

INTERVIEW

WITH ELLEN WILLIAMS
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Assessing the Treaty's verifiability

THREE YEARS AGO, THE U.S. NATIONAL ACADEMY OF SCIENCES (NAS) RELEASED A SEMINAL REPORT ON TECHNICAL ISSUES RELATED TO THE COMPREHENSIVE TEST BAN TREATY (CTBT). THE INDEPENDENT PANEL OF SENIOR SCIENTIFIC AND MILITARY EXPERTS WAS TASKED WITH REVIEWING TECHNICAL DEVELOPMENTS RELATED TO THE U.S. NUCLEAR STOCKPILE AND TO NUCLEAR EXPLOSION TEST MONITORING SINCE THE 2002 NAS REPORT ON THE CTBT. THE 2012 REPORT CONCLUDED THAT THE UNITED STATES DOES NOT NEED TO RESUME NUCLEAR TESTING TO MAINTAIN ITS SECURITY OR THE RELIABILITY OF ITS NUCLEAR WEAPONS.

ELLEN WILLIAMS, DIRECTOR OF THE U.S. DEPARTMENT OF ENERGY'S ADVANCED RESEARCH PROJECTS AGENCY – ENERGY, SERVED AS CHAIR OF THE PANEL. IN THIS INTERVIEW WITH THE CTBTO SHE REFLECTS ON THE MAIN ISSUES THE REPORT ADDRESSED AND ITS SIGNIFICANCE.



I was born in 1953 so when I was growing up, my strongest early memories are from the early sixties as a child. At that time, people in the United States were very worried about the possibility of a nuclear attack and nuclear war. So in our schools we had drills to learn what to do in case there was a nuclear attack. Many people in my neighbourhood had built shelters in their basements where they could go after a nuclear attack and presumably be safe. I clearly remember the Cuban Missile Crisis and seeing the maps in the newspaper that showed how far into the United States the nuclear missiles might reach. This was very frightening for a small child, but of

course very frightening for adults as well.

When were you first involved at a professional or academic level with issues of nuclear disarmament?

I became engaged with issues of nuclear disarmament when I was looking at problems in the United States after we had agreed to stop testing nuclear weapons. There were serious concerns about whether it was possible to maintain the safety and security of those weapons without testing. So beginning in the 1990s, I was closely engaged with learning about issues of nuclear policy and nuclear disarmament and testing.



The certification of the noble gas monitoring system at radionuclide station RN38 in Takasaki, Japan, in December 2014 brought the total number of fully certified IMS facilities to 281. A further 19 stations have already been installed.

As Chair of the Panel that reviewed and updated technical issues related to the CTBT, what impact do you think the report has had on public debate in the United States and worldwide?

During the previous debate in 1999 when the United States last discussed ratification of the CTBT, there was a great deal of confusion about technical issues and it clouded the debate. It was difficult for people to judge the issues because there were many conflicting points of view. I believe that one of the big impacts of the report has been in reconciling the earlier conflicting points of view. The report clarified the issue of different detectability levels depending, among other things, on the type of nuclear device that might be tested. This clearer perspective has resolved some previous differences, and allows discussion of the issue of detectability to be placed in the context of the sorts of nuclear threats that can be avoided under a continuing test ban.

What were the reasons for the National Research Council report on the CTBT and the main issues it addressed?

The CTBT study carried out by the National Research Council was requested by the United States Office of Science and Technology Policy. It was also supported by the Department of Energy, the State Department, the Carnegie Corporation, and the National Research Centre. The request for the study had to do with updating our understanding of the technical issues involved in nuclear monitoring and nuclear security. The National Research Council had conducted a study ten years earlier and policy makers wanted to know what had changed in the intervening decade.

We were specifically asked four questions. Firstly, what was the status of the United States' capability of maintaining its nuclear stockpile safely and securely in the absence of nuclear testing. Secondly, what was the status of the world's ability to monitor for nuclear tests, especially those that might be carried out evasively. Thirdly, what commitments did we as a society have to make to be able to maintain the security and

stability of our monitoring system. And fourthly, what sorts of nuclear threats might be avoided under a continuing nuclear weapons test ban.

How did the report evaluate the progress achieved in setting up the CTBTO's International Monitoring System between 2002 and 2012?

That was one of the most pleasant and outstanding parts of the work that we saw. When the first report was being developed in 2000, the monitoring system under the CTBTO was notional. It had been planned, but little was in place. What we saw between then and 2012 was amazing progress, with the system set up to 80% completion. And by 2015 it is over 85% complete. It has achieved a truly outstanding ability to monitor – achieving much beyond the specifications and the capabilities that might have been possible in 1990. So we now see that it is possible with the CTBTO to monitor worldwide with better than one kiloton sensitivity for a normal nuclear test underground.

i NATIONAL TECHNICAL MEANS

Satellites, aircraft, and electronic and seismic monitoring devices used by Member States to survey the activities of other States, including military movements and treaty compliance with regard to possible nuclear testing activities.

How did the report assess the quality of the data gathered and analysed by the CTBTO?

The quality of the data gathered by the CTBTO is judged as very high quality. We see both the type of data that was possible in 2002, which is tele-seismic data and the new developments in regional seismic imaging. This allows us to understand much better the signatures of the explosion or the event that we see and be better able to distinguish nuclear events from things like earthquakes or mining explosions.

What was the assessment of the overall nuclear-test-ban verification regime?

We believe the overall package of detection methods is valuable. The national technical means (see information box) of course allow individual countries to monitor in addition to the CTBTO and they look at points of interest that are of specific concern to them. So in combination, any country can use its own networks of sensing and monitoring in combination with the CTBTO and get extremely fine coverage. We judged it as a very good combination with the CTBTO adding a lot of value to what the United States has in terms of its national technical means.

Which parts of the report were most challenging for the Committee members and which were easy?

In preparing the report we were specifically asked to address technical issues. Our goal was to provide clarity and understanding of the technical issues so that policymakers could have the information that they needed to make decisions. As we were writing

the report, one of the things we were most concerned about was not to allow our own conclusions, deductions, or personal preferences to enter into the report. We had many long discussions to make sure that we had cleansed the report of personal opinion and kept it on a clear, sound technical level.

How was the report received by scientists and policymakers in the United States?

We believe it was well received. There were over one hundred newspaper articles which were generally favourable in terms of describing the report. We received feedback from scientists who were very pleased by the quality and depth of the technical information and again, we hope that as policymakers engage with more discussions about the CTBT that they have been using the report extensively to help them with their discussions.

Based on an interview conducted in Vienna in July 2012.



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BIOGRAPHICAL NOTE

ELLEN WILLIAMS is Director of the U.S. Department of Energy's Advanced Research Projects Agency – Energy. From 2010 to 2014, she was the Chief Scientist for BP. She also served as Chair of the U.S. National Research Council Committee responsible for reviewing and updating the report on 'The Comprehensive Nuclear Test Ban Treaty: Technical Issues for the United States', released in 2012. Dr Williams is currently on a leave of absence from the University of Maryland where she has served as a Distinguished University Professor in the Department of Physics since 2000.