THE NATIONAL ACADEMIES

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SPEAKERS

Committee on International Security and Arms Control

60th Anniversary of Trinity:
First Manmade Nuclear Explosion, July 16, 1945

Public Symposium
Auditorium, National Academy of Sciences
2100 C Street NW, Washington, DC
July 14, 2005

Speakers (in order of appearance):

RALPH CICERONE

Ralph Cicerone is the President of the National Academy of Sciences. Cicerone earned his bachelor's degree from the Massachusetts Institute of Technology and received his master's and doctoral degrees in electrical engineering with a minor in physics from the University of Illinois, Urbana-Champaign. He served as a research scientist at the University of Michigan, Ann Arbor, the Scripps Institution of Oceanography in La Jolla, Calif., and at the National Center for Atmospheric Research in Boulder, Colo. Cicerone held the Daniel G. Aldrich Jr. Chair in Earth System Science at the University of California – Irvine (UCI) where he was also a professor of chemistry. He was dean of physical sciences at UCI from 1994 to 1998, and served as chancellor there from 1998 until 2005. Cicerone has conducted research on the plasma physics of Earth's ionosphere, the chemistry of the ozone layer, and radiative forcing of climate change. His work has helped shape policy on climate change and pollution. Cicerone was elected to the National Academy of Sciences in 1990 and has been a member of 20 National Academies study committees since 1984. He was awarded the James B. Macelwane and Roger Revelle medals by the American Geophysical Union; the Bower Award and Prize for Achievement in Science by the Franklin Institute; and the Einstein Prize for Science from the World Cultural Council.

RAYMOND JEANLOZ

Raymond Jeanloz is Professor of Earth and Planetary Sciences and of Astronomy at the University of California, Berkeley. He is the current chair of the National Academy of Sciences' Committee on International Security and Arms Control, and has served on numerous advisory committees in areas of security, resources and the environment. His research interests include the properties of materials at high pressures and temperatures, and the nature of planetary interiors. He is a fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, and the American Geophysical Union, and is a member of the National Academy of Sciences. Dr. Jeanloz received a MacArthur Award in 1988. He has a B.A. in geology from Amherst College, and a Ph.D. in geology and geophysics from the California Institute of Technology.

AMBASSADOR LINTON BROOKS

Ambassador Linton F. Brooks was sworn in as the Administrator of the National Nuclear Security Administration (NNSA) and the Undersecretary of Energy for Nuclear Security on 16 May 2003. Prior to his appointment, he was serving as NNSA's Deputy Administrator for Defense Nuclear Nonproliferation. Ambassador Brooks has over four decades of experience in national security, much of it associated with nuclear weapons. His extensive government experience includes service as the Assistant Director of the Arms Control and Disarmament Agency, Chief U.S. Negotiator for the Strategic Arms Reduction Treaty, Director of Arms Control for the National Security Council and a number of Navy and Defense Department assignments as a 30 year career naval officer. Ambassador Brooks has degrees from Duke University, University of Maryland and the U.S. Naval War College. He has published a number of prize-winning articles on naval and nuclear strategy.

THE HONORABLE RUSH HOLT

Congressman Rush Holt has represented New Jersey's 12th district in the House of Representatives since 1999. In the House, Holt serves on the Committee on Education and the Workforce and on the Permanent Select Committee on Intelligence where he is the Ranking Democrat on the Intelligence Policy Subcommittee. He also had the honor of serving on the National Commission on Mathematics and Science Teaching for the 21st Century. From 1989 until he launched his 1998 congressional campaign, Holt was Assistant Director of the Princeton Plasma Physics Laboratory, the largest research facility of Princeton University. He has conducted extensive research on alternative energy and has his own patent for a solar energy device. Holt has also held positions as a teacher, Congressional Science Fellow, and arms control expert at the U.S. State Department where he monitored the nuclear programs of countries such as Iraq, Iran, North Korea, and the former Soviet Union. He was once a five-time winner on the game show "Jeopardy." Holt earned his B.A. in Physics from Carleton College in Minnesota and completed his Master's and Ph.D. at NYU.

WOLFGANG PANOFSKY

At Los Alamos, Dr. Panofsky helped devise instruments to measure the energy released during the test explosion and during the operational use of the weapons.

Wolfgang K.H. Panofsky is Professor and Director Emeritus at the Stanford Linear Accelerator Center of Stanford University. He served as Director of SLAC during the period 1961-1984. His field of expertise is experimental high-energy physics. He was a member of the Presidents' Science Advisory Committee under Presidents Eisenhower and Kennedy, and the General Advisory Committee on Arms Control to the President under President Carter. He is a senior advisor and the former Chair of the Committee on International Security and Arms Control in the National Academy of Sciences. He has also served on the National Research Council Committee to Provide Interim Oversight of the DOE Nuclear Weapons Complex, the DOE Panel on Nuclear Warhead Dismantlement and Special Nuclear Materials Controls, and on ad hoc committees reviewing the directors of the DOE weapons laboratories for the University of California.

HAROLD AGNEW

At Los Alamos, Dr. Agnew was selected as a member of Project Alberta (Destination Team) on Tinian Island. Along with Luis Alvarez and Lawrence Johnston, he flew as a scientific observer with the 509th Composite Group during the mission to Hiroshima on August 6, 1945 to measure the yield of the atomic bomb.

Harold Agnew was born in Denver, Colorado, in 1921. He received his undergraduate degree in chemistry from the University of Denver in 1942. He joined Enrico Fermi's research group at the University of Chicago in 1942 and was a witness at the initiation of the first controlled nuclear chain reaction on December 2, 1942. He was at Los Alamos from 1943 to 1945. From 1946 to 1949, he completed his doctoral degree under Fermi's direction. He then returned to Los Alamos in the Physics Division and eventually became the Weapons Division leader from 1964 to 1970. He then became director of the Los Alamos Scientific Laboratory. In 1979 he retired from Los Alamos and became president of General Atomics until 1983. He has been a scientific advisor to NATO (1961-64), a member of the President's Science Advisory Committee (1965-73), chair of the General Advisory Committee of the Arms Control and Disarmament Agency (1974-78), and White House science councilor (1982-89). He is a member of the National Academy of Sciences and the National Academy of Engineering. Dr. Agnew also had a political career as a New Mexico state senator from 1955 until he resigned to join NATO. He has received recognition for his service including the E.O. Lawrence Award in 1966 and the Department of Energy Enrico Fermi Award in 1978. Along with Bethe, Dr. Agnew was the first recipient of the Los Alamos National Laboratory Medal. He is currently adjunct professor at the University of California, San Diego.

HUGH BRADNER

Early on at Los Alamos, Dr. Bradner planned the equipment needs for the new laboratory and the elements of the town. He then worked on the implosion mechanism in George Kistiakowsky's group and later in Luis Alvarez's group.

Dr. Bradner earned his undergraduate degree at Miami University in 1936 and his doctoral degree at the California Institute of Technology in 1941. He was on the staff of the Naval Ordnance Lab from 1941 to 1943 and at Los Alamos from 1943 to 1946. He was on the research staff of the Radiation Lab at the University of California, Berkeley from 1946 to 1961. In 1952, Dr. Bradner invented the "wet suit" for the Navy. He also designed instrumentation for the fusion bomb, which had to be shielded from the gamma rays of the fission bomb. He then joined the faculty of the University of California, San Diego. He is now Professor Emeritus at the Scripps Institute of Oceanography of the University of California, San Diego. Dr. Bradner has also been a member of various advisory boards for the Navy, the Atomic Energy Commission, and for several universities. He is a fellow of the American Physical Society.

ROBERT CHRISTY

At Los Alamos, Dr. Christy's conservative implosion design for the core alleviated instability problems and was the basis for the plutonium bomb.

Dr. Christy received his undergraduate and masters degrees from the University of British Columbia and his doctoral degree from the University of California. After working at Los Alamos, Dr. Christy went to the University of Chicago. In 1946, he joined the California Institute of Technology. His research interests included cosmic rays, elementary particle and nuclear physics, and astrophysics. Over the last fifty years, Dr. Christy has served CalTech in several capacities including professor, provost, and acting president. Dr. Christy has been awarded the Eddington medal of the Royal Astronomical Society. He is a member of the National Academy of Sciences, the International Astronomers Union, the American Physical Society, and the American Astronomers Society.

VAL FITCH

At Los Alamos, Dr. Fitch worked as a technician in an army uniform. At the Trinity test, Dr. Fitch was at the vacuum tubes that delivered the detonating voltage across 6 miles of cable.

Dr. Fitch was in the US Army from 1943 to 1946 and spent much of that time at Los Alamos. He received his undergraduate degree at McGill University in 1948 and his doctoral degree at Columbia University in 1954. He spent most of his career at Princeton University working in experimental particle physics. He is Professor and Chair Emeritus of the Department of Physics at Princeton. Dr. Fitch was awarded the Nobel Prize in Physics in 1980 with Jim Cronin for the discovery of CP violations in K mesons. He received the E. O. Lawrence award in 1968, the Research Corporation award in 1976 with Jim Cronin, and the John Price Witherill medal of the Franklin Institute in 1976. He received the National Medal of Science in 1993. He is a member of the National Academy of Sciences, the American Academy of Arts and Sciences and the American Philosophical Society. He is a fellow of the American Physical Society (president 1988-89) and the American Association for the Advancement of Science.

DONALD HORNIG

At Los Alamos, Dr. Hornig developed and conceived a triggered spark-gap switch to initiate the explosive lenses used to set off the implosion in the plutonium device. He was also the last person in the arming party at Trinity who could have stopped the explosion.

Dr. Hornig earned his undergraduate degree from Harvard University in 1940 and his doctoral degree in physical chemistry from Harvard in 1943. He then worked at the Woods Hole Oceanographic Institute and later at the Los Alamos Laboratory. He joined Brown University in 1946 where he served on the faculty and as a dean until 1957. He then left for Princeton to serve as chairman of the Department of Chemistry. He served on the President's Science Advisory Committee and Space Science Board before being confirmed as President Johnson's science advisor in 1964. He served in that role until 1969. Since then Dr. Hornig has served as President of Brown University and as Professor of Chemistry in Public Health at Harvard University. Dr. Hornig has been a Guggenheim fellow, a Fulbright fellow, and a recipient of the Charles Lathrop Parsons award of the American Chemical Society. He is also a Fellow of the American Physical Society, the American Academy of Arts and Sciences, the American Philosophical Society and a member of the National Academy of Sciences.

LAWRENCE JOHNSTON

At Los Alamos, Dr. Johnston led a team responsible for the ultra-fast detonators needed for implosion bombs. For the bombs detonated in Japan, he was part of the team tasked with measuring bomb energy yields. Dr. Johnston is the only person to have witnessed the Trinity, Hiroshima and Nagasaki explosions.

Dr. Johnston received his undergraduate degree from the University of California, Berkeley in 1940. From 1940 to 1943, Dr. Johnston was at the MIT Radiation Laboratory where he and Luis Alvarez invented the Ground-Controlled-Approach radar landing system which made it possible for people on the ground to talk pilots in for a safe landing. That radar system helped the Allies win World War II and made the Berlin Airlift possible. He spent the next two years at Los Alamos where he developed exploding bridge-wire detonators for coordinated timing in implosion bombs. After the war, he completed his doctoral degree at Berkeley in 1950. He then moved to the University of Minnesota for a decade where he helped build a linear accelerator. He spent a few years at the Aerospace Corp and at the Stanford Linear Accelerator Center before joining the faculty of the Department of Physics at the University of Idaho in 1967 where he remained until his retirement in 1988. His research interests included nuclear physics, far

infrared lasers, and molecular spectroscopy. Dr. Johnston is a fellow of the American Physical Society.

ARNOLD KRAMISH

At Los Alamos, Kramish was responsible for the simultaneity of the detonators over the entire sphere of the implosion bomb.

Kramish received his undergraduate degree from the University of Denver and his Masters from Harvard University. He was with the Manhattan Project from 1944 to 1946 as a member of the Special Engineering Division (SED). He was the third member of the team present during an explosion at an experimental uranium enrichment facility at the Philadelphia Navy Yard, which killed Douglas Meigs and Peter Bragg. Following the war, he was with the Atomic Energy Commission. In 1951, he became a senior staff member of the RAND corporation. From 1970 to 1976, he was posted in Paris as U.S. Science & Technology Counselor for UNESCO and OECD. During the Reagan administration, we was technical director of a White House study on the Strategic Defense Initiative and advisor to the Undersecretary of Defense for Policy. He has been a Carnegie fellow on the Council for Foreign Relations and a Guggenheim fellow. He is a technical consultant and author of several books, including *The Griffin*. Currently Mr. Kramish is working on his memoirs.

LOUIS ROSEN

At Los Alamos, Dr. Rosen worked on the technology of assembling materials with sufficient rapidity to surmount the problem of pre-detonation. He also investigated the attenuation of electromagnetic signals by high explosives.

Dr. Rosen received his undergraduate and master's degree from the University of Alabama and a doctoral degree from Pennsylvania State University. He joined Los Alamos in 1944. After the war, Dr. Rosen divided his time between basic research in nuclear physics and national defense activities. At Los Alamos, he held various positions from group leader to division leader and director of the Meson Physics Facility (LAMPF). He is currently Senior Laboratory Fellow Emeritus. Dr. Rosen has also served on several advisory boards to the federal government on the management and goals of scientific research. He has also served on health-related public service committees in New Mexico. He is a fellow of the American Physical Society and of the American Association of the Advancement of Science. He has received the Guggenheim Fellowship and the E.O. Lawrence award. In 1997, Los Alamos dedicated the Louis Rosen Auditorium and in 2003, Dr. Rosen received the Los Alamos National Lab medal.

MAURICE SHAPIRO

At Los Alamos, Dr. Shapiro was the leader of a group in the Ordnance Division. He also collaborated with John von Neumann on a hydrodynamics problem.

Born in Jerusalem, as an Ottoman subject, Maurice Shapiro became a British citizen at the age of four, then an American at six. At the University of Chicago he studied physics with Arthur Compton, Enrico Fermi, Bruno Rossi, and John Wheeler. While group leader in wartime Los Alamos, he lobbied for the international control of atomic energy after the war, serving in 1946 as Chair of the Association of Los Alamos Scientists. In Oak Ridge he mentored Adm. Rickover's first nuclear submariners, and designed a power reactor (the prototype of Shippingport). In 1949 he founded a cosmic-ray laboratory at the Naval Research Lab, Washington, where he and collaborators elucidated the composition of the cosmic rays, and established a "Rosetta Stone" revealing their transformations in interstellar space. They derived

the source composition and “age” of the Galactic cosmic rays. Shapiro co-discovered the sigma hyperon. In 1977 he founded the International School of Cosmic-ray Astrophysics in Erice, Italy where he still serves as Director. Shapiro has been Visiting Professor at the University of Maryland since 1985.

RUBBY SHERR

At Los Alamos, Dr. Sherr worked in the Initiator Group under the leadership of Charles Critchfield, designing the trigger used with the plutonium bomb at Trinity. A more sophisticated design, which used the outgoing rebound rather than the incoming shock to initiate a neutron burst, was developed in collaboration with Klaus Fuchs.

Dr. Sherr received his undergraduate degree from NYU in 1934 and his doctoral degree from Princeton University in 1938. He was at Harvard University from 1938 to 1942 and then at the MIT Radiation Lab from 1942 to 1944. He spent two years at Los Alamos before joining the faculty in the Department of Physics at Princeton. He taught and conducted research in nuclear physics for thirty six years and is now Professor Emeritus. He currently lives in Haverford, PA, and is continuing his research in collaboration with Prof. H. T. Fortune of the University of Pennsylvania.

DAVID HOLLOWAY

David Holloway is the Raymond A. Spruance Professor in International History and Professor of Political Science at Stanford University, and Senior Fellow at the Stanford Institute for International Studies. He was born in Dublin, Ireland, and received his undergraduate degree in Modern Languages and Literature and his Ph.D. in Social and Political Sciences from Cambridge University. His publications include *Stalin and the Bomb: The Soviet Union and Atomic Energy, 1939-1956*, (Yale University Press 1994), *The Soviet Union and the Arms Race* (1983), and (with Sidney Drell and Philip Farley) *The Reagan Strategic Defense Initiative: Technical, Political and Arms Control Assessment* (1984). At Stanford he has been co-director of the Center for International Security and Cooperation and director of the Stanford Institute for International Studies.

JOHN HOLDREN

John P. Holdren is Director of the Woods Hole Research Center; Teresa and John Heinz Professor of Environmental Policy and Director of the Program on Science, Technology, and Public Policy at the John F. Kennedy School of Government; Professor of Environmental Science and Public Policy in the Department of Earth and Planetary Sciences at Harvard University; and president-elect of the American Association for the Advancement of Science. Dr. Holdren was trained in engineering and physics at MIT and Stanford but has devoted most of his professional attention for the past 35 years to interdisciplinary studies of energy, environment, and arms control. He co-founded in 1973 and co-led until 1996 the interdisciplinary graduate program in Energy and Resources at the University of California, Berkeley. His research and teaching at Harvard since 1996 have focused on causes and consequences of global climate change, challenges and opportunities with advanced energy technologies, and international cooperation to address problems of environment, development, and international security. Dr. Holdren is a member of the National Academy of Engineering as well as the National Academy of Sciences. He was Chair of the Committee on International Security and Arms Control in the National Academy of Sciences from 1993 to 2004 and has chaired several other committees in the Academy complex. Dr. Holdren was also a member of President Clinton’s Committee of Advisors on Science and Technology (PCAST) from 1994 to 2001 and chaired several PCAST reports.