

## INITIAL PHASE OF INTERNATIONAL PARTNERSHIP FOR NUCLEAR DISARMAMENT VERIFICATION (IPNDV)

Eunhee Yi\*, Sunyoung Chang

Korea Nuclear Non-proliferation and Control, 1534 Yuseong-daero, Yuseong-gu, Daejeon, ROK

\*Corresponding author: ehyi@kinac.re.kr

### 1. INTRODUCTION

The International Partnership for Nuclear Disarmament Verification (IPNDV) was established in March 2015, co-led by US Department of State and Non Government Organization called Nuclear Threat Initiative (NTI); The IPNDV is the first multilateral cooperation body of approximately 30 nuclear and non-nuclear weapon states, international organizations and NGOs, to verify the nuclear weapon disarmament.

The IPNDV was established to deliver expertise, developing verification procedures and concepts of nuclear warhead dismantlement and nuclear weapon elimination.

The effective implementing activities are played an important role by the three Working Groups (WGs) which not only build capacity among partner nations but also draw ten conclusions on the fundamental issues of monitoring and verifying nuclear weapons. The roles and outputs of the WGs are summarized in Table 1.

Table. 1 Working Group Classification

| Classification                                 | Output Document  |
|--|--|
| (WG 1)<br>Monitoring & verification objectives | <ul style="list-style-type: none"> <li>• A framework document with definitions, principles and good practices</li> <li>• Monitoring &amp; verification requirements</li> <li>• A capacity mapping for monitoring &amp; verification</li> </ul>                                   |
| (WG 2)<br>On-site inspections                  | <ul style="list-style-type: none"> <li>• Useful elements and new technologies of on site</li> <li>• Best practices</li> <li>• Future nuclear disarmament verification activities</li> </ul>  |
| (WG 3)<br>Technical challenges & solutions     | <ul style="list-style-type: none"> <li>• Drawing lessons from existing activities</li> <li>• Assessing the approaches to identify nuclear warhead authentication</li> <li>• Verification of separate storage</li> <li>• Monitoring and verification technology status</li> </ul> |

In this paper, the current progress status is reviewed along with the implications of the IPNDV at the end of 2017 when the IPNDV's phase 1 is completed.

### 2. PROGRESS STATUS PHASE 1

The period of the IPNDV's phase 1 is from March 2015 to Nov. 2017. It aims to complete the ten output documents addressing specific tasks of each working group by the 5th plenary meeting in Argentina.

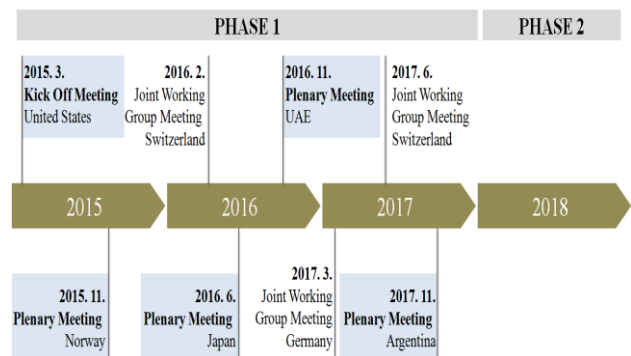


Fig. 1 The IPNDV Progress Timeline

Source: NTI web page

It is focused on the nuclear warhead dismantlement process and the monitored storage of nuclear materials resulting from dismantled nuclear weapons.

It established the extent of verification during the phase 1; Via simple scenario development, technical requirements need to be procured for monitoring and verification by three steps(⑧ Nuclear weapon dismantlement → ⑨ Movement of separate components with dismantlement facility → ⑩ Storage of components at dismantlement facility) in the Progress of Dismantling Nuclear Weapons. [2]

**[The 14 Steps in the Progress of Dismantling Nuclear Weapons]**

① Nuclear weapon removed from delivery system at the deployed site → ② Nuclear Weapon in storage at the deployed site → ③ Transport of nuclear weapon from deployed site to long term storage → ④ Nuclear weapon in long-term storage prior to dismantlement → ⑤ Transport of nuclear weapon to dismantlement facility → ⑥ Nuclear weapon in storage at the dismantlement facility → ⑦ Movement of nuclear weapon within dismantlement facility → ⑧ Nuclear weapon dismantlement → ⑨ Movement of separate components with dismantlement facility → ⑩ Storage of components at dismantlement facility → ⑪ Transport of separate components to other facilities → ⑫ Components in monitored storage → ⑬ Movement of components to the disposition facilities → ⑭ Disposition of components

**3. THE ACHIEVEMENT FROM THE PHASE I  
AND THE FUTURE DIRECTION**

**3-1. Outputs from the phase 1**

According to the 14 Steps in the Progress of Dismantling Nuclear Weapons, six areas were set up between step the six and ten, and the implementation of key surveillance has been discussed such as technologies and procedures for monitoring and inspection each zone.

- ① Location 1 (temporary storage → storing nuclear explosive in the storage): Confirmation of reported surveillance, monitoring and inspection
- ② Location 2 (initial measurement of NDA before dismantlement): identification of nuclear materials and high explosives in use of measuring device and technology, monitoring and inspection
- ③ Location 3 (entrance of dismantlement area): maintaining continuous inspection from Location 2 to dismantlement, monitoring and inspection
- ④ Location 4 (exit of dismantlement area): maintaining continuous inspection of nuclear materials and high explosives, monitoring and inspection

- ⑤ Location 5 (measurement of NDA after dismantlement)
- ⑥ Location 6 (storing nuclear materials and high explosives in the temporary storage)

It is agreed to discuss further in phase 2 monitoring and verification for specific areas such as information barrier sensitive data processing, high explosives detection and nuclear explosive template.

For monitoring and verification of nuclear weapon dismantlement, the detailed application techniques are classified into ‘continuity of surveillance’, ‘high explosives’ and ‘nuclear materials’ to modify and supplement the ‘technical data sheet’ of principle, methodology, measurement time, applicability of equipment and technical limitations by each technology.

Technical limitations and blank technologies derived from Phase 1 are summarized and will be developed in Phase 2.

- Detection and characterization of explosives in a closed container (that is not a swipe sample or destructive to the container or contents.)
- Quantification of the mass of explosives in a closed container (that may contain additional contents.)
- Passive measurement of uranium isotopic and mass in a closed container
- Methods for detecting explosives in a room from a distance
- Additional nuclear weapons template methods
- Information barrier methods
- Evaluation of potential nuclear weapon intrinsic signatures before and after dismantlement

The IPNDV is under development of ‘Information Integration System ([www.portal.ipndv.org](http://www.portal.ipndv.org))’ for its data and information management. In order to strengthen IPNDV’s objectives as well as achievements and enhancement of communication and cooperation at the

phase 1, NTI is planning to develop a website ([www.ipndv.org](http://www.ipndv.org)). The IPNDV's phase 1 summary report will be published and the IPNDV are defined.

### **3.2 Progress of Phase 2(2018~)**

Based on the simple scenario derived from the phase 1, more practical and effective monitoring and verification technologies will be developed for each step of nuclear weapons dismantlement process, along with the training and experiment plan.

The outreach activities such as education and training for non-member states to join the IPNDV will be enhanced.

A simple scenario will be enlarged to the 14 steps of nuclear weapons dismantlement. Most of all, the nuclear weapon reduction and the limitation steps are expected to be concentrated from the Phase 2.

## **4. IMPLICATIONS**

Technologies and procedures will be needed to support future nuclear arms control and disarmament initiatives. Particularly nuclear weapon verification and monitored dismantlement of nuclear weapons will require collaboration and testing, technical cooperation.

- Cooperation among partnership nations will be strengthened in the future to identify and develop technologies and procedures to protect classified sensitive information and increase the reliability of monitoring and verification regarding nuclear warhead dismantlement.
- Technical and procedural knowledge is anticipated to expand on nuclear warhead dismantlement and transparency.

Verification systems are important to managing mitigation threats related to weapons of mass destruction, especially for nuclear weapons. These are essential for providing assurance that all nations are in compliance with their obligations under the regime.

Mistrust have stalled non-proliferation, arms control, and disarmament talks in the past. Transparency provided by independent verification can be a motivator; The IPNDV is expected to possibly overcome this problem through multilateral cooperation if it establishes a verifiable system including nuclear dismantlement process and technologies, and secures the reliability.

In the perspective of South Korea, it is necessary to participate actively in international efforts for nuclear disarmament, establish South Korea's participation plan, and collect the relevant information of the IPNDV's nuclear warhead dismantlement process to prepare for future verification of nuclear weapons in North Korea.

## **REFERENCES**

- [1] NTI web site ([www.nti.org](http://www.nti.org)) (2017.8.)
- [2] Ministry of foreign affairs(ROK), The Outline of IPNDV (2017.6.)