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PROGRESS REPORT ON PHOTOGEOLOGIC STUDIES IN THE CHANDLER RIVER AREA

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by

William P. Brosgé and Hillard N. Reiser

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Illustration

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INTRODUCTION

In November 1951 the Operating Committee recommended that the Grandstand, Big Bend, and Hawk anticlines be structure-contoured by photogeology preliminary to field work in those areas in 1952. The work has been divided into three stages.

1. All critical bedding traces appearing on the photographs were marked and points were picked to indicate where altitudes are needed to establish the dip and strike, as well as actual altitude of the beds. In addition to this, estimates of the angle of dip and of the stratigraphic interval between the traces have been made, and the beds have been numbered according to their relative stratigraphic position.

2. The second stage, to be done by the Trimetrogon Section of the Topographic Division of the Survey, is the determination of the altitude of the points picked in the first operation. This involves the setting up of a control net over the area by photoalidade, and the precise determination of the altitude of the picked points by Kelsh plotter and multiplex. Upon completion of this second stage the photographs will be returned to the Navy Oil Unit.

3. The final stage will consist of computing the strike and dip from the altitudes obtained by the Trimetrogon Section, computing the exact stratigraphic intervals between the traces and compiling a structure-contour map from this information.

All of stage one is completed; all traces have been marked and points picked. Of stage two, the work being done by the Trimetrogon Section, almost all the control has been shot into the area, but the altitude determinations on Grandstand, the first of the three anticlines scheduled, will not be completed until the first of May. This will preclude having the structure contouring of any but the Grandstand anticline completed in time for the field season.

In order to have some information available on the Hawk and Big Bend anticlines for the use of the field geologists in the coming field season, a set of preliminary structure maps has been compiled.

The planimetry of these maps is an uncontrolled mosaic made by tracing the streams, bedding traces, faults and structural axes directly from the annotated photographs. The field geologist will be able to compare this interpretation directly with his own photographs. Dashed structure contours have been added to the maps on the basis of information at hand. The estimates of stratigraphic intervals originally made in order to number the traces systematically have been used again for contouring. Estimates of the dip are inherent in these thickness estimates. Lines of section on the maps show the location of the critical stratigraphic intervals. The altitudes above sea level of points on bedding traces have been estimated by comparison with altitudes from field surveys and from the photoalidade control net. Wherever possible, elevations have been estimated by interpolating or extrapolating stream gradients. It is felt that these preliminary maps, although quantitatively inexact give a fair picture of the structures, and that the addition of the accurate data determined by the Trimetrogon Section will not alter the general shapes shown. One copy of each of these maps will be available to the Operating Committee at the April meeting.

The final photogeologic map of the Grandstand anticline should be finished in time for use by the field geologists. Therefore, no full-scale map of the photo-interpretation of Grandstand has been drawn. However, at the time the Grandstand well was located, several trial sections were drawn across the structure at the larger rivers. From these sections a pair of full-scale preliminary contour maps of the structure near the proposed well location were drawn. Lack of control near the axis on the west bank of the Chandler River made it necessary to project beds from the flanks to the axis there. These projections indicated an axial fault west of the river for which there was no apparent evidence on the photographs. Therefore, two maps were drawn, one showing the axial fault, and the other with the fault eliminated by smoothing out the dips on the south flank, the apparent upthrown block. The faults east of the river, which are indicated by field evidence, by apparent discontinuities of traces on the photographs and by structural interpretations as shown on two other cross sections, are shown on each map. The contour map that shows the axial fault interpretation accompanies this report. In the simpler version the 2,400-foot contour would appear on each side of the axis just west of the Chandler River.

HAWK ANTICLINE

The preliminary maps show Hawk anticline to be a small simple structure with 600 feet of closure. It is a minor fold on the north flank of the Okpikruak anticline. At the Chandler River the structure flattens and merges with the monoclinal north dips of the major structure. The horizon contoured is about 350 feet above the base of zone E, as shown by fossils.

BIG BEND ANTICLINE

Big Bend anticline has an over-all closure of 1,000 feet. The contoured surface has an elevation at the axis of 1,600 feet at the Tuluga River, 2,600 feet just west of the Chandler River, and 600 feet at Nimuluk Creek. A second high of about 1,400 feet near Nimuluk Creek is separated from the Chandler high by a 1,100-foot saddle. Deep grabens are at each high at the axis; at the saddle there is a horst at the axis. Apparently the east end is the only unfaulted part of the structure. The contoured horizon is about 800 feet below the Ayiyak conglomerate (top of zone E) mapped in the field at Nimuluk Creek.

GRANDSTAND ANTICLINE

As indicated by the preliminary contours Grandstand anticline plunges west from the Tuluga River to the Ayiyak River. This plunge is interrupted and the axis offset by a cross fault just east of the Chandler River valley. The valley is on the downthrown block of this fault. Closure near the well site there would be against this cross fault and against the possible axial fault. At the Tuluga River the axis is again offset, probably by a cross fault or by a sharp flexure. The sections drawn indicate no east plunge toward the Anaktuvuk River.

In addition to the work on the structures it has been requested that a photo-measurement be made of the stratigraphic interval between the base of zone B at Tuktu Bluff and the beds exposed on Grandstand anticline. The photo work has been completed and computation of thickness awaits the determination of altitudes. The traverse was made around the west end of the Ayiyak syncline and Hawk anticline and ties into zone E of the measured section at Tuktu Bluff. According to the estimate of thickness along this traverse the contoured horizon at Grandstand anticline is about 4,700 feet above the base of zone B. The proposed location of Grandstand Test well No. 1 is 2,600 to 3,000 feet, depending on structural interpretation, above the base of zone B. However, the contoured horizon (approximately the base of zone E) has been correlated in the field with the contoured horizon at Hawk anticline, which is only 3,900 feet above the base of zone B. This correlation is borne out by the similarity of lithologic sequences on the photographs. Accurate elevations along the traverse are necessary to determine where the 800-foot discrepancy lies, or whether it really exists.