Nichols - Int. 4646

DEPARTMENT OF THE INTERIOR

INFORMATION SERVICE

GEOLOGICAL SURVEY

For Release to PM's, NOVEMBER 3, 1958

INTERIOR DEPARTMENT IS PRINCIPAL COORDINATOR FOR WORLDWIDE "CHEMICAL DENUDATION OF LAND" STUDIES

Streamflow data and two-liter samples of water from some of the 65 major rivers of the world are beginning to arrive at the U. S. Geological Survey as part of a worldwide effort to learn how much water flows into the oceans and how much of the land these rivers carry off as dissolved solids, the Department of the Interior said today.

"Chemical denudation", the dissolving of mineral matter from the rocks and soil, is a natural process that is as much a part of the continuous erosion of our planet's land masses as is the transfer of silt and other suspended materials.

Scientists engaged in certain studies in the field of geochemistry and hydrology have been hampered for many years by a lack of adequate quantitative data on river-borne dissolved chemical substances. Yet these data are becoming increasingly important in newer technical concepts, such as total water budget, the relationship of runoff to precipitation, or the effect upon the earth of salt being carried to the sea.

For dissolved solids the best available estimates of the total amount carried by the rivers, dumping about 18 billion gallons of water a minute into the oceans, range from 280,000 to 450,000 tons an hour. The figures are believed on the conservative side, but textbooks quoting them are careful to state they are only estimates and are being used with considerable uncertainty.

The work of collecting new and meaningful data has been assigned to a "Committee of World-Wide Runoff of Dissolved Solids" appointed from members of the International Association of Hydrology of the International Union of Geodesy and Geophysics. Principal coordinator is Walton H. Durum, chemist in the Geological Survey's Water Resources Division, appointed by former Hydrology Association President J. T. Thijsse of The Netherlands to work with four other Committee members from abroad who are coordinating the efforts of hydrologists from 30 countries.

The other committee members are Prof. L. J. Tison, Belgium, G. A. Avasuk, USSR, G. C. Chaterji, India, and C. R. Vilela, Argentina. Funds have been set aside in the Department of the Interior appropriation for performing chemical analyses on waters from 12 principal North American rivers, and other world streams where chemical laboratory facilities are not available. The sampling program is set up for one year, but it is hoped to continue beyond this time in order to improve the reliability of the data.

Water samples are to be taken at least four times annually near the mouth of each river at a point where it is certain that natural river turbulence insures representative sampling, and far enough from the sea to avoid contamination by sea water. One set of samples is to be collected at high flow, one set at low flow, and one set each at slightly above and slightly below the median flow. Turbid or muddy samples are filtered at the time of collection, with the aid of an unique but simple filter unit devised for this program. Only dissolved solids are included in the study. The collection of data on solids carried in suspension (muddy water) is another problem entirely; one that will be considerably more difficult to coordinate when the time comes to tackle it.

In each kit used by the samplers there are two 2-liter polyethylene bottles, one of which the collector will fill with filtered or natural run-of-the-river water. For the second sample the water will be filtered and nitric acid added (as a preservative to make certain that elements present only in small traces will not be lost). In this way the minor elements, mostly metals, will be changed into more stable form as nitrates. The first sample is analyzed for about 20 chemical substances that can be determined readily by conventional laboratory methods--silica, iron, manganese, calcium, sodium, potassium, sulfate, chloride, etc.; the second sample is analyzed by a spectrograph for minor elements such as strontium, cobalt, lithium, silver, and others. Thus the amounts of many different chemical elements carried by water as dissolved solids can be determined for each set of samples. Comparisons can then be made with other samples from the same or different rivers and for different times of the year.

This is the first time that water analyses of this sort have been conducted on such a broad scale, and the Survey has an opportunity to put its pioneering efforts in the field of spectrographic analysis of water to practical use. "Within a year," say Survey chemists, "we expect to have meaningful data on 25 different trace elements in addition to about 20 principal chemical substances found in water. Sometime in the future we hope to double that figure."

The 65 chosen rivers provide up to 75 percent of the total runoff to the oceans and by directing the Committee's primary efforts toward the sampling and measurement of streamflow of these larger streams, the magnitude of the program is reduced to a practical level. Many supplementary estimates will be required to arrive at the total world runoff figure, but the important data will be made available to many fields of interest.

Compiling the results of the investigation for publication is being done by the Geological Survey with the concurrence of the International Association of Hydrology. Although some general guidelines and standardization of the program has been necessary, it is hoped that many of the coordinating countries will find it convenient to conduct their phase of the program independently, both in the field and in the laboratory.

x x x