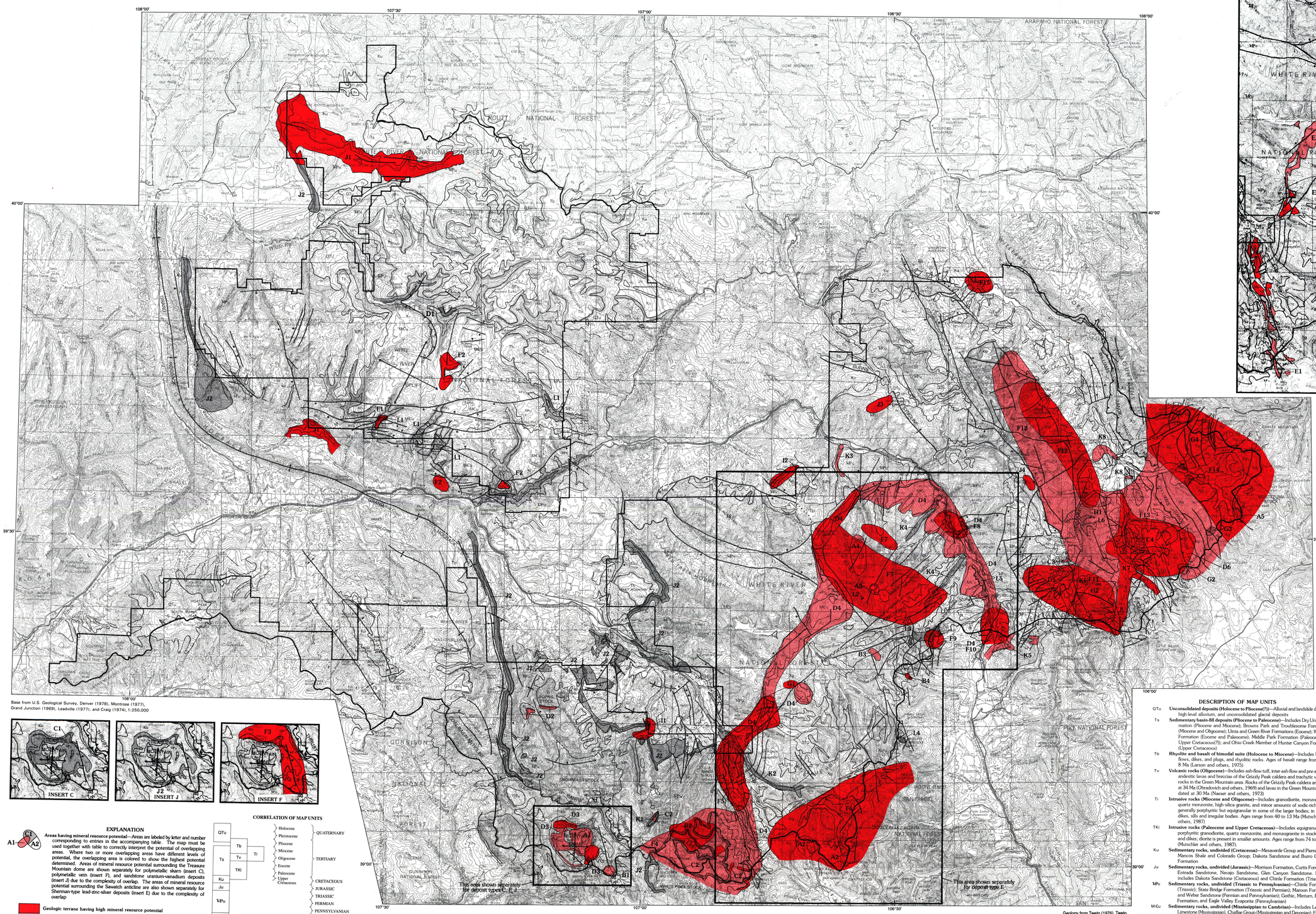
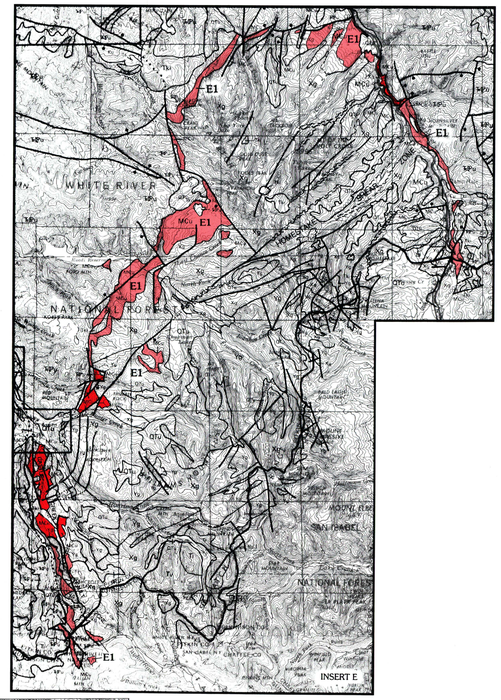
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

BULLETIN 2035
PLATE 1

MINERAL RESOURCE POTENTIAL MAP FOR LOCATABLE LODE AND PLACER COMMODITIES IN THE WHITE RIVER NATIONAL FOREST AND DILLON RANGER DISTRICT OF THE ARAPAHO NATIONAL FOREST AND ADJACENT AREAS, COLORADO





EXPLANATION

Areas having mineral resource potential—Areas are labeled by letter and number corresponding to entries in the accompanying table. The map must be used together with table to correctly interpret the potential of overlapping areas. Where two or more overlapping areas have different levels of potential, the overlapping area is colored to show the highest potential determined. Areas of mineral resource potential surrounding the Treasure Mountain dome are shown separately for polymetallic skarn (insert C), polymetallic vein (insert F), and sandstone uranium-vanadium deposits (insert J) due to the complexity of overlap. The areas of mineral resource potential surrounding the Sawatch anticline are also shown separately for Sherman-type lead-zinc-silver deposits (insert E) due to the complexity of overlap

- Geologic terrane having high mineral resource potential
- Geologic terrane having moderate mineral resource potential
- Geologic terrane having low mineral resource potential
- Geologic terrane having unknown mineral resource potential

CORRELATION OF MAP UNITS

QTu		Holocene	QUATERNARY
		Pleistocene	
Ts	Tb, Tv, Ti	Pliocene	TERTIARY
		Miocene	
		Oligocene	
		Eocene	
Ku	TKi	Paleocene	CRETACEOUS
		Upper Cretaceous	
Ju			JURASSIC
TrPu			TRIASSIC
			PERMIAN
			PENNSYLVANIAN
MCu			MISSISSIPPIAN
			DEVONIAN
Unconformity			ORDOVICIAN
Yg			MIDDLE PROTEROZOIC
Xg			EARLY PROTEROZOIC

DESCRIPTION OF MAP UNITS

QTu **Unconsolidated deposits (Holocene to Pliocene(?))**—Alluvial and landslide deposits, high-level alluvium, and unconsolidated glacial deposits

Ts **Sedimentary basin-fill deposits (Pliocene to Paleocene)**—Includes Dry Union Formation (Pliocene and Miocene); Browns Park and Troublesome Formations (Miocene and Oligocene); Uinta and Green River Formations (Eocene); Wasatch Formation (Eocene and Paleocene); Middle Park Formation (Paleocene and Upper Cretaceous(?)); and Ohio Creek Member of Hunter Canyon Formation (Upper Cretaceous)

Tb **Rhyolite and basalt of bimodal suite (Holocene to Miocene)**—Includes basaltic flows, dikes, and plugs, and rhyolitic rocks. Ages of basalt range from 23 to 8 Ma (Larson and others, 1975)

Tv **Volcanic rocks (Oligocene)**—Includes ash-flow tuff, inter ash-flow and pre-ash-flow andesitic lavas and breccias of the Grizzly Peak caldera and trachytic volcanic rocks in the Green Mountain area. Rocks of the Grizzly Peak caldera are dated at 34 Ma (Obradovich and others, 1969) and lavas in the Green Mountain area dated at 30 Ma (Naeser and others, 1973)

Ti **Intrusive rocks (Miocene and Oligocene)**—Includes granodiorite, monzogranite, quartz monzonite, high-silica granite, and minor amounts of sodic-rich rocks; generally porphyritic but equigranular in some of the larger bodies; in stocks, dikes, sills and irregular bodies. Ages range from 40 to 13 Ma (Mutschler and others, 1987)

TKi **Intrusive rocks (Paleocene and Upper Cretaceous)**—Includes equigranular and porphyritic granodiorite, quartz monzonite, and monzogranite in stocks, sills, and dikes; diorite is present in smaller amounts. Ages range from 74 to 60 Ma (Mutschler and others, 1987)

Ku **Sedimentary rocks, undivided (Cretaceous)**—Mesaverde Group and Pierre Shale; Mancos Shale and Colorado Group; Dakota Sandstone and Burro Canyon Formation

Ju **Sedimentary rocks, undivided (Jurassic)**—Morrison Formation, Curtis Formation, Entrada Sandstone, Navajo Sandstone, Glen Canyon Sandstone. Locally includes Dakota Sandstone (Cretaceous) and Chinle Formation (Triassic)

TrPu **Sedimentary rocks, undivided (Triassic to Pennsylvanian)**—Chinle Formation (Triassic); State Bridge Formation (Triassic and Permian); Maroon Formation and Weber Sandstone (Permian and Pennsylvanian); Gothic, Minturn, Belden Formation, and Eagle Valley Evaporite (Pennsylvanian)

MCu **Sedimentary rocks, undivided (Mississippian to Cambrian)**—Includes Leadville Limestone (Mississippian), Chaffee Group (Mississippian and Devonian); Fremont Limestone, Harding Sandstone, Manitou Dolomite (Ordovician); Dotsero and Peerless Formations, and Sawatch Quartzite (Cambrian)

Yg **Granitic rocks (Middle Proterozoic, 1,400 Ma)**—Includes Silver Plume and St. Kevin Granites and equivalents; rocks lack metamorphic foliation and most are discordant with enclosing metamorphic country rock

Xg **Granitic and leucocratic granitic rocks, mafic intrusive rocks, biotite gneiss, migmatite, and felsic and hornblende gneiss (Early Proterozoic, 1,700 Ma)**—Granitic rocks include the Cross Creek Granite in the Gore and northern Sawatch Ranges and the Denny Creek Granodiorite in the central Sawatch Range; granitic rocks are generally concordant with metamorphic country rock and most are foliated

- **Contact**
- **Fault**—Dotted where concealed, dashed where location inferred. Bar and ball on downthrown side
- **Thrust fault**—Dotted where concealed. Sawteeth on upper plate
- **Anticline**—Showing line of axial trace
- **Syncline**—Showing line of axial trace
- **Monocline**—Showing direction of plunge of axis
- **Dome**
- **Proterozoic shear zone**

Table 2. Description of areas of mineral resource potential for locatable and leasable resources in the White River National Forest and Dillon Ranger District of the Arapaho National Forest, Colorado.

[Map areas are shown on figures 17–47 and plates 1–2. The resource potential column shows both resource potential and level of certainty; both are explained in Appendix 2. Deposit sizes are listed in Appendix 3. Size and type of deposit not listed for gas, coal, coalbed methane, or oil-shale deposits or for hot- and warm-water springs. "Do." indicates that the size and type of deposit is the same as the one above it]

Map area	Resource potential	Commodities (byproducts or trace metals)	Size, type of deposit
A1	M/C	Mo	Small, stockworks
A2	H/C	Mo, (Au, Ag, Sn, W)	Do.
A3	H/D	Mo, Cu, (Ag, Au, Bi, Pb, W)	Do.
A4	M/C	Mo, Cu, (Ag, Bi, Pb, Sn, W)	Do.
A5	M/C	Mo	Do.
B1	M/C	Cu, Mo	Small, stockworks
B2	H/C	Cu, Mo	Do.
B3	M/B	Cu, Mo	Do.
B4	H/D	Cu, Mo, (Ag, Pb, Zn)	Do.
C1	L/B	Cu, Fe, Mn, Pb, Zn, W	Small, contact skarn
C2	H/D, L/C	Cu, Mo, Fe	Medium, contact skarn
C3	M/C	Cu, Mo, W	Small, contact skarn
C4	M/C	Cu, Au	Do.
C5	L/C	Cu, Pb, Zn	Do.
D1	L/C	Ag, Cu, Mn, Pb, Zn	Small, replacement
D2	M/C	Ag, Cu, Pb	Do.
D3	H/D, M/C	Ag, Au, Cu, Pb, Zn	Do.
D4	H/D, M/C	Ag, Au, Cu, Pb, Zn	Large, replacement
D5	H/D	Ag, Au, Cu, Pb, Zn	Do.
D6	H/D	Ag, Au, Cu, Pb, Zn	Small, replacement
E1	H/D, M/C	Ag, Zn, Pb, (Cu)	Small, stratabound
F1	H/D	Au	Small, veins
F2	H/D	Ag, Au, Zn, Pb, Cu	Do.
F3	H/D	Ag, Au, Zn, Pb, Cu	Medium, veins
F4	M/C	Ag, Au, Zn, Pb, Cu	Small, veins
F5	H/D	Ag, Au, Zn, Pb, Cu	Large, veins
F6	H/D	Au, Ag, Cu, Pb	Medium, veins
F7	H/D	Au, Ag, Cu, Pb, Zn	Small, veins
F8	H/D	Ag, Au, Mo, Fe, Zn	Medium, veins
F9	H/D	Ag, Au, Cu, Pb, Zn	Small, veins
F10	M/C	Ag, Au, Cu, Pb, Zn	Do.
F11	H/D	Ag, Au, Cu, Pb, Zn	Do.
F12	H/D, M/C	Ag, Au, Cu, Pb, Zn	Do.
F13	H/D	Ag, Au, Cu, Pb, Zn	Large, veins
F14	H/D	Ag, Au, Cu, Pb, Zn	Medium, veins
F15	H/D	Ag, Au, Cu, Pb, Zn	Small, veins
G1	H/C	U	Small, veins
G2	M/B	U	Do.
G3	L/B	U	Do.
G4	M/B	U	Do.
H1	M/C	W, (Au)	Small, veins
H2	M/C	W, (Zn, Pb, Cu, Ag, Au)	Do.
I1	H/D	Cu, Ag	Small, stratabound
I2	H/C	Cu, Ag, (U, V)	Do.
J1	H/D	U, V	Medium, stratabound
J2	L/C	U, V	Small
J3	H/D	U, V	Do.
J4	H/D	U, V	Do.
K1	M/C	Au	Small, placer
K2	L/C	Au	Do.
K3	M/C	Au	Do.
K4	L/B	Au	Do.
K5	M/C	Au	Do.
K6	M/C	Au	Do.
K7	H/D	Au, (Ag)	Medium, placer
K8	M/C	Au	Small, placer
L1	U/A	Au, Ag, Cu, Pb, Zn	Small, syngenetic, stratiform
L2	L/C	Au, Ag, Cu, Pb, Zn	Do.
L3	L/C	Au, Ag, Cu, Pb, Zn	Do.
L4	L/C	Au, Ag, Cu, Pb, Zn	Do.
L5	U/A	Au, Ag, Cu, Pb, Zn	Do.
L6	U/A	Au, Ag, Cu, Pb, Zn	Do.
M1	H/C	High-calcium limestone	Medium, bedded sedimentary
M2	H/D	High-calcium limestone	Do.
M3	M/C	High-calcium limestone	Do.
M4	M/C	High-calcium limestone	Do.
M5	H/C, M/C	High-calcium limestone	Do.
M6	M/B	High-calcium limestone	Do.
N1	M/B	Gypsum	Small, bedded sedimentary
N2	H/D	Gypsum	Do.
O1	H/D	Gas	
O2	H/D	Gas	
P1	M/C	Coal	
P2	M/C	Coal	
P3	H/D	Coal	
P4	M/B	Coal	
Q1	M/C	Coalbed methane	
Q2	M/C	Coalbed methane	
Q3	H/D	Coalbed methane	
Q4	M/B	Coalbed methane	
R1	M/C	Oil shale	
S1	H/D	Hot- and warm-water springs	
S2	H/D	Hot- and warm-water springs	
S3	H/D	Hot- and warm-water springs	