

ABOUT THE CONTRIBUTORS

THOMAS B. COCHRAN is Director of the Nuclear Program and holds the Wade Greene Chair for Nuclear Policy at the Natural Resources Defense Council (NRDC). He initiated NRDC's Nuclear Weapons Databook Project, and also a series of joint nuclear weapons verification projects with the Soviet Academy of Sciences. These include the Nuclear Test Ban Verification Project, which demonstrated the feasibility of utilizing seismic monitoring to verify a low-threshold test ban, and the Black Sea Experiment, which examined the utility of passive radiation detectors for verifying limits on sea-launched cruise missiles. He has served as a consultant to numerous government and nongovernment agencies on energy, nuclear nonproliferation and nuclear reactor matters. Dr. Cochran is a member of the Department of Energy's (DOE) Nuclear Energy Research Advisory Committee. Previously he served as a member of DOE's Environment Management Advisory Board; Fusion Energy Sciences Advisory Board and Energy Research Advisory Board; the Nuclear Regulatory Commission's Advisory Committee on the Clean Up of Three Mile Island; and the TMI Public Health Advisory Board. Dr. Cochran is the author of *The Liquid Metal Fast Breeder Reactor: An Environmental and Economic Critique* (1974); and coeditor/author of the *Nuclear Weapons Databook, Volume I: U.S. Nuclear Forces and Capabilities* (1984); *Volume II: U.S. Nuclear Warhead Production* (1987); *Volume III: U.S. Nuclear Warhead Facility Profiles* (1987); *Volume IV: Soviet Nuclear Weapons* (1989); and *Making the Russian Bomb: From Stalin to Yeltsin* (1995). In addition, he has published numerous articles and working papers, including those in *SIPRI Yearbook*

chapters, *Arms Control Today*, and the *Bulletin of the Atomic Scientists*. He co-authored, with Dr. Robert S. Norris, the article on “Nuclear Weapons” in the 1990 printing of *The New Encyclopedia Britannica* (15th edition). Dr. Cochran received his Ph.D. in Physics from Vanderbilt University in 1967. He was Assistant Professor of Physics at the Naval Postgraduate School, Monterey, California, from 1967 to 1969; Modeling and Simulation Group Supervisor of the Litton Mellonics Division, Scientific Support Laboratory, Fort Ord, California, from 1969 to 1971; and from 1971 to 1973, he was a Senior Research Associate at Resources for the Future. He is the recipient of the American Physical Society’s Szilard Award and the Federation of American Scientists’ Public Service Award, both in 1987. As a consequence of his work, NRDC received the 1989 Scientific Freedom and Responsibility Award by the American Association for the Advancement of Science (AAAS). Dr. Cochran is a Fellow of the American Physical Society and the AAAS.

GARRY DILLON graduated in Applied Physics from the now University of Salford. After a initial career in radioisotope applications, he joined the UK Central Electricity Generating Board (CEGB) in 1963 and became the Health Physicist at Trawsfynydd Nuclear Power Station. In 1970, he transferred to CEGB London HQ, Nuclear Health and Safety Department, as nuclear safety compliance inspector for Bradwell and Sizewell Nuclear Power Stations. He joined the IAEA, Radiological Safety Section, in 1976 and was appointed Radiation Health and Safety Officer. He transferred to the Department of Safeguards (DSG) in 1978. In 1980, he established the IAEA’s first fully functional Safeguards Field Office, located in Toronto, Canada, and served as head of that office until returning to

Vienna HQ in 1985. He served in a number of line-management positions within DSG, the last of which was as section head responsible for, inter alia, the verification of South Africa's voluntary abandonment of its nuclear weapons program. Mr. Dillon joined the Iraq Action Team in November 1993 as Deputy Leader (Operations) and was Action Team Leader from June 1997 until his retirement in October 1999. In mid-1994, he established the Nuclear Monitoring Group (NMG) whose principal function was the in-field implementation of the IAEA Ongoing Monitoring and Verification (OMV) plan—a critical component of which was a progressively introduced Wide Area Monitoring program. The NMG was continuously present in Iraq until its departure in December 1998. Throughout this time with the Iraq Action Team, he spent more than 350 days in-country and was actively involved in the carrying out of inspections, as well as interviewing Iraqi technologists and political officials.

JACK EDLOW graduated from George Washington University with a BA in Business Administration, then joined his father at Edlow International in 1969. He became Vice President of the company in 1970, then President in 1978. As President of Edlow International Company for over 20 years, Mr. Edlow has been responsible for all phases of the company's activities including transportation, warehousing, and logistic support services for nuclear suppliers and users worldwide. He has acted as sales representative for fuel cycle activities of leading international organizations involving supply of concentrates and conversion services and management of toll enrichment contracts. He has been active in consulting activities covering all aspects of the nuclear fuel cycle. Over a period of 3 years,

Mr. Edlow managed a special division of the Company established to provide special high security transport services to ERDA/DOE for sensitive materials. This system used a fleet of dedicated armored vehicles to move the materials across a nationwide network between various government and contractor facilities. Prior to the establishment of DOE's Office of Civilian Waste Management (OCRWM) program, Edlow International and the firm, Ridihalgh Eggers Assoc., teamed up to design a new generation of truck and rail transport casks. It has become the benchmark for many of the OCRWM financed and supported designs that have been subsequently developed. Mr. Edlow spent 2 years of his and the Company's effort and resources on convincing the Executive and Legislative Branches of the U.S. Government to support the Reduced Enrichment Research & Test Reactor (RERTR) program and to take back the high-enriched spent fuel discharged from such reactors. He has overseen the successful shipment of U.S. origin spent fuel from many research reactors in Europe and South America. Completed shipments have required the complex integration on all modes of transportation while supporting the DOE's 10-year program to complete shipment of material from four countries. Mr. Edlow is also Managing Director of Edlow International Australia Pty. Limited, Edlow International Company's Australian subsidiary in Melbourne. As President of Edlow East-West, Inc., Mr. Edlow has traveled to many Russian nuclear facilities and has acquired extensive personal knowledge.

PIERRE GOLDSCHMIDT is a visiting scholar at the Carnegie Endowment for International Peace and also a member of the Board of Directors for the Association Vinçotte Nuclear (AVN). AVN is a non-profit,

authorized inspection organization charged with verifying compliance of nuclear power plants with Belgian safety regulations. Dr. Goldschmidt was the Deputy Director General, Head of the Department of Safeguards, at the International Atomic Energy Agency from 1999 to June 2005. The Department of Safeguards is responsible for verifying that nuclear material placed under safeguards is not diverted to nuclear weapons or other nuclear explosive devices and that there are no undeclared nuclear material or activities in non-nuclear weapons states party to the NPT. Before assuming this position, Dr. Goldschmidt was, for 12 years, General Manager of SYNATOM, the company responsible for the fuel supply and spent fuel management of seven Belgian nuclear plants that provide about 60 percent of the country's electricity. For 6 years, Dr. Goldschmidt was a member of the Directoire of EURODIF, the large French uranium enrichment company. He has headed numerous European and international committees, including as Chairman of the Uranium Institute in London and Chairman of the Advisory Committee of the EURATOM Supply Agency. Dr. Goldschmidt studied Electro-Mechanical Engineering and holds a Ph.D. in Applied Science from the University of Brussels; a Masters Degree in Nuclear Engineering from the University of California, Berkeley; and a B.A. in Electro-mechanical Engineering from the University of Brussels .

NIKOLAI NIKOLAEVICH KHLEBNIKOV is a national of the Russian Federation. He holds a Ph.D. in Chemical Technology from the State Research Institute of Rare Metals in Moscow. Dr. Khlebnikov started his career in 1970 as a researcher at the State Research Institute of Rare Metals where he worked for 8 years, followed by 8 years as a Section and

Laboratory Head in the Central Research Institute of Atomic Information in Moscow. He then worked for 8 years in the International Atomic Energy Agency (IAEA) in Vienna, first as a Section Head for System Studies in the Division of Concepts and Planning and then as a Section Head in the Division of Operations C responsible for safeguards implementation in European countries. He returned to the Ministry of the Russian Federation on Atomic Energy, Department for International Relations in Moscow where he worked as a Division Head and was responsible for nonproliferation issues and international organizations. He was a member of the Standing Advisory Group on Safeguards Implementation from 1994 until 1998. He joined the IAEA again in 1998, when he was appointed as Director of the Division of Technical Support with overall responsibility for the development and maintenance of equipment for verification of nuclear materials and training, a position he still holds. Dr. Khlebnikov has written about 30 publications in the area of chemical technology and about 25 publications in the area of safeguards.

EDWIN LYMAN is a Senior Staff Scientist in the Global Security Program at the Union of Concerned Scientists (UCS) in Washington, DC, a position he has held since May 2003. Before going to UCS, he worked at the Nuclear Control Institute for nearly 8 years, first as scientific director and then as president. He earned a doctorate in physics from Cornell University in 1992. From 1992 to 1995, he was a postdoctoral research associate at Princeton University's Center for Energy and Environmental Studies. Dr. Lyman's research focuses on security and environmental issues associated with the management of nuclear materials

and the operation of nuclear power plants. He has published articles and letters in journals and magazines including *Science*, the *Bulletin of the Atomic Scientists*, and *Science and Global Security*. He is an active member of the Institute of Nuclear Materials Management. In the spring of 2001, he served on a Nuclear Regulatory Commission expert panel on the role and direction of the NRC Office of Nuclear Regulatory Research and briefed the Commission on his findings. In July 2001, he was again invited to a Commission meeting to discuss the licensing of new nuclear reactors in the United States.

QUENTIN MICHEL is Lecturer in Non-Proliferation and Sustainable Development at the Faculty of Law of Liège University (Belgium). He teaches also at the International School of Nuclear Law, OECD Nuclear Energy Agency and University of Montpellier 1, France. Dr. Michel is also an expert for the European Commission, the Belgium Federal Agency for Nuclear Control, and for the Belgian Government on weapons nonproliferation issues.

DAVIDE PARISE received his Ph.D. in Energy Management on Safeguards at Università "La Sapienza" (Roma) before joining the International Atomic Energy Agency (IAEA) in 2005 to develop software for the characterization of nuclear materials with gamma/X spectroscopy for safeguard use. In 2006 he joined the Novel Technologies Project as a safeguards system analyst to assist with the examination of candidate novel technologies that could be used by IAEA inspectors, mostly focusing on the use of laser technologies and on the detection of nuclear activities and facilities from a distance. In 2007 he joined the

newly established Remote Monitoring Unit to design the remote monitoring infrastructure and to support IAEA inspectors in the field deployment of remote monitored surveillance and monitoring systems.

THOMAS E. SHEA was named Director for Defense Nuclear Nonproliferation Programs in January 2004 at the Pacific Northwest National Laboratory (PNNL) operated by Battelle Memorial Institute for the U.S. Department of Energy. PNNL's Defense Nuclear Nonproliferation Programs assist the National Nuclear Security Administration's Office of Defense Nuclear Nonproliferation in policy and technical activities aimed at preventing proliferation and nuclear terrorism, in nuclear safety, and in weapon-origin fissile material disposition. Prior to joining PNNL, he served for 24 years at the International Atomic Energy Agency (IAEA). At the IAEA, Dr. Shea helped to establish the basic IAEA safeguards implementation parameters and defined safeguards approaches for many complex nuclear facilities. He headed a section of inspectors for 11 years, responsible for safeguards implementation in Japan, India, Taiwan, Australia, and Indonesia. He established the Project Office for the JNFL Rokkasho Reprocessing Facility, and successfully headed a Tripartite Project with the Russian Federation and the People's Republic of China regarding safeguards at centrifuge enrichment plants equipped with Russian centrifuges. During the period from 1996 through 2003, Dr. Shea was Head of the IAEA Trilateral Initiative Office in the Department of Safeguards, responsible for program development and implementation activities associated with a possible new verification role for the IAEA: weapon-origin and other fissile material released from military applications. He also headed

IAEA activities related to a fissile material cutoff treaty, publishing a number of articles and briefing delegates to the UN Conference on Disarmament on six occasions. Dr. Shea was named to a UN Security Council Panel on disarmament in Iraq in 1999 and carried out an IAEA investigation of the technical requirements for the verification of the Comprehensive Nuclear Test Ban Treaty. He wrote the proliferation-resistance and physical protection parts of the U.S. Generation IV Roadmap and led the IAEA Safeguards departmental activities related to proliferation resistance. Dr. Shea was awarded a Special Fellowship from the U.S. Atomic Energy Commission. He received his M.S. in Nuclear Engineering and his Ph.D. in Nuclear Science from Rensselaer Polytechnic Institute. He is a Fellow of the Institute of Nuclear Materials Management.

HENRY D. SOKOLSKI is the Executive Director of the Nonproliferation Policy Education Center, a Washington-based nonprofit organization founded in 1994 to promote a better understanding of strategic weapons proliferation issues for academics, policy makers, and the media. He served from 1989 to 1993 as Deputy for Nonproliferation Policy in the Office of the Secretary of Defense under Paul Wolfowitz and received the Secretary of Defense's Medal for Outstanding Public Service. Prior to his appointment to this post, Mr. Sokolski worked in the Secretary's Office of Net Assessment on proliferation issues. In addition to his Executive Branch service, Mr. Sokolski served from 1984 through 1988 as Senior Military Legislative Aide to Senator Dan Quayle and as Special Assistant on Nuclear Energy Matters to Senator Gordon Humphrey from 1982 through 1983. He also served as a consultant on proliferation issues to the intelligence

community's National Intelligence Council. After his work in the Pentagon, Mr. Sokolski received a congressional appointment to the Deutch Proliferation Commission, which completed its report in July 1999. He also served as a member of The Central Intelligence Agency's Senior Advisory Panel from 1995 to 1996. Mr. Sokolski has authored and edited a number of works on proliferation related issues including, *Best of Intentions: America's Campaign Against Strategic Weapons Proliferation* (2001), *Getting Ready for a Nuclear-ready Iran* (2005); *Checking Iran's Nuclear Ambitions* (2004); *Getting MAD: Nuclear Mutual Assured Destruction Its Origins and Practice* (2004); *Beyond Nunn-Lugar: Curbing the Next Wave of Weapons Proliferation Threats from Russia* (2002); *21st Century Weapons Proliferation: Are We Ready?* (2001); *Planning for a Peaceful Korea* (2001); *Prevailing in A Well Armed World* (2000), and *Fighting Proliferation* (1996). Mr. Sokolski has been a resident fellow at the National Institute for Public Policy, the Heritage Foundation, and the Hoover Institution. He currently serves as an adjunct professor at the Institute of World Politics in Washington and has taught courses at the University of Chicago, Rosary College, and Loyola University. Mr. Sokolski attended the University of Southern California and Pomona College and received his graduate education at the University of Chicago.

FRANK VON HIPPEL is Professor of Public and International Affairs, Woodrow Wilson School, and and co-chair of the International Panel on Fissile Materials. From September 1993 through 1994, he was on leave from Princeton as Assistant Director for National Security in the White House Office of Science and Technology Policy, and played a major

role in developing U.S.-Russian cooperative programs to increase the security of Russian nuclear-weapon materials. In 2005 he chaired the American Physical Society's Panel on Physics and Public Affairs. He also chairs the editorial board of *Science & Global Security* and is a member of the editorial board of the *Bulletin of the Atomic Scientists*. Dr. von Hippel received his B.S. degree in physics from MIT in 1959 and D.Phil. in theoretical physics in 1962 from Oxford, where he was a Rhodes Scholar. During the following 10 years, while his research focus was in theoretical elementary-particle physics, he held research positions at the University of Chicago, Cornell University, and Argonne National Laboratory and served on the physics faculty of Stanford University. In 1974, his interests shifted to "public-policy physics." After spending a year as a Resident Fellow at the National Academy of Science, during which time he organized the American Physical Society's Study on Light-Water Reactor Safety, he was invited to join the research and in 1984 the teaching faculty of Princeton University. Dr. von Hippel has served on advisory panels to the Congressional Office of Technology Assessment, U.S. Department of Energy, National Science Foundation, and U.S. Nuclear Regulatory Commission, and on the boards of directors of the American Association for the Advancement of Science and the *Bulletin of the Atomic Scientists*. For many years he was the elected chairman of the Federation of American Scientists. Dr. von Hippel shared with Joel Primack the American Physical Society's 1977 Forum Award for Promoting the Understanding of the Relationship of Physics and Society for their book, *Advice and Dissent: Scientists in the Political Arena*. In 1989, he was awarded the Federation of American Scientists' Public Service

Award for serving as a “role model for the public interest scientist.” In 1991, the American Institute of Physics published a volume of his selected works under the title *Citizen Scientist*, as one of the first three books in its “Masters of Physics” series. In 1993 he was awarded a 5-year MacArthur Prize fellowship. In 1994, he received the American Association for the Advancement of Sciences’ Hilliard Roderick Prize for Excellence in Science, Arms Control, and International Security.

JULIAN WHICHELLO joined the Australian Nuclear Science and Technology Organisation (formerly the Australian Atomic Energy Commission) in 1973. From 1973 to 1987, he developed high-speed drive systems and electronic instrumentation for the Australian Gas Centrifuge Uranium Enrichment Project. As the Head of the Instrumentation Unit from 1983 to 1987, he collaborated in the development of a nuclear safeguards remote monitoring system for small scale enrichment plants and conducted investigations into the establishment of a stable isotope enrichment facility based on a combination of separation technologies (electromagnetic, laser, and vacuum arc centrifuge). Mr. Whichello was appointed to the International Atomic Energy Agency (IAEA) Surveillance Unit in Vienna in 1987. As Head of the Surveillance Unit from 2000 to 2005, he oversaw the development and implementation of a wide range of safeguards equipment and systems, including secure digital image surveillance and remote monitoring. Mr. Whichello is currently the Manager of the IAEA’s Department of Safeguards Novel Technologies Project.

ROBERT ZARATE is a research fellow at the Nonproliferation Policy Education Center, a Washington, DC-based nonprofit organization founded in 1994 to promote a better understanding of strategic weapons proliferation issues among policymakers, scholars, and the media. He is concurrently researching and writing a book on the late American strategists, Albert and Roberta Wohlstetter. After graduating from the University of Chicago in 1999, Mr. Zarate worked from 2000 to late 2001 as a policy analyst at Steptoe and Johnson LLP in Washington, DC, focusing on international controls related to the import, export, and use of encryption and other dual-use items. In early 2002, he wrote for *Wired News*, covering the intersections of national security, technology, politics, law, and business. In late 2002, he returned to the University of Chicago to begin graduate studies. Mr. Zarate has published essays and articles in *The Weekly Standard*, *National Review Online*, *Wired News*, *E-Commerce Law Week*, and other periodicals.