IPNDV Phase I - Work and Results

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MONITORING AND VERIFICATION ACTIVITIES, AS IDENTIFIED BY THE IPNDV, FOR KEY STEPS IN THE PROCESS OF DISMANTLING NUCLEAR WEAPONS

**Nuclear Weapon Staging Area**
- Step 1: Nuclear weapon removed from delivery system at the deployed site
- Step 2: Nuclear weapon in storage at the deployed site

**IPNDV Basic Dismantlement Scenario**
- Step 3: Transport of nuclear weapon from deployed site to long-term storage
- Step 4: Nuclear weapon in long-term storage prior to dismantlement
- Step 5: Transport of nuclear weapon to dismantlement facility
- Step 7: Movement of nuclear weapon within dismantlement facility
- Step 8: Nuclear weapon dismantlement
- Step 9: Movement of separate components within dismantlement facility
- Step 10: Storage of components at dismantlement facility
- Step 11: Transport of separate components to other facilities
- Step 12: Components in monitored storage
- Step 13: Movement of components to disposition facilities
- Step 14: Disposition of components

**Monitoring Options**
- Inspections
- Chain of Custody
- Measurements
- Temporary Monitored Storage (Until Next Stage of Dismantlement Disposal)
- Restricted Dismantlement Area

*We make the assumption that there will be declarations at each step in the process.*
### Step 8: Nuclear Weapon Dismantlement

<table>
<thead>
<tr>
<th>Step 8a: Entry of nuclear weapon into dismantlement area</th>
<th>Step 8b: Exit from dismantlement area (after dismantlement)</th>
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</thead>
<tbody>
<tr>
<td><strong>Monitoring/inspection tasks:</strong></td>
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<tr>
<td>• Ensure unbroken chain of custody</td>
<td>• Ensure onward chain of custody of SNM/HE containers after exit</td>
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<tr>
<td>• Ensure integrity of dismantlement area so that nuclear weapon/SNM or HE cannot leave area unobserved</td>
<td>• Measure SNM/HE containers exiting area to confirm SNM/HE</td>
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<tr>
<td>• Confirm no remaining SNM/HE or weapon in dismantlement area—and no unauthorized removal</td>
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<td>• Other inspection activities</td>
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<th>Technologies/procedures options:</th>
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<td>• Inspections, containment, and surveillance technologies to verify design and ensure no unauthorized removal or tampering with area</td>
<td>• Same as 6a (chain of custody, integrity of area)</td>
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<td>• Portal monitoring of entry-exit to dismantlement area</td>
<td>• SNM/HE —same as 6b but added techniques given nuclear weapon now dismantled</td>
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<td>• Use of radiological/HE detection equipment to detect presence of SNM/HE in the dismantlement area</td>
<td>• Portal monitoring of entry-exit</td>
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<td>• Re-inspect with radiological/HE detection equipment to ensure absence of any remaining SNM/HE in dismantlement area</td>
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<td>• Use of nuclear weapon “templates”</td>
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Goal BA.1: Confirm unbroken chain of custody upon entry into the dedicated dismantlement area

Task: Verify container identity and integrity

Technologies & Procedures:
- Container Integrity Assessment Technologies and 3D Container Identification
- Physical Verification of the Container
- Tamper Indicating Devices and Seals

Tamper Indicating Devices and Seals

Tamper indicating devices and seals, such as mechanical bolt seals or electronic optical seals, provide an indication if a container, room, or other enclosure has been opened or tampered with.

Benefits:
- Many seals and enclosures are well-developed and tested through years of deployment in the field

Limitations:
- Some seals and enclosures are one-time use and need to be reapplied after the container or room has been accessed.

Time Required:
- Several seconds up to several minutes for both installation and inspection

Image courtesy of the IAEA Imagebank

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IPNDV Phase I Key Judgment:

While tough challenges remain, potentially applicable technologies, information barriers, and inspection procedures provide a path forward that should make possible multilaterally monitored nuclear warhead dismantlement while successfully managing safety, security, non-proliferation, and classification concerns in a future nuclear disarmament agreement.