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International Monitoring System as a Nuclear Test Verification Tool

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During the Senate's consideration of the Comprehensive Test Ban Treaty (CTBT) in 1996, the Clinton Administration touted the International Monitoring System (IMS) as one of the important verification measures contained in the treaty. Proponents of the treaty argued that if the treaty was not ratified, the IMS would not be built. This has proven to be false: 314 facilities have been built or are under construction, even though the CTBT has not entered into force.

While the IMS provides important monitoring capability for the United States, it is not sufficient to verify compliance with a zero-yield treaty. The U.S. should support continuous development of the IMS but should not confuse it with a sufficient verification tool.

The IMS Development to Date. The IMS, when complete, will be comprised of 321 monitoring stations and 16 radionuclide laboratories worldwide. The monitoring stations can detect waveforms, sound waves, airborne radioactive particles, noble gases, and seismic waves that indicate a possible nuclear weapons test. These data are then sent to the IMS laboratories so that experts can determine the location, strength, and nature of these events and assist in recognizing nuclear explosions.

As of February 2013, 274 out of a total 337 facilities have been certified—despite the fact that the CTBT has not, and likely will not, enter into force in the near future because it requires the ratification of North Korea, India, Pakistan, Iran, and Syria.

Not a Sufficient Verification Tool. The CTBT itself does not define what constitutes a nuclear weapons test, which makes it more difficult to determine whether a detected action constitutes a breach of the agreement. Since the mid-1990s, the U.S. has adhered to a zero-yield interpretation, meaning that it cannot conduct any yield-producing experiments itself, and it expects other signatories to the treaty to abide by the same standard.

The IMS, even when completed, will not be capable of detecting nuclear weapons detonations below a certain yield. A 2012 National Research Council (NRC) report titled "The Comprehensive Nuclear Test Ban Treaty: Technical Issues for the United States" puts this yield "below a few kilotons worldwide, and at most a few hundred tons at well-monitored locations."

The CTBT Preparatory Organization's experts are "confident that their system can detect and identify any militarily relevant nuclear test anywhere on the planet." In a 2011 fact sheet, the U.S. State Department similarly stated that the IMS "can aid in the detection and identification of nuclear explosions anywhere on the planet."

This carefully chosen wording reflects the State Department's recognition that the IMS is not able to detect all nuclear weapons explosions, especially if a testing state decides to conceal its activities to evade detection. The NRC assumes that a state would choose to covertly conduct a nuclear weapons experiment on a relatively well-monitored test site. This is contrary to what the U.S. intelligence community believes, as Ambassador Paul Robinson noted in remarks at The Heritage Foundation in April 2012.[1]

Detection Is Not Enough. Neither the U.S. nor the IMS (even

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when complete) has the capability to detect low-yield nuclear weapons experiments that Russia and perhaps China are currently conducting. Even if the IMS did detect an event, it is not clear that it would be possible to prove beyond doubt that the event was a nuclear explosion.

Proponents of the CTBT often argue that the shortcomings of "beyond the proof" verification can be overcome if on-site inspections are permitted. This is not necessarily so, for several reasons.

First, the treaty creates an executive council of 51 member states on a rotating basis. The U.S. may not be a part of this council if such an issue comes up. Second, the treaty requires a two-thirds majority of this council to conduct an on-site inspection, which means a violating country could create interminable delays by lobbying countries on the council. If a vote ever did occur, the violator could obtain enough "nay" votes that permission to conduct an inspection would not be granted at all.

Time is of the essence when it comes to detecting isotopes and precious gases released during a yield-producing experiment, and any delay would make it more difficult to provide conclusive evidence that a nuclear weapons experiment took place—or to determine where precisely it took place.

Even if the obstacles listed above would be overcome, the CTBT does not specify what would happen to a country that was found violating it. As Fred Iklé famously put it in his 1961 article "After Detection, What?" detecting a violation is not enough: "What counts are the political and military consequences of a violation once it has been detected, since these alone will determine whether or not the violator stands to gain in the end."[2]

Useful but Insufficient. It is clear that many countries see the IMS as a useful tool for obtaining information about other nations' potential nuclear weapons explosions. Experience also shows that the United States will not be deprived of the benefits of the system despite the fact that the CTBT has not entered into force and will likely not enter into force any time soon.

Yet the IMS suffers from a number of shortcomings, including the fact that it would likely not be able to detect covert, small-scale nuclear weapons experiments and that it does not define what constitutes a nuclear weapons test. Policymakers should be aware of these shortcomings as they consider these important issues.

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1. Paul Robinson, "Comprehensive Test Ban Treaty: Questions and Challenges," lecture, The Heritage Foundation, April 10, 2012, http://www.heritage.org/events/2012/04/ctbt.
2. Fred Iklé, "After Detection, What?," *Foreign Affairs*, January 1961, http://csis.org/images/stories/ikle/037.ForAffairs1961.pdf (accessed March 14, 2013).