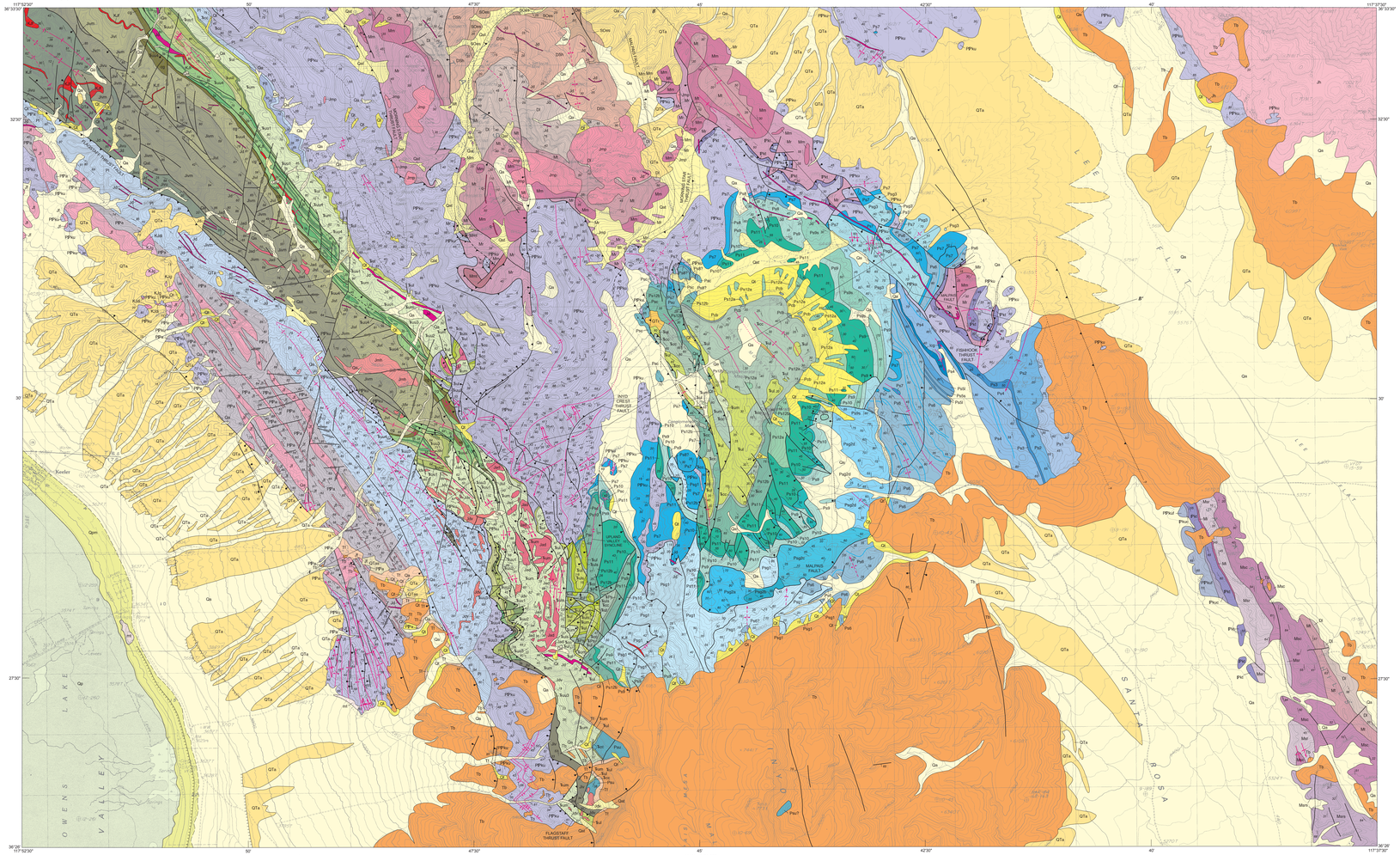
U.S. Department of the Interior
U.S. Geological Survey

Scientific Investigations Map 3094
Version 1.1, September 2014
Pamphlet accompanies map



Base from U.S. Geological Survey, 7.5-minute Cerro Gordo Peak, Keeler, Nelson Range, and Santa Rosa Flat quadrangles, 1987
Universal Transverse Mercator projection
1927 North American Datum
Clark 1866 Ellipsoid, Zone 11

APPROXIMATE MEAN DECLINATION, 2009

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
SUPPLEMENTARY CONTOUR INTERVAL 10 FEET

MAP LOCATION

Geology compiled 2007-2009 by P. Stone, B.J. Swanson, C.H. Stevens, and G.C. Dunne (see accompanying diagram for sources of geologic mapping)
GIS database and digital cartography by S.S. Priest
Edited by Carolyn Donin
Manuscript approved for publication October 1, 2009

LIST OF MAP UNITS

SURFICIAL DEPOSITS AND BASALT

- mt — **Mine tailings**
- Qa — **Alluvium (Quaternary)**
- Qt — **Talus (Quaternary)**
- Qal — **Alluvium and talus, undivided (Quaternary)**
- Qp — **Playa deposits of Owens Lake (Quaternary)**
- Qpm — **Playa-margin deposits of Owens Lake (Quaternary)**
- QTa — **Old alluvium and fanglomerate (Quaternary and Tertiary)**
- QTas — **Silt beds (Quaternary or Tertiary)**
- QTr — **Rubble (Quaternary or Tertiary)**
- Tb — **Basalt (Tertiary)**
- Tf — **Fanglomerate (Tertiary)**

INTRUSIVE ROCKS AND VEINS

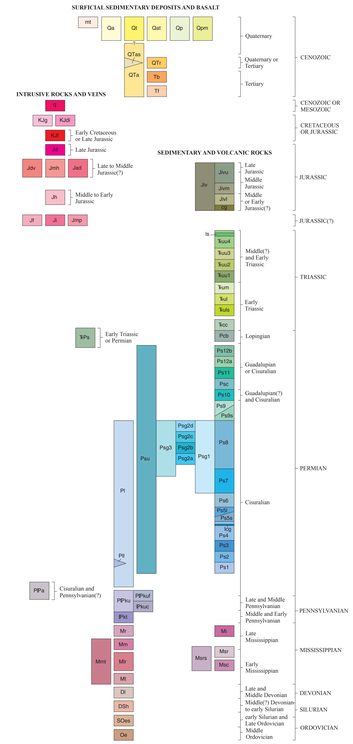
- q — **Quartz veins (Cenozoic or Mesozoic)**
- KJg — **Leucocratic granite (Cretaceous or Jurassic)**
- KJdi — **Diorite (Cretaceous or Jurassic)**
- Kvd — **Younger felsite intrusions (Early Cretaceous or Late Jurassic)**
- Kd — **Dark-colored dikes (Late Jurassic?)**
- JKv — **Deformed intrusions of variable composition (Late to Middle Jurassic?)**
- Jmb — **Mafic hypabyssal intrusion (Late to Middle Jurassic?)**
- Jad — **Altered diorite (Late to Middle Jurassic?)**
- Jh — **Hunter Mountain Quartz Monzonite (Middle to Early Jurassic)**
- Jf — **Older felsite intrusions (Jurassic?)**
- Ja — **Altered fine-grained intrusions (Jurassic?)**
- Jmp — **Hornblende monzodiorite to monzonite porphyry (Jurassic?)**

SEDIMENTARY AND VOLCANIC ROCKS

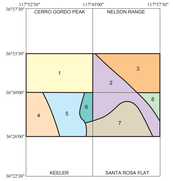
- Jtv — **Inyo Mountains Volcanic Complex (Jurassic)**
- Jvu — **Upper part (Late and Middle Jurassic)**
- Jvm — **Middle part (Middle Jurassic)**
- Jvl — **Lower part (Middle or Early Jurassic?)**
- Jvb — **Basal conglomeratic unit**
- **Union Wash Formation (Middle? and Early Triassic)**
- **Upper member (Middle? and Early Triassic)**
- ℾsu4 — **Subunit 4**
- ℾl — **Limestone**
- ℾsu3 — **Subunit 3**
- ℾsu2 — **Subunit 2**
- ℾsu1 — **Subunit 1**
- ℾum — **Middle member (Early Triassic)**
- ℾul — **Lower member (Early Triassic)**
- ℾub — **Basal sandstone unit**
- **Owens Valley Group (Early Triassic to Cisuralian)**
- **Conglomerate Mesa Formation (Early Triassic and Lopingian)**
- ℾcc — **Member C (Early Triassic)**
- Pcb — **Member B (Lopingian)**
- ℾPs — **Sandstone and chert-pebble conglomerate (Early Triassic or Permian)**
- Psu — **Sedimentary rocks of Santa Rosa Flat (Guadalupian? and Cisuralian)**
- **Unit 12 (Guadalupian or Cisuralian)**
- Pz12b — **Unit 12b**
- Pz12a — **Unit 12a**
- Pz11 — **Unit 11 (Guadalupian or Cisuralian)**
- Psc — **Limestone-clast conglomerate (Guadalupian or Cisuralian)**
- Pz10 — **Unit 10 (Guadalupian? and Cisuralian)**
- Pz9 — **Unit 9 (Cisuralian)**
- Pz9s — **Predominantly siltstone and fine-grained sandstone**
- **Graded limestone unit (Cisuralian)**
- Psg3 — **Subunit 3**
- **Subunit 2**
- Psg2d — **Subunit 2d**
- Psg2c — **Subunit 2c**
- Psg2b — **Subunit 2b**
- Psg2a — **Subunit 2a**
- Psg1 — **Subunit 1**
- Pz8 — **Unit 8 (Cisuralian)**
- Pz7 — **Unit 7 (Cisuralian)**
- Pz6 — **Unit 6 (Cisuralian)**
- **Unit 5 (Cisuralian)**
- Pz5l — **Predominantly limestone**
- Pz5s — **Predominantly siltstone and shale**
- Pz4 — **Unit 4 (Cisuralian)**
- Pz4c — **Limestone conglomerate**
- Pz3 — **Unit 3 (Cisuralian)**
- Pz2 — **Unit 2 (Cisuralian)**
- Pz1 — **Unit 1 (Cisuralian)**
- Pl — **Lone Pine Formation (Cisuralian)**
- Pll — **Limestone**
- PPa — **Argillite and hornfels (Cisuralian and Pennsylvanian?)**
- **Keeler Canyon Formation (Cisuralian to Early Pennsylvanian)**
- PPku — **Upper part (Cisuralian to Middle Pennsylvanian)**
- PPkuf — **Fine-grained upper unit (Cisuralian to Middle Pennsylvanian)**
- PPkuc — **Coarse-grained lower unit (Late and Middle? Pennsylvanian)**
- PPkt — **Tihvipah Member (Middle and Early Pennsylvanian)**
- Mr — **Rest Spring Shale (Late Mississippian)**
- Mi — **Indian Springs Formation (Late Mississippian)**
- Mmt — **Mexican Spring Formation and Tin Mountain Limestone, undivided (Late and Early Mississippian)**
- Mm — **Mexican Spring Formation (Late Mississippian)**
- Mms — **Santa Rosa Hills Limestone and Stone Canyon Limestone, undivided (Late and Early Mississippian)**
- Mtr — **Santa Rosa Hills Limestone (Late and Early Mississippian)**
- Ml — **Leaning Rock Formation (Early Mississippian)**
- Msc — **Stone Canyon Limestone (Early Mississippian)**
- Mt — **Tin Mountain Limestone (Early Mississippian)**
- Dl — **Lost Burro Formation (Late and Middle Devonian)**
- DSh — **Hidden Valley Dolomite (Middle? Devonian to early Silurian)**
- SOes — **Ely Springs Dolomite (early Silurian and Late Ordovician)**
- Oe — **Eureka Quartzite (Middle Ordovician)**

- 45 — **Contact**—Showing dip. Dashed where approximate, dotted where concealed
- **Marker horizon**
- **Limestone marker bed**
- **Paleoshoreline**—Locally coincident with contact
- 20 — **Fault**—Showing dip where known. Bar and ball on downthrown side where known or inferred. Arrows show sense of lateral offset where known or inferred (in cross section: A, movement away from viewer; T, movement toward viewer). Dashed where inferred, dotted where concealed
- **Fault**—Showing vertical dip
- 45 — **Fault**—Showing dip where known. Arrow shows bearing and plunge of striations on fault surface
- **Fault-line scarp**—Hachures point downscarp
- 45 — **Thrust fault**—Showing dip. Teeth on upper plate. Dashed where inferred, dotted where concealed, queried where uncertain
- **Thrust fault reactivated as normal fault**—Teeth on upper plate of thrust fault; bar and ball on downthrown side of normal fault
- 20 — **Anticline**—Trace of axial surface. Dashed where inferred, dotted where concealed. Arrow shows direction of plunge
- 20 — **Overturned anticline**—Trace of axial surface. Dotted where concealed. Arrow shows direction of plunge. Plunge arrow at a high angle to trace of axial surface indicates overturned reclined fold
- **Inverted anticline (synform in overturned beds)**—Trace of axial surface
- 20 — **Overturned anticlinal bend**—Trace of axial surface. Arrow shows direction of plunge. Denotes reclined anticline in which both limbs face the same direction with the lower limb overturned
- 20 — **Syncline**—Trace of axial surface. Dashed where inferred, dotted where concealed. Arrow shows direction of plunge
- 20 — **Overturned syncline**—Trace of axial surface. Dotted where concealed. Arrow shows direction of plunge
- **Inverted syncline (antiform in overturned beds)**—Trace of axial surface
- **Strike and dip of beds**
- 50 — **Inclined**—May include overturned beds in structurally complex areas
- 50 — **Inclined**—Top direction known from local features
- — **Vertical**
- — **Vertical**—Top direction known from local features
- 80 — **Overturned**—Top direction inferred from stratigraphic and structural relations
- 80 — **Overturned**—Top direction known from local features
- **Horizontal**
- 50 — **Strike and dip of foliation**

CORRELATION OF MAP UNITS

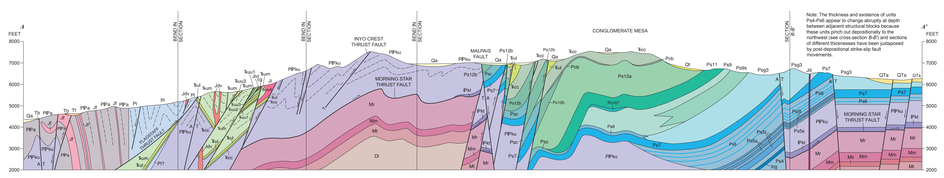


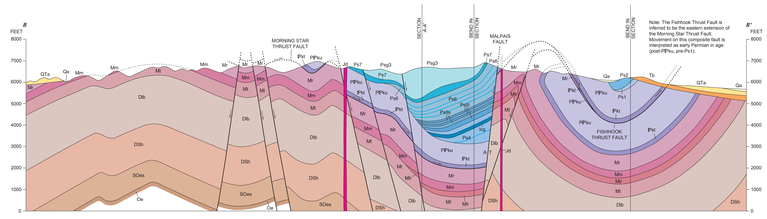
View of southern Inyo Mountains from the west



Sources of geologic mapping and names of 7.5' topographic quadrangles

1. Stone and others, 2004; air photo interpretation by the authors, 2008
2. Stone, 1984; Stone and others, 1989; air photo interpretation and local field studies by the authors, 1996–2013
3. McAllister, 1956; Worner, 1970; air photo interpretation and field studies by the authors, 2007
4. Air photo interpretation and local field studies by the authors, 2007; Stinson, 1977
5. Swanson, 1990; air photo interpretation and local field studies by the authors, 2007; Stinson, 1977
6. Stone, 1984; air photo interpretation and field studies by the authors, 1996–2007
7. Hall and MacKevett, 1962; Stinson, 1977; air photo interpretation and local field studies by the authors, 2007
8. Hall and MacKevett, 1962; air photo interpretation by the authors, 2007





AGE	Western Areas	Conglomerate Mesa Area	Santa Rosa Hills
JURASSIC	Inyo Mountains Volcanic Complex		
TRIASSIC	Union Wash Fm.	Union Wash Fm.	
		Conglomerate Mesa Fm.	
PERMIAN	Lone Pine Fm.	Sedimentary rocks of Santa Rosa Flat	
PENNSYLVANIAN	Keeler Canyon Fm.	Keeler Canyon Fm.	Keeler Canyon Fm.
MISSISSIPPIAN	Rest Spring Shale	Rest Spring Shale	Indian Springs Fm.
	Mexican Spring Fm.	Mexican Spring Fm.	Santa Rosa Hills Ls.
		Leaning Rock Fm.	Stone Canyon Ls.
	Tin Mountain Ls.	Tin Mountain Ls.	Tin Mountain Ls.
DEVONIAN	Lost Burro Fm.		Lost Burro Fm.
SILURIAN	Hidden Valley Dolomite		
ORDOVICIAN	Ely Springs Dolomite		
	Eureka Quartzite		

Chart showing principal stratigraphic units present in different parts of map area

Geologic Map of the Southern Inyo Mountains and Vicinity, Inyo County, California

By
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2009

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