# Verification science

## The role of the IDC analyst in the verification process

*The network of the International Monitoring System (IMS) with its associated communications infrastructure and the International Data Centre (IDC) was designed by a Group of Scientific Experts at the Conference on Disarmament in Geneva to be fully capable of monitoring compliance with the Treaty. New research and improved communications technology continuously strengthens and refines the detection capabilities of the IMS. This column introduces some of the latest developments in the field of verification science.*

One largely unknown area of verification science is the role of the analyst in monitoring Treaty compliance. Monitoring the pulse of the entire earth, the analyst represents the human component of the International Data Centre (IDC) verification effort. They have the exceptionally complex and daunting task of reviewing and assimilating any anomaly in the data occurring anywhere at any time, which might later prove to be the signature of a nuclear explosion. An analyst functions as a near real-time professional investigator of geophysical and radioisotope data.

A daily blizzard of gigabytes of data from up to 321 International Monitoring System (IMS) stations provide automatic processing for lists of seismic and acoustic disturbances (events) in the earth, and gamma ray spectra recorded worldwide. These constitute the starting point for the analyst's work. Combining the latest verification technology with analyst experience, judgment and detective skills, each analyst must go far beyond what automatic processing can achieve. The analyst must correct and improve the automatic results, which would otherwise offer many non-existent or poorly located events to the National Data Centres (NDCs). Despite continuous improvement of the automatic system, the knowledge and judgement of the analyst will remain essential to the quality of the information.

IDC ANALYST REVIEWING RAW DATA AND AUTOMATED LISTS TO PRODUCE QUALITY-CONTROLLED BULLETINS

An analyst must also search for missed events or relevant radionuclides. This judgement requires years of experience and accumulated knowledge in the complex behaviour of the earth. If an event is judged to be real, the analyst interactively estimates its most likely location and time, and the identity of each Treaty-relevant radionuclide must also be established. This process is somewhat like a police forensic investigation, except the analyst is under time pressure to solve each event in a matter of minutes. (After entry into force of the Treaty, the analysts will be mandated to complete the report for each 24-hour period, within only about two days of the time of the event.)

Each analyst is presented with a very large number of puzzle pieces (thousands per day for the entire IMS station network), most of which do not fit together, and they must make the best of what information is available. The analyst must make rapid judgements with confidence, often using signals that are indistinguishable to the untrained eye. This confidence is developed only with a thorough understanding of basic principles, together with extensive practical experience working on global geophysical or radionuclide phenomena.

The final reviewed products are the Reviewed Event Bulletin (REB) and the Reviewed Radionuclide Report (RRR), which are well known and keenly awaited by specialists at NDCs. The high quality and completeness of these products depend crucially upon the analyst's efforts. This imposes a responsibility on the analyst, who is aware that even a small error in judgement could have major adverse consequences should an event of special concern be detected by the IMS stations, but not appear correctly in the REB. The CTBT analyst provides a last line of defence for the integrity of IDC Standard Products. The analyst is therefore a key player in supporting the operational credibility of the monitoring system and thus in supporting the Treaty's role as a strong deterrent to would-be violators. ■