

MENZINGEN VERIFICATION EXPERIMENT. SUMMARY

8 MARCH 2023

The Menzingen Verification Experiment, which took place on 8 March 2023, was designed to test practical procedures for verifying the absence of nuclear weapons at a storage site. The experiment was organized by UNIDIR in partnership with the Swiss Army, Spiez Laboratory, Princeton University's Program on Science and Global Security, and Open Nuclear Network. The project was supported by the Governments of the Netherlands, Norway, and Switzerland.

The experiment modeled an on-site inspection of a nuclear weapons storage site, represented by a former air defense site near Menzingen, Switzerland. In preparation for the experiment, UNIDIR developed a model protocol governing the inspection activities. Together with its partners, it designed procedures to confirm the non-nuclear nature of the inspected items, including radiation measurements with active sources, and arranged for the acquisition of satellite imagery of the site.

Participants in the exercise, who came from seven different countries, were based in Lucerne, where the Armed Forces College provided a venue for the pre-inspection and post-inspection workshops.

GENERAL FRAMEWORK

The scenario assumed that the inspection was conducted as part of an agreement that requires the parties to remove all nuclear weapons from



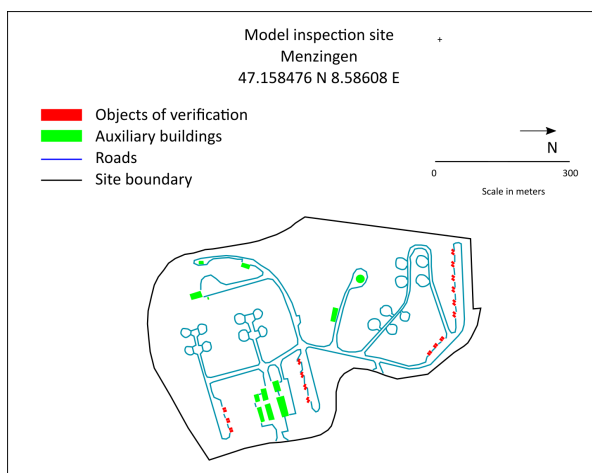
storage sites associated with military bases that host nuclear-capable delivery systems. The agreement would require the parties to declare and provide information on all storage sites capable of permanently storing nuclear weapons. These sites are readily identifiable by the presence of a security perimeter, hardened bunkers, and other support systems. The parties would also have a good understanding of the types of nuclear weapons that could potentially be stored at each site (e.g., gravity bombs, missiles, or missile warheads).

The inspection procedures used in the experiment were modeled on those developed for the CFE Treaty and New START. The experiment did not aim to replicate all the details of an inspection, but instead focused on the key procedures described below.

ACCURACY OF THE SITE DIAGRAM

The inspected party submitted a diagram of the sites that showed the boundaries, entrances, roads, and all structures. All buildings that are suitable for the storage of nuclear weapons, whether permanent or temporary, are subject to inspection and must be marked as objects of verification. These include dedicated storage bunkers as well as garages, hangars, or other similar facilities. Buildings and structures that cannot be used for nuclear weapons storage, such as office buildings or small structures, were identified as auxiliary buildings.

At the first stage of the inspection, the inspectors examined the territory of the site. They identified



buildings that were not shown on the site diagram and suggested that the diagram should be amended. They also challenged the categorization of several buildings designated as auxiliary. In two cases the inspectors documented their challenge by taking measurements and photographs that were included in the inspection report.

INSPECTION OF SELECTED STORAGE BUNKERS

After verifying the accuracy of the site diagram, the inspectors selected two verification objects for inspection. In this experiment, these were two bunkers that had been prepared in advance. Each bunker contained several items that were placed there by the hosts. On the floor plan presented to the inspectors, each item was assigned a category that specified the procedure that could be used to confirm its non-nuclear nature.

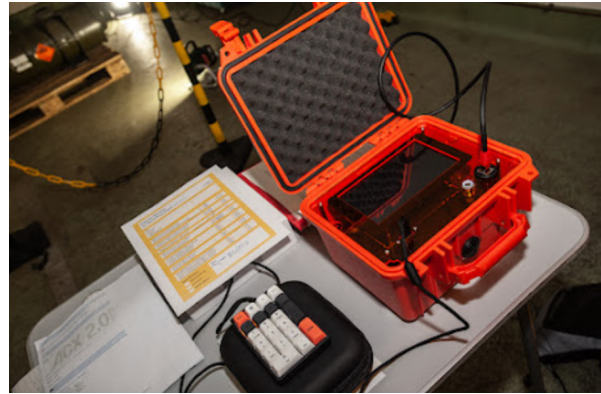
The inspectors examined the bunker and the items inside. They confirmed the absence of hidden volumes and false walls and the accuracy of the categorization of items by taking linear measurements. The inspectors then visually inspected those items that allowed a visual inspection by opening containers, reading the markings, or weighing the items. The inspectors then selected two items for radiation measurement inspection.



RADIATION MEASUREMENTS

The radiation measurements were set up in a separate area of the site in order to ensure safe handling of the radioactive sources used in the experiment. The sources were provided and installed by the Spiez Laboratory.

The two bunkers prepared for passive neutron measurements contained containers identical to the one selected for radiation measurements during the bunker inspection. In preparation for the experiment, a Cf-252 neutron source was placed in one of the containers. The measurement protocol followed that of the New START Treaty.



Another set of radiation measurements demonstrated the possibility of using active radiation sources to confirm the non-nuclear nature of certain inspected items. These measurements used the Absence Confirmation Experimental device developed at Princeton University's Laboratory for Science and Global Security. One of the two inspected containers contained depleted uranium projectiles. The inspection protocol required the use of a Cs-137 reference source and Na-22 calibration source. The measurements confirmed the absence of material or significant shielding in the empty container and detected an anomaly when taken on the container with depleted uranium.

SATELLITE IMAGERY

In partnership with Open Nuclear Network, UNIDIR explored the potential use of satellite imagery to support on-site inspections. To test this capability to monitor the lockdown of the inspected site, Open Nuclear Network obtained several images of the site taken on March 7, 2023, at different times of the day. Two optical images were provided by Planet and two SAR images were obtained from another provider.

CONCLUSION

The Menzingen Verification Experiment demonstrated in practice the viability of the approach to nuclear disarmament based on removing nuclear weapons from their delivery systems. UNIDIR and its partners are working on a research report that will provide a full account of the experiment. The report will be published on the UNIDIR website

CONTACT

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