

Progress and Preliminary Results of the  
Study of the Sediments of Rongelap Lagoon

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1. Size analysis by sieving (coarse fraction) and settling (fine fraction) has been completed on top, middle and bottom segments of the 71 cores obtained from the lagoon in September 1959, and on the 32 samples of unconsolidated Beach Rock (i.e. beach sand) obtained from Kabelle Island.
2. These analyses yielded data which were punched on IBM cards and fed into a 650 computer which calculated statistical parameters for each sample. The parameters include:
  - Mean particle size
  - Sorting coefficients
  - Skewness measures
  - Kurtosis measures

Various plots of these parameters have been made in an endeavor to discover sample groups which indicate distinct sediment types. In the event that such types exist, their areal distribution will be plotted so that relationships between sediment type and causative factors may be discerned.

Sorting has been plotted against mean particle size. This plot shows beach sand as belonging to a distinct and separate sediment type having a mean particle size of about  $1/2$  mm. and exhibiting quite good sorting. Within this sediment type the sorting improves with decreasing average particle size.

The bulk of the middle and lower segments of the lagoon core samples show a mean particle size of about  $1/3$  mm. with considerably poorer sorting. These samples also exhibit an increase in sorting with decrease in average particle size. The top inch of the cores show much more variation in these parameters. Many samples have mean particle sizes between 2 and 4 mm. and show sorting almost as good as in the beach material. A preliminary interpretation of these observations is that the sediments at the water-sediment interface are of

a type different from the sediments at depth.

The percentages of silt, sand and larger than sand-sized components of each sample have been plotted on a triangular coordinate composition diagram. There is little to note except that the sediments at depth shows a tendency to be distinct from the sediment at the water-sediment interface as regards size components.

The 5, 16, 25, 50, 75, 84 and 95 percentiles were plotted on a probability scale versus size on a logarithmic scale in order to compare the samples for possible gross classes of log-normal size distributions. Only a very vague separation into 4 classes of sediment distribution is indicated.

3. The sediment samples have been examined to determine their gross compositional nature. Several sediment types were observed:
  - Halimeda sand
  - Foraminiferal sand
  - Shell sand
  - Beach foram. fauna sand
  - Sand with pink grains
  - Coral

These sediments were plotted on a chart of the lagoon to determine their areal distribution (see attached chart). The sediment pattern seems to be most closely related to the bathymetry of the lagoon and to the prevailing swell direction.

4. The coarse fractions of the samples analyzed for size have been examined under a microscope. Grain counts of 20 constituents were made. Percentage composition values for each sample are being calculated.

5. The gross beta activity of the top two one inch increments has been determined. Samples from the northern end of the atoll have, in general, more activity than those from the south. Analysis of radiation data relative to types of bottom sediments remains to be done.

Vertical distribution has been determined for 26 samples to a maximum depth of 35 inches. Radioactivity is primarily in the top two inches. The picture is not as clear cut as for the soils probably due largely to the fact that the levels of radiation in the bottom samples are low (maximum 127 c/m for a 1 gm sample counted with 30% efficiency).

Low level beta counting of the fine fractions is in progress and thus far indicates that most of the activity is associated with the fines.

Gamma ray spectra indicate the presence of  $Ce^{144}$  and  $Eu^{155}$  and none of the higher energy gamma emitters, <sup>except  $Ru^{106}$ ,  $Rh^{106}$  and  $Co^{60}$</sup>  Chemical separations will be necessary before precise identification and quantification can be made. Since this will require pooling of samples, the chemical separations have been deferred pending completion of beta counting.

Beach rock samples show no radioactivity above background.

