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The International Monitoring System's noble gas network

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The International Monitoring System (IMS) is a unique global network for surveillance of the Comprehensive Nuclear-Test-Ban Treaty. A major component of the IMS is the radionuclide monitoring network since, among all IMS technologies, it can provide the most unequivocal evidence for a nuclear explosion. The radionuclide monitoring component is unprecedented in its combination of global coverage, sensitivity, network density and temporal resolution. In particular for the detection of underground or underwater nuclear tests, forty of the eighty radionuclide stations will eventually be equipped with sensors to measure the Xenon isotopes Xe-131m (T1/2 = 11.8 d), Xe-133 (T1/2 = 5.25 d), Xe-133m (T1/2 = 2.2 d) and Xe-135 (T1/2 = 9.14 h). These are among the isotopes with the highest yields in fission of uranium or plutonium with half-lives long enough to be detected at large distances from the point of emission. As of today, 31 noble gas systems have been installed and are sending data to the International Data Centre. The noble gas systems installed at the stations are automated and sample Xenon continuously from atmospheric air for 12 or 24 hours at an air flow of 0.5 to several m3/h by absorption of Xenon on activated charcoal. Detection of the Xenon isotopes is either by high resolution gamma spectrometry or by beta-gamma coincidence spectrometry. With the currently available equipment, detection limits of 0.2 mBq/m3 can be achieved. An overview on the existing technology and future developments as well as on the interpretation of measurement results is given.

Country or International Organization

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