

CALIFORNIA SUMMARY OF OPERATIONS

FIFTY-NINTH ANNUAL REPORT OF THE
STATE OIL AND GAS SUPERVISOR

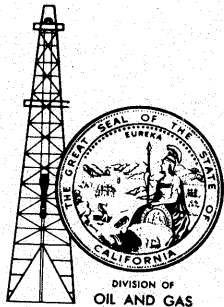
Resources Agency of California
Department of Conservation
DIVISION OF OIL AND GAS

Vol. 59, No. 1

Sacramento 1973

CONTENTS

East Area of Sansinena Oil Field.....	5
Lyon Canyon Oil Field.....	21
Nitrogen Removal Project at Chowchilla Gas Field.....	29
Northeast Edison Oil Field.....	41
Oak Park Oil Field.....	49
Poso Creek Oil Field, McVan Area.....	59
Principles of Stratigraphic Nomenclature Used by the Division of Oil and Gas.....	69
Recent Developments in the West Area of Edison Oil Field.....	83
Collection of Funds by Assessor and Financial Statement.....	93



TECHNICAL PAPERS

1973

Conservation is wise production and use

LYON CANYON OIL FIELD ^a

By *A. D. Stockton* ^b

INTRODUCTION

Lyon Canyon oil field is in the Santa Clara River Valley in northern Los Angeles County, California, adjacent to the towns of Newhall and Valencia to the east and north, respectively (Plate I). The field is in the western portion of Sec. 4, T. 3N., R. 16W., S.B.B. & M., three miles east of Pico Canyon, where, in 1876, the first commercial oil was produced in California. Access to the area is via the Golden State Freeway (Interstate Highway 5) or Lyons Avenue, which intersect within the field boundary. Production is from three wells drilled by MACPET and now operated by American Pacific International, Inc.

The field lies at the eastern end of the Ventura basin on the northeast flank of the Pico anticline, which trends northwesterly and is the predominant geologic feature in the area. Elevations range from 1,400 to 1,700 feet above sea level and the rugged terrain supports vegetation consisting of range grasses, live oaks and other semiarid plants.

The following illustrations accompany this report:

- Plate I. Location map
- Plate II. Contours on top of the Sixth zone
- Plate III. Contours on the base of fresh-water sands
- Plate IV. Cross section A-B
- Plate V. Production graph

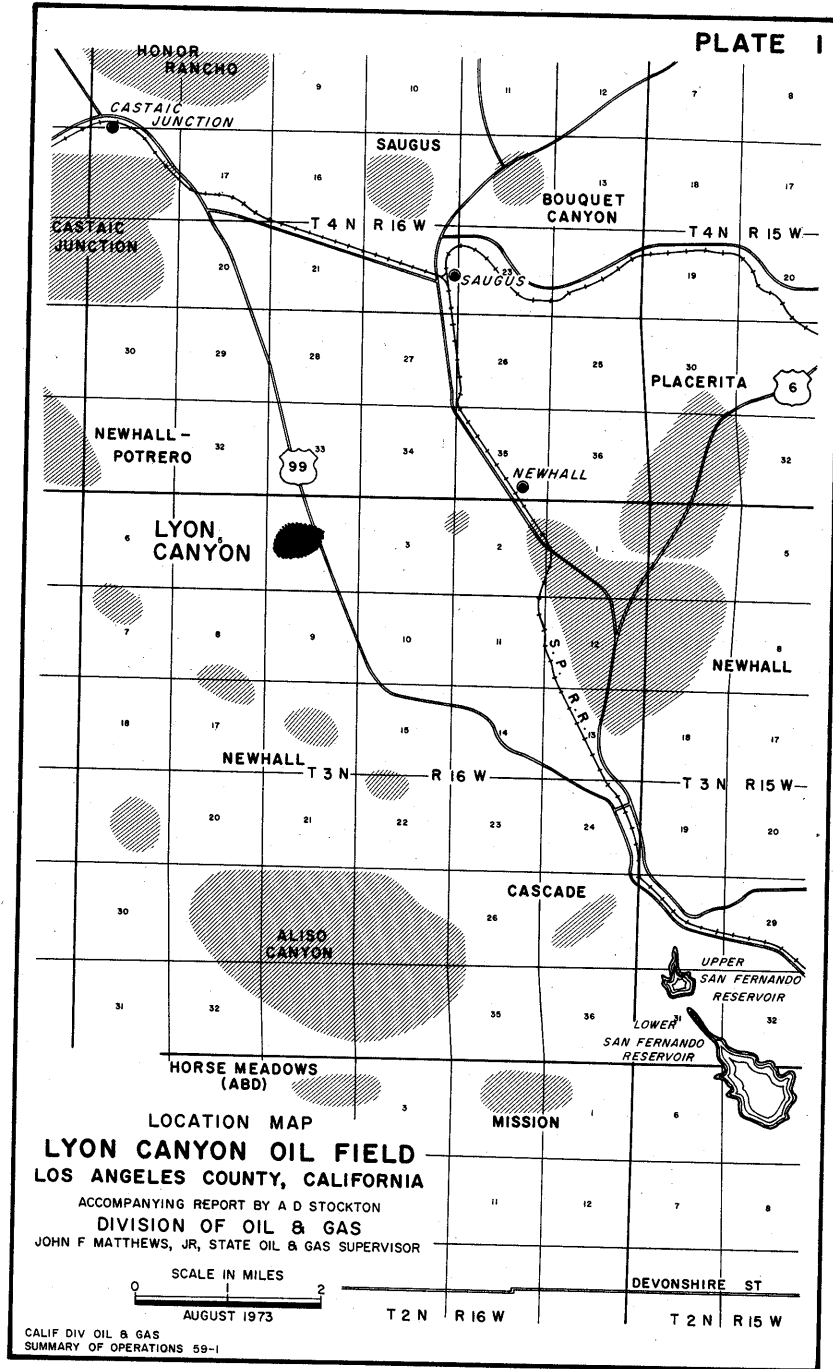
The author thanks E. D. Sherman, consulting geologist, for assistance in the preparation of this report.

HISTORY

Prior to the discovery of the field, only one well had been drilled in the immediate area. In 1922, Schroeder Oil Syndicate drilled well No. 1, in Sec. 4, to a depth of 2,785 feet, but apparently

^a Manuscript submitted October 1973

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no oil was found and the well was abandoned. After a lapse of nearly one-half century, Arrowhead Exploration Company (later MACPET) commenced drilling well No. 35X-4 on December 31, 1968. The well, now operated by American Pacific International, Inc., was drilled to a total depth of 10,930 feet. Several formation tests were conducted, and one interval from 9,860 to 9,865 feet flowed as much as 518 barrels of oil and 404 Mcf. of gas per day, with water cuts from 3 to 10 percent. On March 8, 1969, the discovery well was completed in the Seventh zone, (Modelo, upper Miocene) initially producing an average of 740 barrels of clean 33-degree gravity oil and 900 Mcf. of gas daily through jet perforations in the interval 9,700 to 9,840 feet.

After the discovery of the field, MACPET drilled six more wells. Two wells, (now operated by American Pacific International, Inc.) were completed flowing: 26X-5 from the Seventh zone and 24X-4 from the Sixth zone (Modelo, upper Miocene). The latter well, credited with discovering the Sixth zone, was completed January 5, 1970, and initially produced 100 barrels of 35-degree gravity oil and 160 Mcf. of gas daily, cutting 5 percent water from perforations between 9,180 and 9,225 feet. Well No. 36X-4 was drilled to the east and although shows were found in both the Sixth and Seventh zones, no commercial oil sands were found. The well was then redrilled downdip to the northwest to a more favorable stratigraphic position, but two of three drill-stem tests failed mechanically and the well was abandoned. The other four wells were dry holes; the last one, "Sorenson" 67X-5, was abandoned in July 1970.

GEOLOGY

Stratigraphy

The field is in the southeastern portion of the Ventura basin, where Miocene sediments were deposited on, and adjacent to, an Eocene bench to the east. On the bench, there is an overlap to the east and southeast by upper Miocene, Pliocene and Pleistocene deposits. The field is west of the bench in a depositional area. The Eocene platform is believed to be the source of much of the depositional material.

Modelo (upper Miocene), Towsley (upper Miocene—lower Pliocene), and Pico (Pliocene) strata to the south and east of the field exhibit onlap and wedging onto the Sespe delta bench, which, in turn, lies unconformably upon the lower Eocene rocks (Plate IV). To the east, there is an abrupt reduction of marine clastics of Miocene age on the Sespe delta, but to the west these clastic deposits thicken rapidly. The general stratigraphy of the area, together with the thickness and lithologic characteristics of the various formations encountered, is shown on Table 1. The total thickness of sediments penetrated is 12,400 feet.

Structure

The northwest-trending Pico anticline is the predominant structure in the area. This long, narrow, highly faulted fold terminates some two miles east of Lyon Canyon field and is in part overturned.

TABLE 1
STRATIGRAPHY AND LITHOLOGY
LYON CANYON OIL FIELD

Series	Formation	Oil zone	Average thickness (feet)	Lithology
Pleistocene	Saugus		4,500	Sandstone, fine-to coarse-grained, poorly sorted; mudstone, brown to buff; conglomerate. Nonmarine.
	-(unconformity)			
Pliocene	Pico		600	Siltstone, gray, soft to hard, poorly bedded, locally massive, interbedded with poorly sorted, gray sandstone, locally conglomeratic.
	-(unconformity)			
	Towsley		2,800	Mudstone, brown to red-brown, interbedded with fine-grained sandstone; sandstone, buff, poorly sorted, hard; conglomerate, brown, indurated.
	-(unconformity)			
upper Miocene	Modelo		4,500+	Sandstone, gray to dark-brown, fine-to coarse-grained, pebbly; siltstone, gray to gray-green to black, "biscuit" parting; conglomerate, brown to gray.
		Sixth		
		Seventh		

Regional compressional forces, which caused movement along the Santa Susana thrust fault to the southwest, also caused high-angle reverse faulting on the northeast flank of the Pico anticline. Structurally, Lyon Canyon field is a faulted homocline on the northeast limb of the Pico anticline (Plate II). Oil accumulations in the field are the result of updip pinchouts of sands and a barrier created by a high-angle reverse fault.

FRESH WATERS

Within the field boundary, the fresh water sands in the Saugus Formation extend from the surface to a depth of about 3,000 feet subsea. The base of the fresh water sands in the Towsley Formation is limited to the northeast by some type of hydrologic barrier (fault?) (Plate III).

Determination of the depth of the fresh water bearing sands is based on the concentration of the total dissolved solids (TDS) expressed in parts per million (ppm). The accepted* value of 2,500 ppm is used as the upper limit of TDS that can be present in fresh water. When this value is used in conjunction with a nomogram adapted from Meidav[†], the long-normal electric log resistance values of 30 ohm-meters, or above, represent fresh waters. Also, spontaneous potential (SP) values are used as a guide to pick the base of the fresh-water sands.

PRODUCING ZONES

Sixth Zone

The Sixth zone, where productive north of the fault, occurs at a drilled depth of about 9,200 feet and is composed of gray to dark-brown, fine-to coarse-grained, pebbly sandstone interbedded with gray siltstone. Net oil sand thickness is about 35 feet; the sands become shaly and pinch out to the south and east. Only one well, American Pacific International, Inc., No. 24X-4, has been completed in this zone, that is correlative with the Sixth zone in the Newhall-Potrero field. The initial zone pressure was 3,900 psi. The primary reservoir-drive mechanism was solution gas-expansion. Characteristics of the fluids from the zone are: oil, 32-degree gravity; gas, 0.735 gravity; water, 14,000 ppm sodium chloride. The initial production gas-oil ratio was 1,600 cu.ft./bbl.

Seventh Zone

The Seventh zone occurs at a drilled depth of about 9,750 feet and is composed of gray to dark-brown, fine-to medium-grained sandstone with thin stringers of gray to black siltstone. Net oil sand thickness is about 40 feet. The sandstone pinches out to the south

*Oral communications with the Los Angeles and Santa Ana Regional Water Quality Control Boards.

†Superior figures refer to list of references at end of this report.

and east. Two wells, American Pacific International, Inc., No. 26X-4 and No. 35X-4, have been completed in this zone. The initial flow pressure was 1,400 psi, and the final shut-in pressure, which had not stabilized, was 4,100 psi. The primary reservoir-drive mechanism was solution-gas expansion. Zone fluids are characterized by 36-degree gravity oil, 0.735 gravity gas, and 22,000 ppm sodium chloride water. The initial production gas-oil ratio was 1,215 cu.ft./bbl.

DRILLING AND COMPLETION PRACTICES

The three producing wells were directionally drilled and each well was completed within 48 to 80 days. The method of completion was to cement 10 3/4-inch surface pipe at about 1,000 feet with sufficient cement to reach the surface for pressure containment and hold-down for the Class IV blowout-preventer stack. A 9 7/8-inch hole was then drilled to total depth and 7-inch casing was run and cemented. After a water shut-off test was demonstrated above the zone, the casing was selectively perforated for production. All three wells were completed flowing; later, conventional rod pumping units were installed.

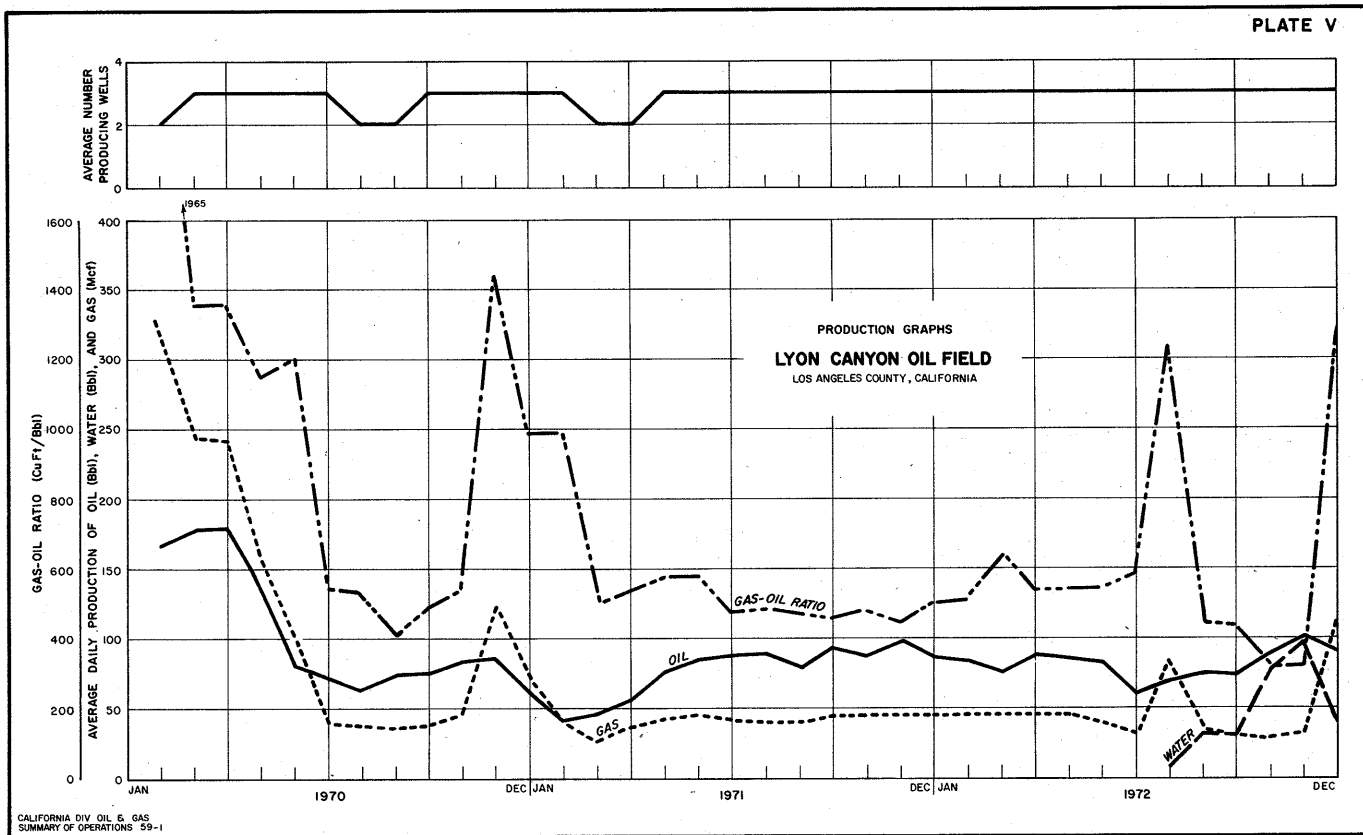
PRODUCTION

As of December 31, 1972, the cumulative production was 204,814 barrels of oil and 237,247 Mcf. of gas (Plate V). Gas reserve as of December 31, 1972 was 262,753 Mcf. Produced water is disposed of by trucking it to a disposal site. Yearly production is shown on Table 2.

TABLE 2

PRODUCTION STATISTICS LYON CANYON OIL FIELD

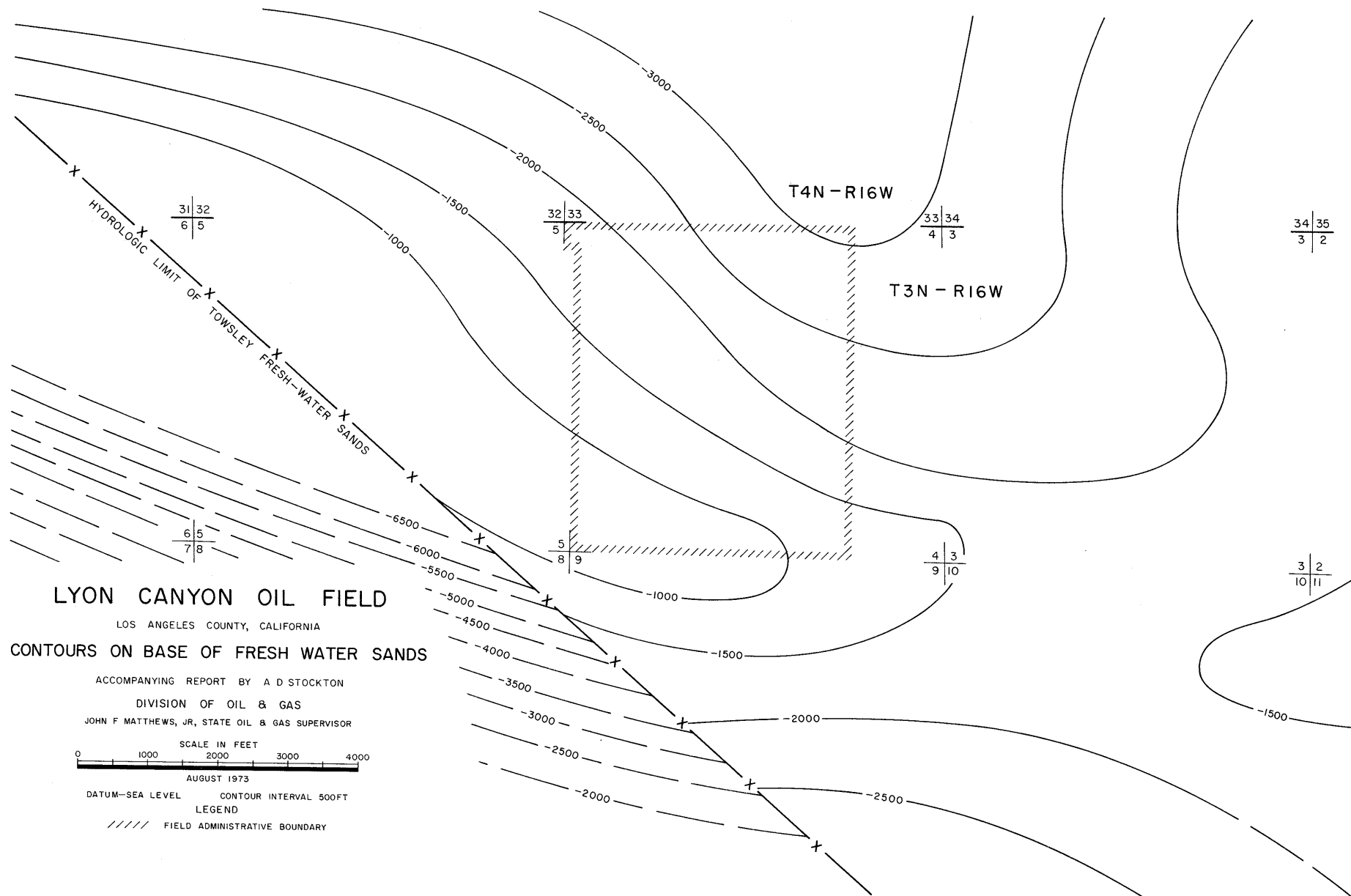
Year	Maximum number of producing wells	Oil (bbl.)	Gas (Mcf.)	Water (bbl.)	Percent water
1969.....	2	109,014	168,834	0	0
1970.....	3	37,732	41,315	0	0
1971.....	3	28,287	14,535	0	0
1972.....	3	29,781	12,563	9,994	25.1
Totals		204,814	237,247	9,994	



CALIFORNIA DIV. OF OIL & GAS
SUMMARY OF OPERATIONS 59-1

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LYON CANYON OIL FIELD
 LOS ANGELES COUNTY, CALIFORNIA
CONTOURS ON BASE OF FRESH WATER SANDS

ACCOMPANYING REPORT BY A D STOCKTON
 DIVISION OF OIL & GAS
 JOHN F MATTHEWS, JR, STATE OIL & GAS SUPERVISOR

SCALE IN FEET
 0 1000 2000 3000 4000

AUGUST 1973

DATUM—SEA LEVEL CONTOUR INTERVAL 500FT

LEGEND
 ///// FIELD ADMINISTRATIVE BOUNDARY

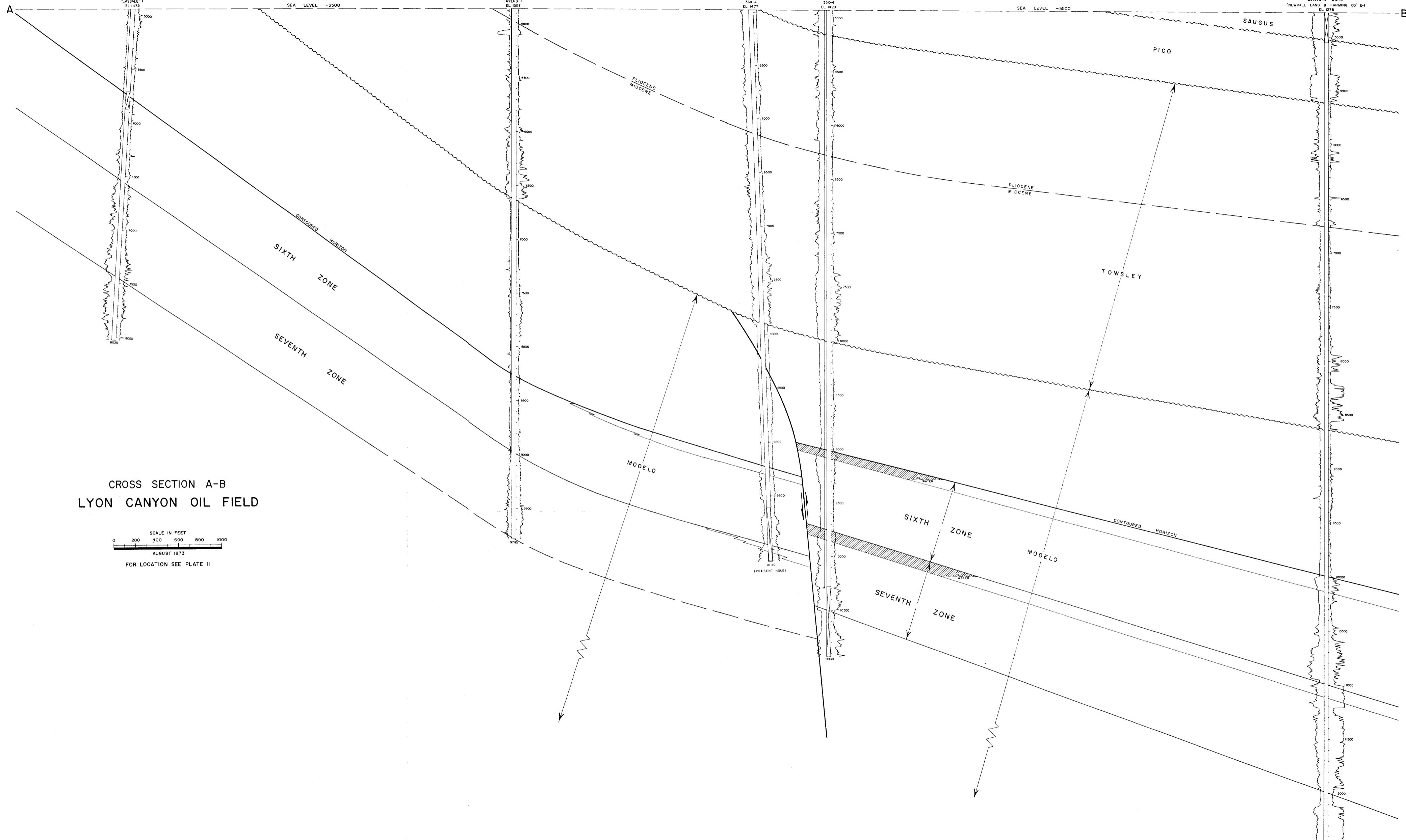
THE SUN DRILLING CO
"LASSALE" 1
EL. 1430

THE SUN DRILLING CO
"AYERS" 1
EL. 1300

AMERICAN PACIFIC INTERNATIONAL, INC
35X-4
EL. 1477

35X-4
EL. 1429

EXXON CORP
"NEWHALL LAND & FARMING CO" E-1
EL. 1278



CROSS SECTION A-B
LYON CANYON OIL FIELD

SCALE IN FEET
0 200 400 600 800 1000
AUGUST 1973
FOR LOCATION SEE PLATE II