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ENCAMPMENT, WYP. Copper Deposits of the Encampment
District, Wyo. A.C. Spencer, USGS PP 25, 1904.

Sierra Madre, N Extension of Park Range.

Precambrian complex forms main mass of mts. Mesozoic outcrop on foothills on either side and dip away. Low arch or anticline, axis of which parallels mt. crest. "The gradual uplift of this arch was accompanied by general erosion, which removed the Mesozoic rocks from its axial portion and revealed the ancient formations below." p.15.

Precambrian rocks in order of age:

1. Hbl. schist derived from bedded volcanics. Base of layered rock series. Fine-grained, dark, strong cleavage. Frequent Py, cpy disseminations or lenses. Creede mine.

Younger rocks probably laid down ~~in~~ over eroded surface of these.
either by igneous or pressure

2. Limestones & shales. Max. thickness 200'. Little altered, not strongly mineralized.

3. Qtzite, slate. 1000'-2000' minimum. Cgl of red granite, lower part. Qtzite so silicified as to resemble vein qtz. Even tiny feldspar, from recrystallization of arkose. Qtzite is CR for ore bodies at Ferris-Haggarty, Doane, most important in district. Sulphides in many other places.
Local erosional surface

4. Conglomerate, youngest Prec. Massive bed. Bldrs are granite, hbl. schist and qtzite. Granite pebbles from gray granite which cuts hbl. sch., especially to N; no red granite which outcrops in large amounts south of sed. found. Granitic rocks (quartz diorite) contributed greatest amount to the cgl. Uplift.

700'. Mechanical, chemical meta. Bldrs, pebbles of granite mashed into dishes, schistose. Recrystallization porphyroblasts of flds, hbl., garnet, in pebbles & matrix. To gneiss.

In a few places where cgl much crushed, qtz-sulph. veins following gneissic structure; s.t. cpy without qtz. along planes of movement parallel schistosity.

Mesozoic: Trias. Red Beds, ss., ls with occasional cgl. 1200'.

Fresh-water Jurassic: shalt, with ss. Lenses marine Ju ls. 400'.
Dakota, Colorado and Montana.

Tertiary: SW part of district cgl overlaps upturned, bevelled edges of Meso. Nearly flat. Wyo cgl.

Gabbro etc. As intercalated sheets in Precambrian and as transgressive bodies. All intruded at same time, after folding, faulting, crushing and partial recrystallization of beds.

Dark, usually fg., tough, hard, look fresh. "Diorite". Really greatly meta. 3 types; basic to acid: olivine-norite pr peridotite; norite; gabbro. Metaproducts serp. and hbl-flds rocks similar to diorite in composition and hbl-qtz-epidote rocks, original felds. gone. All types contain magmatic (?) copper. Meta mainly by pressure, moderate, variable.

Granitic rocks. Much older than gabbros. Gray qtz-diorite older than red granite and intruded by it. Pressure-meta. Genissic structure, secondary parallel beds in great syncline: may have formed at same time.

Red Granite: A few masses north of syncline, but mainly S, where it cuts qd locally, and in general is intrusive into hbl schists. Least altered of all rocks. Uncrushed. Probably at least as old as the gabbros. Intruded after the folding. Granite never sole CR for important veins; but dark rks enclosed in it, and pegmatite dikes localized ore.

Author contradicts himself on age relations: p. 23, says all of qd and greater part of red granite are older than deposition of the ls. P. 40 red granite U gabbro intruded after folding. P. 19, seds all younger than granite rocks and hbl-schist.

rec. Structure: All contacts between seds and the older schist and granitic rocks are flt.s up which gabbro intruded.

Synclorium widens to W, pitches down to W. Extensive strike-faulting some shown on map. Also N-S faults, small, but make veins, esp. in qtzites and basic intrusives (Doane, Ferris-Haggarty).

Ore Deposits. - Doane, Ferris-Haggarty only ones with ore reserves. Kurtze-Chatterton, a few tons good ore.

Mainly copper, a few lead-silver occurrences; gold, by itself in qtz veins or in small, variable amounts with otherbores. Ccpy, bornite, chalcocite, covellite, mal., azurite, chrysocolla, cuprite. Cu also s.t. in pyrrhotite with a little Ni, Co.. Gangue qtz, calcite, siderite. Cr with replacement deposits.

Gossan: Ferris-Haggarty, strong capping of spongy limonite, no copper. Doane: Green copper minerals mixed with limonite at surface.

Hinton Type: ccpy s.t. with magnetite in zones in hbl-schist which here carry much garnet, epidote in addition to usual hbl., qtz. Garnet-epidote mark alteration of thin limy beds.

Creede Type: No CM minerals ex ls. Pyrrhotite with Cu, Ni, Co., ccpy. In cse phase of hbl-schist near mass of norite, probably on contact.

Continental type: Qtz-sulphide veins; at Continehtal, following platy structure of sheared cgl. Elsewhere in veins transverse to general grain of CR. Kurtze-Chatterton.

Cascade Type: ccpy in pegmatite vein or dike with flds., qtz. These shattered, interstices filled with ccpy, qtz-
type.

Doane Type: Main ~~mine~~ Cu₂S, covellite, bornite, under strong gossan, no Cu, ~~gx~~ 2ndry sulphs grade down to ccpy. In Doane and Ferris-Haggarty lodes follow brecciated qtzite beds, ore in interstices.

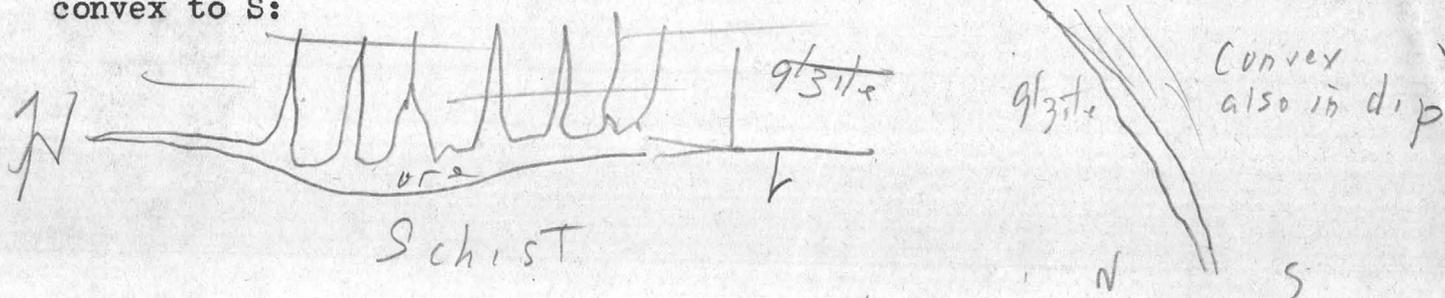
Doane Mine: In 400' belt qtzite, strike E-W, dip steep N, between "diorite" (gabbro clan) on N, conformable, and ls, then "diorite" on S. The 70 N dip is opposed to regional direction.

Joints: most prominent follow beds; another set, north, dip steep W. 3rd set, slight angle to strike of beds, dip steeply S.

Ore bodies: at 3 horizons in qtzite. Gangue only qtzite frags. Ore bodies as pipes sides of which conform in different places to various joint systems described. Bed planes main control, or the fractures parallel to bed and those normal to beds. Thus OBs dip N because beds do, but pitch W with depth because N-S fractures dip W. Resultant pitch is NW. N-S fractures have produced much of the brecciation. Three OBs on same N-S sheeted zone. Channels.

Ferris-Haggarty: In qtzites, 225' below cgl. Dip S 45. Contact horizon has sed. schist above, qtzite below. Schist flowed, no joints. Qtzite fractured, most prominently N-S, normal to course of vein.

Ore follows irreg. brecciated zone in upper part of definite qtzite bed below the sed. schist, latter not brecciated, flowed. Schist 50' thick. HW of ore. No definite FW, gradational, tests, depend on completeness of brecciation or presence of cross fractures. Ore localized where contact convex to S:



General: Faults, joints probably Laramide age. Transvers graben, bounding faults localized in general at borders of synclorium. These borders, and the flts, were channels for two distinct ore zones: on N, Leighton Gentry, Lucky Find, Creede. On S, Rex, Doane, Portland, Hercules. Gertrude, Hidden Treasure, Great Lakes, Kurtz-Chatterton. Ferris-Haggarty However in center of synclorium. N-S joints probably due to arching E-W, as graben due to bending of axis N-S. Although all intrusives are Precambrian, magmatic origin could be supposed.

Main ore bodies limited to most acute segment of synclorium where sides are steepest. Transgressive contacts, faults made main channels.

Ferris-Haggarty, usual contrast between brittle qtzite and soft schist localied the ore.



