

The Nuclear Non-Proliferation Treaty (NPT), the Once
and Future Guarantor of World Peace and Security

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ABSTRACT

The paper, with a focus on the current uncertain status of the treaty-mandated Review Conference—which originally was to be held in 2020—and the future beyond, describes in general terms the purpose and history of the Nuclear Non-proliferation Treaty (NPT) and the threat of nuclear weapons. The many crises and diverse issues involving nuclear weapons over the decades explain the difficulties facing the NPT regime today. The Review Conference, because of the Pandemic, has been rescheduled for 2021, but even that may not be possible; 2022 seems a better bet. Serious issues will confront the Treaty at the Review Conference when it is finally held, and the longer-term prospects for the NPT with the on-rushing existential threat of climate change are not good.

Proliferation was the first and in truth always believed to be the most serious problem from the very beginning of the Nuclear Age. The seminal arms control treaty, The Nuclear Non-Proliferation Treaty (NPT), reflects this fact.

In the 1930s, nuclear scientists from Europe, many of them Jewish, fled Europe to escape Adolph Hitler. They settled in various academic institutions in Britain and the U.S. primarily. A number taking their cue from Albert Einstein and Dr. Leo Szilard and others had come to understand well the potential of nuclear fission. They knew if properly developed it would produce power to make the world far more prosperous but also could be used to construct explosive devices of unimaginable power. They feared that Germany with its scientific capabilities, epitomized by Dr. Werner Heisenberg, after Einstein and Dr. Nils Bohr of Denmark the third nuclear physicist in the world. They were concerned that these scientists might develop an atomic bomb for the German war machine with which Hitler could dominate the world.

Einstein was prevailed upon to write a letter to president Franklin Roosevelt warning him of this danger. Einstein wrote the letter, Szilard wrote a cover memorandum and an economist

named Alexander Sachs, who had a prior relationship with the president, was asked to deliver the letters.

Sachs agreed to do it and asked Roosevelt's office for an appointment. While waiting for the appointment he studied the subject of nuclear fission in the literature that was available. During this wait of several months, during which time Hitler had invaded Poland, Sachs had also considered how to present the papers to Roosevelt. The President was enormously busy with the outbreak of World War II and Sachs knew he would never relate to technical scientific language.

Finally, after a considerable wait, Sachs presented himself to Roosevelt's personal assistant, General Edwin Watson, known as "Pa" to Roosevelt and his close associates, at the White House the afternoon of October 11, 1939. He was admitted to the Oval Office where Roosevelt was expecting him.

The meeting began with light conversation and then Sachs told a joke. He knew Roosevelt always liked that. He then decided to use only his own personal summary of Einstein's and Szilard's letters. Sachs had written an 800-word summary and he read that to Roosevelt. He left Einstein's and Szilard's letters behind him when he left, but had reference only to his personal summary while with Roosevelt. Most of his summary was taken up with describing the use of radioactive materials for power production and secondarily for medical purposes. Only at the end of this brief presentation did he turn to weapons. He later said that he wanted "to emphasize the poles of good and evil." So to discuss weapon potential he turned to the 1936 lecture by Dr. Francis Ashton, a prominent British scientist, "Forty Years of Atomic Theory" which had been published in 1938. Sachs read Ashton's entire last paragraph to Roosevelt.

“Personally, I think there is no doubt that sub-atomic energy is available all around us, and that one day man will release and control its almost infinite power. We cannot prevent him from doing so and can only hope that he will not use it exclusively in blowing up his neighbor.”

Roosevelt got the point immediately. “Alex, what you are after is to see that the Nazis don’t blow us up.” “Precisely,” said Sachs. Roosevelt called in Watson and said simply “This requires action.” Sachs met with Watson afterward to develop first steps. A committee was established by Watson and approved by Roosevelt to hear from several senior nuclear scientists along with military officials. They met in Washington ten days later.

From this came the Manhattan Project and over time it grew into a vast undertaking. It perhaps possessed the greatest collection of nuclear physicists of the highest quality ever assembled before or since. Several of its members had won Nobel Prizes. The project proceeded ahead rapidly, particularly in 1943 and 1944. By early 1945 it was clear that there was going to be a Bomb and it was important to decide whether or not it would be used and if so how and against what targets. The Air Force had been compiling possible targets.¹

On May 3rd, 1945, a secret committee was established within the U.S. government to advise president Truman on the use of the Bomb and general nuclear weapon policy. It was chaired by Secretary of War Henry Stimson who insisted it be named the Interim Committee to avoid it from being seen as usurping the powers of Congress. The Trinity test, the first actual detonation of a nuclear explosive, lay ahead in July in New Mexico and at this point President Truman had not even signed on for the invasion of Japan much less any use of the Bomb. The scientists understood that the advent of the Bomb, was now highly likely but its actual size in

¹ Rhodes, Richard, “The Making of the Atomic Bomb,” Simon and Schuster, New York, 1986, pp. 313-15; 642.

terms of explosive power wasn't understood. Much of the design and development work was done at Los Alamos, a national laboratory built in New Mexico to develop the design of nuclear weapons and which was an integral, indeed central, part of the Manhattan Project. Many of the most prominent scientists associated with the Manhattan Project were involved, with the Committee led by the Director of Los Alamos, Robert Oppenheimer as well as senior government officials including Secretary Stimson, and important military officials, such as General Lesley Groves, the military head of Los Alamos and the Chairman of the Joint Chiefs of Staff George Marshall.

Secretary of State Designate James Byrnes was a late comer to the Committee who was added as the personal representative of the president. Byrnes was able to make the first meeting on May 31, 1945 in spite of his late addition to the Committee.

Secretary Stimson began the Committee's deliberations on May 31, 1945. In his opening remarks, he said the size and character of this weapon represented a revolutionary discovery of the relationship of man to the universe. Similar historical landmarks included the discovery of gravity and the Copernicus theory, but Stimson distinguished this discovery as likely to be greater with respect to its effect on the ordinary affairs of life.

It may destroy or perfect international civilization. It may be Frankenstein or lead us to world peace, he said.²

After the introduction, Dr. Arthur Compton, a leading experimental physicist and an important part of the effort to acquire the Bomb, along with Dr. James Conant, an American chemist central to the atomic bomb project, presented a technical report on Manhattan Project

² Ibid, p. 642.

progress. After being asked a question by Conant on the potential yield of the Bomb they were developing, Robert Oppenheimer took over the presentation. Oppenheimer replied that first stage weapons like the two types of weapons probably to be used against Japan, Little Boy (simple gun type weapon) and Fat Man (an implosion design) would yield up to about 20 kilotons (a thousand tons of TNT equivalent) of explosive power. Advanced nuclear weapons based on enriched uranium or plutonium with implosion type weapons might have yields up to 50 kilotons or 100 kilotons—or 50,000 to 100,000 metric tons of dynamite explosive equivalent. Oppenheimer continued, thermonuclear or hydrogen weapons could range from 10 million to 100 million tons of TNT equivalent, megatons in place of kilotons. A megaton is a million tons of TNT equivalent as opposed to a kiloton—1,000 tons of TNT equivalent.³

These were numbers that most of the scientists in the room were familiar with but not Byrnes, the new addition. “As I heard these scientists...predict the destructive power of the weapons, I was thoroughly frightened. I had sufficient imagination to visualize the danger to our country when some other country possessed such a weapon.”⁴ There was a significant split on the Committee, most of the scientists wanted to warn Japan and then do a warning shot so that the U.S. might be able to actually avoid using the weapon against Japanese cities. Furthermore, they wanted to share this immensely dangerous technology with other nations so as to bring about something like a world government which would ensure the technology was only used for peaceful purposes. The leader of those who thought this way was Niels Bohr from Denmark who had been spirited out of Denmark in 1943 to help with the Manhattan Project. But of course, as a

³ *Ibid*, p. 643.

⁴ *Ibid*, p. 643.

foreign national he could not be a member of the Interim Committee, only an advisor. After Einstein he was perhaps the world's leading physicist.

Needless to say, the government officials and the military wanted nothing to do with world government with the Soviet Union doing by stealth whatever it could to acquire nuclear weapons—they thought the most likely outcome in any case. The world's number three physicist, Werner Heisenberg was head of the Nazi nuclear program which influenced American scientific leaders to think Hitler might get the Bomb. The U.S. as yet was unaware of the extensive Soviet spying in Los Alamos operating for the last several years.

Shortly after this discussion Stimson left for other appointments and Byrnes, who was technically the most senior official present largely took over the direction of the Interim Committee. In the next few hours, he drove the committee to a conclusion that Bohr's ideas would not be pursued, rather a position of "extended status quo," or no change from current plans, would be supported by the Committee. The Committee reluctantly went along with the Secretary of State designate and he at least believed this authorized him to advise President Truman that the Committee supported the use of the bomb against Japan. Byrnes quickly met with the president and carried out this action.

Secretary Stimson in general was in a middle position. He did not support Bohr's ideas but he had never liked attacking large cities for terror purposes which had been going on in Europe for some time, the fire-bombing of Hamburg, and Dresden, for example, which caused hundreds of thousands of casualties. He personally had blocked consideration of Kyoto as an atomic bomb target. He wasn't happy about using the atomic weapon against Japan. He wanted

to do a warning shot, but was overruled.⁵ He talked to senior members of the military, General Marshall was for it because he believed it would save lives of American troops and would avoid the necessity of invading the home islands of Japan. General Eisenhower, on the other hand, was opposed. He told Stimson he was against it on two counts. “First, the Japanese were ready to surrender and it wasn’t necessary to hit them with that awful thing. Second, I hated to see our country be the first to use such a weapon.” Eisenhower spoke with Truman who told him that he agreed with General Marshall, having already formed his own view.⁶

So, Stimson had to go along reluctantly once the Trinity test in New Mexico was a success in mid-July. The war ended with Japan’s surrender, approximately one month later, after the atomic bomb attacks on Hiroshima and Nagasaki and the Russian invasion of Manchuria. Shortly thereafter, Stimson left government. He made the first ever arms control public speech in October of 1945. But in the next few years little happened, the U.S. built fewer than 10 more bombs and during this period nuclear weapons did not appear to threaten the world. However, the Russians were working hard and in the U.S. research on the so-called “Super,” the thermonuclear weapon, was proceeding ahead at Los Alamos. Then in 1949 the Soviets tested their first nuclear weapon. The U.S. response was not to try to negotiate something with the Soviets. It was to build and test the Super in the early 1950s. The second such test of the Super unexpectedly delivered in the range of 15 megatons of explosive power, well above expectations. Also, the U.S. began to build nuclear weapons at a speed the French called “an industrial rhythm.” The arms race was on, rapidly building up to a vast thermonuclear based struggle for mastery of the world. In this international atmosphere, proliferation beyond the U.S. and Russia

⁵ Ibid, p. 647.

⁶ Ibid, pp. 650, 688.

was certain. 1950-70 could be termed the era of proliferation, both horizontal and vertical, a subperiod of the Nuclear Age.

As Richard Rhodes says in the close of his “The Making of the Atomic Bomb”:

“The preeminent international community in our culture is science. With the release of nuclear energy in the first half of the twentieth century that model commonwealth decisively challenged the power of the nation-state. The confrontation is ongoing and inextricably embedded in mortal risk, but it offers at least a distant prospect of felicity. The different country that still opens before us is Bohr’s open world.”⁷ Full compliance by all states with the NPT and all of its obligations and understandings would bring the world much closer to that open world as envisioned by Niels Bohr.

By 1944, Bohr believed that after the war there would be an international arms race in nuclear weapon involving the United States and the Soviet Union and possibly many other nations. He thought that this could lead to the destruction of civilization but he offered an alternative: international control of the weapon and its technology followed by aspects of a world government. An open world rather than a closed and competitive one. He wrote a memorandum outlining this, sending it to Prime Minister Churchill and President Roosevelt; Churchill rejected his ideas and requested of his staff that he not see Bohr again. Roosevelt was more courteous but did nothing. As said above, many of the Manhattan Project scientists shared Bohr’s views to a considerable extent including Robert Oppenheimer. Oppenheimer had been impressed that Stimson in his opening remarks to the Interim Committee appeared to share many of Bohr’s

⁷ Ibid, p. 788.

insights. In the end the U.S. government rejected Bohr's ideas as well, "status quo" was the policy decision.

There was one effort to try to move toward internationalism in the years after the war before the first Soviet test. It was the famous Baruch Plan in 1946 to internationalize the atom. The plan did permit some international cooperation in nuclear technology research, but the U.S. kept its lead in nuclear technology and it included extensive inspections. The Soviets rejected it out of hand.

In 1949 came the first Soviet test and as said, the U.S. responded with a decision to build and test the hydrogen bomb and build uranium weapons as fast as possible. The first U.S. test of a thermonuclear device was in 1951, which came in at over 10 megatons with the next test in 1953, Castle Bravo, significantly exceeding expectations with a just under 15-megaton explosion, as said, injured some Japanese fisherman far from the warning zone laid out in Pacific testing area. One of the fishermen died. The Russians tested thermonuclear weapons several years later and ran their thermonuclear testing all the way to 58.6 megatons in 1961, with an intervening three-year moratorium called for by President Eisenhower.

By 1961 at the time of the Cuban Missile Crisis, the United States had some 22,229 nuclear weapons of all types, the Soviet Union 2,450 and the United Kingdom 50.⁸ One would have thought that the peaceful resolution of the crisis would have led to the beginning of controls over the expansion of arsenals But by the mid-1960s, the U.S. had built over 70,000 nuclear weapons, with 32,500 weapons in its arsenal at one time. The Soviets' total build was 55,000 weapons with 45,000 deployed for several years in the 1980s. In 1972, strategic nuclear

⁸ Robert Norris and William Arkin, "NRDC Nuclear Notebook, Global Nuclear Stockpiles, 1945-2000", Bulletin of the Atomic Scientists, March-April 2000, p. 79.

weapons, which were deliverable by highly accurate long-range missiles with a flight time from the U.S. to the Soviet Union of 30 minutes as well as long range bomber aircraft were deployed in considerable numbers. The U.S. strategic missile force, reached 5,800 weapons carrying 4,100 megatons and on the Soviet side, 2,100 warheads were carried by Soviet missiles delivering 4,000 megatons.⁹ These numbers are incomprehensible as far as any military meaning is concerned or indeed any fundamental rational thought. These arsenals could kill off all life on the planet many times over. This situation led to a number of very near brushes with total world destruction beginning with the Cuban Missile Crisis and extending to a half dozen years after the end of the Cold War. Several of these incidents involved one side or the other coming within minutes of launching their arsenals at the other and causing a global nuclear war resulting in the destruction of civilization. Usually they involved mistaken information based on technical malfunctions or errors discovered at the last moment.

After the Soviets put intermediate range nuclear capable missiles and nuclear weapons into Cuba in 1962 in an attempt to even the threat as they saw it, a world crisis followed. The bipartisan Congressional leadership pressured President Kennedy very hard to invade Cuba and eliminate the missiles and warheads—which threatened all of the United States east of the Mississippi—before they become operational. The U.S. military and U.S. Intelligence Community assured President Kennedy, Secretary of Defense McNamara and the rest of the Executive Committee (a secret committee created by Kennedy of senior officials to decide what to do about the Crisis) and the leaders of Congress that no nuclear weapon systems in Cuba were yet operational. Most members of the Executive Committee leaned toward invasion. The following conclusory exchange between President Kennedy and the U.S. Ambassador to the

⁹ *Ibid*, p. 79.

Soviet Union pointed the way toward avoiding all out nuclear war by, in McNamara's words, "a hairs breadth."¹⁰

The key part of that conversation was:

President Kennedy: "We're not going to get the weapons probably anyway...I mean by negotiation...I didn't think there's any doubt he's not going to retreat now that he made that public.

"Tommy: He's not going to take them out of Cuba." (Ambassador Llewellyn Thompson, known to his friends as Tommy, long-time expert on the Soviet Union, current U.S. Ambassador to Moscow and well acquainted personally with Khrushchev)

Llewellyn Thompson: "I don't agree, Mr. President. I think there's still a chance we can get this line going."

President Kennedy: "He'll back down?"

Llewellyn Thompson: "The important thing for Khrushchev it seems to me is to be able to say, 'I saved Cuba. I stopped the invasion.' and he can get away with this if he wants to and he had a go at that Turkey thing [U.S. missiles deployed in Turkey aimed at the Soviet Union] - and we'll discuss that later."

President Kennedy: "Alright."¹¹

Former Secretary of Defense Robert McNamara who wrote this cited article about the Cuban Missile Crisis, quoting the dialogue, said that he "still quaked when I read these lines."

¹⁰ Blight, James and Blanton, Tom, "The Cuban Missile Crisis Revisited on the Anniversary, Arms Control Today, 32, No. 9, November 2002, p. 3.

¹¹ McNamara, Robert, "Forty Years after 13 Days," Arms Control Today, 32, No. 9, November 2002, pp. 4-8.

Kennedy was uncertain about what to do with all the pressure on him and the strongly held views for invasion held by many involved. But he had great confidence in Ambassador Thompson's expertise so at a time close to the last minute he put the question directly to Ambassador Thompson and the ambassador proved to be exactly right. This truly terrifying crisis was resolved peacefully and McNamara in conclusion said, "We're damn lucky to be here."¹² Thirty years later at a conference of former Cuban Missile Crisis participants, Americans, Russians and Cubans, McNamara learned that the U.S. military and intelligence agencies had been wrong. There were a number of Soviet nuclear weapon carrying missiles that were by the time of Crisis fully operational and would have been launched had the U.S. invaded. This would have triggered all out nuclear war.

In November, 1979, President Carter's National Security Advisor Zbigniew Brzezinski was awakened in the middle of the night by his military advisor and told that the Soviet Union had launched 250 strategic missiles with nuclear weapons at the United States in a surprise attack. Minutes later the estimate was changed to 2,000 missiles. Washington would be incinerated in a few minutes; Brzezinski didn't awaken his wife thinking they would all be dead soon. Brzezinski knew that he, in a few minutes, would have to wake President Carter as the missiles by then would be arriving in ten minutes. The President would have seven minutes to decide whether to launch the entire U.S. retaliatory nuclear arsenal leaving three minutes to deliver the message to U.S. forces before they were destroyed by incoming Soviet missiles. This was the launch on warning policy which both sides more or less followed throughout the Cold War. As it turned out Brzezinski didn't have to wake Carter as several minutes before the ten-minute mark, a further check disclosed that this was a false alert generated by a computer

¹² Ibid, "A Conversation in Havana," pp. 6-7.

malfunction. But if President Carter had been awakened, strategic nuclear war almost certainly would have followed. Two more computer failures took place the next year.

Such incidents were by no means confined to the American side. In September, 1983, a Soviet early warning station detected—with the use of new early warning satellites recently deployed to monitor U.S. Minuteman strategic nuclear missile fields—a missile launch by the U.S. This was at a time when for various reasons the Soviet Union was so fearful of a first strike by the U.S. that it had installed a secret computer program that supposedly measured the strength of the US and NATO forces versus those of the Soviet Union. If the Soviet Union ever fell below a certain level, then the Politburo was to consider preemption-preventive nuclear war. The Soviet Union had secretly modified its launch on warning policy in this way which created a much higher level of instability. The Soviet officer in charge at the station, a Colonel Petrov, called his counterpart who was an assistant to the Chief of the General Staff. Petrov's orders were to simply report what the instruments presented. But he didn't follow orders, he didn't trust the new satellites and he didn't believe either the United States or the Soviet Union ever would launch a first strike. He said to the General Staff office, "false alarm." Immediately after he said that, the large computer screen lit up again, showing four more launches. He had to decide right there on the spot, with no additional information. He repeated to the duty officer, "This is a false alarm." The message went up the chain of command.¹³ Petrov was correct, the satellites had made an incorrect reading. But if he had followed orders, given the paranoia that gripped the Politburo, strategic nuclear war was a virtual certainty to have followed.

¹³ Hoffman, David, *The Dead Hand*, New York: Random House Press, pp. 6-11.

Nor were such crises confined to the years of the Cold War. In January, 1995, several years after the end of the Cold War, the U.S. and Norway were conducting an experiment launching a missile to observe the Aurora Borealis. Over 30 nations, including Russia, were notified weeks in advance. But the notice was lost in the Russian bureaucracy and an early warning station read the rocket's radar signature as a U.S. Trident II submarine missile headed toward Moscow as the first salvo in a nuclear weapon first strike.

The “nuclear briefcase” was brought to Yeltsin. He was informed he had five minutes to decide whether to launch Russia's strategic nuclear missiles at the United States. The Russian military command issued a message to prepare for a launch order .Yeltsin activated the “nuclear keys” the only time this has happened since the beginning of the nuclear age. But Yeltsin had his doubts about whether the U.S. would ever initiate such an attack and he took no action for five tense minutes. Ultimately the order to stand down came after the radar station saw pieces of the rocket fall into the sea.¹⁴ Once again the right man was in the right place at the right time. But the world cannot count on such good fortune forever. The NPT, the cornerstone of world security, despite its flaws and its associated agreements such as New Start—under pressure in recent years on the U.S. side—are essential to the peace and well-being of the planet. The NPT is important to control vertical proliferation as well as horizontal proliferation. Vertical proliferation is increasing the size of existing national arsenals. Horizontal proliferation is the Bomb spreading to additional countries. Now turning to review the state of horizontal proliferation.

The British were first after the Soviet Union. As soon as the war was over the United Kingdom began to develop its nuclear program. The Cabinet subsidiary, the Atomic Bomb

¹⁴ Hoffman, David E., “Shattered Shield, Cold War Doctrine Refuse to Die,” Washington Post, March 15, 1998, A01.

Committee, set up by Prime Minister Atlee began its work in 1945. America's refusal to continue the cooperation that existed during the war only intensified the British resolve. The program formally began in 1946 under the Atomic Energy Research Establishment. No consideration was given to the desirability of controlling the proliferation of nuclear weapons. This was something the British government decided it must have because of economics and prestige. The first test, a plutonium-implosion device like Trinity was carried out in October 1952 in the Montebello Islands, roughly 20 kilometers off the west coast of Australia. Although the UK arsenal could never compete with those of the U.S. and Soviet Union in size, it established the Cold War principle that among major states, the possession of nuclear weapons distinguishes great powers from lesser states.

The French experience was different but the goal was the same, nuclear weapon proliferation was pursued for the purpose of national prestige and conferring status as a great power. Initially, France concluded that it did not need nuclear weapons as long as Germany was kept disarmed—German occupation of France had ended only a few years earlier.¹⁵ The British had a program and the United States was undergoing a rapid and large build-up, but with the French defeat at Dien Bien Phu and German rearmament underway, Premier Mendes—France decided that France must have nuclear weapons. A French government paper stated at the time that “the bomb is not necessary for military purposes” given the U.S. program but a French bomb “did present a double interest: political [and] technical.”¹⁶ The program moved ahead in fits and starts but by the time General de Gaulle returned to power in 1958 it was soon possible to carry

¹⁵ J.E.C. Hymans, “The Psychology of Nuclear Proliferation,” London, Cambridge University Press, 2006, pp. 89-91.

¹⁶ *Ibid.* p. 105.

out a nuclear weapon test. The first test was conducted on February 13, 1960 in the Algerian Sahara.

Sweden's program began promptly after the atomic bombing of Japan. The objective was to establish Sweden as a neutral power but able to defend itself against any potential foe. The Soviet invasion of nearby Finland in 1940 was a motivator. However, the program proceeded slowly because of military budget constraints. In the late 1960s, Sweden had to choose between a nuclear weapon and a new fighter aircraft. The decision was for the plane and Sweden dropped all plans for nuclear weapons when it signed the NPT in 1968.¹⁷

Swiss interest in the acquisition of nuclear weapons also began at the end of World War II. The Federal Council established a study commission which concluded that there was no urgency about building nuclear weapons and noting the high expense. This attitude changed in 1956 with the Soviet suppression of the Hungarian Revolution. A national resolution on prohibiting nuclear weapons development was put to the Swiss people who rejected it by a majority of more than two to one. Intensive work began. The Swiss believed that a small central European state that had successfully resisted Hitler had to find a way now to resist the Soviet Union. A few years later came the Cuban Missile Crisis which enhanced the anxiety of the Swiss people and a second similar referendum in effect passed by a sizeable majority. However, the Crisis was settled peacefully and there were no NATO-Warsaw Pact hostilities. As a result, financial considerations began to be taken more seriously, the interest in Switzerland to build nuclear weapons declined and Switzerland signed the NPT on November 20, 1969.¹⁸

¹⁷ Cole, P. "Sweden without the Bomb" (Washington D.C., RAND Corporation, 1994).

¹⁸ Stassi, J. "Historical Outline on the question of Swiss National Armament" (internet) The Nuclear Weapon Archive available from <http://nuclearweaponsarchive.org/library/swissdoc.html>.

Israel had a somewhat different view of the bomb than the six states mentioned above. It saw the bomb not as security or status, but rather as absolutely necessary for survival in the early days.¹⁹ Israel's first Prime Minister David Ben Gurion believed that Israel must rely on itself and this meant reliance on science and technology where Israel, a tiny state in a sea of hostile states had an edge. This rather quickly took Israel to a bomb program. The first step was the purchase of a small research reactor from the United States in 1955.

The next year a much better opportunity arrived. The Egyptian President, Gamel Abdel Nasser, nationalized the Suez Canal creating a huge crisis. Despite U.S. opposition, Britain and France decided on a military response and France asked Israel to join. France promised Israel a research reactor in return. The British-French military adventure turned out to be a complete failure given the opposition of both the United States and the Soviet Union. Israel however had done its part successfully—seizing the Sinai Peninsula and as a result insisted on being able to buy from France an upgraded research reactor capable of producing large amounts of plutonium. In 1957 France's nuclear supplier Saint Gobain Nuclearie also sold to Israel and agreed to build an underground reprocessing plant for plutonium separation. Both facilities were sited at Dimona in Israel's Negev desert. Completed in 1960 the reactor had an ample supply, twenty tons, of heavy water, purchased from Norway. All of these sales were theoretically made for “for peaceful purposes only.”

France also gave to Israel secret information on the design and manufacture of nuclear weapons. By the 1960s the CIA had learned of the heavy water sale and the presence of Israeli observers at French nuclear tests in the Sahara. And of course, American satellites were well

¹⁹ Cohen, A., “Israel and the Bomb”, New York, Columbia University Press, 1958, pp. 12-13.

aware of the large underground construction project underway at Dimona. The reprocessing plant was completed in 1965. The first plutonium was separated the same year. Israel soon was in possession of two or three nuclear explosive devices. By the 1980s, Israel possessed a nuclear stockpile of a comparable capability to France.

The six previous states whose weapons aspirations were discussed above joined the NPT, four as nuclear weapon states and two, Sweden and Switzerland, as non-nuclear weapon states. Israel continued to refuse to sign the NPT and never admitted that it possessed nuclear weapons. It pursued a policy of “nuclear ambiguity.”²⁰

President Kennedy was briefed on the Israeli program by the outgoing Secretary of State shortly before his inauguration. Kennedy was convinced of the serious risk that nuclear weapons would sweep all over the world and regarded Israel as the greatest immediate danger in this regard.

But then there was China. In 1955 Chinese leader Mao Tse-Tung and senior Politburo members decided on a bomb program and after a break-up with the Soviets in the late 1950s were going it alone; but their first test was not far away. In future years there was more proliferation to come and some proliferation to be undone. India and Pakistan built weapons and first completed weaponization of their stockpiles by tests in 1998. North Korea also built a stockpile and conducted a series of tests over the years beginning in 2006. South Africa built six weapons but gave them up in 1989 and joined the NPT in 1991 as a non-nuclear weapon state. In the aftermath of the collapse of the Soviet Union, Belarus, Kazakhstan and Ukraine inherited

²⁰ Richelson, J.T., *Spying on the Bomb*, New York, W.W. Norton, 2006, pp. 236-242, 254-262.

substantial weapon stockpiles from the Soviet Union but all three surrendered them and joined the NPT as non-nuclear states, Belarus and Kazakhstan readily, Ukraine, very reluctantly.

Many other states have had ambitions to possess nuclear weapons but up to now none has realized such ambitions; states such as Iraq, Iran, Turkey, Argentina, Brazil, Australia, South Korea and Japan, to some degree. And with the proliferation of scientific expertise and technical capabilities by the dawn of the 21st Century likely more than forty countries were capable of building atomic weapons.

The fear of proliferation is by no means a recent phenomenon. In response to a reporter's question in March of 1963, President Kennedy said that his worry was that by 1970 there would be ten nuclear weapon states instead of four, with nuclear weapons integrated into their national arsenals and by 1975 the number could be fifteen to twenty. He regarded this as "the greatest possible danger and hazard."²¹

Kennedy was not the only statesman appalled by both the thermonuclear confrontation and the threat of the widespread proliferation of nuclear weapons. In 1961 the United Nations General Assembly unanimously passed the "Irish Resolution" which called on all states to conclude an international agreement prohibiting the further acquisition or transferring of nuclear weapons. Nothing happened for four years and then the United Nations passed a new resolution, introduced by Sweden and India, which not only called for a nuclear non-proliferation treaty but set forth principles on which the treaty should be based. Among them were principles that called for a balance of obligations between nuclear and non-nuclear states, that is undertakings by the NPT nuclear weapon states in exchange for the commitment to non-proliferation by the non-

²¹ Dallek, Robert, "The Unfinished Life: John F. Kennedy, 1917-63." (Boston: Little, Brown and Company, 2003) p. 615.

nuclear weapon states. This meant in particular, nuclear disarmament and peaceful uses support by the nuclear weapon states. Another principle was that the treaty itself be a step toward nuclear disarmament. This set the stage for negotiations to begin in 1966.

The negotiation took place in Geneva at the 18 Nation Committee on Disarmament known as the ENDC, the acronym based on the name for the organization in French. The ENDC was the successor organization to the Ten Nation Committee on Disarmament which was established by a 1959 United Nations resolution to provide a permanent negotiating body for the two opposing blocs, East and West, to discuss and negotiate nuclear disarmament. There were five NATO members of this Committee, the United States and four others as well as five Warsaw Pact members, the Soviet Union and four others. It operated during 1960 and then in 1961 was succeeded by the ENDC. The ENDC added eight new members to the original ten: Brazil, Burma, Ethiopia, India, Mexico, Nigeria, Sweden, and the United Arab Republic. The ENDC actually operated with only 17 members as France refused to take its seat. The eight additional states, except for Sweden which was considered a neutral, were part of the Non Aligned Movement, established by Indonesia in 1955 to take an international position apart from the Eastern and Western blocs.

The ENDC existed until 1969 when it was expanded twice, first to 31 nations becoming the Committee of the Conference on Disarmament (CCD) and ultimately the Conference on Disarmament or CD in 1979. Since 1979, now 65 members, the CD has been the permanent organization for multilateral arms control negotiations on weapons of mass destruction. The NPT was negotiated at the ENDC, all other such treaties were negotiated either at the CCD or the CD, for example, the Chemical Weapons Convention and Biological Weapons Convention at the CCD and the Comprehensive Nuclear Test Ban Treaty at the CD. France and China which did

not participate in the NPT negotiations eventually became parties to the Treaty in the early 1990s.

By the end of 1966, the two co-chairmen of the negotiation, the United States and the Soviet Union had agreed upon a joint treaty text. This draft text obligated the nuclear weapon states-parties not to transfer nuclear weapons to the non-nuclear weapon states-parties (Article I). Nuclear weapon states were defined in the Treaty as states that had tested a nuclear device prior to January 1, 1967 thereby establishing the five permanent members of the Security Council as the nuclear weapon states: China, France, the United Kingdom, the Soviet Union and the United States. The non-nuclear weapon states—all others—were obligated not to receive or otherwise acquire nuclear weapons (Article II) and provided for safeguards to verify these undertakings (Article III). However, the eight non-aligned members of the ENDC wanted the treaty to be consistent with the five principles of the Sweden-India resolution, in particular balanced obligations and taking a step toward nuclear disarmament. They argued that the Treaty also needed to include specific, tangible interim steps to halt the nuclear arms race and to limit nuclear weapons. Some member states of the ENDC also advocated that a provision was necessary that safeguarded the right of all states-parties to have access to peaceful nuclear technology.

There was a long debate within the ENDC over the concept of “interim steps” of arms control and disarmament on the way to the elimination of nuclear weapons; balanced obligations on the route to nuclear disarmament. This discussion evolved into the general language of Article VI of the Treaty but a number of states continued to argue for more, either specific objectives in Article VI or standalone goals. One state urged for a separate article containing a number of interim steps. The co-chairman encouraged the view among the non-nuclear weapon states that

specific disarmament objectives such as the test ban or fissile material cutoff could be pursued in the Review Conference process, but opposed their inclusion in the Treaty text itself. In the end they relented a bit and agreed to a preambular reference to the Test Ban (paragraph 10). So, Article VI was left as an exhortative provision. For the non-nuclear states, Article VI came to mean a call for an end to the nuclear arms race and the ultimate elimination of nuclear weapons. It was also understood to mean that along the way specific measures such as a comprehensive nuclear test ban treaty, deep reductions in nuclear weapons, a fissile material cutoff treaty and improved safeguards and verification would be achieved.

The test ban was all important. After all, if the nuclear weapons states were unlikely to be able to make much progress in reducing the number of nuclear weapons in the depths of the Cold War at least the nuclear weapon states could permanently stop testing the weapons. Thus, the comprehensive test ban or CTBT became the essential “glue” that held the NPT together. It was and is the single most important commitment for the medium-term future in the eyes of the non-nuclear weapon states and it is the quid for the quo of the non-nuclear weapon states giving up the most destructive weapons ever created. A separate article covered nuclear weapon free zones.

The non-nuclear weapon states’ desire for the treaty to ensure their access to the peaceful use of nuclear energy was codified in Article IV of the Treaty. Article IV establishes the “inherent right” of all states in compliance with Articles I and II to utilize peaceful nuclear energy. A number of additional supportive provisions also were included in Article IV. Many of the states involved in the creation of the NPT regarded the peaceful use of nuclear energy as a sovereign right and essential to their economic development. Without Article IV there would have been no NPT. In a speech to the Bundestag, in 1967, German Foreign Minister Willy

Brandt said that Germany would not accept anything in the emerging NPT which hindered the peaceful utilization of nuclear energy.²²

One of the important provisions for the future was Article X.2 on NPT duration. Many states had pressed for permanent duration of the NPT but Germany, Sweden and Italy were not prepared to agree to this. These three states were concerned about the NPT safeguard system established in Article III and whether it would have a negative commercial effect because of the cost of safeguards for non-nuclear weapon states; the potential effectiveness of the treaty on stopping proliferation and the prospects for widespread membership. It was therefore agreed that the NPT would be given a duration of 25 years after which a conference would be held and on a one-time basis the parties would meet to decide the ultimate duration of the NPT by majority vote without reference to national legislatures. Thus, once again at the 1995 Conference on extending the NPT as provided for in the Treaty the CTBT would play a starring role in the long history of difficult issues for the NPT regime. It was the central issue taken up by the Conference in 1995 to consider NPT extension. All that could be achieved in 1968 was a preambular reference to it and its importance.

The first four Review Conferences in effect were failures contrary to the assurance of the United States and the Soviet Union, the co-managers, as far as Article VI issues were concerned. The primary problem was that the nuclear weapon states were never willing to agree to language committing them to negotiate a comprehensive test ban. This was despite the obvious importance of the CTBT to the NPT negotiations and the preambular reference to its importance in the Treaty text itself. In 1975 a complete impasse was reached on the test ban—20 states had

²² Shaker, M.I. "The Nuclear Non-proliferation Treaty, Origin and Implementation, 1959-1979, London, Oceans Publications, 1980, p. 294.

proposed a protocol to the NPT calling for a test moratorium until France and China joined the Treaty and after that a CTBT. The nuclear weapon states rejected their proposal and in order for the Review Conference to agree on a Final Statement the Conference President gavelled through a statement by the president stating that a test ban treaty should be concluded as soon as possible. In 1980 there was another impasse over the test ban, there was no agreement on a Final Document and the conference failed. In 1985 an “on the one hand, on the other hand” document was agreed. And in 1990 the Review Conference failed again over the test ban. By contrast the discussion of Article IV peaceful uses and Article III safeguards issues at these conferences always ended up with agreed language for a Final Document.

In 1995 the long-awaited Review and Extension Conference took place. Other than the extension of the NPT itself which was intensely controversial, the number one issue was the CTBT. As part of the price for permanent or indefinite NPT extension, it was agreed that a CTBT would be negotiated in one year. This indeed did happen and the Treaty was signed at the United Nations with U.S. President Bill Clinton being the first signer in September of 1996. However, agreement to ratification of the CTBT in the U.S. was blocked by the Republican members of the United States Senate in 1999. Even though over some 168 nations have now ratified the CTBT, there has been no movement in the United States since that time. Subsequent Review Conferences accomplished little on this issue. The 2000 conference reaffirmed the 1995 commitments and affirmed 13 positive steps to take in nuclear disarmament. Few of these have been actually implemented. The 2005 conference failed as there was virtually no agreement on any issue and the commitments of 1995 and 2000 were repudiated by the U.S. The 2010 conference was successful and the U.S. commitments of 1995 and 2000 were restored.

A new issue arose at the 1995 conference that was considered in 1968 but became a major issue for the NPT regime in 1995. The subject is a nuclear weapon free zone for the Middle East or as the Egyptians propose it a weapons of mass destruction free zone for the Middle East. Expressed differently, the real problem for the Arab nations is the Israeli nuclear weapon arsenal. The 2010 conference made its top priority implementing the Middle East Resolution and NPT parties reached agreement temporarily. The 2015 conference failed over this same issue.

In 1993 as part of the debate on United States policy toward the CTBT, President Clinton, after an intense, lengthy internal government struggle over the issue, agreed to extend the nine-month nuclear weapon test moratorium established by Congress the year before, until a CTBT is achieved. France and China joined the moratorium in 1996 and Russia and the United Kingdom were part of it from the beginning. Gradually it spread over the entire world and after the India-Pakistan nuclear weapon tests in 1998, virtually all nations were considered to be observing it. The last holdout, North Korea declared it would do no more tests in the spring of 2018. However, late in the year Kim Jong Un seemed to reverse this position, but by September, 2020 North Korea still had not carried out another nuclear weapon test. The Moratorium is of course an informal policy agreement and is not legally binding. But as of this moment there is no active nuclear weapon test program anywhere in the world. And except for North Korea, an outlier, there have been no nuclear weapon tests anywhere for 22 years. If this situation lasts long enough it could be argued that a ban on testing nuclear weapons has become part of generally accepted customary international law, not the same as a treaty, but binding international law nonetheless. This position would be reinforced by the 1996 World Court decision casting doubt on whether the use of or threat of use of nuclear weapons generally is compatible with

international law applicable in armed conflict and international humanitarian law.²³ But even so it would appear that the NPT regime at this time, 50 years on, has only partially succeeded in its many years of effort to stop nuclear weapon tests worldwide pursuant to a legal binding treaty.

Early on when this author began the campaign for the United States to achieve indefinite extension for the NPT or permanent status, I paid a visit to Foreign Minister Amr Musa in Cairo. There I was told in no uncertain terms that Egypt would never agree to make the NPT permanent—nor would many of its Arab friends—unless Israel took a step toward someday joining the NPT as a non-nuclear weapon state, for example, by closing Dimona. The next year and a half or so featured many trips by American officials to Israel from the Secretary of State on down to discuss this issue. I made a number of trips to Cairo during this period to Egypt to discuss this and other issues and one long trip to Israel. The Israelis were always polite, but they never said they would do anything and they never did do anything about the issue raised by Egypt.

This process to respond to Egypt and other Arab states culminated in a meeting in a basement office at the United Nations the night before the vote on NPT extension and the Arabs still had nothing. At our meeting we discussed the possibility of an additional resolution along with the resolutions already agreed upon (Indefinite Extension, Principles of Arms Control and Disarmament and Enhanced Review for the NPT). But there was a problem deciding who would sponsor it. Egypt said the Arabs had a problem with it not mentioning Israel being outside the NPT and as a result didn't want to do so, and the Conference President Jayantha Dhanapala said he didn't want to introduce it either. Ambassador Dhanapala turned to me and asked "How about

²³ International Court of Justice, *Legality of the Threat or Use of Nuclear Weapons*, (1996) CJ2.

the Depositaries?” (The three states where new parties could submit their instruments of ratification—Britain, Russia and the U.S.) I said OK for the U.S. but I would have to talk with the United Kingdom and Russia, the other two depositaries. I spoke with the British Ambassador and the Russian Ambassador on the phone from the meeting. The British Ambassador agreed to introduce it, the Russian Ambassador, Sergey Kisliak, said he thought he could do so as well but would have to check with Moscow. Over the night someone on the UN staff converted the language we discussed into a draft resolution. Sergey called me early the next morning in my hotel room and told me that he was authorized to co-sponsor. But he said that Moscow had a condition. I replied, “What is that Sergey?” fearing the worst. He replied, “Tom, Moscow says I have to read it first.” The Resolution was adopted that day, the next to last day of the Conference. It was approved by a parliamentary consensus after the first three Resolutions mentioned above—extending the NPT, establishing Principles of Arms Control and Disarmament, and strengthening the NPT Review Conference obligations—were likewise adopted. The additional resolution required about two hours of debate, unlike the others which took seconds, but eventually was adopted.

Over the course of the next 15 years, this issue became an increasing problem for the NPT regime. Finally, after years of waiting for something to happen, Egypt decided to bring it up at the 2010 Review Conference as mentioned above. There was consensus for a non-negotiating conference on this subject at the 2010 Review Conference and the U.S. and its allies agreeing to it made a consensus agreement on a Final Document possible. However, while virtually all other Middle East states agreed to attend this new Conference, Israel did not and the Conference never happened. As a result, the approach of most of the NPT states parties was far more draconian in 2015. There would be a negotiating conference by a fixed date chaired by the Secretary General

of the United Nations. The United States, Canada and the United Kingdom opposed this proposal and an agreed Final Document was blocked. Thus, the Conference failed. The Middle East resolution is a second important issue which the NPT regime has failed to resolve.

Both the test ban issue and the Middle East issue are likely to remain contentious. The Middle East for sure and likely also the test ban issue, given statements by a few officials in the Trump Administration that the U.S. should conduct some low yield nuclear weapon tests. These officials say that Russia and China have carried out such tests recently—without proof of course.

There is a final point worth mentioning here. While the NPT regime has been a great success—with only four nations obtaining nuclear weapons in addition to the original five, far from what President Kennedy feared, viewed from another perspective the NPT has not been a success. The Principal Five still possess highly destructive nuclear weapon arsenals, although far smaller with respect to the number of weapons. On the basis of these arsenals, the P-5 still regard themselves as the great powers charged with managing the world: codified by their permanent membership on the Security Council with the rank of veto. There is a reflection of this status in the G-7/G-8 organization. This organization is supposed to focus primarily on world economic problems; but the world's second largest economy has never been present and a state with a small economy but the world's largest stockpile of nuclear weapons was a member for a time until it was kicked off a few years ago after aggression against Ukraine.

Some supporters of the so-called Ban Treaty recently negotiated at the United Nations, (officially the Treaty on the Prohibition of Nuclear Weapons) argue the NPT should be replaced. They argue that the NPT serves only to protect the great power status of the P-5 states and their control of the UN Security Council and many other international institutions and does little to lift the scourge of nuclear weapons still threatening the world community. They argue that the NPT

should be enlarged in scope by the Ban Treaty, which should become the world's dominant security instrument. This issue likely will come up at the 2020 Review Conference as well. The author believes that such a proposed course of action (replacing the NPT with the Ban Treaty) would be suicidal and that this would result not in the elimination of nuclear weapons but in nuclear weapons sweeping all over the world. The Ban Treaty completely lacks the essential highly intrusive verification provisions required for such an important step. Important countries could easily cheat on the obligations of the Ban Treaty as currently constituted—and they would do so. However, the Ban Treaty does have many supporters, 122 states voted at the United Nations to begin the negotiations, 84 countries signed it in 2017 and 44 have ratified it. It comes into force on the occasion of the 50th ratification.²⁴

The 2020 Review Conference of the NPT is a coming important event. It was postponed from its original dates in the Spring of 2020 because of the Covid-19 pandemic. The preparatory committee meetings over the past three years were not encouraging, there was little convergence on the issues. Originally the Review Conference was scheduled for April 27-May 22, 2020. On the 27th of April, the Conference President-designate of the 2020 NPT Review Conference Ambassador Gustavo Zlauvinen announced that the Review Conference was being postponed by the parties until a later date, as soon as the circumstances will allow it (with respect to what the pandemic will permit), but no later than April, 2021. A tentative date of January 5-29 was established partly because of the necessity of securing available hotel accommodations, but likely the meeting will actually occur later.

²⁴ Chapter XVI 209 Treaty on the prohibition of Nuclear Weapons, United Nations Treaty Collection, 2019.

Daryl Kimball, the Executive Director of the Arms Control Association reported in the April 2020 issue of Arms Control Today, that he had conducted an interview with the President-designate of the 2020 Conference on March 26, 2020. Ambassador Zlauvinen had circulated a proposal to NPT regional groups after extensive consultation, the day before, March 25, to postpone the review conference “until such time as conditions permit, but not later than April, 2021.”²⁵ All other preparatory meetings and consultations were also postponed without future dates mentioned. Holding a virtual meeting was deemed impractical as likely to lead to technical difficulties.

At a United Nations Security Council session convened by Germany in February of 2020 in New York, the UN High Representative for Disarmament Affairs stated that “relationships between states, especially nuclear weapon states are fractured.

“The specter of unconstrained nuclear competition looms over us for the first time since the 1970s. We are witnessing what has been termed a qualitative nuclear arms race, one not based on numbers, but on faster, stealthier, and more accurate weapons. Regional conflicts with a nuclear dimension are worsening, and proliferation challenges are not receding.

“I hope the review conference can serve as a springboard for thinking on how to address the nuclear weapon challenges of our time.”²⁶ the Council was told. But the Review Conference now has been postponed, and given the state of the pandemic possibly indefinitely.

The president-designate said that once travel restrictions are lifted, he planned to resume the regional seminars on the NPT that his predecessor had begun. Ambassador Zlauvinen added

²⁵ Kimball, Daryl, “NPT Review Conference Postponed,” Arms Control Today, April 2010, p. 2.

²⁶ Ibid, p. 5.

that once such discussions resume, he hoped that the NPT states parties would be able to think like a community “and find common solutions to common problems.”

In the Bulletin of the Atomic Scientists on May 13, Robert Einhorn, for many years a high-ranking senior State Department official published an article in which he said the parties should work on narrowing the issues among them until the postponed review conference actually does convene. He explicitly referred to such issues as including “the pace of nuclear disarmament and the establishment of a Middle East free of all weapons of mass destruction”.

On pacing disarmament Einhorn downplayed the significance of the Treaty on the Prohibition of Nuclear Weapons, the “Ban Treaty” He also proposed that the International Atomic Energy Agency (IAEA) Additional Protocol be recognized as the universal safeguards document and highlighted the peaceful uses of modern nuclear technologies. He also suggested work on a provision or understanding which would reduce the risk of abuse of the withdrawal provision, such as developing facilities under IAEA safeguards when a treaty party then withdrew and used such facilities for activities inconsistent with treaty provisions. This is a many-years-old issue which has not been resolved.²⁷

Tariq Rauf, for many years a highly influential NPT expert, in a June 2, 2020 article in the Bulletin commented on Einhorn’s suggestions and proposed a few steps himself.²⁸

He noted that pursuant to the latest IAEA Safeguards Implementation Report the Additional Protocol has already been adopted as the “verification standard” of 125 NPT non-nuclear weapon states. Argentina and Brazil still believe their joint system is better and have not

²⁷ Einhorn, Robert, “Covid-19 has given the 2020 NPT Review Conference a reprieve. Let’s take advantage of it.” Bulletin of the Atomic Scientists, May 13, 2020, thebulletin.org.

²⁸ Rauf Tariq.” “The postponed 2020 NPT Review Conference, a Modest Proposal,” Bulletin of the Atomic Scientists, June 2, 2020, thebulletin.org.

adopted the Additional Protocol. Egypt has conditioned its acceptance on Israel's becoming a non-nuclear weapon state. And by withdrawing from the Joint Comprehensive Plan of Action, the U.S. has put Iran's provisional implementation of the Protocol in jeopardy.

Einhorn had suggested in his paper that the NPT Review Conference abandon the all or nothing Final Document approach and simply have a collection of all recommendations and proposals submitted by parties during the Review Conference and a high-level ministerial statement reaffirming commitment to the NPT at the next Review Conference.

Rauf said that it was his view and also that of the 1995 Conference President Jayantha Dhanapala that merely listing or restating positions without seeking agreement through consensus would be contrary to the strengthened review process established in 1995-2000. The same argument would apply to a variation of this suggestion that the issues that can be agreed be memorialized in a consensus document, but matters that could not be agreed be covered by accompanying documents. In addition to this procedure being inconsistent with the agreement on strengthen review, it would dramatically expose and underline the deep divisions on disarmament, which is the part of any draft Final Document most likely not to achieve agreement.

Finally, Rauf suggested that the 2020 Review Conference be held not in uncertain 2021 but in much safer 2022. It also should be moved from New York to Vienna where the technical support of the IAEA is available.²⁹

It is safe to say after this review of the status of the 2020 NPT Review Conference that it is largely in disarray as are so many other institutions today. That if held in the near future it

²⁹ Ibid, p. 4.

would be dominated by discussions of a new nuclear arms race; severely tested once more by the Middle East Zone free of weapons of mass destruction issue as well as by proposals related to the Ban Treaty. The Middle East Zone and the Ban Treaty are both highly controversial and likely to lead to a failed Conference along the lines of 2015. review process; the lack of progress on the test ban deeply regretted; there would be useful discussions of cooperation on the peaceful application of nuclear technologies in the face of the looming climate crisis; and perhaps some challenging proposals directed toward the CTBT. In addition, the U.S. withdrawal from the Iran agreement, or the JCPOA, as well as the North Korea and Iran problems generally could be the subject of debates. Probably the draft Final Document will be unacceptable to some Western states just as in 2015, for likely the same reason, the Middle East. Perhaps also because of initiatives on the Ban Treaty, the draft Document will be unacceptable to many states, principally the P-5 states and their allies, so that issue as well could contribute to a failure to achieve an agreed Final Document.

But the Conference probably won't be held in the next few months. The pandemic appears as though it is going to stay at full force for months to come and the prospect for widespread availability of a vaccine that could really make a difference as well seems to be still perhaps quite a few months or so away, at least. In this context, Tariq Rauf's proposal seems sensible, schedule the 2020 Review Conference in the spring of 2022. Vienna also appears a good choice to locate the conference, near the IAEA. Thus, it's difficult to say what the issues might be if the conference is held in 2022, as the spring of 2022 is approximately 18 months in the future. But we can safely plan for the test ban, the nuclear arms race, the Middle East, the Ban Treaty and peaceful uses to still be on the agenda then. Perhaps a new American administration will be able to save the JCPOA. Lastly it should be mentioned that the current

U.S. administration is discussing agreeing to a one-year extension of New Start with Russia accompanied by a warhead freeze. If this proposal were to be adopted, a new administration would have to seek negotiations with Russia on a new strategic arms agreement shortly after taking office. If the current administration is not able to accomplish anything and there is a change of administration, the five-year extension option that is part of the New Start Treaty will be valid until February 2021.

So now let's look to the future and speculate on the prospects for the NPT in the 2030 timeframe just to select a date in the medium term on which to focus our thoughts about the future of the NPT.

Since the climate crisis is already upon us with widespread wildfires, severe storms and expanding deserts, this issue must be front and center. Where will we be with climate change in 2030 and how could that affect the NPT? The United Nations Intergovernmental Panel on Climate Change provides expert analysis on the state of the planet and the trajectory of climate change. It is the best available guide. Its last report was in 2015 and the next one is due in 2022. The 2015 report opined that if we take action promptly, immediately beginning the implementation of the commitments of the Paris Climate Agreement of December 2015—none of which had been actually implemented by October 2020—we are likely to get over time eventually 3.2 degrees Celsius of warming over pre-industrial levels. This would be three times as much warming as the Earth has seen since the beginning of industrialization. It will bring the never before imagined collapse of the Antarctic ice sheets, which would in time flood out Miami, Shanghai and Hong Kong and around 100 other large cities around the world. This symptom of global warming would begin at about plus 2 degrees Celsius and likely be well advanced by

1930. This is if we do everything that Paris mandates and we haven't really done anything as yet.³⁰

That the climate crisis is in fact very much present is difficult to deny. Huge fires sweep Australia and California, Oregon and Washington with every likelihood that as the seasons go by, they will move to the Central and Eastern United States. Deserts are expanding in Africa and elsewhere. More and more destructive storms come to the Atlantic coast of the United States every year. By 2016, shortly after the signing of the Paris Agreement, the climate system already was heading toward devastation, passing the bright red line of 400 parts per million of carbon in the earth's atmosphere.³¹ Of course that was more than four years ago. The earth now is just below plus 1.5 degrees Celsius. If the earth's temperature increases to plus 2 degrees Celsius from 1.5, which is likely given how little is being done today to effectively mitigate climate change, it is estimated that over the years 150 million more people will die from air pollution alone trying to breathe unbreathable air.³²

The natural fertile belt around the Northern Hemisphere is moving toward the North Pole by about 160 miles a year. The soil that was once fertile now is too far south, too close to the tropics where grains cannot be grown. It literally disappears in this process, some 75 billion tons of fertile soil every year. Some states are losing their arable lands.³³ Drought may be an even larger problem causing deserts to expand. At 2 degrees of warming the Mediterranean area and

³⁰ Wallace-Wells, David, "The Unhabitable Earth," New York, Tim Duggan Books, 2019, p. 11.

³¹ Ibid., p. 3.

³² Ibid., p. 28.

³³ Ibid., p. 51.

much of India will be severely impacted significantly straining the world food supply. A 2015 NASA study predicted droughts worse than any in a thousand years.³⁴

And fresh water sources are also a serious issue. Human beings have been fighting over fresh water sources for 3,000 years. Right now, there is already a major world water crisis. Seventy-one percent of the Earth's surface is covered with water, barely two percent of this water is fresh and therefore consumable. About half of that is accessible and from the one percent, 70-80 percent goes to support agriculture and another 10-20 percent for industry. The world's population subsists on .007 percent of the world's water. This could be enough but the population continues to rise and there is the impact of climate change. Even today over two billion people don't have access to safe drinking water and nearly five billion do not have safely managed water for sanitation.

A significant percentage of the world's population depends on seasonal melt from high elevation snow and ice for water, but this source is drying up with warming temperatures. There is less seasonal snow and glaciers are melting. In the last hundred years many of the planet's largest lakes have been drying up from the Aral Sea to Lake Chad, for example, two very large lakes that are now completely gone. Other big lakes everywhere are declining. There are deep underground aquifers but once used they cannot be replenished.

The World Bank found in one of its reports that access to water for the world's cities is declining throughout the world, some worse than others, of course. Phoenix is already in an emergency planning mode and London is beginning to be concerned about water shortages. The report notes that by 2030 India will have only half the water it needs. In Pakistan when the

³⁴ Ibid., pp. 55-56.

country was founded water availability was at 5,000 cubic meters per person. Due to population growth it stood at 1,000 in 2016 and with the combination of more population growth and climate change could be at 400 cubic meters in a few years.³⁵ If ever there was a cause for war, this is it and India and Pakistan have nuclear weapons outside of the NPT.

There are of course many other very dangerous effects of climate change in the longer term if drastic mitigation action is not taken soon, to include: killing heat waves to the point that many regions of the earth become simply unlivable; an ever more acidic ocean killing off the fish as well as phytoplankton that serve as food for the fish as well as a substantial source of the world's oxygen; significant destruction of the Amazon rain forest also a substantial source of oxygen; uncontrollable wildfires throughout at much of the world; unbreathable air in many cities and parts of the countryside; vicious tropical diseases circling the globe; rising seas swamping many large cities of the earth; more catastrophic major storms every year; famines and economic collapse. But all this would be for the somewhat longer term—2050 and beyond, assuming that an effective defense is not mounted.

But we are concerned in this paper with looking at the future over the next decade about that other existential threat, nuclear weapons, and the fate of humanity's best defense against it—the NPT. It seems likely that over the next decade that less and less arable land will be available to produce the crops needed to feed the world even while population continues to rise as well as a steady disappearance of fresh water sources to provide essential drinking water. These assets have been major causes of war almost from the beginning of civilization and they will continue to be. But as large states with large armies become less and less able to produce food and water

³⁵ Ibid., pp. 26-28.

for their populations, it is likely that they will put increasing pressure on smaller states which still possess arable land and fresh water sources in relative abundance and which are militarily vulnerable. How will such smaller states respond? If technologically capable it is quite possible, they will reach for the one weapon that they think might save them—a nuclear weapon or weapons. As this scenario plays out perhaps in the late 2020s or 2030 timeframe it will be increasingly difficult to hold the NPT together at all.

What should we do? The answer is simple to state but very difficult in its implementation. First, we, that is the world community, should do everything, I mean everything, we can do as soon as possible to mitigate climate change. That means among other steps primarily zero carbon emissions from energy production, transportation and business activity, particularly dairy, and a huge reforestation effort wherever we can. Desalinization of sea water on a large scale likely will be a must. And negative emissions should be pursued as difficult as this may be—decarbonizing the atmosphere.

On the other hand, to complement this effort to mitigate the effects and progression of global warming, we, again the world community, must undertake our best efforts to make the NPT as strong as possible to have a chance of withstanding these pressures, that means:

1. Bring the CTBT into force within the next year, this we can do;
2. Do the best we can to find a solution to nuclear weapons in the Middle East, which will require finding a successful ending to the long running Palestine peace process; and
3. Reduce nuclear weapons to the lowest practicable and possible level, far, far lower than today's levels. This of course initially will be the task of the United States and Russia. Eventually maybe as we fight global warming and begin to prevail the intense

level of world cooperation that we must have to do this will also permit us to eliminate nuclear weapons.

If humanity can accomplish all these things, while at the same time sensibly and effectively addressing the Pandemic and the decline of democracy and free societies around the world, the human experiment will still have a long time to run on this planet.