On the trail of Gamma Rays

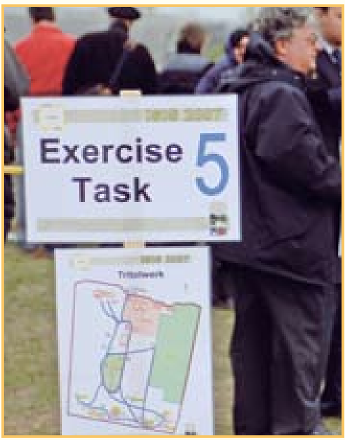
First response and specialized emergency field response teams from around the world test their skills in an exercise organized by the Austrian Research Centres in cooperation with the IAEA and the Austrian NBC Defense School of the Austrian Army.

From 16-20 April 2007, at the Tritolwerk site in Wiener Neustadt, Austria, emergency response teams tested their skills during an exercise called 'In-Situ Gamma Spectrometry and Dose Rate Measurements in Emergency Situations.' Teams tackled scenarios such as terrorist attacks involving radiation sources.

IAEA specialists in emergency response and radiation measurement took part in the exercise.

The exercise saw the participation of 169 experts divided in 57 teams coming from 23 countries as far apart as Australia, Israel, Canada and Iran. In addition, over 120 personnel from first response teams received training, while some 20 observers attended the event with the aim to learn from the exercise.

The teams employed a total of over 30 mobile labs. Participants came from variety of backgrounds, including government agencies, scientific and research institutes, commercial companies and nuclear power plants. Representatives from six vendors of radiation detection devices also attended the event.

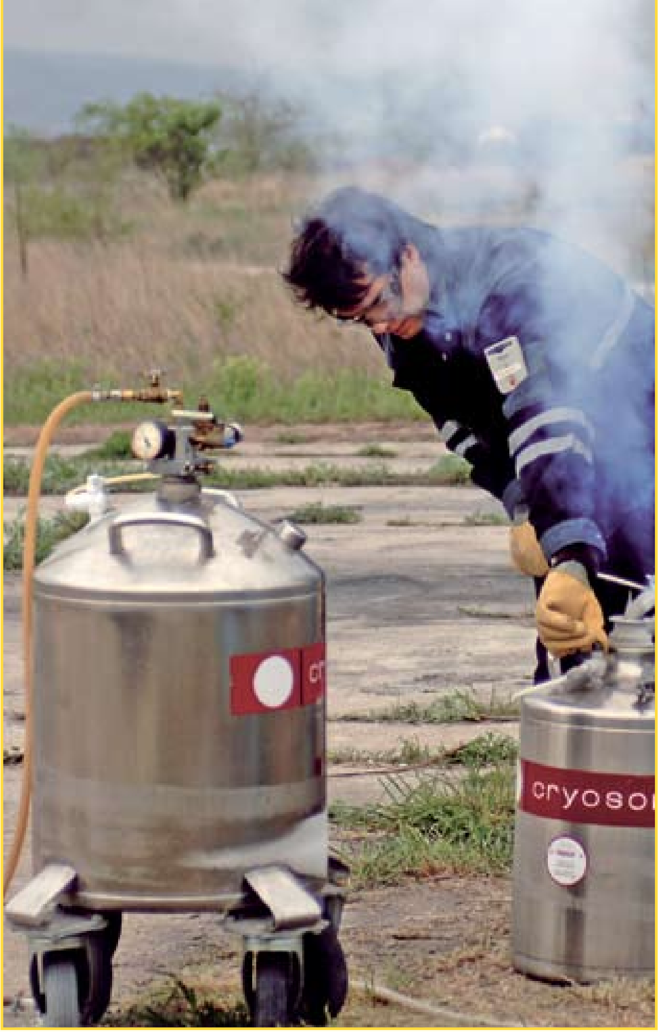


The exercise was divided into ten different tasks, including nine measurements of artificial sources and one of environmental samples. The teams had to perform each task working against the clock, within a set timeframe. The black and yellow ribbon, deployed around several locations, marked the 'contaminated' areas.

Depending on the nature of the task, the radioactive sources were either buried in the ground, hidden or left in view. The environment at the Tritolwerk site, however, did not suffer from any form of contamination, as all sources were securely sealed.

During the exercise, the teams used a wide range of equipment and monitoring methods, reflecting the different tasks they faced. Hand-held counters, such as those shown here, were used to determine the presence of a source and locate its position in the field.

Among the most popular devices of their kind in the scientific community, germanium spectrometers (left) are known to have high resolution but low efficiency. Sodium iodine spectrometers, on the other hand, are more efficient, though they are affected by lower resolution. Both spectrometers were extensively used by the teams.



Liquid nitrogen is normally used to cool down the crystals in the spectrometers. A container with the cooling element was available on site for the teams to refill their tanks.

Not all equipment used during the exercise needed to be cooled with liquid nitrogen. Lanthium bromide spectrometers, for example, work on a different principle. The crystal does not need to be cooled down, though it needs to operate in complete darkness. Hence the black pouch covering the crystal visible in the image.

The reduced size of the equipment and the fact that they do not need a cooling system make lanthium bromide spectrometers particularly attractive for teams working in remote areas.

Some of the tasks required a combination of detection techniques. For example, in Task 1 the teams were asked to map gamma dose rates in a defined area and trace iso-dose curves. Experts needed to use a dose rate meter in combination with a Global Positioning System (GPS) satellite receiver.

In Task 2, unknown gamma sources had to be localized, quantified and identified through a 'drive-by' reading.

Another task required teams to quantify and identify radiological sources in a series of four barrels. The exercise reproduced a scenario in which field teams face sources that cannot be easily reached. Some teams opted to use spectrometers attached to a telescopic pole to perform the reading.

To determine the depth at which a source was buried, the teams carried out two readings at different heights from the ground. The difference in the results gave scientists a clue as to how deep they would have to dig to recover the source.

In a real life scenario, a buried source *must* be identified and measured before it is uncovered. The nature of the source, in fact, influences the procedure that might be adopted to recover it.

The entire exercise was the simulation of real-life scenarios. At times, the teams had to protect their equipment from the elements, as they might be required to do in a real emergency situation.

Rodolfo Cruz-Suarez, who heads the IAEA Individual Monitoring Services, speaks to reporters covering the exercise: "This exercise fits extremely well with the IAEA's vision to support, develop and promote a global safety regime."

Photographs: Dean Calma • Photo essay: Ritu Kenn • Text: Giovanni Verlini