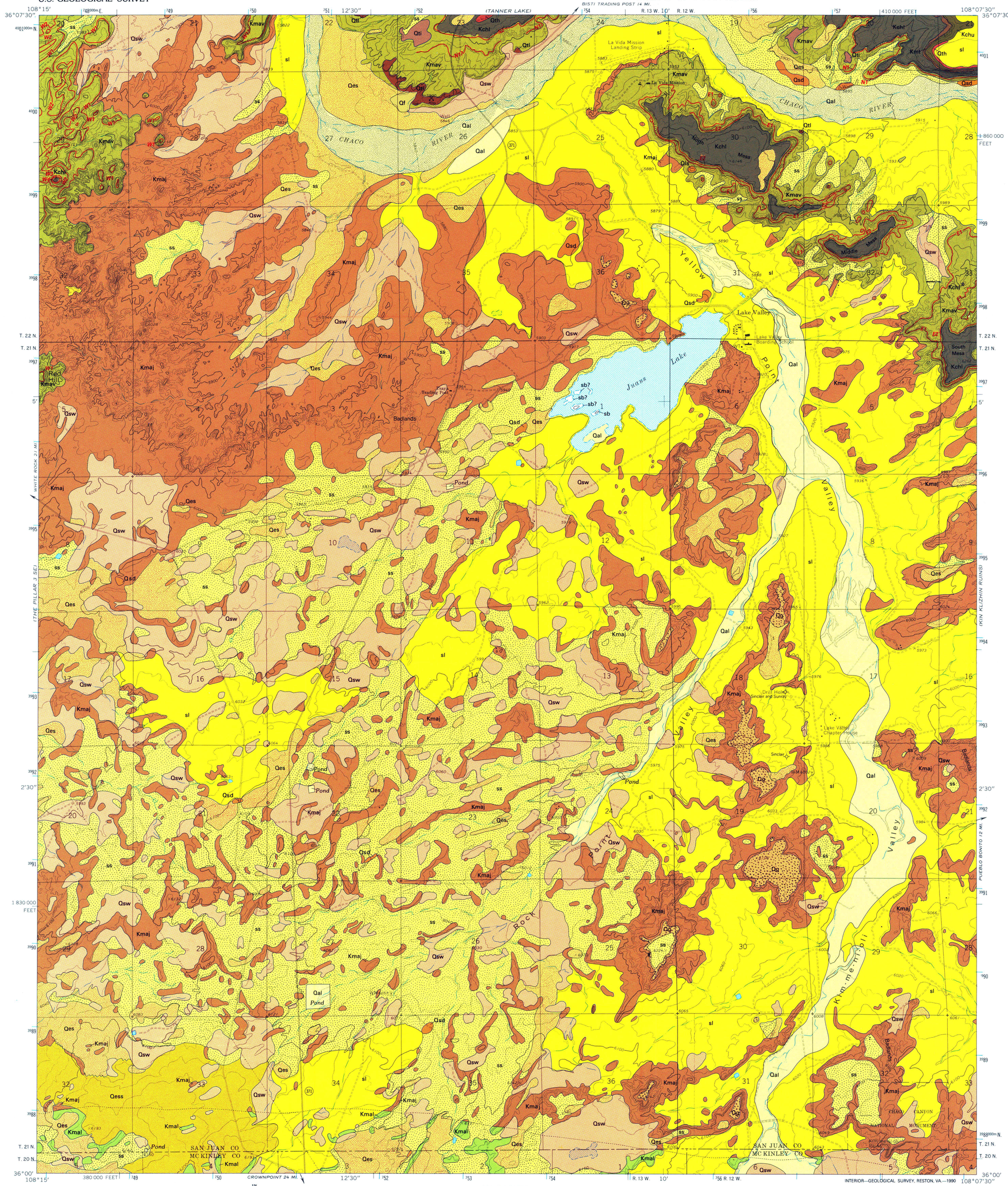
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
BUREAU OF INDIAN AFFAIRS

BULLETIN 1940
PLATE 1



CORRELATION OF MAP UNITS

sl, ss, Qls, Qf, Qsw, Qal, Qsd, Qes, Qess		QUATERNARY
Qg, Qtl, Qti, Qth		QUATERNARY
Unconformity		
Kchu, Kmt, Kchl, Kmav, Kmaj, Kmal	Upper Cretaceous	CRETACEOUS

DESCRIPTION OF MAP UNITS

Talus deposits are abundant on steep slopes below cliffs, but were not mapped because unit would obscure coal beds. Also, areas of clinker formed by baking of mudstone overlying burned coal beds were not mapped. Areas of bedrock outcrop are numerous, but they are isolated by extensive unconsolidated materials. Bedrock best exposed in intricately dissected badland area in northwest part of quadrangle.

sl, ss, Qls, Qf, Qsw

Soil (Holocene)—Developed principally on mudstone of the Menefee Formation
Sedentary soil in large uninterupted area
Sedentary soil in small area or larger area broken up by other units

Landslide deposit (Holocene)—In small landslide in SW¼ sec. 30, T. 22 N., R. 12 W.

Fan deposit (Holocene)—Forms small alluvial fan in secs. 26 and 27, T. 22 N., R. 13 W.

Slope-wash deposit (Holocene)—On gently sloping smooth surfaces swept bare of vegetation by sheetflood erosion. Most surfaces are developed on mudstone of the Menefee Formation. Surfaces may be partly mantled by chips and cobbles of sandstone from nearby outcrops or partly to fully mantled by chips of ironstone from breakup of concretions

Qal, Qsd, Qes, Qess

Alluvium (Holocene)—Sand, silt, and clay deposited along major drainages

Dune deposit (Holocene)—Forms large and small hummocks of fine-grained, windblown sand completely or almost completely devoid of vegetation

Eolian sand (Holocene)—Fine-grained, windblown sand stabilized by vegetation. May mantle large surface area

Eolian sand and soil (Holocene)—Stabilized surface of intricately intermingled windblown sand and sedentary soil developed on Menefee bedrock

Qg

Gravel deposit south of the Chaco River (Pleistocene)—Coarse gravel composed largely of chunks of sandstone and fragmented ironstone concretions of the Menefee Formation. Caps buttes and other high areas that are remnants of a dissected pedimentlike surface that sloped toward Kim-me-ni-oli Valley and Chaco River

Gravel deposit mostly north of the Chaco River (Pleistocene)

Qtl

Low terrace deposit—Coarse gravel 20+ ft (6+ m) above the Chaco River. Gravel consists principally of varicolored pebbles of chert and quartzite 0.5 to 2.5 in. (1.3 to 6.4 cm) in diameter; also contains subrounded pebbles and cobbles of sandstone and ironstone locally derived from the Menefee Formation. Gravel veneers an extensive surface north of the Chaco River in secs. 26 and 27, T. 22 N., R. 13 W. and caps a tiny knob south of the river on the boundary between secs. 29 and 30, T. 22 N., R. 12 W. Interbedded sand and gravel is 15+ ft (4.6+ m) thick in road cut north of new State Route 371 bridge across Chaco River

Qti

Intermediate terrace deposit—Coarse gravel deposited at two levels, one 130 ft (40 m) and the other 65 ft (20 m) above the Chaco River. Principal constituents are identical with the high terrace deposit, but also contains some pebbles of ironstone locally derived from concretions in the Menefee Formation

Qth

High terrace deposit—Coarse gravel deposited at two levels, one 330 ft (101 m) and the other 210 ft (64 m) above the Chaco River. Gravel consists of rounded and flattened oval pebbles of varicolored quartzite and chert and, in some places, chunks of petrified wood. Diameter of gravel ranges from 0.5 to 2.5 in. (1.3 to 6.4 cm). Source of gravel is from the east, probably from the Ojo Alamo Sandstone

Cliff House Sandstone (Upper Cretaceous)

Kchu

Upper member—Fine-grained, massive-bedded, marine sandstone. Forms cliff or shelving ledges. Thickness is 33+ ft (10.1+ m) at best exposure in secs. 20 and 21, T. 22 N., R. 12 W. Unexposed beds at top of unit probably only a few feet thick

Kchl

Lower member—Fine-grained, pale-orange and pale-yellow, massive-bedded, marine sandstone. Forms high sheer cliffs, lower cliffs, and ledges north of Chaco River; south of river, unit caps three mesas in northeast part of quadrangle and one small butte in sec. 29, T. 22 N., R. 13 W. in northwest part of quadrangle. In sharp contact with underlying Menefee Formation in most places; elsewhere, intertongues with topmost beds of Menefee in intervals as much as 10 ft (3 m) thick

Menefee Formation (Upper Cretaceous)

Kmt

Tongue of Menefee Formation—Mudstone, thin gray beds of fine-grained sandstone, and bands of dusky-brown, organic-rich mudstone (humate). Thins eastward from 24 to 5 ft (7.3 to 1.5 m). Does not include coal beds in La Vida Mission quadrangle, but does in the Tanner Lake quadrangle to the north. Present only in northeast corner of quadrangle

Allison Member

Kmav

La Vida Beds of Miller (1984, p. A35–A40)—Fine-grained, nearly white, thin- to thick-bedded sandstone and dark-gray mudstone containing numerous bands of dusky-brown organic-rich mudstone (humate) and numerous lenticular coal beds that are mostly thin, but may be up to 5 ft (1.5 m) thick; petrified wood present, but rare. Crops out only in northern part of quadrangle. Topmost bed containing large calcareous concretions defines the base of La Vida Beds. Thickness is 200 to 230 ft (61 to 70 m)

Kmaj

Juans Lake Beds of Miller (1984, p. A35–A40)—Fine-grained, light-gray to white, thin- to thick-bedded sandstone and dark-gray mudstone that weathers light gray. Characterized by numerous large calcareous concretions that are present at base or top of some sandstone units, but are less common downward; concretions are hard and have a conchoidal fracture. Juans Lake Beds also contain small ironstone (siderite) concretions scattered along individual horizons or coalescing into thin beds. Petrified wood present, but rare. Bands of dusky-brown organic-rich mudstone (humate) several feet thick are present in upper part of beds. Very local thin coal lenses occur in uppermost part of beds; carbonaceous shale units are common. Base of the Juans Lake Beds is defined as the lowest occurrence of calcareous concretions. Thickness is about 750 ft (230 m)

Kmal

Lower part of Allison Member—About 735 ft (225 m) thick, of which only the uppermost 35 ft (11 m) is exposed in La Vida Mission quadrangle. Fine-grained sandstone, gray mudstone, and minor amounts of siltstone; no calcareous concretions and few ironstone (siderite) concretions. Poorly exposed

EXPLANATION

Contact—Dashed where concealed or arbitrary

Coal bed

W3, W4 — Uppermost coal beds—Western area only

W2, N2, E2 — Upper coal bed—Western, northern, or eastern area

W1, N1, E1 — Lower coal bed—Western, northern, or eastern area

Anticline—SW¼, sec. 29, T. 22 N., R. 13 W.

Abandoned and filled gravel quarry

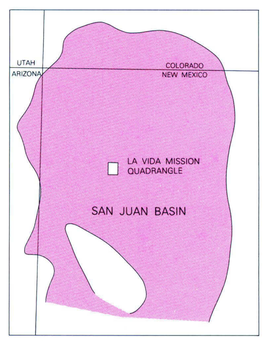
Dry hole for oil and gas

sb — **Jumbled fine-grained sandstone blocks**—Forms artificial island in Juans Lake. Only one of five islands visited

Sandstone dike—NE¼, sec. 25, T. 22 N., R. 13 N.

REFERENCE CITED

Miller, R.L., 1984, Subdivisions of the Menefee Formation and Cliff House Sandstone (Upper Cretaceous) in southwest San Juan Basin, New Mexico, *in* Stratigraphic notes, 1983; contributions to stratigraphy: U.S. Geological Survey Bulletin 1537–A, p. A29–A53.



INDEX SHOWING LOCATION OF LA VIDA MISSION QUADRANGLE AND SAN JUAN BASIN (SHADED)

Base from U.S. Geological Survey, 1966
10,000-foot grid based on New Mexico coordinate system west zone
1000-meter Universal Tranverse Mercator grid ticks, zone 12, shown in blue

APPROXIMATE MEAN DECLINATION 1990

SCALE 1:24 000
1 MILE
1 KILOMETER
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

NEW MEXICO
QUADRANGLE LOCATION

Geology mapped in 1979–84; assisted by K.K. Krohn, S.S. Crowley, and M.A. Kirschbaum, 1979; N.K. Gardner, 1980

Manuscript approved for publication, June 8, 1988

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA.—1990

GEOLOGIC MAP OF LA VIDA MISSION QUADRANGLE, SAN JUAN AND MCKINLEY COUNTIES, NEW MEXICO