NUCLEAR ARMS CONTROL AND DISARMAMENT POLICY BEYOND THE OBAMA ADMINISTRATION

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OUTLINE / OVERVIEW

- Multilateral Arms Control
- The U.S. Nuclear Arsenal: Size and Posture
- Modernization of the U.S. Nuclear Arsenal
- Charting a Path Forward
- Verification Challenges of Nuclear Disarmament
- Conclusion
MULTILATERAL ARMS CONTROL
RELEVANT NUCLEAR ARMS CONTROL TREATIES

**NUCLEAR NON-PROLIFERATION TREATY**
Bans the acquisition of nuclear weapons by non-weapon states and commits the five weapon states to nuclear disarmament; verified by IAEA safeguards

**COMPREHENSIVE TEST BAN TREATY**
Bans all nuclear explosions in all environments and would be verified by extensive verification mechanisms (International Monitoring System, CTBTO)

**FISSILE MATERIAL (CUTOFF) TREATY**
At a minimum, treaty would ban fissile material production for weapons purposes; Issue about treaty scope: Would it also cover existing stocks?

**NEXT-GENERATION NUCLEAR DISARMAMENT TREATIES**
Agreements that place limits on total number of nuclear warheads in arsenals would pose qualitatively new verification challenges
**SCOPE OF THE CTBT**

The CTBT bans all nuclear explosions in all environments.

Signed by 183 states, ratified by 164 states (as of September 2016).

Enters into force when 44 “nuclear capable” countries have ratified.

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**WHILE AWAITING ENTRY INTO FORCE OF THE CTBT**

The Obama Administration is seeking a UN Security Council resolution reinforcing the global norm against nuclear testing; it reportedly also seeks a separate statement by P5 countries recognizing that any future nuclear test defeats the “object and purpose” of the CTBT.
FISSILE MATERIAL (CUTOFF) TREATY

SCOPE OF AN FMCT

FMCT would ban production of fissile materials for weapon purposes
De-facto FMCT for non-weapon states already exists (NPT)
Note: Fissile material production for weapon purposes has ended in NPT weapon states

UNBLOCKING THE CONFERENCE ON DISARMAMENT

In 2016, the United States introduced a proposal for a revised mandate, not referring the “Shannon Mandate” from 1995

Sources: U.S. Department of Energy (top)
NUCLEAR ARSENAL

(SIZE AND POSTURE)
GLOBAL NUCLEAR WEAPON INVENTORY
1945–2016


More than 12,000 nuclear warheads are not currently captured by arms control agreements.
2010 NUCLEAR POSTURE REVIEW

APRIL 2010

Five key objectives of U.S. nuclear weapons policies and postures:

1. Preventing nuclear proliferation and nuclear terrorism;
2. Reducing the role of U.S. nuclear weapons in U.S. national security strategy;
3. Maintaining strategic deterrence and stability at reduced nuclear force levels;
4. Strengthening regional deterrence and reassuring U.S. allies and partners; and
5. Sustaining a safe, secure, and effective nuclear arsenal.
FUTURE REDUCTIONS IN THE ARSENAL

2010 NUCLEAR POSTURE REVIEW

Future efforts should “engage Russia [...] in negotiations aimed at achieving substantial further nuclear force reductions and transparency that would cover all nuclear weapons ...”

2013 BERLIN SPEECH

President Obama announces possibility of further reductions of “deployed strategic nuclear weapons by up to one-third,” i.e., down to 1000–1100 weapons; ideally, in negotiated cuts with Russia

Source: www.whitehouse.gov/the-press-office/2013/06/19/remarks-president-obama-brandenburg-gate-berlin-germany
THE OTHER SIDE OF THE COIN
(MODERNIZATION OF THE U.S. NUCLEAR ARSENAL)
$1 TRILLION
$1,000,000,000,000,000

Source: Tom Collina
"MODERNIZATION MOUNTAIN"

Undated chart by the U.S. Department of Defense Cost and Program Evaluation (CAPE) office
Estimated Costs for Nuclear Triad Modernization

- **Ohio replacement**: new ballistic missile submarine fleet - $140 billion
- **B-21**: new strategic bomber fleet - >$100 billion
- **GBSD**: new ICBM fleet - $62 billion
- **LRSO**: new ALCM fleet - ~$10 billion

**Total DoD nuclear modernization cost over 20 years**: $350-450 billion

**Total NNSA weapons cost over 25 years**: >$300 billion

*In FY2016 constant dollars

Note: All figures in then-year dollars unless otherwise noted

U.S. NUCLEAR MODERNIZATION

POSSIBLE (COST-SAVING) SCENARIOS

**BUDGETARY CONSTRAINTS MAY REQUIRE REASSESSMENT**

Possible life-extension of the existing Minuteman-III missile?
Possible cancellation of the new nuclear cruise missile (LRSO) project?
Possible lower number of submarines?

**FROM THE NUCLEAR TRIAD TO A NUCLEAR DYAD?**

In the discussion, since the 1980s; 2010 NPR confirmed (only) that Triad “will be maintained under New START”

Sources: U.S. Air Force and U.S. Navy
THE “NO FIRST USE” DEBATE

2010 NUCLEAR POSTURE REVIEW
Use of nuclear weapons only under “extreme circumstances to defend the vital interests of the United States or its allies and partners;” the United States will work to establish conditions under which a sole-purpose policy (i.e., to deter nuclear attacks) could be safely adopted.

2013 NUCLEAR WEAPONS EMPLOYMENT STRATEGY
“The guidance narrows U.S. nuclear strategy to focus on only those objectives and missions that are necessary for deterrence in the 21st century. In so doing, the guidance takes further steps toward reducing the role of nuclear weapons in our security strategy.”

Sources: John Carleton/Flickr (image, top), Robert Burns/AP (bottom), and Factsheet, Whitehouse, June 19, 2013
CHARTING A PATH FORWARD
NON-PROLIFERATION AND DISARMAMENT INITIATIVE (NPDI)

BACKGROUND

Established in 2010, the NPDI has 11 members, recognizing “the need for a systematic and continued reduction in all types of nuclear weapons, including non-strategic and non-deployed nuclear weapons”

CURRENT PRIORITIES

Increased transparency of nuclear weapon states
Reduced role of nuclear weapons in security strategies
De-alerting of nuclear weapons

Sources: government.nl (top) and defenseimagery.mil (bottom)
WHAT WOULD IT TAKE FOR THE UNITED STATES TO GIVE UP NUCLEAR WEAPONS?

(FIVE CONDITIONS, ACCORDING TO THE 2010 NUCLEAR POSTURE REVIEW)

“The conditions that would ultimately permit the United States and others to give up their nuclear weapons without risking greater international instability and insecurity are very demanding. Among those conditions are success in halting the proliferation of nuclear weapons, much greater transparency into the programs and capabilities of key countries of concern, verification methods and technologies capable of detecting violations of disarmament obligations, enforcement measures strong and credible enough to deter such violations, and ultimately the resolution of regional disputes that can motivate rival states to acquire and maintain nuclear weapons. Clearly, such conditions do not exist today.”

Looking Ahead: Toward a World without Nuclear Weapons

Nuclear Posture Review Report, April 2010
## Transparency Scorecard, 2016

### Information on Nuclear Warhead and Fissile Material Inventories and Status

<table>
<thead>
<tr>
<th>Category</th>
<th>United States</th>
<th>Russia</th>
<th>Britain</th>
<th>France</th>
<th>China</th>
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<tr>
<td>Number of total warheads</td>
<td>Approximate</td>
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<td>Yes (upper limit)</td>
<td>Yes (upper limit)</td>
<td>Relative (out of date)</td>
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<td>Yes (planned)</td>
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<tr>
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<td>Partial</td>
<td>Partial (some plutonium)</td>
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</tbody>
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A. Glaser, Nuclear Arms Control and Disarmament Policy Beyond the Obama Administration, Tokyo, September 2016
VERIFICATION CHALLENGES OF NUCLEAR DISARMAMENT

(AND THE POTENTIAL ROLE OF NUCLEAR NON-WEAPON STATES)
Five-year project, funded by U.S. DOE, 13 U.S. universities and 9 national labs, led by U-MICH
Princeton participates in the research thrust on disarmament research
(and leads the research thrust of the consortium on policy)
INTERNATIONAL PARTNERSHIP
FOR NUCLEAR DISARMAMENT VERIFICATION

Established in 2015; currently 26 participating countries (including Japan)

Working Group One: “Monitoring and Verification Objectives” (chaired by Italy and the Netherlands)
Working Group Two: “On-Site Inspections” (chaired by Australia and Poland)
Working Group Three: “Technical Challenges and Solutions” (chaired by Sweden and the United States)

www.state.gov/t/avc/ipndv
WHAT IS TO BE VERIFIED?

THERE REMAIN MAJOR GAPS AND CHALLENGES FOR VERIFIED NUCLEAR DISARMAMENT

A Fictional Nuclear Weapon State
www.verification.nu
World Stockpiles of Fissile Materials

1345 tons of highly-enriched uranium

503 tons of separated plutonium

1380 tons of highly-enriched uranium

495 tons of separated plutonium

each block = 50 kg of HEU, the amount necessary to make a first-generation fission bomb; 27,600 bombs-worth total

each block = 5 kg of Pu, the amount necessary to make a first-generation fission bomb; 99,000 bombs-worth total

Graphic by Alex Wellerstein, nuclearsecrecy.com
WILL WE EVER KNOW HOW MUCH FISSION MATERIAL EXISTS WORLDWIDE?

RECONSTRUCTING HISTORIC FISSION MATERIAL PRODUCTION

Many aspects of declared production histories can be reviewed for consistency even without verification

(for example, by comparison with historic krypton emissions)

DATA EXCHANGE AND NUCLEAR ARCHAEOLOGY

Verification could begin with data exchanges (e.g. sharing of available operating records) and, eventually, envision onsite inspections

Nuclear archaeology is based on nuclear forensic analysis of samples taken at former production facilities

NUCLEAR ARCHAEOLOGY WOULD HAVE BEEN USED TO VERIFY NORTH KOREA’S PLUTONIUM DECLARATION

FORENSIC ANALYSIS OF GRAPHITE SAMPLES COULD CONFIRM TOTAL PLUTONIUM PRODUCTION IN NORTH KOREA WITHIN AN UNCERTAINTY OF ±2 KG

The banner reads: “Let’s protect Dear General Kim Jong Il desperately!”
Credit: CNN/Brian Rokus, 2008

Unit cell of the DPRK Yongbyon reactor

Sampling Position
FISSILE MATERIAL PRODUCTION FOR WEAPONS HAS LARGELY ENDED BUT FACILITIES ARE BEING DECOMMISSIONED OR DEMOLISHED

Shutdown of the last Russian plutonium production reactor ADE-2 in Zheleznogorsk, 2010
Source: U.S. Department of Energy

Demolition of the K-25 uranium enrichment plant began in December 2008 and has been completed in 2012
Source: Bechtel Jacobs
MANY NON-NUCLEAR WEAPON STATES HAVE CANDIDATE FACILITIES THAT COULD BE USED TO DEMONSTRATE METHODS REQUIRED FOR NUCLEAR ARCHAEOLOGY

MZFR (200 MW), Karlsruhe, Germany
Now decommissioned

Tokai Magnox (587 MW), Tokai, Japan
Now decommissioned
THE IMPERATIVE OF HIROSHIMA AND NAGASAKI

REMARKS BY U.S. PRESIDENT OBAMA AND PRIME MINISTER ABE
HIROSHIMA PEACE MEMORIAL, MAY 27, 2016

We are determined to realize a world free of nuclear weapons. No matter how long and how difficult the road will be, it is the responsibility of us who live in the present to continue to make efforts.

(Prime Minister Shinzō Abe)

Source: Carlos Barria/Reuters