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HUEY D. JOHNSON
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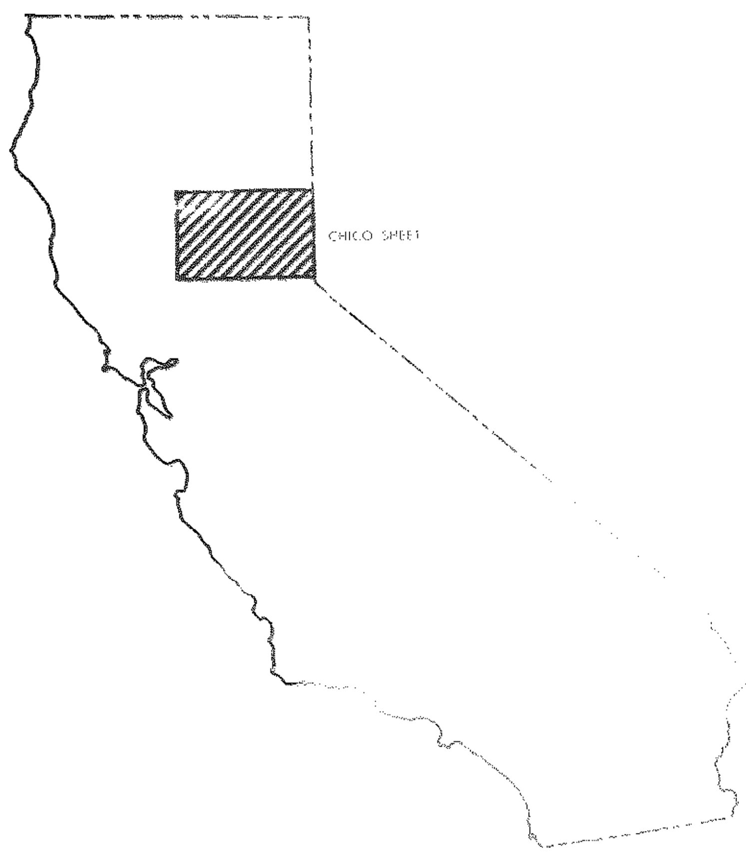
JAN DENTON
DIRECTOR

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS
STATE GEOLOGIST

BOUGUER GRAVITY MAP OF CALIFORNIA
CHICO SHEET

Scale 1:250,000

1982



CALIFORNIA DIVISION OF MINES AND GEOLOGY
1416 Ninth Street, Room 1341
SACRAMENTO, CALIFORNIA 95814

CHICO GRAVITY

DIVISION OF MINES AND GEOLOGY
Ian Campbell, *State Geologist*

STATE OF CALIFORNIA
THE RESOURCES AGENCY

DEPARTMENT OF CONSERVATION
DeWitt Nelson, *Director*

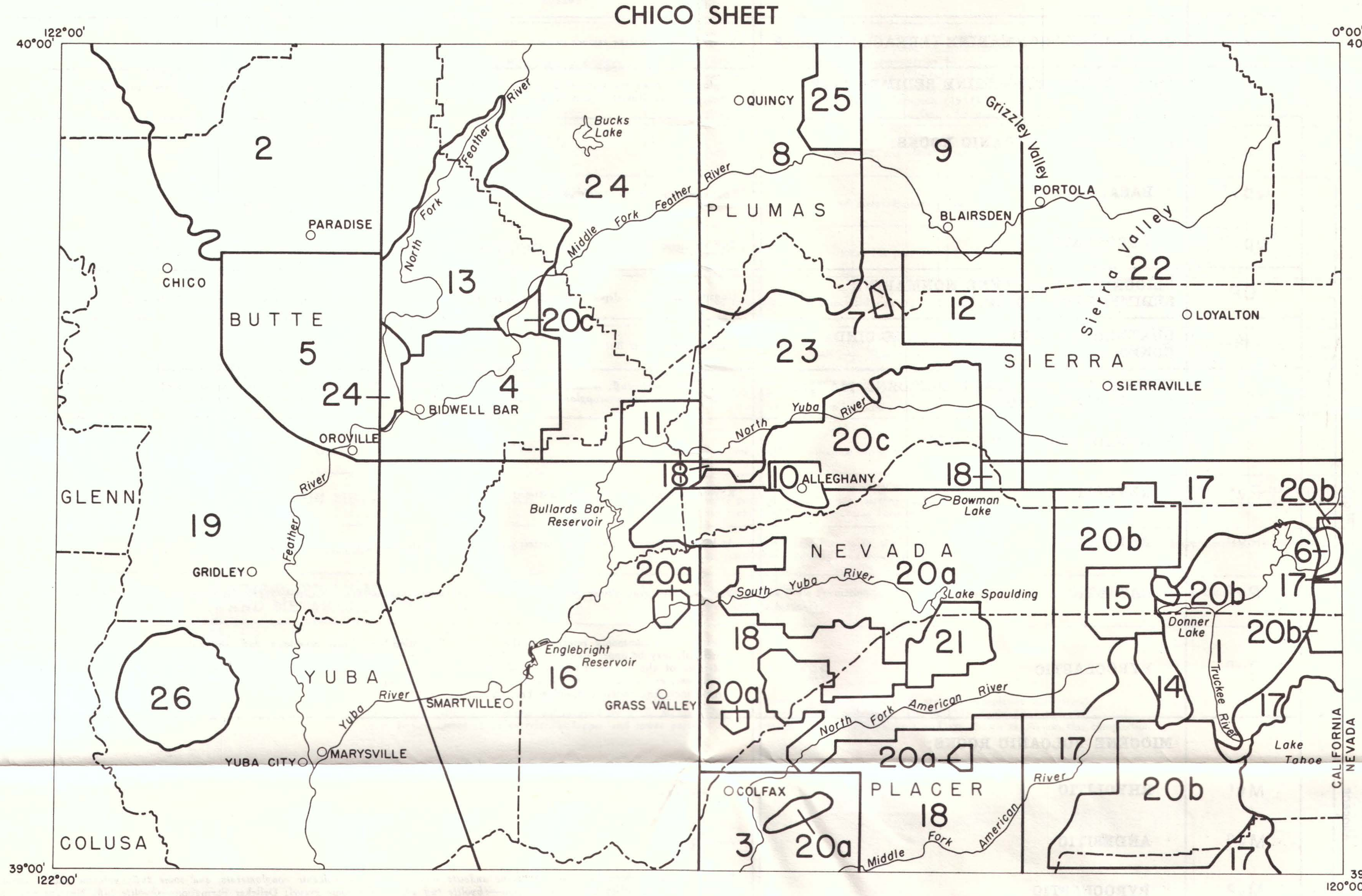
EXPLANATORY DATA
CHICO SHEET
GEOLOGIC MAP OF CALIFORNIA
OLAF P. JENKINS EDITION

COMPILATION BY JOHN L. BURNETT AND CHARLES W. JENNINGS, 1962

(Third Printing, 1977)

THIS DATA SHEET IS A REPRINT OF THE DATA SHEET ACCOMPANYING THE CHICO SHEET, GEOLOGIC MAP OF CALIFORNIA, OLAF P. JENKINS EDITION, FIRST PUBLISHED IN 1962. IT HAS NOT BEEN ALTERED. THE GEOLOGY SHOWN ON THE CHICO SHEET OF THE BOUGUER GRAVITY MAP OF CALIFORNIA IS ALSO REPRINTED FROM THE GEOLOGIC MAP OF CALIFORNIA, 1962. THE GRAVITY DATA PRESENTED WERE COMPILED IN 1980 AND PUBLISHED IN 1982.

INDEX TO GEOLOGIC MAPPING
USED IN THE COMPILATION OF THE CHICO SHEET



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2. Burnett, J. L., Reconnaissance geologic map of the Paradise and the northeastern half of the Richardson Springs quadrangles, California, scale 1:62,500, California Div. Mines and Geology reconnaissance mapping for the State Geologic Map, 1961.

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   Cook, R. E., The Upper Cretaceous Chico Formation at the type locality, scale 1:93,700, Stanford University, unpublished M.S. thesis, 1949.

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5. Creely, R. S., Geology of the Oroville quadrangle, California, scale 1:62,500, University of California, Berkeley, unpublished Ph.D. thesis, 1955. Also California Div. Mines and Geology report in preparation, 1961. Pliocene andesite flows added by J. L. Burnett (see item 2).

6. Daley, A. C., and Poole, D. M., A geologic section in east-central California eastward from Donner Pass, scale 1:31,680, University of California, Los Angeles, unpublished M.A. thesis, 1949.

7. Durrell, C. and Proctor, P. D., 1948, Iron-ore deposits near Lake Hawley and Spencer Lakes, Sierra County, California: California Div. Mines Bulletin 129-L, pp. 167-192, Pl. 20: Geologic map of the magnetite deposits of the Sierra iron mine area, Sierra County, California, scale 1:12,000.

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9. Durrell, C., Geologic map of the Blairsden quadrangle, California, scale 1:48,000, in progress, 1958.

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21. Stanford Geological Survey (R. R. Compton in charge), Geologic map of the Cisco-Yuba Gap area, California, scale 1:48,000, Stanford University, unpublished, 1955.

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25. Wilhelms, D. E., The geology of the eastern portion of the Spring Garden quadrangle, California, scale 1:24,000, University of California, Los Angeles, unpublished M.A. thesis, 1958.

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    Johnson, H. R., 1943, Marysville Buttes (Sutter Buttes) gas field: in California Div. Mines Bulletin 118, pp. 610-615, Fig. 270: Marysville (Sutter) Buttes gas field, scale 1:100,000. Also Buttes Gas and Oil Company map of Sutter Buttes, scale 1" = 400', in Geological Society of Sacramento Annual Field Trip Guidebook, East-Central Sacramento Valley, 1961.

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For a complete list of published geologic maps of this area see Division of Mines Special Report 52.

STRATIGRAPHIC NOMENCLATURE—CHICO SHEET

AGE	STATE MAP SYMBOL	STATE MAP UNIT	STRATIGRAPHIC UNITS AND CHARACTERISTIC LITHOLOGIES (The formally named formations grouped within an individual State Map Unit, are listed in stratigraphic sequence from youngest to oldest.)
CENOZOIC — QUATERNARY — Recent	Qal	**RECENT ALLUVIUM**	Recent river and stream alluvium; fan deposits.
	Qsc	**RECENT RIVER AND MAJOR STREAM CHANNEL DEPOSITS IN THE GREAT VALLEY**	Sediments along river channels and major streams including adjacent natural levees.
	Qf	**RECENT ALLUVIAL FAN DEPOSITS IN THE GREAT VALLEY**	Sediments deposited from streams emerging from high lands surrounding the Great Valley. Includes Victor Formation—*lenticular silt, sand, gravel, and clay* (Pleistocene in part). Qf′ = younger sediments comprising the Chico Fan.
	Qb	**RECENT BASIN DEPOSITS IN THE GREAT VALLEY**	Sediments deposited during flood stages of major streams in the area between natural stream levees and fans.
	Ql	**QUATERNARY LAKE DEPOSITS**	Younger lake beds; playa-like deposits in scattered basins of interior drainage; locally includes overlying alluvium. Mohawk Lake Beds—*conglomerate, sandstone, siltstone, and shale* (may be upper Pliocene in part).
	Qg	**QUATERNARY GLACIAL DEPOSITS**	Moraines, glacial drift, and fluvioglacial sand and gravel.
	Qt	**QUATERNARY NONMARINE TERRACE DEPOSITS**	River, stream, and lake terrace deposits, some fanglomerate; glacial outwash terraces in the Truckee area.
Pleistocene	Qc	**PLEISTOCENE NONMARINE SEDIMENTARY DEPOSITS**	Fanglomerate from the Cascade Range—*sand, gravel, and silt consisting of volcanic detritus derived from the Tuscan Formation.* Older fanglomerate. Fluvial deposits in the Truckee Valley area, including some lake beds.
		PLEISTOCENE VOLCANIC ROCKS:	
	Qpv^{b}	**BASALTIC**	Lousetown Formation—*basalt and latite flows* (Truckee area).
	Qpv^{p}	**PYROCLASTIC**	Tuff associated with cinder cones in the Truckee area.
	QP	**PLIOCENE-PLEISTOCENE NONMARINE SEDIMENTARY DEPOSITS**	Unnamed continental deposits equivalent to the Laguna Formation and Arroyo Seco Gravel to the south—*silt, sand, clay, and unsorted gravel.*
	✳	**QUATERNARY AND/OR PLIOCENE CINDER CONES**	Cinder cones; Sutter Buttes vent tuff.
TERTIARY — Pliocene	Pc	**MIDDLE AND/OR LOWER PLIOCENE MARINE SEDIMENTARY ROCKS**	Sutter Formation—*tuff, sandstone, conglomerate* (probably not of local origin; age uncertain but predates intrusion of Sutter Buttes). New Era Formation—*conglomerate, sandstone, and siltstone underlying the Tuscan Formation in the Oroville area.*
		PLIOCENE VOLCANIC ROCKS:	
	Pv^{r}	**RHYOLITIC**	Rhyolite porphyry in the Sutter Buttes.
	Pv^{a}	**ANDESITIC**	Andesite porphyry in the Sutter Buttes; andesite flows in the Richardson Springs area.
	Pv^{b}	**BASALTIC**	Warner Basalt—*gray olivine basalt, augite basalt, and minor andesite flows* (Durrell, 1959). Unnamed basalt and olivine basalt.
	Pv^{p}	**PYROCLASTIC**	Volcanic rocks commonly referred to the Mehrten Formation [1]—*andesitic mudflows, tuff, and volcanic breccias* (includes some basaltic material; may be upper Miocene in part). Tuscan Formation [1]—*volcanic breccia, tuff, mudflows, and thin-bedded sediments.* Nomlaki Tuff Member of the Tuscan Formation [1]—*dacitic pumice.* Penman Formation [1]—*hornblende andesite mudflow breccia, including some tuff, sandstone, and conglomerate.* Neocene andesite of Lindgren and Turner. Vent tuff in the Sutter Buttes. Unnamed andesitic pyroclastic rocks including andesitic mudflow breccias.
Miocene		**MIOCENE VOLCANIC ROCKS:**	
	Mv^{r}	**RHYOLITIC**	Rhyolite flows.
	Mv^{a}	**ANDESITIC**	Andesite flows.
	Mv^{p}	**PYROCLASTIC**	Bonta Formation—*hornblende and pyroxene andesite mudflow breccia, volcanic conglomerate, and some tuff;* volcanic rocks commonly referred to the Valley Springs Formation—*rhyolite tuff and locally some gravel;* Delleker Formation—*rhyolite tuff.* Neocene rhyolite of Lindgren and Turner.
Oligocene	Φ	**OLIGOCENE MARINE SEDIMENTARY ROCKS**	Wheatland Formation—*fossiliferous silty shale, tuffaceous sandstone, and conglomerate* (upper Eocene in part).
		OLIGOCENE VOLCANIC ROCKS:	
	Φv^{p}	**PYROCLASTIC**	Ingalls Formation—*pyroxene and hornblende andesite mudflow breccia, some tuff and volcanic conglomerate* (includes Neocene pyroxene andesite of Turner according to Durrell, 1959, p. 169). Reeds Creek Andesite—*volcanic breccia and gravel* (Wheatland area).
Eocene	Ec	**EOCENE NONMARINE SEDIMENTARY ROCKS**	Ione Formation—*quartzitic sandstone, anauxitic claystone, siltstone, gravel, and conglomerate;* "Dry Creek Formation" of Allen—*gray shale and biotitic sandstone.* Eocene "auriferous" gravel deposits.
	E	**EOCENE MARINE SEDIMENTARY ROCKS**	Capay Formation—*greenish-gray, glauconitic, fossiliferous claystone and shale* (Sutter Buttes).
		EOCENE VOLCANIC ROCKS:	
	Ev^{b}	**BASALTIC**	Lovejoy Formation—*black olivine basalt flows.* Includes the "older basalt" of Turner (Durrell, 1959, p. 166).
	Ev^{p}	**PYROCLASTIC**	Rhyolite tuff in the Castle Peak area. Andesitic tuff, tuff breccia and associated volcanic sandstone and conglomerate in the Oroville quadrangle (age uncertain).
Undivided	Tc	**TERTIARY NONMARINE SEDIMENTARY ROCKS**	Auriferous (and nonauriferous) gravel deposits of uncertain age. Possibly includes some Ione Formation.
	Tl	**TERTIARY LAKE DEPOSITS**	Older lake beds (conglomerate, clay, sand, and tuff) of the Truckee Valley and Long Valley areas.
		TERTIARY INTRUSIVE (HYPABYSSAL) ROCKS:	
	Ti^{r}	**RHYOLITIC**	Rhyolite plugs.
	Ti^{a}	**ANDESITIC**	Dikes and plugs of andesite, hornblende andesite, and intrusive andesitic breccia.
	Ti^{b}	**BASALTIC**	Dikes and plugs of basalt and olivine basalt.
		TERTIARY VOLCANIC ROCKS: UNDIFFERENTIATED	
	Tv^{a}	**ANDESITIC**	Andesite flows, including some andesitic breccia.
	Tv^{b}	**BASALTIC**	Olivine basalt flows.
	Tv^{p}	**PYROCLASTIC**	Andesite mudflows and rhyolite tuff. Includes some sandstone and conglomerate in the Oroville quadrangle.

STRATIGRAPHIC NOMENCLATURE—Continued

AGE	STATE MAP SYMBOL	STATE MAP UNIT	STRATIGRAPHIC UNITS AND CHARACTERISTIC LITHOLOGIES (The formally named formations grouped within an individual State Map Unit, are listed in stratigraphic sequence from youngest to oldest.)
MESOZOIC — CRETACEOUS	Ku	**UPPER CRETACEOUS MARINE SEDIMENTARY ROCKS**	Chico Formation—*fossiliferous marine sandstone, shale, and conglomerate.* Kione Sand—*white quartzose sandstone* (Sutter Buttes area). Unnamed greenstone conglomerate and sedimentary breccia at Cherokee in the Oroville quadrangle.
	gr	**MESOZOIC GRANITIC ROCKS**	Trondhjemite, granodiorite, tonalite. granophyre, and metagranodiorite porphyry (Big Bald Rock area). Granodiorite, granite, trondhjemite, and diorite (Merrimac area). Elsewhere the granitic rocks include granodiorite, diorite, monzonite, quartz porphyrite, schistose granodiorite, granulite, alaskite, and undifferentiated plutonic rocks.
	bi	**MESOZOIC BASIC INTRUSIVE ROCKS**	Metagabbro (Big Bald Rock area). Metagabbro, metadiorite, and heterogeneous gabbroic and dioritic rocks (Merrimac area). Gabbroic and dioritic rocks (Swedes Flat area). Gabbro and associated albite diorite and albite diabase (Colfax area). Includes some amphibolite which is derived, in part, from volcanic rocks.
	ub	**MESOZOIC ULTRABASIC INTRUSIVE ROCKS**	Ultrabasic intrusive rocks, largely serpentized, including minor talc schist and soapstone.
JURASSIC	Ju	**UPPER JURASSIC MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Mariposa Formation—*slate, shale, graywacke, mudstone, sandstone, breccia, conglomerate, and metabasalt.* Colfax Formation—*fossiliferous tuff and shale.* Lower member of the Trail Formation [2]—*metamorphosed conglomerate, sandstone, slaty shale, and tuff.* Monte de Oro Formation—*siltstone, sandstone, and conglomerate.*
	Jml	**MIDDLE AND/OR LOWER JURASSIC MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Sailor Canyon and Milton Formations [3]—*slate, hornfels, graywacke, quartzite, chert, conglomerate, marble, and some interbedded volcanic rocks.*
	JTRv	**JURASSIC AND/OR TRIASSIC METAVOLCANIC ROCKS**	Logtown Ridge Formation—*basic flows, tuff, and agglomerate, including some shale and slate;* Kettle Formation [2]—*andesite and dacite breccia, tuff, conglomerate, and sills or flows;* volcanic portion of the Sailor Canyon and Milton Formations—*metamorphosed tuff, breccia, and flows (also includes subordinate amounts of hornfels, slate, and graywacke).* Oregon City Formation—*metavolcanic rocks containing lesser amounts of metasedimentary rocks* (Oroville area). Includes most of the porphyrite and diabase, amphibolite, and amphibolite schist of Lindgren and Turner. Metabasalt, metarhyolite, metadacite, quartz porphyry, amphibolite, hornblende porphyry, hornblende and amphibolite schist, and agglomerate of Compton (1955) and Hietanen (1951). Much of the JTRv shown in the broad belt on the western side of the map includes rocks of uncertain age; a large part of these rocks may be Paleozoic.
TRIASSIC	TR	**TRIASSIC MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Cedar Formation—*limestone, sandstone, and shale.* Unnamed limestone and chert breccia in the Duncan Peak 7½′ quadrangle.
PALEOZOIC — UNDIVIDED	m	**PRE-CRETACEOUS METAMORPHIC ROCKS, UNDIFFERENTIATED**	Undifferentiated metavolcanic and metasedimentary rocks.
	mv	**PRE-CRETACEOUS METAVOLCANIC ROCKS**	Amphibolite of the Downieville Folio (in part JTRv). Undifferentiated metavolcanic rocks commonly containing some metasedimentary rocks.
	gr-m	**PRE-CENOZOIC GRANITIC AND METAMORPHIC ROCKS**	Migmatized metavolcanic and metasedimentary rocks. Injection gneiss.
	Pz	**PALEOZOIC MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS,**	Calaveras Group [1] (Upper Paleozoic): Clipper Gap Formation—*clay slate, chert, and crystalline limestone;* Delhi Formation—*siliceous argillite, slate, hornfels, and crystalline limestone;* Cape Horn Slate—*fissile clay slate, schist, quartzite, and metavolcanic rocks;* Relief Quartzite—*quartzite, quartzitic mica schist, chert, and slate;* Kanaka Formation—*siliceous slate, chert, schist, metatuff, and metaconglomerate;* Tightner Formation—*amphibolite schist, slate, hornblende-chlorite schist, and minor crystalline limestone;* Blue Canyon Formation—*slate, phyllite, mica schist, clay slate, quartzite, and crystalline limestone.* Grizzly Formation [2]—*gray quartzite and slaty sandstone* (pre-Permian age). Also includes rocks commonly referred to the Calaveras Formation, but may include some Mesozoic rocks.
	ls	**LIMESTONE AND/OR DOLOMITE**	Crystalline limestone and dolomite lentils within the Calaveras Formation.
	Pzv	**PALEOZOIC METAVOLCANIC ROCKS**	Taylor Formation [2]—*augite andesite metabreccia, metatuff, keratophyre porphyry sills or flows.* Most of the quartz porphyry of Turner and the augite porphyrite of Turner (altered augite andesite with some diabase). Some of the amphibolite of Turner. Greenstone and metavolcanic rocks within the Calaveras Formation. Undifferentiated metavolcanic rocks.
PERMIAN	Pmv	**PERMIAN METAVOLCANIC ROCKS**	Unnamed mafic pyroclastic breccia in the northwestern part of the Blairsden quadrangle. Reeve Formation [2]—*porphyritic andesitic metabreccia, fossiliferous metatuff, and minor slaty mudstone and quartzite.*
MISSISSIPPIAN	CM	**MISSISSIPPIAN MARINE SEDIMENTARY AND METASEDIMENTARY ROCKS**	Upper member of the Peale Formation [2]—*metamorphosed chert, slate, tuffaceous metasandstone, and volcanic flows and breccia* (may include some Pennsylvanian rocks).

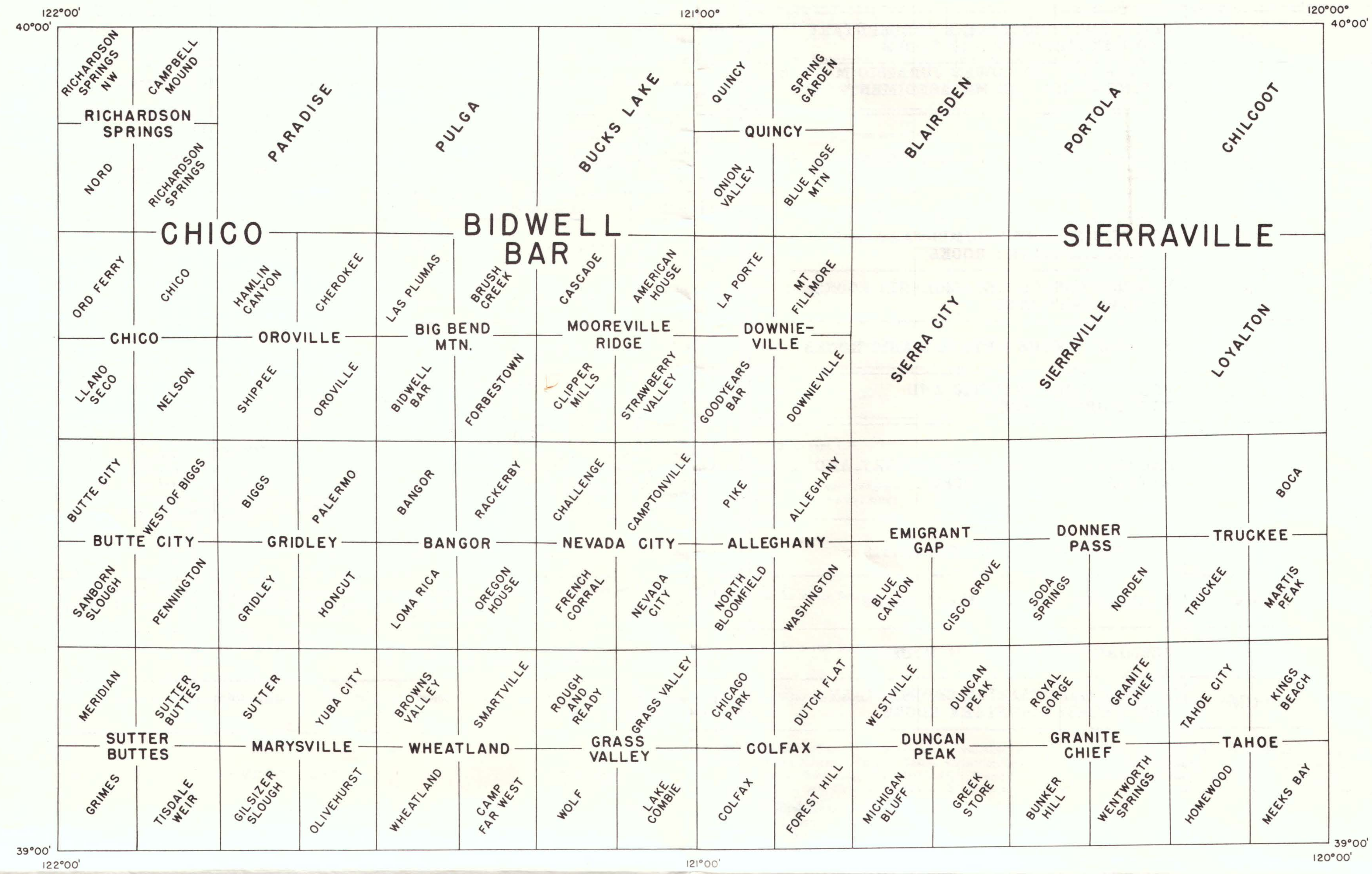
NOTES

1. Not necessarily in stratigraphic sequence inasmuch as interrelationships of these formations are not completely understood.
2. Formation as redefined and mapped by V. E. McMath, "Geology of the Taylorsville area", UCLA PhD thesis, 1958.
3. Considered to be correlative. Upper and lower parts of these formations are largely volcanic and are shown as JTRv on this compilation.

View east along U. S. Highway 40, of the summit region of the Sierra Nevada. Lake Van Norden (right middleground) lies in a valley filled with glacial deposits. Barren rounded topography (left middleground) represents a remnant of an Eocene erosion surface developed on granitic rocks. Castle Peak (elev. 9103 feet) in the center middleground is marked by a prominent black basalt capping which overlies light-colored tuff and agglomerate.

Photo by Clyde Sunderland, Oakland

TOPOGRAPHIC QUADRANGLES
WITHIN THE CHICO SHEET
AVAILABLE FROM THE U.S. GEOLOGICAL SURVEY
1962



View west toward Sutter Buttes, an eroded inactive Pliocene volcano, which pierces the flat alluvial plain of the Sacramento Valley and stands as a prominent landmark 10 miles in diameter and 2100 feet above the valley floor. A central crater filled with vent tuff lies within an andesite porphyry core. Surrounding the steep-sided and craggy core is a ring of rounded hills composed of folded and faulted Cretaceous, Eocene, and early Pliocene sedimentary beds. These beds in turn are girdled by an outer ring of andesite tuff which forms long gentle ridges that merge into the valley alluvium. Scattered through the sedimentary beds and central core are later intrusions of rhyolite porphyry.

Photo by Clyde Sunderland, Oakland

25230-650 3-82 1,500 CAM ◆ OSP

INDEX TO CALIFORNIA GRAVITY MAP SHEETS

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