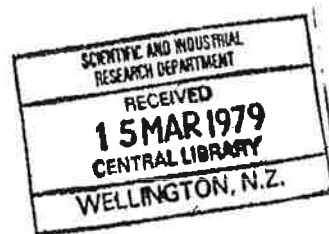


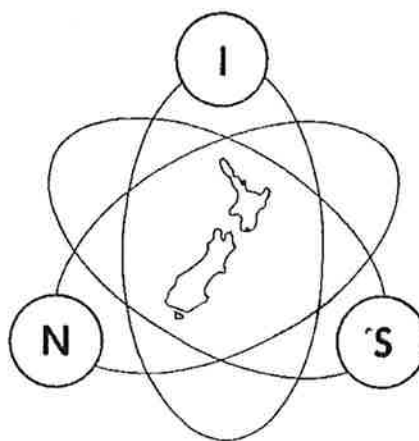
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# SEDIMENTATION RATES MEASURED BY LEAD-210 METHOD ON A LAKE TAUPO CORE

by  
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## INSTITUTE OF NUCLEAR SCIENCES

Department of Scientific and Industrial Research

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LEAD-210 METHOD ON A LAKE TAUPO CORE

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SUMMARY

At the position sampled the overall sedimentation rate was measured as  $0.26 \pm 0.03 \text{ kg/m}^2/\text{yr}$ . The results, however, could be interpreted as showing a change in sedimentation rate in the mid-1940's from  $0.18 \pm 0.02 \text{ kg/m}^2/\text{yr}$  to  $0.30 \pm 0.03 \text{ kg/m}^2/\text{yr}$ .

Sediment Core of Lake Taupo1. Description -General:

The sample consisted of one-half of a core cut longitudinally. The core diameter was 3.25 cm and the length 71 cm. The fine sediments were light green-gray with fine bands of lighter colour.

Location:

Fig. 1 - L. Taupo. N.Z.M.S18. Sheet 8. Taupo.

G.R.313159. Date: November 1972.

Water depth: 100 m approximately.

Method of coring: Drop corer.

2. The Lead-210 Dating Method -

This method was first detailed by Goldberg (1963) who showed how the daughter products of radium could be used for dating sedimentary materials. Koide et al. (1972) summarised work done to that date on a variety of sedimentary systems and which has lead to an acceptable dating method.

Radon-222 (half-life of 3.8 days) in the atmosphere decays through several steps to lead-210 ( $t_{\frac{1}{2}} = 22$  yr). This latter is removed by rain from the atmosphere and in a few days is sedimented out from any holding water bodies such as lakes. This is referred to as "unsupported" lead and can be distinguished from "supported" lead existing in equilibrium with its parent radium in the sedimentary material.

The time span of the method is approximately 100 years.

3. Method of Analysis -

The core was separated into approximately 1 cm lengths which were then dried and weighed. The samples were leached for one hour in hot 6N hydrochloric acid with lead carrier present. Lead was recovered from the solution by coprecipitating lead phosphate with iron hydroxide. Repeated precipitations are required to produce a chloride free lead phosphate precipitate. The addition of sulphuric acid produces an essentially iron and phosphate free lead sulphate precipitate. Final purification is achieved by dissolving the precipitate in 1.5M HCl and loading this onto an anion exchange column (Dowex AG1-X8). The lead is removed with water, precipitated and weighed as lead chromate.

Approximately a month is allowed for the ingrowth of bismuth-210, the 5-day half-life daughter of lead-210, before  $\beta$  counting.

4. Results - TABLE 1.

Layer (from top)	Total Pb-210 dpm/g	Cumulative weight g	"Unsupported" Pb-210 dpm/g	SD
1	4.47	1.70	3.57	0.12
2	3.39	4.72	2.49	0.12
3	2.75	7.08	1.85	0.13
4	1.95	9.50	1.05	0.14
5	1.58	12.36	0.69	0.13
6	1.09	15.41	0.19	0.12
7	0.92	18.62	0.02	0.12
8	0.95	21.81	0.05	0.13
9	0.81	} mean 0.90 $\pm$ 0.11		
10	0.82			
11	0.85			
12	1.07			
13	0.95			

The data from Table 1 are plotted in Fig. 2. A best fit of a single line through the points gives an overall sedimentation rate of  $0.26 \pm 0.03 \text{ kg/m}^2/\text{yr}$ . However, a possibly better interpretation of the data is that a rate of  $0.18 \pm 0.02 \text{ kg/m}^2/\text{yr}$  existed before the mid-1940's and that the rate has more recently been  $0.3 \pm 0.03 \text{ kg/m}^2/\text{yr}$ .

#### References

- Goldberg, E.D. 1963. Geochronology with Lead-210. Radioactive Dating. International Atomic Energy Agency, Vienna. IAEA STI/PUB/68, pp 121-131.
- Koide, M., Soutar, A. and Goldberg, E.D. 1972. Marine Geochronology with Lead -210. Earth and Planetary Science Letters 14: 442-446.



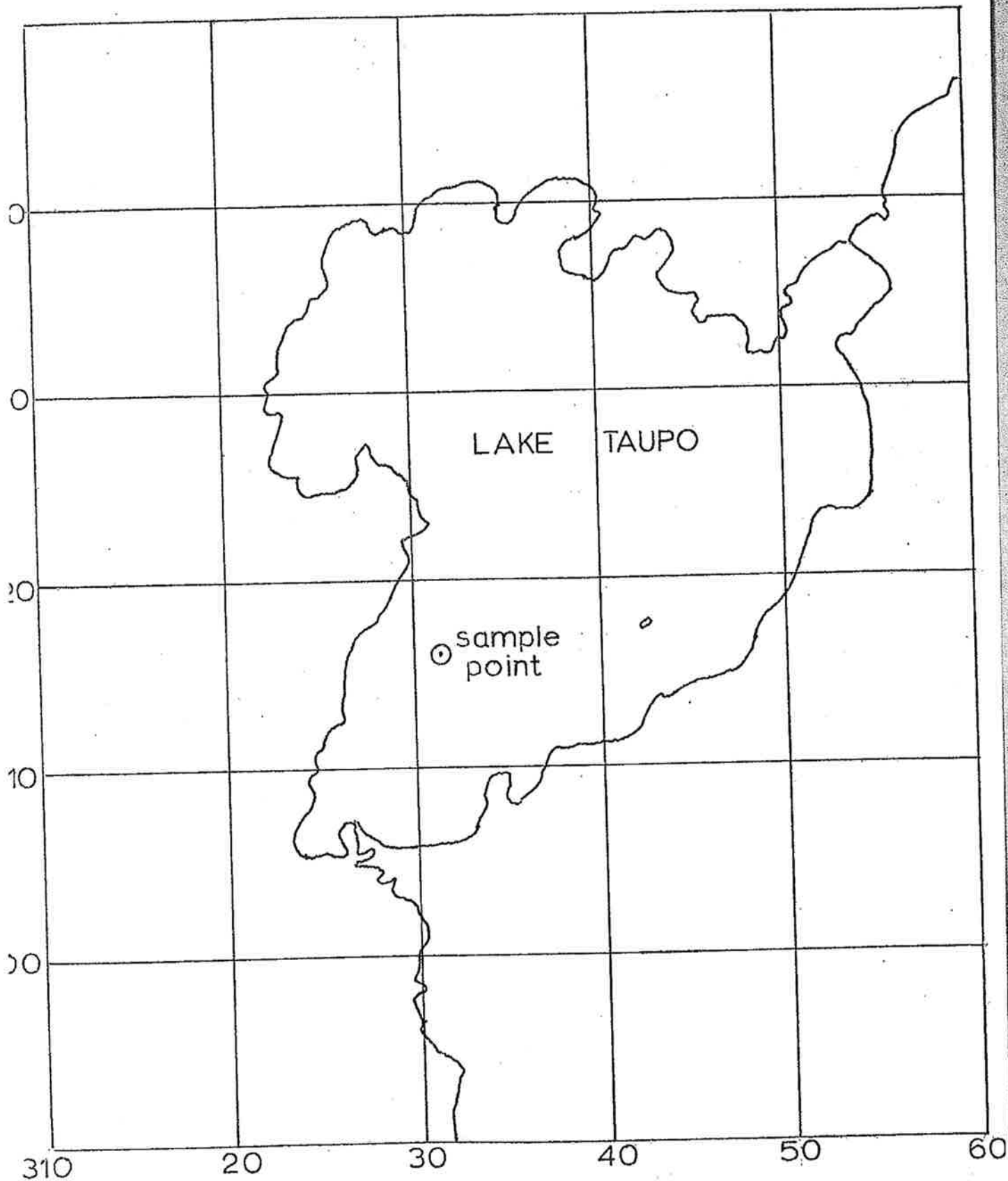


FIG.1.

10km.

# LEAD-210 in LAKE TAUPO SEDIMENTS.

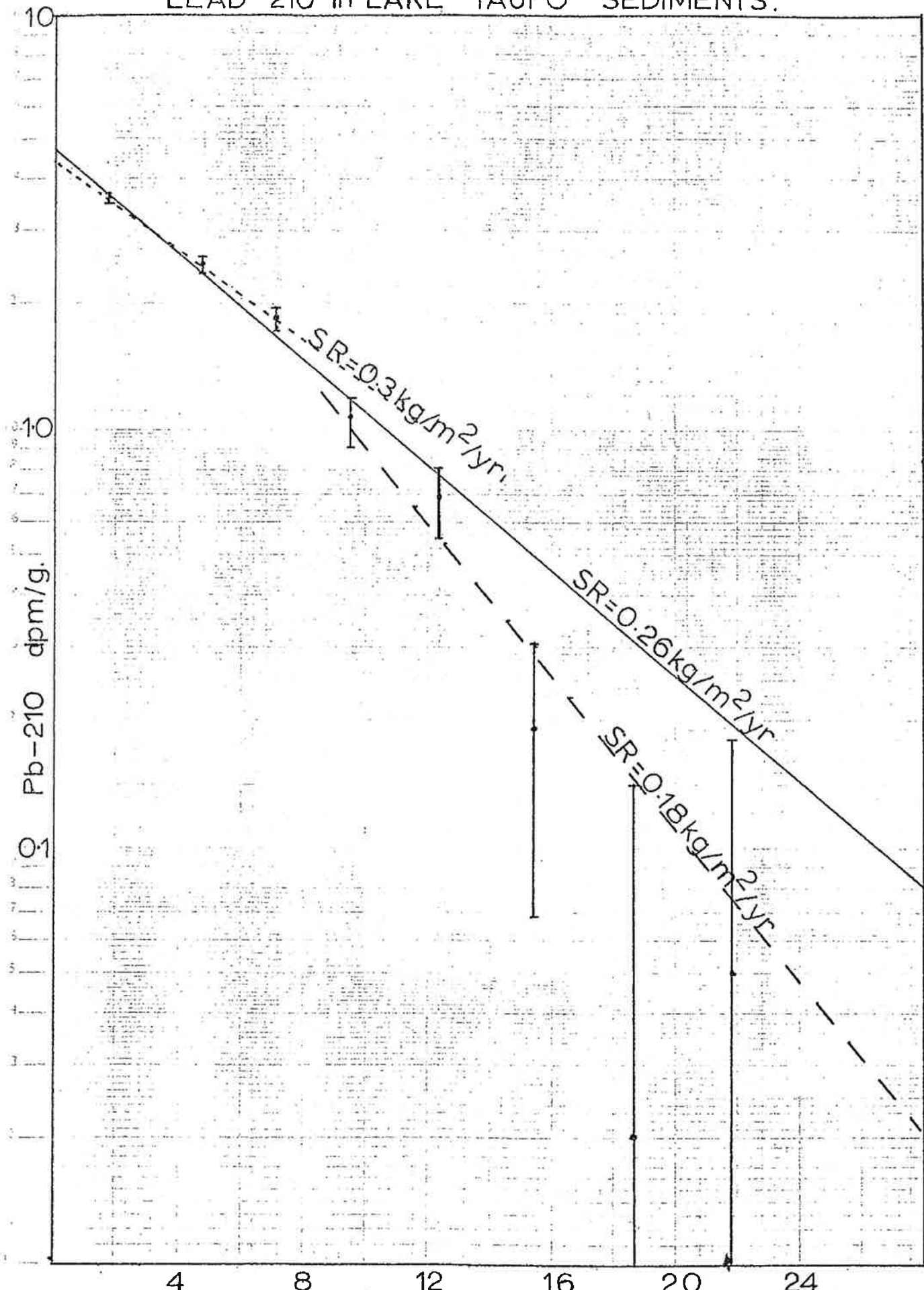


FIG.2. Cumulative weight of sediment - g.

