BULLETIN 1384 UNITED STATES DEPARTMENT OF THE INTERIOR PLATE 1 **GEOLOGICAL SURVEY** CORRELATION OF MAP UNITS Qs QUATERNARY QUATERNARY Pliocene **TERTIARY** Tys Tvb Tt TERTIARY Tpu Tpmv Toa and Oligocene MAJOR UNCONFORMITY PRE-TERTIARY pTms pTmv pTmu pTmsv **DESCRIPTION OF MAP UNITS** UNCONSOLIDATED SEDIMENTARY DEPOSITS (Pleisto-Rhyodacite to andesite flows and tuffs, primarily in areas cene and Holocene) - Include windblown sand, volcanic north of Aurora Crater. Include coarse andesite porphyry ash, alluvium, fan deposits, talus, colluvium, glacial deplug and associated rhyolite and andesite porphyry flows posits south of Bridgeport and in Bridgeport Canyon, 11 m.y. old in the western part of the Brawley Peaks and Bodie Hills, and lake beds exposed on Paoha Island in in Bodie Canyon, southwest of Aurora. Also includes rocks Mono Lake and around the periphery of Mono Lake in Red Wash, near Masonic, described by Johnson (1951), Miocene volcanic rocks of Koenig (1963) in the Sweet-Tys YOUNGER SEDIMENTARY ROCKS (Pliocene) – Fluviatile water Mountains, and the andesitic rocks of Moore (1969) and lacustrine sedimentary rocks. Include fine to coarse in the Pine Grove Hills clastic and diatomaceous material; tuffaceous debris com-Older andesitic rocks, porphyritic to nonporphyritic. Flows, breccias, and intrusive rocks. Minor tuff and andesitic OLDER SEDIMENTARY ROCKS (Miocene) - Fluviatile and sandstone and gravel within the unit in Bodie Canyon are lacustrine deposits, partly tuffaceous. Include diatomite, not differentiated on the map. Age 13.5-15.4 m.y. in fine to coarse clastic beds, and minor ash layers and volvicinity of Aurora (Silberman and McKee, 1972, p. 14) canic breccias. Age about 9-12 m.y.; at least partly correla-In general, all these rocks are weakly altered (propylitized) tive with the Aldrich Station, Coal Valley, and Morgan or, in some areas, intensely altered (argillized and silicified) Ranch Formations of Axelrod (1956) like those at Aurora and vicinity, Masonic and vicinity, MISCELLANEOUS RHYOLITIC TO BASALTIC ROCKS and the Paramount mine area (Pliocene, Pleistocene, and Holocene) OLDER RHYOLITE (Oligocene and Miocene) - Rhyolitic Rhyolitic to dacitic rocks in Mono Lake. Cones, plugs, and rocks, commonly ash flows and tuffs. Rhyolites in the vicinflows forming all or parts of the islands in Mono Lake, inity of Sweetwater Flat (northwest part of map) were shown cluding Paoha and Negit Islands (Lajoie and Carmichael, as Pliocene by Koenig (1963) but are tentatively correlated 1967, who stated that volcanoes were active during with rhyolitic rocks several miles north of the map area in post-Tioga time) the Pine Grove Hills that range in age from 22 to 28 m.y. Andesitic and basaltic rocks in three volcanoes - Aurora (Eastwood, 1969, p. 63, 75). Similar ages were obtained for Crater, Mud Spring, and Black Point. The oldest volcano minor rhyolitic ash flows at or near the base of the Tertiary section east of Mono Lake (Gilbert and others, 1968, p. 280is probably Aurora Crater-lava from there was dated at 250,000 years old. Material from Black Point volcano is PLUTONIC ROCKS (pre-Tertiary) about 13,000 years old (Gilbert and others, 1968, p. 298) Granitic rocks, equigranular to porphyritic; 93 m.y. old in Andesitic and basaltic rocks, mainly near Aurora. Related Bodie Hills at Conway Summit according to Chesterman to volcanoes of Pleistocene age; Beauty Peak volcano, (1968); 90 m.y. old north of Lundy Canyon; 75 m.y. old 2.8 m.y. old; Mount Hicks volcano, 1.6 m.y. old in the southern Wassuk Range (Evernden and Kistler, VOLCANIC ROCKS EAST AND NORTHEAST OF MONO 1970, pl. 2) Diorite and related rocks Andesitic and basaltic andesite rocks of Cedar Hill and Trench Canyon. Age 2.2-3.6 m.y. (Al-Rawi, 1970) METAMORPHIC AND SEDIMENTARY ROCKS (pre-Tertiary) Alkali(?)-olivine basalt and basaltic rocks. Age clustered Chiefly siliceous strata including chert, quartzite, phyllite, in the range from 2.6 to 4.5 m.y. and hornfels; some marble in the Sierra Nevada YOUNGER RHYOLITE (Miocene and Pliocene) - Porphyri-Chiefly metavolcanic rocks, including rhyolite and andesite tic and nonporphyritic rhyolite and rhyodacite. Includes as flows, dikes, and pyroclastic deposits plugs (Spring Peak?), cumulo domes (Bald Peak), dikes, Metamorphic and sedimentary rocks, undifferentiated and flows. Ages vary. Rhyolite intruding altered andesite Metasedimentary and metavolcanic rocks, undifferentiat Aurora is 2.5 m.y. old; rhyolite at Mount Hicks, 3.6 m.y. old (Gilbert and others, 1968); rhyolite and rhyodacite at Warm Spring Flat, 5.3 m.y. old; rhyolite near Meta-andesite, including pyroclastic deposits, mainly in the Mount Biedeman, 9.4 m.y. (Gilbert and others, 1968) and 9.1 m.y. old; rhyolite north of Aurora, 11 m.y.; and Metarhyolite, including pyroclastic deposits, mainly in the rhyolite at Baghdad Peak, 10 m.y. Rocks of intermediate age probably occur AREA OF SMALL INTRUSIVE BODIES - Includes plugs Tvb VOLCANIC ROCKS OF THE BODIE AREA (Miocene) of vent areas and domes; excludes rhyolite bodies. Most Dominantly andesitic and dacitic tuff breccia, lava, and rhyolite bodies form plugs, cumulo domes, and, less comminor tuff, all in blanketlike deposits. Plugs of similar monly, dikes and are shown separately on the map. Note composition are shown by red overprint. Some basalts that intrusive bodies of Tertiary age are not identified in are included. Include the Rancheria Tuff Breccia, Mount the large area in Nevada where field mapping has not been Biedeman Formation, Silver Hill Volcanic Series, Potato sufficiently detailed for their determination (see figure 3 Peak Formation, Murphy Spring Tuff Breccia, and Willow Springs Formation, all of Chesterman and Gray (1966) CINDER CONE - Related to alkali(?)-olivine basalt and baand Chesterman (1968). Most rhyolites in these units are saltic rocks in age range 2.6-4.5 m.y. shown with a separate pattern (Tyr). Ages determined BRECCIA PIPE - Mapped only northeast of Mono Lake range from 7.8 to 13.3 m.y. ASH-FLOW TUFFS (Miocene) - Mildly to intensely welded; ALTERED AREA - Argillic to silicic rocks; propylitic and locally nonwelded. Include conspicuous black to very and pyritic areas not shown. Note that altered areas dark brown vitric zones and, in Bodie Canyon, some are not shown for the Sierra Nevada Sweetwater Mountuffaceous sedimentary rocks. Trachyandesitic in compositains, Pine Grove Hills, Wassuk Range, Excelsior Mountion north of Mono Lake but commonly referred to as tains, Anchorite Hills, and that part of the Bodie Hills latite ignimbrite by workers in the region. Average age is northwest, north, northeast, and east of Masonic 9.4 m.y., except east of Mono Lake, where age is between 11 and 12 m.y. and where rocks have a different source. Include undifferentiated pyroclastic rocks west of the East Walker River in the Sweetwater Mountains, some of Contact, approximately located or inferred - Dotted where which correlate with the ash flows in the Bodie Hills concealed; queried where uncertain. Many of the contacts INTERMEDIATE INTRUSIVE BODIES OF THE MASONIC in Mineral County, Nev., particularly in the Wassuk Range MOUNTAIN AREA (Miocene) - Predominantly andesitic and Excelsior Mountains (taken from Ross, 1961, pl. 2) rocks, including minor amounts of rhyodacitic and should in all probability be considered approximately lobasaltic rocks as intrusive bodies in the vicinity of cated, although for convenience they are shown as solid Masonic Mountain. At least one body is overlain by the ash-flow tuff unit (Tt) that is about 9.4 m.y. old. Other Fault - Dashed where probable; dotted where concealed; bodies intrude volcanic rocks of the Bodie area (Tvb) and queried where uncertain. Bar and ball on downthrown side. are overlain by younger volcanic rocks south of Masonic Arrows show relative horizontal movement Mountain. Intrusive rocks originally mapped by Johnson △¹⁷ △¹⁰ Potassium-argon sample locality (1951), Stanford University (unpub. data), and Al-Rawi Group of mines (1970, pl. 1, p. 63-64) are included Magnetic contours - Showing total intensity magnetic field OLDER VOLCANIC ROCKS (Oligocene and Miocene) of the earth, in gammas, relative to arbitrary datum. Undifferentiated volcanic rocks and andesites in the vicinity Hachured to indicate closed areas of lower magnetic of Masonic and northwest of the Bodie Hills in the Sweetintensity. Contour interval 20 and 100 gammas Geology compiled by F.J. Kleinhampl and M.L. Silberman Base from U.S. Geological Survey water Mountains. Include volcanics in Masonic Gulch Location of measured maximum or minimum intensity with-SCALE 1:125 000 from maps and reports listed in Index to Geologic Mapping 1:250,000 Walker Lake, 1969 (Johnson, 1951) in closed high or closed low Aeromagnetic survey flown at barometric elevations of 11,000 feet above sea level north of lat 38°11' N. and - Flight path - Showing location and spacing of data west of long 118° 37' W. and 9,000 feet above sea level 5 4 3 2 1 0 10 KILOMETRES elsewhere; and compiled by Lockwood, Kessler and Bartlett, CONTOUR INTERVAL 200 FEET WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS DATUM IS MEAN SEA LEVEL 118°45' 119°00′ 118°45' 1. Moore (1969) 2. Ross (1961) 3. Gilbert, Christensen, Al-Rawi, and Lajoie 4. Al-Rawi (1970) **EXPLANATION** 5. Kleinhampl and Silberman (this report). Mapping by Ross and Al-Rawi north of Nevada State Highway 31 was extensively modified Dashed where inferred; dotted where concealed. Bar and ball on downin places by Kleinhampl and Silberman; **NEVADA** mapping by Lundby, Green, Koenig, and thrown side. Arrows indicate relative horizontal movement Johnson, as well as by the Stanford University Geology Department, was modified locally by Kleinhampl and Silberman; 6. Lundby (1957) Axis of warp 7. Green (1964) 8. Koenig (1963) 9. C. W. Chesterman and C. H. Gray, Jr. (unpub. data, 1971) 11. Stanford University Geology Department, 12. Unmapped geology extrapolated into area from surrounding mapped parts using aerial photographs as an aid CALIFORNIA MONO LAKE Modified from Gilbert, Christensen, Al-Rawi and Lajoie (1968) and from other contribu-10 MILES tors listed in Index to Geologic Mapping 15 KILOMETRES

15 KILOMETRES

GENERALIZED GEOLOGIC STRUCTURE

INDEX TO GEOLOGIC MAPPING