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MAP SHOWING OUTCROPS OF GRANITIC ROCKS, BASIN AND RANGE PROVINCE, UTAH

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INTRODUCTION

This map report is one of a series of geologic and hydrologic maps covering all or parts of States within the Basin and Range province of the western United States. Other map reports in this series contain data about ground-water hydrology, ground-water quality, surface distribution of selected rock types, tectonic conditions, areal geophysics, Pleistocene lakes and marshes, and mineral and energy resources. This work is a part of the U.S. Geological Survey's program for geologic and hydrologic evaluation of the province to identify prospective regions for further study relative to isolation of high-level nuclear waste (Bedinger, Sargent, and Reed, 1984).

This map report was prepared from published geologic maps and reports utilizing the project guidelines defined in Sargent and Bedinger (1984). As used in this report, granitic rocks include principally granite, quartz monzonite, and granodiorite, but also minor associated diorite, rhyolite, and latite.

In the Description of Map Units, the geologic and radiometric ages, lithologic character, type of intrusive body and relation to enclosing rock units, where known, and sources of data are described for the granitic rocks within outlined and numbered areas in counties within the study area. The radiometric ages of the rock units are only those that are available and do not necessarily represent the entire age range of the units.

DESCRIPTION OF MAP UNITS
[To convert feet (ft) to meters, multiply feet by 0.3048]

County-area number	Map symbol	Geologic and radiometric age in million of years (m.y.)	Lithology, intrusive type, and comments	References for county area
		BEAVER COUNTY (B)		
B-1	Tg	Tertiary	Nonresistant, granular dioritic rocks, probably occupying volcanic conduits.	Hintze, 1974b
B-2	Tg	Oligocene, 28.0 m.y.	Cactus stock: Medium-grained, holocrystalline quartz monzonite. Part of large tabular Tertiary intrusive.	Lemmon and Morris, 1979; McKelvey, 1973; Schmoker, 1972
B-3	Tg	Oligocene 28.4 m.y.	Stocks, sills, and dikes of granodiorite. West side of largest stock is sill-like.	Lemmon and Morris, 1983; Lemmon and others, 1973; Welsh, 1973
B-4	Tg	Oligocene 27.0 m.y.	Stocks and sills(?) of granite, quartz monzonite, and granodiorite in the Rocky Range. Granite crops out in northwest part, quartz monzonite in southern part, and granodiorite in east and northeast parts. Dikes intrude stocks and surrounding sedimentary rocks.	Lemmon and others, 1973; Whelan, 1973
B-5	Tg	Miocene 20.9 m.y.	Milford Flat stock: Medium- to coarse-grained granodiorite and some quartz monzonite containing stope blocks of limestone.	Abou-Zied, 1973; Abou-Zied and Whelan, 1973; Lemmon and others, 1973
B-6	Tg	Miocene 9 to 15 m.y.	Mineral Mountains batholith: Granitic batholith with joint plane systems striking N. 10°-20°W., and N. 80°-90° W.	Crawford and Buranek, 1957; Luedke and Smith, 1978
B-7	Tg	Tertiary	Monzonite to quartz monzonite, generally equigranular and fine- to medium-grained. Moderately altered.	Haug, 1978
B-8	Tg	Miocene and Oligocene 24.1±1.2 m.y.	Intrusive rocks of Bullion Canyon Volcanics: Mostly porphyritic to equigranular, fine- to medium-grained equigranular, quartz monzonite.	Cunningham and Steven, 1980
B-9	Ti	Miocene 20.7 m.y.	Intrusive rocks of Mount Belknap Volcanics: Several small, porphyritic quartz latitic to rhyolitic stocks.	Cunningham and Steven, 1978
B-10	Tg	Tertiary	Indian Peak stock: Quartz monzonite porphyry; intrudes welded ash flows of Indian Peak cauldron. Much propylitic alteration.	Grant and Best, 1979

BOX ELDER COUNTY (BE)				
BE-1	Tg	Tertiary	Vipoint Mountain intrusion: Lineated granodiorite and adamellite and associated sills.	Compton and others, 1977; Hintze, 1980
	pЄi	Precambrian	Intrusive rocks.	
BE-2	Xg	Early Proterozoic 2,180±190 2,500 m.y.	Intrusive rocks of Clear Creek Canyon: Metamorphosed adamellite, granular to gneissose, and locally porphyritic, biotite adamellite.	Compton, 1975; Compton and others, 1977; Felix, 1956; Todd, 1980
BE-3	Tg	Oligocene 24.9±0.6 m.y.	Stocks of Red Butte Canyon: Cupolas of an adamellite body that lies close to the surface throughout the central Grouse Creek Mountains.	Compton and others, 1977
	XWg	Early Proterozoic or Late Archean 2,510±170 m.y.	Gneissose adamellite that grades upward, from coarse- and medium-grained gneiss to fine-grained gneiss and schist. Interlayed with lesser quantities of granodiorite, tonalite, and leucocratic gneiss.	
BE-4	Tg	Miocene to late Eocene 23.3±0.5 and 38.2±2.0 m.y.	Granitic intrusive bodies of Immigrant Pass.	Armstrong, 1970; Compton and others, 1977
BE-5	Tg	Tertiary	Monzonite stock and monzonite porphyry dikes.	Blue, 1963
BE-6	Jg	Jurassic 149.6±4.5 m.y.	Stock; quartz monzonite core and granodiorite-quartz monzonite rim. Many quartz monzonite porphyry dikes cut main intrusion.	Carroon, 1977
BE-7	KJg	Early Cretaceous or Late Jurassic 140±3 m.y.	Stocks in Silver Island Range. Crater Island quartz monzonite stock, largest, cut by prominent northeast-trending joint set. Radiometric age from Crater Island stock.	Hintze, 1980; Schaeffer and Anderson, 1960
BE-8	Jg	Jurassic	Intrusive rocks.	Hintze, 1980
IRON COUNTY (I)				
I-1	Tg	Miocene 20 m.y.	Three Peaks pluton: Concordant quartz monzonite-porphyry intrusion, consisting of peripheral shell phase 50 to 200 ft thick, altered crumbly phase, and altered interior phase having selvage joints. Subsurface extent shown by Blank and Mackin (1967).	Armstrong, 1970 Blank and Mackin, 1967; Bullock, 1973; Mackin, 1954; Mackin and Rowley, 1976
I-2	Tg	Miocene 20 m.y.	Granite Mountain pluton: Same lithology as Three Peaks pluton, county area I-1.	Armstrong, 1970; Blank and Mackin, 1967; Bullock, 1973; Mackin, 1954; Mackin and others, 1976

I-3	Tg	Miocene 22 m.y.	Intrusive rocks of Iron Mountain: Quartz monzonite porphyry similar to rocks described in county areas I-1 and I-2. Probably considerable westward subsurface extension, as shown by aeromagnetic study (Blank and Mackin, 1967).	Armstrong, 1970; Blank and Mackin, 1967
I-4	Tg	Tertiary	Stoddard Mountain laccolith and westward extension, the Paradise intrusive body: Quartz monzonite porphyry similar to other granitic rocks in Iron County. Probable westward subsurface extension.	Cook, 1957

JUAB COUNTY (J)

J-1	Tg	Tertiary 18.7±0.4 and 22 m.y.	Ibapah stock: Altered biotite-adamellite stock bisecting Deep Creek Mountains. North and south contacts are planar faults striking N. 70° W., and dipping 40°-70°S. Intensely fractured by six sets of cooling joints.	Armstrong, 1966, 1970; Bick, 1966
J-2	Ti	Oligocene 26.5±0.5 to 32.4±1.2 m.y.	Intrusive rocks of Desert Mountain: Oldest to youngest--granodiorite, adamellite, leucogranite porphyry, quartz-latite porphyry, and a shallow rhyolite intrusive. Aeromagnetic survey (Calkins, 1972) indicate resurgent intrusive mass at depth.	Armstrong, 1970; Calkins, 1972; Kattelman, 1968; Lindsey and others, 1975; Shawe, 1972
J-3	Tg	Oligocene or Eocene	Westernmost body is West Tintic monzonite stock of uniform granitic texture, overlain 400 500 ft of andesite and tuff. Parts of northern outcrops called breccia pipes by Morris (1977).	Cohenour, 1959; Morris, 1977
J-4	Tg	Oligocene 31.5±0.9 m.y.	Silver City stock: Granular to prophyritic, medium- to fine-grained, propylitically altered Silver City monzonite. Also includes plug and dikes.	Lindgren and Loughlin, 1919; Morris, 1964; 1975; Morris and Lovering, 1979
		Tertiary	Swansea Peak stock: Northwestern end of largest outcrop. Composed of medium- to fine-grained, porphyritic Swansea Quartz Monzonite.	
J-5	Tg	Oligocene >31.5 and <32.8 m.y.	Gough sill, Dry Ridge sill, and Sunrise Peak stock: Sills, stock, and small intrusives composed of Sunrise Peak Monzonite Porphyry. Gough sill (northern and largest outcrop) about 500 to 1,000 ft thick. Dry Ridge sill (southernmost outcrop) 500 ft thick in cross section (Morris, 1975). Sunrise Peak stock is small, unmapped outcrop along southwest corner of Gough sill. Aeromagnetic data (Mabey and Morris, 1967) indicate an extensive igneous body underlies south one-half of East Tintic Mountains.	Mabey and Morris, 1967; Morris, 1964, 1975; Morris and Lovering, 1979

J-6	Ti	Oligocene	Plugs and dikes composed of Sunrise Peak Monzonite Porphyry and latite porphyry of Burnt Hollow. Latite strongly argillized, consists largely of kaolinitic clay minerals.	Morris, 1964, Morris and Lovering, 1979
			MILLARD COUNTY (M)	
M-1	Jg	Late Jurassic 143±3 m.y.	Notch Peak intrusive: Jointed, porphyritic quartz monzonite stock. Southerwestern flank is large sill about 100 ft thick, whose roof rock is Cambrian limestone. Recent placement of Cretaceous-Jurassic boundary at 144 m.y. (Palmer, 1983) indicates possible Early Cretaceous age.	Armstrong and Suppe, 1973; Crawford and Buranek, 1957; Gehman, 1958; Hanks, 1962; Hintze, 1974a, 1980: Palmer, 1983
			TOOELE COUNTY (T)	
T-1	TKg	Tertiary or Cretaceous 22 and 26.2±0.5 m.y.	Little Cottonwood stock: Quartz monzonite, tentatively dated as Cretaceous because it is cut by the Charleston thrust fault (Late Cretaceous), radiometric ages are Miocene to Oligocene.	Armstrong, 1966, 1970; Baker and Crittenden, 1961; Crittenden, 1965a, 1965b
T-2	Tg	Oligocene to Eocene 32.8±0.7 and 39±6 m.y.	Alta stock. Granodiorite.	Armstrong, 1966, 1970; Crittenden, 1965b
T-3	Tg	Eocene 37.8±0.8 and 41.9±0.8 m.y.	Bingham Canyon stock: Biotite-uralitized augite monzonite. Magnetic study shows a large parent mass of monzonite underlying the Oquirrh Mountains; consequently, plutons in county areas T-3 through T-8 may be contiguous at depth.	Armstrong, 1970; Moore, 1973
T-4	Tg	Tertiary	Intrusions of Settlement and Middle Canyons: Quartz monzonite and diorite stocks, sills, and dikes.	Gilluly, 1932
T-5	Tg	Tertiary	Stockton stock (or Soldier Canyon stock): Shallow porphyritic adamellite stock with related dikes and sills.	Gilluly, 1932; Lufkin, 1965
T-6	Ti	Tertiary	Intrusive rhyolite at Bald Mountain: similar to porphyritic rhyolite of county area T-8.	Gilluly, 1932
T-7	Tg	Tertiary	Sills at Porphyry Knob and Lion Hill: "Bird's-eye" monzonite porphyry cut by prominent joint sets.	Gilluly, 1932
T-8	Ti	Tertiary	Intrusive rhyolite at Sunrise Hill and small stocks of porphyritic Eagle Hill Rhyolite.	Gilluly, 1932

T-9	Tg	Eocene 38±2 and 42.5±0.8 m.y.	Northern part of the Gold Hill stock: Principally quartz monzonite and related porphyry dikes and aplites.	Armstrong, 1970: El-Shatoury and Whelan, 1970; Fowkes, 1964; Nolan, 1935; Stacey and Zartman, 1978
	Jg	Jurassic 152±5 m.y.	Southern part of the Gold Hill stock: Lithology identical to northern part of stock.	
T-10	pEg	Precambrian	Granite Peak leucocratic granite, extensively jointed and cut by numerous pegmatite dikes and quartz veins.	Fowkes, 1964
T-11	Ti	Tertiary	Intrusive rocks.	Hintze, 1980
T-12	Tg	Miocene 16.7±0.3 m.y.	Sheeprock leucocratic granite: Crumbly weathering biotite adamellite, cut by numerous joint sets.	Armstrong, 1970; Cohenour, 1959; Mabey and Morris, 1967

WASHINGTON COUNTY (W)

W-1	Tg	Miocene	Mineral Mountain stock: Alkali-feldspar granite porphyry. Right-lateral strike-slip fault which displaces northern part of stock 3,840 ft eastward.	Morris, 1980
W-2	Tg	Tertiary	Hypabyssal calc-alkaline intrusives of Bull Valley Mountains.	Blank, 1959; Blank and McKee, 1969; Tobey, 1976; Zoldock and Wilson, 1953
W-3	Tg	Tertiary	Pine Valley laccolith. Completely de-roofed monzonite-porphyry laccolith at least 3,000 ft thick.	Cook, 1959, 1960
W-4	pEg	Precambrian	Coarse-grained granite which intrudes gneiss and schists. Gray granite exposed in large bodies; cut by pegmatite dikes of pink granite, which also occurs as thin sheets along planes of schistosity.	Reber, 1951

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