

## **UK ARMS CONTROL VERIFICATION PROGRAMME**

The remit of the UK's Arms Control Verification programme, sponsored by the Ministry of Defence, is: "To develop methodologies and technologies to verify possible future nuclear disarmament agreements, in support of the UK's commitment under the nuclear Non-Proliferation Treaty (NPT) Article VI".

The key challenge for any verification regime operating within a nuclear weapon complex is to provide the Inspectors with the opportunity to gather sufficient evidence of treaty compliance, while at the same time protecting sensitive or proliferative information held by the Host. An inspecting party presented with this challenge will wish to undertake certain basic activities: obtain access to the Treaty Accountable Item (TAI) and dismantlement facilities; confirm that the item presented as the TAI is as declared; and maintain the chain of custody of the TAI (and other items of relevance) through the dismantlement process. The research programme, based at the UK Atomic Weapon Establishment (AWE), supports these objectives by undertaking studies into areas which include:

- **Managed Access:** The process by which 'uncleared' personnel are given access to sensitive facilities, or supervised areas, under the terms of an agreed procedure.
- **Device Authentication:** Technologies which could confirm that the object presented for dismantlement is the item described, or referred to within any given declarations, whilst protecting host sensitivities (e.g. information barriers).
- **Chain of Custody:** Techniques which provide confidence that the items emerging from the dismantlement process have originated from the object authenticated at the beginning of the process (e.g. tamper indicating devices and monitored storage).
- **Equipment Authentication:** An overarching requirement to ensure that any equipment utilized during the verification process is approved by both the Inspecting and Host parties as conforming to an agreed specification, incapable of acquiring sensitive information and restricted to performing agreed tasks only.

### **UK – NORWAY INITIATIVE**

Early in 2007, representatives from several Norwegian laboratories, the UK Ministry of Defence, the UK Atomic Weapons Establishment and the respected non-governmental organisation VERTIC met to discuss a potential cooperation on matters connected with technical verification of nuclear arms reductions. It was agreed that an unclassified exchange within this field of research was feasible and that a programme of work should be progressed. It should be noted that this is the first time that a Nuclear Weapon State (NWS), a Non Nuclear Weapon State (NNWS) and an independent non-governmental organisation have attempted collaboration in this field of research. Subsequently, two projects have been taken forward under this initiative: Managed Access and Information Barriers.

## Managed Access

The Managed Access project has now successfully completed two planned Exercises. These exercises were based on a hypothetical, non-reciprocal, bi-lateral agreement between two fictitious states; one a NWS and the other a NNWS. The scenario postulated that the NWS had declared its intention to dismantle a single notional 'class' of nuclear warhead and that the NNWS had been invited to verify the dismantlement process.



As a NNWS, Norway, was involved in this exercise, several steps were undertaken to ensure that proliferation risks would be minimised during the collaboration process. It was agreed that the participants would 'swap roles', so that Norway would play the role of a NWS and the UK the role of the NNWS, and that the exercise would take place within Norwegian facilities. Although a nuclear device would be alluded to during negotiation phases, the actual device for dismantlement would be based on a Cobalt-60 source.

The exercise in December 2008, the 'Familiarization Visit', formed the first part of the managed access work program which culminated in the 'Monitoring Visit' exercise in June 2009. The aim of the Familiarisation Visit was for the host and inspecting teams to negotiate the scope for the verification regime, and to visit the facilities relevant to the dismantlement process prior to a full inspection of the dismantlement of a single, notional warhead during the subsequent Monitoring Visit.



The Familiarisation Visit Exercise was reported at the 2009 NPT PrepCom meeting. The report on the outputs and lessons learned from the Monitoring Visit Exercise will be published and presented at the 2010 NPT RevCon meeting.

## Information Barrier Project

In its simplest state, an information barrier (IB) takes data from a measurement device, processes the data and provides a pass/fail answer relative to predetermined criteria. The information barrier must protect sensitive or proliferative measurement data from being released to the inspecting party. This could either be done through hardware engineering and/or by procedures controlled by all parties. Both parties will need to have full trust and confidence in the operation of any proposed information barrier system for the verification system to succeed.



The remit of the UK/Norway IB project is to develop a tool that will verify that a TAI is compliant with a host's declaration without revealing weapon attributes and characteristics. In order to avoid potential proliferation issues, the joint UK/Norwegian team decided to utilise a surrogate material, Cobalt-60, in order to facilitate the design and testing of the proposed concepts. This would allow the participants to freely discuss and explore all the relevant technical challenges.

Currently the detailed design requirements have been captured and prototypes barriers looking for Cobalt-60 presence are complete. Testing of these systems was undertaken during May/June of 2009 and the IBs deployed successfully during the June 2009 Monitoring Visit exercise. Further development is now underway and progress will be reported at the 2010 NPT RevCon meeting.

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