# INTEGRATING THE RADIONUCLIDE NETWORK DATA INTO THE INTERNATIONAL VERIFICATION REGIME

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## ABSTRACT

Throughout the final stages of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) negotiations, radioactivity unambiguously characteristic of a nuclear weapons explosion, collected from the 80-station-station International Monitoring System (IMS) radionuclide network, was seen by many as being the "smoking gun" of nuclear-test-ban verification. Carried by global atmospheric transport, radionuclides released into the atmosphere would be detected and identified in areas far away from the source. The detected radioactivity could then be linked to anomalous events detected by the seismic, infrasonic or hydroacoustic IMS networks, through the use of existing geo-location capabilities based on meteorological transport modeling. If a clandestine test were to occur, ideally, the event location and associated error ellipses from the different IMS networks would overlap and delineate in which region of the world a States Party might wish to call an On-Site Inspection. Use of one of any number of technically acceptable meteorological transport models could point to quite different regions as probable sources of the detected radioactivity. That is why it is important to understand the uncertainties inherent in these models and to use the radionuclide data in concert with data from the other three monitoring technologies. Within the context of the Preparatory Commission's Working Group B, we are investigating mechanisms for providing CTBT Signatories with an international consensus on meteorological geo-location results that reflects the inherent uncertainties that must be taken into account in evaluating a particular event and deciding on an appropriate response to that event.

**Key Words:** radionuclide network, meteorological back tracking, data fusion