

THE VELOCITY OF ELASTIC WAVES
IN SOME PALEOZOIC FORMATIONS
IN THE VICINITY OF SAINT LOUIS, MISSOURI

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Chapter

by
Previous Work.
Acknowledgments.

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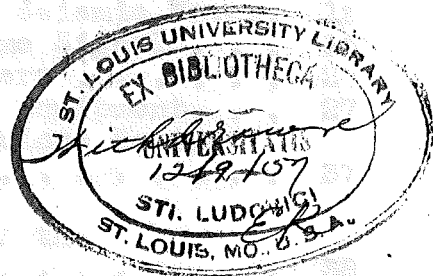
The School Department.
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The Firing Time
The Solarimeter
The Recording
The Computation
rent

Field Parallel of
Equipment.

The Profile
The St. Peter Sandstone
The Josephine Schist
The Elmerian Limestone

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CHAPTER I

INTRODUCTION

Objectives

The departures from homogeneity in the outer layers of the earth's crust make it necessary to examine the layers one by one if we are to gain information about the structure and elastic properties of this portion of our earth.

The outer crust varies widely from place to place over the earth and each locality presents a problem in itself. The general picture of the structure underlying Saint Louis, Missouri, has been derived from the study of near earthquakes by Walter (66)* and Birkenhauer (62), but no study of the velocity characteristics of the individual sedimentary layers has been made. In places where a thick series of sediments overlies the granitic layer, as in the Saint Louis vicinity, the characteristics of these sediments can affect the earthquake waves that are recorded at seismographic stations of the region (59, p.227).

The primary purpose of this investigation was the determination of the velocity with which explosion-generated elastic waves are propagated through various rock formations in the region around Saint Louis.

*For this and other references to authors and their works, see Bibliography.

The principle interest of the research was in the condensation-rarefaction type (P type) wave. It was originally hoped that it would be possible to positively identify shear waves on the records obtained, and to thus obtain values for the velocity of these waves, but it soon became obvious that the difficulties involved in such an identification were great enough to warrant a research project on this subject alone, and attention was turned to the P waves entirely. Undoubtedly one of the reasons that shear waves were not identifiable was the short profiles that were employed in the investigation.

There are a great number of Paleozoic formations outcropping in the vicinity of Saint Louis. Of these, the following were selected for the investigation, first because they are representative of the consolidated strata, each of which is homogeneous and dated sediments of the region, and secondly because of the availability of good exposures of these particular formations for seismic work: the St. Peter sandstone, the Joachim dolomite and the Kilmswick limestone; all of Middle Ordovician age; the Saint Louis limestone of Mississippian age, and the Cherokee shales of Pennsylvanian age. The details of the lithology of each of these formations will be discussed subsequently as the individual profiles are taken up.