



Summary Report of the IPNDV Plenary Meeting London, United Kingdom

December 4-7, 2018

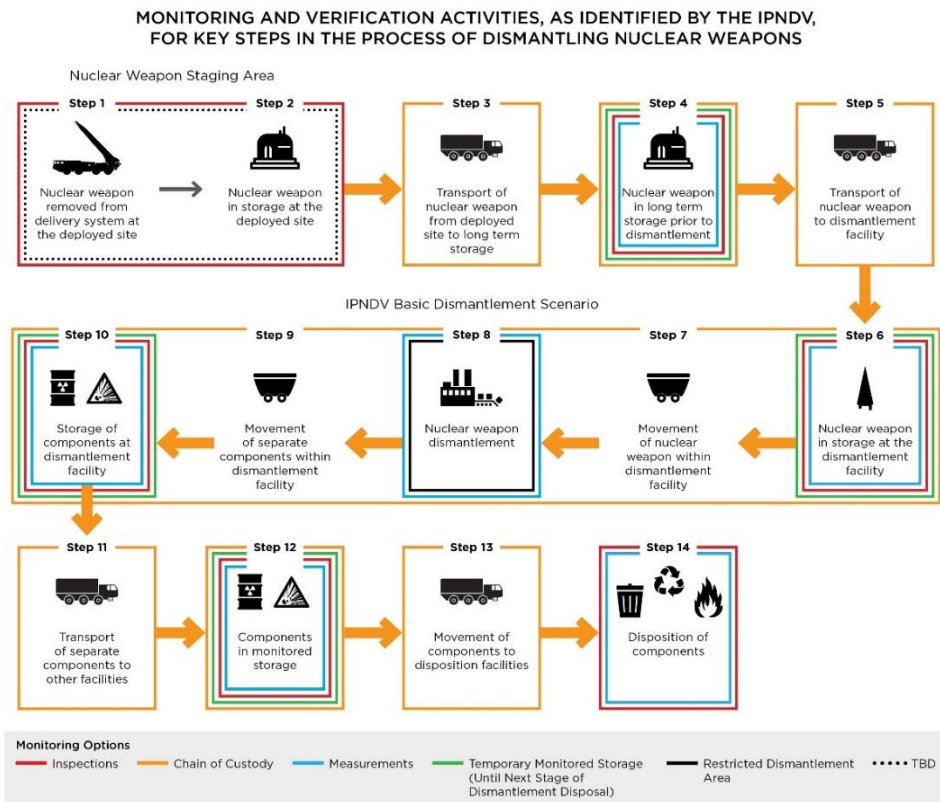


The International Partnership for Nuclear Disarmament Verification (IPNDV - “the Partnership”) held the first plenary meeting of Phase II in London, United Kingdom, December 4-7, 2018. This plenary marks the halfway point of the Partnership’s Phase II which will conclude at the end of 2019. More than 100 experts from 23 countries and the European Union participated. During this plenary meeting, the working groups constituted under Phase II continued to refine their respective programs of work, and began to consider what products they will produce at the conclusion of Phase II.

The London meeting also included a visit to RAF Honington, a former RAF operational nuclear weapons base and the location of the Quad “Letterpress” exercise. Participants toured hardened aircraft shelters and former nuclear weapons storage bunkers used during the exercise. The trip to this former nuclear weapons base helped to familiarize participants with realistic examples of nuclear weapons storage sites, a facility type that many would never have had the opportunity to visit.

Additionally, the Partnership continued planning for a set of practical exercises and technology demonstrations that will take place throughout 2019. Summaries of the outcomes of each of the Working Groups and the Exercise/Demonstration Planning Group follow below.

Figure 1- 14 Steps in Nuclear Weapons Dismantlement



Working Group 4 - Verification of Nuclear Weapon Declarations **Co-Chairs: The United Kingdom (David Chambers) and Poland (Marek Sobótko)**

Working Group 4 (WG4) continued its work from the previous IPNDV meeting in Seoul by reviewing a set of new papers on declarations. These papers covered topics such as the role of transparency in declarations, the role and objectives of declarations in different phases of disarmament, site-specific issues that may arise in verifying the completeness of a declaration, the challenges and complications connected with verifying the completeness of nuclear warhead declarations by a state, and weapon-specific issues to address correctness of nuclear weapon declarations.

WG4 determined that many of the technical questions inherent in these topics, particularly on weapon-specific issues and the use of unique identifiers and absence measurements, would be best suited for collaborative work with Working Group 6 (WG6). WG4 also focused on certain key definitions relevant to declarations, including the definitional reach of “nuclear weapon,” “item declared as a nuclear weapon,” and “transparency.” WG4 will revisit some of these key definitions in a paper at the next working group meeting in March 2019.

WG4 also reviewed a nuclear disarmament scenario with a simplistic initial baseline declaration on which to base its work for the remainder of Phase 2. This scenario will enable the group to focus its work and to more easily identify and assess possible future verifications options. In addition, WG4 also studied the declarations and inspection regimes in the Treaty on Conventional Armed Forces in Europe and applied them to this hypothetical scenario during a table-top exercise. A prominent question throughout this exercise was whether certain inspection regimes applied to conventional weapons could equally apply to nuclear weapons, or if they would need to be significantly adapted to provide confidence in the correctness and completeness of state declarations. To address this question, WG4 members worked in small groups to develop potential inspection approaches to three different fictional nuclear weapon deployment sites and to identify non-declared sites of interest within the fictional State.

WG4 discussed plans for 2019 and intends to develop several additional papers addressing: verification options for declared nuclear weapons and nuclear weapon sites/facilities including building confidence over time, based on the outcomes of the table top exercise, options for verifying absence of nuclear weapons at non-declared sites State wide, potential statistical models for evaluating confidence in compliance, and reviewing and updating inspection modalities and terms and definitions from Phase I.

Working Group 5 - Verification of Reductions **Co-chairs: The Netherlands (Piet de Klerk) and Australia (Rob Floyd)**

In London, Working Group 5 (WG5) continued its work on verification objectives across the 14 steps of nuclear weapon dismantlement, which range from the removal of nuclear weapons from deployed delivery systems to the disposition of dismantled components (figure 1). The group is developing a thorough description of the verification process for each of the 14 steps of nuclear

weapon dismantlement that outlines verification objectives, as well as potential inspection procedures/technologies to achieve those objectives across the 14 steps. WG5 and WG6 held combined meetings to discuss the utility of different verification technologies at each of the 14 steps and the groups anticipate continuing similar combined sessions at future meetings.

WG5 reviewed papers prepared by Partners in advance of the meeting on mapping of verification requirements across the 14 steps. While each step is differentiated individually, in London the members considered all 14 steps holistically, where the verification results from one step may carry over into subsequent steps, along with “cross-cutting” measures. The members also discussed that among the 14 steps, “initialization” (the point at which a nuclear weapon is “born” into a treaty verification regime) could start at any of the steps given the particularities of the country and its systems.

WG5 also received several presentations that examined various initiatives which may have applicability to the group’s work. These included: a paper examining how to determine the frequency of (re)confirmation activities from the United States and Germany; a case study that develops a model of a fictional nuclear weapon state for use in exercise activities from the United States, United Kingdom, and France; the potential for developing a physical model of acquisition and diversion pathways from Germany; and a paper on completeness in verification from the United Kingdom and Norway. WG5’s discussion also identified issues and questions that could be addressed in an upcoming Walkthrough Exercise of the 14 steps.

Moving forward, WG5 expects its Phase II deliverables to be: a comprehensive paper on the 14 steps of the dismantlement process, a paper assessing potential options for disposition of nuclear material following the dismantlement process, and a description of elements and options for future practical arrangements for multilateral verification of commitments by one or more states to dismantle an agreed set of nuclear warheads.

Working Group 6 - Technologies for Verification

Co-chairs: Sweden (Jens Wirstam) and the United States (Carol Mertz)

Working Group 6 (WG6) continued its detailed technical discussions focused on developing a toolbox of potentially applicable technologies that could support future verification of nuclear weapon dismantlement. The group discussed technology gaps identified in Phase I and considered ways to make progress on work in Phase II, including planned technology demonstrations. Members received presentations from Sweden on their “Food-for-Thought” paper focused on the disposition of dismantled nuclear weapon components in step 14, Japan on the end state of step 8 and sensitivity analysis, and from Germany and the Netherlands on absence measurements. The group also reviewed questions posed by members of WG5 regarding potential technologies that could be applicable at each of the 14 steps.

WG6 discussed potentially applicable technologies for steps 1-5 of the 14-step process, when the nuclear warhead is removed from deployed delivery systems and placed into interim long-term

storage before dismantlement, and at steps 11-14, when the fissile material and the high explosives are separated and disposed of after dismantlement. Specifically, the group considered how different classes of technologies—those supporting chain of custody and radiation detection specifically—could be used in combination across the steps in order to strengthen the confidence in the dismantlement process. To this end, WG6 continued their assessments of technologies applicable at steps 1-5/11-14 and populated technology matrices.

In preparation for the next Joint Working Group meeting, WG6 members intend to develop several technical papers and presentations, some in cooperation with members of WG5. Expected papers are: a “deep dive” on step 14 by Sweden (in coordination with members of WG5); measurements under optimal conditions by Finland; and absence measurements by Germany and the Netherlands. Additionally, WG6 anticipates a presentation on the Black Sea experiment by Norway and updated spreadsheets for Special Nuclear Material (SNM) and High Explosives (HE) monitoring by the U.S. co-chair. WG6 members hope to incorporate input from other working groups at the next Joint Working Group meeting in March.

Exercise/Demonstration Planning Group

The Exercise/Demonstration Planning Group met twice during the London meeting. The Group is coordinating the planning of several exercise/demonstration activities in 2019.

The Partnership will conduct a series of exercise and technology demonstrations designed to assess the work done to date by the working groups:

- France and Germany will jointly host a “deep dive” exercise in September that focuses on potential procedures and technologies to verify the dismantlement of a nuclear weapon occurring in step 8. In this scenario, dismantlement is defined as the separation of the SNM and HE in the weapon.
- The Partners will conduct a tabletop walkthrough exercise similar to the one conducted in Phase I ([link to report](#)), that addresses all 14 steps. This exercise will assess potential procedures and technologies applicable across the entire dismantlement process, including a focus on proposed modifications of approaches identified in Phase I, trade-offs between monitoring/inspection procedures, and the implications of considering the 14-step dismantlement process as a whole rather than as discrete steps.
- Belgium will host a technology demonstration assessing various methods to detect the presence/absence of nuclear material during the dismantlement process.
- Canada will host a technology demonstration assessing the potential for detection of SNM by muon scattering.

Summary

The meeting in London served as a productive review of the ongoing work in Phase II. While there remains a great deal to be done, the Working Groups took strong, positive steps towards

further refining their work plans. At the next Joint Working Group meeting in Helsinki, the working groups will continue their work, and begin to finalize specific tasks and products to be developed by the conclusion of Phase II in December 2019.

