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COMPLETED AND PLANNED STUDIES
OF A RULISON CORE SAMPLE

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INTRODUCTION

LRL has been asked to study the results of the Rulison gas-stimulation experiment. As a part of this study and as a step toward understanding the chemical composition and radioactivity of the Rulison gas, we are characterizing the rock that was near the nuclear explosive before it was detonated.

We have received from the Austral Oil Company a set of rock samples that were cut from a core sample taken from the Rulison emplacement hole. The purpose of this report is to outline the measurements that we plan to make on these samples. We ask for suggestions of other measurements that would contribute to the understanding of the Rulison experiment. This report also lists all of the information on the core sample that we have been able to obtain (see Table 1). If additional measurements have been made or are planned, please let us know. We intend to circulate the results of our measurements.

Table 1. Measurements that have been made on the Rulison core sample.

Measurement	Sample depth ^a (ft)	Worker	Agency ^b	Date
Semiquantitative spectrochemical analysis	8456 to 8502 ^c	Harris	USGS	November 1968
Quantitative chemical analysis of major components and of H ₂ O, CO ₂ , and lithium	8456 to 8502 ^c	Stead	USGS	December 1968
Quantitative chemical analysis of H ₂ O, CO ₂ , boron, carbon, calcium, hydrogen, lithium, and magnesium	8406 to 8451	Hill	LRL	December 1969
Physical properties, porosity, permeability, etc., and lithological description	8400 to 8462	Wilkenson	CLI	January 1969
X-ray diffraction to measure the calcite/dolomite ratio	8406 to 8451	Braun	LRL	March 1970
Mercury analysis	8442	Stead	USGS	October 1970

^aAll depths in this report were measured from the kelly bushing.

^bUSGS = U. S. Geological Survey, CLI = Core Laboratories, Inc.

^cThese samples were taken from the Rulison exploratory hole (R-EX), but our records do not indicate that the core sample was taken as deep as 8502 ft.

DESCRIPTION OF OUR SAMPLES

The Rulison emplacement hole (R-E) was cored between 8400 and 8462 ft in three continuous cores, each about 20 ft long and 4-3/8 in. in diameter. Our samples were cut parallel to the axes of these cores in order to get representative samples. They are 2 to 8 in. long and are 1 to 2 in. thick at the widest part. A general lithological description of each section of the cores from which our samples were cut has been made by Core Laboratories, Inc. Table 2 lists the depths from which our samples came.

PLANNED MEASUREMENTS ON OUR SAMPLES

We do not intend to make all of the following measurements on all of our samples. We must find, by preliminary measurements on samples from closely spaced regions of the core sample, how many samples must be measured to estimate meaningful averages. This information will also serve as a guide to sampling the sites of future shots in

similar complex formations of interbedded shales and sandstones.

Table 2. Depths of our samples.^a

Core No. 1	Core No. 2	Core No. 3
8400.0	8420.0	8442.5
8400.5	8420.5	8443.5
8401.5	8421.5	8444.5
8402.5	8422.5	8445.5
8403.5	8423.0	8446.5
8404.5	8423.5	8447.0
8405.5	8424.5	8447.5
8406.0	8425.0	8448.7
8406.5	8425.5	8449.5
8407.5	8426.5	8450.0
8408.5	8427.5	8451.0
8409.5	8428.5	8451.5
8410.0	8430.5	8452.5
8410.5	8431.5	8453.5
8411.5	8432.5	8454.5
8412.5	8433.5	8455.5
8413.5	8434.5	8456.0
8414.5	8436.5	8456.5
8415.5	8437.0	8457.0
8416.5	8437.5	8458.0
8417.5	8438.5	8458.5
8418.5	8439.0	8459.5
8419.5	8440.0	8460.5
8420.5	8440.5	8461.0
	8441.5	8462.0
	8442.0	

^aAs measured from the kelly bushing. The shot point was at 8441 ft.

1. Chemical analyses (J. H. Hill).
 - a. Total carbon.
 - b. Carbon in carbonates.
 - c. Total hydrogen.
 - d. Hydrogen in water.
 - e. Major elements.
 - f. Boron, lithium, mercury, and rare elements.
2. Physical measurements (D. O. Emerson, R. L. Braun, I. Y. Borg, and D. R. Stephens).
 - a. Grain size and shape and a general petrographic description.
 - b. Carbonate mineralogy.
 - c. Carbonate/quartz ratio.
 - d. High-pressure equation of state.
 - e. Grain and bulk density and effective porosity.
3. Heating experiments (J. H. Hill and R. W. Taylor).
 - a. Amount, composition, and rate of evolution of gases from Rulison rock as a function of temperature (50 to 1250° C) and pressure (1 to 200 atm).

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