The Last Mile to a CTBT

U.S. – Russia Cooperative Verification to Speed Entry-into-Force of the Comprehensive Test Ban Treaty

Presentation by
Christopher Paine
Natural Resources Defense Council (NRDC)
04 March 2010
Outline of Presentation

• Main themes of U.S. conservative attacks on the CTBT pertaining to Russian (and potentially Chinese) nuclear testing activities.

• Did the P-5 reach clear agreement on the scope of the treaty’s basic obligation?

• Can Russia and the U.S. work together to overcome suspicions of “cheating” when small magnitude seismic events coincide in space and time with testing activities not prohibited by the treaty?
Outline of Presentation - 2.

• For underground and other experimental activities without reliably detectable seismic signatures, can U.S. and Russia work together to increase confidence that these are in fact “activities-not-prohibited” by the treaty.

• Are there any “grey area” P-5 experimental activities, involving the rapid release of nuclear energy, whose status under the treaty requires or deserves further clarification?
Some US Strategic Experts Allege Russia and U.S. have not agreed on what is prohibited

• “At present, the United States and Russia (and China) seem to have different interpretations, and, if so, this could put the United States at a disadvantage.”

• “The [Obama] administration must be able to assure the Senate...that there is an agreed understanding with the other nuclear weapons states about the specific testing activities banned and permitted under the treaty.”

CTBT Opponents within US Strategic Posture ("Perry-Schlesinger") Commission Go Further:

- “The treaty remarkably does not define a nuclear test.”
- “This allows different interpretations of its prohibitions and asymmetrical restrictions.”
- “The strict U.S. interpretation precludes tests that produce nuclear yield.”
- “Other countries with different interpretations could conduct tests with hundreds of tons of nuclear yield—…”
(Posture Commission opponents, cont...) 

• “...allowing them [other countries] to develop or advance nuclear capabilities with low-yield, enhanced radiation, and electro-magnetic pulse.”

• “This is quite serious because Russian and Chinese doctrine highlights tactical nuclear war-fighting.”

• “With no agreed definition, U.S. relative understanding of these capabilities would fall further behind over time...”
“Perry-Schlesinger” Commissioners Opposed to CTB, cont:

• “[from previous slide]…and undermine our capability to deter tactical threats against allies.”

• “In short, under the CTB, opponents [of the U.S.] could make improvements in their nuclear capabilities, while

• “U.S. ratification would preclude the testing that could help preserve the U.S. capability to deter them.”
Former CIA Director Jim Woolsey Makes Similar Arguments Against the CTBT

• “They [the Russians] are working hard on a range of nuclear improvements and also consolidating their advantage in short range weapons in order to dominate their neighbors.”

• “The Kremlin is simultaneously engaging in more and more direct threats against our allies, eroding confidence in the US extended deterrent.”
Woolsey claims Russia is violating the CTBT

“Moscow is irrefutably doing hydro-nuclear and hydro-dynamic experiments at Novaya Zemlya, underground nuclear testing of a sort the United States claims is impermissible under the Comprehensive Test Ban Treaty and that it has, as a signatory (albeit not a state party to the treaty) forsworn.”

— R. James Woolsey, 24 June 2009
US Intelligence Community played a role in Senate’s October 1999 rejection of the CTBT

Senator Kay Bailey Hutchinson (R-TX) stated:

• “...there were suspected Russian tests as recently as September 8, 1999 and September 23, 1999.”

• “...in my estimation, the evidence [of Russian test activity] is strong enough to raise serious doubts about the wisdom of ratifying this treaty.”

• “The evidence, I believe, indicates that in fact Russia is currently testing low-yield nuclear weapons, and is seeking to develop, from their own public statements and the Russian media, a new type of tactical weapon.”
CTBT Opponents Claim Russian Compliance With “Zero Yield” Treaty Cannot be Verified

Senator Hutchinson (R-TX):
“I think it is overwhelmingly clear from what I heard from the intelligence community – we cannot have assurance that we will be able to verify a zero-yield treaty. That was very plain and very clear from the testimony we heard.”

--- Senate debate, 12 October 1999
Other Verification Concerns Relating to Russia

• Senator Richard Lugar (a key Republican vote needed to ratify the treaty):
  – Cited a Washington Post story reporting on an intelligence leak about a “large granite cave” at Novaya Zemlya where “incidents” take place.
  – Complained that the 50 square kilometer keep-out zone in a CTBT onsite inspection compared unfavorably with a more effective OSI regime in the CWC.

• Senator John Warner (then chairman of the Senate Armed Services Committee) stated:
  – “The development of any nuclear weapon, regardless of its yield, is militarily significant to this Senator.”
Which of these concerns have a basis in reality?

- To answer this question, the several layers of the conservative critique need to be separated:
- First, is there any basis for believing that Russia and the U.S. “interpret” the CTBT Basic Obligation differently?
- If not, is there a basis for concluding that P-5 “activities-not-prohibited” present a significant challenge to the verification regime set forth in the treaty?
No Case for Believing Russia Interprets CTBT Basic Obligation Differently than US

- At their summit meeting in Hyde Park on October 23, 1995, President Clinton had no doubt that President Yeltsin had agreed to a “zero yield” treaty:

  - “And finally, we agreed – and this is very, very important – that we would work together to succeed in getting a zero-yield comprehensive test ban treaty next year.

  - "This is a major, major step, and it dramatically increases the chances of our success for a sweeping comprehensive test ban treaty in 1996. And I want to thank President Yeltsin for that."

Q. “...is there any difference of opinion on nuclear testing?”

PRESIDENT YELTSIN: “...All, to the very last one, agreed that this year we’ve got to sign the treaty on banning testing in any size of test forever and forever.”

PRESIDENT CLINTON: “...We have all agreed to go with the so-called Australian language which is a strict zero-yield comprehensive test ban treaty...Some other countries want to kind of leave a big crack in the door for so-called ‘peaceful tests’ or experimentation. And we all believe that we just have to try to persuade them to our way of thinking.”

• “At present the sufficiency of regular, non-prohibited by the CTBT subcritical and hydrodynamic tests, in order to guarantee safety of storage, transportation, and combat readiness of the nuclear warheads with a required degree of credibility, is confirmed.”

• “Qualitative modernization of nuclear weapons is only possible with the conduct of actual and hydronuclear tests with any fission energy yield, which directly contradicts the CTBT.”
However, Kapralov did alert the Duma to verification concerns regarding hydronuclear experiments.

“There is a danger of concealment of hydronuclear experiments from the verification mechanism of the CTBT. However, we think that they can be detected by special equipment located in the immediate proximity.”
US CTBT Expert Voiced Similar Concerns to the US Senate

- Prof. Sidney Drell, longtime science adviser to the US Defense and Energy departments (and cautious supporter of the CTBT) testified to the U.S. Senate in October 1999:

  - “I know there are serious questions about what the Russians are doing at their test site in Novaya Zemlya... I am not persuaded by evidence that any nuclear yield producing testing has occurred in violation of the Treaty. That does not say I am confident it has not occurred, you understand.”

  - “This is an issue that will require resolution in a satisfactory treaty regime for which improved information exchange and transparency with the Russians will be required.”
Conclusion on CTBT Basic Obligation Issue

• Russia has clear understanding of its Basic Obligation under the CTBT that matches US understanding:

• No nuclear yield, no matter how small, may be produced from a “prompt critical” assembly of fissile material
  – (i.e. no self-sustaining fission chain reaction by means of fast neutrons may occur in the fissile material used in the experiment.)

• Accusation by US CTBT opponents can be effectively countered by the historical record.
Real Issue is Mutual Confidence

How do we improve mutual confidence that hydrodynamic and other “activities not prohibited” do not encompass or conceal prohibited hydronuclear or other very low-yield nuclear test explosions?
Political Use of “Zero-Yield” Shorthand Has Led to Some Confusion

• Los Alamos Director Sig Hecker noted in August 1995, immediately after President Clinton announced U.S. “zero-yield” objective in CTBT talks:

  “I should point out that the President’s statement had zero in quotation marks because it was understood that a strict zero nuclear yield would eliminate the types of experiments with nuclear materials that the President included in his safeguards to make up for the loss of testing”

• “The intent was to rule out low-yield nuclear tests and hydronuclear experiments, but not other experiments.”
  – LANL Newsbulletin, August 18, 1995, p. 2
First Deputy Minister Victor Mikhailov sowed confusion in April 1999 with this statement:

• “Above all, I would single out three basic directions [for Russia’s weapons complex]: new computer equipment, non-test site ‘simulation’ experiments, and so-called test-site hydronuclear experiments, when there is practically no release of nuclear energy.”

• “I will dwell separately on the last circumstance, because while in discussing the problem of rejecting nuclear tests the United States initially insisted on a certain ‘zero option,’ U.S. specialists now speak of the need for a broader interpretation of the concept of ‘authorized activity.’”
More from Mikhailov

• “The problem of transparency of the nuclear weapons complex both of Russia and of the United States is one of the chief political issues today.

• “And this is explainable...developed traditional nuclear powers can use hydronuclear experiments to perform tasks of improving the reliability of their nuclear arsenal and effectively steward its operation.”

• “All countries indirectly gain here inasmuch as the risk of nuclear accidents is lowered. Determining the limits of ‘authorized activity’ is no simple process and only professionals can direct it correctly.”
Mikhailov’s Gambit

• “...one can hardly separate the problem of authorized test site experiments from the problem of ensuring confidence among the nuclear countries through reasonable transparency and openness in all three aspects of nuclear activity: experimental design facilities of nuclear weapons laboratories, test-site operation, and the process of dismantling nuclear weapons.”

• Mikhailov’s apparent gambit: suggest ambiguity in Russia’s understanding of its CTBT basic obligation to leverage more transparent and cooperative relationship with the US nuclear weapons laboratories, and greater domestic resources for Russian non-nuclear “stewardship” effort.
Mikhailov’s Gambit Backfired


- Provided ammunition to CTBT critics who made the “Russia does not agree to zero-yield” argument.
U.S. State Dept. under G.W. Bush/Condi Rice also grossly mischaracterized CTBT scope issue (perhaps deliberately)

- “The Department of State is not aware of any international agreement on what ‘zero’ yield means.
- “During the negotiation of the Treaty, the P-5 reached an understanding that subcritical nuclear experiments would not be prohibited under the Treaty.
- “The United States also made clear that, in its view, supercritical nuclear explosive driven device tests would be prohibited under the Treaty.”
Erroneous August 2007 State Dept. Letter to Senator Kyl

• “However there was no agreement among the P-5 that criticality would be the basis for determining which activities would be permitted under the CTBT and which activities would not be permitted.

• “Therefore, it is left to the individual State Party to decide for itself whether a test that produced more than a zero yield would violate the treaty.”

--- Enclosure in Letter from Jeffrey T. Bergner, Asst. Secretary, Legislative Affairs, U.S. Dept. of State, to the Honorable Jon Kyl, United States Senate, August 9, 2007, cited in Congressional Research Service Issues Brief made widely available to members of Congress.
October 1996 Proposal by R. L. Garwin (US) and V.A Simonenko (Russia)

- Jointly proposed measures to verify that hydrodynamic and other subcritical test activities not prohibited by the treaty do not involve banned hydronuclear experiments.

- “Because hydrodynamic tests may involve kilograms of Pu [with chance of supporting a prohibited self-sustaining fast neutron chain reaction in the material], they cannot be done in the atmosphere under current standards;...they should be done in a containment vessel, above ground.”

- “Other sub-critical experiments may involve masses of fissile material and configurations that have no chance at all of criticality. To provide greatest assurance of compliance with a CTBT, such experiments...should also be done above ground.”
In the event P-5 continue to use the underground environment for experiments:

• “the planning should include through-pipes into which States could agree to put their measuring equipment to ensure that there is no neutron or gamma ray output from the test.”

• “working definition of zero yield fission experiments”:

• “...‘zero-yield’ [is] satisfied if the prompt [neutron] reproduction factor for a fissile system, k, is less than 1 in any experiment. . . A practical upper limit on k in systems involving high explosives might be k = 0.8 or less...”

• “In contrast, a hydronuclear test with a yield of 2 kg HE corresponds to . . . 58 doublings [of neutron population].”
If top U.S. and Russian nuclear weapon experts can agree on reciprocal transparency measures, why can’t their respective governments?

Richard L. Garwin, IBM Fellow Emeritus, IBM Research Division, and defense science adviser to the USG since the Eisenhower era;

V.A. Simonenko, Deputy Scientific Director, Russian Institute of Technical Physics (VNIITV),

Persistent US misidentification of small magnitude seismic events in and around Novaya Zemlya is easily resolved

- Install one or more “open” three-component seismic monitoring stations in tunnels or vaults at NZ in Russia and NTS in the United States.
- Cost is only about $300,000 per station.
- Would improve rapid seismic event location capability, and further improve discrimination capabilities for very small events in the ton range.
Scope issues that merit further clarification

• “Subcritical” is a term that applies to experiments with fissile material.

• HE-driven, weapon-like assembly systems can also be used to compress fusion materials, e.g. “Gas-Dynamic ICF,” “HE Pulsed Power” and “Magnetized Target Fusion” devices.

• U.S. and Russia, and the rest of the P-5, should review consistency of these experiments with the CTBT’s Basic Obligation.

• Their future exclusion, or an agreed limitation on their energy release, is desirable in the interests of nuclear nonproliferation.
CONCLUSION

- US and Russian scientists should cooperate, as they did in the late 1980’s, to clear away misinformation and increase transparency of each side’s nuclear stockpile stewardship activities.

- This cooperation will build the mutual confidence in compliance needed to achieve U.S. ratification of the CTBT.

- As we did in the past, The Natural Resources Defense Council (NRDC) stands ready to assist such an effort.