

Abstract: The CTBT's verification provisions- especially the IMS -are unparalleled in arms control agreements. Yet, verification concerns were key in the 1999 US Senate rejection of the CTBT. More generally, the role of effective verification has not been not been sufficiently acknowledged recently. The Treaty on the Prohibition of Nuclear Weapons, for example, reduces verification to Comprehensive Safeguards Agreements, thus taking a step back from the more rigorous Additional Protocol. Similarly, the demise of the Intermediate-Range Nuclear Forces Treaty underlines the importance of verification of treaties, with 'disarmament verification' having become a buzzword in the framework of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). We argue that the CTBT's contribution to arms control verification should be leveraged not only for strengthening the NPT in trying to work out what verification would look like in a nuclear disarmament context, but also for achieving entry-into-force of the CTBT itself. The nuclear tests conducted by the Democratic People's Republic of Korea (DPRK) demonstrate that the IMS works and that the CTBT is verifiable. Now is the time to highlight the CTBT's unparalleled verification contribution to arms control, its expertise to verify the closure of the DPRK's test site, and to persuade the United States and China that they could strengthen a weakened NPT by showcasing their fidelity to NPT Article 6 through CTBT ratification.

How progress in verification deliberations preceded and facilitated progress in (political) negotiations

- The conclusion of a comprehensive nuclear-test-ban had been aspired to since at least the mid-1950s. In 1958, the United Kingdom, the United States, and the Soviet Union started nuclear test ban negotiations, but Cold War rivalries and disagreements on whether a nuclear test ban could be verified impeded progress. After the Cuban Missile Crisis, the three parties signed the Partial Test Ban Treaty (PTBT) in 1963, banning nuclear testing in the atmosphere, in space, and underwater. Nuclear tests could still be carried out underground, however.
- To study the question of verifiability (and thus to facilitate progress in future negotiations), a so-called Group of Scientific Experts (GSE-CTBT) was set up based on Sweden's proposal. The group worked from 1976 to 1996. Consisting of mostly seismologists, the GSE-CTBT produced reports for the Conference on Disarmament on what a monitoring system could look like.
- Crucially, whilst CTBT negotiations did not open until 1994, the GSE-CTBT not only kept the vision of a CTBT alive despite a lack of political will for such a treaty during the heightened geopolitical tensions of the Cold War. Although the GSE-CTBT progressed in fits and starts, its work demonstrated that a seismic verification system for a CTBT was scientifically and technologically feasible. As such, the GSE-CTBT shows that expert groups can bridge political divides, work on common research agendas to facilitate a shared understanding of verification options and, ultimately, empower diplomatic agreement.

How verification concerns influenced the 1999 rejection of CTBT ratification by the US Senate

- On 13 October 1999, the US Senate rejected ratification of the CTBT, the very treaty the US had been instrumental in negotiating. Verification concerns played a key role in the rejection decision:
 1. Could the United States effectively verify if countries were adhering to the CTBT; and
 2. could the United States maintain a safe and reliable nuclear arsenal solely through its stockpile stewardship programme?
- The ratification of the CTBT by the United States is seen as critical to international efforts to ban nuclear testing. Not only is US ratification required for the treaty to enter-into-force, but some observers only expect the other seven remaining Annex 2 states to proceed with ratification after the United States ratifies.

The CTBT/CTBTO's role in the DPRK nuclear crisis

- The role of the CTBT and the CTBTO could play facilitating the denuclearization North Korea is greater than ever before. Now, we should urge North Korea to join the CTBT as an observer through cooperation and coordination with the South Korean government. This could work as follows. If the US asks North Korea to join as observer, North Korea can be rebellious because the United States has nuclear weapons. Therefore, South Korea should persuade the role of observer through active dialogue with North Korea.
- The denuclearization of North Korea must be verified. This means that the international community must have confidence that the facilities were shut down and destroyed completely. Since the explosion of the Punggye-ri nuclear test site was carried out without experts verification last May, it is necessary to confirm whether it is properly closed. The CTBTO has the necessary technical expertise to verify this closure. The South Korean government should more actively include the CTBTO and the CTBT in its engagement with the US and North Korea.

Lessons learnt from the CTBT experience for nuclear disarmament verification work in the NPT context

- As outlined above, the CTBT is a case in point of a treaty whose technical solutions preceded the actual treaty negotiations. This shared technical understanding created confidence and ultimately facilitated agreement during the CTBT negotiations.
- The key lesson learnt from the CTBT process is thus that there is value in pursuing scientific and technical work in expert groups even when the geopolitical environment does not lend itself to progress in diplomatic negotiations.
- The review process of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) has suffered from disagreements over progress on nuclear disarmament between 'immediate abolitionists' and those advocating a step-by-step approach aligned with the international environment. One initiative to bridge this divide has focused on nuclear disarmament verification—an issue which both sides of the divide acknowledge as important. A number of initiatives studying various aspects of disarmament verification exist in the NPT context (e.g. the UK-Norway Initiative (which has evolved into the Quad), the International Partnership for Nuclear Disarmament Verification, and the UN Group of Governmental Experts). However, whilst there are instances of overlapping membership, there appears to be little coordination between these groupings. Applying the lessons from the GSE-CTBT could help to render nuclear disarmament verification (NDV) within the NPT sustainable and successful. As VERTIC has shown, establishing a Group of Scientific Experts on Nuclear Disarmament Verification (GSE-NDV) could, in the long-term, help create a shared and trusted understanding of the technical, procedural and policy challenges of nuclear disarmament verification (in particular between nuclear and non-nuclear weapon armed states). A GSE-NDV could consolidate and coordinate NDV efforts to date, ensuring balanced participation (geographical and political inclusiveness), long-term and sustainable funding from the UN Budget and regular and irregular contributions from individual states and develop organisational capacity. [See <http://www.vertic.org/media/assets/Publications/VB27.pdf>]

Recommendations for the CTBTO

1. greater emphasis on verifiability, particularly in interactions with non-ratifying Annex 2 states. The CTBT is no theoretical treaty; its verification provisions work
2. proactively position the CTBT and the CTBTO in the DPRK nuclear crisis, calling upon the DPRK to join the CTBT; engaging regional stakeholders, such as the participants of the former Six-Party Talks initiative (North Korea, South Korea, China, United States, Russia, Japan) on the CTBT/CTBTO's contribution to defusing tensions
3. focus on non-Annex 2 states to sustain a momentum of ratifications. Many states that were victims of nuclear weapons testing in the South Pacific for example have to date only signed but not ratified the CTBT. As states that have experienced the effects of testing first-hand, they should arguably be at the forefront of international efforts to cease testing by anyone, anywhere.