The United Kingdom - Norway Initiative: Further Research into Managed Access of Inspectors During Warhead Dismantlement Verification

Summary

Article VI of the NPT sets out, among other elements, that each of the Parties to the Treaty undertakes to pursue effective measures relating to arms control and disarmament “under strict and effective international control”, Non-Nuclear Weapon States (NNWS) and Nuclear Weapon States (NWS) alike. Establishing effective verification measures will be an important precondition for fulfilling the goals of Article VI. The UK-Norway Initiative (UKNI) has explored activities in line with these obligations, with both Parties mindful of their roles and obligations under international agreements and national regulations. This is an ongoing collaboration between experts from Norway and the United Kingdom investigating technical and procedural challenges associated with a possible future nuclear disarmament verification regime. This has been a process of building trust and cooperation in an area which presents significant technical and political challenges to both Parties.

Since 2007, the UKNI has undertaken several exercises designed to elucidate the technical and procedural issues surrounding managed access of inspectors into highly sensitive facilities. During the NPT Review Conference in 2010, the UKNI presented the outcome of the planning, conduct and evaluation of a Managed Access Monitoring Visit exercise held in Norway in June 2009. That report detailed the lessons learned during the course of the work, highlighted the key findings, discussed possible areas for development and the potential role of the NNWS.

Following on from the 2009 exercise, the UKNI collaboration undertook a further ‘focused’ exercise which explored the impact of Host security measures on the Inspection regime, and demonstrated some aspects of the safety regulatory environment associated with a nuclear weapons complex. The exercise showed how the security/safety regime implemented by the Host state could impact on the Inspectors’ ability to assess the potential threats to, and vulnerabilities of, a potential future monitoring regime. A comparison between the adversarial environment of the 2010 exercise and the collaborative environment of the 2008/2009 exercises indicate that a collaborative environment, and a proactive Host, could help to facilitate the inspection process and increase confidence levels in the overall verification regime. In conclusion, the exercise provided a common understanding within the UKNI collaboration of the impact that Host security and safety could have on an inspection regime. This is essential for technology and procedural development in the future.

1 Introduction

Article VI of the NPT sets out, among other elements, that each of the Parties to the Treaty undertakes to pursue effective measures relating to arms control and disarmament “under

strict and effective international control", NNWS and NWS alike. Establishing effective verification measures will be an important precondition for fulfilling the goals of Article VI.

Any future disarmament process will need to be underpinned by a verification regime that can demonstrate with confidence that nuclear disarmament has taken place. With this principle in mind, the UK and Norway have been working together since 2007 on a unique and ground breaking technical collaboration, investigating the techniques and procedures needed to verify the dismantlement phase of nuclear disarmament [see references 1-5]. This collaboration has been a process of building trust and cooperation in an area which presents significant technical and political challenges to both Parties. The principal objectives for the collaboration are:

- To create scenarios in which Norwegian and United Kingdom participants could explore issues relating to nuclear arms control verification without the risk of proliferation.
- To promote understanding between a NWS and a NNWS on the issues faced by the other party.
- To promote discussion on how a NNWS could be involved in a nuclear arms control verification process.

In a future verification regime for nuclear warhead dismantlement, Inspecting Parties are likely to request access to highly sensitive facilities and weapon components. Managed Access is the process by which 'uncleared' personnel are given access to sensitive facilities, or supervised areas, under the terms of an agreed procedure or protocol. Such access will have to be managed carefully by the Host Party to prevent the disclosure of sensitive information, both in compliance with the NPT and in consideration of national security. At the same time, it will be incumbent on the Inspectors not to gain proliferation-sensitive information.

The primary aim of the Managed Access project is to provide practical opportunities for participants to deploy technologies and test procedures within this working environment, thereby increasing the mutual understanding of the issues involved. The UK-Norway initiative has successfully delivered three Managed Access exercises:

- Familiarisation Visit Exercise, Norway, 2008
- Monitoring Visit Exercise, Norway, 2009
- Focused Exercise, UK, 2010

Outputs from the 2008 and 2009 exercise programme have been reported previously [1, 2, 3 and 4]. This paper discusses the outputs from the latest Focused Exercise undertaken within the UK in December 2010.

2 Managed Access Exercise 2008 and 2009

The Managed Access Exercises in 2008 and 2009 were underpinned by a framework which included a hypothetical treaty between two hypothetical countries: the "Kingdom of Torland", a NWS and the "Republic of Luvania," a NNWS. In an initial Declaration, Torland stated its intention to dismantle its ten remaining Odin class nuclear weapons (gravity

bombs). Torland invited Luvania to verify the dismantlement process for one of these weapons. The key objective for Luvania was to establish confidence in the Declaration made by Torland with regards to the Treaty Accountable Item[1] and to demonstrate, to the satisfaction of both Parties, a chain of custody through the dismantlement process. The key objective for Torland was to demonstrate compliance with their obligations under the Treaty whilst protecting national security and proliferation sensitive information.

All of the Managed Access exercises are planned and overseen by a joint team of UK and Norwegian experts. A key element of the planning process is an assessment of the roles and obligations relating to NPT Articles I and II, and the incorporation of these precepts into the collaboration and any exercise scenarios. For the 2008 and 2009 exercises this was underpinned by three practical measures:

- The exercises took place in Norway.
- Although the exercise play was based on a framework involving "the Odin class Nuclear Weapon," the actual object used during the notional dismantlement process was based on a cobalt-60 radiological source.
- The development of Torland's "Atomic Weapons Laboratory", where the Managed Access exercises took place, was based on a generic facility model comprising simple, logical building blocks which might conceivably be present within any Nuclear Weapon Complex.

For the purpose of these exercises, it was decided that the United Kingdom and Norway would 'swap roles'; Norway would play the NWS while the United Kingdom would play the NNWS. This gave the participants the opportunity to explore the problem from the other side's viewpoint. The exercises promoted a discussion on how a NNWS might contribute in the nuclear arms control verification process and the overall outputs were presented at the 2010 NPT Review Conference [2].

3 2010 – Moving On

The lessons learned from the 2008/2009 exercises were wide ranging [2], but two in particular were singled out when a potential follow on exercise was initially discussed:

- National security and proliferation concerns permeate through everything.
- The implications of Health and Safety regulations must not be underestimated.

The Norwegian facilities used to host the 2008/2009 exercises were not 'high security' facilities; therefore the security aspects of the scenario could only be played lightly. Health and Safety regulations were included in the scenario, but again it was felt that these did not quite match the level that would be experienced in an actual nuclear weapons complex. It was decided that a 'focused exercise' was required which would more realistically explore the impact of Host security measures on the Inspection regime and demonstrate some aspects of the safety regulatory environment associated with a nuclear weapons complex. In order to achieve the level of realism required, it was agreed the

[1] The Treaty Accountable Item was the Odin pit; the pit was the notional fissile component within the Odin nuclear weapon.

exercise would take place at a UK facility with the UK now taking the role of the Host NWS party Torland.

It was decided that the focused exercise would use the same documentation as in 2008/2009; however the players were warned that the implementation of the scenario would be different. The exercise focused on a familiarisation visit to an initial storage/receipt facility. The Inspecting Luvanian team (Norway) were tasked to:

- Understand relevant processes, routes and facilities by obtaining access to the initial storage/receipt facility.
- Become familiar with the container types that would be used in the dismantlement process.
- Consider a strategy for a future monitoring regime. The exercise provided an opportunity to trial potential seal types on the containers.
- Maintain the safety and security of the team and comply with obligations under the NPT.

In order to play this scenario with an increased level of realism, the UK suggested the use of a low security facility within the boundaries of one of the AWE[2] sites. Simulated facilities were set-up to demonstrate increasing levels of security that would have to be negotiated in order to access an inner storage/receipt area (Figure 1). This arrangement had two advantages:

- It provided an opportunity for Norway to play the Inspecting Party (Luvania).
- The exercise benefited from the expertise of AWE's staff and utilisation of AWE's existing infrastructure. Although the actual facility used was in a low security area not associated with the dismantlement process, AWE's security and facility team were asked to create a facility that mimicked many of the techniques and processes which might be deployed to 'Manage Access' within a typical nuclear weapons complex. This arrangement satisfied the joint planning team that obligations relating to NPT Articles I and II would be met during the planning and conduct of the exercise.

The Host team (Torland) was given the same primary objective as in 2008/2009, to demonstrate compliance with their obligations under the Treaty whilst protecting national security and proliferation sensitive information. However, whereas during 2008/2009 both teams were instructed that the process was collaborative, for the 2010 exercise the planners decided to change the emphasis for the Host team. In this exercise, the Torian Host was described as:

- Having a heavy emphasis on security as a first priority.
- Inexperienced in dealing with Inspection activities.
- Reactive rather than proactive.

The planners were aware that the above changes would result in a more confrontational scenario than had been played in 2008/2009, but this was considered to be in keeping with the overall objective of the focused exercise. The exercise was set up to maximise Host security intrusion; given this, the planners accepted that the Inspectors might not be

[2] AWE – The Atomic Weapons Establishment

completely satisfied with the outcome of their inspection activities. For the planners, a successful conclusion to the exercise was ensuring that the impact of security on the inspection process had been fully explored.

The planners assembled a UK and Norwegian team to play the parts of the Torian Host Party and the Luvanian Inspecting Party respectively. Torland's Host Team was played by experts from AWE and the UK's Ministry of Defence. Luvania's Inspecting Team was played by Norwegian experts with experience acting as inspectors for the Organisation for the Prohibition of Chemical Weapons (OPCW), National Safeguards or as the Host during the 2008/2009 UKNI exercises.

The exercise was designed to run over a three day period. Day 1 and Day 2 would be in play. Day 1 was set aside for negotiation activities with the on-site visit planned for Day 2. Day 3 would be predominantly out of play. During Day 3 the players and planners would review the exercise and discuss observations.

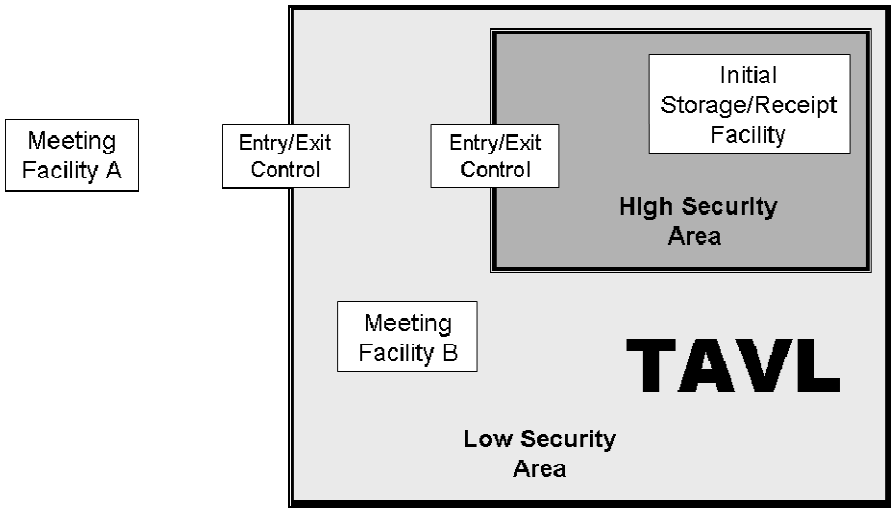

Figure 1: TAVL, Torland's "Atomic Weapons Laboratory" (Focused Exercise, 2010)

4 Managed Access Exercise 2010

Day 1: Negotiations

The Luvanian Inspecting Party arrived at Meeting Facility A with pre-prepared procedural documentation and a structure for the inspection report. The team anticipated that the Host would provide a full, detailed briefing on the facilities and processes prior to the on-site visit. A Health and Safety plan had been developed, and a request was made for a side discussion to agree the contents. It was anticipated that the inspectors would have full access to all areas of relevance to the inspection process, along with supporting schematics which would allow them to identify potential material diversion routes. In order to fully understand the role of the facility within the dismantlement process, Luvania also

requested details of the operations which would take place within the facility, including any associated transport phases. Furthermore, they wished to confirm the location of the site and relevant facilities with a GPS system.

Torland pointed out that TAVL, Torland's "Atomic Weapons Laboratory", was a high security facility, and that Torland had a responsibility to maintain the physical security surrounding assets, staff and operations. Torland regarded the exact layout and design of the facilities as an integral part of the physical security of the site, therefore, maps and schematics could not be released. Torland also pointed out that no-one, including Host personnel, would be allowed to take GPS readings on-site. The physical security surrounding transport phases was particularly sensitive for Torland. Consequently no information was provided regarding the transport vehicles or the timetable for transport phases; Inspectors would not be allowed to witness transport phases.

Torland noted a misunderstanding in terms of the function of the Storage/Receipt facility. This was not a long term storage area but an area that had been set aside to support inspection activities. A containerised Odin weapon would be brought to the facility at the beginning of the inspection process; Inspectors would be given the agreed level of access at that point. Host concerns over site physical security measures meant that they were not prepared to reveal the location or design of the long term storage facility to Luvania. It was noted that the function of the Storage/Receipt facility had not been adequately defined within the initial documentation.

The Torian Host team welcomed the inclusion of the Luvanian pre-prepared documentation and was prepared to discuss the Health and Safety plan. The Host team pointed out that the Storage/Receipt facility was subject to both explosive and radiological safety regulations. As a result, Torland intended to limit the time within the Storage/Receipt facility to a maximum of 75 minutes with only four inspectors per visit. Torland suggested two visits so that all the inspectors would have an opportunity to see the facility. It should be noted that Torland had a secondary security based motive to limit time and numbers, as this made the visit easier to manage. Torland briefly mentioned some of the Managed Access methods that would be deployed but provided no details other than to clarify that the use of notepads would be controlled, and that all equipment would be provided and operated by Host staff. By insisting on the Host supply and operation of equipment, Torland could ensure that it would not be possible for Luvania to take covert measurements within the facility.

The Host provision and operation of equipment impacted on Luvanian plans to trial seals on the containers. This was primarily required to test whether the proposed seal types were fit for purpose. Luvania pointed out that both sides needed to have trust in the equipment. It was agreed to trial a "random sampling" regime which would allow the Inspecting Party to take away a sample of the Host provided seals for testing. Also, the Inspecting Party insisted that they be allowed to check the seals once they had been applied. It was jointly agreed that the discussion of the sealing system should extend to a consideration of the seal reader and the management of any measurement data. The time did not allow for further discussion on this topic, but it was noted that it would have to be addressed as part of a strategy for a future monitoring regime.

Luvania turned to a consideration of a future monitoring strategy and the potential need to make radiation measurements to confirm the information provided in Torland's declaration. The Luvanian Inspectors felt that additional confidence would be gained by deploying measurement techniques as early as possible in the dismantlement process. A radiation measurement system behind an Information Barrier was being developed between Torland and Luvania which could be used in this regard [5]. The Inspectors also suggested a counting activity to confirm the declared number of Odin class weapons that would be entering into the dismantlement process. Therefore the inspectors requested access to see all ten of the Odin weapons scheduled for dismantlement, obtain background radiation readings from the facility and take dimensional measurements to ensure the correct placement of the measurement equipment. In order to understand the impact of the container design on a radiation measurement, a request was made for information about the construction of the container and dimensions.

Torland could not provide any more information than detailed within the declaration[3] with regards the design of the Odin class weapon, as design information is proliferative under Article I of the NPT. Torland agreed that an Information Barrier is required to protect against the release of sensitive information [5]. Dimensional based measurements would have to be tightly controlled to ensure that no information could be gathered about the size of the facility and the size of the container. Torland stated that the container formed part of the physical security plan for the asset; therefore no construction information could be released. Torland was nervous that background radiation measurement may release sensitive information with regards to operations within the facility, but suggested that the issues be discussed as part of ongoing joint technology development activities.

Day 2: Facility Visit

In addition to the 'guards, guns and gates' which are associated with the TAVL site, Torland deployed several additional levels of security to manage the Luvanian access onto the Storage/Receipt facility:

- Initial entry into the protected area involved identification checks, searches and the removal of prohibited items (such as cameras, phones and recording devices).
- Shrouding was deployed to ensure that Inspectors only viewed areas of site directly related to the inspection process.
- The Inspectors were escorted and monitored at all times.
- Entry into and egress from the high security area involved additional identity checks and the deployment of search and detection equipment.
- Entry into and egress from the Storage/Receipt facility was via a Change Barrier (a change into protective clothing). As well as meeting Health and Safety requirements, the implementation of the barrier provided an added a layer of security assurance.
- Movement within the facility was restricted to prescribed walkways; the Inspecting Party was not allowed to approach the container or the walls of the facility.

[3] From Torland's declaration: "Torland's nuclear arsenal includes a total of 10 "Odin" class gravity bombs which are currently in storage. This weapon is a plutonium-based atomic bomb."

- Additional escorts were deployed within the facility.
- Shrouding was used within the facility to conceal items which could provide sensitive or proliferative information.
- Notepads were issued on entry to the Storage/Receipt facility and retained by Torland on exiting the facility. The notepad content was checked by Torland security and photocopies of cleared documents were provided to the Inspectors.
- All equipment was supplied by Torland.
- All equipment was operated by Torland. One inspector was allowed to approach the container to check the integrity of the deployed seals.

The Inspectors were based inside Meeting Facility B for the day and were moved to the Storage/Receipt facility, one group at a time, for the two agreed visits. The level of security came as a surprise as the briefing on Day 1 had not given full details of the Managed Access procedures that would be deployed. As a definition of the function and extent of the facility had not been agreed, there was a misunderstanding with regards to the time allotted to each visit. The Inspectors defined the facility as the room in which the container was housed whereas the Host defined the facility as the whole building including the Change Barrier area. The Change Barrier process took a significant amount of time away from the agreed inspection activities. However, the Inspectors did successfully gain entry into the facility and visual access to the container.

The procedure for seal deployment began with a random selection activity. Torland presented a selection of seals to Luvania; the seals were of a jointly agreed type and had not previously been taken into the high security area. Luvania randomly selected two sample sets:

- The Inspectors were allowed to keep set 1. These were taken off site and destructively analysed.
- Set 2 were placed in a clear plastic bag and were held in dual custody. The Host Party had physical possession of the seals, but the Inspecting Party had visual contact at all times. These seals remained within the facility following application.

In the facility, the Torian staff applied the seals to the container and took reference photographs. A Luvanian Inspector was then allowed to approach the container to physically check the integrity of the seal. Although the random selection process was successful, both sides lost visual custody of the seals at points during the period between selection and deployment within the facility. Despite the increased escorting activities within the Storage/Receipt facility, the escorting team found it challenging to manage the agreed sealing activity.

5 Discussion

Day 3 was primarily ‘out of play’ and was viewed as an opportunity to review the exercise and discuss observations. Further discussion sessions were held during the course of January 2011.

General Observations

Although lessons should be learned from past experience within other regimes (i.e. CWC or Safeguards), this scenario also offered some unique challenges for the Inspecting Party. Observations were made on the difficulty, particularly from the viewpoint of a NNWS, of inspecting such an unfamiliar environment and process. Multiple Familiarisation Visits would probably be required to support the inspection process. Opportunities for NNWS to discuss the challenges of nuclear warhead verification would assist in preparing for a potential verification regime[4]. It was noted that this inspection process seemed to be a hybrid of the 'Scheduled (Routine) Inspection' and 'Challenge Inspection' concepts seen in other regimes.

As the planners expected, the atmosphere of the negotiation visit was adversarial. Although the Inspecting Party achieved their overall objectives for the visit, their confidence in the outputs of the inspection process were low compared with the 2008/2009 exercises (where a more cooperative interaction was encouraged). This highlighted the advantages of a proactive, cooperative Host in the facilitation of a successful inspection process. Clear definitions of terminology and the unambiguous communication of relevant information would also have helped to aid Host-Inspector interactions. This is particularly important in this scenario where the Host is unable to discuss certain elements of the process because of proliferation and national security concerns.

[4] Example activity: UKNI Workshop December 2011 [6].

The impact of Host security measures on the Inspection regime

The primary objective for the Inspectors was to understand relevant processes, routes and facilities by obtaining access to the initial Storage/Receipt facility. Host security and proliferation concerns meant that the preliminary information provided during the negotiation phase was limited. Ambiguity in the language used to describe the facility, both during discussions and within the supporting documentation, meant that there was a fundamental misunderstanding with regards to the function of the Storage/Receipt facility. Inspectors successfully negotiated access to the facility with a view to clarifying the situation and compensating for the lack of building schematics. However, Torland's Managed Access procedures limited time within the facility and did not provide the freedom of movement to fully explore inside the facility or view adjoining areas. As a result, potential material diversion routes could not be identified. The Inspectors left with an overview of the facility and related operations, but not how those operations linked to the overall dismantlement process.

The second objective for the Inspectors was to consider a strategy for a future monitoring regime. The two concepts that were discussed were a sealing strategy for the container and the deployment of a radiation detector behind an Information Barrier. Torland was unwilling to discuss the construction of the container because of security concerns; this made it hard to assess the effectiveness and vulnerability of the proposed technologies. A lack of information about the facility in which the radiation measurement system was to be deployed again prompted questions in terms of the Host's ability to 'spoof' the measurement.

The Host supply and operation of equipment was in part counteracted by the trial of a random selection process, which did give both parties a level of confidence in the integrity of equipment. However, the system requires additional thought particularly with regards to the movement of equipment into the facility and the management of data leaving the facility. The Host application of the seals followed by Inspector confirmation of integrity was achieved, but the process was described as 'awkward', as the equipment and escorting concept had not been designed with ease of deployment in mind.

Demonstration of the safety regulatory environment associated with a nuclear weapons laboratory

The Inspecting Team felt that the safety regime was more intrusive than expected. The primary impact experienced by the Inspectors in this exercise scenario was in terms of the limit on the number of Inspectors allowed into the facility. This safety measure results from a combination of explosives and fire regulations. This had two effects on the inspection regime: time and communication. The time required for the inspection process increased because multiple visits were required to the facility. The Inspection Team was split between multiple buildings which made communication, and consequently coordination, increasingly difficult.

6 Conclusions

In summary, safety and security concerns will potentially affect:

- The level of information released by the Host.
- The time that inspection activities will take.
- The number of Inspectors that can be deployed with a given facility.
- Communication and coordination between Inspecting Teams.
- Deployment of equipment within sensitive facilities.

The focused 2010 Managed Access exercise showed how the security/safety regime implemented by the Host state could impact on the Inspectors' ability to assess the potential threats to, and vulnerabilities of, a potential future monitoring regime. It should be noted that despite the intrusive levels of the Host security and safety arrangements, the Inspecting Party still managed to complete the objectives of the Familiarisation Visit, albeit with a low level of confidence in the outputs from the visit. A comparison between the adversarial environment of the 2010 exercise and the collaborative environment of the 2008/2009 exercises indicate that a collaborative environment, and a proactive Host, could help to facilitate the inspection process and increase confidence levels in the overall verification regime. However, even in a cooperative environment, security and safety will still have a significant impact on the inspection regime.

In conclusion, the exercise provided a common understanding within the UKNI collaboration of the impact that Host security and safety could have on an inspection regime. This is essential for technology and procedural development in the future.

7 References

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