

**Pre-CERCLA Screening Checklist/Decision Document**

**Gold Bug Mine**

**Park County, Colorado**

**September 7, 2021**

**EPA Region 8**

**Site Assessment Program**

**1595 Wynkoop Street**

**Denver, CO 80202**

## **Pre-CERCLA Screening – Gold Bug Mine**

Pre-CERCLA<sup>1</sup> Screening (PCS) and sampling was conducted at the Gold Bug mine located in Buckskin Gulch on September 7, 2021 by Region 8 Environmental Protection Agency (EPA) Site Assessment Program and other federal and state members of the Colorado Mixed-Ownership Team.

Historical sampling and analysis were completed by EPA in 2014 and 2015 in accordance with the EPA-approved Sampling and Analysis Plan/Quality Assurance Project Plan.

The PCS Checklist/Decision Document, as required by EPA Pre-CERCLA Guidance (Office of Land and Emergency Management (OLEMJ) Directive# 9200.3-107, is included as Attachment A. A sample location figure and summary of soil and water analytical results as reported by the EPA Contract Laboratory is included in Attachment B.

<sup>1</sup> Comprehensive Environmental Response, Compensation, and Liability Act

**Gold Bug Mine  
Park County, Colorado**

**Attachment A:  
Pre-CERCLA Screening Checklist Decision Form**

# Pre-CERCLA Screening

## Checklist/Decision Form



This form is used in conjunction with a site map and any additional information required by the EPA Region to document completion of a Pre-CERCLA Screening (PCS). The form includes a decision on whether a site should be added to the Superfund program's active site inventory for further investigation.

**EPA Region:** 8      **State:** Colorado

**EPA ID No. (If Available):** Not Applicable

<b>Site Category:</b> Draining Mines	<b>Select a Site Name (Primary):</b> Gold Bug Mine (Buckskin Gulch)
<b>Site Number:</b> Not Applicable	
<b>Date of Site Visit:</b> September 7, 2021	<b>Time of Site Visit:</b> 11:33

### Checklist Preparer

**Title:** PM/SAM

**Name:** Jean Wyatt

**Organization:** EPA

**Street Address:** 1595 Wynkoop St

**City:** Denver

**State:** Colorado    **Zip Code:** 80202

**Phone:** (303) 312-6258

**Email:** Wyatt.jean@epa.gov

### Site Information - Preliminary

**Site Name (Alternate 1):** N/A

**Site Name (Alternate 2):** N/A

**Region:** 8

**State:** Colorado    **County:** Park

**Congressional District:** 3

**Township & Range:** NA

**Section:** NA

**Section (1/4):** NA

**Section (1/16):** NA

### Spatial Location

**Latitude:** 39.2918

**Longitude:** -106.095719

**Collection Method:** Location already obtained on prior sampling event.

**Horizontal Accuracy in Meters:** NA

**Site Description (of this Spatial Location):**  
Center of Site

### Site Contact

**Title:** N/A

**Name:** N/A

**Organization:** N/A

**Street Address:** N/A

**City:** N/A

**State:** N/A    **Zip Code:** N/A

**Phone:** N/A

**Email:** N/A

## Preliminary Assessment - Historical Data

**CERCLA 105d Petition for Preliminary Assessment:** No

**Petition Date:** Not Applicable

**RCRA Subtitle C Site Status: Is site in RCRA Info?:** No

**RCRAInfo Handler ID #:** Not Applicable

**Additional RCRAInfo ID #:** Not Applicable

**State ID:** None

**Other ID:**

**Ownership Type:** Mixed Ownership

**Site Type:** Abandoned Mine Site

**Site Sub-Type:** Hard Rock Mining

**Federal Facility:** No

**Federal Facility Owner:** Not Applicable

**Federal Facility Operator:** Not Applicable

**Formerly Used Defense Site (FUDS):** No

**Federal Facility Docket:** No

**Federal Facility Docket Listing Date:** Not Applicable

**Federal Facility Docket Reporting Mechanism:** Not Applicable

**Native American Interest:** Unknown

**Tribe:** Not Applicable

**Additional Tribe:** Not Applicable

## Site Description - Physical Setting

**Abandoned Mine Site:** Yes

**Buildings:** Buildings Present

**Mill or Milling Equipment or Tailing Present:** Yes

**Steep Waste Piles:** Yes

**Safety Hazards Present:** Yes

**Safety Hazards** Dangerous slide potential or steep vertical face/wall/cliff (caused by mining operations), Miscellaneous Debris, Pits/Trenches, Potential for contact (human/eco) with open acidic mine drainage stream, Steep Vertical Inclines, Surface subsidence such as open stope, pit, caving, potholes, troughs, cracks, vaults, underground mine void

**Accessibility (provide details with regard to ability to access the site)** Located Along Main Road

**Time it takes to reach this site (Hours:Minutes):** 15 minutes

**Detailed description of how the site was accessed:** From Main Street in Alma, go west on Buckskin Street aka County Road 8, a dirt road, for about 2 miles. Access Gold Bug mine by taking dirt driveway or through forested area adjacent to County Road 8.

**Adjacent to Resident(s):** Yes; nearest resident is 630 feet to the west; next nearest resident 2000 feet downslope. A cabin is located 200 feet to the west but frequency of use is unknown.

**Adjacent Residential Features:** Cabin

**Mountainous Steep Terrain:** Yes

**Vegetation Present:** Yes

**Vegetation Density:** Moderate/Interspersed

**Surface Water Body on or Adjacent to the Site:** Yes

**Open Fields:** Yes

**Waste Pile Erosion Observed:** Yes

**Describe Waste Pile Run Off:** Channeling from top of pile.

**Tailings Erosion Observed:** Yes

**Describe Tailings Run Off:** Tailings observed on top of pile but not at base of pile.

**Draining Adits or Seeps Discharge from the Site:** No

**Adits Flow Rate from Site:** Not Applicable

**Describe Adit Flow from Site:**

**Draining Adits or Seeps Discharge Across Waste Piles:** No

**Draining Adits or Seeps Discharge to Adjacent Habitat:** No

**Adit Flows into what habitat:** Not Applicable

**Habitat Name:** Not Applicable

**Physical Setting and Access Features:** Accessible and unique recreational area (e.g., tourist/natural attractions, hiking/biking trails, etc.) . Tailings ponds are easily accessible to the public and are 100 feet from County Road 8. Recreational users primarily consist of mining enthusiasts.

**Physical Setting (Field Notes - provide a brief summary of physical setting including notable safety concerns, waste types, human uses/exposures to wastes, runoff/drainage, and notable habitat/ecological use):** Large historical mill building/attraction on top of waste rock pile. Several subsidence areas which could be ponds in spring and early summer which exhibit high lead levels.

## Site Description - Land Use

**Roads/Trails:** Yes

**Road/Trail Type:** Dirt Road

**Human Activity:** Yes **Residential:** Yes

**Human Activity Type:** Moderate **Residential Density:**

**Recreational Use:** Yes **Camping:**

Minimal **Recreational Density:** 2 properties nearby

Unknown **Fishing:** Unknown

**Camping Frequency:** Not Applicable

**Hiking:** Unknown

**Fishing Frequency:** Not Applicable

**Biking:** No

**Hiking Frequency:** Not Applicable **Biking Frequency:**

**Picnicking:** Unknown

Not Applicable

**Ecological Activity:** Yes

**Picnicking Frequency:** Not known

**Ecological Activity:** Moderate

**Observed/likely fishing/consumption of fish/aquatic organisms at the mine site or within ¼ miles downstream:**  
Unknown

**Are there other observed sensitive environments on-site or downstream of the waste area(s) within ¼ mile?**  
Unknown

Sensitive Environment (wetland, stream, creek, river, known to be in the vicinity of a National Park, designated federal/state wildlife or scenic area, fish hatchery/spawning area, designated for wildlife or game management, known to be used by or designated critical habitat for Threatened or Endangered Species, or any other sensitive environment critical to supporting wildlife): Immediately adjacent to Buckskin Creek. Moose, deer and elk scat were found at and adjacent to site.

### Other Sensitive Environments:

**Land Use (Field Notes – provide a brief summary of human/ecological type of use and use level (e.g., heavily used for biking and camping; observed camp fire rings and picnic tables at the site immediately adjacent to the waste runoff; narrow foot trail with difficult steep access to the waste areas and minimal use of the area, etc.):** Adjacent to dirt road close to the Town of Alma; evidence of car tracks on top of pile. Also large historical mill building present on site. Legacy mining enthusiasts frequently visit the site as evidence from foot traffic and recent dumping of trash were observed during July field event and June cadastral survey work.

## Site Surface Description

**Draining Adit:** No

**Draining Adit Type:** Not Applicable

**Waste Piles:** Yes

**Number of Waste Piles:** 1

**Airborne Release of Fine Material/Dust:**

**Surface Water on or Immediately Adjacent:** Yes

**Water Body Name:** Buckskin Creek

**Wetlands on or Adjacent to Site:** Yes

**Forested on or Adjacent to the Site:** Yes

**Riparian on or Adjacent to the Site:** Yes

**Site Surface (Field Notes):** Heavily forested area. Toe of pile sits in Buckskin Creek. Good wildlife habitat nearby.

## Site Description - Other

**Groundwater Seeps Observed:** No

**Primary Drainage Name:**

**Groundwater Seeps (Field Notes):** No Seeps at this Site

**Previous Investigations:** No

**Investigation Type:** Not Applicable

**Who Completed Investigations at this Site:** Not Applicable Not Applicable

**Cleanup Activities:** No **Cleanup Type:** Not Applicable

**Site Description Cleanup Field Notes:** Not Applicable

**Who Completed Cleanup Activities at this Site:** Not Applicable Not Applicable

**Previous Regulatory Actions (Permitting and Enforcement):** No

**Previous Regulatory Type:** Not Applicable

**Site Feature Name(s):** Not Applicable

**Field Note(s):** Not Applicable

**Who Completed Regulatory Actions at this Site:** Not Applicable Not Applicable

**Institutional Controls:** No **Institutional Control Type:** Not Applicable

**Institutional Controls (indicate name/entity on signs/controls):** No Institutional Controls

**Community Interest:** Yes **Community Interest Type:** Watershed Group Activity

**Community Interest (Indicate watershed group or other interest group):** Coalition of Upper South Platte

## Survey Form

<b>1. An initial search for the site in EPA's Superfund active, archive and non-site inventories should be performed prior to starting a PCS. Is this a new site that does not already exist in these site inventories?</b>	Yes
<b>2. Is there evidence of an actual release or a potential to release?</b> <b>Evidence of Potential Release</b> Waste pile material observed in water body or other surrounding environment, Evidence of waste pile runoff/erosion (channels, rills, run off)	Yes
<b>3. Are there possible targets that could be impacted by a release of contamination at the site?</b>	Yes
<b>4. Is there documentation indicating that a target has been exposed to a hazardous substance released from the site?</b>	Yes
<b>5. Is the release of a naturally occurring substance in its unaltered form, or is it altered solely through naturally occurring processes or phenomena, from a location where it is naturally found?</b>	No
<b>6. Is the release from products which are part of the structure of, and result in exposure within, residential buildings or business or community structures?</b>	No
<b>7. If there has been a release into a public or private drinking water supply, is it due to deterioration of the system through ordinary use?</b>	No
<b>8. Are the hazardous substances possibly released at the site, or is the release itself, excluded from being addressed under CERCLA?</b>	No
<b>9. Is the site being addressed under RCRA corrective action or by the Nuclear Regulatory Commission?</b>	No
<b>10. Is another federal, state, tribe or local government environmental cleanup program other than site assessment actively involved with the site (e.g., state voluntary cleanup program)?</b>	No
<b>11. Is there sufficient documentation or evidence that demonstrates there is no likelihood of a significant release that could cause adverse environmental or human health impacts?</b>	No
<b>12. Are there OTHER site-specific situations or factors that warrant further CERCLA remedial/integrated assessment or response?</b>	No

US EPA Pre-CERCLA Checklist/Decision Form OLEM 9355.1-119, February 2018.

Current version of the PCS checklist and additional information is available at:

<https://www.epa.gov/superfund/pre-cercla-screening>.

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## Preparer's Recommendation

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**Preparer's Recommendation:** Site warrants consideration for reclamation/clean-up.

**Please explain recommendation below:**

Mine waste pile and ponded water are directly located adjacent to County Road. The waste area is not fenced, has easy access, is open for hiking and recreational use, and is directly adjacent to Buckskin Creek. Buckskin Creek flows past the mine site which is immediately adjacent to Creek; Creek flow subsequently enters the Alma drinking water gallery located approximately 1 mile downstream of the mine.

Surface soil/waste on the top of the pile and in ponded depressions indicate lead concentrations up to 14,900 mg/kg, significantly above both EPA Residential and Industrial RSLs. Arsenic, manganese, and zinc are also elevated above the RSLs. Exceedances of aquatic life water quality standards in Buckskin Creek below the mine waste area are observed for aluminum, cadmium, copper, lead, and zinc.

**Site Assessor's Name:** Jean Wyatt

**Site Assessor's Signature:**

**Date:** September 7, 2021

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## EPA Regional Review and Pre-CERCLA Screening Decision

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**EPAs Recommendation:**

**Add site to the Superfund active site inventory for completion of a:**

- Standard/full preliminary assessment (PA)
- Abbreviated preliminary assessment (APA)
- Combined Preliminary Assessment/Site Inspection (PA/SI)
- Integrated Removal Assessment and Preliminary Assessment
- Integrated Removal Assessment and Combined PA/SI
- Other Description

**Do not add site to the Superfund active site inventory. Site is:**

- Not a valid site or incident
- Refer to/being addressed by EPA's Removal Program
- Refer to/being addressed by a State cleanup program
- Refer to/being addressed by Tribal cleanup program
- Refer to/being addressed under Resource Conservation and Recovery Act (RCRA)
- Refer to/being addressed by the Nuclear Regulatory Commission (NRC)

X Other Description – Refer to/being addressed by US Forest Service in cooperation with the EPA Removal Program

**EPA Region 8 Reviewer's Name:** Jean Wyatt

**EPA Region 8 Reviewer's Signature:**

**Date:**

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## Site Location

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## Photographs

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Gold Bug Mine (Buckskin Gulch): Lower pile ponded type area at base / entrance of pile from road



Gold Bug Mine (Buckskin Gulch): Property boundary marker at base of site



Gold Bug Mine (Buckskin Gulch): Another low spot on top of pile



Gold Bug Mine (Buckskin Gulch): Steep side of pile facing Buckskin Creek

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## Additional Photographs

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Gravity Mill building onsite



Top of waste rock pile at front of mill



Steep side of pile with toe in Buckskin Creek



Top of pile showing access road to mill

**Gold Bug**  
**Field and Laboratory Results Summary**

## Gold Bug Mine – Analytical Results Summary - Pre-CERCLA Screening

EPA June 2015 - Surface Water Total Recoverable Metals Analytical Chemistry Results																													
Location ID	Analysis	Matrix	Sample Date	Sample Time	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Uranium	Vanadium	Zinc
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BG-14 (Upstream Gold Bug)	Total Recoverable Metals	Surface Water	6/17/2015	13:55	457	<2.50 U	<2.50 U	22.1	<2.00 U	<0.500 U	11700	<5.00 U	2.00 U	7.31 D	552	12.6 D	4100	80.0	<0.050 U	<5.00 U	<2.50 U	740 J	<5.00 U	<2.50 U	635 J	<2.50 U	1.16 D	<10.0 U	184
BG-15 (downstream Gold Bug)	Total Recoverable Metals	Surface Water	6/17/2015	13:45	452	<2.50 U	<2.50 U	22.1	<2.00 U	0.756 JD	11900	<5.00 U	2.00 U	7.08 D	571	13.2 D	4140	85.0	<0.050 U	<5.00 U	<2.50 U	720 J	<5.00 U	<2.50 U	614 J	<2.50 U	1.22 D	<10.0 U	191
BG-16	Total Recoverable Metals	Surface Water	6/17/2015	12:05	2710	<2.50 U	<2.69 JD	15.5	<2.00 U	79.8	96800	<5.00 U	9.09	120 D	6210	31.2 D	60700	3600	<0.050 U	<5.00 U	5.81 D	1200	<5.00 U	<2.50 U	1040	<2.50 U	5.29 D	<10.0 U	17100
BG-17	Total Recoverable Metals	Surface Water	6/17/2015	11:40	367	<2.50 U	<2.50 U	20.5	<2.00 U	1.07 D	12600	<5.00 U	2.00 U	6.82 D	493	7.91 D	4600	85.0	<0.050 U	<5.00 U	<2.50 U	698 J	<5.00 U	<2.50 U	641 J	<2.50 U	1.18 D	<10.0 U	259
BG-18	Total Recoverable Metals	Surface Water	6/17/2015	11:10	388	<2.50 U	<2.50 U	21.4	<2.00 U	0.690 JD	12400	<5.00 U	2.00 U	6.45 D	455	10.2 D	4480	71.5	<0.050 U	<5.00 U	<2.50 U	715 J	<5.00 U	<2.50 U	638 J	<2.50 U	1.07 D	<10.0 U	203
BG-19	Total Recoverable Metals	Surface Water	6/17/2015	10:40	<20.0	<2.50 U	<2.50 U	29.5	<2.00 U	<0.500 U	20200	<5.00 U	2.00 U	4.63 JD	<100 U	<0.500 U	7620	<2.0	<0.050 U	<5.00 U	<2.50 U	670 J	<5.00 U	<2.50 U	925 J	<2.50 U	1.18 D	<10.0 U	95.8
BG-20	Total Recoverable Metals	Surface Water	6/17/2015	10:00	265	<2.50 U	<2.50 U	35.4	<2.00 U	<0.500 U	18600	<5.00 U	2.00 U	3.64 JD	502	2.92 D	7690	74.8	<0.050 U	<5.00 U	<2.50 U	947 J	<5.00 U	<2.50 U	1630	<2.50 U	1.21 D	<10.0 U	10.9 J
BG-21	Total Recoverable Metals	Surface Water	6/17/2015	10:10	564	<2.50 U	<2.50 U	33.3	<2.00 U	<0.500 U	16700	<5.00 U	2.00 U	5.36 D	920	9.63 D	6720	109	<0.050 U	<5.00 U	<2.50 U	984 J	<5.00 U	<2.50 U	1290	<2.50 U	1.27 D	<10.0 U	126
BJ-01 (base of pile drainage)	Total Recoverable Metals	Surface Water	6/17/2015	12:45	21900	<2.50 U	<2.50 U	21.3	<2.00 U	185	194000	11.1 D	37.4	794 D	35900	199 D	115000	9790	0.530 J	<5.00 U	19.6 D	1140	<5.00 U	<2.88 JD	2140	<2.50 U	14.4 D	<10.0 U	33400

U = Laboratory analysis indicates that the analyte was undetected at the concentration shown

J = Laboratory quality control review indicates that this result is considered estimated

D = Sample diluted prior to analysis; reported result is for undiluted sample

EPA June 2015 - Surface Water Dissolved Metals Analytical Chemistry Results																														
Location ID	Analysis	Matrix	Sample Date	Sample Time	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Uranium	Vanadium	Zinc	Hardness <sup>1</sup>
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BG-14 (Upstream Gold Bug)	Dissolved Metals	Surface Water	6/17/2015	13:55	38.4 J	<0.500 U	<0.500 U	17.4	<2.00 U	0.351	11600	<1.00 U	2.00 U	3.19	<100 U	0.359	3760	8.16	<0.050 U	1.28	<0.500 U	541 J	<1.00 U	<0.500 U	554 J	<0.500 U	0.695	<2.00 U	119 J	44
BG-15 (downstream Gold Bug)	Dissolved Metals	Surface Water	6/17/2015	13:45	42.5 J	<0.500 U	<0.500 U	15.9	<2.00 U	0.346	11400	<1.00 U	2.00 U	3.15	<100 U	0.440	3770	8.86	<0.050 U	1.36	<0.500 U	537 J	<1.00 U	<0.500 U	565 J	<0.500 U	0.685	<2.00 U	114 J	44
BG-16	Dissolved Metals	Surface Water	6/17/2015	12:05	89.5	<0.500 U	<0.516 J	14.7	<2.00 U	81.4	94100	<1.00 U	10.2	59.7	435	0.644	58300	3510	<0.050 U	<1.00 U	5.86	1090	2.38	<0.500 U	982 J	<0.500 U	0.683	<2.00 U	16900 J	475
BG-17	Dissolved Metals	Surface Water	6/17/2015	11:40	43.2 J	<0.500 U	<0.500 U	17.4	<2.00 U	0.863	12300	<1.00 U	2.07 J	3.53	<100 U	0.351	4250	29.0	<0.050 U	1.31	<0.500 U	550 J	<1.00 U	<0.500 U	581 J	<0.500 U	0.692	<2.00 U	217 J	48
BG-18	Dissolved Metals	Surface Water	6/17/2015	11:10	37.9 J	<0.500 U	<0.500 U	16.7	<2.00 U	0.542	12000	<1.00 U	2.00 U	3.33	<100 U	0.344	4060	16.6	<0.050 U	1.26	<0.500 U	539 J	<1.00 U	<0.500 U	576 J	<0.500 U	0.677	<2.00 U	165 J	47
BG-19	Dissolved Metals	Surface Water	6/17/2015	10:40	<20.0	<0.500 U	<0.500 U	30.6	<2.00 U	0.350	22200	<1.08 J	2.00 U	1.67	<100 U	0.125 J	7340	<2.0	<0.050 U	1.02	<0.500 U	659 J	<1.00 U	<0.500 U	932 J	<0.500 U	1.08	<2.00 U	211 J	86
BG-20	Dissolved Metals	Surface Water	6/17/2015	10:00	<20.0	<0.500 U	<0.500 U	30.3	<2.00 U	<0.100 U	18100	<1.00 U	2.00 U	1.29	<100 U	0.202	7220	30.9	<0.050 U	<1.00 U	<0.500 U	787 J	<1.00 U	<0.500 U	1510	<0.500 U	1.14	<2.00 U	<10.0 U	75
BG-21	Dissolved Metals	Surface Water	6/17/2015	10:10	<20.0	<0.500 U	<0.500 U	25.7	<2.00 U	0.188 J	15900	<1.00 U	2.00 U	2.04	<100 U	0.365	6110	24.8	<0.050 U	<1.00 U	<0.500 U	702 J	<1.00 U	<0.500 U	1180	<0.500 U	0.939	<2.00 U	49.6 J	65
BJ-01 (base of pile drainage)	Dissolved Metals	Surface Water	6/17/2015	12:45	21000	<0.500 U	<0.773 J	4.90 J	<2.00 U	159	193000	8.28	38.8	666	24500	45.4	113000	9660	<0.050 U	<1.00 U	15.1	644 J	3.13	<0.500 U	2010	<0.500 U	14.5	<2.00 U	33300	947

<sup>1</sup> Sample-specific hardness calculated using dissolved calcium and magnesium concentrations for use in assessing hardness-based in accordance with Colorado Water Quality Control Commission, Regulation 31 ([https://www.colorado.gov/pacific/sites/default/files/31\\_2018%2801%29.pdf](https://www.colorado.gov/pacific/sites/default/files/31_2018%2801%29.pdf))

N/A = not analyzed

U = Laboratory analysis indicates that the analyte was undetected at the concentration shown

J = Laboratory quality control review indicates that this result is considered estimated

D = Sample diluted prior to analysis; reported result is for undiluted sample

EPA June 2015 - Surface Water Field-Measured Parameters										
Location ID	Analysis	Matrix	Sample Date	Sample Time	pH	Temp.	Dissolved Oxygen	Conductivity	Flow	Flow Measurement Equipment
					Stand. Unit	C	mg/L	µS/cm	cfs	
BG-14 (Upstream Gold Bug)	In Situ Measure	Surface Water	6/17/2015	13:55	6.55	5.17	9.3	102.7	Not Collected a	Not Applicable
BG-15 (downstream Gold Bug)	In Situ Measure	Surface Water	6/17/2015	13:45	6.23	5.15	9.2	103.4	Not Collected a	Not Applicable
BG-16	In Situ Measure	Surface Water	6/17/2015	12:05	6.65	3.06	9.4	931.6	0.187	4" Flume
BG-17	In Situ Measure	Surface Water	6/17/2015	11:40	7.57	4.68	9.3	113.9	Not Collected a	Not Applicable
BG-18	In Situ Measure	Surface Water	6/17/2015	11:10	7.54	4.27	9.4	110.3	Not Collected a	Not Applicable
BG-19	In Situ Measure	Surface Water	6/17/2015	10:40	7.35	2.86	7.6	180.1	Not Collected a	Not Applicable
BG-20	In Situ Measure	Surface Water	6/17/2015	10:00	7.18	6.35	8.8	165.0	Not Collected a	Not Applicable
BG-21	In Situ Measure	Surface Water	6/17/2015	10:10	7.55	5.61	9.2	147.6	Not Collected a	Not Applicable
BJ-01 (base of pile drainage)	In Situ Measure	Surface Water	6/17/2015	12:45	2.99	8.99	6.9	2162	Not Collected a	Not Applicable

N/C = not collected; N/A = not applicable

a = Sample location was too deep and swift to safely measure flow

Gold Bug Mine – EPA 2014 Soil/Waste - Analytical Results - Pre-CERCLA Screening

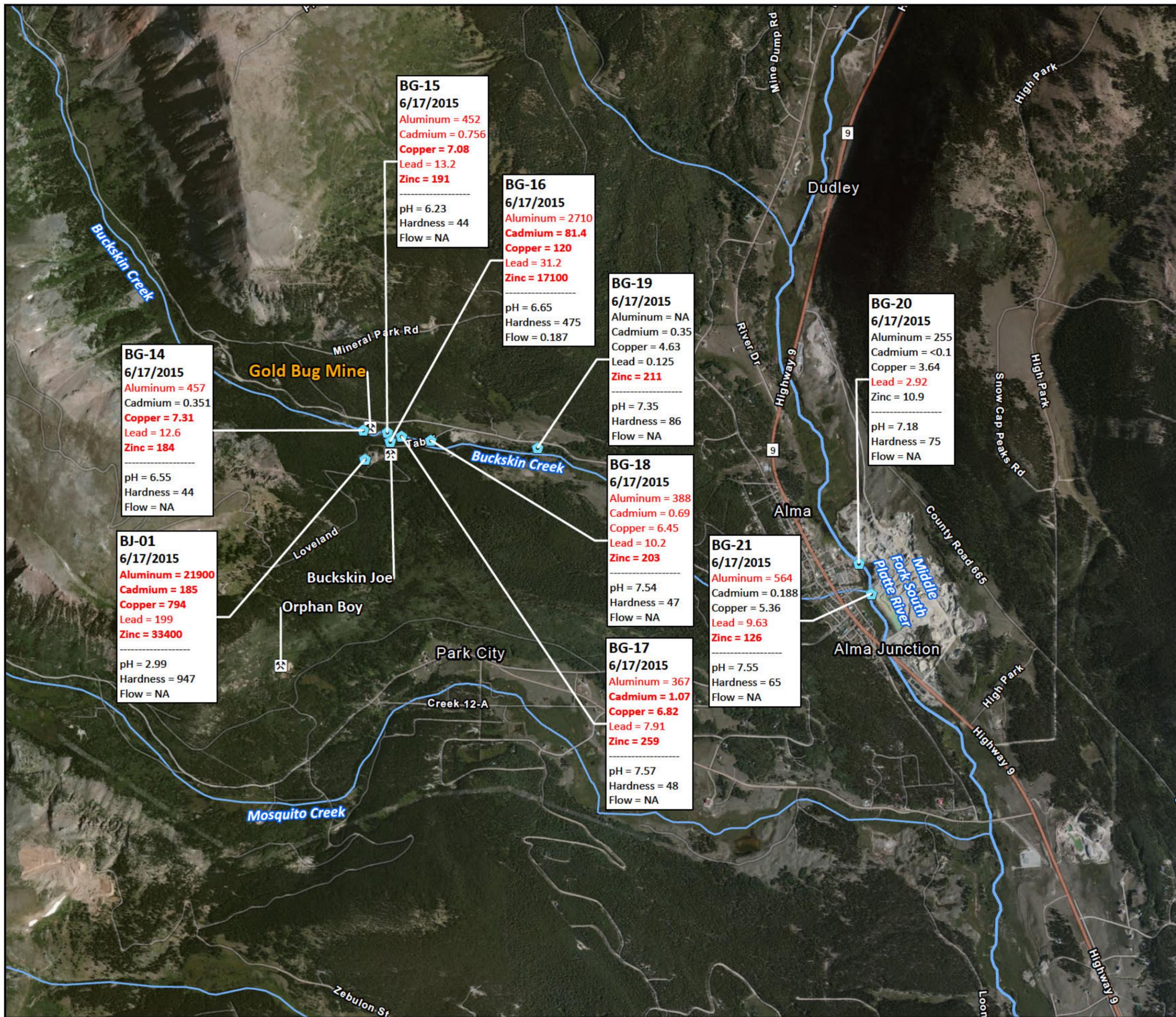
Location ID	Analysis	Matrix	Sample Date	Sample Time	Aluminum mg/kg	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Calcium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Iron mg/kg	Lead mg/kg	Magnesium mg/kg	Manganese mg/kg	Mercury mg/kg	Nickel mg/kg	Potassium mg/kg	Selenium mg/kg	Silver mg/kg	Sodium mg/kg	Thallium mg/kg	Vanadium mg/kg	Zinc mg/kg
GB-02	Total Recoverable Metals	Soil	7/1/2014	14:42	3971	2.4	20.80	288	<5.07U	74.5	26900	<20.31U	12.4	2500	113000	14900	16800	6210	1933	<10.11U	738.1	<20.31U	45.1	<1010U	<10.11U	<10.41U	36500
GB-04	Total Recoverable Metals	Soil	7/1/2014	14:46	7910	3.28	7.37	81.1	<5.01U	87.2	101000	9.21	6.02	290	51500	7900	30100	9020	0.784	5.7	1080	1.28J	13.3	<1000U	1.12	12.6	14400

D = Diluted Value qualifier.  
 U = Laboratory analysis indicates that the analyte was undetected at the concentration shown  
 J = Laboratory quality control review indicates that this result is considered estimated

July 2014 - X-Ray Fluorescence (XRF) Spectrometry Soil Survey Results																															
Mine Name	XRF Sample ID	Date	Time	LiveTime	Matrix	Instrument	Units	Ti	Ti +/-	Cr	Cr +/-	Mn	Mn +/-	Fe	Fe +/-	Co	Co +/-	Ni	Ni +/-	Cu	Cu +/-	Zn	Zn +/-	As	As +/-	Se	Se +/-	Hg	Hg +/-	Pb	Pb +/-
Buckskin/Gold Bug	GB01	1-Jul-14	14:10:36	23.1	soil	alpha 4000s 6471	ppm	<LOD	2877	<LOD	480	7430	287	194114	3493	1335	280	<LOD	168	1259	52	19067	359	<LOD	160	<LOD	30	<LOD	85	7557	152
Buckskin/Gold Bug	GB02	1-Jul-14	14:13:12	22.69	soil	alpha 4000s 6471	ppm	<LOD	4262	<LOD	710	16416	581	276225	6316	<LOD	1240	<LOD	247	3128	115	48672	1123	<LOD	317	<LOD	55	<LOD	146	18784	446
Buckskin/Gold Bug	GB03	1-Jul-14	14:15:52	24.2	soil	alpha 4000s 6471	ppm	<LOD	1441	<LOD	223	5666	179	26192	459	<LOD	256	<LOD	72	206	20	6970	121	<LOD	81	<LOD	15	<LOD	45	2795	55
Buckskin/Gold Bug	GB04	1-Jul-14	14:17:46	23.28	soil	alpha 4000s 6471	ppm	<LOD	1790	<LOD	271	8476	267	39900	769	<LOD	375	<LOD	98	287	27	11982	226	<LOD	148	<LOD	26	<LOD	72	7075	137
Buckskin/Gold Bug	GB05	1-Jul-14	14:20:03	24.24	soil	alpha 4000s 6471	ppm	2840	640	318	98	2962	145	73797	1186	843	151	<LOD	100	50	14	1652	43	<LOD	44	<LOD	10	<LOD	32	773	24
Buckskin/Gold Bug	GB06	1-Jul-14	14:22:52	24.44	soil	alpha 4000s 6471	ppm	1467	458	<LOD	212	7156	204	22716	411	<LOD	246	<LOD	74	191	19	6418	113	<LOD	76	<LOD	15	<LOD	41	2596	52
Buckskin/Gold Bug	GB07	1-Jul-14	14:25:10	24.2	soil	alpha 4000s 6471	ppm	<LOD	1565	<LOD	234	11075	280	27583	502	<LOD	277	<LOD	82	208	22	12000	202	<LOD	100	<LOD	19	<LOD	54	4089	77
Buckskin/Gold Bug	GB08	1-Jul-14	14:27:43	23.14	soil	alpha 4000s 6471	ppm	2157	451	<LOD	185	1716	94	25887	425	373	82	<LOD	71	125	15	1563	37	66	16	<LOD	11	<LOD	28	1042	26
Buckskin/Gold Bug	GB09	1-Jul-14	14:33:06	24.85	soil	alpha 4000s 6471	ppm	<LOD	1378	<LOD	178	2500	115	31370	518	<LOD	274	<LOD	70	159	16	1907	44	<LOD	35	<LOD	10	<LOD	27	549	19
Buckskin/Gold Bug	GB10	1-Jul-14	14:35:52	24.43	soil	alpha 4000s 6471	ppm	1930	469	<LOD	179	2788	119	34627	549	393	95	<LOD	77	219	18	2105	46	<LOD	38	<LOD	11	<LOD	31	631	20

X-Ray Fluorescence (XRF) Spectrometry Soil Survey Results (Continued)																															
Mine Name	XRF Sample ID	Date	Time	LiveTime	Matrix	Instrument	Units	Rb	Rb +/-	Sr	Sr +/-	Zr	Zr +/-	Mo	Mo +/-	Ag	Ag +/-	Cd	Cd +/-	Sn	Sn +/-	Sb	Sb +/-	Au	Au +/-	Bi	Bi +/-	Ba	Ba +/-		
Buckskin/Gold Bug	GB01	1-Jul-14	14:10:36	23.1	soil	alpha 4000s 6471	ppm	132	7	53	4	228	10	<LOD	15	<LOD	66	<LOD	79	<LOD	128	178	47	<LOD	20	42	11	<LOD	1803		
Buckskin/Gold Bug	GB02	1-Jul-14	14:13:12	22.69	soil	alpha 4000s 6471	ppm	111	10	57	6	200	13	<LOD	20	<LOD	88	174	35	174	56	<LOD	182	<LOD	37	<LOD	61	<LOD	2663		
Buckskin/Gold Bug	GB03	1-Jul-14	14:15:52	24.2	soil	alpha 4000s 6471	ppm	80	5	93	4	213	8	<LOD	13	<LOD	53	<LOD	67	<LOD	108	<LOD	120	<LOD	10	<LOD	17	<LOD	926		
Buckskin/Gold Bug	GB04	1-Jul-14	14:17:46	23.28	soil	alpha 4000s 6471	ppm	76	6	114	6	246	10	<LOD	15	<LOD	62	109	26	<LOD	125	<LOD	136	<LOD	18	<LOD	29	<LOD	1165		
Buckskin/Gold Bug	GB05	1-Jul-14	14:20:03	24.24	soil	alpha 4000s 6471	ppm	127	5	126	5	215	8	17	4	<LOD	54	<LOD	67	<LOD	108	<LOD	118	<LOD	7	<LOD	12	<LOD	1137		
Buckskin/Gold Bug	GB06	1-Jul-14	14:22:52	24.44	soil	alpha 4000s 6471	ppm	71	4	95	4	177	7	<LOD	12	<LOD	52	104	22	<LOD	106	<LOD	117	<LOD	10	<LOD	15	<LOD	827		
Buckskin/Gold Bug	GB07	1-Jul-14	14:25:10	24.2	soil	alpha 4000s 6471	ppm	47	4	119	5	154	8	<LOD	13	<LOD	54	123	23	<LOD	110	<LOD	121	<LOD	13	<LOD	20	<LOD	970		
Buckskin/Gold Bug	GB08	1-Jul-14	14:27:43	23.14	soil	alpha 4000s 6471	ppm	126	5	331	8	174	7	<LOD	12	<LOD	49	<LOD	62	<LOD	101	<LOD	111	<LOD	7	<LOD	11	<LOD	778		
Buckskin/Gold Bug	GB09	1-Jul-14	14:33:06	24.85	soil	alpha 4000s 6471	ppm	182	6	146	5	295	9	<LOD	12	<LOD	50	<LOD	62	<LOD	101	<LOD	111	<LOD	7	<LOD	11	<LOD	830		
Buckskin/Gold Bug	GB10	1-Jul-14	14:35:52	24.43	soil	alpha 4000s 6471	ppm	212	6	158	5	250	8	<LOD	12	<LOD	49	<LOD	62	<LOD	99	<LOD	109	<LOD	7	<LOD	12	<LOD	926		

<LOD = below level of detection  
 Ti = titanium, Cr = chromium, Mn = manganese, Fe = iron, Co = cobalt, Ni = nickel, Cu = copper, Zn = zinc, As = arsenic, Se = selenium, Rb = rubidium, Sr = strontium, Zr = zirconium, Mo = molybdenum, Ag = silver, Cd = cadmium, Sn = tin, Sb = antimony, Ba = barium, Hg = mercury, Pb = lead



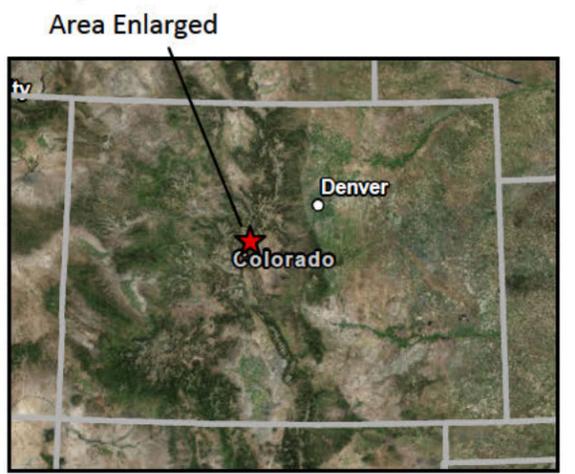
**Figure 2**  
**Gold Bug Mine Area**  
 Alma, Colorado  
 U.S. EPA Region 8  
 June 2015 -Surface Water  
 Sample Locations/Key Results\*

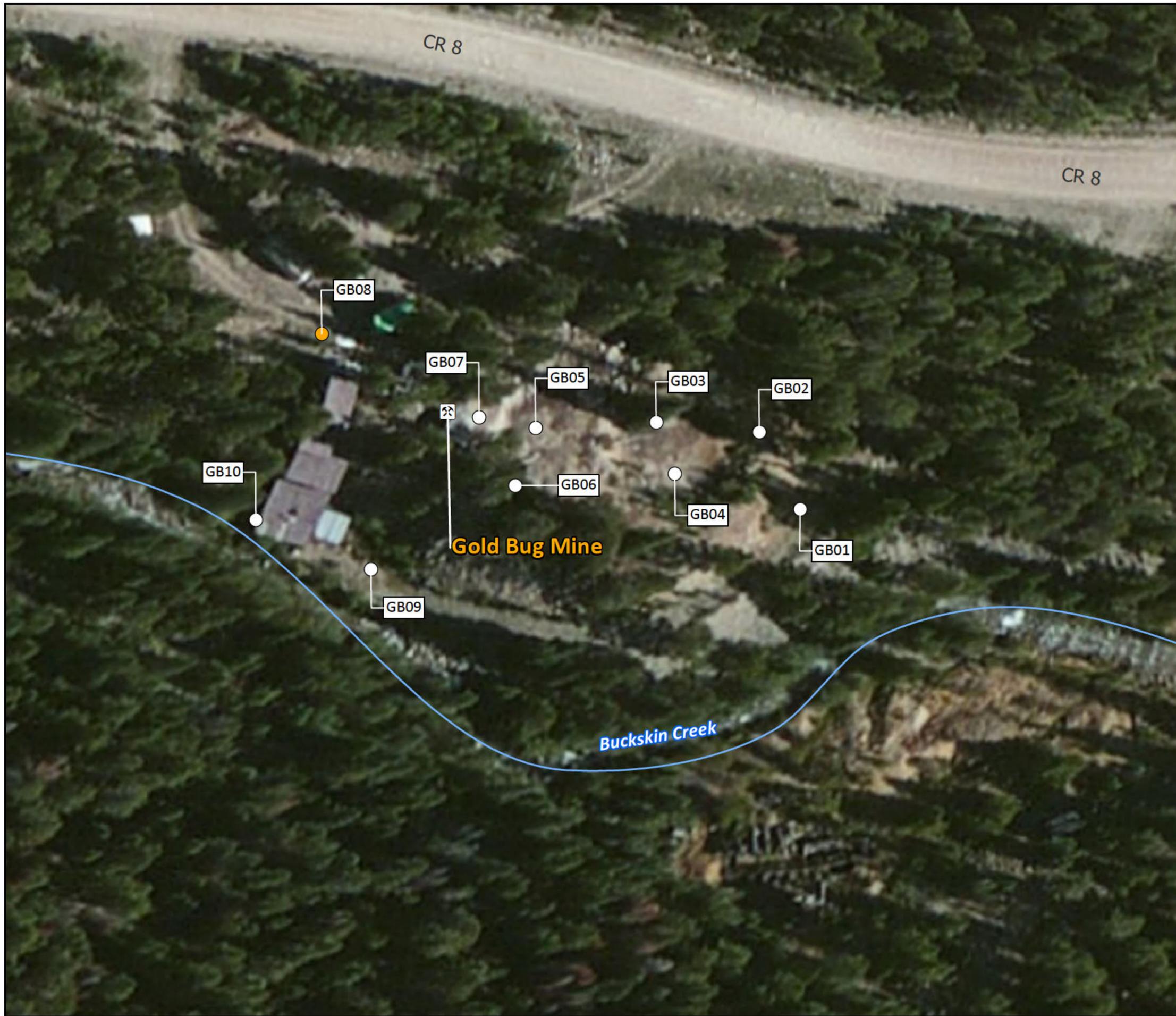
- Surface Water Sample Location
- Dissolved Metals: units = µg/L
- Total Recoverable Aluminum: units = µg/L
- Flow: units = cubic feet per second
- pH: units = standard units
- Hardness: units = mg of CaCO<sub>3</sub>/L
- Mine
- River
- Creek

\* RED font indicates an exceedance to a hardness-based CO Department of Public Health and Environment (CDPHE) Regulation 31 - Chronic Water Quality Standard.  
 RED BOLD font indicates an exceedance to both an acute and chronic Water Quality Standard (CDPHE Regulation 31).

CDPHE Reg 31: [https://www.colorado.gov/pacific/sites/default/files/31\\_2018%2801%29.pdf](https://www.colorado.gov/pacific/sites/default/files/31_2018%2801%29.pdf)

Date: August 30, 2021  
 Map Projection: UTM Zone 13N, WGS84, Meters  
 Data Sources:  
 Sample & Mine Locations: U.S. EPA (2021);  
 Hydrography: NHDPlus V2 -U.S. EPA & USGS (2013);  
 Base Map: Esri World Imagery (Clarity) Web Service (2021).





**Figure 3**  
**Gold Bug Mine**  
 Alma, Colorado  
 U.S. EPA Region 8  
**XRF Survey - Arsenic Results (mg/kg)**

Survey Date: July 01, 2014

Arsenic - EPA Regional Screening Levels (RSLs)\*

Arsenic Residential RSL = 0.68 mg/kg

Arsenic Industrial RSL = 3.00 mg/kg

- < Instrument Level of Detection (LOD)
- > Detected above Residential and Industrial RSL
- > 10x Industrial RSL
- > 50x Industrial RSL
- > 100x Industrial RSL

\* <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>

Note that the analytical sensitivity of the XRF instrument is not fine enough to detect arsenic near the RSLs; one should consult the total recoverable metals mine waste/soil analytical results for more representative arsenic concentrations.

- ⊠ Gold Bug Mine
- ~ Creek

Date: August 30, 2021

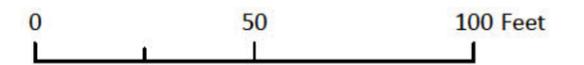
Map Projection: UTM Zone 13N, WGS84, Meters

Data Sources:

Sample & Mine Locations: U.S. EPA (2021);

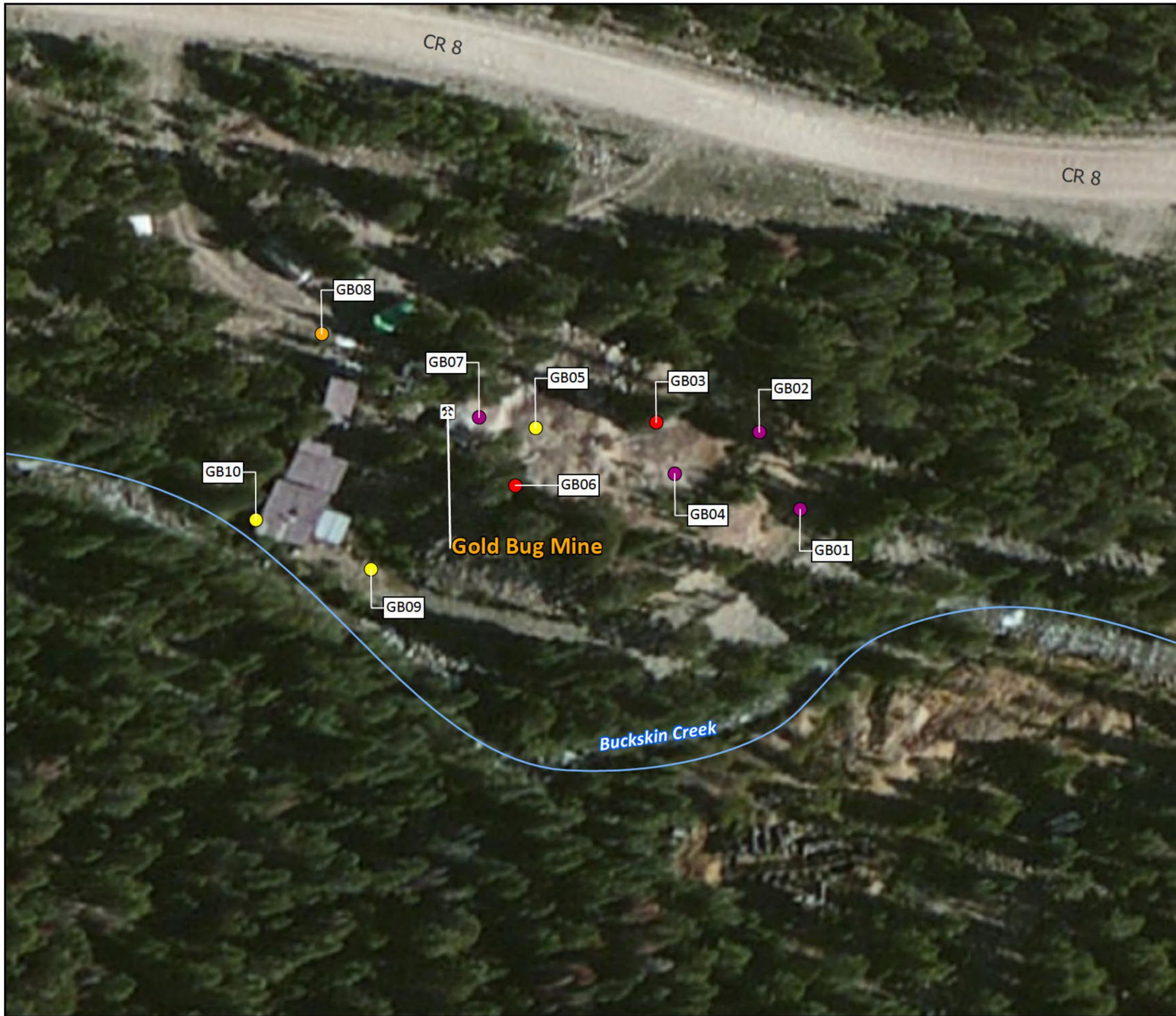
Hydrography: NHDPlus V2 -U.S. EPA & USGS (2013);

Base Map: Esri World Imagery (Clarity) Web Service (2021).



Area Enlarged





### Figure 4 Gold Bug Mine

Alma, Colorado  
U.S. EPA Region 8

#### XRF Survey - Lead Results (mg/kg)

Survey Date: July 01, 2014

Lead - EPA Regional Screening Levels (RSLs)\*

Lead Residential RSL = 400 mg/kg

Lead Industrial RSL = 800 mg/kg

- < Instrument Level of Detection (LOD)
- < Residential RSL
- > Residential RSL
- > Industrial RSL
- > 2x Industrial RSL
- > 4x Industrial RSL

\*<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>

- ☒ Gold Bug Mine
- ~ Creek

Date: August 30, 2021

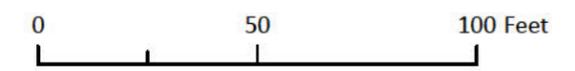
Map Projection: UTM Zone 13N, WGS84, Meters

Data Sources:

Sample & Mine Locations: U.S. EPA (2021);

Hydrography: NHDPlus V2 -U.S. EPA & USGS (2013);

Base Map: Esri World Imagery (Clarity) Web Service (2021).



Area Enlarged





**Figure 5**  
**Gold Bug Mine**  
 Alma, Colorado  
 U.S. EPA Region 8

**June 2014 - Surface Soils**  
**Sample Locations/Key Results\***  
 Analytical results presented in mg/kg

- Composite Soil Sample Locations
- ⊗ Gold Bug Mine
- ~ Creek

	Arsenic	Copper	Lead	Manganese	Zinc
Residential	0.68	3,100	400	1,800	23,000
Industrial	3.0	47,000	800	26,000	350,000

\*RED font indicates an exceedance of EPA Regional Soil Screening Levels (RSLs).

<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>

Date: August 30, 2021

Map Projection: UTM Zone 13N, WGS84, Meters

Data Sources:

Sample & Mine Locations: U.S. EPA (2021);  
 Hydrography: NHDPlus V2 -U.S. EPA & USGS (2013);  
 Base Map: Esri World Imagery (Clarity) Web Service (2021).



Area Enlarged

