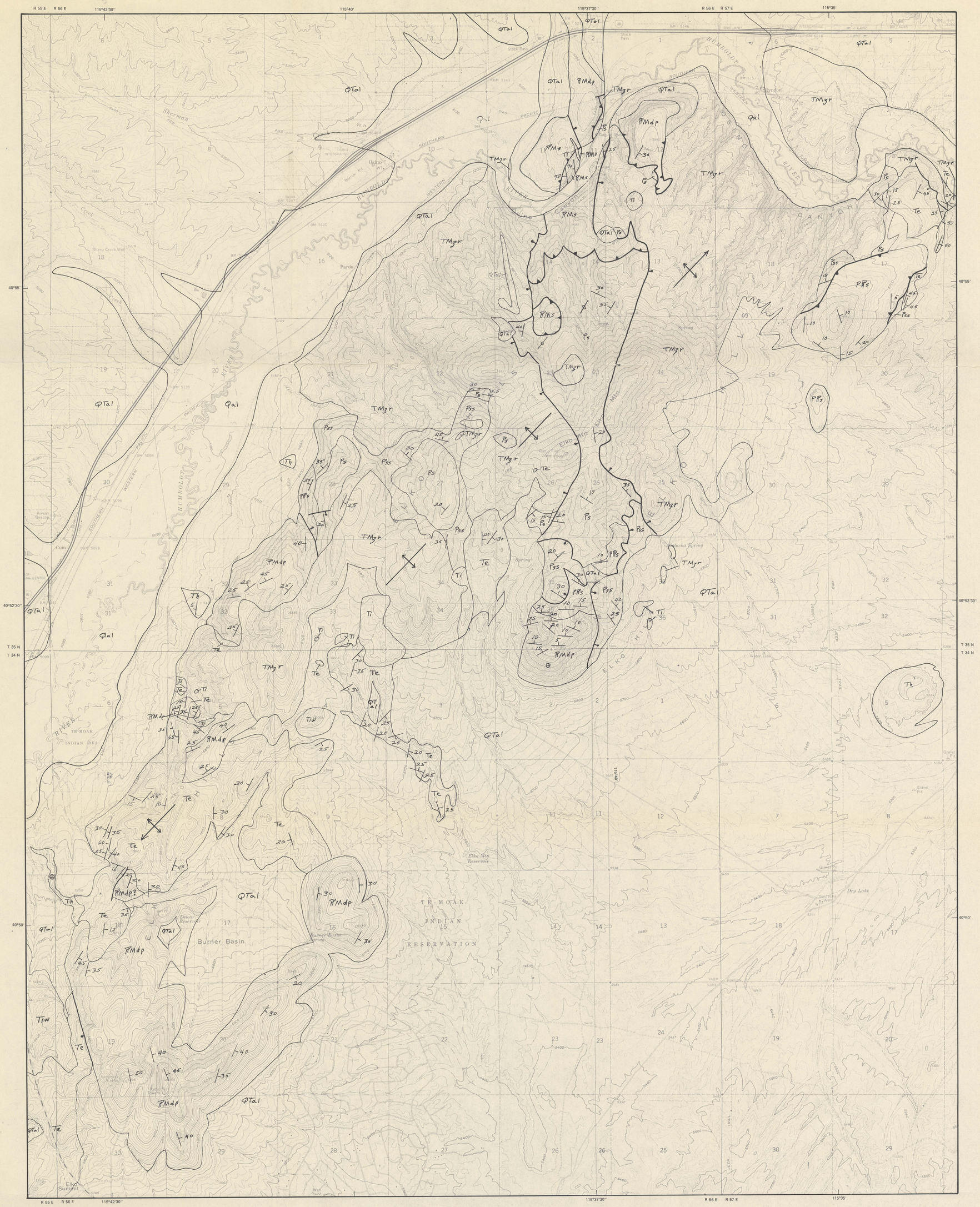
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 85-713



BASE FROM UNITED STATES GEOLOGICAL SURVEY
OSINO QUADRANGLE 1975
RYNDON QUADRANGLE 1962
ELKO EAST QUADRANGLE 1975
BOYD RESERVOIR QUADRANGLE 1975

SCALE 1:24 000
1 0 1 MILE
1 .5 0 1 KILOMETER
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

GEOLOGY BY K. B. KETNER
1968 AND 1983-1985
WITH ADDITIONAL DATA FROM
SOLOMON AND MOORE 1982

PRELIMINARY GEOLOGIC MAP OF THE ELKO HILLS, ELKO COUNTY, NEVADA

By
Keith B. Ketner
1985

CORRELATION OF MAP UNITS

Qal	Recent	QUATERNARY
QTal	Pleisto-cene	QUATERNARY
Th	Pliocene	TERTIARY
Tiw	Miocene	TERTIARY
Ti	Oligocene	TERTIARY
Te	Eocene	TERTIARY
TMgr	Paleocene	TERTIARY
Ps Pss		MESOZOIC
PPs		PERMIAN
PMdp		PENNSYLVANIAN
PMs		MISSISSIPPIAN

DESCRIPTION OF MAP UNITS

Qal ALLUVIUM (QUATERNARY) mud, silt, and sand along the Humboldt River.

QTal ALLUVIUM (QUATERNARY AND UPPER TERTIARY) alluvium, colluvium, landslides and talus above floodplain of the Humboldt River.

Th HUMBOLDT FORMATION (MIOCENE) lake sediments and alluvium: limestone, volcanic ash, gravel, and sand.

Tiw INDIAN WELL FORMATION (OLIGOCENE) volcaniclastic sediments and rhyolitic to dacitic tuff.

Ti INTRUSIVE PORPHYRY (OLIGOCENE OR YOUNGER) rhyolitic to dacitic; intrudes Elko Formation.

Te ELKO FORMATION (OLIGOCENE? AND EOCENE) siltstone, sandstone, conglomerate, limestone, shale, and oil shale. Term used in broad sense to include conglomerate at the base of the Tertiary sequence. Conglomerate at base and within the Elko Formation distinguished from Paleozoic conglomerate by the presence of pebbles of rhyolite, pebbles of spiculitic and phosphatic chert (Permian) and pebbles of chert-grain sandstone (upper Paleozoic). The Elko Formation lies unconformably on Paleozoic rocks and on the volcanic complex (TMzr).

TMzr VOLCANIC COMPLEX (LOWERMOST TERTIARY OR MESOZOIC?) rhyolitic flows tuffs, intrusives, and volcaniclastic sediments.

Ps, Pss SILTSTONE (MID-PERMIAN) limestone, sandstone, conglomerate and chert beds; chert beds most abundant in lower part; commonly silicified near contacts with rhyolite (Pss).

PPs STRATHEARN FORMATION (LOWER PERMIAN AND UPPER PENNSYLVANIAN) detrital limestone, limestone with abundant quartz and chert clasts, quartz sandstone, and conglomerate. Abundant fusulinids, bryozoans, brachiopods, and corals.

PMdp DIAMOND PEAK FORMATION (PENNSYLVANIAN AND MISSISSIPPIAN) conglomerate, sandstone; silicified in places. Distinguished from Tertiary conglomerate, which it may superficially resemble, by composition of clasts (see Te).

PMs SILICEOUS BLACK ROCKS (PENNSYLVANIAN AND MISSISSIPPIAN?) siltstone, shale, argillite, chert, cherty dolomitic baritic siltstone, and sandstone. Conodonts from one exposure indicate an Early Pennsylvanian age. Other exposures resemble Lower Mississippian units exposed in neighboring mountain ranges.

MAP SYMBOLS

- contact
- high angle fault, ball on downthrown side
- low angle fault, teeth on upper plate
- 35 strike and dip of beds
- vertical beds
- horizontal beds
- axis of anticline, indicating direction of plunge

STRUCTURE

The basic structure of the Elko Hills is an anticlinorium trending north 45 degrees east. It plunges to the southwest and probably also to the northeast. Structural relief, measured on the base of the Elko Formation, is greater than 1800 feet and average dips of the limbs, measured on beds of the Elko Formation, are about 30 degrees. Folding of the Elko Hills anticline took place after deposition of the Elko Formation and prior to deposition of the undeformed Miocene Humboldt Formation. The youngest dated bed in the Elko Formation is about 39 my, close to the Eocene-Oligocene boundary. Beds of the Elko Formation overlying the dated bed could very well be of Oligocene age. It is not entirely clear from evidence in the Elko Hills whether the late Oligocene Indian Well Formation was deformed along with the Elko Formation. However, in the nearby Pinon Range, the Indian Well Formation is younger than deformation of the Elko Formation. Therefore the Elko Hills anticline probably formed in mid-Oligocene time.

A matched pair of prominent north-striking normal faults slice through the Elko Hills anticline. Each fault dips 30 degrees but in opposite directions. Each is planar and strikes north, making an angle of 45 degrees with the axis of the anticline.

A thrust fault is well displayed in section 14 just south of Osino Canyon. The steep north dip of the fault is due to its position on the northwest limb of the Elko Hills anticline. The fault must be younger than mid-Permian, the age of the youngest overridden rocks, and it is older than the Mesozoic or very Early Tertiary volcanic complex.

Near Osino Canyon, three separate patches of Paleozoic rocks overlie Tertiary and Permian units and the contacts are nearly horizontal faults. Conceivably they are erosional remnants of a single formerly continuous plate. Two of the patches, which form cliffs on the northwest and southeast sides of the west end of Osino Canyon, are composed of Diamond Peak Formation. The contact between the Diamond Peak and the underlying younger formations is clearly exposed in several places on both sides of the canyon. The orientation of mullions on the underside of the Diamond Peak in one place is about east-west. The Permian and Pennsylvanian Strathearn Formation, located just south of the east end of Osino Canyon, forms the third patch. Although the contact is not clearly exposed, geometric relations suggest that the Strathearn overlies Permian rocks and the Elko Formation on a nearly horizontal fault.

POST-PALEOZOIC EVENTS

1) Upper Pennsylvanian and Permian shelf rocks were overthrust by black, siliceous Pennsylvanian and Mississippian(?) units. 2) Rhyolite erupted in Mesozoic or very early Tertiary time and the Paleozoic rocks were covered with a thick blanket of flows, tuffs, and sparse sediments. 3) After a period of erosion a lake formed and sandy, gravelly alluvium, limestone, and shale, constituting the Elko Formation, were deposited in Eocene to early Oligocene(?) time. 4) The Paleozoic to Tertiary rocks were folded in the form of a northeast trending anticline or elongate dome. 5) The anticline was cleaved diagonnally by two planar normal faults. 6) A structural plate of Paleozoic rocks was emplaced over units ranging in age from Permian to Eocene or Oligocene(?) on a nearly horizontal fault. 7) Finally, high angle normal faults, now concealed by alluvium, elevated the Elko Hills area producing the present relief.

REFERENCE

Solomon, B. J., and Moore, S. W., 1982, Geologic map and oil shale deposits of the Elko East quadrangle, Elko County, Nevada: U. S. Geological Survey Miscellaneous Field Studies Map, MF-1421.

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.