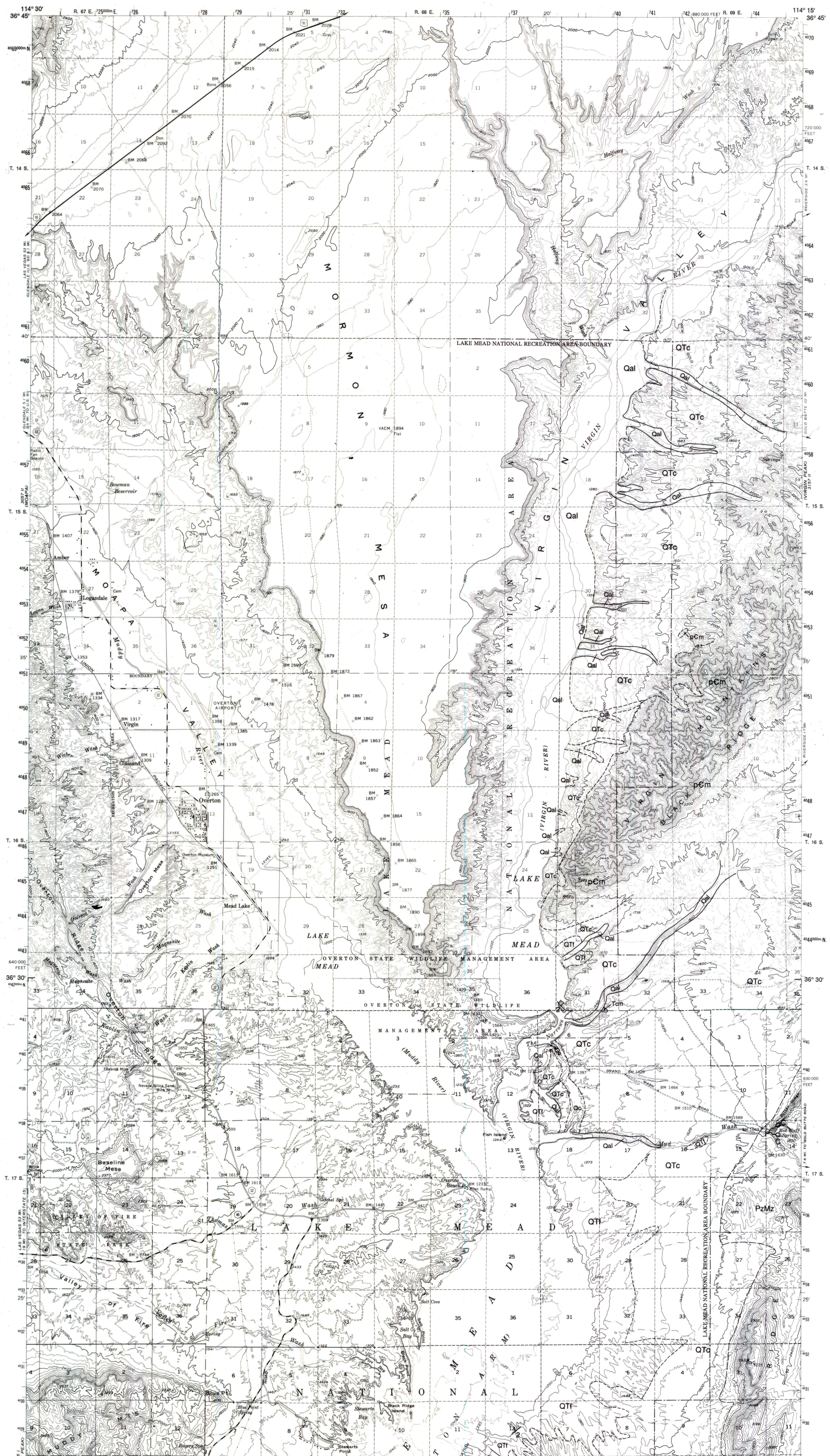

EXPLANATION

Unit	Description	Age
Qal	YOUNGER ALLUVIUM—Tan to brown, unconsolidated, angular to subangular silty sand, gravel, and boulders of local origin. Unit generally drained of water except near Lake Mead or where water discharges from underlying units. Wells may yield from a few tens to a few hundreds of gallons per minute of water from the unit where saturated near the lake	HOLOCENE — QUATERNARY
Qc	CHEMEHUEVI FORMATION—White, pink, tan, thin-bedded, well-sorted unconsolidated fine sand. The unit is present in places near Lake Mead and may produce a few tens to a few hundreds of gallons per minute of water where saturated	PLEISTOCENE — QUATERNARY
QTf, QTc	OLDER ALLUVIUM—Divided into a coarse-grained unit and a fine-grained unit. The coarse-grained unit (QTc) consists of gray to brownish-gray weakly to moderately cemented angular to subrounded silty, sandy gravel of locally derived material; locally contains well-rounded exotic clasts of quartz, quartzite, red jasper, and black chert from ancestral through-flowing drainages of the Colorado and Virgin Rivers. The fine-grained unit (QTf) consists of tan to light-brown, and locally olive, light-green and reddish-brown, weakly to moderately cemented, subangular to rounded, poorly sorted silty and clayey sand; locally may contain crystals of selenite. The coarse-grained unit may yield as much as several hundred gallons per minute of water to wells near Lake Mead. The fine-grained unit probably would yield no more than a few tens of gallons of water per minute to wells near the lake; quality of the water may be poorer than that of the lake because of gypsum in the unit	UPPER TERTIARY AND LOWER QUATERNARY — TERTIARY AND QUATERNARY
Tb	YOUNGER BASALT—Gray to dark-gray moderately fractured, vuggy, olivine basalt. Is of limited areal extent but forms a continuous aquifer with the coarse unit of the older alluvium east of Grand Wash	PLIOCENE — TERTIARY
Tcc, Tcls, Tcf, Tcm	MUDDY CREEK FORMATION—Divided into the conglomerate facies (Tcc), the mudstone facies (Tcm), the limestone facies (TcLs), and the Fortification Basalt Member (Tcf). The conglomerate facies consists of moderately to strongly cemented angular to subangular metamorphic, igneous, and sedimentary rock detritus set in a gray, grayish-brown, or reddish-brown silty, sandy matrix. The mudstone facies consists of weakly to moderately cemented reddish-tan, reddish-brown, or pinkish-brown clayey silt (or siltstone). Gypsum may be disseminated throughout the unit or may occur as crystals of selenite ranging from a few inches to a few feet in length; along the east side of Overton Arm at the mouth of Quail Spring Wash and locally along the east side of Grand Wash, steep-sided sinkholes are developed in the unit. The limestone facies consists of gray to grayish-white thin marly limestone to thickly bedded limestone containing minor disseminated mud. The Fortification Basalt Member consists of a series of dark-gray olivine basalt flows. The conglomerate facies probably will yield as much as 10 gal/min to wells where the unit is saturated near Lake Mead; elsewhere, the facies is likely to yield less than this quantity to wells. The mudstone facies is a confining unit throughout the area, and springs in the Grand Wash area occur above or near the contact of the facies and the overlying older alluvium. The limestone facies generally caps mesas and is drained of water; locally may discharge water to springs. The Fortification Basalt Member may yield a few tens of gallons per minute of water to wells on Gull Island, depending on the amount of fracturing; elsewhere, the unit is drained of water	MIOCENE AND PLIOCENE — TERTIARY
Th	HORSE SPRING FORMATION—Brownish-red strongly indurated well-stratified sandstone; locally contains gypsum. Exposed only in secs. 34 and 35, T. 18 S., R. 68 E. (Nevada), at lake level, but strong induration and possible presence of gypsum probably would result in yields of meager quantities of poor-quality water to wells	MIOCENE — TERTIARY
PzMz	PALEOZOIC AND MESOZOIC SEDIMENTARY ROCKS, UNDIFFERENTIATED—Limestone, dolomite, sandstone, quartzite, and shale. Includes the Tapeats Sandstone, Bright Angle Shale, Muav Limestone, Muddy Peak Limestone, Rogers Spring Limestone, Callville Limestone, Kaibab Formation, Toroweap Formation, Coconino Formation, Chinle Formation, Moenkopi Formation, and Aztec Sandstone. Limestones of Paleozoic age in sec. 14, T. 17 S., R. 69 E. (Nevada), yield less than 5 gal/min of poor-quality water to springs. Yields could be greater than this quantity through fractures and solution channels where the rocks are saturated near Lake Mead	CAMBRIAN TO JURASSIC
p€m, p€p	METAMORPHIC AND PLUTONIC ROCKS—Metamorphic rocks (p€m) include strongly contorted quartz-mica schist, banded gneiss, and locally mylonite. The plutonic rocks (p€p) are pink to pinkish-gray porphyritic granite rocks. Rocks may yield as much as 5 gal/min to springs; similar yields could be expected to wells where the unit is fractured and saturated near Lake Mead	PRECAMBRIAN

MYLONITIZED ZONE

APPROXIMATE AREA OF LANDSLIDES IN THE METAMORPHIC ROCKS

GEOLOGIC CONTACT—Long dashed where approximate; short dashed where inferred or gradational; queried where doubtful

FAULT—High-angle fault; dashed where approximately located; dotted where concealed; queried where probable. U, upthrown side; D, downthrown side

STRIKE AND DIP OF BEDS

SPRING—C indicates that chemical analysis of water is given in tables 3 and 4

FAVORABLE AREA FOR GROUND-WATER EXPLORATION—Number refers to area discussed in text

BASE FROM U.S. GEOLOGICAL SURVEY
OVERTON 1:62,500, 1953
OVERTON BEACH 1:62,500, 1953
VIRGIN BASIN 1:62,500, 1953
ICEBERG CANYON 1:62,500, 1953
GOLD BUTTE 1:62,500, 1953
GYP HILLS 1:24,000, 1971
SNAP CANYON 1:24,000, 1971
COLUMBINE FALLS 1:24,000, 1971

TOPOGRAPHIC CONTOUR INTERVALS 80 AND 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

GEOLOGY BY J.T. BALES AND R.L. LANEY, 1979-86. GEOLOGY IN EASTERN PART OF AREA BY J.T. BALES AND R.L. LANEY, 1979-86, AND MODIFIED FROM LUCCHITTA (1966). GEOLOGY OF PRECAMBRIAN, PALEOZOIC, AND MESOZOIC ROCKS MODIFIED FROM LONGWELL AND OTHERS (1965)

RECONNAISSANCE GEOHYDROLOGY OF THE LAKE MEAD NATIONAL RECREATION AREA—VIRGIN RIVER, NEVADA, TO GRAND WASH CLIFFS, ARIZONA

By
J.T. Bales and R.L. Laney
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