhibited no guideline exceedances but are contributors to the gross radionuclide measurements. Figures generated include uranium (Figure 6), thorium (Figure 7), gross alpha (Figure 8), gross beta (Figure 9), radium-226 plus radium-228 (Figure 10), thorium-230 plus thorium-232 (Figure 11), antimony (Figure 12), arsenic (Figure 13), lead (Figure 14), and manganese (Figure 15). Sample locations with no detections of the analyte of interest are shown with small, light gray filled circles in these figures. 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 having no exceedances of their respective water quality guidelines.

Data Evaluation:

Analytes exhibiting exceedances of the applicable drinking water guidelines are listed with the number of exceedances from most to least: lead (7), gross alpha (6), radium 226+228 (4), manganese (4), arsenic (2), gross beta (1), uranium (1), and antimony (1). The following bulleted list presents observations for the various analytes:

- Uranium was detected at 52 of the 58 sampled locations but only one exceedance was reported, located in grid #20 (Figure 6). This location consisted of a 300-foot-deep well which was described by the well driller as having a geology of "sandstone over granite". Based on the geologic map in Figure 3, this would

likely be the Jurassic to Cretaceous Dakota Sandstone, Burro Canyon and Morrison Formations, and Junction Creek Sandstone (KJdj) over Precambrian granite (Xg). Granites are a known source for uranium and the Brushy Basin Member of the Morrison Formation has been identified elsewhere in the state as containing uranium deposits.

- Thorium was detected at 10 locations (Figure 7) at estimated concentrations (below the reporting limit) in the mg/L range but was not detected above the reporting limit. These 10 locations were located either near the Powderhorn District or were in the central Gunnison valley area not associated with any mining district or any single geologic unit. Isotopic thorium-230+232 was detected in the picocuries per liter (pCi/L) range at 2 of the 10 thorium locations and elsewhere where the total thorium was not detected in the mg/L range. However, the concentrations were low with a maximum of 0.67 pCi/L, which is two orders of magnitude below the 60 pCi/L guideline (Figure 11).
- Gross alpha (Figure 8) and gross beta (Figure 9) were detected above their calculated reporting limits at 25 and 48 locations, respectively. However, gross alpha and gross beta only exhibited 6 and 1 exceedance(s), respectively. The exceedances occurred either near the Powderhorn/Vulcan South Districts or were in the central Gunnison valley area not associated with a mining district. The gross alpha exceedances occurred predominantly in bedrock wells drilled into sandstone where documented in the driller's logs. Based on the geologic map (Figure 3), it appears that this sandstone in the central valley area may be the same Jurassic to Cretaceous Dakota Sandstone, Burro Canyon and Morrison Formations, and Junction Creek Sandstone (KJdj); however, this cannot be confirmed due to this area being buried by valley alluvial deposits.
- Radium-226 and radium-228 (Figure 10) were detected at 22 and 24 locations, respectively. Both were detected at 14 locations. Only 4 locations exhibited exceedance of the combined Radium-226+228 guideline of 5 pCi/L. Where exceedances occurred all correlated with locations having gross alpha exceedances or elevated concentrations (Table 1).
- Thorium-228 and thorium-230 were detected in low concentrations at 2 and 11 locations, respectively. Thorium-232 was not detected at any of the sampled locations. The detections did not appear to correlate with any specific geologic unit. No exceedances of the thorium-230+232 guideline of 60 pCi/L occurred (Figure 11).
- Antimony (Figure 12) had one exceedance and two estimated value detections. All three values were located near historic mining districts - the Powderhorn, Vulcan South and Elk Mountains.
- Arsenic was detected at estimated concentrations below the reporting limit at 12 locations. Two other locations had detections above the reporting limit, and both were also exceedances of the 0.01 guidance criteria (Figure 13). These exceedances occurred in volcanic-sourced rocks.
- Lead was detected at estimated concentrations below the reporting limit at 6 locations and was present above the reporting limit at seven other locations which are considered exceedances (Figure 14). Most of these wells appeared to be drilled into various bedrock formations.
- Manganese was detected at 31 locations of which all but 7 were above the reporting limit. Exceedances of the 0.3 mg/L guidance criteria only occurred at four locations (Figure 15). These exceedances did not appear to correlate with any specific geologic unit.

Best Regards,

Lesley Sebol, PhD
Senior Hydrogeologist

Attachments:

Table 1. Water quality data

Figure 1. Historic metal mining districts and areas favorable to uranium and vanadium in Gunnison County, Colorado
Figure 2. Historic groundwater uranium detected in wells and springs in Gunnison County, Colorado
Figure 3. Compiled geologic map of Gunnison County, Colorado
Figure 4. Sampling grid and residential water wells in Gunnison County, Colorado
Figure 5. Sampled residential water wells in Gunnison County, Colorado
Figure 6. Uranium concentrations in milligrams per liter (mg/L) from water wells in Gunnison County
Figure 7. Thorium concentrations in milligrams per liter (mg/L) from water wells in Gunnison County
Figure 8. Gross Alpha concentrations in picocuries per liter (pCi/L) from water wells in Gunnison County
Figure 9. Gross Beta concentrations in picocuries per liter (pCi/L) from water wells in Gunnison County
Figure 10. Radium 226+228 concentrations in picocuries per liter (pCi/L) from water wells in Gunnison County
Figure 11. Thorium 230+232 concentrations in picocuries per liter (pCi/L) from water wells in Gunnison County
Figure 12. Antimony concentrations in milligrams per liter (mg/L) from water wells in Gunnison County
Figure 13. Arsenic concentrations in milligrams per liter (mg/L) from water wells in Gunnison County
Figure 14. Lead concentrations in milligrams per liter (mg/L) from water wells in Gunnison County
Figure 15. Manganese concentrations in milligrams per liter (mg/L) from water wells in Gunnison County

Table 1. Water quality data in Gunnison County, Colorado

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)
							DWG[3]:	***15***		***50***		--->		--->		***5***	--->		--->		--->		***60***
2023510801	*160-51445-1*	38.67	-106.85	8/17/2023	13:00	35	*sand & gravel (S&G)*	0.121 U	1.4	1.06	0.7	0.0444 U	0.1	0.727	0.4	0.727	0.0283 U	0.13	0.108 U	0.12	0.000 U	0.01	ND
2023510802	*160-51445-2*	38.47	-106.94	8/17/2023	12:25	84	*weathered granite*	6.89	2.8	3.29	1.0	0.0497 U	0.1	0.256 U	0.3	ND	0.00150 U	0.14	0.233	0.16	0.0165 U	0.07	0.233
2023510803	*160-51445-3*	38.44	-107.24	8/17/2023	10:05	250	*volcanic*	1.71 U	1.9	3.83	1.0	0.0564 U	0.1	0.622	0.4	0.622	-0.0250 U	0.16	0.0477 U	0.13	0.0226 U	0.07	ND
2023510804	*160-51445-4*	38.58	-106.92	8/21/2023	10:00	35	*S&G*	0.537 U	2.2	2.25	0.7	0.00892 U	0.0	-0.0480 U	0.2	ND	0.0152 U	0.14	0.195	0.14	0.0106 U	0.05	0.195
2023510805	*160-51445-5*	38.51	-106.94	8/19/2023	20:00	41	*sand, gravel & clay/clay*	2.82 U	2.2	2.65	0.9	0.0945 U	0.1	0.417 U	0.4	ND	0.0336 U	0.16	0.398	0.22	0.0176 U	0.06	0.398
2023510806	*160-51445-6*	38.28	-107.14	8/27/2023	16:45	300	*soft white rock*	**55.6**	13.2	**54.5**	7.7	29.0	2.8	17.5	2.1	**46.5**	0.448	0.29	0.485	0.26	0.0640 U	0.09	0.485
2023510807	*160-51445-7*	38.86	-106.96	8/30/2023	15:00	24	*S&G*	-0.0836 U	1.2	1.27	0.6	0.141	0.1	0.353 U	0.3	0.141	0.0335 U	0.14	0.352	0.19	0.0636 U	0.09	0.352
2023510808	*160-51445-8*	38.57	-106.61	8/29/2023	19:30	125	*green rock*	0.594 U	1.6	1.62	0.7	0.0953 U	0.1	0.307 U	0.3	ND	0.0295 U	0.10	0.670	0.24	0.0370 U	0.06	0.670
2023510809	*160-51445-9*	38.32	-107.24	8/28/2023	11:20	552	*clayst./sandst./volcanic*	1.29	0.9	1.71	0.7	-0.0187 U	0.1	0.539	0.3	0.539	-0.00922 U	0.10	0.0897 U	0.10	-0.0118 U	0.01	ND
2023510810	*160-51445-10*	38.21	-107.07	8/30/2023	15:30	45	*granite*	1.91 U	1.5	1.34	0.7	0.0717 U	0.1	0.642	0.4	0.642	0.103 U	0.18	0.331	0.21	-0.0351 U	0.03	0.331
2023510811	*160-51445-11*	38.96	-106.99	9/1/2023	10:30	200	*black rock (shale?)*	6.26	3.3	1.33 U	1.1	0.178	0.1	0.395 U	0.3	0.178	0.0784 U	0.16	0.153 U	0.18	-0.0490 U	0.03	ND
2023510812	*160-51445-12*	38.51	-106.67	8/31/2023	17:40	495	*red & black granite*	12.5	2.9	1.2	0.8	0.195	0.1	0.483 U	0.3	0.195	-0.0222 U	0.13	0.293	0.19	-0.0177 U	0.09	0.293
2023510813	*160-51445-13*	38.75	-107.03	9/1/2023	14:58	325	*sandstone*	7.74 U	5.8	0.515 U	1.6	0.852	0.2	2.18	0.6	3.032	0.0460 U	0.16	0.169 U	0.17	0.0439 U	0.09	ND
2023510814	*160-51445-14*	38.83	-106.92	9/5/2023	9:45	123	*S&G*	0.807 U	1.8	1.43	0.8	0.0167 U	0.1	0.561	0.3	0.561	0.0155 U	0.11	0.230	0.16	0.00155 U	0.05	0.230
2023510815	*160-51445-15*	38.52	-106.83	9/8/2023	13:31	41	*S&G*	3.10	1.4	2.73	0.8	4.44	0.6	0.121 U	0.3	4.44	0.0439 U	0.18	0.218 U	0.19	0.000 U	0.01	ND
2023510816	*160-51445-16*	38.50	-106.73	9/8/2023	14:03	280	*granite*	10.1	5.1	11.6	2.8	5.70	0.7	8.31	1.2	**14.01**	0.213 U	0.25	0.0426 U	0.15	-0.00446 U	0.08	ND
2023510817	*160-51552-6*	38.76	-106.88	9/14/2023	9:30	340	*Black rock*	1.31 U	2.9	0.780 U	1.1	0.0101 U	0.1	0.140 U	0.3	ND	-0.0297 U	0.14	0.0678 U	0.19	0.0290 U	0.07	ND
2023510818	*160-51552-7*	38.44	-106.90	9/18/2023	10:00	400	*granite*	4.32	1.5	2.51	0.8	0.174	0.1	0.316 U	0.4	0.174	-0.0375 U	0.12	0.114 U	0.19	0.0505 U	0.07	ND
2023510819	*160-51678-1*	38.33	-107.26	9/14/2023	19:00	240	*unknown-no log*	3.1	1.7	0.971 U	0.7	0.0998 U	0.1	0.515 U	0.4	ND	-0.0744 U	0.12	0.145 U	0.20	-0.00554 U	0.02	ND
2023510820	*160-51678-2*	38.32	-107.17	9/19/2023	11:40	260	*granite*	3.83 UG	3.0	0.916 U	1.0	0.0901 U	0.1	0.562 U	0.4	ND	-0.00855 U	0.12	0.290	0.24	0.0116 U	0.05	0.290
2023510821	*160-51678-5*	38.77	-107.05	9/19/2023	16:30	340	*shale & sandstone*	1.42 U	1.2	0.365 U	0.5	0.0626 U	0.1	0.0832 U	0.3	ND	-0.0915 U	0.10	-0.0451 U	0.17	0.00741 U	0.05	ND
2023510822	*160-51678-6*	38.73	-106.77	9/20/2023	7:50	--	*unk*	3.95	1.9	1.58	0.7	1.96	0.4	1.57	0.5	3.53	0.0905 U	0.16	0.141 U	0.21	0.0292 U	0.09	ND
2023510823	*160-51678-9*	38.76	-107.06	9/22/2023	10:30	40	*clay & gravel/shale*	1.50 U	1.4	1.48	0.7	0.00885 U	0.1	0.472 U	0.4	ND	-0.0293 U	0.14	0.412	0.28	0.0247 U	0.07	0.412
2023510824	*160-51678-10*	38.81	-106.88	9/25/2023	14:10	--	*S&G*	1.26 UG	2.1	1.42	0.8	0.167 U	0.2	0.837	0.5	0.837	-0.0733 U	0.13	0.00735 U	0.18	-0.0222 U	0.03	ND
2023510825	*160-51747-3*	38.61	-106.89	9/28/2023	12:04	69	*S&G*	1.06 U	1.7	1.87	0.7	-0.0154 U	0.1	-0.220 U	0.3	ND	-0.122 U	0.19	0.159 U	0.28	0.0404 U	0.11	ND
2023510826	*160-51747-6*	38.61	-106.95	10/2/2023	10:20	600	*sandstone*	**15.1 G**	5.7	26.5	4.0	2.47	0.4	2.61	0.6	**5.08**	0.0435 U	0.17	0.0141 U	0.21	0.0181 U	0.06	ND
2023510827	*160-51747-7*	38.66	-106.85	9/29/2023	9:33	72	*clay & gravel/shale*	1.13 U	1.5	2.78	0.8	-0.0210 U	0.1	0.427 U	0.3	ND	-0.137 U	0.10	0.0179 U	0.20	-0.00409 U	0.06	ND
2023510828	*160-51747-8*	38.60	-106.94	9/28/2023	14:30	98	*clay with sand, gravel*	**21.7 G**	6.7	8.46	2.4	0.0141 U	0.1	0.196 U	0.3	ND	-0.130 U	0.12	-0.0566 U	0.21	-0.0212 U	0.03	ND
2023510829	*160-51747-9*	38.56	-106.92	10/2/2023	10:15	320	*sandstone*	**24.9 G**	8.4	19.9	3.6	1.7	0.3	0.972	0.4	2.672	-0.0495 U	0.18	0.114 U	0.24	-0.0111 U	0.03	ND
2023510830	*160-51747-10*	38.58	-106.96	10/2/2023	10:25	--	*unkown*	2.60 UG	3.2	3.89	1.5	0.0916 U	0.1	0.671	0.4	0.671	-0.0467 U	0.11	-0.0834 U	0.19	-0.0105 U	0.03	ND
2023510831	*160-51747-11*	38.91	-106.96	10/3/2023	8:57	--	*unkown*	-0.298 U	1.1	0.390 U	0.6	-0.0749 U	0.1	0.581 U	0.6	ND	0.0256 U	0.12	0.0957 U	0.21	-0.00992 U	0.02	ND
2023510832	*160-51747-12*	38.61	-106.51	10/2/2023	16:00	340	*black hard rock*	1.74 UG	2.7	0.225 U	0.9	0.00358 U	0.1	0.170 U	0.4	ND	-0.0482 U	0.14	-0.157 U	0.15	-0.0107 U	0.03	ND
2023510833	*160-51747-13*	38.63	-106.87	9/28/2023	10:31	100	*sandstone/granite*	4.91 G	2.7	3.39	1.1	0.0862 U	0.1	0.0321 U	0.3	ND	-0.0730 U	0.12	-0.0102 U	0.18	0.00487 U	0.06	ND
2023510834	*160-51747-16*	38.55	-106.89	10/5/2023	12:55	--	*unkown*	4.40 UG	3.6	3.35	1.5	0.293	0.1	3.04	0.7	3.333	-0.0366 U	0.19	0.0539 U	0.20	0.0590 U	0.09	ND

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*
2023510801	ND	ND	ND	0.089	ND	ND	0.00015 J	ND	ND	0.011	0.084	ND	0.0025 J	ND	ND	ND	ND	ND	0.00058 J	ND	0.001	ND	0.0081 J
2023510802	ND	ND	0.0024 J	0.061	ND	ND	0.00016 J	ND	ND	0.012	0.024 J	ND	ND	ND	ND	ND	ND	ND	0.00067 J	ND	0.0029	ND	0.0078 J
2023510803	ND	ND	0.0094 J	0.073	ND	0.024 J	0.000078 J	ND	ND	0.08	0.076	0.0014 J	0.0028 J	ND	0.0012	ND	ND	ND	ND	0.026	0.00062 J	0.016	0.038
2023510804	ND	ND	ND	0.073	ND	ND	ND	ND	ND	0.012	0.72	ND	0.0053	ND	0.0048 J	ND	ND	ND	ND	ND	0.0022	ND	0.014 J
2023510805	ND	ND	ND	0.14	ND	0.022 J	ND	ND	ND	0.041	0.042 J	ND	0.0051	0.0027 J	ND	ND	ND	ND	ND	ND	0.0022	0.0049 J	ND
2023510806	0.14	0.0029 J	**0.29**	0.031	0.0026	0.76	ND	ND	ND	0.0085	6	ND	**0.36**	0.0023 J	0.003 J	ND	ND	ND	ND	ND	0.0003 J	ND	0.5
2023510807	ND	ND	ND	0.046	ND	ND	ND	ND	ND	0.018	0.025 J	ND	ND	ND	0.0017 J	ND	ND	ND	ND	ND	ND	ND	0.027
2023510808	ND	ND	ND	0.012	ND	ND	ND	ND	ND	0.018	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0034 J	0.0013	ND	0.0076 J
2023510809	ND	ND	**0.061**	0.013	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0019	0.0059 J	ND
2023510810	ND	ND	0.0047 J	0.17	ND	ND	ND	ND	ND	0.014	0.03 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00032 J	ND	0.047
2023510811	ND	0.00031 J	ND	0.078	ND	0.045 J	0.00017 J	ND	ND	0.029	0.044 J	ND	ND	0.0029 J	0.0014 J	ND	ND	ND	0.00063 J	ND	0.0024	ND	0.039
2023510812	ND	ND	ND	0.027	ND	ND	ND	ND	ND	0.049	0.026 J	ND	ND	0.0021 J	ND	ND	ND	ND	ND	ND	0.0045	0.0041 J	0.018 J
2023510813	ND	ND	ND	0.64	ND	0.071 J	ND	ND	ND	ND	0.55	ND	0.076	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2023510814	ND	ND	ND	0.095	ND	ND	ND	ND	ND	0.0083	0.071	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0012	ND	ND
2023510815	ND	ND	ND	0.072	ND	ND	ND	ND	0.00097 J	0.0087	2.5	ND	**0.61**	0.0027 J	0.001 J	ND	ND	ND	ND	ND	0.002	ND	0.018 J
2023510816	ND	ND	0.0026 J	0.081	ND	0.44	ND	ND	ND	0.013	0.52	**0.0035**	0.03	0.0028 J	0.0018 J	ND	ND	ND	ND	ND	0.00077 J	ND	0.0082 J
2023510817	ND	ND	ND	0.062	ND	0.23	ND	ND	ND	0.0047	0.029 J	0.0022 J	0.0028 J	ND	0.001 JB	ND	ND	ND	ND	ND	ND	ND	0.035
2023510818	ND	ND	0.0037 J	0.051	ND	ND	ND	ND	ND	0.015	ND	ND	ND	0.0077	ND	ND	ND	ND	ND	ND	0.0022	ND	ND
2023510819	ND	**0.0095**	0.0022 J	0.034	ND	ND	0.000090 J	0.0013 JB	ND	0.0034	ND	ND	ND	ND	ND	ND	ND	ND	0.00064 J	ND	0.0012	0.0047 J	0.0083 J
2023510820	ND	ND	ND	0.15	ND	ND	0.00012 J	ND	ND	0.022	ND	ND	ND	ND	ND	ND	ND	ND	0.00073 J	ND	0.0033	0.0049 J	0.012 J
2023510821	ND	ND	ND	0.043	ND	ND	ND	ND	ND	0.045	0.063	**0.0055**	0.0029 JB	ND	ND	ND	ND	ND	ND	ND	0.00073 J	ND	0.021
2023510822	ND	ND	ND	0.16	ND	ND	0.000094 J	ND	ND	0.0086	0.82 B	ND	0.082 B	0.0020 J	ND	ND	ND	ND	ND	ND	0.00060 J	ND	0.089
2023510823	ND	ND	ND	0.02	ND	ND	ND	ND	ND	0.004	2.6 B	ND	0.025 B	ND	0.0013 JB	ND	ND	ND	ND	ND	ND	ND	0.012 J
2023510824	ND	ND	ND	0.15	ND	ND	ND	ND	ND	0.012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00070 J	ND	0.055
2023510825	ND	ND	ND	0.061	ND	ND	ND	ND	ND	0.0098	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0025	ND	ND
2023510826	ND	ND	ND	0.024	ND	0.250	ND	ND	ND	0.058	1.7	0.0010 J	0.057	ND	0.0012 JB	ND	ND	ND	ND	ND	ND	ND	0.02
2023510827	ND	ND	ND	0.130	ND	ND	ND	ND	ND	0.093	0.12	0.0013 J	0.0051	ND	0.0012 JB	ND	ND	ND	ND	ND	0.0022	ND	0.047
2023510828	ND	ND	ND	0.021	ND	0.077 J	ND	ND	ND	0.110	0.093	ND	0.0024 J	0.008	0.0012 JB	0.0058	ND	ND	ND	ND	0.010	ND	0.0078 J
2023510829	ND	ND	0.0016 J	0.097	ND	0.041 J	0.00035 J	ND	ND	0.015	1	ND	**0.32**	0.0033 J	0.00093 JB	ND	ND	ND	0.0019 JB	0.00084 J	0.020	ND	0.0088 J
2023510830	ND	ND	0.0024 J	0.130	ND	0.043 J	ND	ND	ND	0.037	2.2	0.0018 J	0.014	0.0028 J	0.0015 JB	ND	ND	ND	ND	ND	0.0024	0.0072 J	0.0091 J
2023510831	ND	ND	ND	0.044	ND	ND	0.00016 J	ND	ND	0.032	0.052 B	ND	ND	ND	ND	ND	ND	ND	0.0015 J	ND	0.00018 J	ND	0.0086 J
2023510832	ND	ND	ND	0.048	ND	ND	0.00012 J	ND	ND	0.012	0.046 JB	**0.0088**	ND	ND	0.0014 JB	ND	ND	ND	ND	ND	0.00062 J	ND	0.0087 J
2023510833	ND	ND	ND	0.097	ND	0.030 J	ND	ND	ND	0.046	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0047	ND	ND
2023510834	ND	ND	ND	0.071	ND	0.022 J	ND	ND	ND	0.0077	0.020 JB	ND	ND	ND	0.0017 JB	ND	ND	ND	ND	ND	0.0037	ND	0.019 J

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)
							DWG[3]:	*15*		*50*		--->		--->		*5*	--->		--->		--->		*60*
2023510835	*160-51747-17*	38.86	-106.96	10/4/2023	10:00	52	*S&G*	-0.139 U	1.3	1.06	0.6	0.0686 U	0.1	0.285 U	0.4	ND	0.0439 U	0.19	0.0224 U	0.21	0.0169 U	0.06	ND
2023510836	*160-51747-18*	38.64	-106.94	10/4/2023	10:45	--	*unkown*	0.574 UG	1.8	0.838 U	0.8	0.0363 U	0.1	-0.149 U	0.4	ND	0.315	0.23	0.234 U	0.26	-0.0109 U	0.03	ND
2023510837	*160-51747-19*	38.52	-106.76	10/4/2023	11:50	130	*sandstone*	1.75 UG	2.4	2.2	0.9	0.0204 U	0.1	0.141 U	0.3	ND	0.0968 U	0.21	-0.00957 U	0.22	-0.00910 U	0.07	ND
2023510838	*160-51747-20*	38.27	-107.23	9/20/2023	16:00	300	*sandstone/shale*	1.30 U	1.2	1.2	0.6	0.0143 U	0.1	-0.393 U	0.3	ND	-0.0496 U	0.18	-0.0546 U	0.20	-0.0275 U	0.03	ND
2023510839	*160-51794-1*	38.59	-106.91	10/4/2023	11:15	53	*S&G*	3.96	1.9	4.02	1.0	0.0420 U	0.1	0.205 U	0.3	ND	-0.0965 U	0.15	0.0870 U	0.23	0.0178 U	0.06	ND
2023510840	*160-51794-4*	38.55	-106.95	10/6/2023	14:04	--	*unkown*	2.45 UG	2.2	5.03	1.0	0.305	0.1	1.13	0.5	1.435	0.0541 U	0.16	0.0734 U	0.20	0.0327 U	0.07	ND
2023510841	*160-51794-5*	38.57	-106.61	10/6/2023	6:00	--	*unkown*	4.27	1.8	3.07	0.9	0.117	0.1	0.67	0.4	0.787	-0.0551 U	0.19	-0.00998 U	0.25	-0.00554 U	0.04	ND
2023510842	*160-51794-6*	38.50	-106.94	10/5/2023	14:30	200	*black hard rock*	4.05	2.1	3.32	1.0	0.135	0.1	0.183 U	0.3	0.135	0.0583 U	0.16	0.196 U	0.25	-0.0312 U	0.03	ND
2023510843	*160-51794-7*	38.57	-106.61	10/3/2023	14:30	32	*unkown*	-0.519 U	0.7	2.2	0.7	0.0807 U	0.1	0.413 U	0.3	ND	-0.224 U	0.13	0.0443 U	0.21	0.0870 U	0.11	ND
2023510844	*160-51794-8*	38.58	-106.93	10/6/2023	9:45	39	*alluvium*	2.14 UG	2.1	1.76	0.8	0.138	0.1	0.421 U	0.4	0.138	0.0225 U	0.21	0.0957 U	0.25	-0.00345 U	0.08	ND
2023510845	*160-51794-9*	38.58	-106.90	10/9/2023	12:50	--	*landslide, Tw/Mancos Sh.*	7.29 G	2.9	9.34	1.4	1.83	0.3	1.53	0.5	3.36	-0.0475 U	0.14	0.114 U	0.21	0.0775 U	0.10	ND
2023510846	*160-51794-10*	38.53	-106.97	10/9/2023	12:51	44	*S&G/clay*	0.797 U	1.2	1.59	0.6	0.0912 U	0.1	0.528 U	0.4	ND	-0.0776 U	0.18	0.0265 U	0.22	0.00193 U	0.07	ND
2023510847	*160-51960-1*	38.66	-106.85	10/11/2023	9:20	65	*debris flow, alluv./quartzite*	5.76	2.2	2.63	0.9	0.116	0.1	0.592	0.3	0.708	0.0355 U	0.16	0.228 U	0.25	0.00669 U	0.08	ND
2023510848	*160-51960-2*	38.62	-106.93	10/10/2023	8:00	650	*unknown - no log*	**19.4 G**	5.0	37.3	4.4	3.32	0.4	3.05	0.6	**6.37**	0.171 U	0.22	0.285 U	0.26	0.0271 U	0.09	ND
2023510849	*160-51960-5*	38.52	-107.01	10/13/2023	8:00	102	*volcanics*	0.913 U	1.7	4.00	1.1	0.0632 U	0.1	0.422 U	0.3	ND	0.0672 U	0.16	0.126 U	0.22	-0.00554 U	0.03	ND
2023510850	*160-51960-6*	38.61	-106.52	10/13/2023	9:20	20	*S&G*	2.98	1.4	1.43	0.7	0.0446 U	0.1	0.844	0.4	0.844	-0.0414 U	0.15	-0.0548 U	0.18	0.00958 U	0.06	ND
2023510851	*160-51960-7*	38.30	-107.09	10/12/2023	19:20	*81*	*sandstone*	2.37 UG	2.6	2.92	1.1	0.0889 U	0.1	0.877	0.4	0.877	-0.0145 U	0.17	0.135 U	0.22	0.00942 U	0.05	ND
2023510852	*160-51960-8*	38.60	-106.93	10/15/2023	19:00	*45*	*S&G/shale at bottom*	1.39 UG	1.8	2.89	1.1	0.0493 U	0.1	0.329 U	0.4	ND	0.0264 U	0.22	0.320 U	0.31	0.0628 U	0.10	ND
2023510853	*160-51960-9*	38.67	-106.96	10/19/2023	16:15	*5*	*sand &clay/clay*	2.62 UG	2.2	2.20	0.8	0.142	0.1	0.264 U	0.4	0.142	0.00511 U	0.18	0.152 U	0.24	-0.00554 U	0.03	ND
2023510854	*160-51960-10*	38.52	-106.99	10/19/2023	14:00	*28*	*S&G or weathered granite*	2.86	1.8	0.713 U	0.6	0.0548 U	0.1	0.325 U	0.3	ND	-0.112 U	0.17	0.135 U	0.25	0.0141 U	0.07	ND
2023510855	*160-52080-1*	38.54	-106.84	10/23/2023	19:50	*352*	*sandstone/granite*	4.83 G	3.2	6.17	1.7	0.496	0.2	1.02	0.5	1.516	0.0493 U	0.1	0.195 U*	0.2	-0.0164 U	0.0	ND
2023510856	*160-52080-2*	38.53	-106.96	10/26/2023	13:00	300	*sandstone/granite*	**38.3 G**	10.5	18.6 G	4.8	0.582	0.2	1.39	0.5	1.972	-0.0341 U	0.2	0.187 U*	0.2	-0.0249 U	0.1	ND
2023510857	*160-52080-4*	38.23	-107.07	10/31/2023	14:30	380	*granite*	3.20 G	2.2	3.08	1.0	0.0806 U	0.1	1.18	0.4	1.18	0.0929 U	0.3	0.0910 U*	0.1	0.0322 U	0.1	ND
2023510858	*160-52080-5*	38.59	-106.92	10/30/2023	11:28	49	*S&G*	4.20 G	3.5	1.44	1.2	0.129 U	0.2	0.443 U	0.6	ND	0.0244 U	0.3	0.112 U*	0.2	0.000 U	0.1	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 guidelines are bolded.

"U" = Result is less than the sample detection limit (i.e., not detected (ND)).

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

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

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*
2023510835	ND	ND	ND	0.040	ND	ND	ND	ND	ND	0.18	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00020 J	ND	0.013 J
2023510836	ND	ND	ND	0.018	ND	0.022 J	ND	ND	ND	0.061	ND	ND	0.024	ND	0.0018 JB	ND	ND	ND	ND	ND	0.00054 J	0.0052 J	ND
2023510837	ND	ND	ND	0.170	ND	ND	ND	ND	ND	0.035	0.037 JB	**0.067**	ND	ND	ND	ND	ND	ND	ND	ND	0.0035	0.0041 J	0.026
2023510838	ND	ND	0.0043 J	0.0042	ND	0.071 J	ND	ND	ND	0.0012 J	0.027 JB	ND	ND	0.0027 J	ND	ND	ND	ND	ND	ND	0.00031 J	ND	ND
2023510839	ND	ND	ND	0.057	ND	ND	0.00030 J	ND	ND	0.0064	0.22	ND	0.0045 J	ND	ND	ND	ND	ND	0.0016 JB	ND	0.0028	ND	ND
2023510840	0.069 J	ND	0.0027 J	0.088	ND	0.048 J	0.00021 J	ND	0.0013 J	0.63	3.8	**0.014**	**0.91**	ND	0.0015 JB	ND	ND	0.00038 J	ND	0.0057	0.00086 J	ND	0.052
2023510841	ND	ND	ND	0.023	ND	ND	ND	ND	ND	0.17	0.045 J	ND	0.0028 J	ND	0.0073 B	ND	ND	ND	ND	ND	0.0026	ND	0.028
2023510842	ND	ND	ND	0.073	ND	ND	ND	ND	ND	0.016	0.024 J	ND	ND	ND	ND	0.00085 J	ND	ND	ND	ND	0.0022	ND	ND
2023510843	ND	ND	ND	0.018	ND	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2023510844	ND	ND	ND	0.12	ND	ND	ND	ND	ND	0.02	0.022 J	ND	ND	ND	0.0018 JB	ND	ND	ND	ND	ND	0.0029	ND	0.0091 J
2023510845	ND	ND	ND	0.02	ND	0.14	ND	ND	ND	0.066	0.38	**0.013**	0.07	ND	0.0016 JB	ND	ND	ND	ND	ND	0.00065 J	ND	0.072
2023510846	ND	ND	ND	0.068	ND	ND	ND	ND	ND	0.033	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0012	ND	ND
2023510847	ND	ND	ND	0.12	ND	ND	0.00010 J	ND	ND	0.004	0.071	ND	ND	ND	0.0010 J	ND	ND	ND	0.00081 J	ND	0.0029	ND	0.036
2023510848	0.59	ND	0.0021 J	0.047	ND	0.33	0.000082 J	ND	ND	0.024	0.42	ND	0.024	ND	0.0025 J	ND	ND	ND	0.0017 J	0.00085 J	0.00029 J	ND	0.048
2023510849	ND	ND	ND	ND	ND	0.079 J	ND	ND	ND	0.0065	0.030 J	ND	0.0064	ND	ND	ND	ND	ND	ND	ND	0.00051 J	ND	ND
2023510850	ND	ND	ND	0.017	ND	ND	ND	ND	ND	0.0031	0.032 J	ND	0.0085	ND	ND	ND	ND	ND	ND	ND	0.0026	ND	0.017 J
2023510851	ND	ND	ND	0.082	ND	0.027 J	ND	ND	ND	0.0064	0.023 J	ND	0.0068	ND	ND	ND	ND	ND	ND	ND	0.0019	ND	0.011 J
2023510852	ND	ND	ND	0.062	ND	0.037 J	ND	ND	ND	0.0033	ND	ND	0.0057	0.0022 J	0.00089 J	ND	ND	ND	ND	ND	0.0031	ND	ND
2023510853	ND	ND	ND	0.054	ND	0.092 J	0.00072	ND	ND	0.017	0.38	ND	0.26	0.0054	0.0046 J	ND	ND	ND	ND	ND	0.0025	ND	0.015 J
2023510854	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.92	0.062	0.0015 J	0.0047 J	ND	ND	ND	0.00053 J	ND	ND	ND	0.00096 J	ND	0.026
2023510855	ND	ND	ND	0.062	ND	0.1	0.000068 J	ND	ND	0.036	ND	**0.0048**	ND	0.0032 J	ND	0.0018 J	ND	ND	ND	ND	0.0044	ND	0.014 JB
2023510856	ND	ND	ND	0.045	ND	0.12	ND	ND	ND	0.0097	0.12	ND	0.0029 J	0.011	0.0028 J	ND	ND	ND	ND	ND	**0.054**	ND	0.020 B
2023510857	ND	ND	0.0022 J	0.11	ND	ND	ND	ND	ND	0.0012 J	0.33	ND	0.032	0.0087	ND	ND	ND	ND	ND	ND	0.0014	ND	0.088 B
2023510858	ND	ND	ND	0.10	ND	ND	ND	ND	ND	0.0053	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0015	ND	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 guidelines are bolded.

"U" = Result is less than the sample detection limit (i.e., not detected (ND)).

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

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

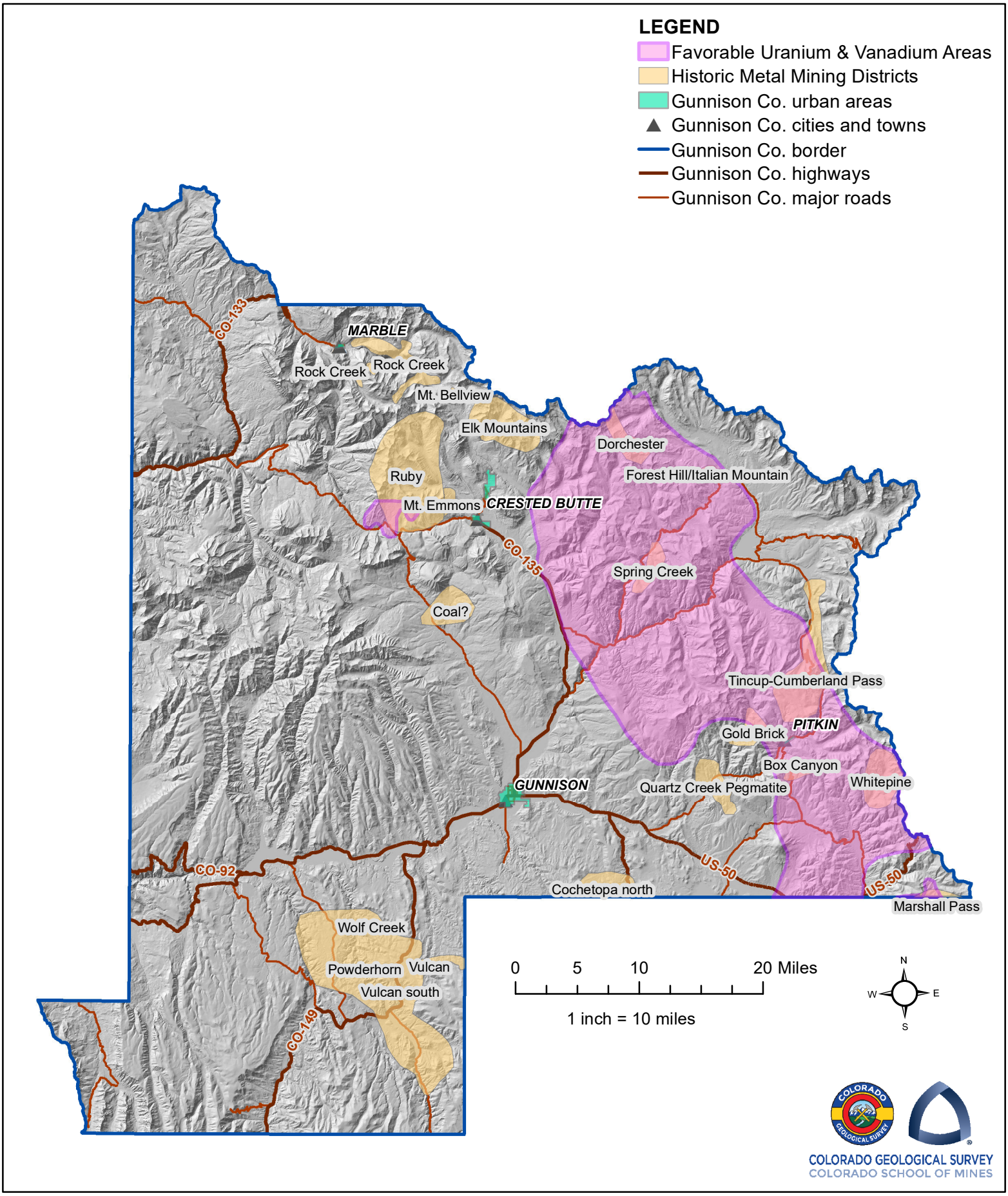

Figure 1. Historic metal mining districts and areas favorable to uranium and vanadium in Gunnison County, Colorado. Districts are sourced from the CGS Resource Series RS-37.

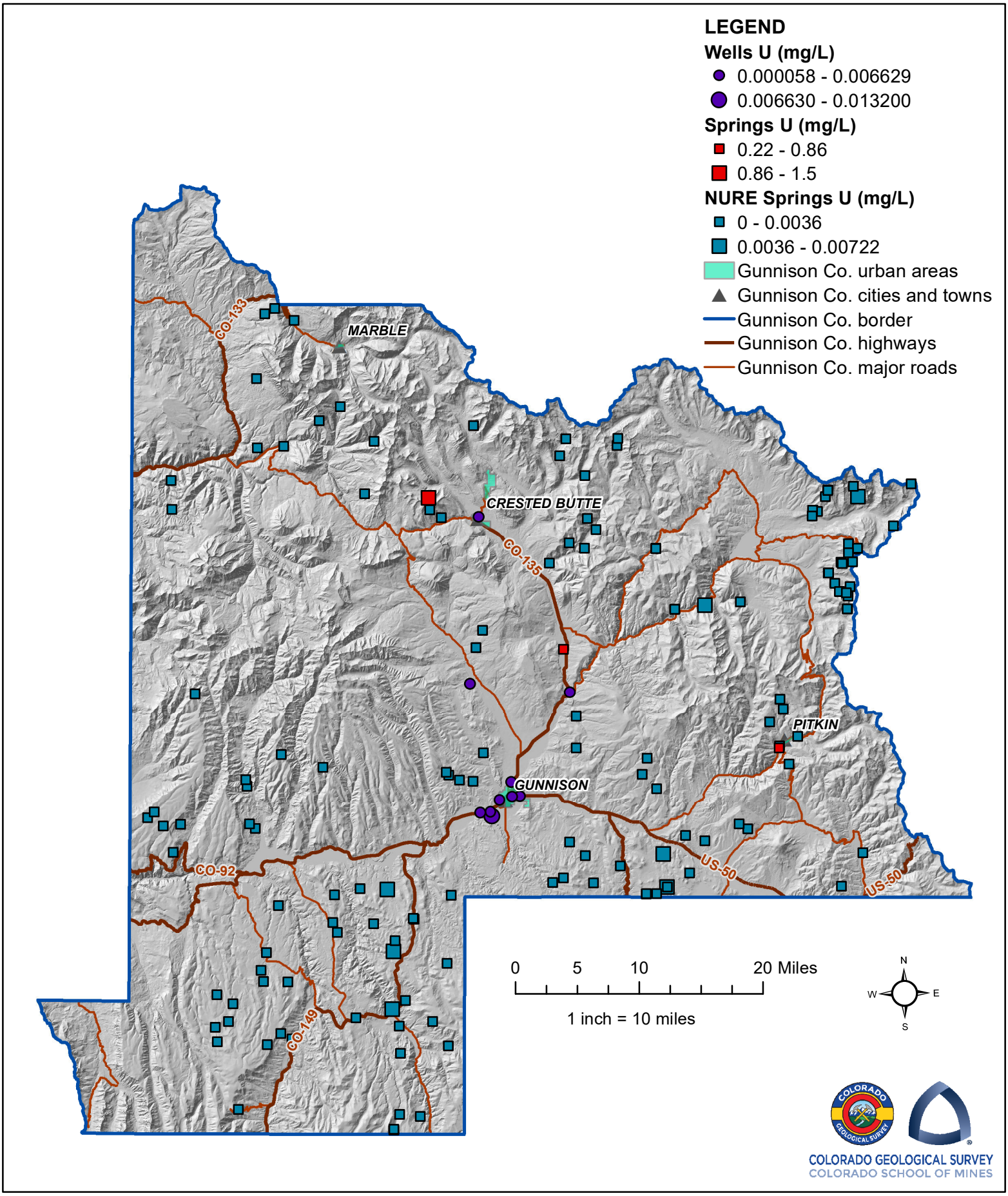

Figure 2. Historic groundwater uranium detected in wells and springs in Gunnison County, Colorado. Exceedances of the uranium 0.030 mg/L drinking water standard are shown in red. Data sources are the Water Quality Portal (WQP), the ECMC (COGCC), and NURE.

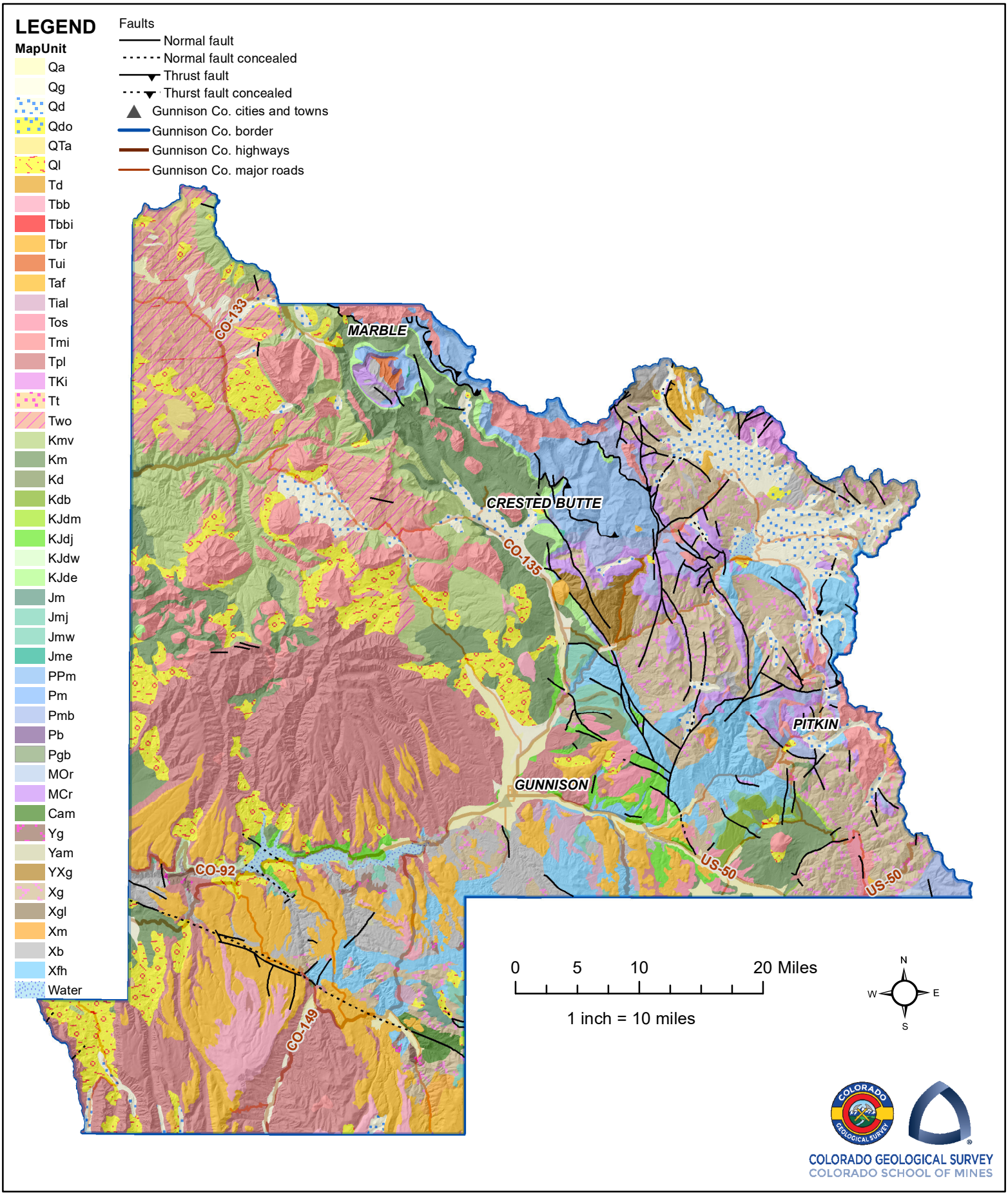

Figure 3. Compiled geologic map of Gunnison County, Colorado. From CGS Resource Series RS-37.

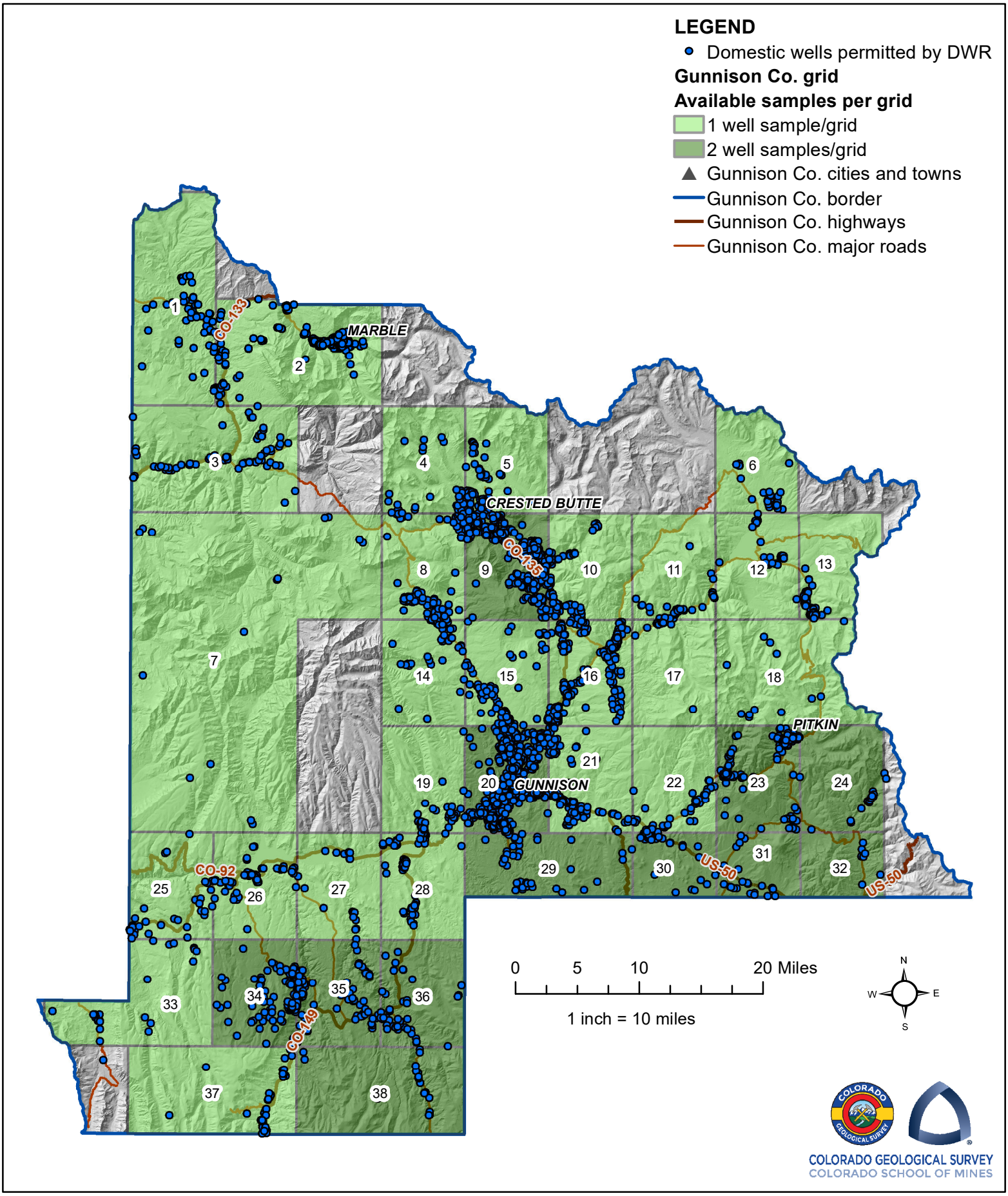

Figure 4. Sampling grid and residential water wells in Gunnison County, Colorado. The grid was designed using historic mining districts containing metals and radionuclides from CGS RS-37. The original alloted number of samples per grid space are shown.

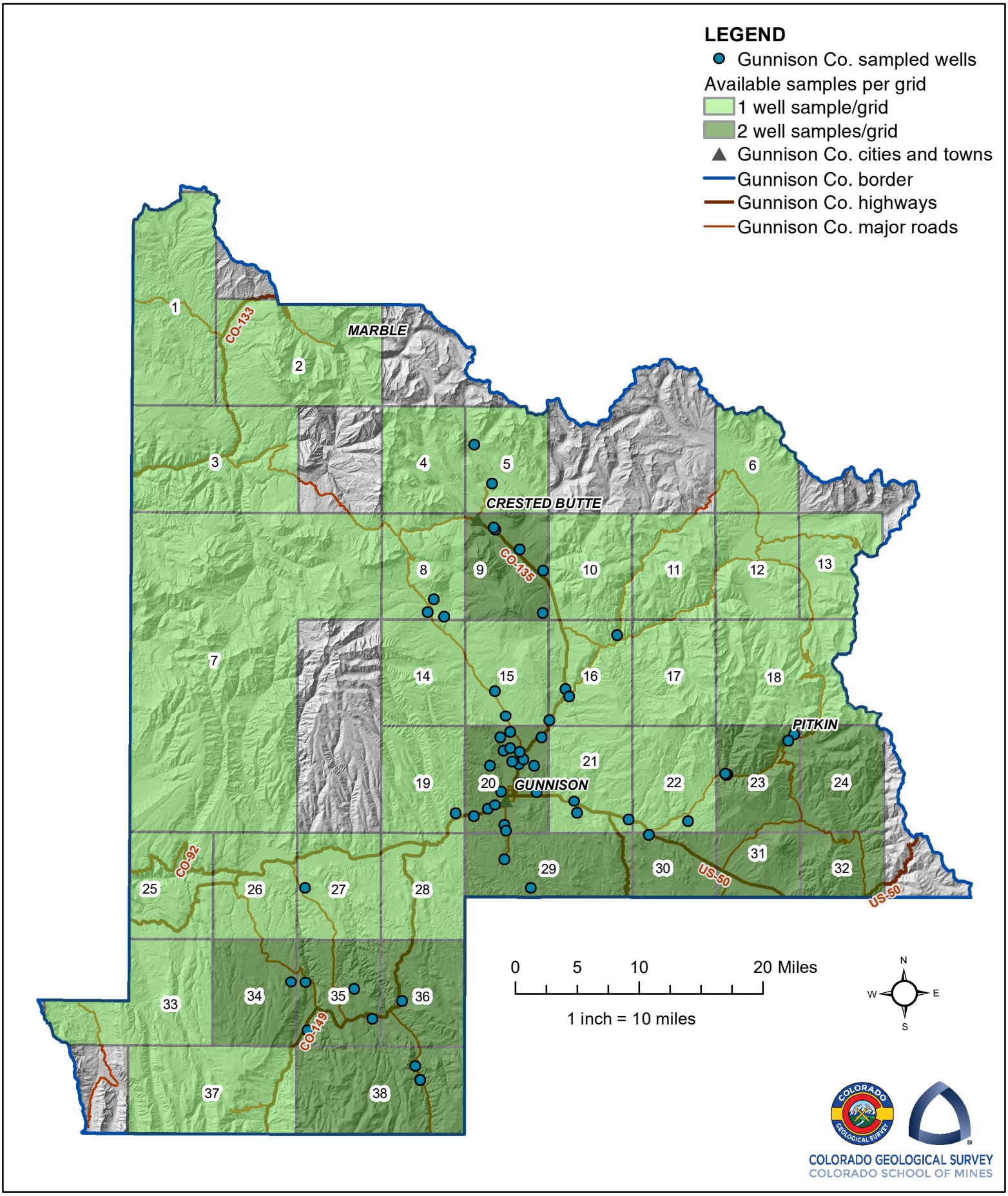

Figure 5. Sampled residential water wells in Gunnison County. Volunteers were selected from available grids and where no volunteers were obtained in a given grid an alternate was chosen from the extra volunteers placed on reserve in other grids.

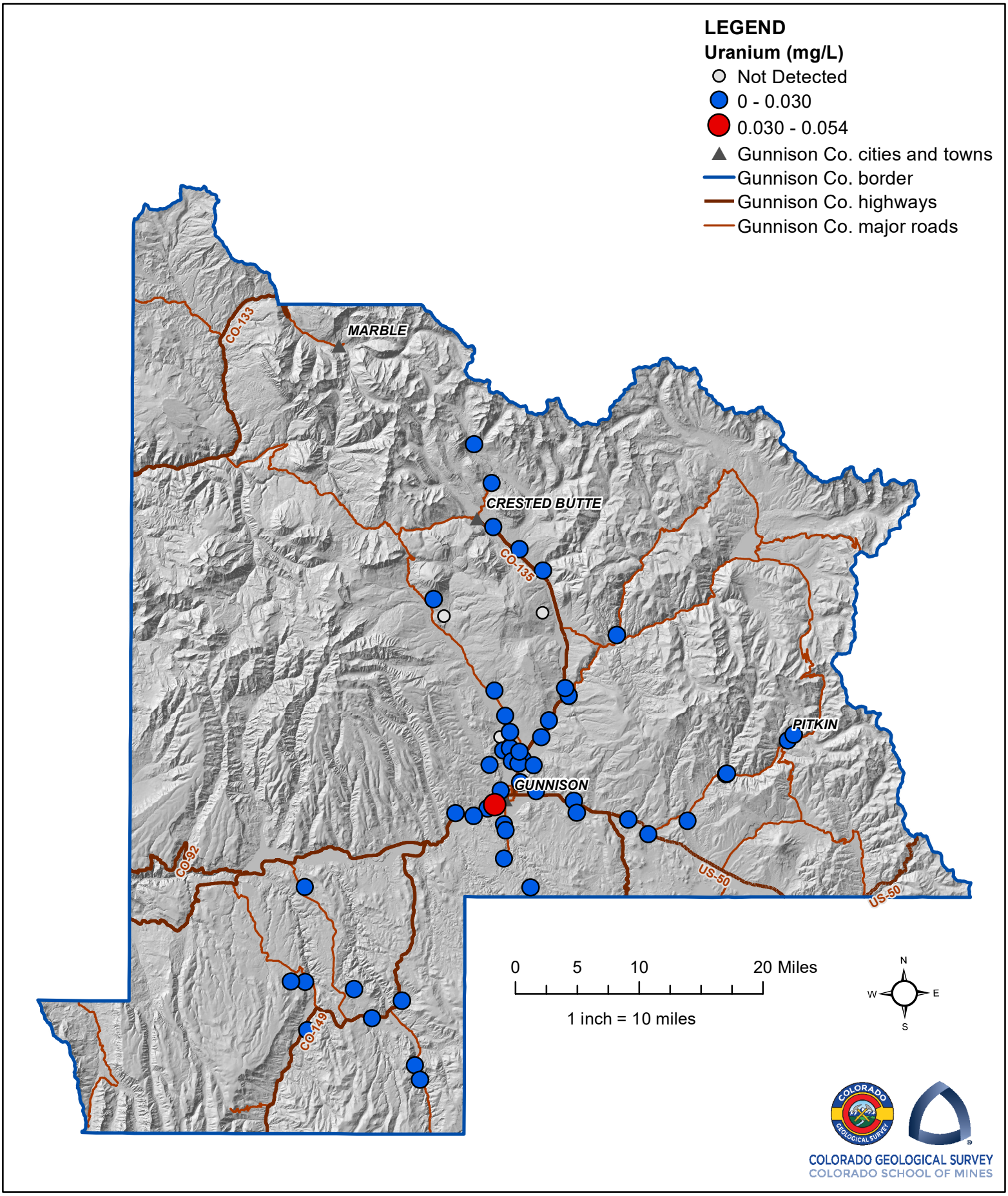

Figure 6. Uranium concentrations in milligrams per liter (mg/L) from water wells in Gunnison County. Locations where values were above the drinking water guideline of 0.03 mg/L are shown in red.

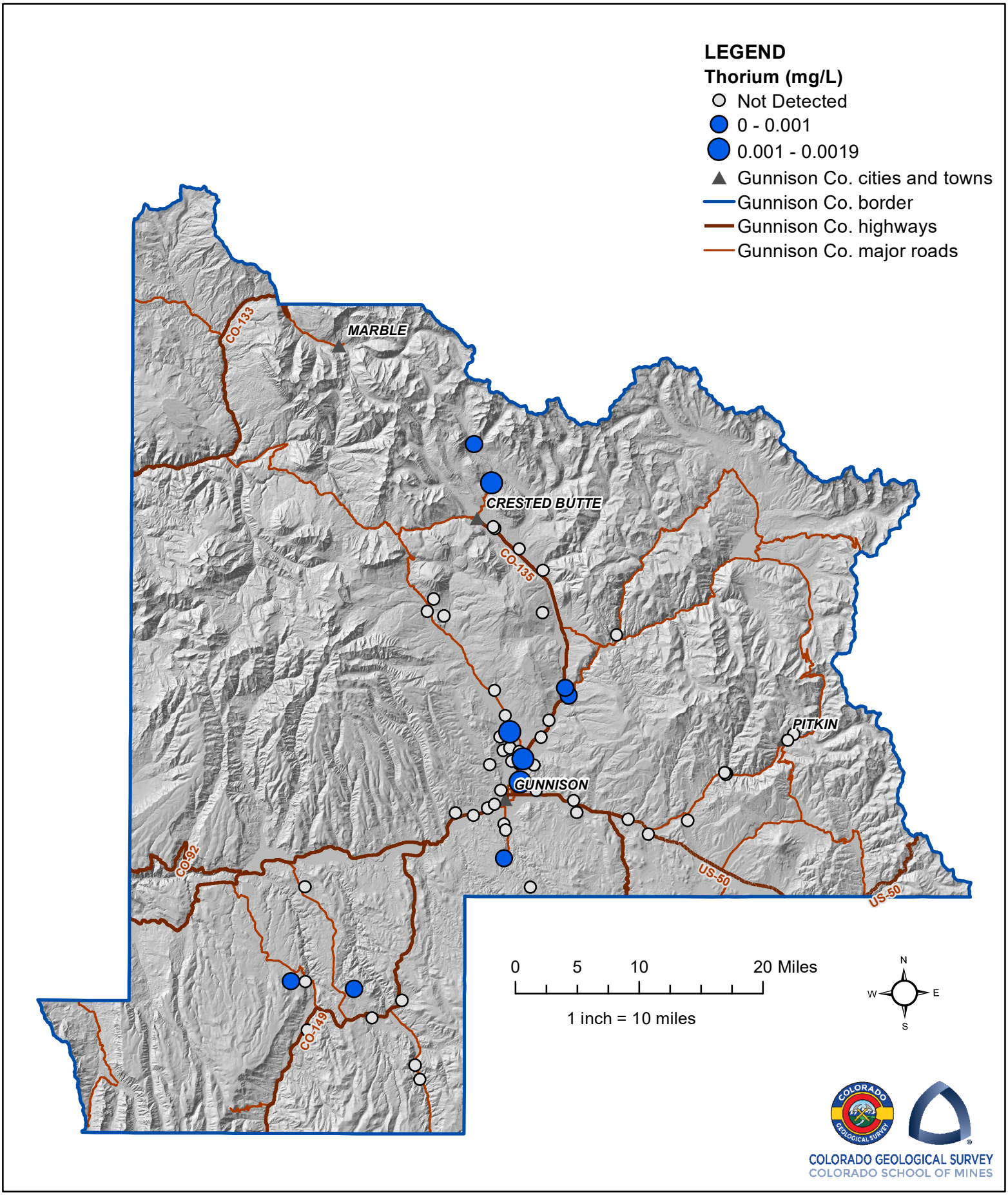

Figure 7. Thorium concentrations in milligrams per liter (mg/L) from water wells in Gunnison County. Thorium does not have a drinking water guideline, but it does contribute to other gross radionuclide measurements.

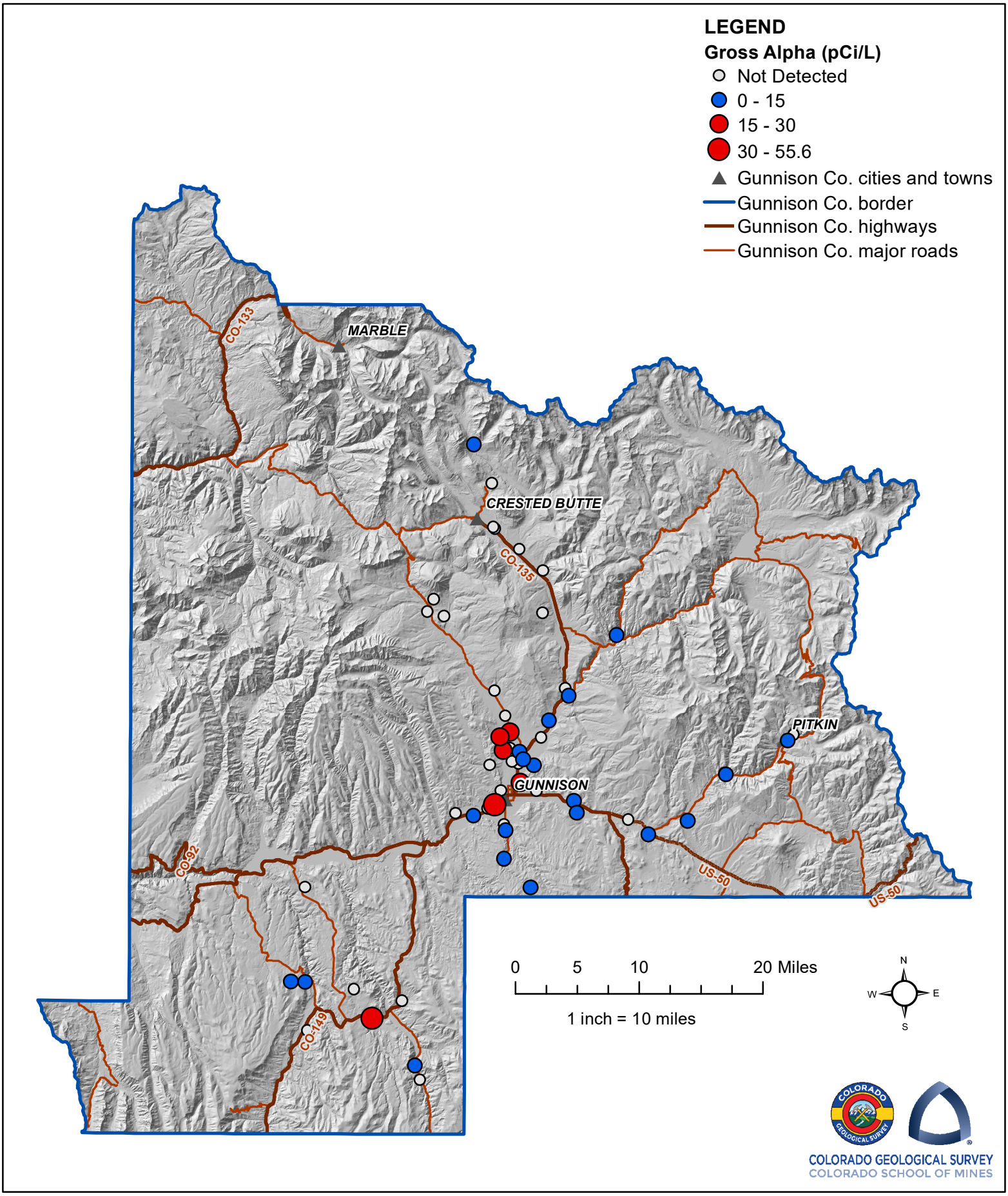

Figure 8. Gross Alpha concentrations in picocuries per liter (pCi/L) from water wells in Gunnison County. Locations where values were above the drinking water guideline of 15 pCi/L are shown in red.

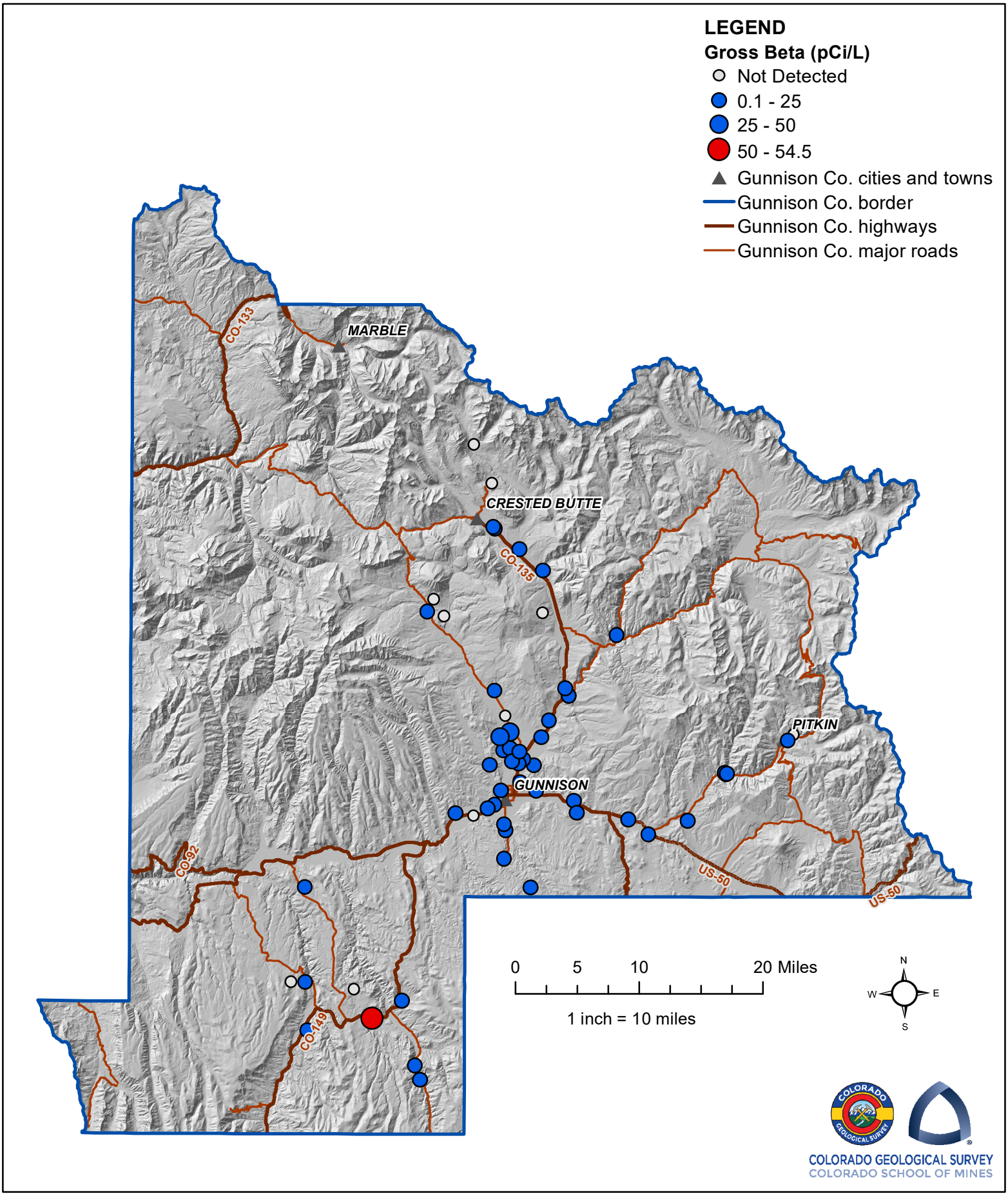

Figure 9. Gross Beta concentrations in picocuries per liter (pCi/L) from water wells in Gunnison County. Locations where values were above the drinking water guideline of 50 pCi/L are shown in red.

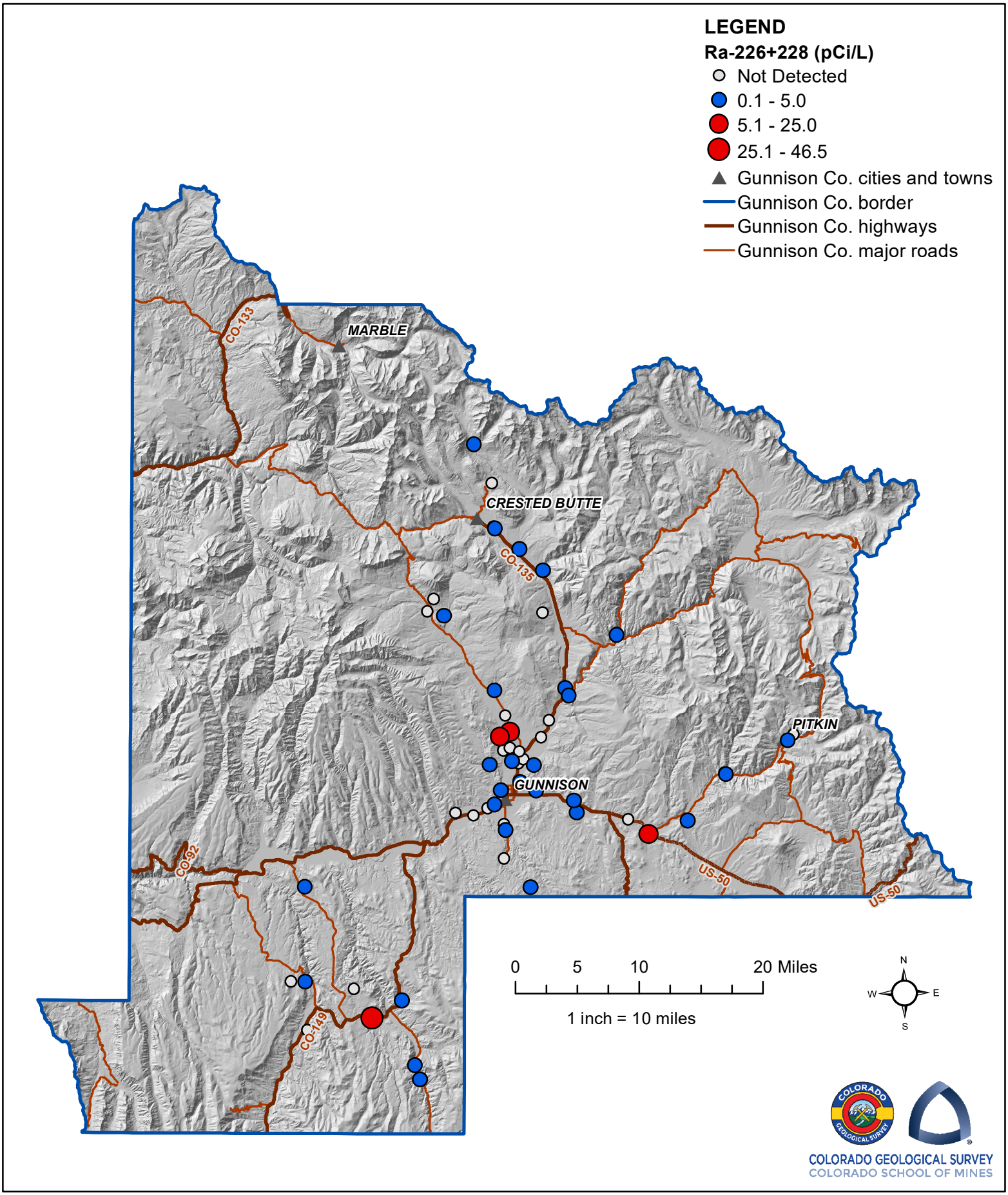

Figure 10. Radium-226+228 concentrations in picocuries per liter (pCi/L) from water wells in Gunnison County. Locations where values were above the drinking water guideline of 5 pCi/L are shown in red.

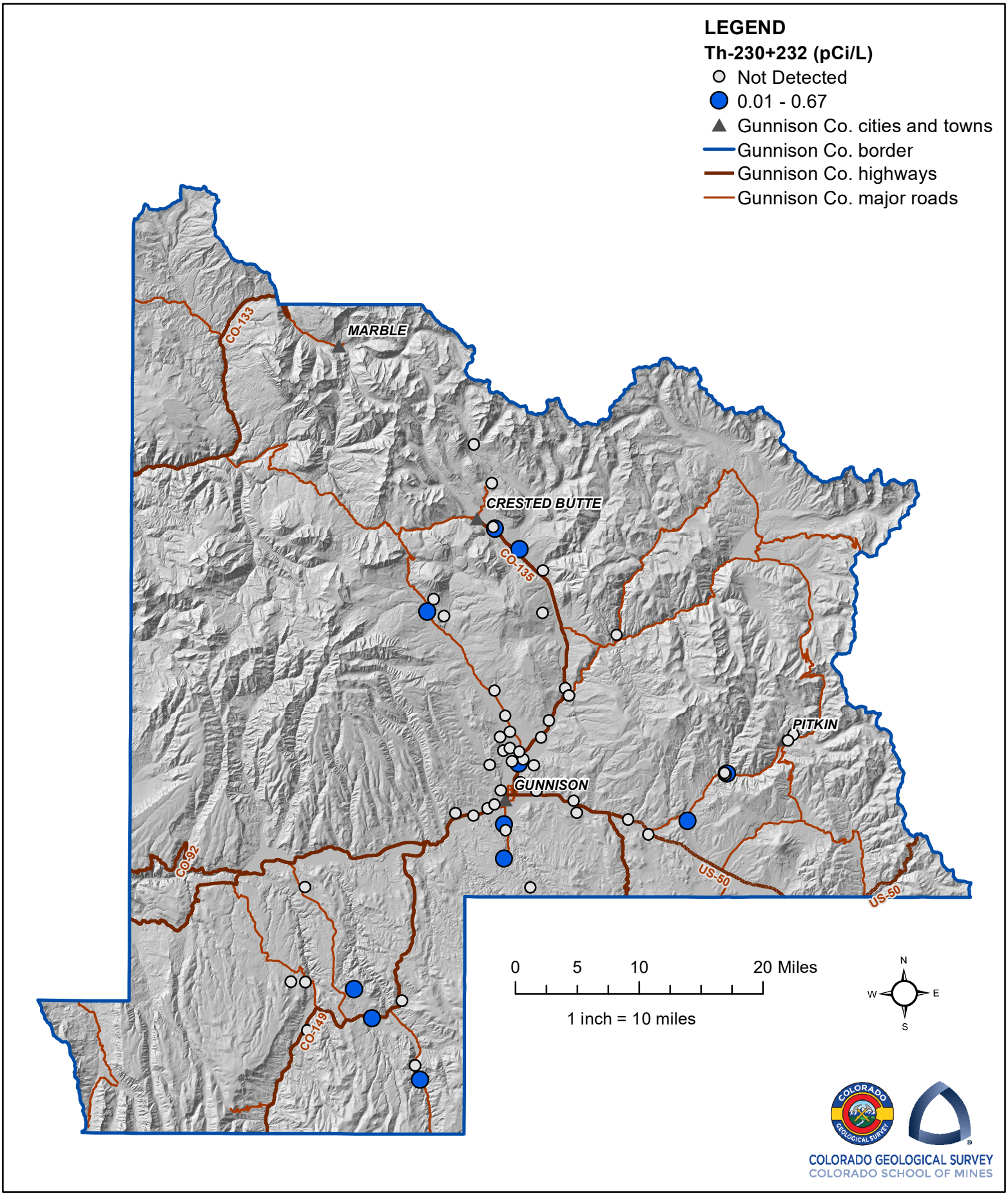

Figure 11. Thorium-230+232 concentrations in picocuries per liter (pCi/L) from water wells in Gunnison County. Locations where values were above the drinking water guideline of 60 pCi/L are shown in red (if present).

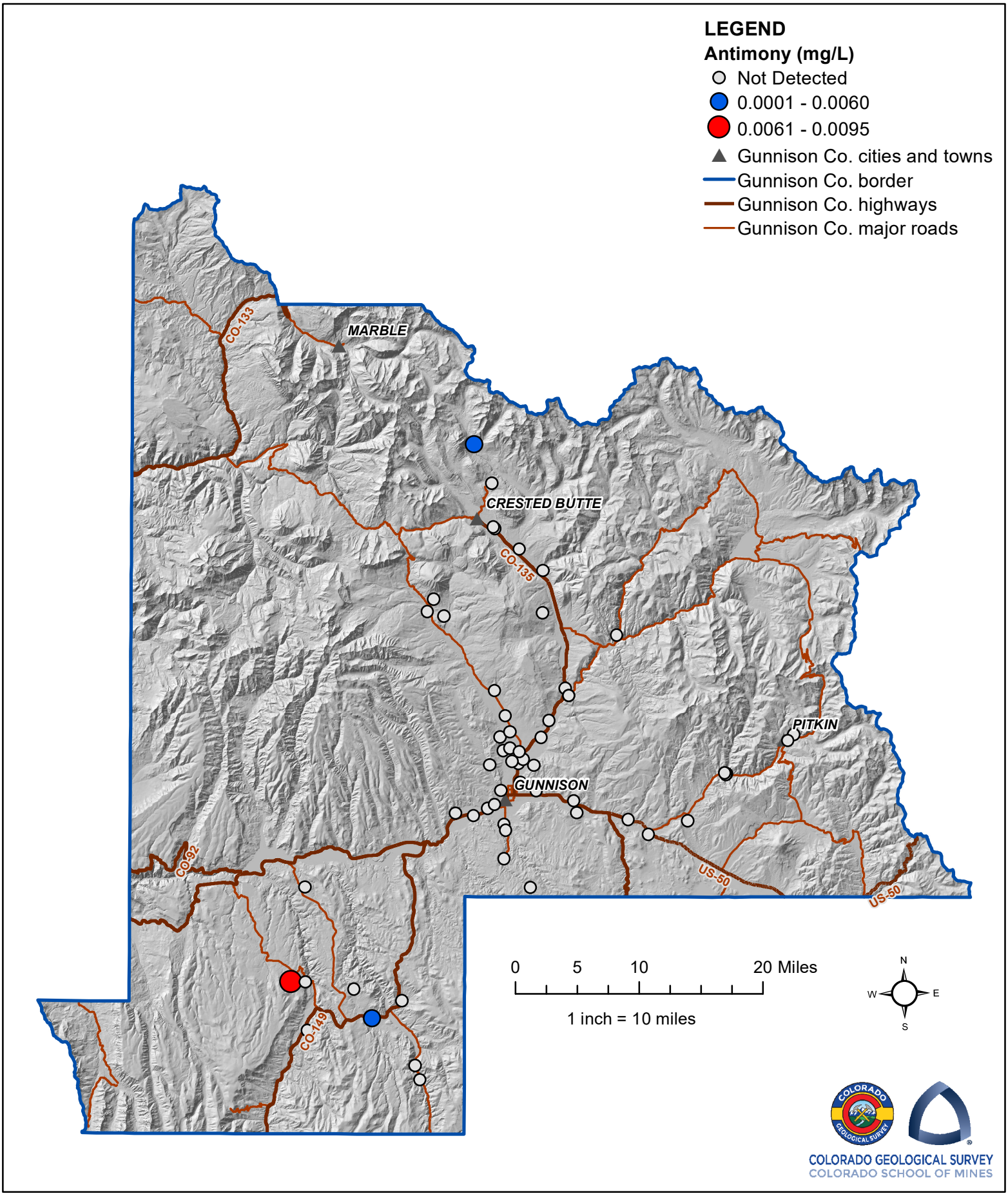

Figure 12. Antimony concentrations in milligrams per liter (mg/L) from water wells in Gunnison County. Locations where values were above the drinking water guideline of 0.006 mg/L are shown in red.

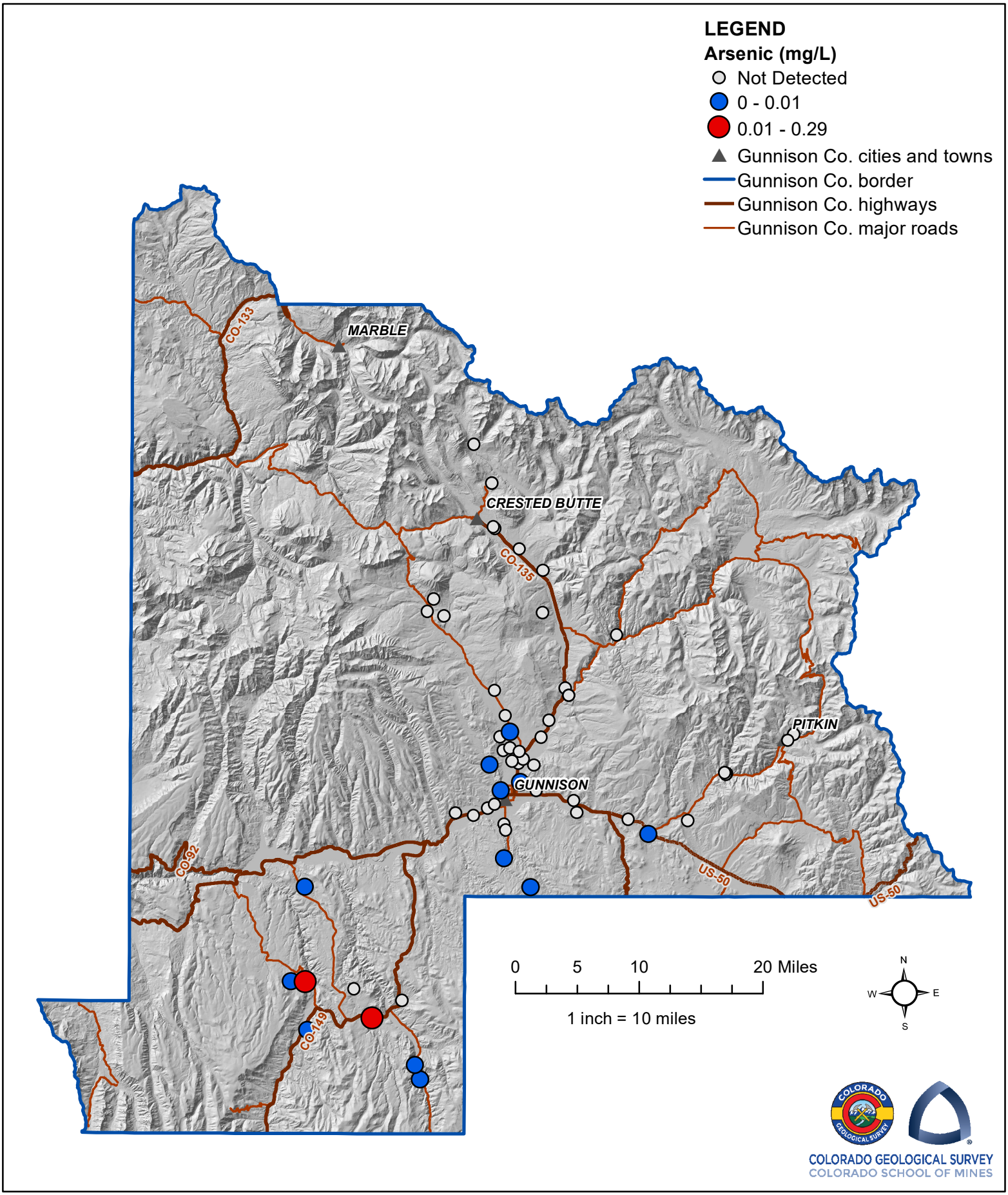

Figure 13. Arsenic concentrations in milligrams per liter (mg/L) from water wells in Gunnison County. Locations where values were above the drinking water guideline of 0.01 mg/L are shown in red.

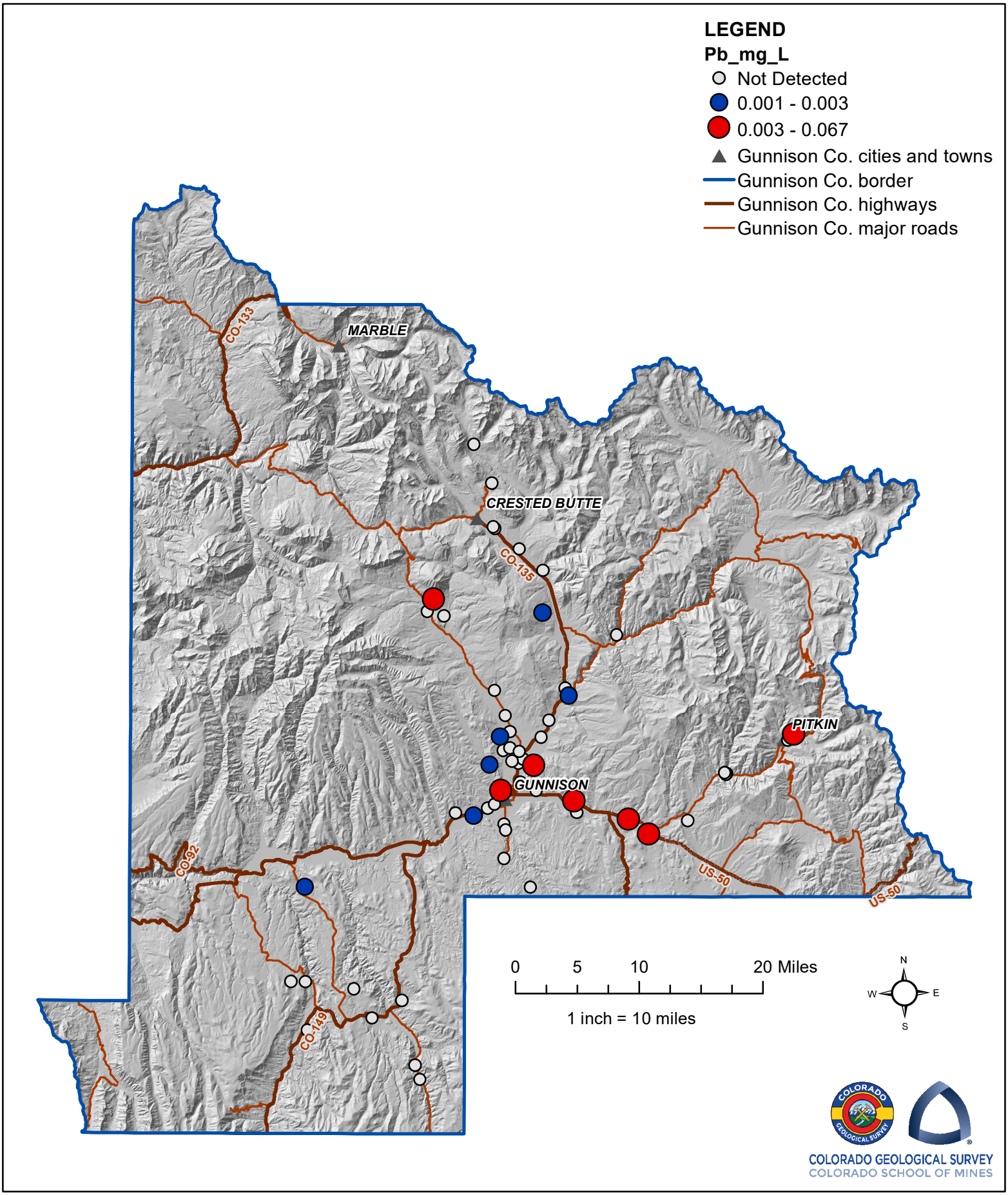

Figure 14. Lead concentrations in milligrams per liter (mg/L) from water wells in Gunnison County. Locations with estimated values (below the reporting limit (RL)) are shown in blue. Only values above the RL are considered above the drinking water guideline of "Present" and are shown in red.

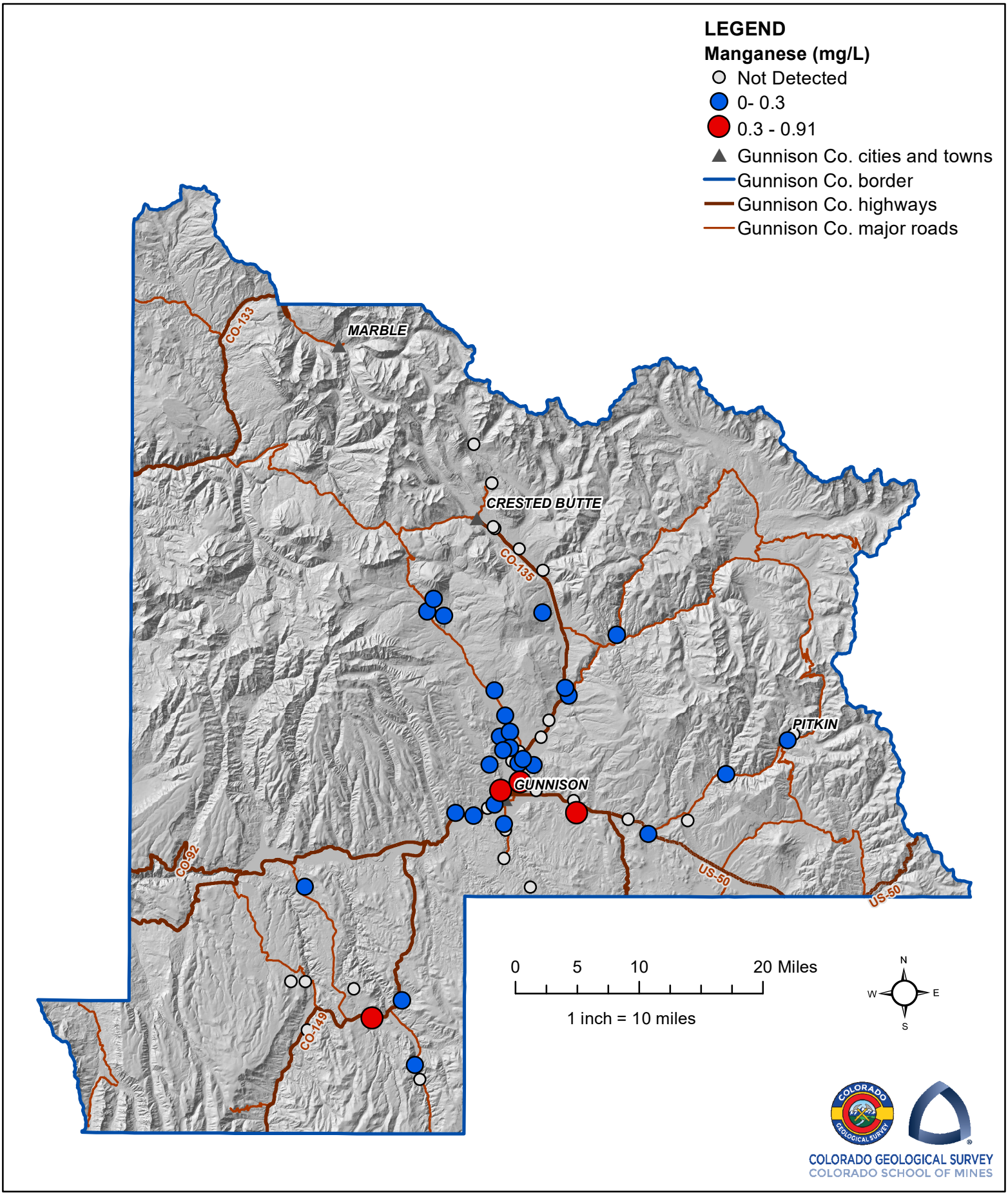

Figure 15. Manganese concentrations in milligrams per liter (mg/L) from water wells in Gunnison County. Locations where values were above the drinking water guideline of 0.3 mg/L are shown in red.