

James Blankenship is a forensic examiner with the Federal Bureau of Investigation at the FBI Laboratory at Quantico, Virginia, where he leads the exploitation efforts on weapons of mass destruction, specifically the threat of nuclear weapons and radioactive dispersal devices. As an US Air Force officer, he has been an executive officer in the Pentagon, supporting the Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense Programs. As a program manager at the Defense Threat Reduction Agency, he provided technical oversight and programmatic guidance to the Radiation Hardened Microelectronics Advanced Technology program and was deployed to the Iraq Survey Group as a part of Task Force DTRA. Blankenship received a PhD in chemistry from Texas A&M University, an MS in materials engineering from the University of Dayton, and a BS in chemistry from Virginia Military Institute.

M. Elaine Bunn is Deputy Assistant Secretary of Defense for Nuclear and Missile Defense Policy. As such, she directs the offices of the Under Secretary for Policy that develop and review departmental and national policies for nuclear and missile defense capabilities. These responsibilities include defining requirements for future capabilities, reviewing and adjusting operational planning, and leading discussions to develop strategies and options with allies and friends as well as international cooperation or agreements in the areas of nuclear forces, global strike and missile defense. Prior to her appointment in 2013, Bunn was a Distinguished Research Fellow in the Center for Strategic Research at National Defense University's Institute for National Strategic Studies (INSS), where she headed a project on future strategic concepts. Before joining INSS in 2000, she was a senior executive in the Office of the Secretary of Defense (OSD), where she worked for twenty years in international security policy. She served as Principal Director, Nuclear Forces and Missile Defense Policy, from 1993–98. During that time, she was executive director of the 1994 Nuclear Posture Review. Her other assignments in OSD included the offices of Strategic Defense Policy, Strategic Arms Control Policy, and Theater Nuclear Forces Policy. Bunn has published a number of articles and book chapters on deterrence, assurance of allies, strategic planning, nuclear policy, missile defense, and preemption, and has spoken frequently on these issues at US and international conferences.

Tom Collina is director of policy at the Ploughshares Fund in Washington, DC. Collina has worked extensively as a researcher, analyst, and advocate to strengthen the efforts to end US nuclear testing, rationalize anti-missile programs, extend the Non-Proliferation Treaty, and secure Senate ratification of the New START Treaty. Prior to joining Ploughshares Fund in 2014, Collina served as research director of the Arms Control Association. He was the executive director and co-founder of the Institute for Science and International Security and the director of the Global Security Program at the Union of Concerned Scientists, among other leadership positions. He has published widely in major magazines and journals and has appeared frequently in the national media, including the *New York Times*, CNN, and NPR. He has testified before the Senate Foreign Relations Committee and regularly briefs congressional staff. Collina has a degree in international relations from Cornell University.

Toby Dalton is co-director of the Nuclear Policy Program at the Carnegie Endowment. An expert on nonproliferation and nuclear energy, his work addresses regional security challenges and the evolution of the global nuclear order. From 2002 to 2010, Dalton served in a variety of high-level positions at the US Department of Energy, including acting director for the Office of Nuclear Safeguards and Security and senior policy adviser to the Office of Nonproliferation and International Security. He also established and led the department's office at the US embassy in Pakistan from 2008 to 2009. Dalton previously served

as professional staff member to the Senate Foreign Relations Committee, a Luce Scholar at the Institute for Far Eastern Studies in Seoul, a research associate at the National Bureau of Asian Research, and a project associate for the Carnegie Nuclear Policy Program. Dalton's research and writing focuses in particular on South Asia and East Asia. He has authored numerous op-eds and journal articles in publications such as *Foreign Policy*, the *Washington Quarterly*, *Asia Policy*, *Politico*, the *National Interest*, the *Diplomat*, *Dawn*, the *Wire*, *Force*, and *Dong-A Ilbo*. He is author of "Beyond Incrementalism: Rethinking Approaches to CBMs and Stability in South Asia," *Not War, Not Peace? Motivating Pakistan to Prevent Cross-Border Terrorism* (with George Perkovich, Oxford University Press, 2016), and *A Normal Nuclear Pakistan* (with Michael Krepon, Stimson Center, 2015).

Massimiliano Fratoni is assistant professor in the Department of Nuclear Engineering at UC Berkeley. He received a Laurea in nuclear engineering from Università di Roma "La Sapienza" (Italy), and a MSc and a PhD from UC Berkeley. Prior to joining the Department of Nuclear Engineering, he held a research scientist position at Lawrence Livermore National Laboratory and a faculty position at Pennsylvania State University. Fratoni has a decades' worth of experience in reactor design and analysis spanning a large variety of reactor concepts, such as advanced high-temperature reactors, small modular fast reactors, liquid fuel reactors, advanced light water reactors, and molten salt reactors. His main research interests lie in advanced fuel cycles for maximizing natural resource utilization and minimize nuclear waste.

John R. Harvey is a physicist with more than 35 years of experience working nuclear weapons and national security issues, first at Lawrence Livermore National Laboratory, then at Stanford University's Center for International Security and Arms Control and in senior positions in the Departments of Defense (twice) and Energy. From 2009 to 2013, he served as Principal Deputy Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs under then Undersecretary Ash Carter. He was Carter's "go to" person for the 2010 Nuclear Posture Review, as well as for interactions with the Department of Energy on joint oversight of the U.S. nuclear weapons stockpile. Harvey also provided oversight to Department of Defense acquisition programs to sustain and modernize nuclear weapons delivery systems and systems for their command and control. Since retiring from government service in 2013, he consults with the Institute for Defense Analysis, Los Alamos National Laboratory, the National Institute for Public Policy, the Center for Strategic and International Studies, and the Strategic Command Strategic Advisory Group's Panel on Nuclear Weapons Command and Control.

Siegfried S. Hecker is a professor (research) emeritus in the Department of Management Science and Engineering and a senior fellow emeritus at the Freeman Spogli Institute for International Studies. He was co-director of the Center for International Security and Cooperation from 2007 to 2012. From 1986 to 1997, Hecker served as the fifth director of the Los Alamos National Laboratory. Hecker is an internationally recognized expert in plutonium science, global threat reduction, and nuclear security. His current research interests include plutonium science, nuclear weapons policy, nuclear security, and the safe and secure expansion of nuclear energy. Over the past 20 years, he has fostered cooperation with the Russian nuclear laboratories to secure and safeguard the vast stockpile of ex-Soviet fissile materials. In 2016, Hecker published two edited volumes documenting the history of Russian-US laboratory-to-laboratory cooperation since 1992.

Olli Heinonen is senior advisor on science and nonproliferation at the Foundation for Defense of Democracies in Washington, DC. From 2010 through June 2017, he was a senior fellow at the Belfer Center for Science and International Affairs, Kennedy School of Government, Harvard University. Before joining the Belfer Center, Heinonen served for 27 years at the International Atomic Energy Agency (IAEA) in Vienna. He was the deputy director general of the IAEA, and head of its Department of Safeguards. Prior to that, he was director at the agency's various operational divisions, and an inspector, including at the IAEA's overseas office in Tokyo, Japan. Prior to joining the IAEA, Heinonen was a senior research officer at the Technical Research Centre of Finland Reactor Laboratory, in charge of research and development related to nuclear waste solidification and disposal. Heinonen is co-author of several patents on radioactive waste solidification. He studied radiochemistry and completed his PhD dissertation in nuclear material analysis at the University of Helsinki.

Rebecca Hersman is director of the Project on Nuclear Issues and senior adviser for the International Security Program at the Center for Strategic and International Studies. Hersman joined CSIS in April 2015 from the Department of Defense, where she served as deputy assistant secretary of defense for countering weapons of mass destruction since 2009. She served as DoD's principal policy advocate on issues pertaining to the Biological Weapons Convention, Chemical Weapons Convention, Nuclear Non-Proliferation Treaty and Cooperative Threat Reduction Program. Hersman was a senior research fellow with the Center for the Study of Weapons of Mass Destruction at the National Defense University from 1998 to 2009, where she also founded and directed the center's Program for Emerging Leaders. Hersman previously held positions as an international affairs fellow at the Council on Foreign Relations, a special assistant to the Undersecretary of Defense for Policy, and a member of the House Armed Services Committee professional staff. She holds an MA in Arab studies from Georgetown University and a BA from Duke University.

Sheryl Hingorani leads Sandia's Systems Analysis and Engineering organization in Livermore, California. Hingorani started her career at Sandia in 1986 as a mechanical design engineer. She has spent most of her career working in a variety of positions in Sandia's nuclear weapons program, including as Sandia's Nuclear Weapons chief of staff and as chair of the independent Red Team for the Annual Assessment of the state of health of the US nuclear stockpile. Hingorani received a special appointment to Distinguished Member of Technical Staff at Sandia in 1998, and moved into management in 2004. She completed studies as a fellow with the Massachusetts Institute of Technology Center for International Studies, and was the recipient of the Leadership Foundation Fellowship from the International Women's Forum. Between 2000 and 2005, Hingorani was the executive director of the Albuquerque Committee on Foreign Relations; she also served as secretary for the American Committees on Foreign Relations for two years. Hingorani is a laboratory advisor to the Defense Science Board Special Task Force on Weapons of Mass Destruction, and is a laboratory affiliate to the California Council on Science and Technology. She is a member of the Society of Women Engineers.

Ambassador Laura S.H. Holgate is currently a nonresident senior fellow at the Belfer Center for Science and International Affairs at Harvard University. She served as US Representative to the Vienna Office of the United Nations and the International Atomic Energy Agency from July 2016 to January 2017. In this role, Amb. Holgate advanced President Barack Obama's commitment to design and implement global approaches to reduce global threats and seize global opportunities in the areas of nuclear

nonproliferation, nuclear security, verification of the Iran Deal, nuclear testing, counterterrorism, anti-corruption, drug policy, export control, and the Nuclear Suppliers Group. Holgate was previously the Special Assistant to the President and Senior Director for Weapons of Mass Destruction Terrorism and Threat Reduction on the National Security Council. From 2001 to 2009, Holgate was the vice president for Russia/New Independent States programs at the Nuclear Threat Initiative. Prior to that, she directed the US Department of Energy's Office of Fissile Materials Disposition from 1998 to 2001, and was special coordinator for cooperative threat reduction at the Department for Defense from 1995 through 1998, where she provided policy oversight of the "Nunn-Lugar" Cooperative Threat Reduction program. Holgate received a BA in politics from Princeton University and an MS in political science from the Massachusetts Institute of Technology, and spent two years on the research staff at Harvard University's Center for Science and International Affairs at the Kennedy School of Government. She is a member of the Strategic Advisory Group to Oak Ridge National Laboratory, past president of Women in International Security, and a member of the Council on Foreign Relations.

Kim Knight is a staff scientist at Lawrence Livermore National Laboratory (LLNL), where her work focuses on nuclear forensic research through analysis of nuclear and associated materials for clues about material origins. A geochemist by training, she remains endlessly fascinated with radioactive materials. She is presently involved in the development of new techniques and methods that can be applied to improve interpretation of nuclear materials, including several international collaborative technical efforts. She has been involved in the design and delivery of numerous training courses in technical nuclear forensics, as well as the development and revision of international guidelines as a participant in International Atomic Energy Agency consultancies and workshops. Knight received her PhD from UC Berkeley in 2006 and worked as a post-doctoral researcher at the University of Chicago and Argonne National Laboratory prior to joining LLNL in 2008.

Matthew Kroenig is an associate professor in the Department of Government and the Edmund A. Walsh School of Foreign Service at Georgetown University and a senior fellow in the Brent Scowcroft Center on International Security at the Atlantic Council. His work has covered a wide range of topics in national security policy. Kroenig is the author or editor of six books, including the forthcoming, *The Logic of American Nuclear Strategy* (Oxford University Press). His articles have appeared in a wide range of publications, including *American Political Science Review*, *Foreign Affairs*, *Foreign Policy*, *International Organization*, the *Wall Street Journal*, and the *Washington Post*. He was a senior national security adviser on the 2016 Marco Rubio presidential campaign and a foreign policy adviser on the 2012 Mitt Romney campaign. He has served in a variety of positions in the US Department of Defense and Central Intelligence Agency and regularly consults with a wide range of US government entities. He formerly held research positions at the Council on Foreign Relations, Harvard University, and Stanford University. Kroenig provides regular commentary for major media outlets, including PBS Newshour, NPR Talk of the Nation, BBC, CNN, Fox News, NPR, and C-SPAN. He is a life member of the Council on Foreign Relations and holds an MA and PhD in political science from the University of California Berkeley.

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Richard Nephew is a senior research scholar at the Center on Global Energy Policy at Columbia University's School for International and Public Affairs. He is also a nonresident senior fellow at the

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Joseph F. Pilat is a program manager in the National Security Office at Los Alamos National Laboratory and global fellow of international security studies at the Wilson Center. Pilat served as representative of the Secretary of Defense to the Fourth Review Conference of the Nuclear Non-Proliferation Treaty (NPT) and to the Open Skies negotiations, and as an advisor to the United States delegation at the 1995 NPT Review and Extension Conference. Previous positions include working in the Office of the Deputy Assistant Secretary of Defense for Negotiations Policy, the Congressional Research Service, and at the International Institute for Strategic Studies. Pilat has taught Cornell University College of William and Mary, and Georgetown University. He has been a senior associate member of St. Antony's College, University of Oxford, a visiting fellow at Cornell's Peace Studies Program and a Philip E. Mosely Fellow at the Center for Strategic and International Studies. He has written numerous articles for US and European scholarly journals and newspapers, and is the author or editor of several books.

Brad Roberts is director of the Center for Global Security Research at Lawrence Livermore National Laboratory in Livermore, California. From April 2009 to March 2013, he served as Deputy Assistant Secretary of Defense for Nuclear and Missile Defense Policy. In this role, he served as policy director of the Obama administration's Nuclear Posture Review and Ballistic Missile Defense Review. From September 2013 through December 2014, Roberts was a consulting professor and William Perry Fellow at the Center for International Security and Cooperation at Stanford University. Prior to joining the Obama administration, Roberts was a member of the research staff at the Institute for Defense Analyses and an adjunct professor at the George Washington University. His recent publications include *The Case for U.S. Nuclear Weapons in the 21st Century* (Stanford University Press, 2015); *Extended Deterrence and Strategic Stability in Northeast Asia* (Tokyo: National Institute for Defense Studies, 2013); and *On the Strategic Value of Ballistic Missile Defense* (Paris: Institut Français des Relations Internationales, 2014).

Laura Rockwood is the executive director of the Vienna Center for Disarmament and Non-Proliferation (VCDNP). Prior to assuming that position in June 2015, she was a senior research fellow with the Managing the Atom Project at Harvard University's Kennedy School Belfer Center. Rockwood retired in November 2013 from the International Atomic Energy Agency (IAEA) as the section head for nonproliferation and policymaking in the Office of Legal Affairs, where she had served since 1985. At the IAEA, she was responsible for all legal aspects of the negotiation, interpretation, and implementation of the IAEA safeguards, and was the principal author of the document that became the Model Additional Protocol. Prior to working for the IAEA, she was employed by the US Department of Energy as a trial attorney in radiation injury cases, and as counsel in general legal matters. Rockwood received a JD in 1976 from the University of California's Hastings College of Law, San Francisco, and a BA in 1973 from

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Scott D. Sagan is the Caroline S.G. Munro Professor of Political Science, the Mimi and Peter Haas University Fellow in Undergraduate Education, and Senior Fellow at the Center for International Security and Cooperation and the Freeman Spogli Institute at Stanford University. He also serves as Project Chair for the American Academy of Arts and Sciences' Initiative on New Dilemmas in Ethics, Technology, and War. Before joining the Stanford faculty, Sagan was a lecturer in the Department of Government at Harvard University. From 1984 to 1985, he served as special assistant to the director of the Organization of the Joint Chiefs of Staff in the Pentagon. Sagan has also served as a consultant to the office of the Secretary of Defense and at the Sandia National Laboratory and the Los Alamos National Laboratory. Sagan is the author of *Moving Targets: Nuclear Strategy and National Security* (Princeton University Press, 1989); *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton University Press, 1993); and, with co-author Kenneth N. Waltz, *The Spread of Nuclear Weapons: An Enduring Debate* (W.W. Norton, 2012). He is the co-editor of *Planning the Unthinkable* (Cornell University Press, 2000) with Peter R. Lavoy and James L. Wirtz; the editor of *Inside Nuclear South Asia* (Stanford University Press, 2009); co-editor of *Learning from a Disaster: Improving Nuclear Safety and Security after Fukushima* (Stanford University Press, 2016) with Edward D. Blandford; and co-editor of *Insider Threats* (Cornell University Press, 2017) with Matthew Bunn.

Sagan is also the guest editor of a two-volume special issue of *Daedalus, New Dilemmas in Ethics, Technology, and War* (Fall 2016 and Winter 2017); co-editor of a two-volume special issue of *Daedalus, On the Global Nuclear Future* (Fall 2009 and Winter 2010), with Steven E. Miller. Other publications include "A Call for Global Nuclear Disarmament" in *Nature* (July 2012); "Atomic Aversion: Experimental Evidence on Taboos, Traditions, and the Non-Use of Nuclear Weapons" with Daryl G. Press and Benjamin A. Valentino in the *American Political Science Review* (February 2013); and, with Matthew Bunn, the American Academy of Arts and Sciences occasional paper, "A Worst Practices Guide to Insider Threats: Lessons from Past Mistakes" (2014).

Mark Schanfein is a senior nonproliferation advisor at Pacific Northwest National Laboratory working on a broad range of safeguards and arms control issues. At Idaho National Laboratory (INL) he focused on pyrosafeguards for electro-chemical separation and other safeguards related research. Prior to INL, he had a 20-year career at Los Alamos National Laboratory where, in his last role, he served as program manager for nonproliferation and security technology. Schanfein also spent 10 years at the LANL plutonium facility managing all the non-destructive assay systems used for domestic accountability measurements. He started his career at LANL conducting domestic safeguards inspections and managing the overall measurement control program for all of the accountability measurement systems at LANL as well as running the portal monitoring program. He served as a technical expert on the ground in the DPRK during the disablement activities resulting from the Six-Party Talks. Schanfein has eight years of experience working at the International Atomic Energy Agency in Vienna, Austria, in the Department of Safeguards where he served four years as a safeguards inspector and as Inspection Group Leader in Operations C, and four years as the Unit Head for Unattended Monitoring Systems in Technical Scientific Services. In this position, he was responsible for the installation of all IAEA unattended systems in nuclear fuel cycle facilities worldwide.

John Scott started at Los Alamos National Laboratory (LANL) in 1998 as a postdoc in the weapon design division after completing his PhD in nuclear engineering at the University of California Berkeley. He became a staff member in 2000. During his career, Scott has served as the system point of contact for two weapons systems and was the lead secondary designer for the Reliable Replacement Warhead project at LANL. Scott served as a member of the ASC Predictive Science Panel from 2009 to 2013 and has been the project leader for weapons performance metrics in the Advanced Certification program since 2009. He was LANL's program lead to develop the capability to certify a primary with a re-use pit. Currently he is the leader for the Integrated Design and Assessment group with the Theoretical Design Division and he has recently started working with the National Security and International Studies office at LANL.

William Tobey is a senior fellow at Belfer Center for Science and International Affairs at the Kennedy School of Government, Harvard University. He was most recently deputy administrator for defense nuclear nonproliferation at the National Nuclear Security Administration. There, he managed the United States government's largest program to prevent nuclear proliferation and terrorism by detecting, securing, and disposing of dangerous nuclear material. Tobey also served on the National Security Council staff in three administrations, in defense policy, arms control, and counter-proliferation positions. He has participated in international negotiations ranging from the START talks with the Soviet Union to the Six-Party Talks with North Korea. He also has extensive experience in investment banking and venture capital.

Christopher P. Twomey is an associate professor with tenure in the Department of National Security Affairs at the Naval Postgraduate School (NPS) in Monterey, California. His research interests center on security studies, Chinese foreign policy, modern nuclear affairs, strategic culture, statecraft, and East Asian security in theory and practice. He is the author of *The Military Lens: Doctrinal Differences and Deterrence Failure in Sino-American Relations* (Cornell University Press, 2010). His edited volume *Perspectives on Sino-American Strategic Nuclear Issues* (Palgrave Macmillan) was published in 2008. Among his recent articles are "Projecting Strategy: The Myth of Chinese Counter-intervention," (with M. Taylor Fravel) *Washington Quarterly* (January 2015); and "Asia's Complex Strategic Environment: Nuclear Multipolarity and Other Dangers," *Asia Policy* 11 (January 2011). Twomey manages a track II diplomatic exchange on Sino-American nuclear issues involving several PLA flag officers, academics, and civilian policymakers. This project is in its second decade. He works on a range of diplomatic projects in Asia for the Office of the Secretary of Defense (in coordination with the State Department) and has consulted for the Office of Net Assessment on the future of security competition in Asia. Before coming to NPS, he taught on the faculty at Boston College and was a fellow at Harvard. He received his PhD in political science from MIT in 2005.

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Dean Wilkening is a physicist at the Johns Hopkins University Applied Physics Laboratory. From 2011 to 2016 he worked at the Lawrence Livermore National Laboratory and prior to that he was the director of the science program at the Center for International Security and Cooperation at Stanford University for 16 years. From 1982 to 1995, he held several management positions at the RAND Corporation in Santa Monica, California. Wilkening's major research interests include nuclear strategy and policy, arms control, the proliferation of nuclear and biological weapons, bioterrorism, ballistic missile proliferation,

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Heather Williams is a lecturer/assistant professor in the Center for Science and Security Studies at King's College London and is a co-convenor for the master's program on arms control and international security. Until January 2015, she was a research fellow on nuclear weapons policy at Chatham House and led projects on the Nuclear Non-Proliferation Treaty and the humanitarian impacts of Nuclear Weapons Initiative. Williams completed her PhD in the Department of War Studies at King's College London in December 2014. She has worked for the Institute for Defense Analyses and the US Department of Defense. She has a BA in international relations and Russian studies from Boston University, and an MA in security policy studies from the George Washington University. Her most recent publications include "The Nuclear Education of Donald J. Trump" (with Jeffrey Michaels) in *Contemporary Security Policy*, and her current research focuses on multidisciplinary concepts of strategic stability, trust building in arms control and nonproliferation, and US nuclear modernization.

Joel Wit, senior fellow at the United States-Korea Institute at SAIS and adjunct senior fellow at Columbia University's Weatherhead Institute for East Asia, is the founder of "38 North." Wit has 20 years of experience in the US State Department and Washington think-tank arena. After writing the first National Intelligence Estimate on ballistic missile proliferation for the CIA, Wit was a member of US delegations to the Strategic Arms Limitations and Intermediate Nuclear Force Talks with the Soviet Union. In 1993, he joined the staff of Ambassador Robert L. Gallucci and was an important player in reaching the 1994 US-North Korea Agreed Framework. From 1995 to 2000, Wit was the State Department Coordinator and played a key role in the formation of KEDO. Wit has been an international affairs fellow at the Council on Foreign Relations, a senior associate at the Henry L. Stimson Center, a guest scholar at the Brookings Institution and a senior fellow at the Center for Strategic and International Studies. He has written numerous articles, including "US Strategy Towards North Korea: Rebuilding on Dialogue and Engagement," and co-authored *Going Critical: The First North Korean Nuclear Crisis*.

John Zabko currently serves as the assistant director of the Architecture and Plans Directorate (APD) in the Domestic Nuclear Detection Office (DNDO) within the Department of Homeland Security. He leads a staff of 70+ civilian and contractor personnel responsible for reducing the risk of nuclear terrorism to the nation by developing and enhancing the Global Nuclear Detection Architecture. Zabko served from 2005 to 2008 as a staff architect within DNDO's Office of Systems Architecture and Engineering. In September 2001, Zabko was selected to serve as a health physicist for the Office of State and Tribal Programs within the US Nuclear Regulatory Commission. Zabko worked in private industry as an environmental chemist at Green Mountain Laboratories of Vermont and as an instructor of laboratory neurobiology at the University of Vermont. Zabko was appointed to the Senior Executive Service in March of 2012 and has 21 years of federal and military service.