



CRITICAL MINERALS

Basic Facts For Utah

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What are critical minerals?

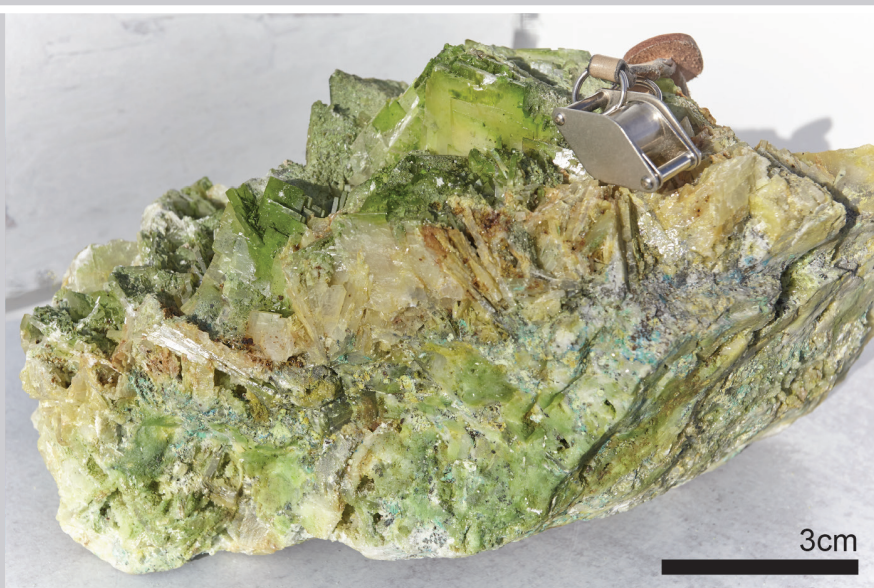
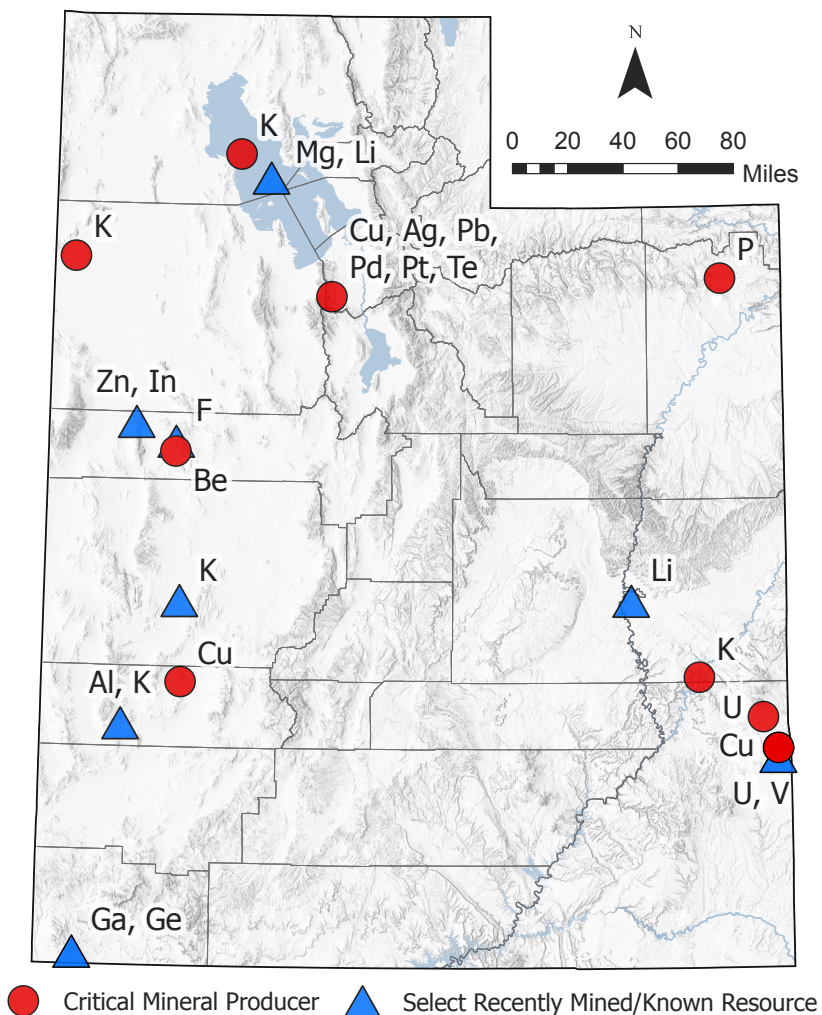
“Critical minerals” is a term that refers to mineral commodities that are important for the country’s economic stability and national security but may have vulnerabilities in the supply chain. The term “minerals” in the context of critical minerals includes commodities that are actual minerals (such as fluorspar), refined commodities produced from minerals (such as copper produced from chalcopyrite), and commodities that are only made of one element (such as graphite, which is a specific form of carbon). The lists of minerals and elements that are considered critical have changed through time with the earliest lists being prepared around the time of World War I. More recently, the U.S. Geological Survey published a list of critical minerals in 2018 which was subsequently updated in 2022 and 2025. In the current era, the usual reason a mineral commodity is deemed critical is because the United States produces very little domestically and imports the commodity from foreign sources. This dependency is increasingly driven by the modern economy’s reliance on high-tech electronic devices and the needs of the aerospace and defense industries, all of which require a vast array of raw critical minerals.

Utah Critical Mineral Status																																															
<ul style="list-style-type: none"> Currently mined and processed Currently processed, not mined (limited potential) Recently mined/known resource Past mining production Geologic occurrences (limited potential) No known potential 																																															
1 H 1.008 Hydrogen																	2 He 4.003 Helium																														
3 Li 6.94 Lithium	4 Be 9.012 Beryllium															5 B 10.811 Boron	6 C* 12.011 Carbon	7 N 14.007 Nitrogen	8 O 15.999 Oxygen	9 F* 18.998 Fluorine	10 Ne 20.180 Neon																										
11 Na 22.990 Sodium	12 Mg 24.305 Magnesium															13 Al 26.982 Aluminum	14 Si 28.086 Silicon	15 P* 30.974 Phosphorus	16 S 32.066 Sulfur	17 Cl 35.453 Chlorine	18 Ar 39.948 Argon																										
19 K* 39.098 Potassium	20 Ca 40.08 Calcium	21 Sc 44.956 Scandium	22 Ti 47.867 Titanium	23 V 50.942 Vanadium	24 Cr 51.996 Chromium	25 Mn 54.938 Manganese	26 Fe 55.845 Iron	27 Co 58.933 Cobalt	28 Ni 58.693 Nickel	29 Cu 63.546 Copper	30 Zn 65.38 Zinc	31 Ga 69.723 Gallium	32 Ge 72.631 Germanium	33 As 74.922 Arsenic	34 Se 78.972 Selenium	35 Br 79.904 Bromine	36 Kr 84.798 Krypton																														
37 Rb 85.468 Rubidium	38 Sr 87.62 Strontium	39 Y 88.906 Yttrium	40 Zr 91.224 Zirconium	41 Nb 92.906 Niobium	42 Mo 95.95 Molybdenum	43 Tc 98.907 Technetium	44 Ru 101.07 Ruthenium	45 Rh 102.906 Rhodium	46 Pd 106.42 Palladium	47 Ag 107.868 Silver	48 Cd 112.411 Cadmium	49 In 114.818 Indium	50 Sn 118.711 Tin	51 Sb 121.760 Antimony	52 Te 127.6 Tellurium	53 I 126.904 Iodine	54 Xe 131.294 Xenon																														
55 Cs 132.905 Cesium	56 Ba* 137.328 Barium	57-71		72 Hf 178.49 Hafnium	73 Ta 180.948 Tantalum	74 W 183.84 Tungsten	75 Re 186.207 Rhenium	76 Os 192.227 Osmium	77 Ir 192.227 Iridium	78 Pt 195.085 Platinum	79 Au 196.967 Gold	80 Hg 200.592 Mercury	81 Tl 204.383 Thallium	82 Pb 207.2 Lead	83 Bi 208.980 Bismuth	84 Po [208.982] Polonium	85 At 209.987 Astatine	86 Rn 222.018 Radon																													
87 Fr 223.020 Francium	88 Ra 226.025 Radium	89-103		104 Rf [261] Rutherfordium	105 Db [262] Dubnium	106 Sg [266] Seaborgium	107 Bh [264] Bohrium	108 Hs [269] Hassium	109 Mt [268] Meitnerium	110 Ds [269] Darmstadtium	111 Rg [272] Roentgenium	112 Cn [277] Copernicium	113 Nh [284] Nihonium	114 Fl [289] Flerovium	115 Mc [288] Moscovium	116 Lv [298] Livermorium	117 Ts [294] Tennessine	118 Og [294] Oganesson																													
<table border="1"> <tr> <td>57 La 138.905 Lanthanum</td> <td>58 Ce 140.116 Cerium</td> <td>59 Pr 140.908 Praseodymium</td> <td>60 Nd 144.242 Neodymium</td> <td>61 Pm 144.913 Promethium</td> <td>62 Sm 150.36 Samarium</td> <td>63 Eu 151.964 Europium</td> <td>64 Gd 157.25 Gadolinium</td> <td>65 Tb 158.925 Terbium</td> <td>66 Dy 162.500 Dysprosium</td> <td>67 Ho 164.930 Holmium</td> <td>68 Er 167.259 Erbium</td> <td>69 Tm 168.934 Thulium</td> <td>70 Yb 173.055 Ytterbium</td> <td>71 Lu 174.967 Lutetium</td> </tr> <tr> <td>89 Ac 227.028 Actinium</td> <td>90 Th 232.038 Thorium</td> <td>91 Pa 231.036 Protactinium</td> <td>92 U 238.029 Uranium</td> <td>93 Np 237.048 Neptunium</td> <td>94 Pu 244.064 Plutonium</td> <td>95 Am 243.061 Americium</td> <td>96 Cm 247.070 Curium</td> <td>97 Bk 247.070 Berkelium</td> <td>98 Cf 251.080 Californium</td> <td>99 Es [254] Einsteinium</td> <td>100 Fm 257.095 Fermium</td> <td>101 Md 258.1 Mendelevium</td> <td>102 No 259.101 Nobelium</td> <td>103 Lr [262] Lawrencium</td> </tr> </table>																		57 La 138.905 Lanthanum	58 Ce 140.116 Cerium	59 Pr 140.908 Praseodymium	60 Nd 144.242 Neodymium	61 Pm 144.913 Promethium	62 Sm 150.36 Samarium	63 Eu 151.964 Europium	64 Gd 157.25 Gadolinium	65 Tb 158.925 Terbium	66 Dy 162.500 Dysprosium	67 Ho 164.930 Holmium	68 Er 167.259 Erbium	69 Tm 168.934 Thulium	70 Yb 173.055 Ytterbium	71 Lu 174.967 Lutetium	89 Ac 227.028 Actinium	90 Th 232.038 Thorium	91 Pa 231.036 Protactinium	92 U 238.029 Uranium	93 Np 237.048 Neptunium	94 Pu 244.064 Plutonium	95 Am 243.061 Americium	96 Cm 247.070 Curium	97 Bk 247.070 Berkelium	98 Cf 251.080 Californium	99 Es [254] Einsteinium	100 Fm 257.095 Fermium	101 Md 258.1 Mendelevium	102 No 259.101 Nobelium	103 Lr [262] Lawrencium
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*Some critical mineral commodities are listed in elemental form on this table: - Barium = Barite, - Carbon = Graphite (no known potential) and Metallurgical Coal (past production), - Fluorine = Fluorspar, - Phosphorous = Phosphate, - Potassium = Potash

Utah's critical minerals

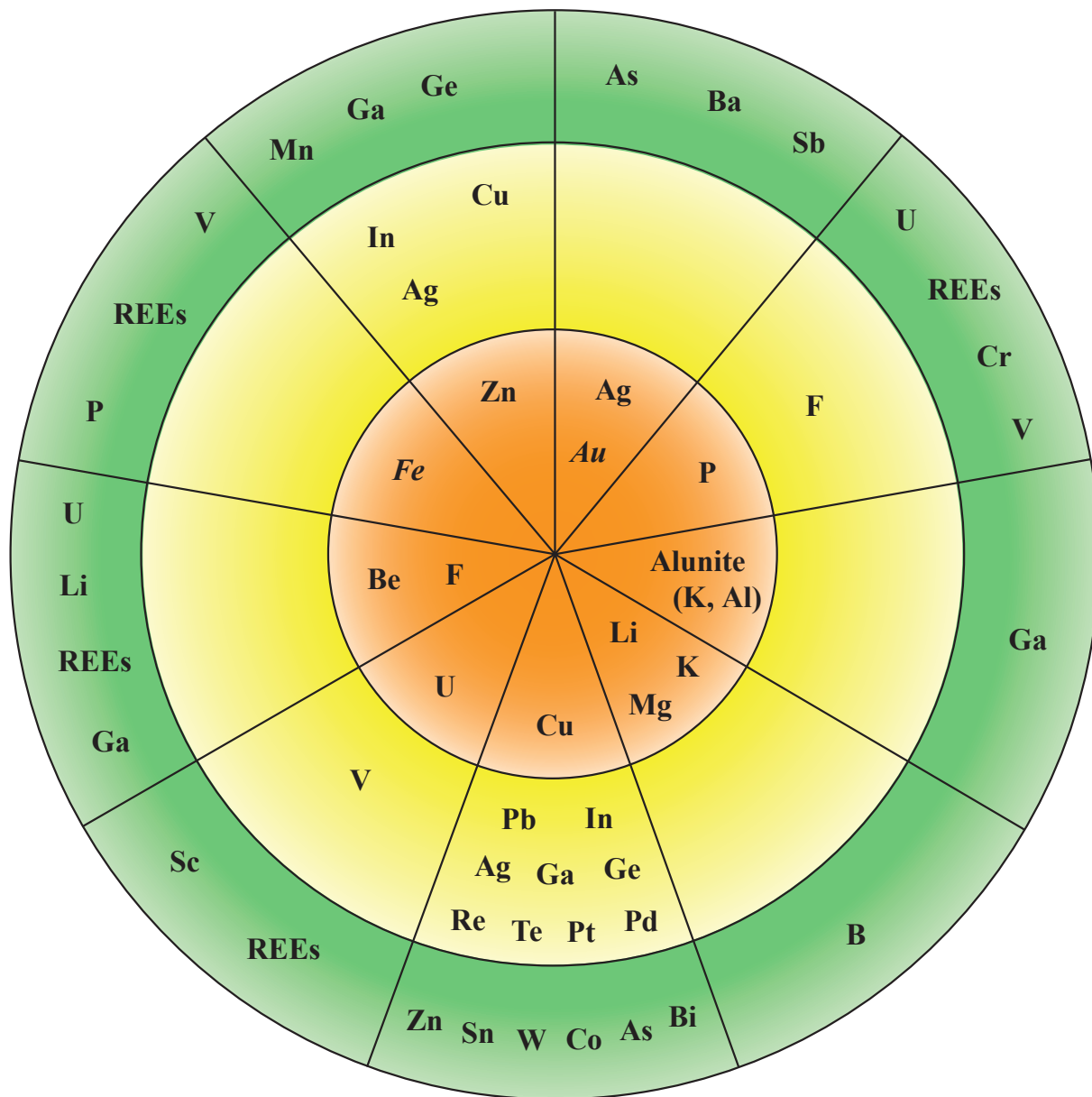
Utah has diverse geologic resources that host a wide variety of critical minerals. Utah hosts 50 of the 60 critical minerals on the 2025 list. Ten critical minerals are currently mined and at least partially processed in Utah. Processing refers to chemical or physical steps that transform raw ore into a usable product, such as taking a rock with trace gold and producing a rough gold bar. A further 10 commodities have been mined within the past 5 years in Utah, or there is a significant known resource. Seven commodities have historically been mined in Utah. Utah also has 23 critical mineral commodities that are known to occur at some level of enrichment but most of these are generally considered to have low development potential. Fourteen commodities, known as the Rare Earth Elements (REEs), are processed at the nation's only uranium mill in southeast Utah, but the raw ore is from out of state. Utah is also home to one of only two active copper smelters in the United States.



Examples of ore from Utah mines. High-grade-ore from Bingham Canyon copper mine (left), and ultra-high grade ore from the Trixie gold mine (right).

Main products versus byproducts

Mineral commodities are often differentiated between those that are considered main commodities (i.e., those that are the primary focus of a mining operation) and byproduct commodities (i.e., those that can be produced in addition to a main commodity but would not be the individual focus of a mining operation). The distinction between main and byproduct commodities is important for critical minerals because many critical mineral commodities are only produced as a byproduct.



● = Main commodity

● = Known byproduct

● = Possible byproduct

This pie chart illustrates the relationship between main products and byproducts for some critical mineral-bearing deposit types found in Utah. Main products typically drive the economics of a mine. Known byproducts are critical mineral commodities that have been produced alongside the main commodities either in Utah or elsewhere. Possible byproducts are known to commonly occur with the main commodities but, to date, have not commonly been produced with the main commodity. Italics indicates the commodity is not a critical mineral.

In Utah, the Bingham Canyon mine produces copper as a main commodity. In addition, silver, tellurium, platinum, palladium, and lead are also produced as critical mineral byproducts. Hence, this single mining operation produces 6 of the 10 currently mined critical minerals in Utah. Another example is the uranium mines in south-east Utah. Uranium is the main commodity mined and processed from these deposits, but considerable amounts of vanadium are also present in the raw ore. The vanadium can be stockpiled and processed as needed at a later date. A recent study demonstrated that much of the domestic mineral need in the United States can be met by better recovery of byproducts at active mining operations.



The open pit at Bingham Canyon mine looking south, taken June 2017.

Critical minerals in mine waste

Mine waste is a general term used to describe any rock or mineral material left over from extraction of mineral commodities from raw ore. Mine waste from past production has the potential to contain critical minerals that were not considered valuable in previous decades. Because they were not recovered during initial processing, some critical minerals may reside in mine waste such as tailings. Research by the Utah Geological Survey and other groups across the state is evaluating the resource potential in historical mine waste features. The historic Burgin mine near Eureka focused on zinc when it was in production from 1955 to 1978, but early research demonstrates there may be considerable manganese left in some of the mine waste. In addition to historical mine waste, many active mining operations are evaluating whether additional byproducts may be recoverable from their waste streams.

As the minerals landscape evolves, the Utah Geological Survey remains at the forefront of characterizing and understanding Utah's mineral resources. As always, look for updates on projects and publications at geology.utah.gov.



Geologist monitoring a portable dual XRD/XRF (X-ray diffraction/X-ray fluorescence) instrument, which is being used to identify mineralogy and geochemistry from downhole mine waste samples at the historic Burgin mine.