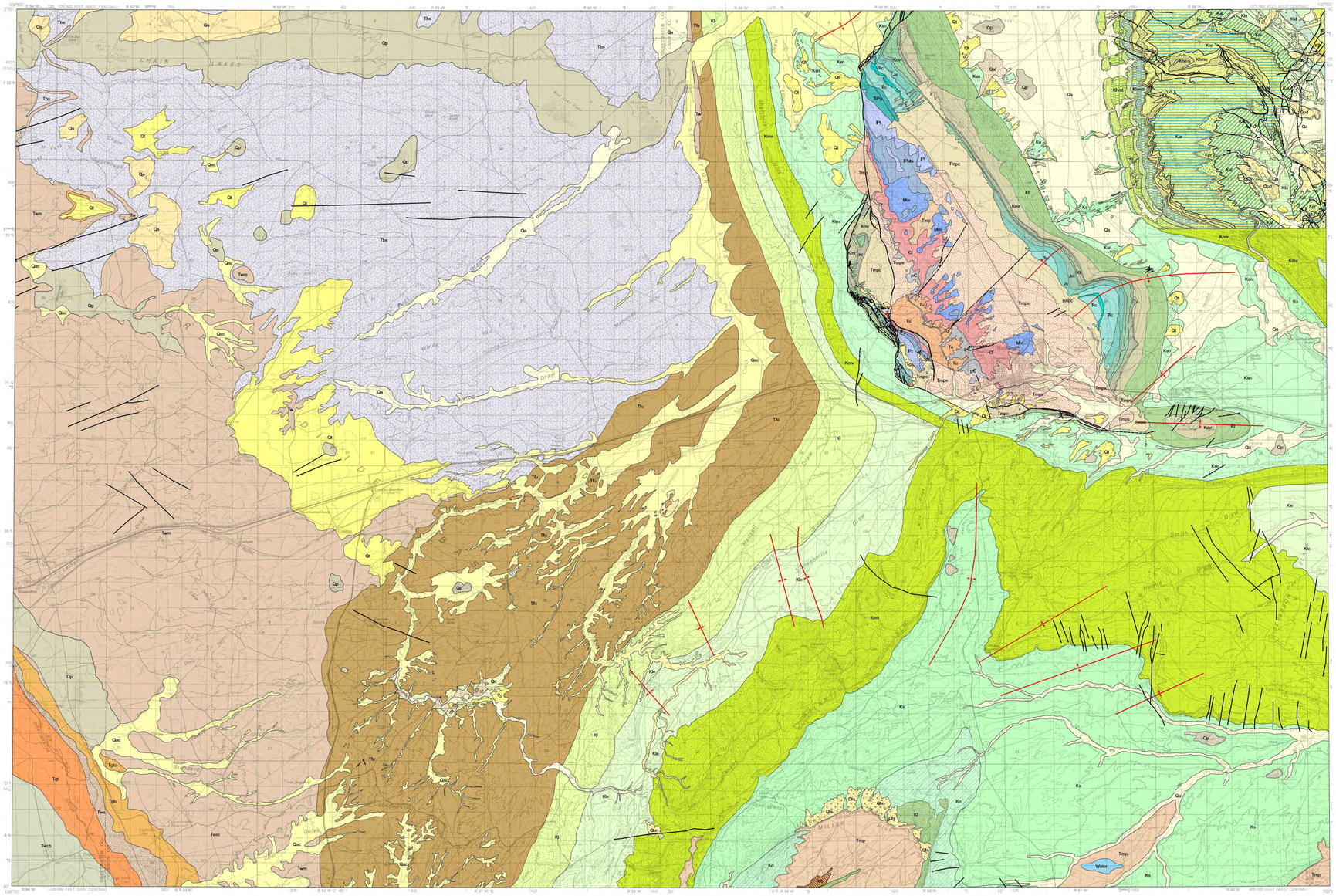
WYOMING STATE GEOLOGICAL SURVEY
Ronald C. Surdam, State Geologist
Laramie, Wyoming

Geology - Interpreting the past to provide for the future

USGS science for a changing world

Prepared in cooperation with the U.S. GEOLOGICAL SURVEY

Open File Report OFR 8-4
Rawlins 1:100,000 - scale
Preliminary Geologic Map



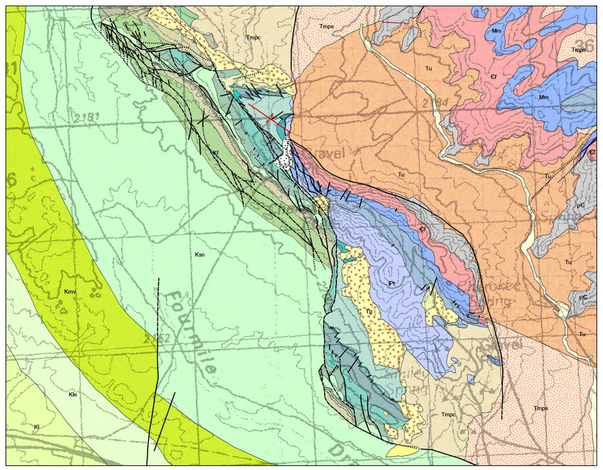
Base map from U.S. Geological Survey 1:100,000 - scale
Metric topographic map of the Casper, Wyoming
30' x 60' Quadrangle, 1979

Projection: Universal Transverse Mercator (UTM), zone 13
North American Datum of 1927 (NAD 27)
10,000-meter grid ticks: UTM, zone 13
50,000-foot grid ticks: Wyoming State Plane Coordinate System, East zone

Kilometers 0 2 4 6 8 10 12 14 16 18 20
Miles 0 1 2 3 4 5 6 7 8 9 10 11 12

SCALE 1:100,000
Contour Interval 20 Meters

Meters 0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000
Feet 0 5,000 10,000 15,000 20,000 25,000 30,000 35,000 40,000 45,000 50,000 55,000 60,000 65,000 70,000



Inset Image: Rawlins Uplift Area

PRELIMINARY GEOLOGIC MAP OF THE RAWLINS 30' x 60' QUADRANGLE, CARBON AND SWEETWATER COUNTIES, SOUTHEASTERN WYOMING

compiled by
J. Fred McLaughlin and Jeff Fruhwirth
2008

Digital cartography by Jeff Fruhwirth and Thomas E. Ver Ploeg

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Additional copies of this map can be obtained from:
Wyoming State Geological Survey
P.O. Box 1347 Laramie, WY 82073-1347
Phone: (307) 766-2286 Fax: (307) 766 - 2605
Email: sales-wsgs@uwyo.edu

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INDEX TO 1:100,000-SCALE BEDROCK GEOLOGIC MAPS OF WYOMING

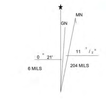
MAP SYMBOLS

Formation contact

Fault- Dashed where approximately located

Anticline- Trace of axial plane and direction of plunge compiled from source mapping or by field dip measurements. Arrows point in direction of dip.

Syncline- Trace of axial plane and direction of plunge compiled from source mapping or by field dip measurements. Arrows point in direction of dip.



UTM GRID CONVERGENCE (GN)
1982 MAGNETIC DECLINATION (MN) AT CENTER OF SHEET
DIAGRAM IS APPROXIMATE

DESCRIPTION OF MAP UNITS

Quaternary surficial deposits

Qad **Anthropogenically disturbed ground**—Area disturbed by mining activities

Qa **Alluvial deposits ((Holocene)** —Unconsolidated and poorly consolidated clay, silt, sand, and gravel, mainly in floodplains and lowest stream terraces; thickness approximately 0 to 50 feet

Qaf **Alluvial fan deposits (Holocene)**—Unstratified, poorly sorted sand, silt, and minor gravel

Qs **Windblown sand deposits (Holocene)**—Active and stabilized dunes, made up of fine-to fine-grained sand; thickness approximately 0 to 15 feet

Qp **Playa lake deposits (Holocene?)**—Light-gray-brown compact expandable clay, the surface of which is seasonally "whitened" by alkali salts. Quartz or ganister ventifacts 1 to 2 inches in diameter litter surface of playa but not adjacent colluvial areas

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 50 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.

Qls **Landside deposits (Holocene/Pleistocene)**—Blocks of bedrock or loose slope debris; arrows on the map show the inferred direction of movement.

Qt **Terrace gravels (Pleistocene)**—Poorly consolidated, rounded, fluvially deposited cobbles, gravels, sands, mud and clays forming large, flat benches and terraces.

Qpd **Pediment deposits (Pleistocene)**—Silt, sand, pebbles, and cobbles; pebbles and cobbles from terraces are rounded

Unconformity

Tertiary sedimentary rocks

Tg **Gravel (Tertiary/Quaternary? or Pleistocene?)**—Thin veneer of colluvial and paleo-alluvial debris; locally caps flat, elevated areas and contains cobbles and boulders of Precambrian rock types and large clasts of Paleozoic rocks; thickness 0 to approximately 50 feet (0 to 15 m) (from Otteman, 2003); equivalent to "Tmpc" as mapped by Barlow (1952)

Tu **Tertiary undifferentiated (Miocene-Pliocene)**—Sedimentary rocks deposited unconformably on Precambrian basement in Cherokee Creek valley; thickness 200 to 200 feet (30-61 m) (description and thickness from Otteman, 2003). Equivalent to "Tmps" as mapped by Barlow (1952)

Tmp **Miocene and/or Pliocene rocks** (from Barlow, 1952)—Shown as "Tm" and described as white soft tuffaceous sandstone on Wyoming geologic map (Love and Christiansen, 1985)

Tmps Predominantly unconsolidated sand with some sandstone and conglomerate (from Barlow, 1952)

Tmpc Predominantly conglomerate with some sandstone and unconsolidated sand (from Barlow, 1952)

Green River Formation (lower Eocene)—Only occurs in extreme southwestern part of quadrangle

Tgt **Tipton Shale Member**—Oil shale and marlstone

Tglu **Luman Tongue**—Oil shale, carbonaceous shale, and sandstone

Tw **Wasatch Formation (lower Eocene)**—Claystone and siltstone, and light fine to medium-grained calcareous sandstone. Includes carbonaceous shales and coal.

Twcb **Cathedral Bluffs Tongue**—Variegated claystone and lenticular sandstone

Twn **Niland Tongue**—Brown sandstone, carbonaceous shale, and coal beds

Twm **Main body of Wasatch Formation**—Drab sandstone, drab to variegated claystone, and siltstone; locally derived conglomerate around basin margins

Tbs **Battle Spring Formation (Lower Eocene)**—Conglomerate derived from Granite Mountains uplift and deposited in northeastern Great Divide Basin; merges to south with main body of Wasatch Formation

Tfu **Fort Union Formation (Paleocene)**—Complexly interbedded, commonly lenticular or discontinuous sequence of beds consisting of light-colored sandstone, argillaceous, fine- to medium-grained, commonly contains ferruginous concretions; light-brown to orange siltstone, commonly ferruginous, argillaceous; light- to dark-gray shale, locally maroon, locally contains numerous plant fossils; and generally thin and discontinuous coal beds with lenticular beds thickening to as much as 9 feet. Plant, Unionid pelecypod, viviparid gastropod, turtle, and crocodilian fossils are locally numerous; approximately 1,500 feet thick

Upper Cretaceous rocks

Kl **Lance Formation**—Medium-gray to grayish-black shale, partly silty, partly carbonaceous; light-gray to grayish-black siltsone, partly sandy, partly carbonaceous; light-gray sandstone, very fine to fine-grained, partly silty; and coal beds

Medicine Bow Formation—Shale, siltstone, sandstone, and coal beds mapped in western Hanna Basin east of the Rawlins uplift, equivalent to the Lance Formation. Shale is medium gray to grayish black, partly silty, partly carbonaceous; siltstone is light gray to grayish black, partly sandy and carbonaceous; sandstone is light gray, very fine to fine-grained, partly silty; and coal beds are lenticular (description modified from Merewether, 1973)

Kfh **Fox Hills Sandstone**—The base is light to medium-gray very fine to fine grained, silty sandstone grading upwards to medium-gray sandy siltstone and medium to dark gray silty shale. Not mapped or included in Lance Formation west of Rawlins uplift

Kle **Lewis Shale**—Interbedded light-gray sandstone and medium- to dark-gray and gray-green shale. Plant fragments are locally numerous in the shale. Upper 100 feet contains pebble-bearing white sandstone lithologically similar to the basal beds of the Fort Union Formation from which it can be distinguished by its less massive nature, by the presence of large bone fragments (rare), and by an overlying unit of 20 feet of greenish-gray shale. Approximately 3,800 feet thick. Merewether (1972 and 1973) mapped and subdivided formation into six units, including an unnamed upper shale unit, the Dad Sandstone Member, and four alternating shale and sandstone units (combined as the unnamed lower unit of the Lewis

Kld **Dad Sandstone**—Medium- to dark-gray shale, partly silty; medium-gray siltstone, partly sandy, platy; and light-gray to dusky-yellow sandstone, very fine to medium-grained, partly silty, friable to well cemented, locally concretionary, flaggy to massive, and contains few burrows

Kll **Unnamed lower unit**—Complex sequence of four subunits (from top to bottom) consisting of a) dominantly marine shale and siltstone, b) dominantly marine sandstone, c) dominantly marine shale and siltstone, and d) dominantly marine sandstone. Subunit a) is medium- to dark-gray, partly silty shale; medium-gray to medium dark gray siltstone, partly argillaceous, partly sandy; and light-gray to light greenish gray bentonite. Subunit b) is medium dark gray shale, silty; medium-gray siltsone, sandy; and sandstone, light- to medium-gray, very fine grained, silty. Subunit c) is medium dark gray to dark-gray shale, partly silty and medium-gray to medium dark gray siltstone, partly sandy. Subunit d) is medium dark gray shale, silty; medium-gray siltstone, sandy; and medium-gray sandstone, very fine to fine-grained, silty

Kmv **Mesaverde Group undivided**—White and brown soft sandstone, gray sandy shale, coal, and carbonaceous shale; used where individual formations were not distinguished

Kaf **Almond Formation**—Medium- to dark-gray shale, partly silty, partly carbonaceous; light- to medium-gray siltstone, sandy; light- to medium-gray sandstone, very fine to fine-grained, partly silty; and coal beds

Kpr **Pine Ridge Sandstone**—Dark-gray shale, carbonaceous, partly silty; medium- to dark-gray siltstone, partly sandy, partly carbonaceous; light- to medium-gray sandstone, very fine grained, party silty, partly carbonaceous; and coal beds

Unconformity

Kar **Allen Ridge Formation**—Upper 150 feet is an unnamed marine member consisting of medium-gray to dark-gray shale, partly silty, partly carbonaceous; light- to dark-gray siltstone, partly argillaceous, partly sandy, partly carbonaceous; light- to medium-gray sandstone, very fine to fine-grained, mainly silty, partly carbonaceous; and coal beds. Upper unit contains burrows. Lower part is shale, medium-gray to grayish-black, partly silty, partly carbonaceous; light- to dark-gray siltstone, partly argillaceous, partly sandy, partly carbonaceous; light- to medium-gray sandstone, very fine to fine-grained, mainly silty, partly carbonaceous; and coal beds

Haystack Mountains Formation—Subdivided into members in northeastern part of quadrangle (Merewether, 1972; 1973)

Khmu **Upper unnamed member**—Dark-gray shale, partly silty, partly carbonaceous; light- to medium-gray siltstone, partly sandy; and light- to medium-gray sandstone, very fine grained, silty

Khms **Unnamed sandstone member**—Light- to medium-gray sandstone, very fine to fine-grained

Khmu **Upper unnamed member**—Medium- to dark-gray shale, partly silty, partly carbonaceous; medium-gray to medium-dark-gray siltstone, partly argillaceous, partly sandy, partly carbonaceous; and light- to medium-gray sandstone, very fine to fine-grained, silty

Khmh **Hatfield Sandstone Member**—Dark-gray shale, partly silty, partly carbonaceous; medium- to dark-gray siltstone, partly sandy; and light- to medium-gray sandstone, very fine to fine-grained, partly silty, partly carbonaceous

Khmm **Middle unnamed member**—Medium- to dark-gray shale, partly silty; gray to medium-dark-gray siltstone, partly sandy; and light- to medium-gray sandstone, very fine to fine-grained, partly silty

Khmo **O'Brien Spring Sandstone Member**—Dark-gray shale, silty, carbonaceous; medium-gray siltsone, sandy; light- to medium-gray sandstone, very fine to fine-grained, partly silty; and bentonite beds

Khml **Lower unnamed member**—Medium- to dark-gray shale, partly silty, concretionary; medium- to dark-gray siltstone, partly sandy; and bentonite beds

Khmt **Tapers Ranch Sandstone Member**—Light- to dark-gray sandstone, very fine to fine-grained, silty, glauconitic; contains burrows.

Ksn **Steele Shale and Niobrara Formation Undevided**—Dull-gray shale, gray siltstone, and fine-grained gray sandstone; used where Steele Shale and Niobrara Formation have not been differentiated

Ks **Steele Shale**—Medium- to dark-gray marine shale, silty; light- to dark-gray siltstone, partly sandy, partly argillaceous; light- to medium gray sandstone, very fine grained, silty, partly glauconitic; and bentonite beds

Kn **Niobrara Formation**—Black or gray to yellow calcareous shale, with interbedded light-colored limestone and chalk

Kf **Frontier Formation**—Dark-gray to black shale with interbedded tan to gray sandstones and then bentonite beds; weather-resistant tan sandstone bed(s) cap(s) top of formation

Kmr **Mowry Shale**—Gray to dark-gray siliceous shale, dense, fissile, contains fish scales, weathers to flaky, white to silver-gray color

Upper and Lower Cretaceous Rocks

Kfk **Frontier Formation, Mowry Shales, Muddy Sandstone and Thermopolis Shale, undivided**

Lower Cretaceous rocks

Kmd **Muddy Sandstone**—Tan to white sandstone, medium-grained, with interbedded gray carbonaceous shale; forms minor ridges above weathered Thermopolis Shale; contains abundant trace fossils from burrowing organisms; approximately 35 feet (10.5 m) thick

Kt **Thermopolis Shale**—Gray to dark-gray shale, fissile, contains thin sandstone and bentonite lenses; approximately 35 feet (10.5 m) thick

Kcv **Cloverly Formation**—Tripartite unit consisting of an upper gray to brown fine- to coarse-grained sandstone, purple claystones and black shale beds in middle, and a basal tan to white sandstone and chert conglomerate; generally forms prominent ridge with talus obscuring upper and lower contacts; approximately 110 feet (33 m) thick (thickness from Otteman, 2003)

Lower Cretaceous and Jurassic Rocks

KJs **Cloverly, Morrison and Sundance Formations, undivided**

Unconformity

Jurassic rocks

Jm **Morrison Formation (Upper 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. Approximately 280 feet (85 m) thick (thickness from Otteman, 2003)

Js **Sundance Formation (Upper and Middle Jurassic)**—Variegated gray sandstone and siltstone, with greenish sandy shale in the lower part of the section and limestones in the upper part; average thickness approximately 400 feet (122 m) (thickness from Otteman, 2003)

Unconformity

Triassic rocks

Trc **Chugwater Group (Triassic)**—Red shale and siltstone with interbedded red to salmon to buff, fine-grained sandstone

Trj **Jelm Formation**—Red, fine-grained sandstone with interbedded shale or mudstone; lighter red and slightly more resistant to weathering than Red Peak Member below Alcova, and has readily identifiable cross-bedding; approximately 370 feet (110 m) thick (description and thickness from Otteman, 2003). Approximately equivalent to Crow Mountain Sandstone and Popo Agie Formation to north and west

Tra **Alcova Limestone Member**—Gray stromatolitic limestone; forms resistant ridge; 15 feet (4.5 m) thick (description and thickness from Otteman, 2003)

Trr **Red Peak Member**—Dark red, dominantly fine-grained sandstone with interbedded shale or mudstone; minimum of 650 feet (198 m) thick (description and thickness from Otteman, 2003)

Mesozoic and Paleozoic rocks

PPg **Goose Egg Formation (Triassic and Permian)**—Alternating gray-green to purple shale and light purple limestone with underlying thin evaporite beds; thickness approximately 300 feet (91 m) (description and thickness from Otteman, 2003)

Unconformity

Paleozoic rocks

PPt **Tensleep Sandstone (Pennsylvanian)**—Buff-colored sandstone, fine- to medium-grained, with intermittent sandy limestonebeds; commonly contains well-defined cross-bedding sets often greater than 50 feet 15 m); thickness approximately 800 feet(243 m) (description and thickness from Otteman, 2003)

PPMa **Amsden Formation (Pennsylvanian and Upper Mississippian)**—Red sandy shale, interbedded sandy shale and limestone, and hard, fine-grained sandstone; approximately 300 feet (91 m) thick (thickness from Otteman, 2003)

Unconformity

Mm **Madison Limestone (Upper and Lower Mississippian)**—Gray, often cherty, limestone with lenses of brown dolomite; approximately 170 feet (52 m) thick (thickness from Otteman, 2003)

Unconformity

Cf **Flathead Sandstone (Upper and Middle Cambrian)**—Upper part is red silty shale, variable thickness but 25 feet (7.5 m) thick in central part of Rawlins uplift; middle part is mostly dark purple, cross-bedded sandstone with thin, interbedded silty shales; lower part is reddish-brown basic quartz-pebble conglomerate, average thickness 50 feet (15 m); total thickness ranges from 300 to 600 feet (91 to 183 m) (description and thickness from Otteman, 2003)

Unconformity

Precambrian rocks

pC **Precambrian rocks undifferentiated (Archean)**—Salmon to dark pink magacrystic biotite monsogranite; large (1.5 to 3 cm) tabular K-feldspar and plagioclase crystals define a weak magmatic foliation; contains shear zones (description from Otteman, 2003)