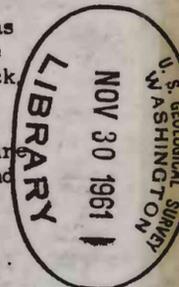


Symbol and name	Rock character, form, and distribution
Basalt dikes and plugs. Tbi	Nearly black aphanitic to finely crystalline basalt with phenocrysts of olivine, augite, and hypersthene (?) in matrix of labradorite laths. Flow-banded and vesicular near some contacts. Feeders to flows.
Rhyolite plugs and dikes. (Not shown)	White to pink, flow-banded felsitic rhyolite with phenocrysts of quartz and biotite set in an aphanitic matrix. Only 1 dike, 10 feet wide, 300 feet long in mining district; cuts Colorado formation in North Star Basin--undifferentiated.
Post Wimsattville dikes and irregular plugs, Sparse quartz group: Tli Quartzose group: Tliq	A heterogeneous group of intrusions, of intermediate composition, having insignificant age differences, defy rigid simple classification because of numerous combinations of such variables as size, shape, arrangement and proportion of crystals, variations in abundance of mineral species, but general similarity in mineral composition. The entire suite of post-Groundhog quartz monzonite rocks are characterized by one or more of the following features: 1.) Needle hornblende--at least in border zones; 2.) brecciated host rock adjacent to irregular contact; 3.) percentage of phenocrysts less than 50 percent, generally 30 percent; 4.) nature of alteration: from simple weathering to intensely chloritized, carbonatized, pyritized, argillized or "sericitized"--but not epidotized. Lack of significant quantities of epidote most distinctive--and reliable; 5.) nature of border zones: pronounced fluxion structure generally, gray to black chilled facies; decrease of biotite and quartz marginally; 6.) thin books or flaky biotite only (thick books absent) eliminates all older rocks; presence of thin and thick not diagnostic; 7.) crosscut by older suite of rocks. All the minerals of the older rocks are known in post-ore suite, but not necessarily all in any one specimen. Known constituents are quartz, large poikilitic orthoclase, oligoclase, andesine, acicular and blocky hornblende, biotite in plates and thick books up to 2:1, length: diameter. Accessories: apatite, allanite, sphene, zircon, and magnetite. Rock types include biotite hornblende latites, quartz latites, quartz monzonite porphyries, rhyolite and granite porphyries. Thin dikes, like some chilled borders, are hornblende andesite. Further classification beyond quartz content must be based on fabric differences, such as nature of chilled selvage or its absence. These rocks confined to a belt 3.5 miles wide trending NNE, from Bayard to Fierro. Quartzose types (generally older) are within 1 to 1½ miles of Hanover in the west-central part of the belt. Here, to, are the pre-Wimsattville formation post-ore dikes--the Turnerville and Republic dikes--which are essentially identical to, although older than the quartzose group.
Turnerville and Republic dikes. Salic quartz monzonite. Tli	<u>Turnerville dike:</u> thick facies: light-colored porphyry 50 percent in phenocrysts of quartz, (well formed bipyramids) biotite as thin plates and thick books, stubby prisms of hornblende, oligoclase, and numerous large poikilitic orthoclase phenocrysts. Accessories include magnetite, probable sphene, rutile (?) and apatite. Groundmass is quartz-orthoclase intergrowth. Thin facies has less quartz and no poikilitic orthoclase. Trends northwest between Santa Rita stock and Wimsattville structural basin 4100 feet long, 60-400 feet wide. Fragments of it in Wimsattville formation. Alteration like next older Tertiary group. Cut by few quartz-pyrite, chalcopyrite veinlets in SE, part. <u>Republic dike:</u> 35-40 percent phenocrysts. Mineralogically like Turnerville except more of the biotite is in thick books and border zone has abundant needle hornblende. Both dikes are salic quartz monzonites. Trends EW, just north of Bull Hill, through Hanover and Republic mine area. Four echelons in 7000 feet. Nowhere silicified but a little epidote appears where cutting through previously epidotized country rock. Two kinds of quartzose Tertiary dikes cut across it.
Groundhog quartz monzonite. TKqm or qm	Differs from older granodiorite dikes only in greater abundance of quartz and presence of large poikilitic phenocrysts of orthoclase, obscure in altered rock. Chemically identical within limits of accuracy, with fresh Santa Rita stock rock. Largely confined within wedge of ground marked by Fierro at the apex and the Groundhog mine and a point on the south wall of Chino's South Pit. Epidote rarely so abundant as in granodiorite. Probably followed deposition of major zinc mineralization, but contains disseminated chalcopyrite. Dike near Buckhorn gulch, one in Princess shaft area, and one in Groundhog mine may be intermediate in age between normal quartz monzonite and granodiorite dikes. Orthoclase phenocrysts smaller, less abundant. Possibly related to Copper Flat stock.
Copper Flat intrusives. TKcf ₁ , TKcf ₂	A composite mass consisting of a quartz monzonite ethmolith intruded on its west margin by a plug of monzonite porphyry. The plug, 65 percent matrix of orthoclase and quartz, 35 percent phenocrysts of argillized feldspar, thick books of chloritized biotite, and long prisms of hornblende, no quartz. The ethmolith mass has four facies: 1.) quartz monzonite porphyry; 2.) quartz monzonite porphyry with sparse small orthoclase phenocrysts; 3.) similar to 2.), but more and larger orthoclase phenos; 4.) monzonite of the border, resembles the plug rock. Minerals present: quartz, oligoclase, orthoclase, hornblende, small plates of biotite; accessories are magnetite, apatite, zircon, and possibly sphene. Relative age based on mineralogical similarity and presence of epidote in alteration suite and fact they cut the TKlp quartz diorite sill at depth.
Granodiorite intrusives. TKgd or gd. TKgd ₁ and TKgd ₂	<u>Granodiorite porphyry dikes:</u> (TKgd or simply gd). Marked porphyritic texture with phenocrysts of andesine, hornblende, biotite and quartz set in matrix of fine-grained to aphanitic orthoclase and quartz. Accessories: sphene, apatite, magnetite, zircon, and allanite. Wide chilled borders north of Hanover. Exposed within 2-mile wide belt trending NNE, and NE, from Bayard to and beyond Fierro. <u>Porphyritic granodiorite:</u> (TKgd ₂). Stocks and apophyses. Same mineral content as dikes; generally more quartz, lighter color and distinguishable from earlier sill by biotites having greater than 1:1 ratio of axes to diameter. Usually coarse grained, but fine- to medium-grained facies in Santa Rita stock may represent chilled margin. Represents 85 percent of Hanover stock rock and appears to be later than rock of south lobe. <u>Granitoid hornblende diorite or quartz diorite:</u> (TKgd ₁). Light-gray, granitoid, holocrystalline rock consisting largely of andesine (An ₃₂) 60 percent with interstitial hornblende and extremely variable amounts of thin biotite plates. Accessories are sphene, quartz, and apatite. Makes up south lobe of Hanover stock.
North Star Basin suite. TK, Td, Tu	<u>General:</u> Rocks of this suite with few exceptions are restricted to area north of Barringer fault. Most are pyroxene-bearing. Less than 5 percent of the dikes can be shown at scale of map. <u>Tk:</u> Kersantite dikes: abundant biotite phenocrysts and plagioclase laths in fine-grained groundmass. Fresh fracture olive gray, weathers orange brown. <u>Sparse augite - abundant epidote.</u> <u>Td:</u> Includes all lighter colored dikes some of which may be Ktlp, others are identical to Ktlpd; includes dikes of slightly different relative age. <u>Tu:</u> Undifferentiated dikes: includes basic andesite, augite and pigeonite andesite porphyries, augite-biotite andesite porphyry, augite hornblende andesite, and others. Usually less than 10 feet wide, difficult to trace over 50 feet because of correlation difficulties.
Orthoclase gabbro composite plug. Tg ₁ , Tg ₂	<u>Tg₁:</u> Crescent-shaped western portion of composite plug. Medium-gray, granitoid, coarse-grained rock consisting of augite and biotite set in gray matrix of feldspar. Orthoclase 20 percent; bytownite-andesine (zoned) 55 percent, biotite and chlorite 10 percent, augite 15 percent, quartz 3 percent. Apatite in augite, orthoclase in shapeless masses poikilitically including biotite, plagioclase, and quartz. <u>Tg₂:</u> Dark-gray, finer-grained rock containing 30 percent orthoclase, 25 percent calcic labradorite, 11 percent biotite and chlorite, 31 percent augite, less than 3 percent magnetite, apatite, etc. Rocks cut by countless pink aplitic and pegmatite dikelets an inch or less thick. Cut also by most dikes of the North Star Basin suite.
Later quartz diorite of Bull. 870 Ktlp	Greenish-gray even-grained rock composed of labradorite-andesine, hornblende, and sparse droplet quartz. Accessories include apatite, zircon, and biotite in Santa Rita and more eastern outcrops, but absent near Groundhog area. Epidote common, some in spherical masses. Occurs mainly as sills or laccoliths, but east of Kneeling Nun - as dikes.
Hornblende porphyry KThp	Similar to Later quartz diorite except hornblende phenocrysts are long and prominent and feldspar phenocrysts are larger; considerable orthoclase; plagioclase indeterminate because of severe alteration. A little anhedral quartz present. Laccoliths sills and dikes--in NE part of district only. Hornblende altered to zoisite, calcite, chlorite, and epidote.
Augite-hornblende diorite porphyry. KTphd	Dark greenish-gray porphyritic rock with stubby phenocrysts of augite and hornblende set in fine-grained matrix consisting largely of andesine and augite with some quartz, orthoclase, apatite, and magnetite. Epidote and chlorite abundant as alteration products. Sills and laccoliths NW, quarter of District. Constitutes Hermosa Mountain and Fierro laccoliths of Spencer and Paige (1935).
Quartz diorite porphyry. KTeP	Gray to greenish-gray seriate porphyry with phenocrysts of hornblende, biotite (1:1 or less) labradorite-andesine, quartz, orthoclase, and apatite. The matrix, 50-60 percent of the rock, consists of very fine-grained quartz and orthoclase, presumably. Accessories include apatite, magnetite, sphene, and allanite. Sparse large phenocrysts of poikilitic orthoclase are in the massive sills near Shingle Canyon, but some reservations are held on the correlation of this mass with the Earlier quartz diorite of the Santa Rita area. It might possibly be equivalent to the Copper Flat porphyry. As sills and laccoliths; chilled zone 4-10 feet resembles Later quartz diorite (Ktlp). Abundant epidote, chlorite, albite, etc.
Albite-quartz porphyry. (No outcrop)	Nearly white porphyry with numerous small euhedral bipyramids of quartz and albite crystals set in an aphanitic groundmass. Chlorite, epidote common alteration minerals. In the district known only underground, but east of district, intrudes Percha shale. From Groundhog to Republic mine as sills and laccoliths in Oswaldo and Percha.



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