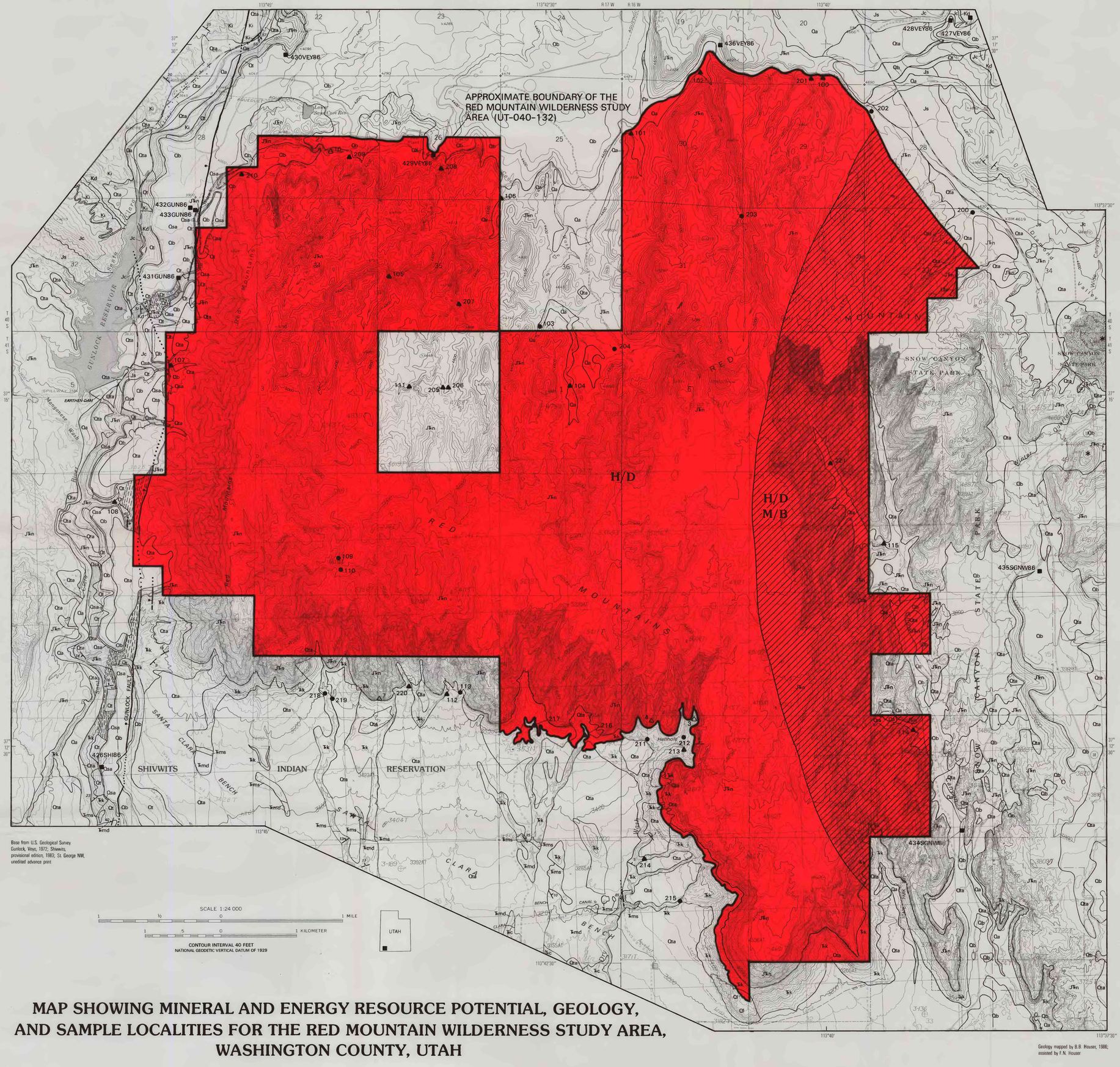
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

BULLETIN 1746-D
PLATE 1



Base from U.S. Geological Survey
Gunlock, Veyo, 1972; Shivwits, provisional edition, 1983; St. George NW, unedited advance print

SCALE 1:24 000
1 ½ 0 1 MILE
1 5 0 1 KILOMETER
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTAH

Geology mapped by B.B. Houser, 1986; assisted by F.N. Houser

MAP SHOWING MINERAL AND ENERGY RESOURCE POTENTIAL, GEOLOGY, AND SAMPLE LOCALITIES FOR THE RED MOUNTAIN WILDERNESS STUDY AREA, WASHINGTON COUNTY, UTAH

EXPLANATION OF MINERAL AND ENERGY RESOURCE POTENTIAL

[Entire study area has low resource potential for (1) silver, copper, uranium, vanadium, and gold, with certainty level B, (2) all other metallic minerals, with certainty level C, and (3) oil and gas, with certainty level B. Entire study area has no energy resource potential for coal, with certainty level D]

H/D — **Geologic terrane having high energy resource potential for low-temperature geothermal sources, with certainty level D—Applies to entire study area**

M/B — **Geologic terrane having moderate energy resource potential for high-temperature geothermal sources, with certainty level B—Applies to eastern part of study area (patterned)**

CORRELATION OF MAP UNITS

Qa, Qta, Qt, Ql, Qb, Qsa	Holocene, Pleistocene	QUATERNARY
Major unconformity		
Ki	Upper(?) Cretaceous	CRETACEOUS
Kd	Upper Cretaceous	
Major unconformity		
Jc	Middle Jurassic	JURASSIC
Js		
JTrn	Jurassic and Triassic(?)	
Trk	Upper Triassic(?)	TRIASSIC(?)
Trms		
Trmd		
Trc	Upper Triassic	TRIASSIC

DESCRIPTION OF MAP UNITS

Qa **Alluvium (Holocene)**—Alluvium of floodplain and channel of Santa Clara River and other large streams. Probably less than 15 ft thick

Qta **Terrace and pediment alluvium (Holocene and Pleistocene)**—Unconsolidated alluvial deposits chiefly on terraces and pediments. Range from relatively well-sorted gravelly alluvium of Santa Clara River terraces, to poorly sorted, subangular, gravelly and silty pediment alluvium south and northeast of Red Mountain, to loose sand in canyons east of Red Mountain. Includes steep, bouldery alluvial fans at cliff base south of Red Mountain, modern channel alluvium of smaller streams, and small areas of eolian sheet and dune sand. Maximum thickness about 50 ft

Qt **Talus (Holocene and Pleistocene)**—Unsorted accumulations of small to large blocks of basalt that mantle slopes below basalt flows. Maximum thickness 15 ft

Ql **Landslide block (Holocene or Pleistocene)**—Detached mass of Kayenta Formation (Trk) sandstone and mudstone that moved downslope as a coherent block in southeast corner of map area

Qb **Basalt (Holocene? and Pleistocene)**—Dark-gray, olivine-bearing basalt and basaltic andesite (49.1–54.1 percent SiO_2). Occurs as individual and multiple flows in modern valleys on east side of map area and in paleovalleys (now basalt-capped mesas) on west side of map area; forms a relatively flat plain on north side of map area. Cinder cones north and east of study area (fig. 2) were sources of some of the flows. Flows on west and north described by Embree (1970). Two flows on west side of map area were dated by M.G. Best at 1.6±0.1 Ma (Hintze, 1986) and 1.1±0.1 Ma (sample no. SG-70, Best and others, 1980). Thickness 0–100 ft

Qsa **Alluvium of the Santa Clara River (Pleistocene)**—Alluvium of Santa Clara River beneath oldest (1.6 Ma) basalt flow at western edge of map area. Thickness about 15 ft

Ki **Iron Springs Formation (Upper? Cretaceous)**—Yellow to brown, calcareous, feldspathic, crossbedded fluvial sandstone and pale-red to medium-red siltstone and shale. Locally bentonitic. Occurs northwest and northeast of study area. Maximum thickness 3,000 ft (Hintze, 1986)

Kd **Dakota Conglomerate (Upper Cretaceous)**—Moderately well sorted, imbricated pebble and cobble conglomerate consisting of well-rounded clasts of limestone, chert, vein quartz, and quartzite. Weathers to dark brown. Forms cuestas. Unconformably overlies Carmel Formation (Jc). Thickness 0–50 ft (Hintze, 1986). Thickness 5–10 ft northeast of study area

Jc **Carmel Formation (Middle Jurassic)**—Comprises two units. Poorly exposed upper unit of red and gray mudstone is about 30 ft thick. May correlate with banded member of the Carmel Formation as described in nearby areas by Mackin and Rowley (1976) and Peterson and Pipiringos (1979). Mapped by Hintze (1986) as the Crystal Creek Member of the Carmel as described by Blakey and others (1983).

Lower unit consists of interbedded calcareous shale, sandy limestone, and limestone. Limestone is medium gray, thin bedded, fossiliferous, and locally oolitic. Weathered color is yellowish gray. Mapped as upper and lower parts of the Judd Hollow Member of the Carmel by Hintze (1986) following the usage of Blakey and others (1983). Maximum thickness about 410 ft (Hintze, 1986)

Js **Sinawava Member of the Temple Cap Sandstone (Middle Jurassic)**—Red-brown gypsiferous mudstone and sandstone and a massive gypsum bed as thick as 6 ft near top. Maximum thickness about 450 ft

JTrn **Navajo Sandstone (Jurassic and Triassic?)**—Fine- to medium-grained, well-sorted, moderately well cemented to poorly cemented sandstone. Cement is chiefly calcite or iron oxide minerals, but locally (secs. 19, 30, T. 40 S., R. 16 W., north of Snow Canyon) the sandstone is cemented by chalcedony and has a vitreous luster. Characterized by large-scale eolian crossbedding and strong jointing. Color of lower half is moderate reddish orange; upper half commonly is white. Forms massive cliffs. Forms surface rock in virtually all of study area. Thickness 2,000–2,500 ft (Hintze, 1986)

Trk **Kayenta Formation (Upper Triassic?)**—Moderate-reddish-brown to reddish-orange (locally streaked and spotted with light gray), thinly laminated to thick-bedded, sandy mudstone and muddy sandstone. Minor ripple crossbedding, mud cracks, and sand load casts are present. Locally gypsiferous or calcareous. Sandstone predominates in upper part of formation. Reddish-brown, crossbedded, pebbly sandstone channel lenses locally common. Thickness about 1,200 ft

Moenave Formation (Upper Triassic?)—Includes Springdale Sandstone Member and Dinosaur Canyon Member

Trms **Springdale Sandstone Member**—Light-gray, pale-red, or grayish-yellow, massive appearing to crossbedded, fine- to medium-grained sandstone interbedded with pale-red claystone and clay-pebble conglomerate beds 1–2 ft thick. Sandstone forms rounded ledges and low domes. Detrital carbonaceous material is locally abundant in conglomerate and sandstone beds and is associated with silver, copper, and uranium-vanadium mineralization in Silver Reef mining district about 15 mi east of study area. Thickness 30–100 ft

Trmd **Dinosaur Canyon Member**—Light-green-gray and brown-red mudstone, and moderate-red-brown muddy sandstone. Thick bedded. Thickness 300–370 ft

Trc **Petrified Forest Member of the Chinle Formation (Upper Triassic)**—Consists of bentonitic mudstone of variegated pastel shades, and crossbedded, arkosic, pebbly sandstone that locally contains petrified wood. Thickness about 400 ft

Contact

Fault—Showing dip where known. Dashed where inferred. Bar and ball on downthrown side. Longer arrow shows direction and plunge of slickensides

Shear zone

Strike and dip of bedding
- Inclined
- Apparent

Volcanic cinder cone

U.S. Bureau of Mines rock sample locality—Numbers refer to Wood (1987)

U.S. Geological Survey sample locality—Numbers at triangles and circles refer to Detra and others (1988)

Rock sample

Stream-sediment, panned-concentrate, and rock sample

Stream-sediment and panned-concentrate sample

LEVEL OF RESOURCE POTENTIAL ↑ / LEVEL OF CERTAINTY →	A	B	C	D
U/A	H/B HIGH POTENTIAL	H/C HIGH POTENTIAL	H/D HIGH POTENTIAL	
UNKNOWN POTENTIAL	M/B MODERATE POTENTIAL	M/C MODERATE POTENTIAL	M/D MODERATE POTENTIAL	
	L/B LOW POTENTIAL	L/C LOW POTENTIAL	L/D LOW POTENTIAL	
			N/D NO POTENTIAL	

LEVELS OF RESOURCE POTENTIAL
- H High mineral resource potential
- M Moderate mineral resource potential
- L Low mineral resource potential
- U Unknown mineral resource potential
- N No known mineral resource potential

LEVELS OF CERTAINTY
- A Available data not adequate
- B Data indicate geologic environment and suggest level of resource potential
- C Data indicate geologic environment, give good indication of level of resource potential, but do not establish activity of resource-forming processes
- D Data clearly define geologic environment and level of resource potential and indicate activity of resource-forming processes in all or part of the area

Diagram showing relationships between levels of mineral resource potential and levels of certainty. Shading shows levels that apply to this study area