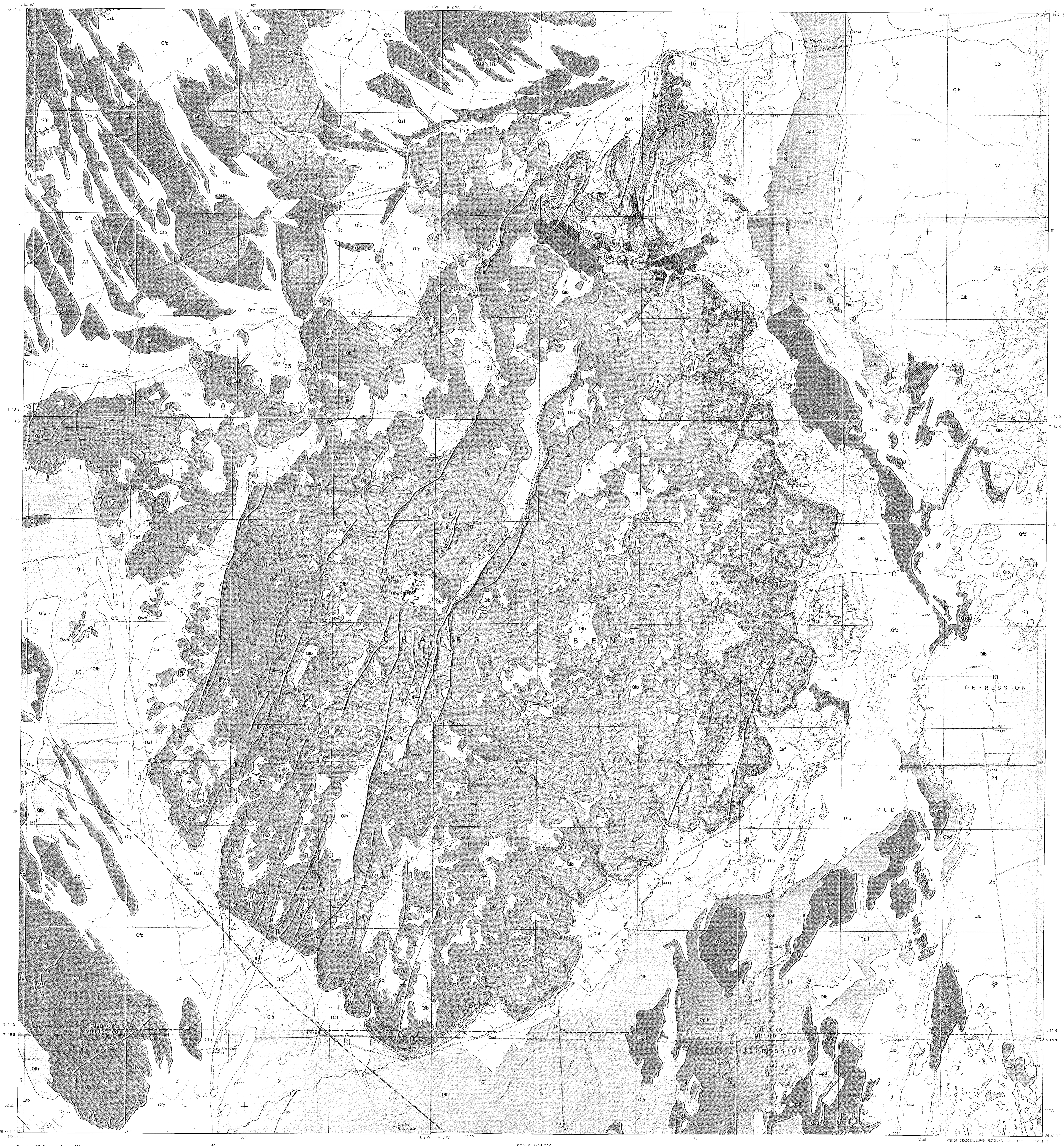
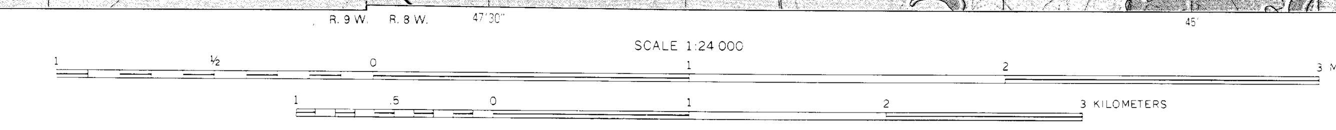
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I-1297



Base from U.S. Geological Survey, 1971
Baker Hot Springs, Crater Bench Reservoir,
Fumarole Butte, The Hogback



CONTOUR INTERVALS 5, 10, AND 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA.—1981—C30421

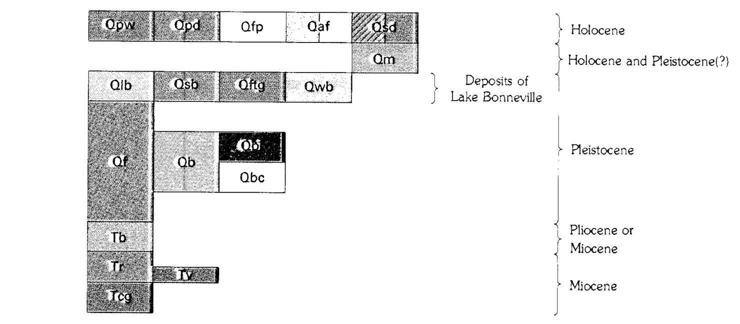
Geology by airphoto and field reconaissance methods.
Field work by G. L. Galyardt, 1975 (assisted by
James V. Roberts), and F. Eugene Rush, 1976

GEOLOGIC MAP OF THE CRATER SPRINGS KNOWN GEOTHERMAL RESOURCES AREA AND VICINITY, JUAB AND MILLARD COUNTIES, UTAH

By
Gary L. Galyardt and F. Eugene Rush

1981

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

ALLUVIAL AND EOLIAN DEPOSITS

Qpw WET PLAYA DEPOSITS (HOLOCENE)—Light-brown silt and clay, water-saturated; commonly flooded by runoff and rising ground water. Thin, light-tan clay crust (locally silty) may form on land surface during extended dry periods. Very thin, discontinuous salt crust

Qpd DRY PLAYA DEPOSITS (HOLOCENE)—Light-tan to medium-brown silt and clay, saturated to land surface during winter and spring; occasionally flooded by runoff. Depth to saturation during summer and fall may be as much as 1 m; land surface firmest during early fall. Includes small areas of blow sand and small sand dunes

Qfp FLOOD-PLAIN DEPOSITS (HOLOCENE)—Light-tan clay, sand, and silt; generally thin deposits. Occur in shallow channels of low to moderate gradient peripheral to Crater Bench. Deposited by ephemeral runoff from adjacent and upslope areas

Qaf ALLUVIAL-FAN DEPOSITS (HOLOCENE)—Light-tan clay, sand, and silt with some pebble- to boulder-size clasts of basalt and quartzite bedrock exposures. Formed as result of erosion of lake-sediment veneer during periods of emergence and by erosion of bedrock and bar and beach deposits. Stippled pattern identifies alluvial fans and cones composed entirely of or mantled by basalt boulders, cobbles, and pebbles, with clay, silt, and sand matrix. Found along steep margins of The Hogback, Crater Bench, and, locally, along larger fault scarps

Qsd DUNE DEPOSITS (HOLOCENE)—Mostly fine- to coarse-grained quartz sand and silt and clay. Deposited as eolian dunes by prevailing southwesterly winds. Crossbedded dunes east of Crater Bench are dominantly silt and clay. Commonly 2–6 m high. Parallel lines identify deposits of sand, silt, and clay blown from dunes and accumulated as a layer, commonly less than 1 m thick, on flat areas downwind from dunes

HYDROTHERMAL-RELATED DEPOSITS

Qm MOUNT-SPRING DEPOSITS (HOLOCENE AND PLEISTOCENE?)—Mostly light-gray clay, silt, and sand and reddish-brown calcareous manganese-rich hot-spring-derived tufa at core of mound and at mound crest. Mound has accreted around mouths of hot springs, owing to entrapment of eolian clay, silt, and sand by moist ground and vegetation. When dry, soil is fluffy. Mound has a very shallow water table; it is saturated to land surface during winter months and to slightly below land surface during summer months. Locally dissected

DEPOSITS OF LAKE BONNEVILLE

Qlb LAKE SEDIMENTS (PLEISTOCENE)—Light-tan clay, sandy silt, and sand. Light-tan crust with small desiccation cracks and desert pavement of volcanic rock fragments common. Land surface nearly horizontal and varies from hard to soft; relatively undissected except in the eastern part of the area where dissection is extensive adjacent to playas. Thickness 0 to 1+m

Qsb SANDBAR DEPOSITS (PLEISTOCENE)—Light-tan fine- to medium-grained silty quartz sand and volcanic-rock fragments; unconsolidated. Surface partly covered with desert pavement of volcanic-rock fragments as much as 60 mm in diameter. Map unit consists of bars deposited on the northern and northwestern sides of Crater Bench. Offshore bars of Bonneville age are the highest (about 1,520 m); near-shore bars of Provo age are lower and smaller and abut the western margin of the basalts of Crater Bench. The largest of these near-shore bars extends about 3 m above the general land surface, at 1,465 m above mean sea level

Qftg REWORKED TERTIARY CONGLOMERATE DEPOSITS (PLEISTOCENE)—Light tan poorly sorted unconsolidated material derived by wave erosion of the tuffaceous conglomerate (Tcg); medium- to coarse-grained sand with pebbles and cobbles of pumice, silicified volcanic rocks, and basalt

Qwb WAVE-BENCH DEPOSITS (PLEISTOCENE)—Benches are wave-reworked basalt fragments (boulder to pebble size); less commonly, benches are thin poorly cemented beach deposits of sand and gravel, formed at various elevations. The most prominent benches were formed during the high stand of Lake Bonneville during Provo time at elevations of 1,450–1,465 m above mean sea level, and are cut benches on older lake-sediment deposits; these benches are found only around The Hogback

PRE-LAKE DEPOSITS

Qf FLUVIAL DEPOSITS (PLEISTOCENE)—Interbedded and unconsolidated gravel, sand, silt, and clay. Gravel lenses consist of subangular to subrounded clasts averaging 7 cm in diameter, but may be as large as 30 cm in diameter; clasts are volcanic and sedimentary rocks derived from nearby source areas to the west and northwest. Silt and clay underlying gravel and sand deposits may be lacustrine deposits. The uppermost part of these deposits has been reworked by wave action during Lake Bonneville time; the deposits shown in the southwest map corner may be an elongate delta of Lake Bonneville, but the exact origin is undetermined

VOLCANIC DEPOSITS

Qb BASALTS OF CRATER BENCH (PLEISTOCENE)—Black fine-grained vesicular to nonvesicular basalt flows, described by Hogg (1972) as "very fine aphyric basaltic andesite." Individual flows not mapped. The flow complex is about 11 km wide by 13 km long. In cross section it is shaped like an inverted saucer, with an estimated maximum thickness of about 180 m near Fumarole Butte. K-Ar age is 0.95±0.1 m.y. (Harald Mehnert, written commun., 1978)

Qbl Basalt—Black to dark-red fine-grained nonvesicular very resistant. Intrudes the remnant cinder cone (Qbc)

Qbc Erosional remnant of a basalt cinder cone—Consists of two units that form a topographically prominent knob (Fumarole Butte) with a remnant central summit depression. Unit 1 is composed of dark-red densely welded cinders intruded by Qbl; unit 2 is the erosional remnant of a nonwelded cinder mantle that once surrounded the central cone (vent) of unit 1; most of unit 2 has been removed by erosion

Tb BASALT OF THE HOGBACK (PLIOCENE OR MIOCENE)—Black vesicular basalt having a maximum thickness of 45 m. K-Ar age dated at 5.26±0.42 m.y. (Harald Mehnert, written commun., 1978). Weathers to large angular blocks that obscure contacts with underlying mapped units. Forms The Hogback and adjacent ridges to the west. Mapped unit includes associated basalt talus

Tr RHYOLITE OF THE HOGBACK (MIOCENE)—Light-gray rhyolite with well-developed flow banding; contains large phenocrysts of sanidine, as much as 4 mm in length, and quartz. Lithophysae, as much as 2 cm in diameter, are filled with drusy quartz crystals. K-Ar age is 6.87±0.28 m.y. (Mehnert, Rowley, and Lipman, 1978). Differential weathering has given the flow a coarse, irregular, vuggy surface

Tv Vitrophyre—Black basal unit, porphyritic, poorly exposed

PREVOLCANIC ROCKS

Tcg CONGLOMERATE (MIOCENE)—Light-tan to dark-red fluvial conglomerate and interbedded sandstone; clasts of pumice, quartzite, rhyolite, basalt, and other volcanic rocks up to 0.8 m in diameter. A bedded tuff 0.53 m thick crops out near the stratigraphically lowest exposures in NW¼NW¼ sec. 29, T. 13 S., R. 8 W.; the tuff contains pebbles and cobbles of subangular tuff, basalt, and orthoquartzite cemented by chalcedony(?) and opal nodules 1–2 mm in diameter. Unit varies from poorly resistant to very resistant; poorly resistant beds weather easily, becoming reworked debris in Qftg unit; resistant beds weather to large angular blocks of clasts with attached matrix and individual rounded clasts. Minimum thickness of unit is 229 m. D. A. Lindsey (oral commun., 1979) identified cobbles of Joy Tuff (38 m.y.; Lindsey, 1979) from samples taken across the exposed stratigraphic section and cobbles of Topaz Mountain Rhyolite (6–7 m.y.; Lindsey, 1979) from a sample near the stratigraphically highest exposed beds of this unit; fragments of Topaz Mountain Rhyolite were not found in stratigraphically lower samples. The source areas for the identified volcanic clasts (D. A. Lindsey, oral commun., 1979) are in the southeastern Thomas Range, northeastern Drum Mountains and Keg Mountain to the west and northwest of the map area

CONTACT—Approximate

LAKE BONNEVILLE SHORELINE—Usually dissected shoreline benches; prominent along northwest side of mapped area

FAULT—Dashed where inferred; dotted where concealed; queried where doubtful. Ball and bar on downthrown side

LINEAMENT—From aerial photographs; of unknown origin

fi FISSURE—Open fissures in basalt, often fault-associated; dashed where approximately located, dotted where obscured or partially filled by Qlb deposits

12 STRIKE AND DIP OF BEDS

76 STRIKE AND DIP OF FLOW FOLIATION

HOT SPRING—Crater Hot Springs, also known as Baker and (or) Abraham Hot Springs

INFERRED CURRENT DIRECTION—Sandbar deposits

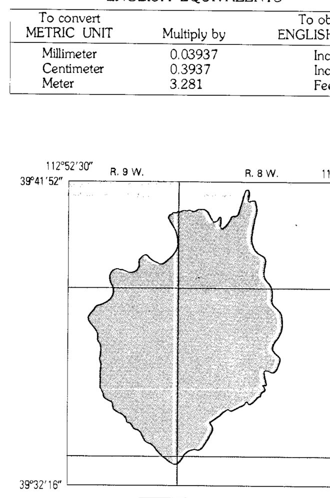
VOLCANIC VENT

REFERENCES

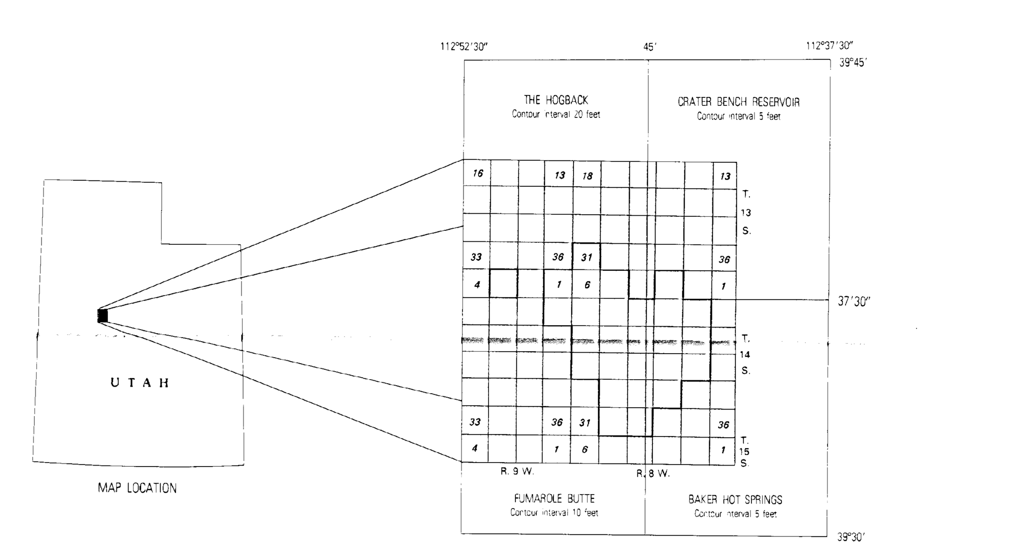
Hogg, N. C., 1972, Shoshonitic lavas in west-central Utah: Brigham Young University, Geologic Studies, v. 19, pt. 2, p. 133–185.
Lindsey, D. A., 1979, Preliminary report on Tertiary volcanism and uranium mineralization in the Thomas Range and northern Drum Mountains, Juab County, Utah: U.S. Geological Survey Open-File Report 79-1076, 101 p.
Mehnert, H. H., Rowley, P. D., and Lipman, P. W., 1978, K-Ar ages and geothermal implications of young rhyolites in west-central Utah: Isochron West, no. 21, p. 3–7.

CONVERSION FACTORS FOR ENGLISH EQUIVALENTS

To convert METRIC UNIT	Multiply by	To obtain ENGLISH UNIT
Millimeter	0.03937	Inch
Centimeter	0.3937	Inch
Meter	3.281	Feet



INDEX MAP SHOWING AREAS OF MAPPING RESPONSIBILITY



INDEX MAP SHOWING QUADRANGLE NAMES AND BOUNDARIES, AREA OF THIS GEOLOGIC MAP (SHADED), AND BOUNDARY (HEAVY LINE) OF CRATER SPRINGS KNOWN GEOTHERMAL RESOURCES AREA (KGRA) EFFECTIVE FEBRUARY 1, 1974

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