SNOW AND SMOW

In the midst of Vienna's hottest weather spell this year, members of the Agency's headquarters laboratory staff found themselves unpacking a consignment of fresh snow from the Antarctic. It had been sent by air through Los Angeles, not for cooling purposes, but to assist in making more accurate measurements as part of the study of the world's water distribution and movement. The same research also involves SMOW (Standard Mean Ocean Water) and samples of water from the mid-Pacific will also soon arrive for scientific examination.

Among the ways in which the Agency is contributing to the world-wide investigation connected with the International Hydrological Decade is the measurement of isotopic variations in the content of water in various places. Practically all water contains, in addition to the well-known H_2O, variations of the atoms of hydrogen and oxygen such as deuterium (heavy hydrogen) and oxygen-18 (a non-radioactive isotope of oxygen). Measurements made with a mass spectrometer of the variations in these isotopes and changes in the ratio between them are essential in building up the data required for hydrological work. Such measurements have to be related to standards.

A panel of international experts met in Vienna last November to discuss the results of an Agency inter-comparison of deuterium and oxygen-18 measurements made in different parts of the world to establish the reliability of existing standards. As a result of its studies a recommendation was made that the Agency should provide two standards against which future samples could be compared. One of them should be the lightest water possible, isotopically speaking, i.e. with the least possible deuterium and oxygen -18. It is known that snow in the Antarctic is composed of water meeting this requirement. The second should be SMOW.

The assistance of Dr. Harmon Craig, of the Department of Earth Sciences, University of California, was enlisted. One result was that at the end of June, on a day when the temperature in Vienna was 36°C, a large crate arrived at the laboratory containing four large plastic parcels of fresh snow. It had travelled under refrigeration half-way round the world, but the full story of how it was arranged awaits Dr. Craig's return. This will not be for some while, because almost at the same time a message arrived from him, sent from a ship at "no place, no time, latitude 0°, longitude 180°" indicating that he was collecting some water. In other words he was on both the Equator and the dateline in the middle of the Pacific Ocean.

The temperature in Vienna was 36°C, so high for June that the newspaper in the pocket of Peter Schwartz, of the Agency's tritium laboratory, had headlines about it. Yet he is busy preparing for research work with snow from somewhere near the South Pole. See article "Snow and SMOW".

Ultimately snow and the water (and even the snow has by now been converted into 80 kg of water) will be measured absolutely, at a laboratory in France, and it will then be possible to provide standards against which scientists engaged in special branches of hydrology will be able to compare their measurements of other water. They will then have an additional tool for their work of increasing knowledge about the behaviour of water and the best way to use it.