LATE CENOZOIC GEOLOGY OF THE LOWER SAFFORD VALLEY--A PRELIMINARY REPORT

By

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INTRODUCTION

The lower Safford Valley, as here defined, includes the intermontane trough drained by the Gila River from Fort Thomas, about 20 miles northwest of Safford, to Coolidge Dam where the Gila River leaves the basin through a gorge carved into the Mescal Mountains. It also includes the lower reach of the San Carlos River between its confluence with the Gila and the town of San Carlos. Late Cenozoic terrestrial sediments occur in the lower Safford trough to an unknown depth, and form a relatively soft valley fill which is cut by a well-defined pediment surface. Subsequent downcutting has resulted in an intricately dissected badland topography over most of the area. In the vicinity of the San Carlos Reservoir, lava flows are interbedded with the basin sediments and a number of small basaltic plugs have intruded the basin fill.

It is emphasized that the data presented herein are largely drawn from field inferences and are as yet unsupported by laboratory or office work.

SEDIMENTATION

The valley fill is composed of fine-grained sand, silt, clay, and limestone, lying nearly horizontally or with a gentle primary dip toward the valley axis. Previous workers (Schwennesen, 1919, Knechtel, 1937) described these beds as lacustrine in origin but differed in their interpretations of the relationship of coarse gravels on the valley margin to the fine-grained sediments in the center of the valley. Both writers correlated all or part of the beds with the Gila conglomerate of Gilbert (1875). Van Horn 1957) concluded that the beds of the upper Safford Valley are lake deposits.

The sediments are generally reddish-brown, fine sand to clay sized, well bedded and discontinuous laterally. Irregular lens-shaped units indicate deposition in intermittent, isolated bodies of water. Cross-stratification is rare and gently inclined. Calcium carbonate content in the valley fill is locally extremely variable but generally increases downstream. Thin plates of marl in the vicinity of Fort Thomas give way to hard limestone interbedded with silt at San Carlos Reservoir. Evaporites are common in the clay beds.

On the north side of San Carlos Reservoir extensive vulcanism has influenced sedimentation. Beds in this area are whitish and contrast sharply with the reddish-brown beds of the rest of the valley. Total thickness of this "white" facies is approximately 1000 feet. Tuff beds occur sporadically throughout the section, increasing in frequency upward and culminating in thick sequences of coarse pyroclastics and lava flows. Those in the lower part of the section are well stratified and probably waterlaid; in the uppermost beds, around The Triplets, impact structures 4-6 feet deep indicate a moist condition of the sediments at the time of eruption. Although some sand occurs, sediments north of the reservoir are predominantly limestone and limey silt and clay. A lateral transition into the "red" facies occurs about ten miles east of the San Carlos.

A number of green carbonaceous clay zones and a bituminous limestone attest to the intermittent existence of paludal environments of deposition. Fossil plant stems are common in situ in the "white" facies, and detrital remains of reed-like stems are abundant. Diatoms collected near Fort Thomas are described as typical of a warm, saline lake environment (Knechtel, 1937, p. 200).

The coarse gravels along the flanks are believed to be partly continuous and

interfingering with the lake beds, as described by Knechtel, and partly overlying them. At Fort Thomas fine silt and clay are observed to lap against the Gila Mountains and to be overlain by alluvial gravels. A similar situation is described (Bromfield and Shride, 1956, p. 626) north of San Carlos, A sheet-like cap of Pleistocene(?) gravel covers the pediment surface.

Remnants of an ancient pedimented surface are preserved beneath the lava flows north of Coolidge Dam. This surface does not slope toward the Gila, but rather toward the San Carlos; similarly, primary dips of beds in this area are toward the San Carlos. These attitudes are interpreted as being remnant from slopes established at a time before the Gila began to flow through its present gorge in the Mescals. Such an interpretation accords with other recent evidence which may indicate a former course of the Gila through the present San Carlos valley.

STRUCTURE

The valley floors of the Gila and San Carlos Rivers are believed to be down-faulted blocks (Bromfield and Shride, 1956, p. 629). Post-lake bed faults parallel the valley trends and indicate the movement may be continuing. Lake beds on the flank of the Mescal Mountains near Coolidge Dam are tilted 15-23° southward, the direction in which the mountain structure dips. A boundary fault is traceable for approximately four miles along the mountain front in this vicinity. At the confluence of the Gila and San Carlos Rivers large (1/2-2 mile) blocks of white limestone stand above the surrounding pediments which are cut on sediments of the "red" facies. Small blocks of red silt and clay are faulted against the limestone which outcrops in all three angles of the confluence. Pedimented sand and clay along the east side of the San Carlos are separated from the "white" facies farther eastward by a N25W-trending fault zone which closely parallels the lower reach of the San Carlos. North of the reservoir, several basaltic plugs have deformed the lake beds and are flanked by folded and thrusted sediments. Relative downward displacement of beds toward the axis of the valley is evident in the large blocks of limestone and pyroclastics in this vicinity.

Correlation within the areas north of the Gila, south of the Gila, and west of the San Carlos is made possible by three extensive tuff beds. No correlation, however, has been achieved between the three areas. This lack of continuity and the difference in aspect between beds on opposite sides of the Gila are taken as evidence of differential movement along the valley axis.

At least four major episodes of lava flows are preserved in the limey beds against the Gila Mountains. The source of the flows is not known, but is presumed to have been associated with major structural breaks. Several diatremes occur in the lake beds from the town of Bylas westward to the San Carlos. (See Diatremes and a ring intrusion on the San Carlos Indian Reservation, p. 124 this volume). A crude alignment of diatremes and the concentration of intrusives in the "white" facies area suggest a deep structural zone of weakness. A thick sequence of extremely coarse pyroclastics occurs high in the section near The Triplets, a large intrusive plug, and may indicate one source of extrusion.

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