Geologic Descriptions

AGE	SYMBOL	NAME	DESCRIPTION
Quaternary			
	Qal	Alluvium	Floodplain and pediment deposits; includes low terrace deposits along streams, and bedrock locally in stream channels; pediment deposits of sandy silt locally modified by sheetwash action.
	Qcd	Eolian deposits	Sand, calcareous, mainly dark brown to grayish brown; derived from lacustrine, fluviatile, and eolian deposits; commonly rests on lacustrine deposits (Tahoka Formation) and eolian sand; includes some alluvium; mostly confined to New Mexico
	Qsd	Windblown sand	Sand and silt in sheets, Qs, locally includes cover sand; dunes and dune ridges, Qsd; and sand sheets, dunes, and dune ridges undivided,
	Qsu	Windblown sand	Sand and silt in sheets, Qs, locally includes cover sand; dunes and dune ridges, Qsd; and sand sheets, dunes, and dune ridges undivided,
	Qs	Windblown sand	Sand and silt in sheets, Qs, locally includes cover sand; dunes and dune ridges, Qsd; and sand sheets, dunes, and dune ridges undivided,
	Qp	Playa and pond deposits	Playa deposits, Qp, clay and silt, sandy, light gray, in shallow depressions, usually covered by thin deposit of Recent sediment (Wisconsinan)
	Qcc	Caliche	Caliche stripped of covering materials mapped separately; thickness up to 10 feet
	Qsgc	Colluvial deposits	Sand, silt, and gravel deposited by slopewash, and talus for Ogallala, red to gray; in part calichified, caliche 1 to 20 feet thick; may include weathered Gatuna Formation locally; rests mainly on Triassic and Permian rocks.
	Qun	Pond deposits	Gastropod-bearing sandy silt and silty clay, gray to light gray, deposited in ponds and shallow swales, locally may include upper part of Tahoka deposits.
	Qta	Tahoka Formation	Locally contains Vigo Park and Rich Lake Dolomites in uppermost clay zones, not separately mapped. Locustrine clay, silt, sand, and gravel, coarser toward margins of deposits, locally calcareous, selenitic. Clay and silt, sandy, indistinctly bedded to massive, weakly coherent, various shades of light gray and bluish gray. Sand, fine- to coarse-grained quartz, indistinctly bedded to massive, friable, gray, grades to gravel at margins of deposits. Molluscan and vertebrate fossils. Thickness 25 feet, feathers out laterally (Wisconsinan)
	Qcs	Windblown cover sand	Sand, fine- to medium-grained quartz, silty, calcareous, locally clayey, caliche nodules, massive, grayish red; distinct soil profile; thickness 25 feet, feathers out locally (mostly Illinoian, may included younger deposits)

Geologic Descriptions

IBOL	NAME	DESCRIPTION
ıl	Alluvium	Floodplain and pediment deposits; includes low terrace deposits along streams, and bedrock locally in stream channels; pediment deposits of sandy silt locally modified by sheetwash action.
:d	Eolian deposits	Sand, calcareous, mainly dark brown to grayish brown; derived from lacustrine, fluviatile, and eolian deposits; commonly rests on lacustrine deposits (Tahoka Formation) and eolian sand; includes some alluvitum; mostly confined to New Mexico
;d	Windblown sand	Sand and silt in sheets, Qs, locally includes cover sand; dunes and dune ridges, Qsd; and sand sheets, dunes, and dune ridges undivided,
;u	Windblown sand	Sand and silt in sheets, Qs, locally includes cover sand; dunes and dune ridges, Qsd; and sand sheets, dunes, and dune ridges undivided,
;	Windblown sand	Sand and silt in sheets, Qs, locally includes cover sand; dunes and dune ridges, Qsd; and sand sheets, dunes, and dune ridges undivided,
)	Playa and pond deposits	Playa deposits, Qp, clay and silt, sandy, light gray, in shallow depressions, usually covered by thin deposit of Recent sediment (Wisconsinan)
:c	Caliche	Caliche stripped of covering materials mapped separately; thickness up to 10 feet
;gc	Colluvial deposits	Sand, silt, and gravel deposited by slopewash, and talus for Ogallala, red to gray; in part calichified, caliche 1 to 20 feet thick; may include weathered Gatuna Formation locally; rests mainly on Triassic and Permian rocks.
ın	Pond deposits	Gastropod-bearing sandy silt and silty clay, gray to light gray, deposited in ponds and shallow swales, locally may include upper part of Tahoka deposits.
:a	Tahoka Formation	Locally contains Vigo Park and Rich Lake Dolomites in uppermost clay zones, not separately mapped. Locustrine clay, silt, sand, and gravel, coarser toward margins of deposits, locally calcareous, selenitic. Clay and silt, sandy, indistinctly bedded to massive, weakly coherent, various shades of light gray and bluish gray. Sand, fine- to coarse-grained quartz, indistinctly bedded to massive, friable, gray, grades to gravel at margins of deposits. Molluscan and vertebrate fossils. Thickness 25 feet, feathers out laterally (Wisconsinan)
:s	Windblown cover sand	Sand, fine- to medium-grained quartz, silty, calcareous, locally clayey, caliche nodules, massive, grayish red; distinct soil profile; thickness 25 feet, feathers out locally (mostly Illinoian, may included younger deposits)

Geologic Descriptions (cont.)

AGE	SYMBOL	NAME	DESCRIPTION
Tertiary			
	To	Ogallala Formation	Sand, silt, clay, gravel, and caliche. Sand, fine- to coarse-grained quartz, silty in part, cemented locally by calcite and by silica, locally crossbedded, various shades of gray and red. Minor silt and clay with caliche nodules, massive, white, gray, olive green, maroon. Gravel, not everywhere present, composed of pebbles and cobbles of quartz, quartzite, minor chert, igneous rock, metamorphic rock, limestone, and abraded Gryphaea in intraformational channel deposits and in basal conglomerate. Caliche, sandy, pisolitic, forms caprock, may include some caliche of Pleistocene age. Where stippled pattern shown, overlain sporadically by 14 to 30 inches of brownish gray to brown to reddish brown, calcareous sand and silt of pre-Illinoian age; on San Juan Mesa, includes sandy loess. Pre-Illinoian sand and silt west of stippled pattern not separately mapped, confined mainly to northwest-southeast trending swales and irregular topographic lows. Thickness up to 350 feet.
	To1	Ogallala Formation	Overlain sporadically by 14 to 30 inches of brownish gray to brown to reddish brown, calcareous sand and silt of pre-Illinoian age
Cretaceous			
	K	Cretaceous undivided	Limestone and shale; limestone, mostly fine grained, argillaceous, thin to thick bedded and massive, in part nodular, grayish yellow, light gray; shale, calcareous, thinly laminated, dusky yellow, yellowish gray, light olive-gray, dark gray; marine megafossils abundant in some beds; outcrop thickness of 53 feet measured at northwestern margin of McKenzie Lake.
Triassic			
	Trd	Dockum Group	Shale, sandstone, siltstone, limestone, and gravel; mostly shale, thin bedded, micaceous, variegated; dips eastward; thickness up to 2000
Permian			
		Rustler Formation	Anhydrite and rock salt with subordinate dolomite, sandstone, claystone, and polyhalite; thickness 90to 450 feet
		Salado Formation	Rock salt with subordinate anhydrite, polyhalite, potassium ores, sandstone, and magnesite; thickness ranges from approximately 800 to 1,200 feet
		Castile Formation	Anhydrite and rock salt with subordinate limestone, thickness ranges to 2,100 feet in Lea County
		San Andres limestone	Artesia Group, limestone, sandstone, siltstone, shale, dolomite, and anhydrite; thickness averages approximately 1,500 feet
		Capitan Reef Complex	Consists of Goat Seep limestone and Capitan limestone, which occupy the Delaware Basin. Lithology consists of variations of carbonate beds including reef deposits; thickness ranges to in excess of 2,250 feet

Geologic Descriptions (cont.)

BOL	NAME	DESCRIPTION
	Ogallala Formation	Sand, silt, clay, gravel, and caliche. Sand, fine- to coarse-grained quartz, silty in part, cemented locally by calcite and by silica, locally crossbedded, various shades of gray and red. Minor silt and clay with caliche nodules, massive, white, gray, olive green, maroon. Gravel, not everywhere present, composed of pebbles and cobbles of quartz, quartzite, minor chert, igneous rock, metamorphic rock, limestone, and abraded Gryphaea in intraformational channel deposits and in basal conglomerate. Caliche, sandy, pisolitic, forms caprock, may include some caliche of Pleistocene age. Where stippled pattern shown, overlain sporadically by 14 to 30 inches of brownish gray to brown to reddish brown, calcareous sand and silt of pre-Illinoian age; on San Juan Mesa, includes sandy loess. Pre-Illinoian sand and silt west of stippled pattern not separately mapped, confined mainly to northwest-southeast trending swales and irregular topographic lows. Thickness up to 350 feet.
l	Ogallala Formation	Overlain sporadically by 14 to 30 inches of brownish gray to brown to reddish brown, calcareous sand and silt of pre-Illinoian age
	Cretaceous undivided	Limestone and shale; limestone, mostly fine grained, argillaceous, thin to thick bedded and massive, in part nodular, grayish yellow, light gray; shale, calcareous, thinly laminated, dusky yellow, yellowish gray, light olive-gray, dark gray; marine megafossils abundant in some beds; outcrop thickness of 53 feet measured at northwestern margin of McKenzie Lake.
d	Dockum Group	Shale, sandstone, siltstone, limestone, and gravel; mostly shale, thin bedded, micaceous, variegated; dips eastward; thickness up to 2000
	Rustler Formation	Anhydrite and rock salt with subordinate dolomite, sandstone, claystone, and polyhalite; thickness 90to 450 feet
	Salado Formation	Rock salt with subordinate anhydrite, polyhalite, potassium ores, sandstone, and magnesite; thickness ranges from approximately 800 to 1,200 feet
	Castile Formation	Anhydrite and rock salt with subordinate limestone, thickness ranges to 2,100 feet in Lea County
	San Andres limestone	Artesia Group, limestone, sandstone, siltstone, shale, dolomite, and anhydrite; thickness averages approximately 1,500 feet
	Capitan Reef Complex	Consists of Goat Seep limestone and Capitan limestone, which occupy the Delaware Basin. Lithology consists of variations of carbonate beds including reef deposits; thickness ranges to in excess of 2,250 feet

Geologic Descriptions (cont.)

AGE	SYMBOL	NAME	DESCRIPTION
Permian			
		Delaware Mountain	Consists of a thick sequence of sandstones and siltstones interbedded with thin calcareous mudstones; thickness ranges from 2,000 to 4,000 feet
		Permian Leonardian	Series is composed of three distinctive facies: 1) basinal section composed of shale, siltstone, sandstone, and dark limestone; 2) reef and shelf-margin carbonates; 3) shelf section composed of carbonates, evaporites, and redbeds; thickness 2,000 to 3,500 feet

Geologic Descriptions (cont.)

BOL	NAME	DESCRIPTION
	Delaware Mountain	Consists of a thick sequence of sandstones and siltstones interbedded with thin calcareous mudstones; thickness ranges from 2,000 to 4,000 feet
	Permian Leonardian	Series is composed of three distinctive facies: 1) basinal section composed of shale, siltstone, sandstone, and dark limestone; 2) reef and shelf-margin carbonates; 3) shelf section composed of carbonates, evaporites, and redbeds; thickness 2,000 to 3,500 feet

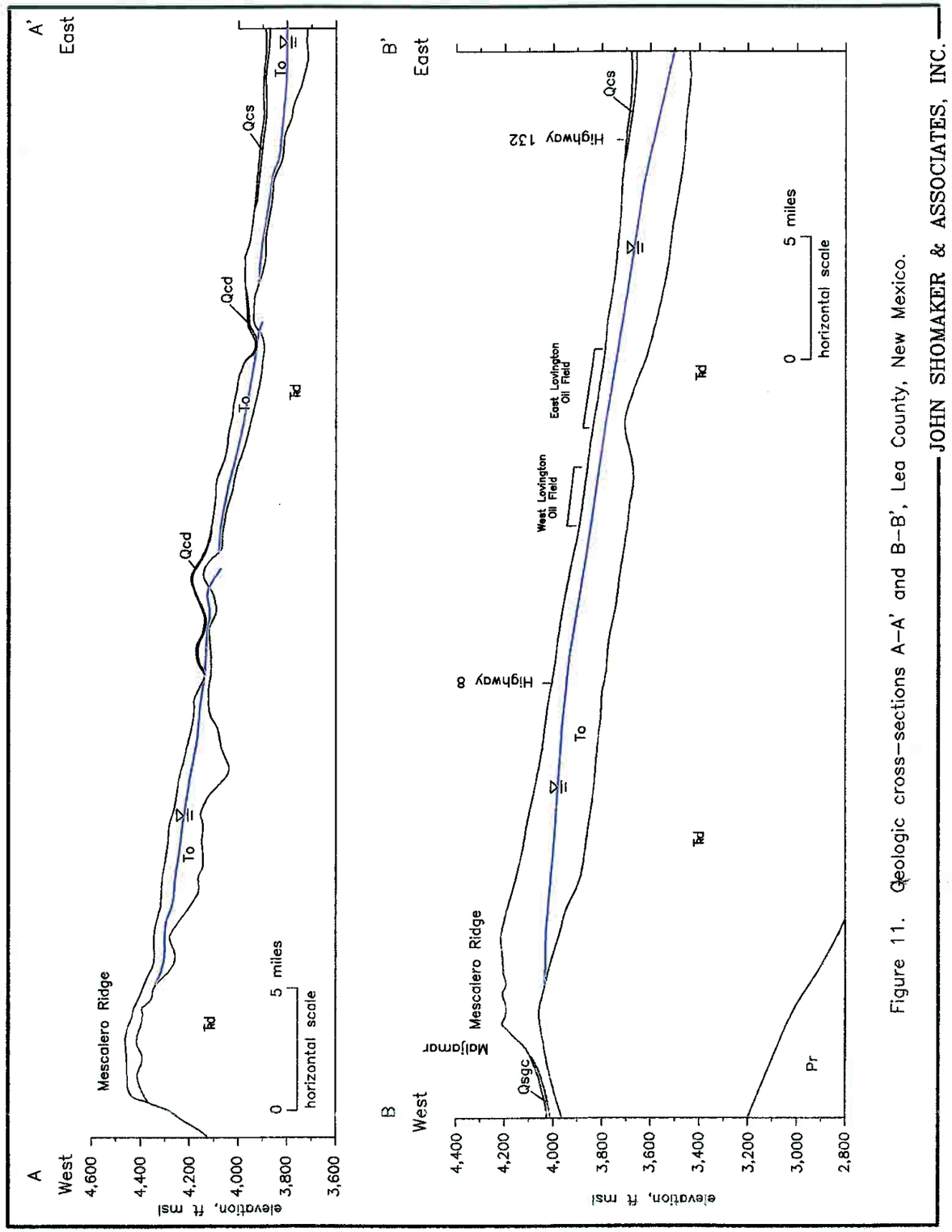

Figure 11. Geologic cross-sections A–A' and B–B', Lea County, New Mexico.

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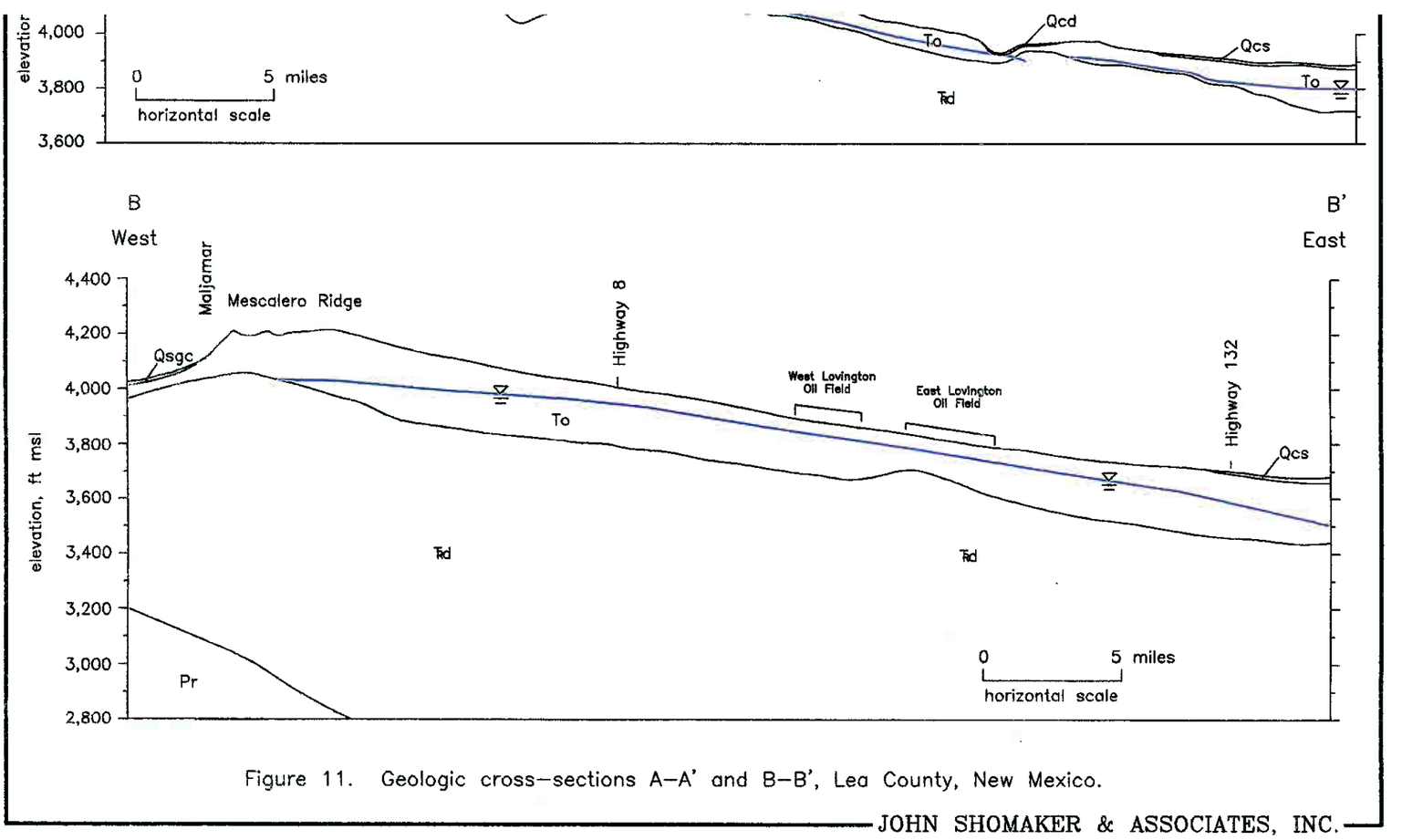

Figure 11. Geologic cross-sections A-A' and B-B', Lea County, New Mexico.

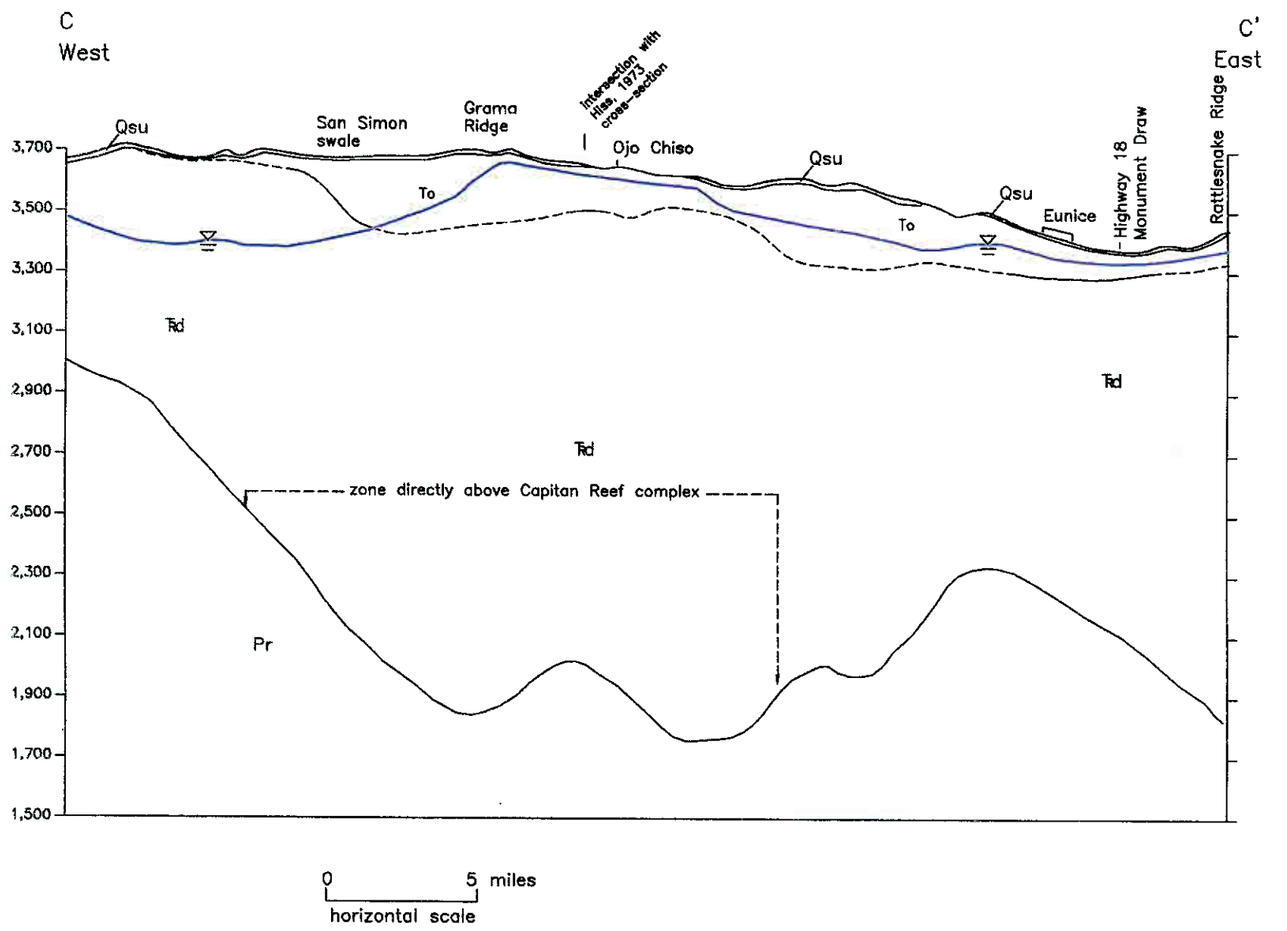

Figure 12. Geologic cross-section C-C', Lea County, New Mexico.

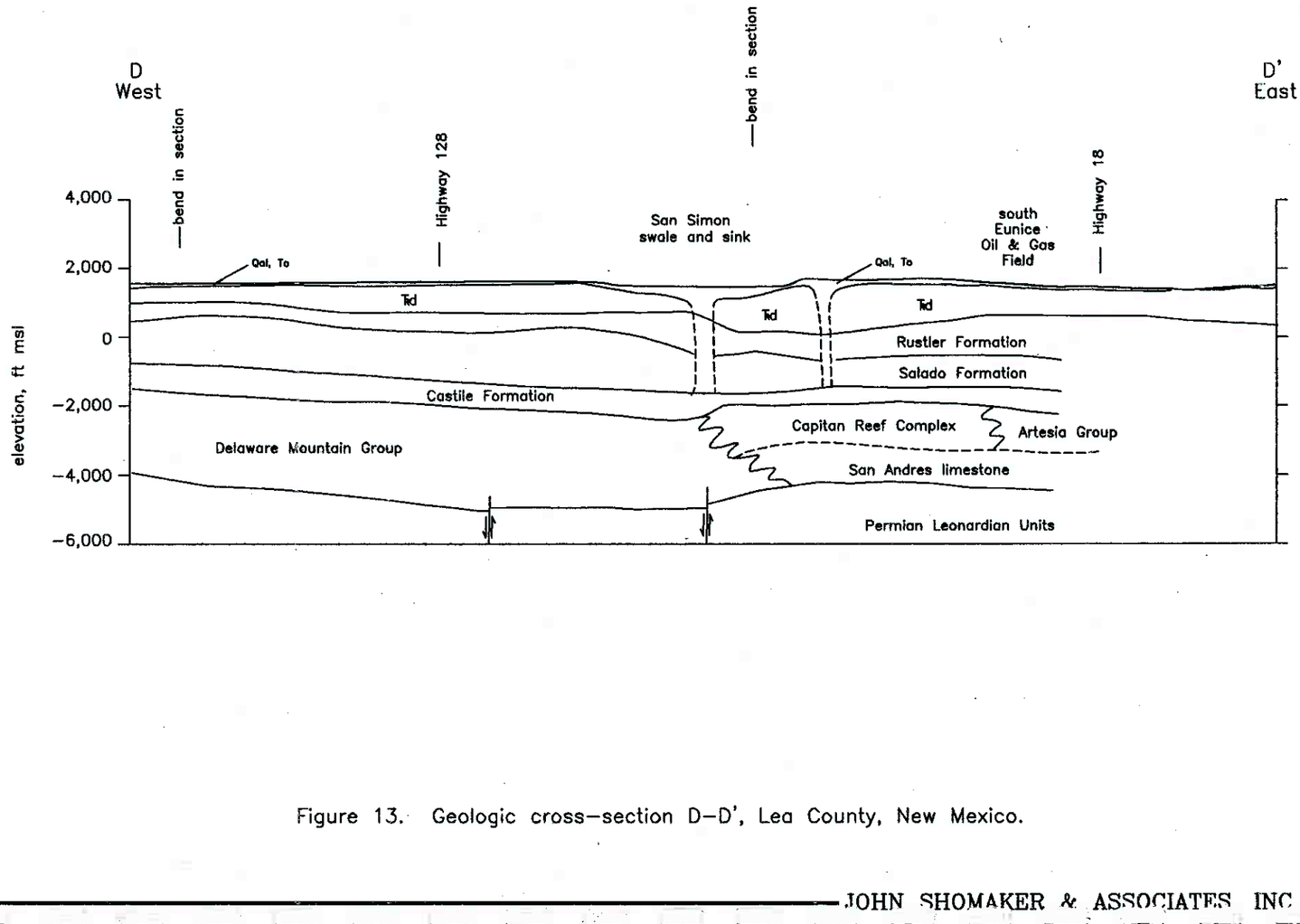

Figure 13. Geologic cross-section D-D', Lea County, New Mexico.

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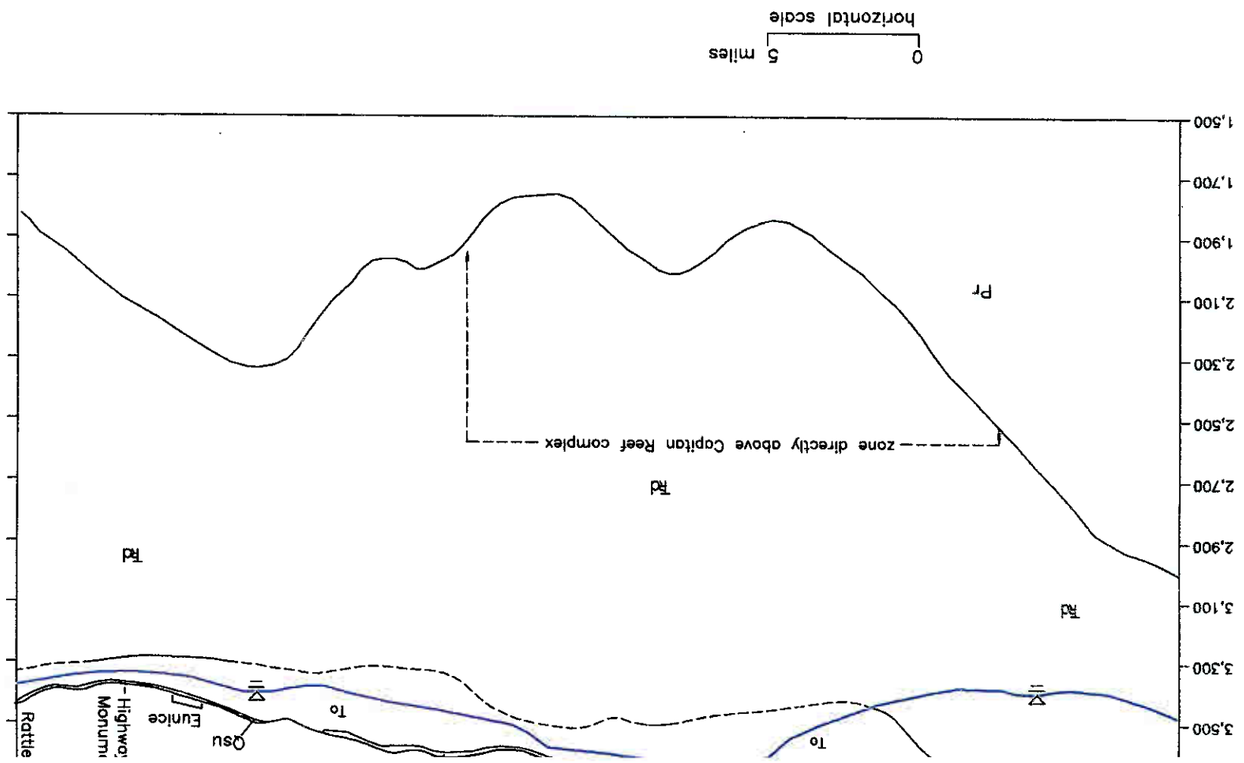
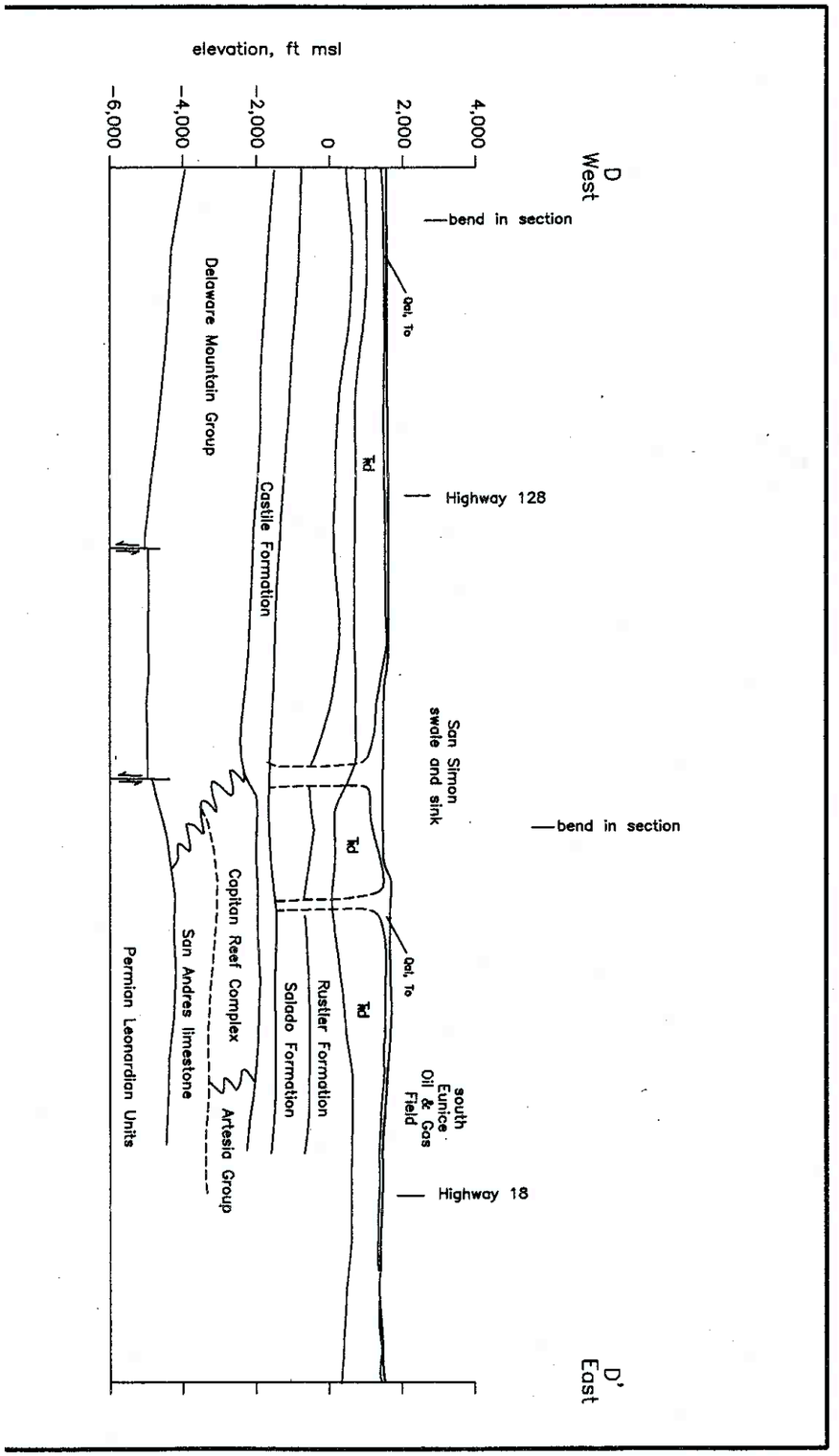
Figure 12. Geologic cross-section C-C', Lea County, New Mexico.





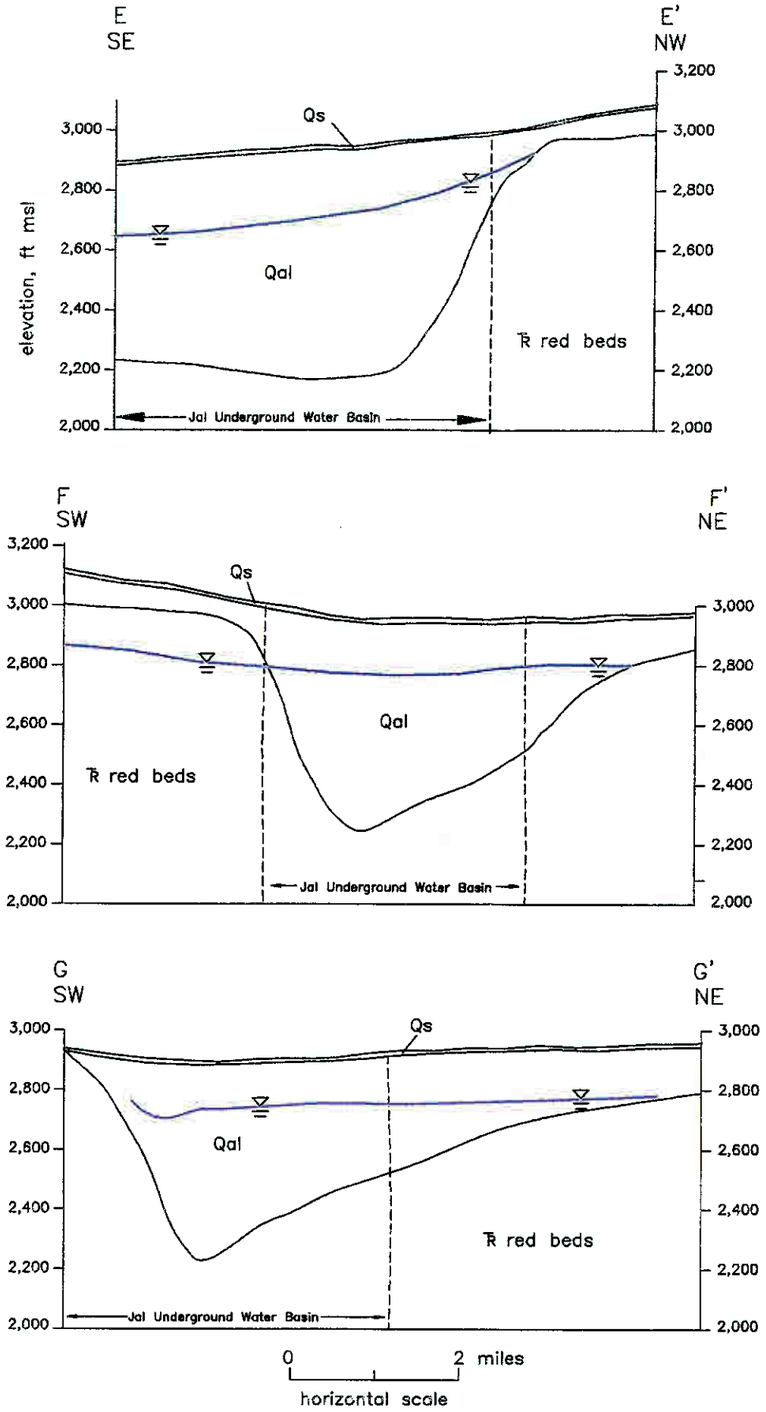
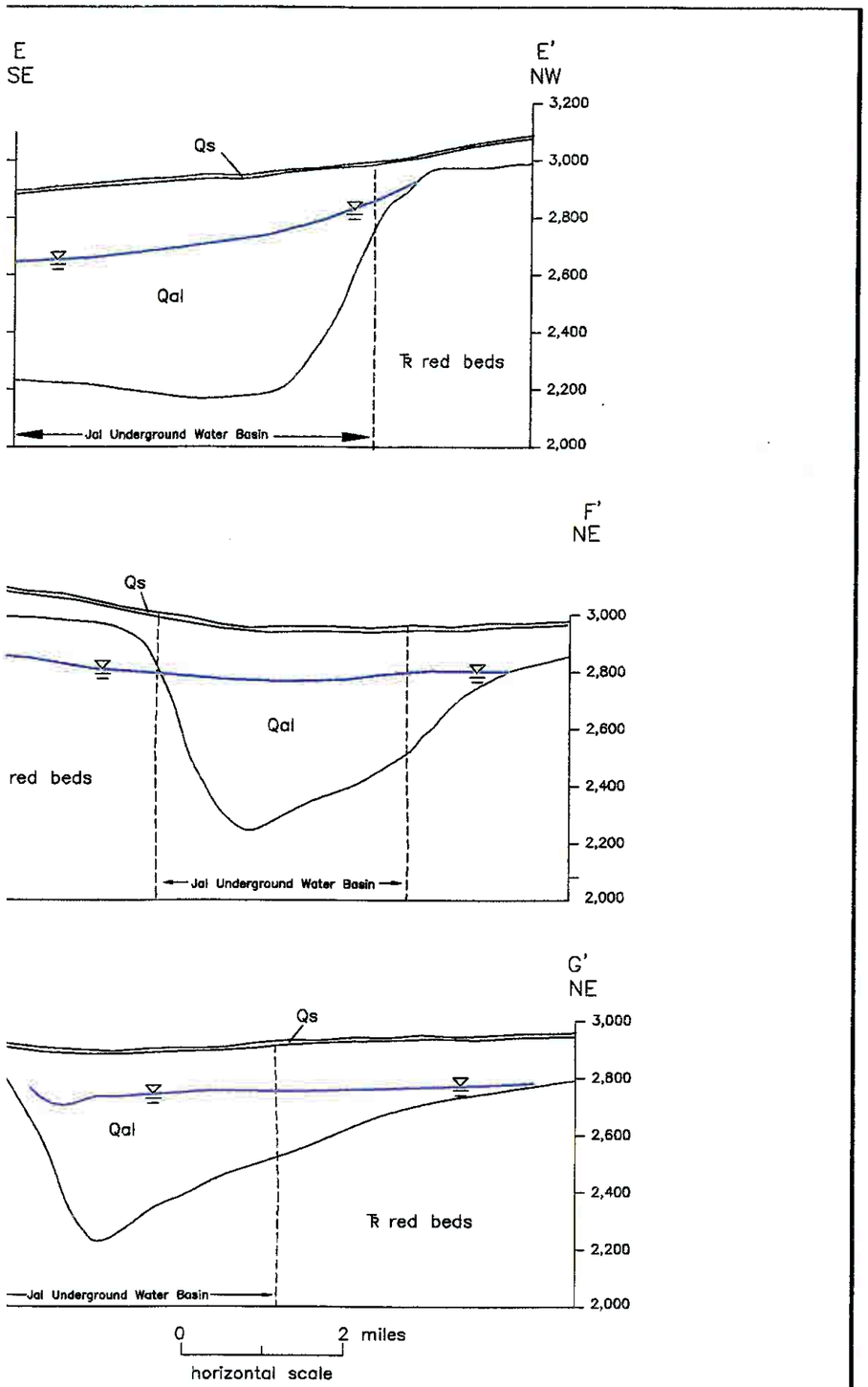


Figure 14. Geologic cross-sections E–E', F–F', and G–G' Jal Underground Water Basin, Lea County, New Mexico.



cross–sections E–E', F–F', and G–G' Jal Underground Water Basin,
inty, New Mexico.

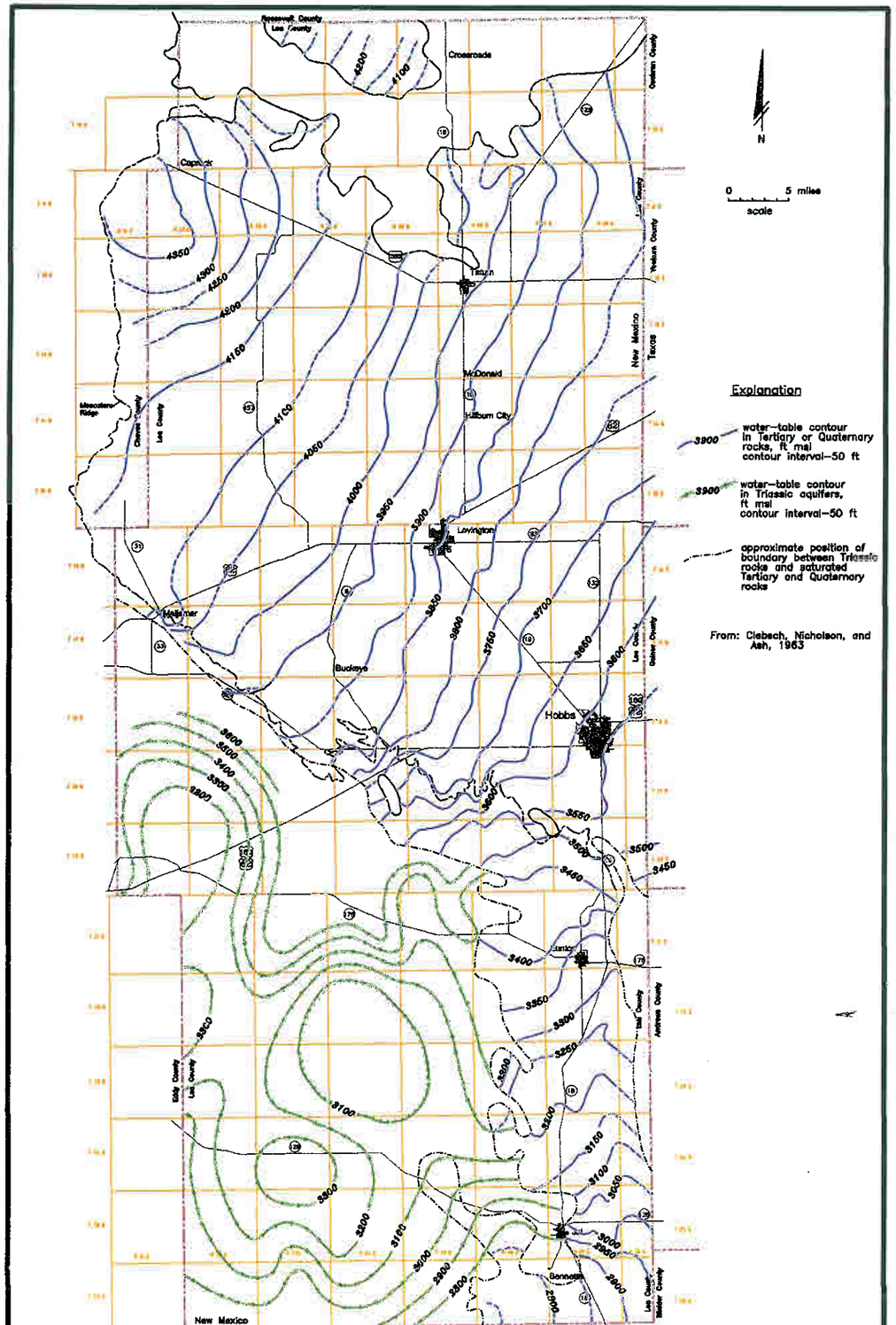
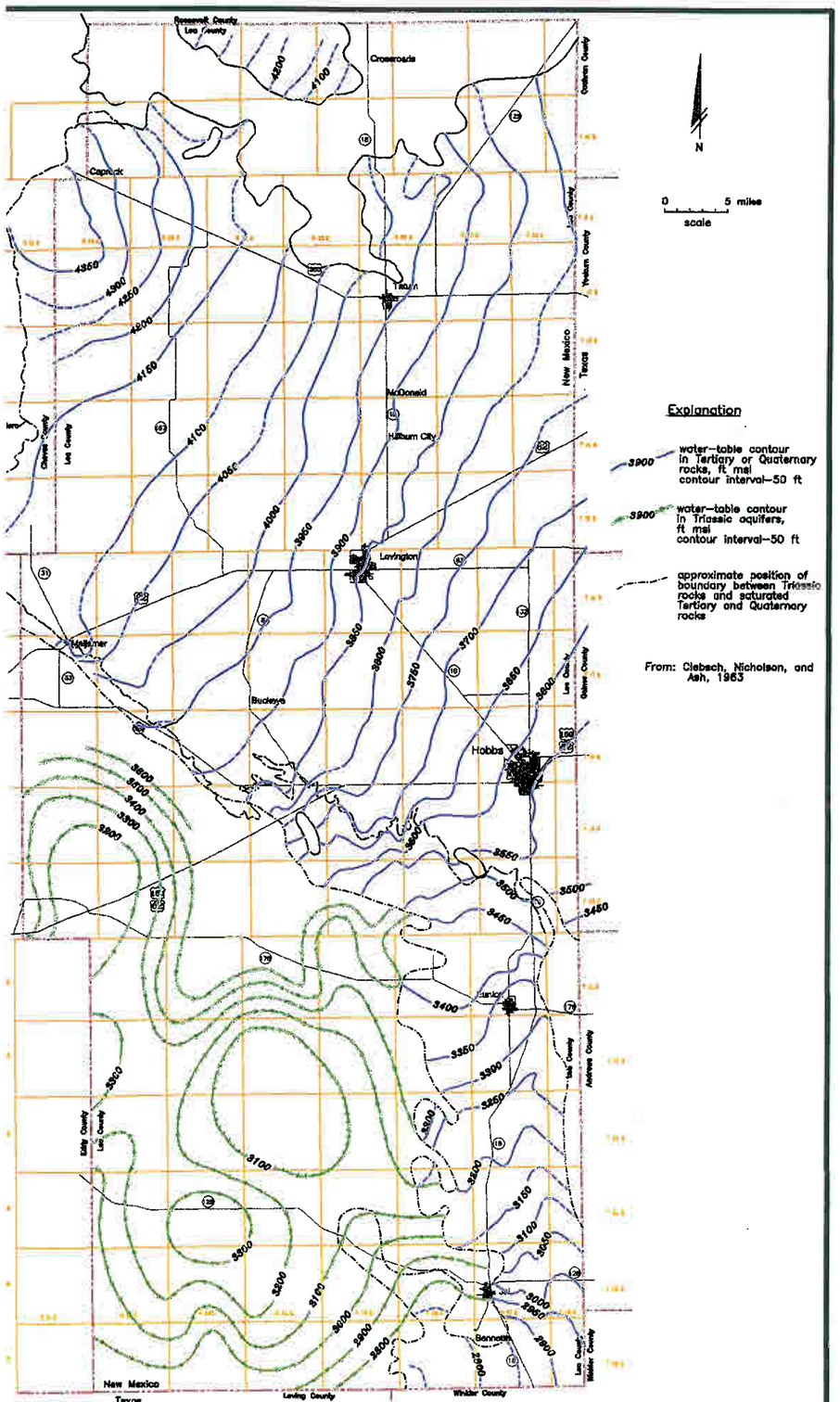


Figure 15. Map showing potentiometric surface elevation in Tertiary–age or Quaternary–age rocks, and Triassic aquifers, 1952, Lea County, New Mexico.



e 15. Map showing potentiometric surface elevation in Tertiary-age or Quaternary-age rocks, and Triassic aquifers, 1952, Lea County, New Mexico.

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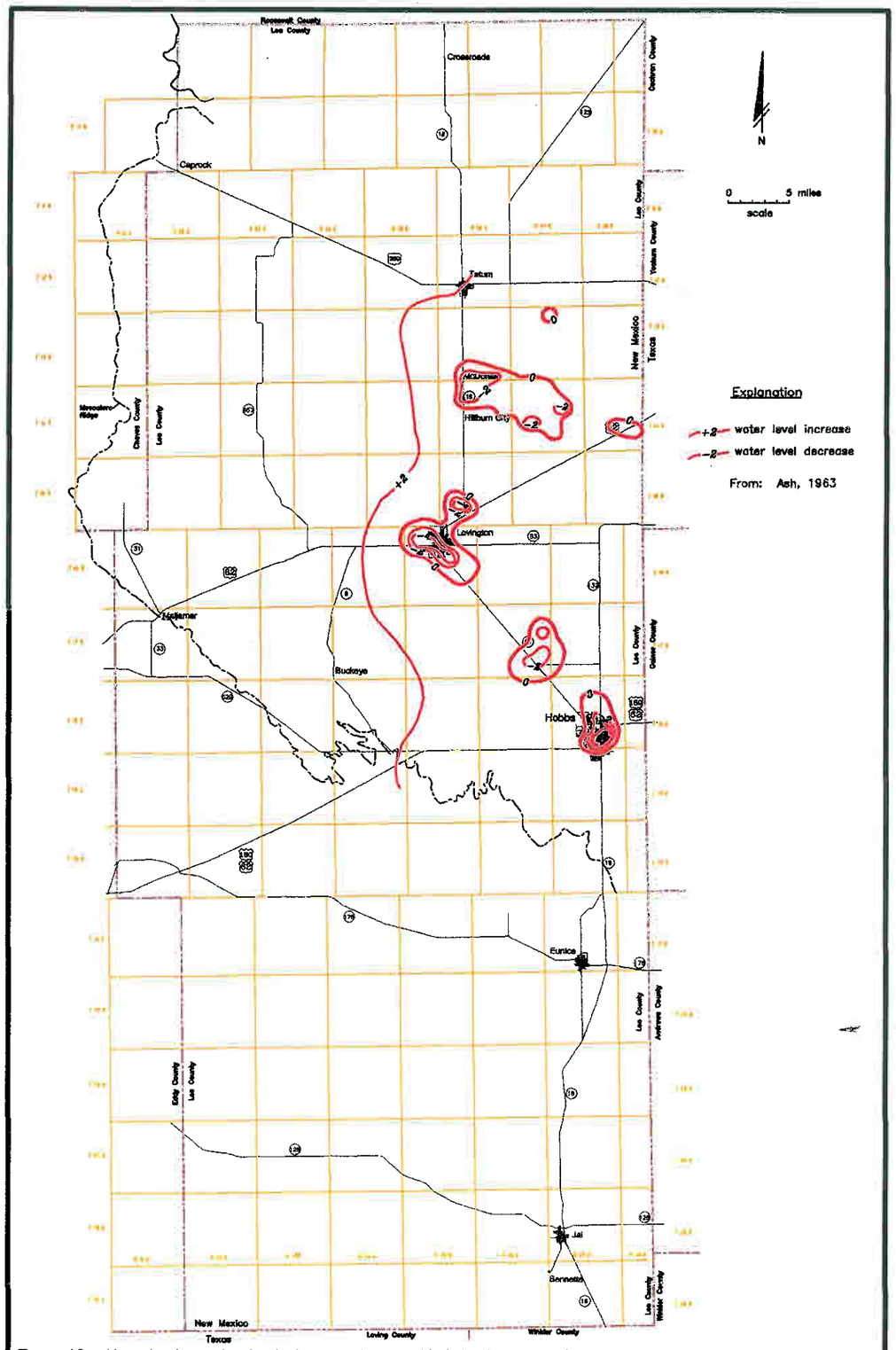

Figure 16. Map showing water level changes, January 1940 to January 1950 in east-central Lea County, New Mexico.

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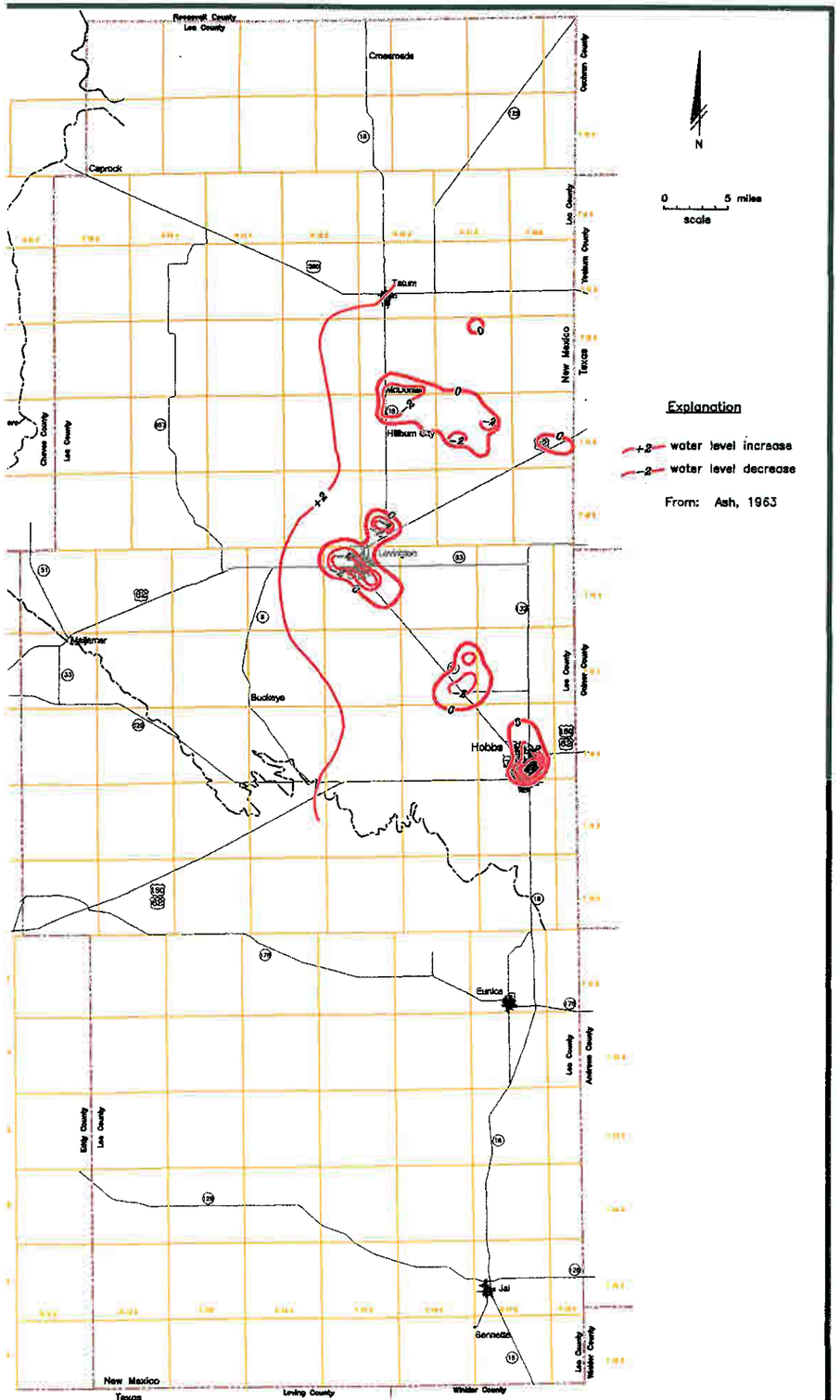

Map showing water level changes, January 1940 to January 1950 in east-central Lea County, New Mexico.

JOHN SHOMAKER & ASSOCIATES, INC.

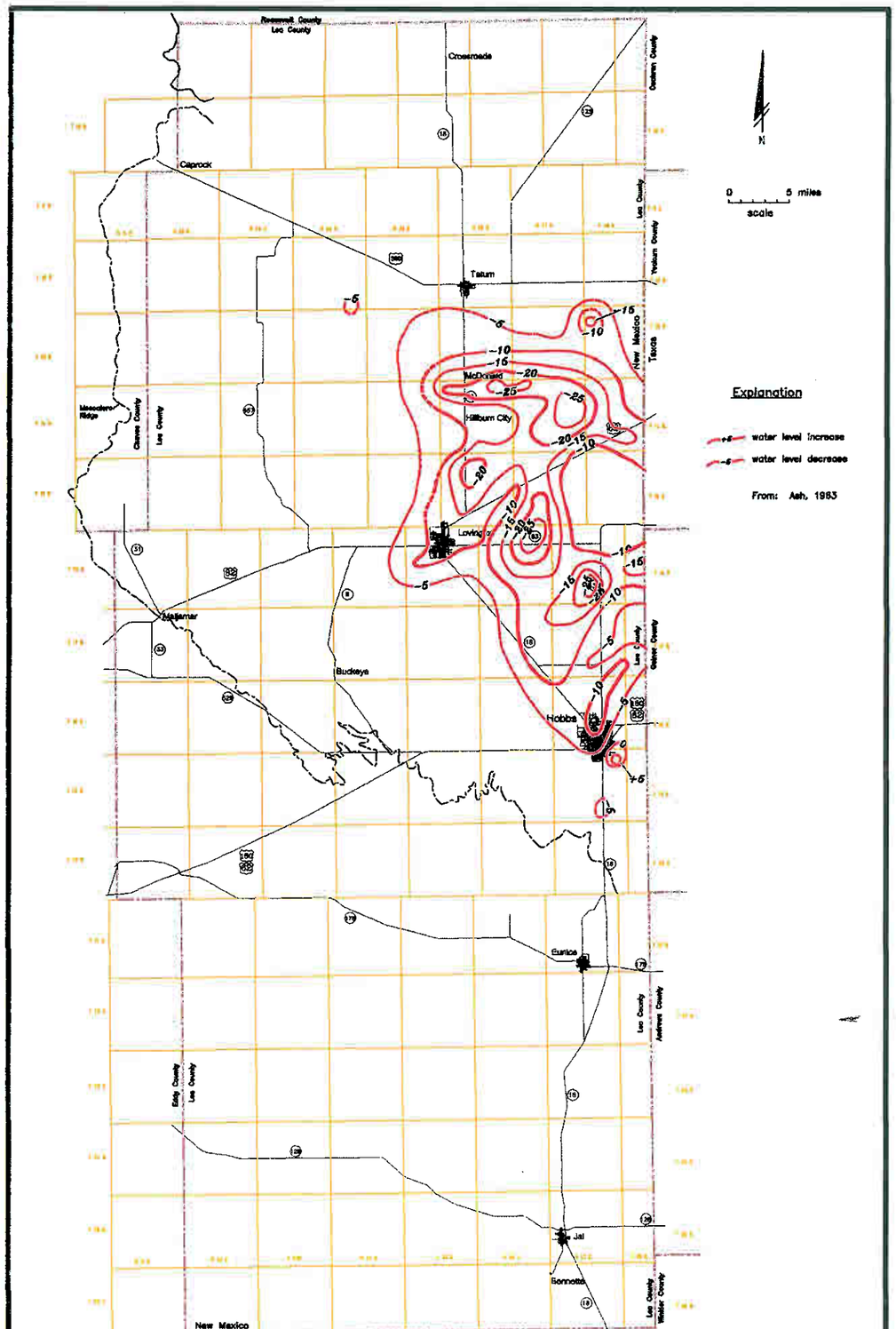

Figure 17. Map showing water level changes, January 1950 to January 1960 in east-central Lea County, New Mexico.

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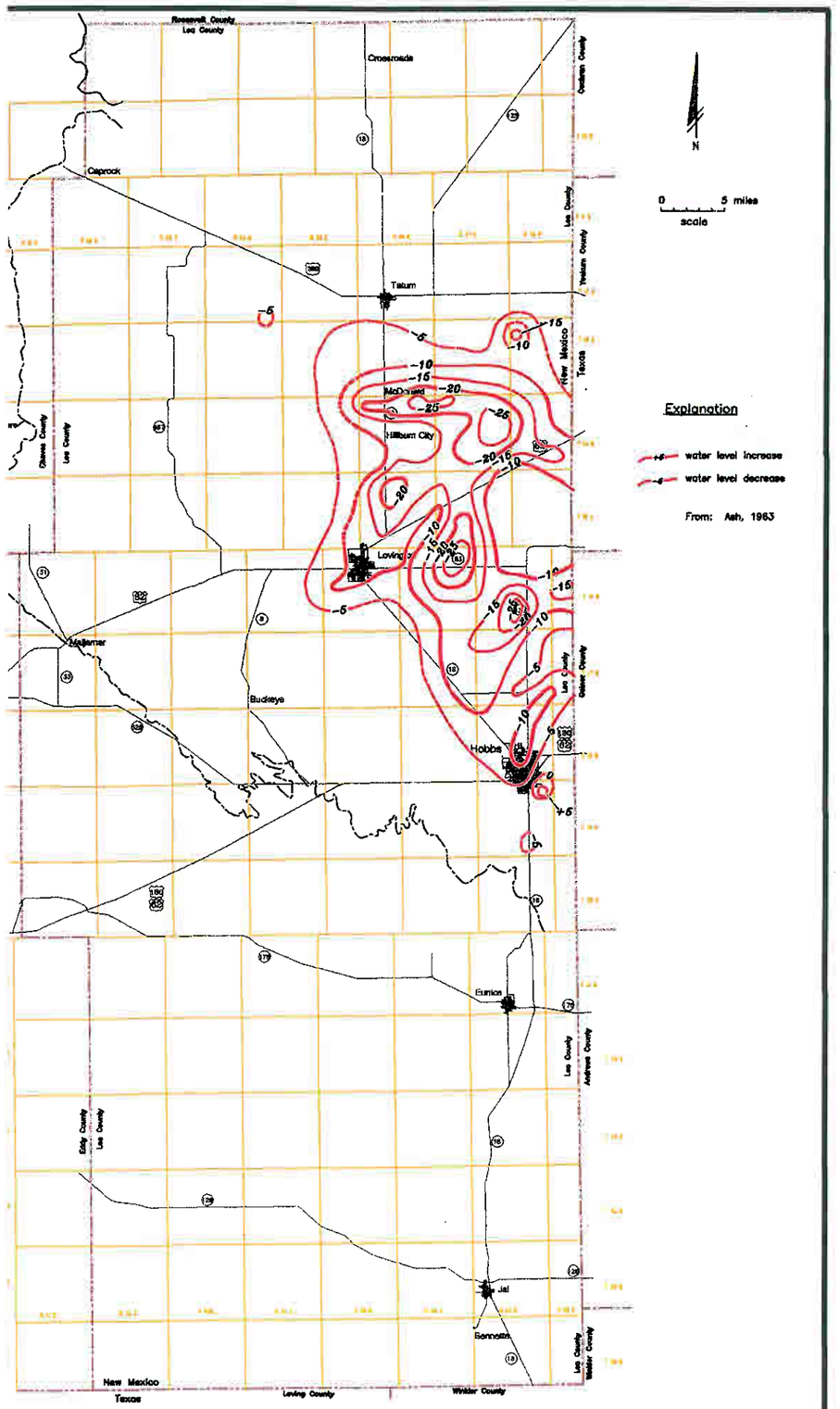


Map showing water level changes, January 1950 to January 1960 in east-central Lea County, New Mexico.

JOHN SHOMAKER & ASSOCIATES, INC.

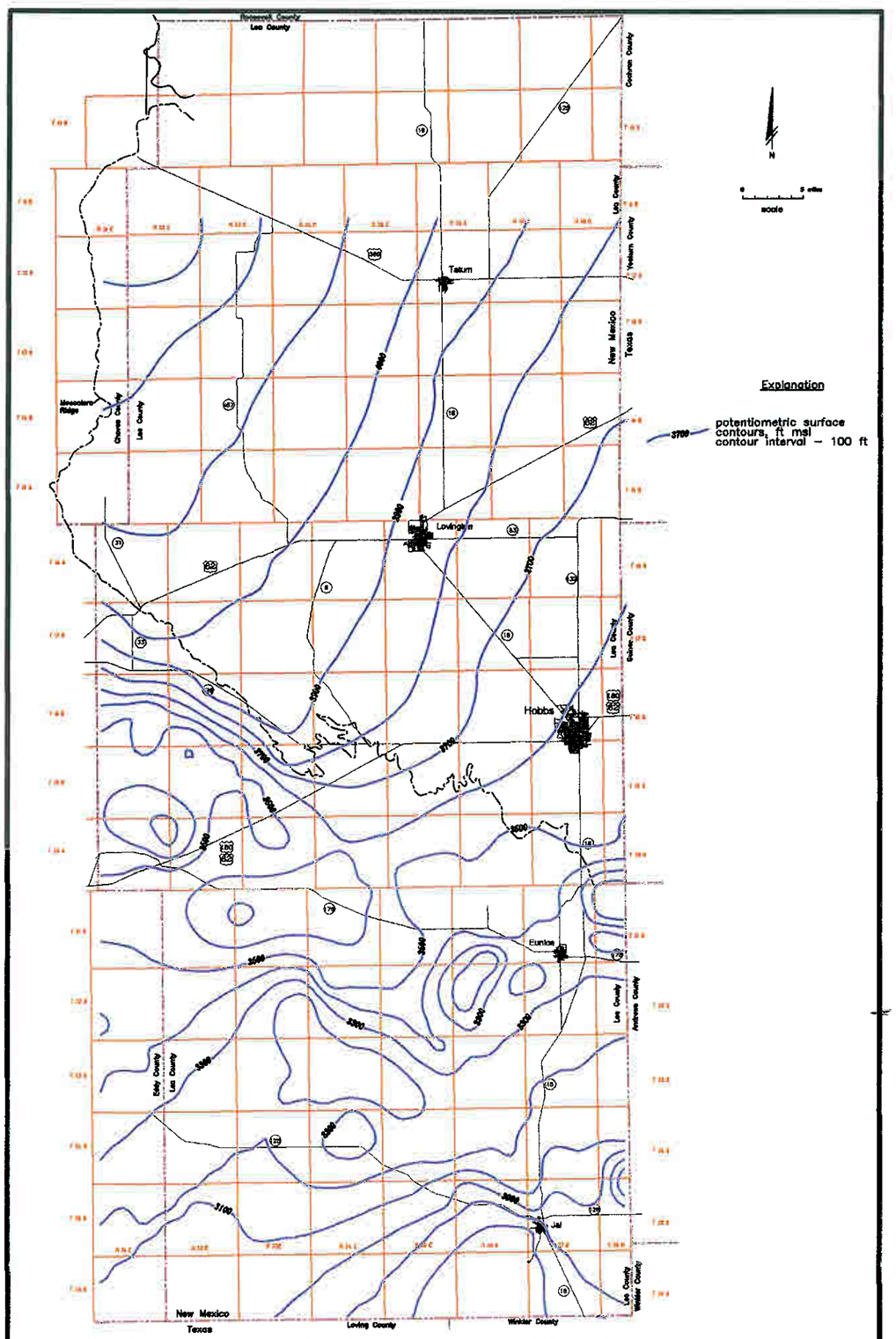
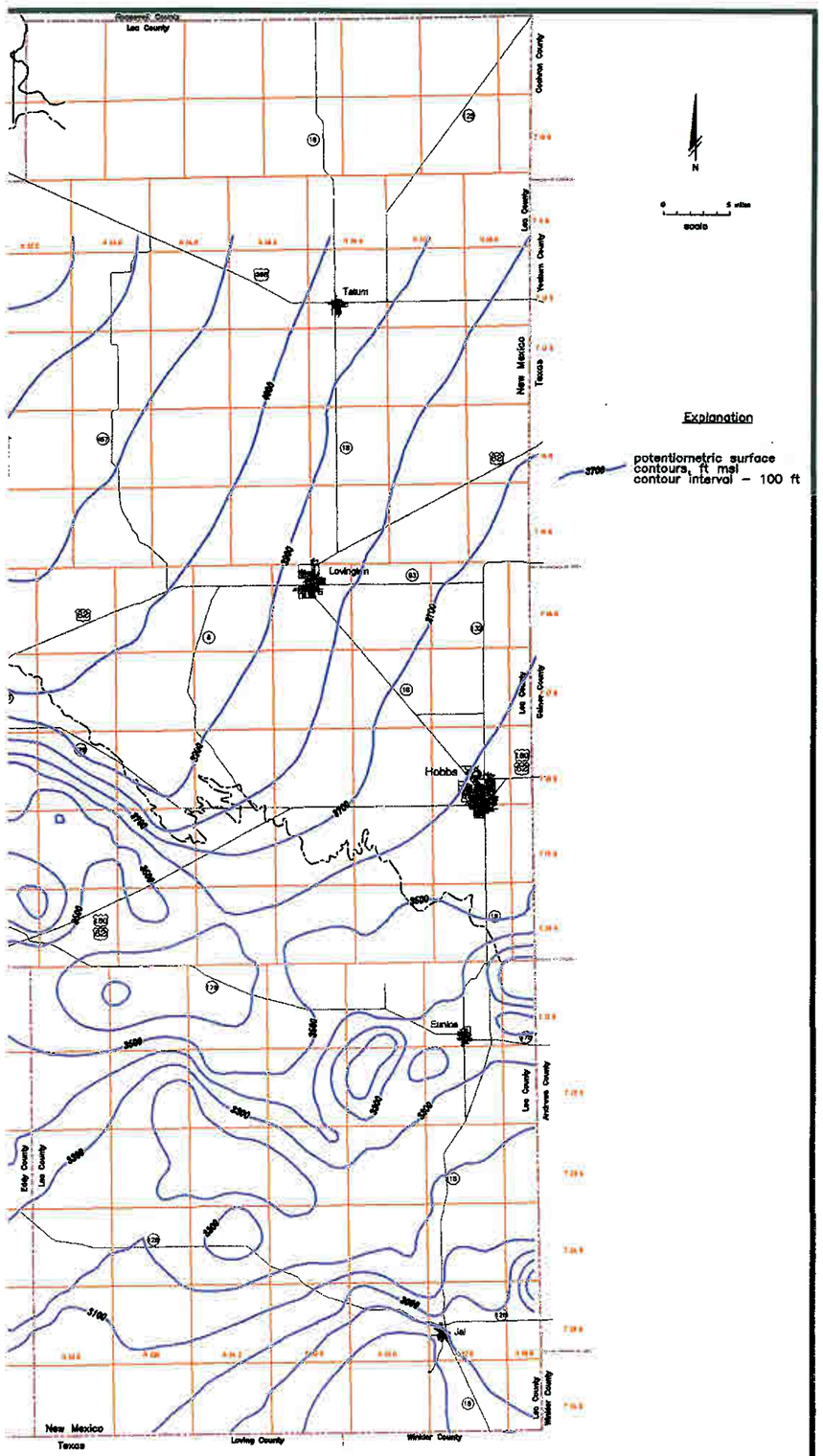


Figure 18. Map showing potentiometric surface elevation contours, 1968, Lea County, New Mexico.

JOHN SHOMAKER & ASSOCIATES, INC.



p showing potentiometric surface elevation contours, 1968, Lea County, New Mexico.

JOHN SHOMAKER & ASSOCIATES, INC.

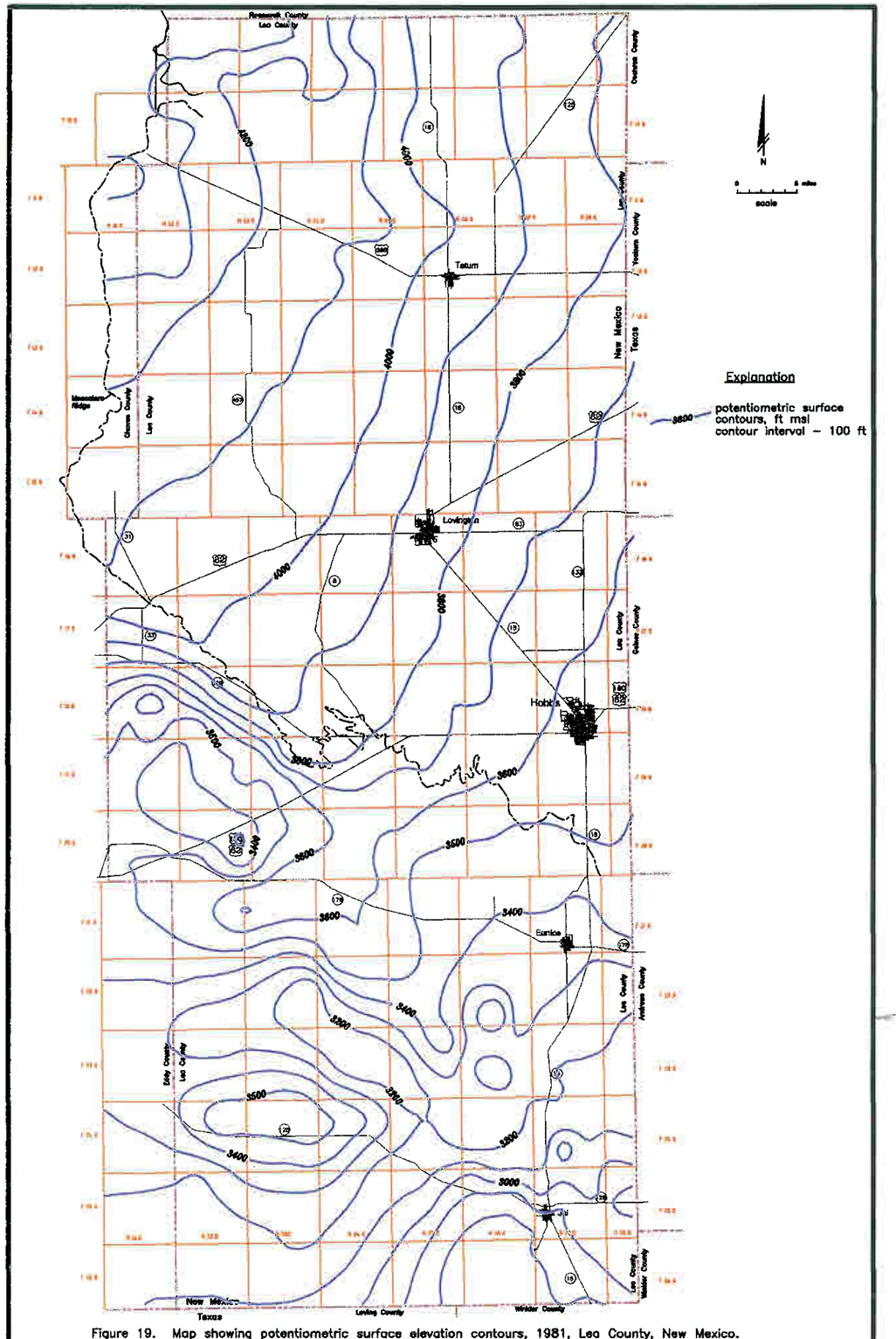


Figure 19. Map showing potentiometric surface elevation contours, 1981, Lea County, New Mexico.

JOHN SHOMAKER & ASSOCIATES, INC.