Potential civil and scientific applications

The International Monitoring System uses seismic, hydroacoustic, infrasound and radionuclide monitoring technologies capable of detecting evidence of nuclear explosions underground, in water and in the atmosphere in order to monitor compliance with the Comprehensive Nuclear-Test-Ban Treaty. These verification technologies, together with the data, technologies and products of the International Data Centre, have potential civil and scientific applications which can provide significant benefits to States and the international scientific community.

The CTBT radionuclide network: Detecting radiological events from a canvas of radionuclides

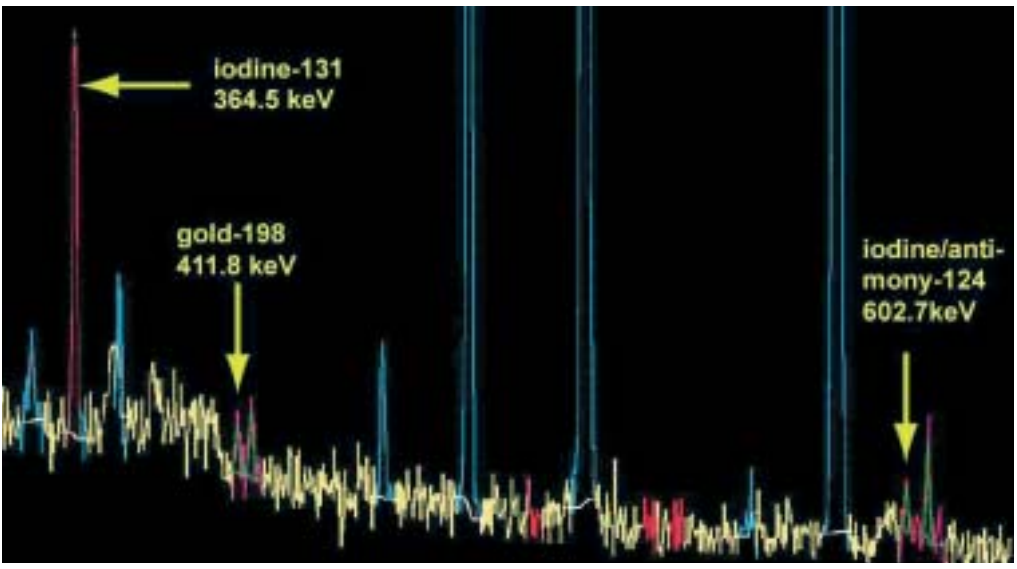
The establishment of the CTBT radionuclide network of 80 stations and 16 laboratories can be regarded as the development of a 'machine', comparable in scope to the construction of a giant new particle accelerator for groundbreaking physics experiments, or some other enormous global project. Once established, the CTBT radionuclide network will have an unprecedented reach in terms of global and temporal coverage.

EQUIPMENT FOR FULLY AUTOMATIC SAMPLING AND ANALYSIS OF AIRBORNE RADIONUCLIDES, CTBT RADIONUCLIDE STATION SEP 63 IN STOCKHOLM (SWEDEN)

The radionuclide content in ambient air – the air that we breathe every day – is dominated by naturally occurring nuclides, be it radon daughters or cosmogenically produced nuclides like beryllium-7. CTBT-relevant radionuclides must therefore be extracted from a background canvas of other radionuclides. These are also of interest for society and for our scientific knowledge. They provide information on humankind's exposure to natural radioactivity in different environments on the globe, they can be used as tracers to validate atmospheric transport models and they can be used to study effects of cosmic radiation. Dust, pollen and insects on the filters can further provide a historic archive for a number of scientific studies.

In the 1950s, 60s, and 70s the global atmosphere always carried information on the atmospheric testing of nuclear weapons. One reason was that large nuclear explosions injected radioactive residues into the stratosphere, which in turn passed it down – in chunks delayed by years – to the troposphere we live in. The last atmospheric nuclear test was carried out in 1980 and by 1986 the stratospheric reservoir was nearly empty of any nuclides from this atmospheric test era.

While national institutions have in the past investigated radionuclides captured by small aerosol particles, new developments in noble gas (xenon) detection spearheaded by France, Russia, Sweden and the United States in cooperation with the Provisional Technical Secretariat will establish a technology, which, together with the particulate systems in the global network, will provide a unique detection capability. Automated and highly sensitive noble gas surveillance technology is actually a CTBT driven development that will surely also be of interest for other parts of society. ■



A SPECTRUM FROM THE CTBT RADIONUCLIDE NETWORK IN LATE 2002 WHICH SHOWS THREE ANTHROPOGENIC RADIONUCLIDES WHICH WERE MOST LIKELY PRODUCED FOR MEDICAL APPLICATIONS. THE UNMARKED PEAKS ARE NATURAL – FROM RADON DAUGHTERS AND FROM RADIONUCLIDES PRODUCED IN THE ATMOSPHERE OR IN THE DETECTOR BY COSMIC RADIATION. THESE NATURAL SIGNALS APPEAR IN ALL SPECTRA AND CONSTITUTE THE 'FOREST' WITHIN WHICH WE LOOK FOR NUCLEAR TEST EXPLOSIONS