The INMM has demonstrated a remarkable resilience. Despite the global “shutdown” due to the COVID-19 pandemic, an incredible group of volunteers—which include the Executive Committee, the INMM Association Headquarters (AH) staff, as well as many others—put together a successful 61st Annual Meeting in a virtual environment while most of us were hunkered down either in our own homes, or some in a desolate work environment.

Originally scheduled to be held at the Inner Harbor in Baltimore, Maryland, this year’s Annual Meeting allowed many participants to “attend” who might not otherwise had been able to make the weeklong trip. We had over 700 participants this year, including 330 first-timers, 322 non-members, and 81 students. From most accounts, the event provided broad access to technical presentations, opportunities for networking in an Internet Café, and a new era of participation with the ability to go back and review paper presentations and Q&As that might have been missed the first time around (the presentations will now be online for attendees through June of 2021).

Most people in our “nuclear world” have found themselves to be even busier than normal despite the shutdown, juggling technology, new work schedules, and additional reporting requirements during the pandemic. In many cases we have had to strike a new balance with children and other family members in need, as well as navigating the supply chain and other quality of life issues. The pandemic is a significant challenge to our societies and political structures.

**Strategic Global Security Challenges Impacting the Institute**

In the previous “Taking the Long View” column, I posed these questions in the context of the disruptions caused by the COVID-19 pandemic:

- Will the global community recover economically to continue new scientific and engineering discoveries?
- Will this event reinvigorate investment in the “inherently safe” new generation of nuclear power technologies?
- Will the new “Zoom generation” change the standard for face-to-face meetings?

One might also ask the question:

- Will the pandemic be a tipping point for the world to come together to address cataclysmic events that are existential threats to humankind?

Since we have not yet seen an end to the pandemic, this latter question is still yet to be answered completely. However, despite all of these new challenges brought about by the pandemic that the world is facing, it has been somewhat remarkable (and discouraging) to note that the existing global security challenges we faced prior to the emergence of the virus not only are still there, but continue to escalate, as the world seems to be hurting toward some onerous future.

I have provided an update below on these challenges to ensure that we all continue to take a “long view” of the future.

**International**

- Continuing Tensions Between the West and Russia. Tensions continue between the United States and Russia as both countries have withdrawn from the Intermediate Range Nuclear Forces (INF) Treaty, and both are perilously close to seeing the New START agreement expire in February 2021. If this Treaty does end, it will be the first time in more than several decades that the United States and Russia do not have an active, bi-lateral nuclear weapons reduction arms control agreement in place. U.S. Congressional concerns over this situation have led to inquiries about the budget impact if New START were to end, and a recent report by the Congressional Budget Office (CBO) analyzed various scenarios identifying the potential costs associated with the expiration of the Treaty. So startling was the prospect of the expiration of this Treaty and the deteriorating relationship between the two nations to the Arms Control community that a letter was sent to President Trump in early August signed by 103 foreign policy experts making recommendations for reestablishing a dialog with Russia and opening further diplomatic discussions on a
number of issues.\textsuperscript{4} The United States has also announced its intention to withdraw from the Open Skies Treaty,\textsuperscript{5} and previously had withdrawn from the Joint Comprehensive Plan of Action (JCPOA) agreement.\textsuperscript{6} All of these actions come amidst announcements by both countries of new weapons systems, giving rise to concerns that the world is on the verge of a new Cold War.\textsuperscript{7}

**Escalation of Tensions Between China and the United States, and Territorial Claims in the East and South China Sea.** The long-standing territorial conflict between China and Japan, as well as other Southeast Asian nations, over islands and sovereignty in the East and South China Sea continues. Some analysts are now speculating that a military confrontation is inevitable.\textsuperscript{8} China’s increasing success with hypersonic vehicles also is a great concern to the West, as is its increasing investment in military technologies, including a recent assessment by the United States that it has the capability to double its nuclear stockpile.\textsuperscript{9} The unusual relationship between China and North Korea, and now, the U.S. Trump Administration, creates a complicated environment. With the additional uncertainties associated with tariffs and the ensuing threat of a major trade war, even the creation of future scenarios for how these issues will be resolved becomes difficult. Additionally, the recent events surrounding the COVID-19 pandemic have dealt a significant blow to China’s economy that it is struggling to overcome,\textsuperscript{10} as well as its relationships worldwide. Also, domestic issues have arisen with the transition of Hong Kong to Chinese rule, tensions have been increasing with Taiwan, and growing border issues with India have raised new concerns.\textsuperscript{11}

**Iran.** The decision by President Trump to withdraw from the Joint Comprehensive Plan of Action (JCPOA - the “Iran Deal”) on May 8, 2018 has triggered international turmoil as the other members of the Iran Deal have maintained their support for it, and as Iran, in reaction to the United States’ withdrawal, has taken steps away from its JCPOA obligations, including increased enrichment activities.\textsuperscript{12} In September, progress was made through a direct intervention with Tehran by the new IAEA Director General on inspector access to locations in question.\textsuperscript{13} However, the killing of General Qassem Soleimani in early January by a U.S. drone strike, and the subsequent retaliation by Iran with a missile attack on U.S. bases in Iraq, has created a highly tense international situation that is yet to be fully understood with respect to future hostilities between the two nations. During this summer, several “mysterious” fires and explosions occurred at critical Iranian facilities, including the Natanz nuclear facility which houses centrifuges. These events are still being investigated, although some sources have speculated that Israel or the U.S. is behind them.\textsuperscript{14}

**North Korea (DPRK).** The summits between President Trump and Kim Jong-un appear to have fallen short of creating a long-term meaningful solution to nuclear issues that plague the Korean Peninsula.\textsuperscript{15} The recent COVID-19 outbreak in China has also led to speculation concerning its impact on North Korea, both with respect to reduced cooperation as well as the potential for the virus to have a devastating impact on the DPRK if it spreads to that country with its limited health care infrastructure.

**Global Instability.** The unrest in the Middle East continues, although recent “peace” agreements brokered by the United States between Israel and the United Arab Emirates and Bahrain appear to offer a glimmer of hope for reduction of tensions, but may also result in tension between Arab states in the region.\textsuperscript{16} The impact of the COVID-19 pandemic is yet to be fully understood, as efforts mount globally to find a vaccine. New technologies, including hypersonic weapons, the modernization of the world’s nuclear deterrents, artificial intelligence, and continuing cybersecurity threats as the world becomes more and more dependent on high technology networks and computing outpace the ability to develop counter strategies. This is the 21st century world that has emerged in the third decade of the new millennium. At times, the magnitude of these driving forces brings an overwhelming sense of despair to many, which may ultimately contribute to a global economic downturn.

**Nuclear Renaissance.** The United Arab Emirates (UAE) has brought the first of four nuclear reactors on line (the Barakah Nuclear Energy Plant in Al Dhafra), as other countries such as Saudi Arabia are in the planning stages of similarly using nuclear power to meet their long-term energy needs. In fact, the
nuclear power plant world market is booming, with the principal suppliers being Russia, China, and the Republic of Korea. South Korea, in fact, was the primary contractor supporting the installation of the successful UAE reactors, with Russia assisting a build in Turkey and China building in Bangladesh. Although the United States is not currently a player in this boom, that may change with the introduction of Small Modular Reactors (SMRs) and new “safe” nuclear fuels.17 Promise continues to be held for SMR technology as evidenced by the recent signing of a Memorandum of Cooperation with the U.S. Nuclear Regulatory Commission (NRC) and the Canadian Nuclear Regulatory Authority, and the acceptance and recommendation for approval by NRC staff of the first SMR design by the NRC (NuScale Power).18 However, SMR pilot installations have yet to be implemented and demonstrated. Despite these advances, however, technological struggles continue in Japan to contain the spread of radioactive contamination at the Fukushima site, as the nation struggles with a decision to dump millions of gallons of contaminated cooling water into the ocean in their continued efforts to mitigate the 2011 event.

• India-Pakistan Relations. Tensions between these two nuclear armed nation states rise and fall as both nations continue to strengthen and modernize their strategic weapons systems. Recent public statements by leaders on both sides over the continuing tensions in Kashmir have escalated, leading many news outlets to speculate on a potential nuclear war between the nations.19 The United States’ relationship with Pakistan has also ebbed and flowed over the past year. In a recent talk in Los Alamos, former Laboratory Director Sig Hecker stated that the most dangerous nuclear threat to the world today is the tension that exists between these two nuclear-armed adversaries.

• Cyber Threat. The growing threat posed by both state and non-state hackers to infiltrate even the most secure networks has created an alarming vision of the future, and U.S. Congressional investigations continue on the possibility of foreign governments intervening in the United States elections. Another important aspect of the cyber issue is the growing threat to critical infrastructure using remote communications, particularly those that are associated with nuclear facilities. The International Atomic Energy Agency (IAEA) and others have focused on providing guidance for nuclear facility operators to enhance the cybersecurity posture of those facilities.20 As a result of the growing threat by state and non-state actors, the United States has named both space and cyberspace as “warfighting domains,” raising the level of importance in the defense posture for both of these new areas. The DOE has launched a new initiative to establish a special cyber program and named an Assistant Secretary for Cyber and Infrastructure Protection; the Pentagon has stood up CYBERCOM as a Unified Combatant Command; and a new National Institute of Standards and Technology (NIST) cyber security control compliance requirement is now in all DoD contracts and subcontracts, and will be implemented in 2020.

• Nuclear Modernization. Growing international tensions and security uncertainties continue to drive modernization efforts of all the major nuclear weapons-possessing states, particularly as aging infrastructure, weapons and delivery systems bring into question their ability to meet deterrent needs, and new technologies including hypersonic delivery vehicles and artificial intelligence create new challenges for deterrence strategies. Despite efforts to reduce the size of nuclear stockpiles, these modernization programs, including those of the United States,21 are a harbinger of a new Cold War. A U.S. Congressional Budget Office study identified the planned 30-year modernization effort of the U.S. alone will be in excess of $1.2 trillion. These plans were confirmed with the release of the 2018 Nuclear Posture Review on February 3, 2018. Future efforts, however, will hinge on the 2020 U.S. Presidential election as questions have been raised about the validity of some aspects of the modernization program. Of note, there is interest in the United Kingdom in some of the modernization efforts planned in the United States that would impact their own strategic posture.22

• Brexit. The withdrawal of the United Kingdom from the European Union has been initiated, creating a further unknown to the development of Western economic and security collaborations, including issues surrounding its own nuclear weapons
deterrent. The election of Boris Johnson as the Prime Minister has added yet another uncertainty into the global environment that will not be fully understood until the transition period is over at the end of 2020.

- **Ukraine.** This topical area has been added to address the increasingly complex relationship between the United States, NATO, and Russia with respect to the independence and role of this country in international security. Further complicating those issues are the failed U.S. Presidential impeachment efforts that raised the undertone of political influence emerging from this nation-state. The unique relationship that the Ukraine has to the world of nuclear material management dates to the decision in 1994, following the breakup of the Soviet Union, to remove nuclear weapons from the state under the Budapest Memorandum on Security Assurances.

**United States**

- **U.S. Administration.** The impact to U.S. nuclear policy resulting from the election of President Trump has been addressed in previous “Taking the Long View” columns. It behooves the Institute to closely monitor this dramatically changing environment, particularly as it pertains to the technical and policy issues associated with the JCPOA; North Korean nuclear issues; geologic storage of spent fuel and high-level defense waste; nuclear power; and nuclear weapons modernization efforts.

- **U.S. Budget Deficit and National Debt.** The economic malaise that has impacted the global community is also reflected in the growing U.S. budget deficit, which has been significantly impacted by the economic relief packages associated with the COVID-19 pandemic. The World Economic Forum speaks to the “The Great Reset” that will be needed following the unprecedented impact of the COVID-19 pandemic. Podcast discussions entitled, “The World vs. Virus” predict the impact of the virus will be greater than the global impact of the 2008 financial crisis. Global economies can change national policies and attitudes, and impact decisions about investments made for activities that are supported by our Institute. In the United States, our national deficit was originally expected to exceed $1 trillion in 2020, creating a national debt that exceeded $23 trillion. The FY2020 budget deficit is now estimated by the Congressional Budget Office to be in excess of $3.8 trillion, and could become larger if additional funding is appropriated to assist in the economic recovery. These economic uncertainties that continue to be exacerbated by global conflicts, the uncertain future of the European Union, and global oil markets impacted by the U.S. withdrawal from the Iran Deal as well as the reduced demand due to the COVID-19 pandemic add unknowns to the stability not only of the U.S. economy, but the world.

**U.S. Nuclear Security Enterprise**

- **MOX and Pits, Interim Storage, WIPP, and Yucca Mountain.** As the WIPP site continues to ramp up its operational capability six years after the accidental release of contamination resulting from a breached storage container, there was a growing optimism that the nation’s efforts to permanently dispose of legacy waste were on track. There were initial efforts by the new Administration to restart the Yucca Mountain project, and proposals for the licensing of a Consolidated Interim Storage Facility (CISF) to hold spent fuel from nuclear plants across the United States. Caught up in the politics of the upcoming presidential election, however, the Yucca Mountain Project is once again stalled for FY2021. Political struggles also continue with the decision by NNSA to establish a new Pit manufacturing facility at SRS using the shell of the Mixed Oxide Fuel Fabrication Facility (MFFF), while the Governor of New Mexico has said she would fight the CISF facility proposed for Southeastern New Mexico. Interim “short-term” storage for spent fuel continues to appear to be the most viable solution to safely store the waste of current nuclear power plants, although licensing of those interim storage facilities, and the associated transportation of that waste to those sites continue to encounter many roadblocks from anti-nuclear and environmental organizations.

- **Future of the Nuclear Security Enterprise.** The future of the NNSA Nuclear Security Enterprise (NSE) is yet to be determined. The NNSA Strategic Vision and Governance & Management Framework (May 2019) have set the stage to address the issues identified in the Augustine-Mies and CRENEL reports as
competitions for the Management & Operating (M&O) contracts abound. These include the new contract for the Savannah River National Laboratory (SRNL), which was split from the Savannah River Site (SRS), and the NNSA Production Office contract which includes Y-12 and Pantex. These competitions will introduce variables, including the possibility of new contractor entities. The President’s budget request for FY2021 of more than a 20% increase to $19.8 billion demonstrates the Administration’s focus on meeting the requirements set in the 2018 NPR. However, an internal conflict over that budget has prompted language in the FY 2021 draft National Defense Authorization Act that proposes to place more authority for NNSA in the Secretary’s office by removing language from the NNSA Act which stipulates its employees, “shall not be responsible to, or subject to the authority, direction, or control” of any DOE officials, except the Secretary of Energy.26 Of note, an earlier proposal by the Senate would have placed more authority with the DoD in the review of NNSA budgets, potentially introducing more authority with the DoD in additional matters.27 Additionally, some significant turmoil occurred in May when it was revealed that discussions occurred in White House meetings that the President was interested in how long it would take to resume nuclear testing.28 That news story spawned many articles revisiting this topic and the Comprehensive Test Ban Treaty (CTBT) which has never been ratified by the United States. The NNSA is charged with the responsibility of being prepared to resume nuclear testing if a national security issue arises with respect to the reliability, safety, or security of the nuclear stockpile.29

INMM

- The INMM itself faces “history in the making” in its 62nd year as it attempts to adapt to this dramatically changing global environment, including the continuing impact of U.S. government restrictions on conferences, the loss of participation from Russia due to international tensions, the changing demographics of its membership, and the long-term impact of the COVID-19 pandemic. Other organizations, including the American Nuclear Society (ANS), have recently indicated they are facing similar challenges due to the new generational issues, the political divide, and international complexities. It would behoove the INMM to monitor the actions of those similar organizations and identify best practices that may be applicable. The successful implementation of the first virtual Annual Meeting due to COVID-19 has also set a new standard for the Institute, as challenges exist worldwide to address the pandemic. The first planned International Annual Meeting, scheduled to be held in Vienna, Austria in August of 2021 is still on track. However, the Institute will have to monitor how rapidly international travel and large conference gatherings come back, if a vaccine is successfully deployed, and whether a component of that Annual Meeting could also be virtual for those who cannot meet the travel requirements.

Where Do We Go from Here?

Monitoring critical issues as outlined above is an important element associated with scenario planning, as we track paths to the future. This is the process of connecting the dots. By rehearsing potential future worlds and what events might occur to get there, we can better prepare for those worlds to ensure success, or at least survival.

Such is the world that we are facing in the third decade of the new millennium, with a new realization of how fragile the environment is that we live in, and how interdependent we all are on one another.

This column is intended to serve as a forum to present and discuss current strategic issues impacting the Institute of Nuclear Materials Management in the furtherance of its mission. The views expressed by the author are not necessarily endorsed by the Institute but are intended to stimulate and encourage INMM readers to actively participate in strategic discussions. Please provide your thoughts and ideas to the Institute’s leadership on these and other issues of importance. With your feedback, we hope to create an environment of open dialogue, addressing the critical uncertainties that lie ahead for the world, and identify the possible paths to the future based on those uncertainties that can be influenced by the Institute. Jack Jekowski can be contacted at jpjekowski@aol.com.

Endnotes

1. To access recorded sessions, simply log into the virtual meeting platform with the same credentials you used to login to the meeting in July (https://inmm.org/page/AM61). Attendees who registered for the full event will continue to have access to all recorded sessions. Attendees who registered for single days will have access to the sessions available from those days.


6. Although the United States withdrew from this agreement in 2018, other signatories have not (Germany, France, Britain, China, and Russia). Despite the other signatories’ efforts to sustain the agreement, however, Iran has chosen to violate terms of the agreement in steps. See “U.N. Agency Says Iran is Violating All Restrictions of Nuclear Deal,” https://www.defensenews.com/global/mideast-africa/2020/06/05/un-agency-says-iran-is-violating-all restrictions-of-nuclear-deal/ (9-12-20).

An attempt by the United States in late August to reinstate international economic sanctions through the United Nations failed, however, leaving the status of the agreement in limbo. See “U.S. Fails in Bid to Extend U.N. Arms Embargo on Iran,” https://www.ft.com/longread/2020_09_ 22/iran-embargo-decision (9-12-20).


29. The discussion of nuclear testing has been an issue of public discussion for decades, because of events such as the India and Pakistan tests in 1998, a series of nuclear tests performed by North Korea in recent years, and speculation that both Russia and China have been surreptitiously conducting small, undetectable tests as part of their own nuclear modernization programs. These discussions intensified following the revelation of the discussions at the White House in May. Some pertinent references for the reader include:


- A letter in Science magazine authored by approximately 70 notable scientists requesting that the U.S. Government desist from plans to conduct nuclear tests and presenting the arguments for the ratification of the CTBT. See https://science.sciencemag.org/content/369/6501/262.2 (9-14-20).