

[54] MEANS AND METHOD OF SAMPLING FLOW RELATED VARIABLES FROM A WATERWAY IN AN ACCURATE MANNER USING A PROGRAMMABLE CALCULATOR

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[56] **References Cited**

U.S. PATENT DOCUMENTS

3,253,469	3/1966	Norman .	
3,362,222	1/1968	Johnson et al.	73/198
3,719,081	3/1973	Lynn et al.	73/198
3,727,464	4/1973	Rutkowski et al.	73/863.01
3,893,333	7/1975	Sunahara et al.	73/61 R
3,929,017	12/1975	Kowalski	73/198
3,940,993	3/1976	Lapidot .	
4,022,059	5/1977	Schontzks et al.	73/863.02 X
4,099,871	7/1978	Sunahara et al.	356/442 X
4,245,758	1/1981	McCabe	73/198
4,409,853	10/1983	Chase et al.	73/863
4,523,460	6/1985	Strickler et al.	73/198 X

FOREIGN PATENT DOCUMENTS

1125493 11/1984 U.S.S.R. 73/863

OTHER PUBLICATIONS

"Errors in Estimating Suspended Sediment", *Proceedings of the D. B. Simons Symposium on Erosion and Sedi-*

mentation, Sep. 1983, pp. 1.162-1.177, Robert B. Thomas.

"Controlling the Automatic Sampling of Suspended Sediment Using a Programmable Calculator and Interface Circuit", Feb. 1986, Rand E. Eads et al., 33 page draft copy of article published by Forest Service, U.S. Dept. of Agriculture, Arcata, Calif. 95521.

"Estimating Total Suspended Sediment Yield with Probability Sampling", 36 page draft copy of article by Robert B. Thomas, published in Sep. 1986 issue of *Water Resources Research*, vol. 21, No. 9, pp. 1381-1388.

"A Programmable Calculator Improves Automatic Sampling of Suspended Sediment", 16 page draft copy of article by Rand E. Eads et al. to be published in *Water Resources Bulletin* after Feb. 3, 1986.

"An Automatic Sampler for Intermittent Flows of Water", *Instrument Practice*, vol. 8, No. 5, pp. 414-415, May 1954, R. Wilkinson.

"Automated System for Collecting Water Samples in Proportion to Stream Flow Rate", *New Zealand Journal of Science*, vol. 18, No. 2, pp. 289-296, G. G. C. Claridge, Jun. 1975.

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[57] **ABSTRACT**

A programmable calculator (20) is connected to a pumping sampler (12) by an interface circuit board (22). The calculator has a sediment sampling program stored therein and includes a timer (60) to periodically wake up the calculator. Sediment collection is controlled by a Selection At List Time (SALT) scheme in which the probability of taking a sample is proportional to its estimated contribution to total sediment discharge, or according to accumulated predicted sediment weight. Stage height is also measured and is recorded according to a set scheme.

12 Claims, 2 Drawing Figures

