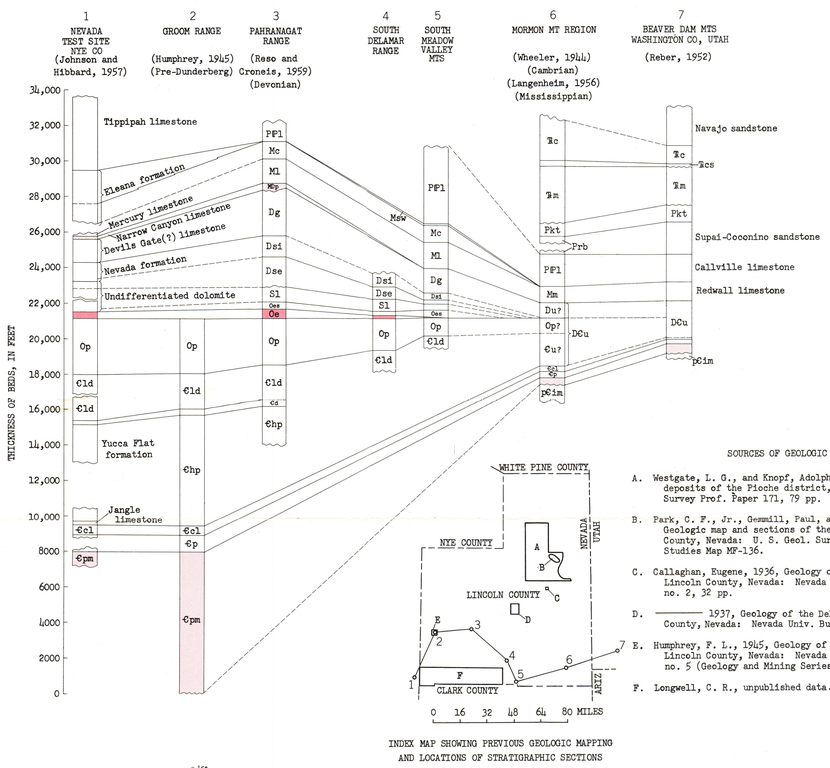
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
NEVADA BUREAU OF MINES

MINERAL INVESTIGATIONS
FIELD STUDIES MAP MF-206
SHEET 1 OF 2

STRATIGRAPHIC CORRELATION ACROSS SOUTHERN LINCOLN COUNTY



INDEX MAP SHOWING PREVIOUS GEOLOGIC MAPPING AND LOCATIONS OF STRATIGRAPHIC SECTIONS

SOURCES OF GEOLOGIC DATA

A. Westgate, L. G., and Knopf, Adolph, 1932, Geology and ore deposits of the Pioche district, Nevada: U. S. Geol. Survey Prof. Paper 171, 79 pp.

B. Park, C. F., Jr., Gemmill, Paul, and Tschanz, C. M., 1958, Geologic map and sections of the Pioche Hills, Lincoln County, Nevada: U. S. Geol. Survey Mineral Inv. Field Studies Map MF-136.

C. Callaghan, Eugene, 1936, Geology of the Chief district, Lincoln County, Nevada: Nevada Univ. Bull., v. 30, no. 2, 32 pp.

D. ——— 1937, Geology of the Delamar district, Lincoln County, Nevada: Nevada Univ. Bull., v. 31, no. 5, 72 pp.

E. Humphrey, F. L., 1945, Geology of the Groom district, Lincoln County, Nevada: Nevada Univ. Bull., v. 39, no. 5 (Geology and Mining Series no. 42), 50 pp.

F. Longwell, C. R., unpublished data.

APPROXIMATE MEAN DECLINATION, 1961

Index map, references cited and explanation on sheet 2

Base from Army Map Service 2° sheets,
Lund (NJ 11-6) 1960, Caliente (NJ 11-9) 1954
Las Vegas (NJ 11-12) 1954

Geology mapped in 1956-58

PRELIMINARY GEOLOGIC MAP OF LINCOLN COUNTY, NEVADA

By

C. M. Tschanz and E. H. Pampeyan

SCALE 1:200000

0 5 0 5 10 15 20 MILES

CONTOUR INTERVAL 200 FEET
DATUM IS MEAN SEA LEVEL

1961

MINERAL INVESTIGATIONS
FIELD STUDIES MAP MF-206
SHEET 1 OF 2

For sale by U. S. Geological Survey, price 1.00 per set

EXPLANATION

QUATERNARY

Recent

Qp — Recent playa deposits

Largely reworked and undissected lake sediments

Qs — Dune sand

Qal — Younger alluvium

Reworked older alluvium and recent deposits in stream channels

Pleistocene(?)

Ql — Younger lake beds

Chiefly slightly dissected white and light-gray clays, with some silt and marl. Within highest beach line. Base not exposed. May be several hundred feet thick. May correlate with the Pleistocene(?) lake beds in the Las Vegas Valley. Probably same age as Lakes Bonneville and Lahontan

Qol — Older alluvium

Chiefly unconsolidated valley fill and terrace gravels now being dissected. Thickness 0 to 1000 feet or more. Includes older unconsolidated deposits not otherwise distinguished

Pliocene(?) and Pleistocene(?)

QTl — Intermediate lake beds

Dissected lake beds above the highest beach lines. Lithology identical to older and younger lake beds

QTg — Older gravels

Chiefly dissected unconsolidated and poorly consolidated gravel fans as much as several thousand feet thick. Younger than the youngest volcanic rocks, but may include rocks of different ages

UNCONFORMITY

TERTIARY(?) AND QUATERNARY(?)

Pliocene

Tl — Older lake beds

White, buff, tan, and terra cotta tuffaceous clay, sand, and silt with some diatomaceous earth and marly limestone. Probable source of material redeposited in successively younger lake beds. Thickness 0 to 1200 feet. Includes the Muddy Creek, of Pliocene(?) age, and the Panaca formations

Tb — Basalt

Chiefly olivine basalt composed of as many as 6 flows from 5 to 12 feet thick, separated by layers of gravel, silt, or clay. Thickness 0 to 150 feet. Includes some older basalt flows and basalt dikes of several ages

ANGULAR UNCONFORMITY

TERTIARY

Oligocene, Miocene, and Pliocene

Ts Tvy Tp | **Tvt Tvr Tva Tvb Tvc Tvd** — Younger volcanic rocks

Tvy, younger volcanic rocks, undifferentiated. Well-layered series of predominantly quartz-bearing ignimbrites and tuffs several thousand feet thick. Some perlite (p) and interlayered volcanic pebble gravels, waterlaid tuff, and sandstone (Ts) are included. Interbedded sedimentary rocks are as much as 300 feet thick; they occur at several levels in the sequence. Some prominent units and distinctive rock types mapped separately. Includes volcanic rocks equivalent to the Oak Spring formation in the southwest corner and to the Quichapa group of Mackin (Cook, 1957) elsewhere

Tvt, white or pink tuff that includes several persistent units of different ages

Tvr, rhyolite dome complex and related rhyolite flows, and welded and partly welded tuffs, locally alunitized or kaolinized

Tva, thick, dark gray-brown pyroxene andesite flow in Fairview Range and a red andesitic flow in Groom Range

Tvb, distinctive and widespread, spheroidal weathering dacite welded tuff unit

Tvc, persistent thin dark-gray rhyolite welded tuff unit with opalescent feldspar, that overlies gravels near Caliente

Tvd, thick massive gray dacite with hexagonal biotite crystals

Tg Tr Tgp Tgd Tqm Td Tdi Tvn — Intrusive rocks

Includes rocks of several periods of intrusion. Probably cover the same time span as the younger volcanic rocks. Diorite and monzonite generally older than granites and rhyolite. Youngest rocks are probably basalt dikes

Tg, granite stocks and dikes

Tr, rhyolite and microgranite dikes

Tgp, granite porphyry

Tgd, granodiorite

Tqm, quartz diorite or quartz monzonite

Td, diorite

Tdi, diabase dikes and sills

Tvn, volcanic neck of intermediate composition

TKvu — Volcanic rocks, undifferentiated

ANGULAR UNCONFORMITY

TKv — Older volcanic rocks

Andesitic flows, mud flows, breccias, and tuffs. Several thousand feet thick. Generally more massive, sheared, and altered than the more widespread younger volcanic rocks which generally contain quartz

Tf — Lacustrine limestone

Chiefly white, buff, and gray, but locally black, lenticular fresh-water algal limestone with some interbedded conglomerate and volcanic rocks. Unconformably overlies Paleozoic and Triassic rocks but conformably overlies clastic rocks (TKc) and locally volcanic rocks. Truncates Laramide structures. Dated as Miocene or younger by pollen. Probably equivalent to upper part of Horse Spring formation and basal beds of the Oak Spring formation

Cretaceous(?) or Eocene

Tsp / TKc — Clastic rocks and limestone

Tsp, Sheep Pass formation of Winfrey (1958); clastic rocks and petroliferous lacustrine limestone of Eocene age. Thickness 0 to 4000 feet thick. Present only in Egan Range north of Shingle Pass

TKc, tilted, poorly consolidated orogenic clastic rocks of unknown age. Chiefly reddish-brown or gray well-rounded Paleozoic cobble conglomerates with some sandstone and siltstone. Thickness 0 to 5000 feet or more. Probably equivalent to the clastic rocks of the Horse Spring(?) formation in northwestern Clark County, of the Titus Canyon formation of Stock and Bode (1935) near Death Valley, and of the Claron formation in southwestern Utah

CRETACEOUS(?) OR TERTIARY

UNCONFORMITY

TRIASSIC

Upper Triassic

Tc / Tcs — Chinle formation

Tc, Chinle formation; variegated, predominantly red shale, siltstone, and sandstone. Estimated thickness is 1500 to 3000 feet; top not exposed

Tcs, Shinarump member; brown pebble conglomerate and conglomeratic sandstone 50 to 200 feet thick

UNCONFORMITY(?)

Lower and Middle(?) Triassic

Tm — Moenkopi formation

Thin-bedded gray, buff, and pink marine limestone. Many silty, shaly or sandy beds. Upper 200 to 400 feet is brick-red siltstone, sandstone, and shale; locally a basal conglomerate of fragments of Kaibab limestone. Estimated thickness is 2500 to 3500 feet

EROSIONAL UNCONFORMITY

PERMIAN

Middle Permian

Pkt — Kaibab limestone and Toroweap formation, undifferentiated

Double cliffs of massive, gray, very cherty limestone separated by thin-bedded buff, white, and pink dolomite, gypsum, and limestone breccia. Thickness 0 to about 1000 feet. Thins rapidly westward and pinches out along an unconformity

Lower Permian

Prb — Red beds

Reddish, yellowish, and brownish sandstone, siltstone, gypsiferous shale, and some thin beds of gray limestone. Thickness is about 3200 feet along Meadow Valley Wash; decreases eastward to 1100 feet. Probably equivalent to the Queantoweap sandstone of McNair (1951) and the Hermit shale

Lower, Middle, and Upper Pennsylvanian

PPl / Pu / Pl — Limestone

PPl, Permian and Pennsylvanian limestone, undifferentiated. Thickness 1500 to 4300 feet. Approximately equivalent to the Bird Spring formation without the Indian Springs member of Longwell and Dunbar (1936), and to the Bailey Spring and Tippipah limestones

Pl, Permian limestone; gray, yellow-brown, and pink silty and sandy limestone. Alternating resistant massive limestone beds and nonresistant silty or sandy beds. Thickness exceeds 1900 feet; top not exposed. Partly equivalent to Rib Hill formation of Pennebaker (1932)

Pu, Upper Pennsylvanian sandstone facies; yellow, brown, or pink quartz sandstone and a few interbedded limestone layers. Exposed thickness is 500 to probably more than 1600 feet increasing westward where it includes progressively older rocks. Mapped only in the Egan and Golden Gate Ranges. Upper Pennsylvanian rocks are probably absent east of Grassy Mountain

Pl, Pennsylvanian limestone; gray massive cherty limestone beds as much as 50 feet thick alternating with nonresistant gray and buff limestone and dolomite. Lithology is variable. Brownish and reddish sandstone abundant near top of some sections. Thickness 950 to 2800 feet

PENNSYLVANIAN

CARBONIFEROUS

Upper Mississippian

Msc / Msw / Mc — Clastic rocks

Msc, Upper Mississippian clastic rocks, undifferentiated. All proportions of quartzite, shale, and limestone. Equivalent to lowest (Indian Springs) member of the Bird Spring formation of Longwell and Dunbar (1936) and to the Eleana formation. Not recognized in the Mormon Mountains

Msw, Scotty Wash quartzite facies; varicolored red or brown quartzite or sandstone (35 to 65 percent) and inconspicuous shale. Thickness 0 to about 800 feet. Silty or sandy varicolored limestone 150 to 300 feet thick occurs at the top north of 38° N. Lat. Quartzite thin or absent in southern half of the county. Grades eastward into shale and then into limestone near the Needle Range, Utah (Illipah formation of Gould, 1959) Partly equivalent to the Diamond Peak formation and the Illipah formation of Christiansen (1951)

Mc, Chainman shale facies; basal calcareous siltstone and bedded chert overlain by thick black fissile shale and then by brownish or varicolored calcareous shale. Some fossiliferous limestone. Thickness 100 to 1250 feet; thins southeastward. Equivalent to Peers Spring formation in the Pioche district and to lower member of Eleana formation

Lower Mississippian

Ml — Limestone

Limestones between the Pilot and Chainman shales. Includes the equivalent cliff-forming units, Joana, Mercury, and Bristol Pass limestones and 500 to 700 feet of younger thinner bedded limestones. In the southwest corner of the county, the shales at the top and bottom included by Bowyer and others (1958) in the Monte Cristo limestone were mapped separately as Chainman and Pilot shales. Total thickness 400 to 1500 feet. Thickest just west of Meadow Valley Wash

Mm — Monte Cristo limestone

Massive light and dark-gray cliff-forming limestone. One of five members, the Anchor limestone member, contains abundant chert. Thickness 900 feet. Mapped only in the Mormon Mountains and vicinity

LOCAL UNCONFORMITY

MDp — Pilot shale

Nonresistant, thin-bedded, gray or buff limestone with argillaceous shale partings and some shale beds. Contains both Mississippian and Devonian fossils. Lower half of thick facies in the Pahranagat and Spotted Ranges contains sandstone or quartzite, bedded dark-gray chert, and cherty limestone. Thickness 0 to 500 feet; thins southeastward. Locally absent in South Egan Range north of Shingle Pass. Partly cut out by local unconformities. In the Pioche district includes the West Range limestone. Equivalent to the Narrow Canyon limestone

MISSISSIPPIAN

Upper Devonian

LOCAL UNCONFORMITY

Dg — Guilmette formation

Chiefly cliff-forming limestone with several hundred feet of colorbanded dolomite in middle. Three facies are recognized: one has abundant sandstone or quartzite; another is entirely limestone; the third is predominantly dolomite. Stromatoporoid reefs and local unconformities are common. 50 to 70 feet of yellowish-gray thin-bedded silty dolomite and limestone at the base. Thickness 1300 to 3100 feet; thickens northward. Equivalent to Devils Gate limestone of the Eureka district and upper part of Sultan limestone in Clark County. Includes the Silverhorn dolomite in the Pioche district and zones A, B, and C of Merriam (1940, p. 39-40). Includes beds equivalent to the West Range limestone outside the Pioche district

Middle and Upper Devonian

Dsi — Simonson dolomite

Alternating dark brownish-gray crystalline dolomite and light-gray aphanitic dolomite, some "spaghetti" beds and stromatoporoid bioherms. Thickness 400 to 1200 feet; thins toward southwest and southeast. Not recognized in Mormon Mountains. Equivalent to lower part of the Sultan limestone in Clark County. Equivalent to the upper three members of the Nevada formation, the Sentinel Mountain dolomite, the Woodpecker limestone, and the Bay State dolomite members

Middle Devonian

Dse — Sevy dolomite

Homogeneous unfossiliferous light-gray aphanitic dolomite. Upper part sandy, with a persistent 10- to 50-foot thick sandstone at top. Yellow-buff argillaceous cherty aphanitic dolomite up to 200 feet thick may occur below sandstone. Thickness 300 to 1600 feet; thins toward southeast and southwest. Not recognized in Mormon Mountains. Equivalent to Beacon Peak dolomite and Oxyoke Canyon sandstone members of the Nevada formation. Included in Lone Mountain dolomite by Bowyer and others (1958) in the Spotted and Pintwater Ranges

Lower(?) and Middle Devonian

MDu — Mississippian and Devonian rocks, undifferentiated

Du — Devonian rocks, undifferentiated

DEVONIAN

DSu — Devonian and Silurian dolomite, undifferentiated

LOCAL UNCONFORMITY

Sl — Laketown dolomite

Dark and light-gray granular dolomite. Darker cherty beds predominate in lower third and upper fourth. Bioherms common in upper part. Thickness 300 to 1000 feet, decreasing southeastward. Probably absent in Mormon Mountains. Lower part included in Ely Springs dolomite by Bowyer and others (1958) in the Pintwater Range

Middle and Upper Silurian

SILURIAN

Oes — Ely Springs dolomite

Dark-gray to black granular dolomite. Upper part cherty. Some limestone in lower part. Seventy feet of yellowish silty dolomite at top in western half of county. Thickness 100 to 550 feet, increasing northward. Probably absent in Mormon Mountains. Equivalent to Fish Haven dolomite and Hanson Creek formation

Upper Ordovician

SOu — Silurian and Ordovician dolomite, undifferentiated

DCu — Devonian to Cambrian limestone and dolomite, undifferentiated

Anomalous thin shelf facies of miogeosyncline confined to southeast corner of Lincoln County. Upper part is dark-gray, gray, and reddish oolitic limestone and minor dolomite and sandstone of Devonian(?) age. Includes thin-bedded rocks equivalent to Pilot shale and a 50-foot white dense limestone that may be the Crystal Pass member of Sultan limestone. Middle part is thin-bedded limestone and dolomite which contains Lower Ordovician fossils and is partly equivalent to the Pogonip group. Lower part is alternating black, brown, and white brecciated or oolitic dolomite of Cambrian(?) age. Total thickness about 3000 feet. Approximately equivalent to the Goodsprings dolomite

Cu — Cambrian limestone and dolomite, undifferentiated

Middle to Upper(?) Ordovician

Oe — Eureka quartzite

White pure orthoquartzite with some brownish quartzitic sandstone in upper and lower parts in western half of county. Absent in Mormon Mountains; 0 to 12 feet thick in the Meadow Valley Mountains; thickens north and west to 550 feet

Lower Ordovician

Op — Pogonip group

Alternating gray and brown cliff-forming limestone and yellowish-buff slope-forming silty and shaly limestone. Lower 400 feet is very cherty. Thickness 500 to 3500 feet, decreasing southeastward. Equivalent to Tank Hill and Yellow Hill limestones in the Ely Springs Range, Pioche district

ORDOVICIAN

Upper Cambrian

Cld — Limestone and dolomite

Upper part is mostly secondary dolomite with some limestone or oolitic limestone near the top. Lower part consists chiefly of dark-gray and brownish-gray limestone, cherty near the base, with some reddish silty and sandy partings in thin-bedded limestone. Thickness 2000 to 3500 feet. Approximately equivalent to the Mendha limestone in the Pioche district and the Windfall formation in the Eureka district

Cd — Dunderberg shale

Thin-bedded limestone and shale. Thickness 200 to 400 feet. Included with the overlying unit where not mapped separately

Middle Cambrian

Chp — Highland Peak limestone

Alternating dark and light-gray limestone and dolomite with several prominent beds of buff or light-gray laminated dolomite or dolomitic sandstone. Thickens southwestward from 3800 feet in the Pioche district to 6000 to 7600 feet in the Groom Range. Equivalent rocks not differentiated in Mormon Mountains. Includes the Swasey, Dome, Burnt Canyon, Burrows, and Peasley limestones of Wheeler (1948). Equivalent to the original Highland Peak limestone, and to the Jangle limestone and Yucca Flat formation in the Nevada Test Site, Nye County

Cc / Ccl / Cp — Chisholm shale, Lyndon limestone, and Pioche shale

Cc, Chisholm shale, Lyndon limestone, and Pioche shale, undifferentiated

Ccl, Chisholm shale and Lyndon limestone, undifferentiated; red-brown and buff argillaceous shale 0 to 300 feet thick and massive dark and light-gray limestone 50 to 450 feet thick

Cp, Pioche shale; yellowish, greenish, and brownish micaceous and argillaceous shale with some sandstone and several prominent limestone beds. A 100-foot thick quartzite bed occurs in the middle in the South Schell Creek Range. Within the county, thickness ranges from 350 feet in the southeast corner to about 1000 feet elsewhere

Cpm — Prospect Mountain quartzite

Reddish and brownish poorly sorted quartzite with some shale and conglomerate beds. Massive white quartzite common at top. Increases in thickness from about 300 to 500 feet in the Mormon Mountains to about 7900 feet in the Groom Range. Includes the Stirling quartzite and the Wood Canyon formation in the Desert Range

Cs — Shale

Yellowish-gray or buff calcareous shale of upper Middle Cambrian age. About 2000 feet thick. Equivalent to lower parts of both the Lincoln Peak formation in the Snake Range and the Secret Canyon shale in the Eureka district. Mapped only near Patterson Pass; absent farther south

Cpc — Pole Canyon limestone

Massive and thick-bedded dark and light-gray limestone. About 2000 feet thick. Equivalent to the lower part of the Highland Peak limestone, Lyndon limestone, and Chisholm shale. Mapped only in the South Schell Creek Range

Middle Cambrian

Lower Cambrian

Cj — Johnnie formation

Brown sandstone and quartzite with interbedded green and brown platy or phyllitic shale and rusty limestone and dolomite. Persistent rusty thin oolitic dolomite bed at or near top. Thickness more than 3000 feet; base not exposed. Exposed only in Desert Range. Equivalent beds may be included in Prospect Mountain quartzite in Groom Range

UNCONFORMITY

pCim — Igneous and metamorphic rocks

Granite, amphibolite, gneiss, and biotite schist, all cut by pegmatite dikes

CAMBRIAN

PRECAMBRIAN

Contact

Dashed where approximately located, dotted where generalized or inferred

Fault, showing dip

Dashed where approximately located, dotted where concealed; query indicates probable or inferred fault. U, upthrown side; D, downthrown side. Arrows show direction of apparent relative movement

Thrust fault

Dashed where approximately located, triangular dot where concealed; query indicates probable or inferred thrust fault. Saw-teeth on upper plate

Fault breccia

Highest beach or strand line, or wave-cut terrace

Anticline

Syncline

Overturned syncline

Showing trace of axial plane and direction of plunge of axis. Dashed where approximately located, dotted where concealed

Strike and dip of beds

Strike and dip of overturned beds

Strike of vertical beds

Horizontal beds

Strike of vertical joints

J — Jasperoid

Mine or quarry

X — Prospect

REFERENCES CITED

Bowyer, Ben, Pampeyan, E. H., and Longwell, C. R., 1958, Geologic map of Clark County, Nevada: U. S. Geol. Survey Mineral Inv. Field Studies Map MF-138.

Cook, E. F., 1957, Geology of the Pine Valley Mountains, Utah: Utah Geol. and Mineralog. Survey, Bull. 58, p. 53-57.

Christiansen, F. W., 1951, A summary of the structural history of the Great Basin province in Utah and eastern Nevada: Utah Geol. Soc. Guidebook, no. 6, p. 68-80.

Gould, W. J., 1959, Geology of the northern Needle Range, Millard County, Utah: Brigham Young University Research Studies, Geology Series, v. 6, no. 5, p. 38-39.

Humphrey, F. L., 1945, Geology of the Groom district, Lincoln County, Nevada: Nevada Univ. Bull., v. 39, no. 5, (Geology and Mining Series no. 42), 50, p.

Johnson, M. S., and Hibbard, D. E., 1957, Geology of the Atomic Energy Proving Grounds Area, Nevada: U. S. Geol. Survey Bull. 1021-K, p. 333-381.

Langenheim, R. L., 1956, Lower Mississippian stratigraphic units in southern Nevada: Geol. Soc. America Bull., v. 67, no. 12, pt. 2, p. 1773.

Longwell, C. R., and Dunbar, C. O., 1936, Problems of Pennsylvanian Permian boundary in southern Nevada: Am. Assoc. Petroleum Geologists Bull., v. 20, no. 9, p. 1198-1207.

McNair, A. H., 1951, Paleozoic stratigraphy of part of northwestern Arizona: Am. Assoc. Petroleum Geologists Bull., v. 35, no. 3, p. 503-541.

Merriam, C. W., 1940, Devonian stratigraphy and paleontology of the Roberts Mountain region, Nevada: Geol. Soc. America Spec. Paper 25, p. 39-40

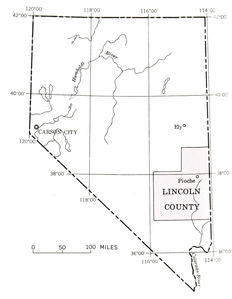
Pennebaker, E. N., 1932, Geology of the Robinson (Ely) mining district in Nevada: A preliminary report on the primary monzonite porphyry intrusive ore bodies and how they are formed: Mining and Metallurgy, v. 13, no. 304, p. 163-168.

Reber, S. J., 1952, Stratigraphy and structure of the south-central and northern Beaver Dam Mountains, Utah: Guidebook to the Geol. of Utah, no. 7, Cedar City, Utah, to Las Vegas, Nevada, Intermountain Assoc. Petroleum Geologists, p. 101-108.

Reso, Anthony, and Cronels, Carey, 1959, Devonian system in the Pahranagat Range, southeastern Nevada: Geol. Soc. America Bull., v. 70, no. 9, p. 1249-1252.

Stock, Chester, and Bode, F. D., 1935, Occurrence of lower-Oligocene mammal bearing beds near Death Valley, California: Nat. Acad. Sci. Proc., v. 21, no.10, p. 571-579.

Wheeler, H. E., 1948, Lower and Middle Cambrian stratigraphy in the Great Basin area: Nevada Univ. Bull., v. 38, no. 3 (Geology and Mining Series no. 39), p. 1804-1806.



INDEX MAP SHOWING LOCATION OF AREA MAPPED

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—61019

PRELIMINARY GEOLOGIC MAP OF LINCOLN COUNTY, NEVADA

By
C. M. Tschanz and E. H. Pampeyan

1961

MINERAL INVESTIGATIONS
FIELD STUDIES MAP MF-206
SHEET 2 OF 2

For sale by U. S. Geological Survey, price $1.00 per set