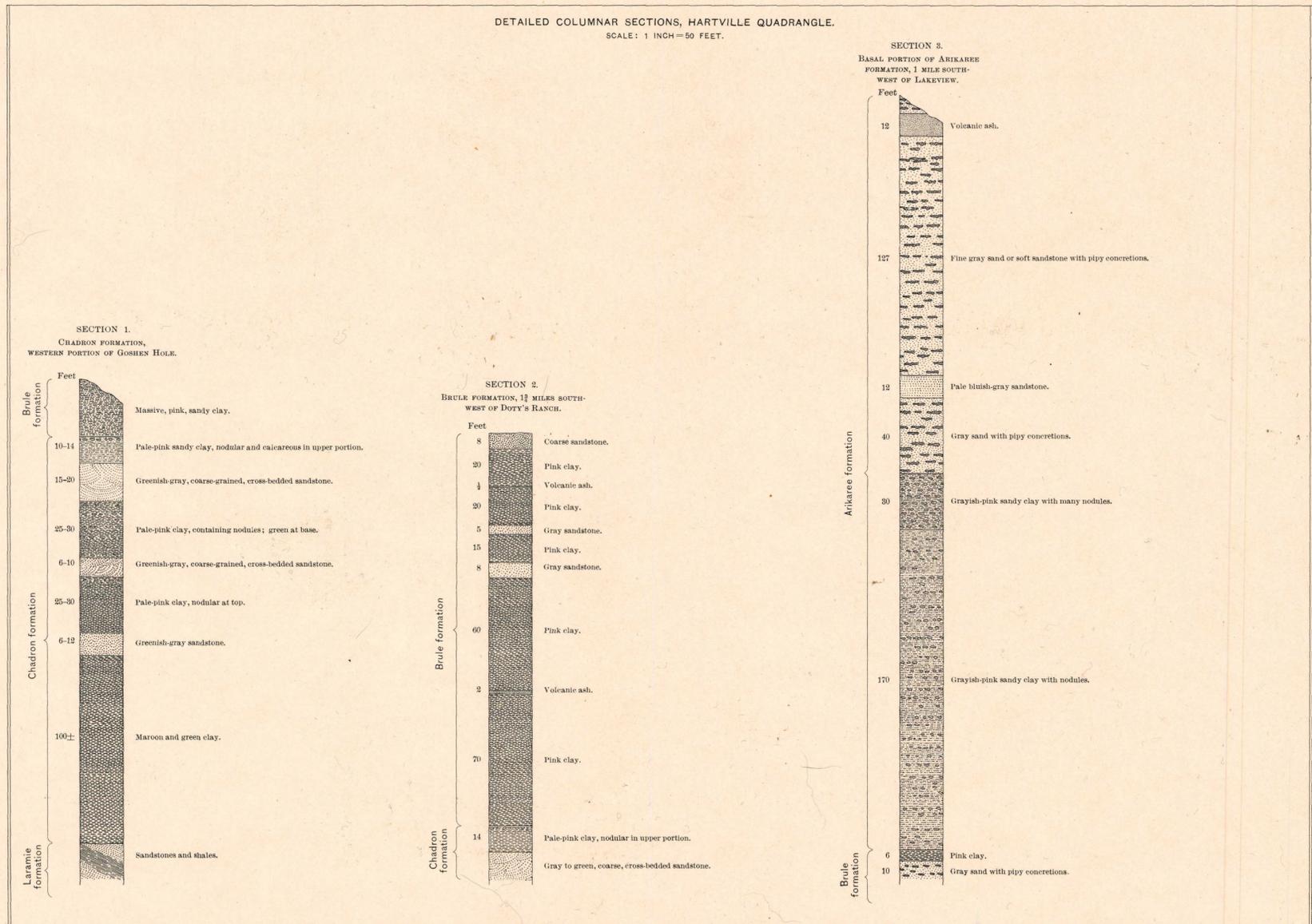


# COLUMNAR SECTION SHEET 1

GENERALIZED SECTION OF THE ROCKS OF THE HARTVILLE QUADRANGLE.  
SCALE: 1 INCH = 500 FEET.

PERIOD.	FORMATION NAME.	SYMBOL.	COLUMNAR SECTION.	THICKNESS IN FEET.	CHARACTER OF ROCKS.	CHARACTER OF TOPOGRAPHY.
PLEISTOCENE	Alluvium.	Pag		1-30	Gravel, sand, and silt.	Occupies valley floors and caps mesas and terraces.
	Arikaree formation.	Nar		700+	White sand and soft sandstone with pipy concretions.	Valleys of variable width, bordered by abrupt slopes; broad mesas, terraces, and extensive, flat uplands; and the upper portions of cliffs.
NEOCENE				(30-40)	Gray sandstone and conglomerate.	
	Brule formation.	Eb		250	Flesh-colored sandy clay with lenses of sandstone.	Slopes below cliffs of Arikaree formation and broad, shallow valleys separated by low, broad divides.
EOCENE (OLIGOCENE)	Chadron formation.	Ec		60+	Green, maroon, and pink sandy clay and gray sandstone.	Valleys.
	Graneros formation.	Kgs		120+	Gray flaky shale with concretions and massive sandstone near the top.	Mesas and hills with flat or gently sloping tops.
CRETACEOUS	Dakota sandstone.	Kd		250-300	Massive buff, gray, and reddish sandstone and quartzite with several thin beds of clay and shale.	"Hogback" hills with gentle slopes or flat-topped hills bordered by abrupt cliffs.
	Morrison clay.	Jm		100	Clay of various colors from green to purple and black, with a thin bed of limestone.	Slopes below Dakota sandstone cliffs, and valleys between.
JURATRIAS (TRIASSIC?)	Sundance formation.	Jsd		200	Buff sandstone with interbedded clays near the top.	Slopes, especially at the base of Dakota sandstone cliffs; also valleys.
	Spearfish sandstone. ("Red beds.")	Jsf		450	Dark reddish-brown, medium-grained, thin-bedded sandstone containing limestone lenses and thin sheets of gypsum in the lower portion.	Valleys and low saddles.
CARBONIFEROUS (PERMIAN)	Minnekahta limestone.	Cmk		20	Gray to purplish, thin-bedded, platy limestone.	Summit and western slopes of low "hogback" hills.
	Opeche formation.	Co		60	Bright-red, thin-bedded sandstone, with red, flaky shale.	Eastern slopes of Minnekahta limestone "hogbacks;" also valleys.
	Hartville formation.	Ch		650	Massive gray limestone, some beds containing chert nodules, with occasional beds of white, gray, buff, and red sandstone.  Red shale and gray limestone. Red quartzite streaked with white.	Flat-topped hills with narrow canyons and open valleys.  Upper portion of cliffs and flat or sloping tops of hills.
	Guernsey formation.	Cg		150	Conglomeratic quartzite with overlying sandstone and massive gray limestone.	
ALGONKIAN	Whalen group and intrusive granite.	Aw (gr)			Quartzite, schist, siliceous limestone, and gneiss. Large masses and dikes of granitic rocks intrusive in the sedimentary beds.	Rugged hills and slopes.

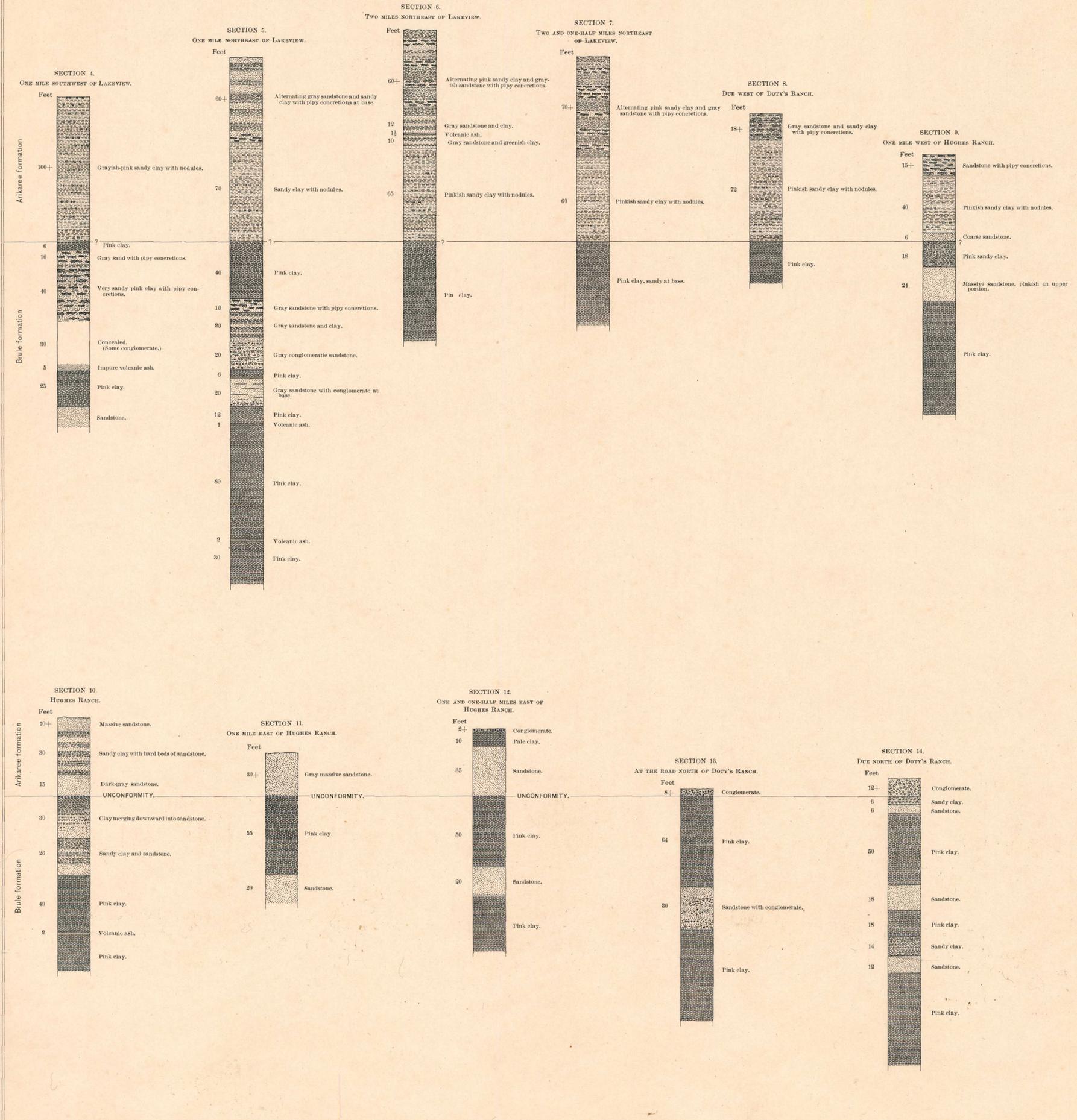
DETAILED COLUMNAR SECTIONS, HARTVILLE QUADRANGLE.  
SCALE: 1 INCH = 50 FEET.



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# COLUMNAR SECTION SHEET 2

DETAILED COLUMNAR SECTIONS OF THE BRULE AND ARIKAREE FORMATIONS, HARTVILLE QUADRANGLE.  
SCALE: 1 INCH = 50 FEET.



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FIG. 1.—BUTTE CAPPED BY A BED OF SANDSTONE IN THE ARIKAREE FORMATION, NORTHEAST OF BOXELDER SPRINGS.

The butte has been determined by the resistant character of the sandstone, and the weathering at its margin has developed columnar structure.



FIG. 2.—OLD GRAVEL-CAPPED RIVER TERRACE OF NORTH PLATTE RIVER, NORTHEAST OF CASSA.

Terrace is on the Arikaree formation. Hartville formation in the background.

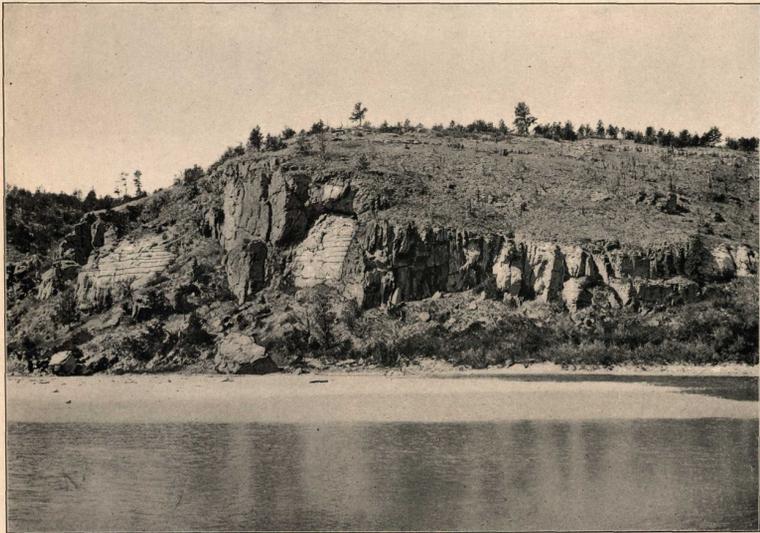


FIG. 3.—CLIFF OF CARBONIFEROUS ROCKS ON THE WEST SIDE OF NORTH PLATTE RIVER, JUST ABOVE FAIRBANK.

Showing the jointed, massive quartzite at the base of the Hartville formation resting unconformably on the bedded limestone of the Guernsey formation.

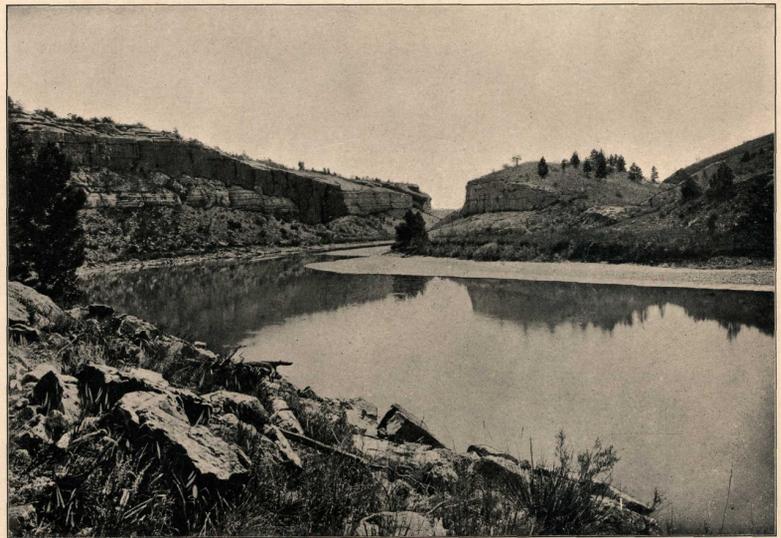


FIG. 4.—CANYON OF NORTH PLATTE RIVER WEST OF FAIRBANK, LOOKING EASTWARD.

Showing the massive quartzite at the base of the Hartville formation resting unconformably on the bedded rocks of the Guernsey formation.



FIG. 5.—CANYON OF NORTH PLATTE RIVER, ONE AND ONE-HALF MILES ABOVE WENDOVER, LOOKING NORTHWESTERLY.

A characteristic view of the canyon, which has been cut in the rocks of the Hartville formation.

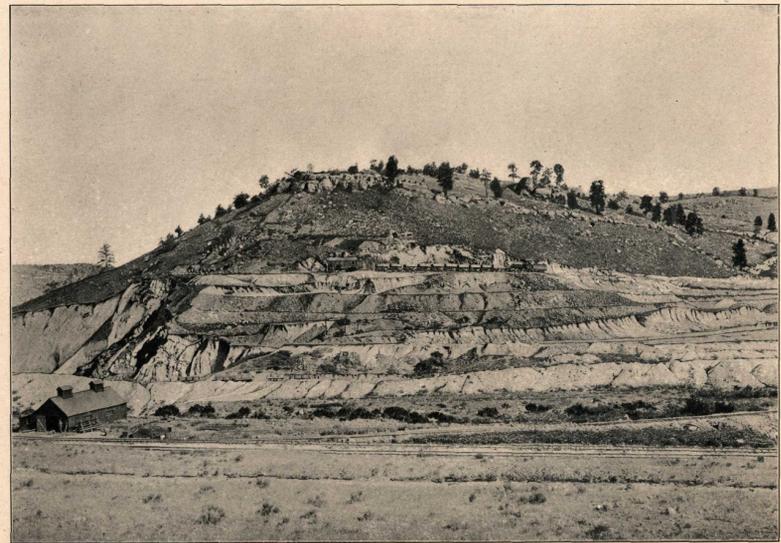


FIG. 6.—GENERAL VIEW OF THE IRON MINE AT SUNRISE.

Deposit of hematite in the Whalen group. Guernsey and Hartville formations form the top of the hill. Photograph taken in the summer of 1901.