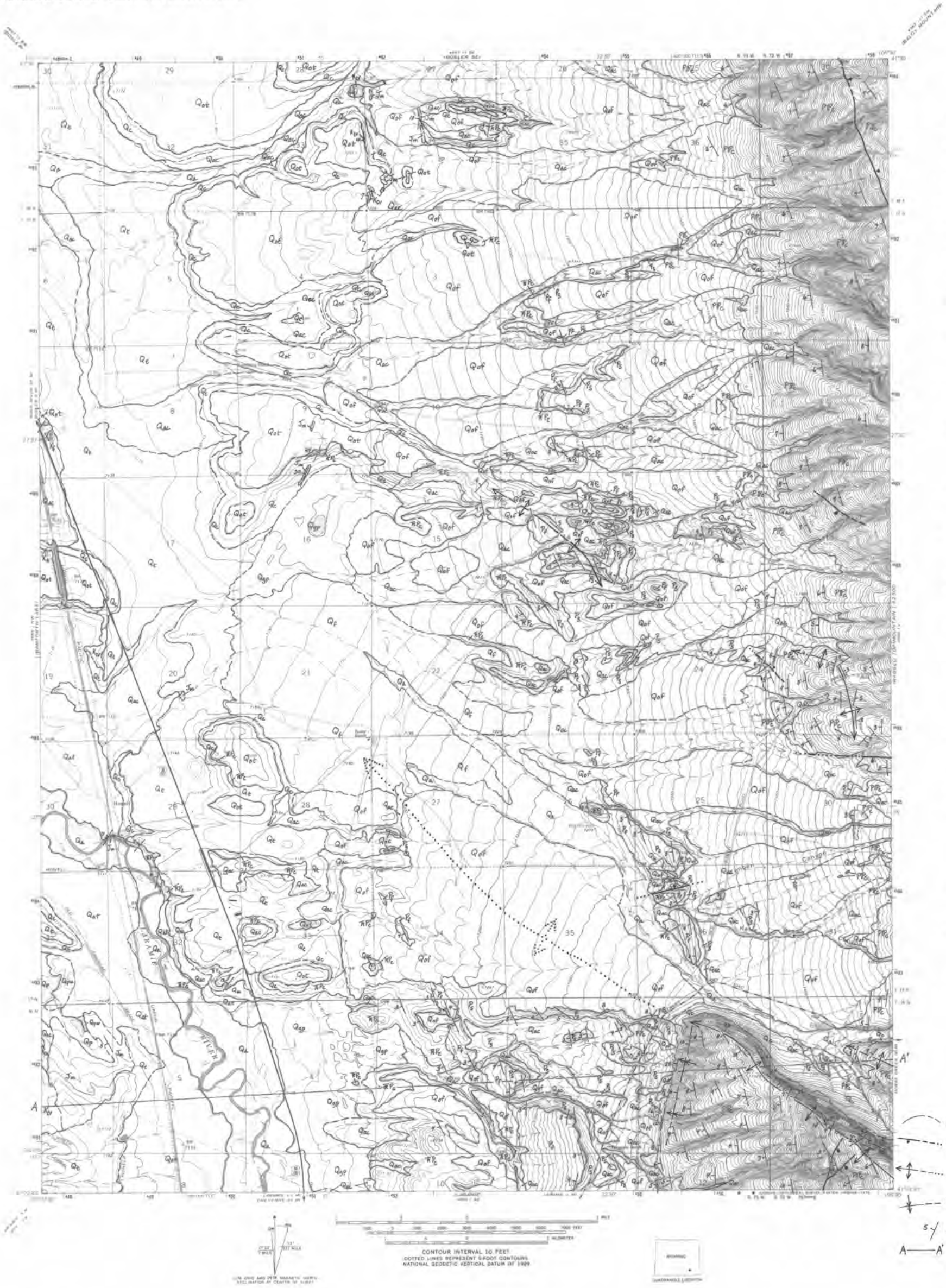

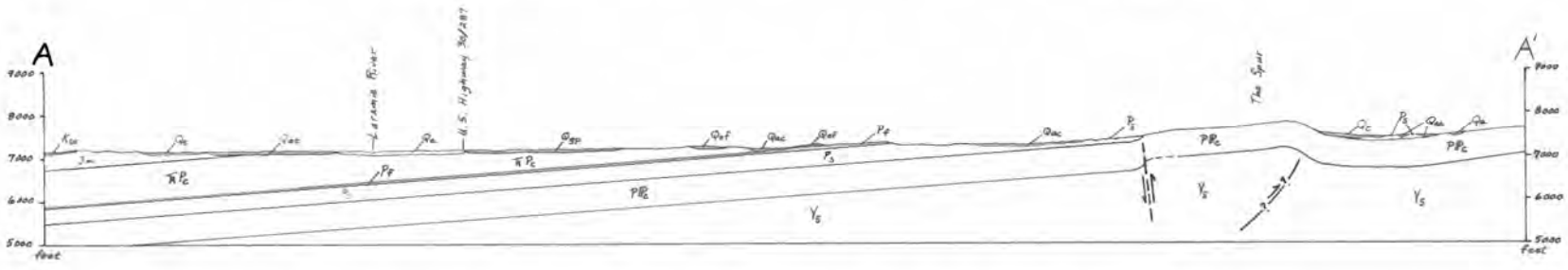

PRELIMINARY GEOLOGIC MAP OF THE HOWELL QUADRANGLE, ALBANY COUNTY, WYOMING

by
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1996

EXPLANATION

SEDIMENTARY ROCKS AND SURFICIAL DEPOSITS

Qa **Alluvial deposits (Holocene)**
Unconsolidated and poorly consolidated clay, silt, sand, and gravel, mainly in floodplains and lowest stream terraces. Thickness 0 to 25 feet.

Qat **Mixed alluvium and terrace deposits (Holocene)**
Unconsolidated and poorly consolidated clay, silt, sand, and gravel, representing a transition zone between alluvium and terrace deposits, mainly adjacent to the Laramie River. Thickness approximately 0 to 30 feet.

Qp **Playa lake deposits (Holocene)**
Clay to silt-sizes stratified lake bed deposits. Thickness generally less than 5 feet.

Qpw **Wind blown playa lake deposits (Holocene)**
Clay to silt-sized lake bed deposits occurring in dunes on the northeast (downwind) side of playa lake beds. Thickness 0 to 15 feet.

Qc **Colluvium (Holocene/Pleistocene)**
Unconsolidated masses of rock fragments and soil material on relatively steep slopes with thickest accumulations at the bases of slopes.

Qac **Mixed alluvium and colluvium (Holocene/Pleistocene)**
Sand, silt, clay, and gravel deposited mainly along intermittent streams; includes slope wash and smaller alluvial fan deposits that coalesce with alluvium. Thickness approximately 0 to 20 feet.

Qf **Alluvial fan deposits (Holocene/Pleistocene)**
Poorly sorted clay, silt, and gravel; crudely bedded to nonbedded. Appear to be active receiving sediments from intermittent streams flowing off of the Laramie Range. May have some debris flow component. Grade into terrace deposits toward west, approaching the Laramie River. Locally, grade into alluvium and colluvium. Thickness approximately 0 to 25 feet.

Qt **Terrace deposits (Holocene/Pleistocene)**
Beds of coarse sand and gravel with occasional boulders and lenses of silt and clay. Includes fragments of weathered granite and limestone cobbles, predominance varies depending on source of feeding stream. Occur along present drainages, a few feet to over 35 feet above modern flood plains. Thickness approximately 0 to 10 feet.

Qls **Landslide deposits (Holocene/Pleistocene)**
Blocks of bedrock or loose slope debris; arrows point in the inferred direction of movement. Occur in the Forelle Limestone, detaching at the contact with the underlying Satanka Shale.

Qgp **Gypsite deposits (Holocene/Pleistocene)**
Unconsolidated clay-sized gypsum interbedded with red clay, sand, gravel, and limestone cobbles. Located in stream valleys immediately west of the Laramie Fault, probably related to erosion of gypsum beds of the lower Chugwater Formation which were brought to the surface or near surface by the Laramie Fault. These deposits were mined for cement plaster near the turn of the century. Thickness 0 to 10 feet.

Qof **Older alluvial fan deposits (Holocene/Pleistocene)**
Poorly sorted clay, silt, sand and gravel; crudely bedded to nonbedded with some debris flow component. Limestone cobbles are common. Currently inactive and dissected, often occurring as erosional remnants. Grade into older terrace deposits toward the west, in the northern part of the map area. Thickness 0 to 10 feet.

Qot **Older terrace deposits (Holocene/Pleistocene)**
Beds of coarse sand and gravel with occasional boulders and lenses of silt and clay. Limestone cobbles are common. Often occur as erosional remnants ranging from 20 to 100 feet above present stream floodplains. Some remnants may actually be older alluvial fan remnants. Thickness 0 to 10 feet.

UNCONFORMITY

Kf **Frontier Formation (Upper Cretaceous)**
Dark gray to black shale with interbedded thin, lenticular, tan to gray sandstones and thin bentonite beds. Persistent tan sandstone occurs at top of formation, locally referred to as the "Wall Creek Sandstone". Thickness approximately 550 feet.

Kt **Thermopolis Shale (Lower Cretaceous)**
Gray to black soft shale with some thin brown to tan sandstones locally interbedded. Ironstone concretions appear in the upper portion of the formation. Fossil fish fragments occur locally in the upper thin sandstones. Selenite crystals are common in outcrop. Thickness 60 to 75 feet.

Kcv **Cloverly Formation (Lower Cretaceous)**
Basal tan to white coarse-grained sandstone and chert pebble conglomerate, locally crossbedded and overlain by varigated buff and purple claystones interbedded with thin black shale beds, and an upper gray to buff to brown, fine- to coarse-grained sandstone, crossbedded in lower portion. Thickness 100 to 130 feet.

UNCONFORMITY

Jm **Morrison Formation (Upper and Middle Jurassic)**
Pale-green, olive-green, blue-green to maroon and chalky white variegated calcareous and bentonitic claystones interbedded with thin drab limestones and buff, non-resistant sandstones. Limestone, locally, contains orange to brown chert inclusions. A thin section of Sundance Formation may exist in the area, but due to few and poor exposures, it is mapped with the Morrison. Thickness 300 to 350 feet.

UNCONFORMITY

TrPc **Chugwater Formation (Triassic and Permian)**
Red shale and siltstone with interbedded red to salmon to buff, fine-grained sandstone. Lower portion of section contains red shale interbedded with thin to thick gypsum beds, local solution breccia, and banded wavy gypsiferous thin limestone sometimes mistaken for part of the Forelle Limestone. This portion of the Chugwater along with the underlying Forelle Limestone and Santanka Shale would be mapped as Goose Egg Formation west of the Laramie Basin. Locally, some possible Jelm Formation sandstone erosional outliers may occur, but due to their lack of persistence they are mapped with the Chugwater. Thickness 650 to 800 feet.

Pf **Forelle Limestone (Permian)**
Gray to purple, thin bedded, sparsely fossiliferous limestone locally interbedded with red siltstone and thin gypsum laminations. Wavy outcrops resembling algal structures common. Landslides are common on Forelle dip slopes with the unit detaching from the underlying Satanka Shale. Thickness 10 to 30 feet.

Ps **Satanka Shale (Permian)**
Red siltstone and shale (often banded with white and ocher color zones), soft sandstone, thin limestones, and local gypsum beds, especially near the top. Buff to orange to red, fine-grained sandstone with ripple marks common near base of unit. Gypsum beds in the Satanka were mined some time after the turn of the century in Section 2, T16N, R73W on this map. Thickness 250 to 300 feet.

UNCONFORMITY

PPc **Casper Formation (Permian and Pennsylvanian)**
Buff to reddish, calcareous to quartzitic, very fine- to coarse-grained, well cemented subarkosic sandstone interbedded with buff to purplish-gray limestone and dolomite beds, usually micritic and locally fossiliferous. Sandstone often exhibits large-scale festoon cross-bedding, increasing toward the south. As many as 10 different limestone or dolomite beds, which are locally quarried for cement or gravel uses, have been identified in the Laramie area. The Casper Formation serves as the prime aquifer in the Laramie area. Intertongues with underlying Fountain Formation, which is less than 50 feet thick, ocourring in the subsurface only and pinching out to the north within in the map area. Thickness 600 to 660 feet.

MAP SYMBOLS

Formation contact
Dashed where approximately located.

Fault
Dashed where approximately located, dotted where concealed. Bar and ball on downthrown block.

Anticline
Trace of axial plane and direction of plunge determined by field dip measurements and by photo interpretation. Dashed where approximately located, dotted where concealed.

Monocline
Trace of axial plane as determined by field measurements and by photo interpretation. Dashed where approximately located. Short arrow denotes steeper dipping limb.

5 **Strike and dip of beds, showing angle of dip.**

A——A' **Cross section location**
Line of section. Sherman Granite (Middle Proterozoic)-Ys-is shown on the cross section only as it does not crop out in map area. Coarsely crystalline pink granite ranging in age from 1,414 to 1,435 Ma.

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