

BROWN GEOPHYSICAL COMPANY
5300 BROWNWAY ROAD
HOUSTON 19, TEXAS

October 2, 1951

REPORT ON

ANTELOPE LAKE UNIT AREA

Lincoln County, New Mexico

Prepared for

Mr. L. G. Welsh

INTRODUCTION

This report is a condensation of a report filed for the confidential use of the U.S.G.S., at the time application was first made for the designation of the Antelope Lake Unit Area. That original report contained confidential data regarding an extensive area surrounding the proposed Unit Area. The writer will be glad to show and to discuss all these confidential data with the New Mexico Oil Conservation Commission and with the Land Commissioner, if requested.

Selection of this proposed Unit Area is the result of study of the gravity survey covering the entire southeastern quarter of New Mexico; and a correlation of that data with all available surface and subsurface geological information. These studies have been conducted by the writer during the last five years, and involve other prospects additional to this proposed Antelope Lake Unit Area, hence the writer's hesitancy to include such information in this file which is to be available to public inspection.

SOURCE OF GEOPHYSICAL DATA

Map 3 shows an index of Regional Gravity maps which the writer has compiled and owns. The intensive study of these data, in correlation with the known geologic structures within that area, furnish the experience and background drawn upon in predicting what geologic conditions will probably be found when the proposed Antelope Lake Unit Area is drilled; and in preparing the conclusions and recommendations contained in this report. Map 1, of this report, is a very small section taken out of this extensive regional gravity map. It shows the Bouguer Anomaly values, on U.S. Coast and Geodetic datum, at points where observations were made, and also shows contours of equal gravity values.

INTERPRETATIONS

From the regional gravity map, the writer has defined an area in excess of 1000 square miles as the "Arabella Basin". Part

of this basin is outlined in yellow on enclosed Map 1. It is the writer's conclusion that chances are 9 out of 10 that this basin will show considerable thicknesses of Devonian-Silurian and/or Ordovician, whereas the areas immediately surrounding the basin will have very thin sections or be devoid of these formations. Exact interpretation of Gravity Maps can rarely be made; and there is one chance in ten that this gravity indication results from densities in the basement rocks entirely, in which event there will be no basin found by drilling. Published studies of the Permian surface by Philip King definitely support the theory that such a basin exists. No deep wells have been drilled in locations which will prove or disprove the presence of such a supposed basin, hence there is no positive means of evaluating the subsurface conditions. Because of the thick limestone at the surface, seismic studies are extremely difficult or impossible. Exploratory drilling is the best present approach to evaluate the prospect.

Along the eastern edge of the basin a very strong gravity indication can best be interpreted as a fault zone in the basement surface, and probably also in the rocks immediately on top of the basement. The writer's interpretation of these indications are portrayed on Map 1.

Gravity generally permits determination of relative depths only. The cross-sections shown on Chart 2. were prepared in order to estimate reasonable depths and formation thicknesses, which probably will be found by drilling. Profile A-E is taken from a point about 15 miles north of Alamogorda, thence eastward across the mountains, through the wells shown, and terminates at the Cass Pool. Although these profiles are several years old, no new wells have been drilled in the areas west of Roswell. These profiles make use of the subsurface points established by drilled holes and by surface exposures, for positive information; and make use of suggestions contributed by the gravity as to the contours of the deep subsurface between known points. Profile F-G was developed in the same manner, crosses the proposed Unit Area, and provides the best available basis on which to predict depths at which the various formations will be encountered in the proposed test well.

CONCLUSIONS

The writer believes that if the proposed well is drilled, that basement will be encountered at 6500 feet or a less depth; that

there is excellent chance for petroleum accumulation to be encountered in structural traps typically found in connection with faulting, in any rocks encountered between the base of the Pennsylvanian and the top of the basement; that there is possibility of production from reef type formations or from pinch-out developments in the lower Permian or in the Pennsylvanian.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Hart Brown".

Hart Brown

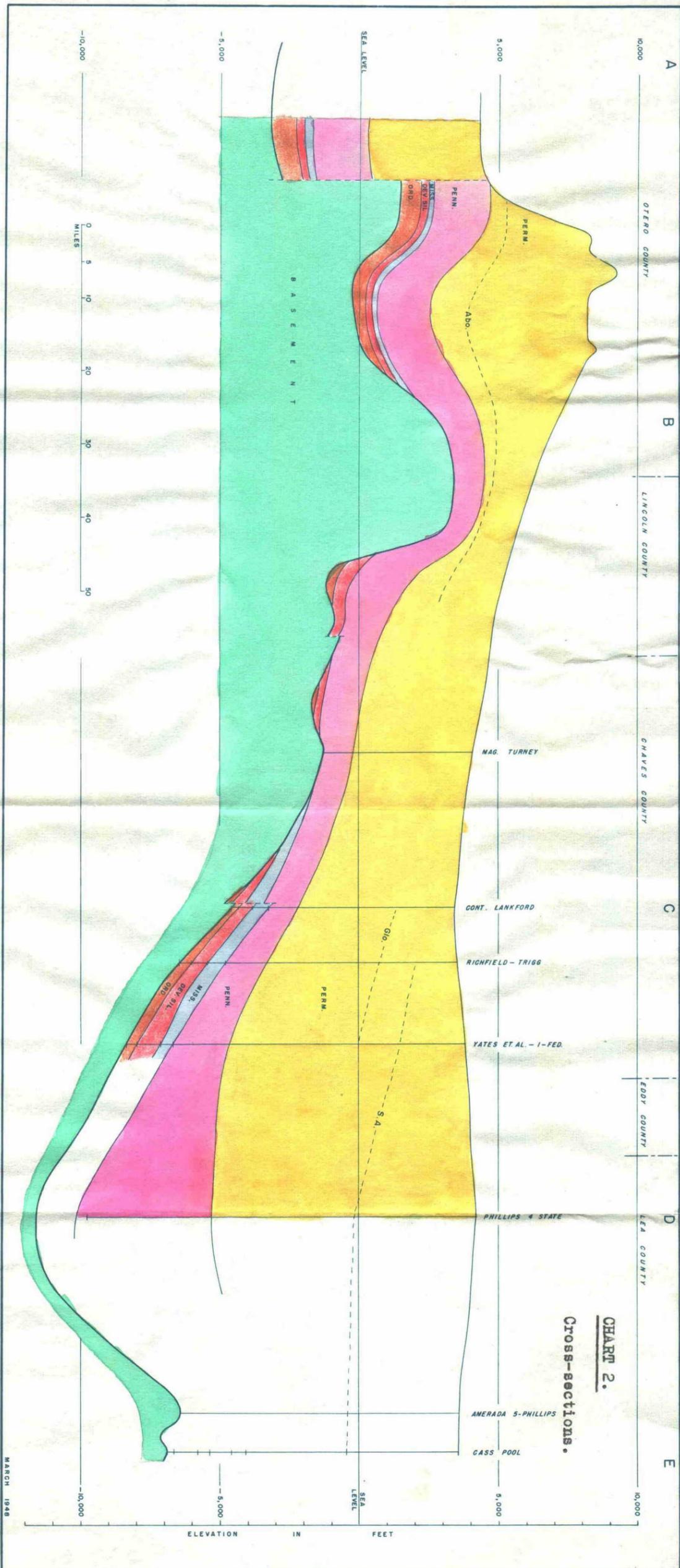
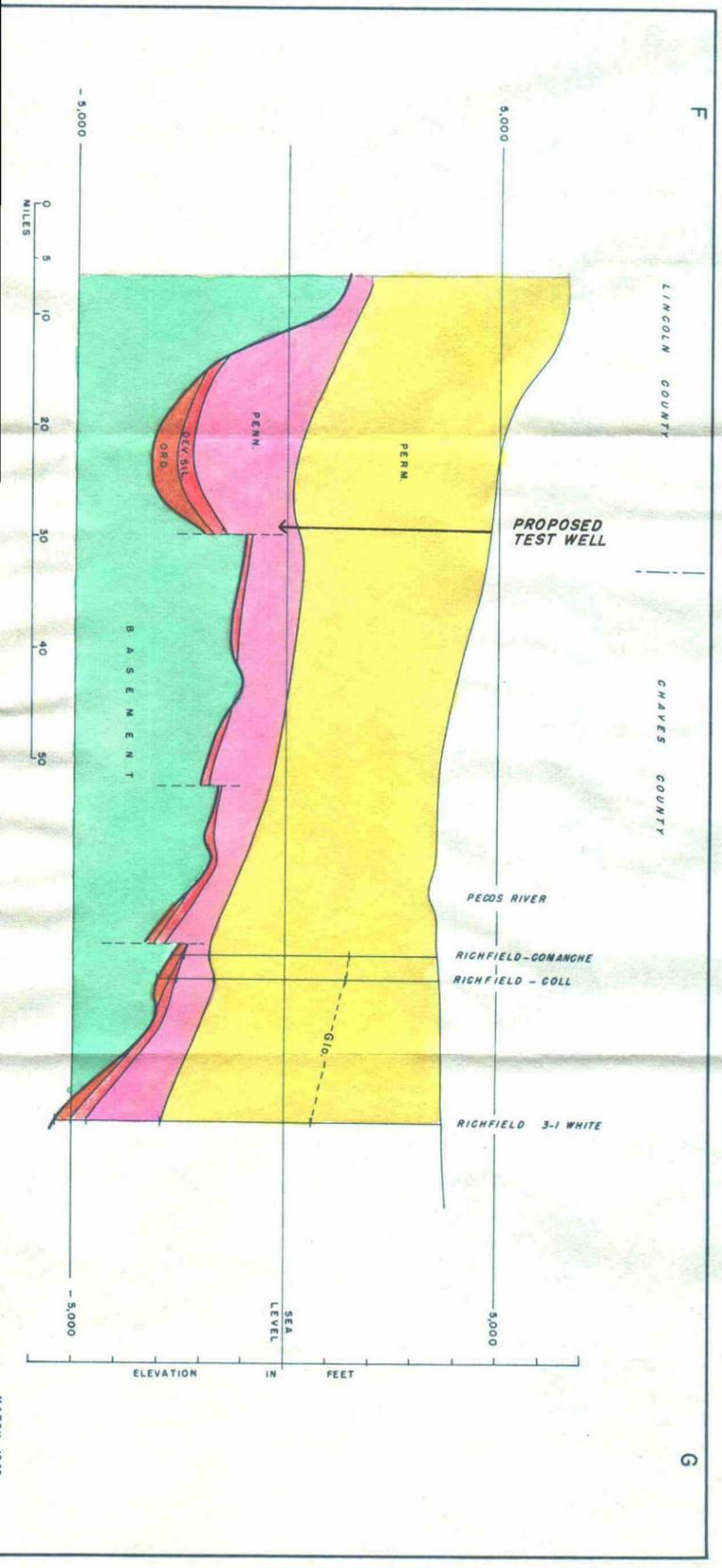


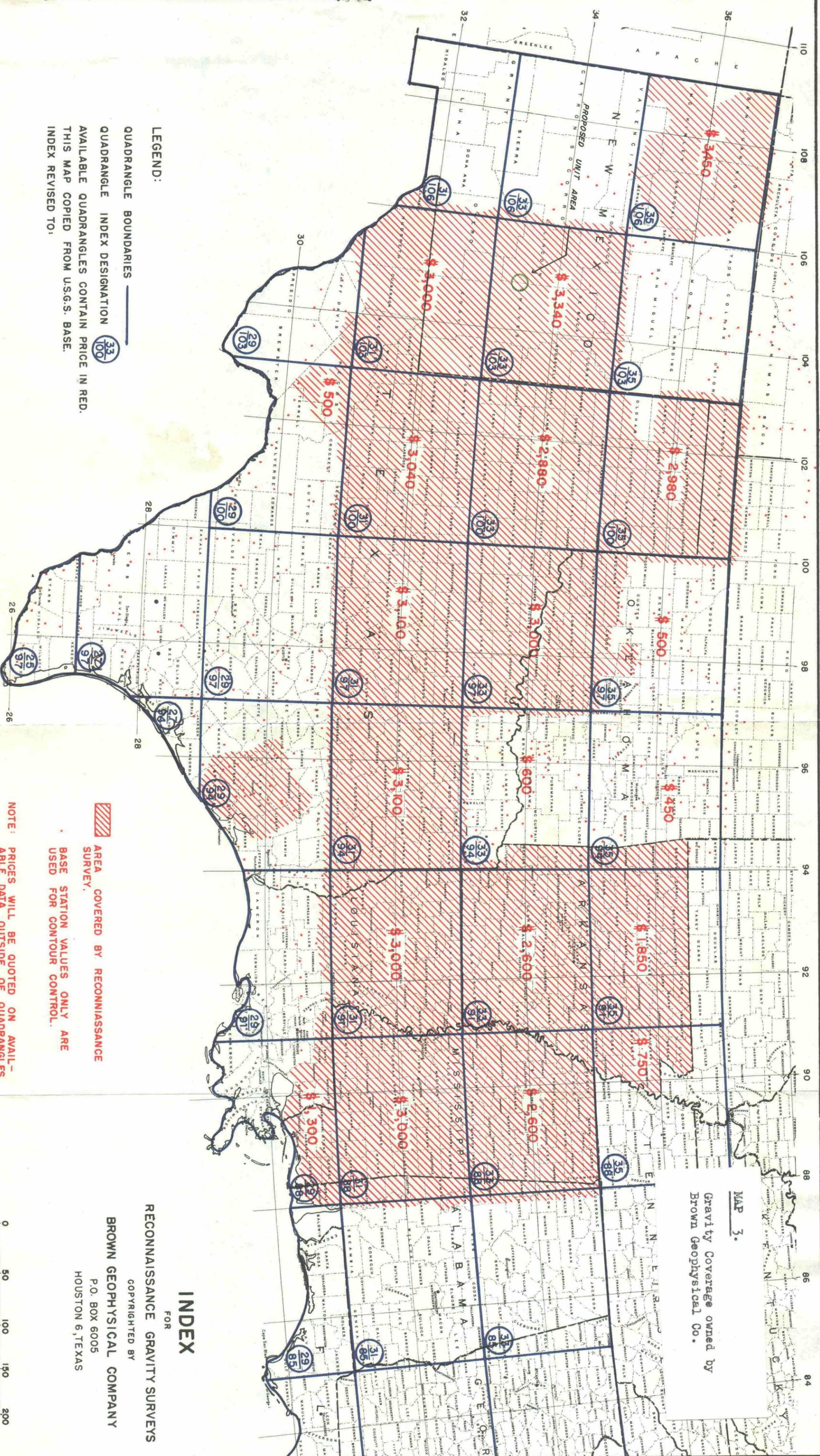
CHART 2.
Cross-sections.

MARCH 1948



ELEVATION IN FEET
 SEA LEVEL

MILES
 0 5 10 20 30 40 50



LEGEND:

QUADRANGLE BOUNDARIES ———

QUADRANGLE INDEX DESIGNATION (33/100)

AVAILABLE QUADRANGLES CONTAIN PRICE IN RED.

THIS MAP COPIED FROM U.S.G.S. BASE.

INDEX REVISED TO:

(Red hatched area symbol) AREA COVERED BY RECONNAISSANCE SURVEY.

(Red contour line symbol) BASE STATION VALUES ONLY ARE USED FOR CONTOUR CONTROL.

NOTE: PRICES WILL BE QUOTED ON AVAILABLE DATA OUTSIDE OF QUADRANGLES WHICH ARE PRICED HEREON.

MAP 3.
Gravity Coverage owned by
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INDEX

FOR RECONNAISSANCE GRAVITY SURVEYS

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