DLC SPQ FR





Geologic Mapping Field Review

Skinner Peaks 7.5' Quadrangle, Juab and Sanpete Counties, Utah

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Mapping by:

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Route Map Skinner Peaks 7.5' Quadrangle



Field Trip Stops Skinner Peaks 7.5' Quadrangle

Assemble in Nephi at I-15 Exit 222 (Tesoro Station)

I-15 South to Mills Exit 207

<u>Trip Stops</u>

- 1. **Radio Tower Overlook (West Hills, Chicken Creek Reservoir, South Hills)** Previous work and terminology, Tertiary strata, Goldens Ranch Formation, Western Juab Valley fault zone, Formation of Painted Rocks, surficial deposits, Placid State #1 well.
- 2. South Hills Member 5 Fm. of Painted Rocks, Tertiary fines and gravels, Oldest alluvial fans.
- 3. **Chriss Creek at Temple Road** The Washboard, Lake Bonneville shoreline, oldest alluvial fan deposits, Tertiary fines and gravels, Member 5 Fm. of Painted Rocks.
- 4. **Painted Rocks Cuesta (HKCSW quad)** Hike volcanic section on cuesta road, Members 1 through 4 Formation of Painted Rocks, geochronologic and geochemical data, Placid Barton well.
- Lunch Yuba State Park Painted Rocks shade, restrooms, no water.
- 5. Green River outcrop near State Route-28 "Tawny facies" of Green River Fm.
- 6. **"Milky Wash"Area** Member 1 Fm. of Painted Rocks, Chicken Creek Tuff, faulting versus paleotopography, regional correlation of volcanic rocks.
- 7. Skinner Peaks Trench Site Levan and Fayette segments of Wasatch fault zone, fault scarps, Jackson trench site.
- 8. **Skinner Peaks and Gypsum Quarry** –Tertiary volcanic rocks, Tertiary-Cretaceous? stratigraphy, Arapien Shale, local structure, surficial deposits.
- 9. Little Salt Creek Area Green River Formation on Arapien antiform, hornblende monzonite intrusions.

Return to Nephi Assembly Point Via State Route-28 through Levan

QUATERNARY

Alluvial Deposits

- Qaly **Younger stream alluvium** (upper Holocene) Gravel, sand, and silt with minor clay and scattered cobbles and boulders; clasts well rounded to subangular; generally stratified; deposited in modern stream channels and flood plains, and adjacent to Chicken Creek Reservoir; locally forms terraces less than 30 feet (10 m) above stream level that grade downslope into upper Holocene alluvial-fan deposits (unit Qafy); also grades to map units Qaf and Qac; may include small alluvial fans and minor colluvium along steep stream embankments; exposed thickness less than 30 feet (<10 m).
- Qafy **Younger alluvial fan alluvium** (upper Holocene) Pebble and cobble gravel, locally bouldery, in a matrix of sand, silt, and minor clay; clasts angular to subrounded; deposited by intermittent streams, debris flows, and debris floods graded to modern stream level; deposits form discrete fans, typically with bar and swale topography; locally includes deposits of unit Qcd too small to map separately; local weak stage I carbonate morphology (Birkeland and others, 1991); exposed thickness less than 15 feet (<5 m).
- Qafi Intermediate-age fan alluvium (lower Holocene) Pebble and cobble gravel, locally bouldery, in a matrix of sand, silt and minor clay; clasts angular to well rounded; preserved as intermediate-level remnants incised by modern streams and locally buried by younger fan alluvium (Qafy); incised by, and grades downslope into, undifferentiated fan alluvium (Qaf); Stage I+ carbonate morphology (Birkeland and others, 1991); exposed thickness less than 15 feet (<5 m).
- Qafo **Older fan alluvium** (Upper to Middle Pleistocene) Pebble and cobble gravel, locally bouldery, in a matrix of sand, silt, and minor clay; clasts subangular to well rounded; preserved as relatively high, isolated remnants that lack fan morphology; Stage II to III+ carbonate morphology (Birkeland and others, 1991); exposed thickness less than 50 feet (<15 m).
- Qaf Undifferentiated fan alluvium (upper Holocene to Middle? Pleistocene) Proximal facies: pebble and cobble gravel, locally bouldery, in a matrix of sand, silt, and minor clay; clasts subangular to well rounded; distal facies: silt and fine sand with minor clay; deposited by perennial and intermittent streams, debris flows, and debris floods graded to or slightly above modern stream level; includes a significant component of eolian silt; deposits form large, low-gradient fans that cover most of the floor of Juab Valley and a small area in Flat Canyon; includes local areas of active fan deposition (unit Qafy) and deposits of units Qaly and Qcd too small to map separately; maximum thickness greater than 600 feet (>180 m); Qaf represents only the uppermost portion of the Juab Valley basin fill deposits, which thicken northward.
- Qap **Pediment alluvium** (lower Holocene to Upper Pleistocene) Gently sloping mantle of clay- to bouldersize material overlying a truncated bedrock surface on the east flank of the West Hills; exposed thickness from 0 to over 40 feet (0-12+ m); total thickness unknown.

Deltaic and Lacustrine Deposits

Deltaic and lacustrine deposits were developed in the Sevier River estuary during the transgressive phase of Lake Bonneville and during its high stand (Bonneville level). The shoreline elevation in the quadrangle is approximately 5100 feet (1555 m) (also see Crittenden, 1963; Currey, 1982).

Qdf **Deltaic (estuarine) fines (**Upper Pleistocene) – Light-brown, unconsolidated, coarse- to fine-grained sand, silt, and mud deposited by Lake Bonneville; deposits are finely laminated and cross-laminated; soft

sediment deformation structures and ripple cross-lamination are common near the base of the exposed section; exposed thickness up to about 20 feet (0-6 m), but total thickness uncertain.

Colluvial Deposits

- Qc **Colluvium** (upper Holocene) Slopewash deposits of clay- to boulder-size, locally-derived sediments deposited on upland slopes adjacent to drainages; generally less than 20 feet (<6 m) thick.
- Qcd **Debris-flow deposits** (upper Holocene) Clast- and matrix-supported pebble and cobble gravel, locally bouldery; clasts angular; matrix consists of sand, silt, and clay; commonly covered with coarse, angular rubble and have relatively fresh-appearing levees and channels; deposited on surface of upper Holocene alluvial fans (unit Qafy); deposits too small to map separately are included in unit Qafy; mapped only near mouth of Little Salt Creek Canyon; exposed thickness less than 15 feet (<5 m).
- Qco **Older colluvium** (lower Holocene to Upper Pleistocene) Gravels and fines of local materials; clast- and matrix-supported pebble and cobble gravel, locally bouldery; clasts angular; matrix consists of sand, silt, and clay; grain size generally decreases downslope; forms a dissected surface on various bedrock units around the base of Skinner Peaks; thickness from 0 to over 40 feet (0-12+ m).

Eolian Deposits

Qes **Eolian sand** (Holocene) – Moderate-brown sand forming hummocky surfaces along the southern map border; sand generated from beach or bedrock deposits near Sevier Bridge Reservoir; exposed thickness from 0 to 20 feet (0-6 m); total thickness unknown.

Mixed-environment Deposits

- Qca **Colluvium and alluvium, undivided** (Holocene to Upper Pleistocene) Undifferentiated hillslope colluvium, stream and fan alluvium, and small landslide deposits; thickness up to approximately 50 feet (0-15 m).
- Qac Alluvium and colluvium, undivided (Holocene) Undifferentiated stream and fan alluvium and hillslope colluvium; may also locally include eolian silt and sand; deposited in shallow drainages associated with intermittent streams, and in small, shallow basins; thickness up to approximately 50 feet (0-15 m).

Mass-movement Deposits

- Qmsy **Younger landslide deposits** (Historical to Upper Pleistocene?) –Slide and slump material on steeper slopes derived from volcanic rock units, Arapien Shale, and Green River Formation; includes one slide on State Route 28 with probable historical movement; thickness highly variable.
- Qmso **Older landslide deposits** (Upper? to Middle Pleistocene) Angular, poorly-sorted debris and blocks of rock; slide and slump material on steeper slopes derived from the Green River Formation, volcanic rock units, and surficial deposits; thickness highly variable.

Human-made Deposits

Qf **Fill** (Historical) – Fill material along Interstate Highway 15 (I-15), which is not shown on the 1965 topographic base map; fill and local earth materials that have been graded or reworked in the vicinity of the Mills interchange on I-15; local earth materials used to construct dams for stock ponds and berms to divert drainages; thickness 0 to 20 feet (0-6 m).

Stacked-unit Deposits

- Qa/Qdf Undifferentiated alluvium over deltaic fines (Holocene) Fine-grained alluvial deposits forming a veneer over Lake Bonneville deltaic fines; forms flat-topped and irregular surfaces covering underlying materials; thickness 0 to 10 feet (0-3 m).
- Qa/QTaf Undifferentiated alluvium over oldest alluvial-fan deposits (Holocene) Fine grained alluvial deposits forming a veneer over oldest alluvial-fan deposits; forms gently sloping to irregular surfaces covering underlying materials; thickness 0 to 10 feet (0-3 m).
- Ql/QTaf Undifferentiated lacustrine deposits over oldest alluvial-fan deposits (Upper Pleistocene) Clay- to pebble-size lacustrine sediments forming a veneer over oldest alluvial-fan deposits located immediately below the Lake Bonneville shoreline; thickness less than 20 feet (<6 m).
- Ql/Tfg Undifferentiated lacustrine deposits over Tertiary fines and gravels (Upper Pleistocene) Clay- to pebble-size lacustrine sediments forming a veneer over Tertiary fines and gravels located immediately below the Lake Bonneville shoreline; queried where uncertain designation; thickness less than 20 feet (<6 m).

QUATERNARY-TERTIARY

QTaf **Oldest alluvial-fan deposits** (Pleistocene to Pliocene?) – Yellowish-gray to light-brownish-orange, coarse- to fine-grained, poorly sorted, deeply dissected alluvial, debris flow and colluvial sediment shed from San Pitch Mountains (much of it derived from the Green River Formation); typically unconsolidated, but locally consolidated; covers a large portion of the South Hills and Flat Canyon areas; clasts include brown sandstone, quartzite, carbonates, and volcanic rocks; higher in elevation and more deeply incised than younger alluvial fans; locally unconformably overlies Tertiary fines and gravels (Tfg) and various bedrock units; query indicates uncertain designation; exposed thickness up to over 200 feet (0-60+ m); total thickness uncertain.

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TERTIARY

Tfg **Tertiary fines and gravels** (Pliocene? to Miocene?) – Moderate-reddish-orange fine-grained to pebbly alluvial debris; typically unconsolidated with no obvious stratification, but locally consolidated; the unit primarily consists of silt and clay with few clasts, while pebbly and cobbly areas contain clasts of rounded quartzite, light-red sandstone, and minor volcanics; locally exposed beneath older alluvial-fan deposits (QTaf) throughout the South Hills, where it unconformably overlies paleotopography developed on volcanic bedrock units (map units Tgh and Tp5); exposed thickness up to over 100 feet (0-30+ m); total thickness unknown.

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TERTIARY INTRUSIVE ROCKS

Thmp Hornblende monzonite porphyry (Upper Oligocene) – Pinkish-gray to light-gray hornblende monzonite porphyry that weathers to a yellow and brown grussy talus with a cinder-like appearance; exposed in two small outcrops north of Little Salt Creek as dikes or sills within the Jurassic Arapien Shale near the contact with the Green River Formation; similar rock types form stocks, plugs, dikes, and sills in adjacent quadrangles to the east and north (John, 1964, 1972; Auby, 1991; Weiss and others, 2003); the rock has an aphanitic groundmass of K-feldspar and andesine and phenocrysts of feldspar, hornblende, and biotite (also see John, 1964, 1972); K/Ar ages of related intrusions are 23.3 to 23.8 million years (Witkind and Marvin, 1989; Auby, 1991); we obtained a new ⁴⁰Ar/³⁹Ar isochron age on hornblende of 23.97 ± 0.14 Ma from a hornblende monzonite porphyry (sample PR-15) that crops out one mile (1.6 km) northeast of the

Skinner Peaks quadrangle exposures (in the Chriss Canyon quadrangle); exposed width less than 30 feet (<9 m).

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TERTIARY SEDIMENTARY AND VOLCANIC ROCKS

Tv Undifferentiated Oligocene-Eocene volcanic rocks – Cross section only.

Formation of Painted Rocks (New Informal Name) (Lower Oligocene to Middle Eocene)

Tp4-5 Members 4 and 5, undivided – Locally mapped as combined unit in small exposures.

Tp3-5 Members 3, 4 and 5, undivided – Locally mapped as combined unit in small exposures.

- Tp5 Member 5 Gray to brown volcanic conglomerate, "salt and pepper" quartz sandstone, and tuffaceous sandstone; poorly consolidated, rubbly to sandy exposures; volcanic conglomerate with pebbles to boulders of dark-gray to dark-pink subangular to subrounded volcanic clasts and lesser quartzite and carbonate clasts; conglomerate exposures typically contain welded Fernow Quartz Latite clasts, and South Hills exposures also locally contain clasts of tuff derived from Member 4 and Tuff of Little Sage Valley (see Clark, 2003); sandstone forms a few ledges but typically weathers to moderate- to dark-brown sandy expanses; total thickness unknown due to poor exposures and structural complications, but possibly 1000 to 2000 feet (300-600 m) thick; locally includes small areas of other members too small to map separately; interbedded with these lahar and alluvial deposits are welded tuff and ash-flow tuff units described below.
- Tp5w **Member 5, welded-tuff unit** Grayish-pink densely welded rhyolite with phenocrysts of quartz and biotite; unit is typically fractured with no obvious layering or foliation; forms small cliffs; sample PR-28 yielded a preliminary ⁴⁰Ar/³⁹Ar age of 29.87 Ma (on biotite); as mapped may also include small exposures of Tp5a; stratigraphic position within Tp5 not well constrained; thickness up to approximately 50 feet (0-15 m).
- Tp5a **Member 5, ash-flow-tuff unit** Very light gray poorly to moderately welded dacite, with phenocrysts of quartz, feldspar, and bronze biotite flakes; forms slopes to small cliffs; locally present beneath welded tuff unit; as mapped may include small exposures of Tp5w; stratigraphic position within Tp5 not well constrained; thickness up to approximately 50 feet (0-15 m).
- Tp4 **Member 4** Very pale orange to grayish-orange-pink, poorly to moderately welded rhyolitic ash-flow tuff with conspicuous pumice and rock fragments and some quartz and biotite phenocrysts (table 2); exposures vary from poor to good; weathers to honeycomb pattern and small caves; vertical fracturing and lack of layering typical; distinctive rock unit caps Painted Rocks cuesta at Yuba State Park (section 5, T. 17 S., R. 1 W.; Section 32, T. 16 S., R. 1 W.; Hells Kitchen Canyon SW quadrangle); sample PR-9 yielded an ⁴⁰Ar/³⁹Ar single crystal fusion sanidine age of 34.00 ± 0.13 Ma, which supercedes prior K/Ar ages from Witkind and Marvin (1989); locally includes small outcrops of other members too small to map separately; locally quarried for use as poultry grit and soil mineralizer (see Pratt and Callaghan, 1970); approximately 70 to 150 feet (20-45 m) thick.
- Tp2-3 Members 2 and 3, undivided Locally mapped as combined unit in small exposures.
- Tp3 **Member 3** Pinkish-gray to locally moderate-reddish-orange (near Skinner Peaks) quartz-rich sandstone; distinctive unit contains about 60-80% coarse- to very coarse sand size, euhedral to subangular quartz grains; also locally includes rounded pebbles and cobbles of volcanic rocks and quartzite; including welded Fernow Quartz Latite clasts (34.83 ± 0.15 Ma), thus suggesting a northward source area; ledgeforming unit that is medium to thickly bedded with very low-angle cross stratification; locally includes

small outcrops of other members too small to map separately; unit thickness from about 50 to 90 feet (15-25 m).

- Tp2 **Member 2** Grayish-pink poorly to moderately welded rhyolitic ash-flow tuff, with phenocrysts of quartz, sanidine?, and minor biotite, as well as pumice? and dark rock fragments; sample PR-16 yielded a preliminary ⁴⁰Ar/³⁹Ar age of 35.19 Ma on sanidine; appears to correlate with the Fernow Quartz Latite exposed in the southern East Tintic Mountains and Sage Valley; typically forms poorly exposed slopes; locally includes small outcrops of other members too small to map separately; from 40 to 100 feet (12-30 m) thick.
- Tp1 Member 1 Upper portion of rock unit (about 200 feet [60 m]) exposed at Painted Rocks consists of gray and light-bluish-gray volcanic conglomerate and tuffaceous sandstone; pebble- to boulder-size, dark-gray to dark-pink, subangular to subrounded volcanic clasts with minor quartzite and carbonate clasts; most extensive exposures of Member 1 in "Milky Wash" area of Vogel (1957) (Section 27 and 34, T. 16 S., R. 1 W.), also include gray, brown, green, and blue tuffaceous sandstone and mudstone with minor volcanic conglomerate and tuff; includes the Chicken Creek Tuff (38.61 ± 0.13 Ma) within the lower portion of the unit; the Placid Oil Barton #1 well (table 3) contains an incomplete section of Member 1 totaling about 1325 feet (405 m), which includes about 470 feet (143 m) of Member 1 below the Chicken Creek Tuff; locally includes small outcrops of other members too small to map separately; total Member 1 thickness unknown but estimated at 1700 feet (520 m).

Goldens Ranch Formation (Upper? to Middle Eocene) – Originally defined by Muessig (1951a, 1951b). Revised by Meibos (1983) to only include the lower part of Muessig's formation and divided into three members named the upper Sage Valley Limestone, middle Hall Canyon Conglomerate, and lower Chicken Creek Tuff. After Meibos (1983) and excluding the Sage Valley Limestone Member, which is not present in this quadrangle:

- TghHall Canyon Conglomerate Member Gray, poorly consolidated conglomerate and volcanic
conglomerate; clast composition varies from quartzite-carbonate to volcanic; clasts are angular to
subrounded pebbles to boulders in an ashy to sandy matrix; typically forms rubbly slopes; mapped in the
northwest quadrant of the quadrangle near Chicken Creek Reservoir where it directly overlies the Green
River Formation; apparently laterally equivalent to lower portion of Member 1 Formation of Painted
Rocks; exposed thickness about 100 to 300 feet (30-90 m) thick.
- Tgc Chicken Creek Tuff Member Grayish-pink to light-gray, poorly welded, vitric, dacitic ash-flow tuff with pumice lapilli, volcanic and quartzite rock fragments, and minor biotite; generally not well exposed; named for small exposure southwest of Chicken Creek Reservoir in Section 19, T. 15 S., R. 1 W.; other exposures are in and near "Milky Wash"; query indicates uncertain designation; ⁴⁰Ar/³⁹Ar age of 38.61 ± 0.13 Ma from Sage Valley (Clark, 2003) supercedes K/Ar ages from Everenden and James (1964) and Witkind and Marvin (1989); source unknown; near the reservoir, located within the Hall Canyon Member from roughly 200 feet (60 m) or less above the top of the Green River Formation; near Painted Rocks and "Milky Wash" located stratigraphically within the lower portion of Member 1 (about 470 feet [145 m] above base); exposed thickness less than 100 feet (30 m), but total dip-corrected thickness in Placid Barton well is 170 feet (50 m).
- Tg Green River Formation (Middle Eocene) West Hills exposures (see Clark, 1990; Felger, 1991): upper part of interbedded moderate-greenish-yellow and moderate-greenish-gray mudstone, and yellowish-gray fossiliferous platy micritic limestone; mudstones become ashy near contact with overlying Hall Canyon Conglomerate; medial portion of orange, brown, and gray conglomerate, mudstone, sandstone, siltstone; lower part of green mudstone capped by yellowish-gray to light-olive-gray stromatolitic limestone; the formation is nearly 900 feet (275 m) thick (Clark, 1990).
 - Skinner Peaks area exposures: a clastic lithofacies previously referred to as the "Tawny facies" (Zeller, 1949; Hardy and Zeller, 1953; Vogel, 1957; Millen, 1982; Felger, 1991; Weiss and others, 2003) composed of green, red, and variegated mudstone, and yellowish-tan coarse-grained sandstone,

conglomerate, conglomeratic sandstone and limestone; this lithofacies grades laterally eastward into the upper limestone member of the Green River Formation in the adjacent Chriss Canyon quadrangle (Millen, 1982; Weiss and others, 2003); sandstone near top of section contains reptilian? vertebrate fossils (Vogel, 1957; Felger, 1991); on the north side of Chriss Creek, unit has a heavy colluvial cover or locally a veneer of QTaf; contact with overlying volcanic rocks not exposed, but present in Barton #1 well and is possibly conformable; directly overlies the Jurassic Arapien Shale at and north of Skinners Peaks; total thickness in subsurface from 1100 to 1300 feet (335-395 m).

- Tc Colton Formation (Lower Eocene) Moderate-reddish-orange, moderate-reddish-brown, and pale-red mudstone, and lesser sandstone, conglomerate, and mottled carbonates (mottled pale red, reddish orange and white with reduction spots); existence in West Hills follows Witkind and Weiss (1991), but is apparently absent in the Skinner Peaks area; conformable with overlying Green River Formation and underlying Flagstaff Formation; thickness from 0 to 300 feet (0-90 m).
- Tf Flagstaff Formation (Lower Eocene to Upper Paleocene) As mapped in West Hills, grayish-yellow to pale-reddish-orange calcareous mudstone, sandstone, sandy limestone, limestone, and conglomerate (also see Lambert, 1976, and Vorce, 1979); base not exposed; exposed thickness of 525 feet (160 m), but total thickness in West Hills is about 650 feet (200 m) (Clark, 1987, 1990); locally absent near Skinner Peaks or included within map unit TKu1 and/or TKu2.
- TKnh North Horn Formation (Paleocene? to Upper Cretaceous [Maastrichtian]) Refer to cross section; may be included within map unit TKu1 and/or TKu2.

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TERTIARY-CRETACEOUS

- TKu Tertiary-Cretaceous strata, undifferentiated Corresponds to Colton, Flagstaff and North Horn Formations; subsurface only.
- TKu2 Unit 2 of undifferentiated Tertiary-Cretaceous strata (Middle to Lower Eocene? to Upper Cretaceous [Maastrichtian]?) Outcrops on the northwest and southeast portions of Skinner Peaks between the Green River Formation (Tawny facies) above and TKu1 (conglomeratic unit) or Arapien Shale below; consists of sandstone, sandy limestone, mudstone, pebble conglomerate, and oncolitic limestone; possible equivalent to Green River, Colton, Flagstaff and/or North Horn Formations; Felger (1991) measured 216 feet (65 m); thickness from 0 to 300 feet (0-90 m).
- TKu1 Unit 1 of undifferentiated Tertiary-Cretaceous strata (Lower Eocene? to Upper Cretaceous?) One conglomeratic outcrop belt on the northwest portion of Skinner Peaks consisting of gray carbonate-clast conglomerate overlying red quartzite-clast conglomerate; the carbonate clast conglomerate contains predominantly pebbles and cobbles of gray carbonate clasts and forms a cliff; the quartzite-clast conglomerate contains cobbles and boulders of Mutual Formation, Prospect Mountain Quartzite, and Dutch Peak Formation (distinctive frosted lime-green-colored quartzite) clasts that forms ledges and small cliffs; the quartzite-clast conglomerate appears somewhat similar to the Red Narrows Conglomerate and North Horn Formation mapped in the West Hills (see Meibos, 1983; Clark, 1990); possible equivalent to Flagstaff Formation, North Horn Formation, or Indianola Group strata; Felger (1991) measured approximately 300 feet (90 m); thickness from 0 to 300 feet (0-90 m).

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CRETACEOUS

Refer to table 3 for data on subsurface units of Cretaceous and older age from exploratory drill holes (see Sprinkel, 1994). Also refer to Sprinkel and others (1999).

Ku Cretaceous strata, undifferentiated (Upper and Lower Cretaceous) – Corresponds to the Indianola Group, San Pitch Formation, and Cedar Mountain Formation; subsurface only.

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JURASSIC

- Jtg Twist Gulch Formation (Middle Jurassic) Subsurface only.
- Ja Arapien Shale (Middle Jurassic [Callovian to Bathonian]) Mostly thin-bedded calcareous mudstone and muddy micritic limestone, which is light yellowish or olive gray, weathering to very light gray or white; includes a few beds of calcarous, fine-grained sandstone or sandy siltstone; gypsum occurs in thin discontinuous beds and also forms beds or large pods locally tens of feet thick; the pods on the north side of Skinner Peaks have been mined; more extensive gypsum beds are mapped along the eastern map border; many mudstone beds near the larger pods of gypsum are red or light gray streaked with red; the depositional thickness of the Arapien Shale is not known, and the Arapien is so folded and faulted that a reasonable thickness cannot be measured (see Lawton, 1985; Lawton and others, 1997; Villien and Kligfield, 1986; Witkind, 1983; Witkind, 1994); a maximum thickness of 3500 feet (1065 m) is reported from test wells in the quadrangle.
- Jtc Twin Creek Limestone, undivided (Middle Jurassic) Subsurface only.

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Jn Navajo Sandstone (Lower Jurassic) – Subsurface only.

unconformity

TRIASSIC

TRc Chinle Formation, undivided (Upper Triassic) – Subsurface only.

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TRm Moenkopi Formation, undivided (Middle to Lower Triassic) – Subsurface only.

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PERMIAN – CAMBRIAN?

P-C? Paleozoic strata, undivided (Permian to Cambrian?) – Differing interpretations of Paleozoic units in well logs; subsurface only.



S GI	TIME- STRATI- GRAPHIC UNIT		GEOLOGIC UNIT				MAP SYMBOL				THICKNESS Feet (Meters)		LITHOLOGY			
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	ane	Lower	rentiated		Member 5 welded tuff unit ash-flow tuff unit			Tp5			1000?-200 (300?-600	0? ?)			Clasts of Fernow Quartz Latite and other volcanic	
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		ddn	volcanic rocks	P.	Mem	Member 1					1700? (520?)				A Placid Oil Barton #1 (HKCSW) -see table 3	
A				Ch Fm											Hall Canyon Conglomerate Member in West Hills	
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s I	dle									3500+			Sypsum			
A S	W				Arapien Shale		Ja				(1065±)				Subsurface	
U R	8			Twin Creek Limestone				Jtc			500-1900				Subsunace	
٦	Lower		Undifferentiated							+	(150-580) 1250-1625		~~~~~	Und	conformity	
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Lithologic Column, Skinner Peaks 7.5' Quadrangle



CORRELATION OF QUATERNARY MAP UNITS, SKINNER PEAKS 7.5' QUADRANGLE





Structural cross section A-A' through the West Hills and west-central San Pitch Mountains area (below; modified from Standlee, 1982). Location of line of section shown on map at left. Refer to Standlee (1982) for names and data of other wells on index map.



Cross section from the Wasatch Plateau to West Hills, showing subsurface structural geometry based on surface geology, drill hole data, seismic lines, and gravity surveys. Wells #11 and #16 are on line of section A-A' shown in Figure 1. Double-barbed arrows indicate two senses of fault displacement; thrusting preceded normal faulting. The fault at the east end of the cross section, passing under the Wasatch Plateau, follows the salt horizon in the Arapien (Carmel to east); it is interpreted as having two senses of fault displacement.

Operator	Well Name	Location	KB (ft)	TD (ft)	Formation	Top (ft)	Thickness (ft)	Subsea (ft)
Placid	WXC-State 1	NW1/4SW1/4 s. 36, T. 15 S., R. 11/2 W Skinner Peaks quadrangle	5201	13894	Green River Fm Colton Fm Flagstaff Ls	0 796 1210	796 414 295	5201 4405 3991
					North Horn Fm	1505	1840	3696
					Indianola Gp	3345 3926	581 922	1856 1275
					Arapien Shale	4848	1904	353
					Twin Creek Ls	6752 7751	999 344	-1551
					thrust fault	8095	0	-2894
					Arapien Shale	8095	3561	-2894
					Twin Creek Ls Gydsum Spring Mbr of Twin Ck Ls	12575	344	-6455 -7374
					Navajo Ss TD	12919 13894	975	-7718 -8693
Amoco	Sevier Bridge Unit 1	SW1/4SE1/4 s. 11, T. 16 S., R. 1 W.	5655	11000	Green River Fm	0	1280	5655
		Skinner Peaks quadrangle			Arapien Shale	1280	3489	4375
					Twin Creek Ls Gysum Sprina Mbr of Twin Ck Ls	4769 5190	421 45	886 465
					Navajo Ss	5235	1624	420
					Petrified Forest Mbr of Chinle Fm	6859 7470	611 130	-1204 -1815
					Moenkopi Fm	7600	390	-1945
					thrust fault	7990 7990	0 857	-2335
					Petrified Forest Mbr of Chinle Fm	8847	465	-2333
					Moss Back Mbr of Chinle Fm	9312	95 1054	-3657
					Upper Red Mbr of Chinie Em Shnabkaib Mbr of Moenkopi Fm	9407 10461	217	-3752
					Middle Red Mbr of Moenkopi Fm	10678	310	-5203
					Sinbad Ls Mbr of Moenkopi Fm TD	10988 11000	12	-5333 -5345
Placid Oil	WXC-Barton #1	NW1/4SE1/4 s. 32, T. 16 S., R. 1 W.	5116	21845	Goldens Ranch Fm	0	1641	5116
		Hells Kitchen SW quadrangle			Green River Fm Indianola Gp	1641 2717	1076 1733	3475 2399
					Unnamed conglomerate	4450	767	666
					Cedar Mountain Fm Twist Gulch Fm	5217 5422	205 308	-101 -306
					Arapien Shale	5730	1820	-614
					Twin Creek Ls	7550	560	-2434
					Navaio Ss	8272	1246	-2994 -3156
					Petrified Forest Mbr of Chinle Fm	9518	367	-4402
					Moss Back Mbr of Chinle Fm Moenkopi Fm	9885 100 47	162 1638	-4769 -4931
					thrust fault	11685	0	-6569
					Paleozoic	11685	1403	-6569
					Black Box Dolomite (inverted)	13088	235	-7972
					Black Dragon Mbr of Moenkopi Fm (inverted)	13323	287	-8207
					Sinbad Ls Mbr of Moenkopi Fm (inverted) Middle Red Mbr of Moenkopi Fm (inverted)	13610 14182	572 408	-8494 -9066
					Shnabkaib Mbr of Moenkopi Fm (inverted)	14590	241	-9474
					Upper Red Mbr of Moenkopi Fm (inverted)	14831 15130	299	-9715 -10014
					Sinbad Ls Mbr of Moenkopi Fm	15130	584	-10014
					thrust fault	15714	0	-10598
					Shnabkaib Mbr of Moenkopi Fm	15/14	346	-10598
					Middle Red Mbr of Moenkopi Fm	16320	310	-11204
					Sinbad Ls Mbr of Moenkopi Fm Black Dragon Mbr of Moenkopi Fm	16630 17195	565 460	-11514
					Black Box Dolomite	17655	235	-12539
					Toroweap Fm	17890	1083	-12774
		x			Deseret Ls	19060	920	-13057
					Gardison Ls	19980	584	-14864
					Pitchville Fm Pinvon Peak Ls	20564	246 187	-15448 -15694
					Cambrian(?) TD	20997 21845	848	-15881 -16729

Table 3. Simplified logs of exploratory drill holes in and adjacent to the Skinner Peaks quadrangle. Data from Sprinkel (1994); also refer to Welsh's interpretation in Hintze and Davis (2003). KB denotes kelly bushing, while TD is total depth.



Figure 4. Chart showing suggested correlations between the Goldens Ranch and Moroni Formations.

(Witkind and Marvin, 1989)



(John, 1972)

SPQ

V

Comments on Field Review 7/28/05 Hellmut + Eric C. use Goldens Ranch for whole pile of volcanics + separate finther. Jon says no - use informal as may not a place to formatize mames + more work to be done to determine extent x-section -V-vernore dustred line in ga J- Acating Tg/TK blocks in Ja?? J- make Mickenesses consistent Eg SPeak (?) (- Map extra QF by s. border NO - Lone for Ja contact ?? V - QI/Tfg? - Tps outrop @ Chriss CK. Add Text box on Ja relations





Invitation -- Field Review of New Geologic Mapping -- Invitation

Skinner Peaks 7.5' Quadrangle, Juab and Sanpete Counties, Utah

Mapping by Donald L. Clark¹, Michael D. Hylland¹, Tracey J. Felger² ¹ Utah Geological Survey, ² U.S. Geological Survey

Thursday, July 28, 2004

Meet in Nephi at I-15 exit 222, south to the parking area between the Tesoro station and Burger King. Assemble at 8:15 am; depart at 8:30 am sharp.

You are invited to attend a one-day field review highlighting new geologic mapping of the Skinner Peaks 7.5' quadrangle. This area covers the southern West Hills and Juab Valley, Levan Segment of the Wasatch fault zone, and westernmost San Pitch Mountains. Please note requirements below.

Highlights

- Revised volcanic rock stratigraphy and regional correlation.
- "Tawny facies" of the Green River Formation and other Tertiary rock units.
- Jurassic Arapien Shale associated with thrusting and local diapirism.
- Subsurface rock units, structure, and the central Utah oil play.
- Detailed mapping of Tertiary and Quaternary surficial deposits.
- Lake Bonneville shoreline features and deposits.
- Southern part of the Levan Segment of the Wasatch fault zone.

Information

- Anyone is invited.
- Please **RSVP** to the Utah Geological Survey (email: <u>lisabrown@utah.gov</u>; or call 801-537-3300).
- A few short but strenuous hikes are planned.
- A high-clearance vehicle is required. We may have some spaces in UGS vehicles please contact us if you would like a ride.
- Please bring lunch, water, boots, hat, and field clothes.
- Be prepared for inclement weather hot, cold, wind, or rain are possible!
- If severe weather threatens, please call the UGS office the day before to see if the trip is postponed.

Utah Geological Survey, 1594 W. North Temple, Ste 3110, Salt Lake City, UT 84114-6100; Telephone (801) 537-3300, Fax (801) 537-3400; to RSVP email <u>lisabrown@utah.gov</u>; for trip questions email <u>donclark@utah.gov</u> or call 537-3344.

This project was funded by the Utah Geological Survey.

Hund See Brown ski SKINNER PEAKS FIELD REVIEW Telephone E-mail <u># in Group</u> Name * Ride davide sliger.com 1 Simon 1. 3301 2. rom Nephi (801) 475-0942 Tento 626-0413 3. 4. week 5. 6. Fe +felger@USqS, gov / ger 8. Mc V 9. 1 pickup Hellmu ✓ 10. Callister NII. Jan 12. 13. LAA (0) 14.~ Christiansen 4 15. 81 Buck 16. 14 m 163 hicles 17. 18. 19. 20. In U65 Vehicle 6:3

Timeline - SPQ FR 8:30 Am Report Nephi Bliss 20 min To stop] 8:50-9:30Am Stop 1 Radio 40 min 10 min Sto Stop2 9:40-10.00 Stop 2 5. Hills 20 min 15 min [To Stop 3] 10:15-11:00 Stop 3 Chriss (k 45 min 15 min [to stop 4] 11:15 - Noon Stop 4 - P. Rachs 10 min To Lunch 12:12:45 Lunch Step - Yulsa # min 10 min (to Stop 5) 12:55-1:15 Stop 5 - Tg - Foy Rt 28 20 min 5 min [TO stop 6] 1:20-1:50 stop 6 - milky wash 30 min 10 min (to stup 7). 2:00-2:30 Stop 7 - SP Therech 30 m 5mm (70 \$70p 8) 2:35-3:20 Stop 8 - SPK, Quany 55 min 10 mm (to stop 9) 3:30-4:00 Stop 9 - ISalt ck 30 min

8:30 Depart Nephi Assembly Pt. - Short intro. Introductions put out 3 maps - Vogel/Felgor/New 0 20min [Stop 1]- Radio Tower Hill - I-15 Major physio graphic areas: Near the states West Hills villen mins. Mean the states 8:50-9:30 gunt Valley + CCR San Pitch MAns Canyon Mans Under Edmund Spieken Miessig, Vogel, Neihaus Refer to Brevious Work - OSU 1950s Indep to Others on GP Terting Strata - atypical Q W. Lake magins Volcanic rocks - Coldens Ranch Fm. West Hills ferminology. TETC/TO/N Tg - Jake bedst red Beds Tc - net mapped by 054, Withend mapped, follow him red ms strike valley TF - SS, MS, contonates, base not exposed. farther north grades to cgl. unit (Orme \$\$\$ Cyl.) ASTA STA North How mapped to the North

Goldens Ramle Fm. (Muessig) Volamics used by other OSU falles mied to clanify Strat tromped unit, except SVL Revised to prior work to gratt valley guads Meibos - lower part of unit + 3 mbrs witt Marrin - KlAr dates SVL, He, CCT. ongrad KAr date 33.2 Ma - EV+fames Ar Ar 38.6 Ma - Saye Valley Joing. Point to Tg | TV confact by I-15 - conformable? Tgh + Tgc overlain by Surficial + don't see SUL WIVFZ. places you places younger volkemics against Tigh. TV to SE-(rubble on vulble.) here called Fin of Painted Locks. The (prov problems cornelisting de Miles + Retains Felger) Felger) Aller Subdivision GRFm)

Placed State #1 well just to w. See Table 3 m For tags. spudded in Jg Jution + K section Thrust failts Basis for w. part of cross section A-A' Surficial deps. Qtat - standing on Tfg - over Tght unduQtaf. hill to NE The Washboard - incised Qdf. onto Stop Z V 540p2 - South Hills Jp5-vc putnop, also sandy areast 10 mm 9:30 -9:40 hasellet That the mits - welded - 29. - Ma ash-flow prelim Avite (~35 MA) [Jps Thickness? (~35 MA) [Jps Thickness? - hard to lead with stay 15/20 min 10:00 Look E. to s. Hills TB5-55+VC (w. dippy) & (Tfg-red (QTaf-latrop TB5-55+VC (w. dippy)) & (Tfg-red QTaf-latrop Hould filly fills Tame failes topography or TV surface of Gerer The some paleo togography on Tu sinface ATg - confusing unit, best seen at yuba boat ramp onen ATaf - covers large area, similar lithologies

Step 27 Stop 3 15mm 50 10:15 IStop 37 Temple Rd by Criss ck. Lake bornerille thouline - 5100' Adt on The Washbourg + Neised by Criss cle. SECO They & QTaf. Tp 5-55, weathers to "beach" view to E. of 51K. PKS. walk to look at finning 9/4 fg? Stops & Jon Rd to Painted Rocks And And Stop of the St stop 475 [Stop # Painted Rock Tight parking on Rd. walk section on Rd. 5-mg 70194 Geochem & dates ~ \$ fluid Burton well - cct ithin Subsinface Quant Tpy - witt soil. MnOz

Step 5 - Green River "Tanny faires" sed contact Tv not exposed see in Bonton Truell. "Tamy facies" originally mapped as topplato with by vight Tanny from old USGS useage - Probably from Spieker - Color of a tion hiding in the fillass Green River to East - upper LS mbr Lower sh mbr + includes + overlain by Evary Hollow Fm. - Almial unt salt + pepper Zeller + Millen - thought western lithofacies + Felger of upper LS mbs Hunt + Vegel - napped as younger unit uncomp Norton - thought was crazy Hollow over Green rave Lithologies - Brn ss, pebble cgl, LS, shale on Skinner Peaks To conductain by Tky Honorth Tg on Ja Lithofacies @ w. Hills different. Age - No direct dating here on w. side 6P Sampett Valley - Sheliga - shale mbr 43-46 A wasatch Phatten - 42-45 2 fission trach (Bryant tothers)

Weiss clanfies

to cc Qot veport

Stop 6 - "milky Wash" - Name used by Vogel, not on topo map (Tg Q Skimer PKS + ridge between M. Washt Flat reptilian fossil locality Graben Mbr. 1 - Fm. of PR, largest exposure fault contact in Tg Thickness estimated based on this exposure + Baston well Includes pink hoodoos - CET geochem + in Barton well, dated in sage valley To west see Tp1 overlain by Tp2+Tp3 Locally see TpSW on TpI Domotropped blocks to W. + E of TV (TpI > TpS) Faulting vs. paleotogography issue mapping suggests I see locally to south Regional correlation of volcamic rocks (Show chart on map board)

mike to discuss uFZ Stop 7 Also look at SK. PKs + brief discussion on mapping there Next Step is Taluany

show vertrag By Frich Stop & - An Oning bound to the local oup cores Midiapin? SK PKS To TKnz+1 Ja Qco surface ion Ja/17ps - prospects - FeO + and it - Dec. Stone grang > Diapinism vs. other mechanism TPSt GTat to N. Chriss CK dramay Amoco 5 B Unit well - Basts for E. part A-A'x sect. Disuss Strutue Cass sections A-AI +B-B' Flat Conyon Graben Central Utah Oil play (Show Board) M Loc. + sections

Step 9 - little Salt Creek Thomp TgATJa Green River on complexing und of ga ? sed or structural contact 2 small Thomp intensions (see Johns - date on one to E. Field quide for onterops) 23.97 Mg Ar. (prior AAr dates 23.3 Mg) +23.5 Instrusions of John - 6 types oldest i piabase 2 monzonite porph 3 Biet - Augite non porph 4 hbl mon pouph yourgest 5 porph. lencomons yourgest 6 sygenodionite porph Could Intensions be related to Ja upumping? The Larra flows for NW put ~ 34.78 may will raped Also dated Salt Creek dike only other intension in immediate vicinity Volcomics rear Salina 238 Mg Sources of volcanic rolles - Hough farmble chromistry flocation (Sources of older volcanic section not well documented) Good evidence for an older volcanic much to the existing E. Tintics vol pile Tufts in Tg 46-42 Ma, Tw clasits (lat equiv) 1000-3000' of volcanic vortes below Ferron in sage Valley + "2000" more wally

Stop 9 - withe salt creek

To A Ja

Green River an completing after at ? Ed or structural andrest

2 small Thing intensions (see Jeturs, - date on one for E. 23.97 Ma Ar. · (griver After diates 233724) (subreques ind) 423,5

solly 9 - mood to swatching older e Pralizae 2 monzanite poph I dist Angike anon party 4 till man perph 5 pergh lenconcon yompst 6 sygnodiente perph

770'eg Lahors in Lower moreni Fm. Lava flows for NW part Sage Valley guad -37mg

only athen infrassion m. Volcamics near Salina ~38 Mg

Fall guesde

Sources of valcomic rottes - area formable chromostry & location Sources of alder valeaning section not well decenantical Good evillance for an older volucinic ander proximal to the existing E. Muttes us pile tuting in Tg 46-42 min, Tew clasts (lat again) 1000 - 3000 of welcomic vorks believe Ferrican in Sage Valley

stops Jund [mach.] Emch > Step 6 Cmilky Wash) 15 min drive Ty stops-D - Mong Kd from milky usoh « DT D Tg bloch just between Best R+ 28+ old 28 just to 5. og milky und Rd. B-onwez Egtv block -1/2 mi E. og 28 Stop F- Tg outrop. Stop WFZ @ trench site area - MHylland Step 8 -Stop 9 - SK. P.K. cyp Quany Stop 10 - Tg [Ja on little salt 94 M.