



On-Site inspections as a tool for nuclear explosion monitoring in the framework of the Comprehensive Nuclear Test Ban Treaty

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On-site inspections (OSIs) constitute the final verification measure under the Comprehensive Nuclear-Test-Ban Treaty (CTBT). OSIs are launched to establish whether or not a nuclear explosion has been carried out, thus they are conducted to verify States' compliance with the Treaty.

During such an inspection, facts are gathered within a limited investigation area of 1000 Km² to identify possible violators of the Treaty. Time scale (referring both to the preparation of the inspection as well as to the conduct of an OSI itself) is one of the challenges that an inspection team has to face when conducting an OSI. Other challenges are the size of the team – which is limited to 40 inspectors - and political limitations imposed by the Treaty in the use of allowed techniques.

The Integrated Field Exercise 2008 (IFE08) recently conducted in Kazakhstan was the first large-scale, as well as the most comprehensive, on site inspection exercise ever conducted by the Preparatory Commission of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO). The exercise took place in a deserted area south east of Kurchatov, within the former Soviet Union's Semipalatinsk nuclear test site.

In this paper we will provide an overview of the technical activities conducted by the inspection team during IFE08 in order to collect evidence for a hypothetical nuclear explosion test. The techniques applied can be distributed in four different blocks: visual observation (to look for man-made changes in the geomorphology as well as anthropogenic features related to an underground nuclear explosion, UNE); passive seismic monitoring (to identify possible aftershocks created by the UNE); radionuclide measurements (to collect evidence for radionuclide isotopes related to a nuclear explosion); and finally geophysical surveys (to identify geophysical signatures related to an UNE in terms of changes in the geological strata, to the hydrogeological regime, and in terms of the shallow remains of the infrastructure deployed during the preparation and monitoring of the test). The data collected during IFE08, together with data from previous exercises, set the fundamentals of a database of invaluable value to be used by CTBTO in the future for a better understanding of the phenomenology related to a nuclear explosion.