

Author Biographies

Walter J. Bawiec

U.S. Geological Survey, Reston, Va., U.S.A.

Walter J. Bawiec is a research geologist in the Eastern Mineral Resources Team of the U.S. Geological Survey (USGS), based in Reston, Va. His current assignments are (1) project leader responsible for geographic information systems (GIS) and computer infrastructure of the Eastern Mineral Resources Team, (2) task leader responsible for GIS in the Global Mineral Resource Assessment Project (GMRAP), and (3) participant in a project to make data produced by the Minerals Program of the USGS available to the public. He has been involved in studies related to the assessment of mineral and petroleum resources and is considered an expert in GIS. He received a B.S. in geology from Waynesburg College, Pa., and an M.S. in geology from the George Washington University, Washington, D.C. He is a member of the Geological Society of America and the American Geophysical Union. He has been employed by the U.S. Geological Survey full time since 1974. He served 3 years (1970–73) in the U.S. Army field artillery. He is author or coauthor of more than 35 scientific papers.

Jens Dieter Becker-Platen

**Bundesanstalt für Geowissenschaften und Rohstoffe,
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Dr. Becker-Platen has been vice president of the Bundesanstalt für Geowissenschaften und Rohstoffe BGR (Federal Institute for Geosciences and Natural Resources and the Lower Saxony Geological Survey NLfB) since 1992. Beginning in 1958, he studied geology at the Universities of Freiburg i. Br., Braunschweig, and Bonn. He received his doctorate from the University of Hannover. He was involved in technical cooperation projects concerned with lignite exploration in Greece and Turkey. He joined the NLfB and BGR in 1968, and since then he has held various management positions in the NLfB, mainly in the mineral deposits and applied geology fields. He was president of the International Peat Society from 1995 to 2000.

Vladimir I. Berger

U.S. Geological Survey, Menlo Park, Calif., U.S.A.

Dr. Berger was born in 1931 in Moscow, Russia. In Tadjikistan, he graduated from Dushanbe State University in 1953 as an economic geologist. A career in prospecting and exploration began in 1949 in the Pamirs Mountains and

continued in central Kazakhstan and Yakutia until 1962. Then he became a research geologist followed by team leader in the All-Russian Geological Research Institute (VSEGEI) in St. Petersburg. He received degrees of Candidate of Sciences in Geology (1964) in St. Petersburg School of Mines and Doctor of Sciences in Geology (1979) in VSEGEI. His main research and publications are related to geology and exploration of rock crystal, mercury, antimony, and gold-antimony deposits; regional metallogeny; and assessment of mineral resources. In 1991, he immigrated to the United States and settled in California after a year in Maryland. He worked as a volunteer in the Maryland University and in the U.S. Geological Survey, Menlo Park, Calif. As a consulting geologist, he participated in gold prospecting in Australia for the Varuno Company and for ASARCO and, briefly, Newmont, in the Russian Far East. During the last 7 years, he worked as a contract geologist with the USGS, compiling worldwide databases of major ore deposit types with Don Singer and assisting Ted Theodore in geologic mapping in northeastern Nevada.

Joseph A. Briskey

U.S. Geological Survey, Reston, Va., U.S.A.

Dr. Briskey graduated from Oregon State University in 1975 with a Ph.D. in geology and economic geology and a doctoral thesis on the “Geology, Petrology, and Geochemistry of the Jersey, East Jersey, Huestis, and Iona Porphyry Copper-Molybdenum Deposits, Highland Valley, British Columbia.” He joined the U.S. Geological Survey in Menlo Park, Calif., in 1975, where he conducted geologic and mineral deposit modeling research and served as commodity geologist for zinc and lead. His research there also included geologic research and mineral resource assessments of 2-degree quadrangles and of Indian lands in the Western United States, together with studies of Mississippi-Valley-type zinc deposits in the southern Appalachians. In 1985, Dr. Briskey became associate chief of the Branch of Western Mineral Resources and, in 1988, was transferred to USGS headquarters in Reston, Va., to become deputy chief of the Office of Mineral Resources and program coordinator for the National Mineral Resources Assessment Program. In 1994, Dr. Briskey was awarded a Brookings Institution LEGIS Congressional Fellowship and served for 2 years on personal and committee staff of the United States Senate.

Dr. Briskey presently is conducting research and research development in three major areas: (1) a feasibility study for a global nonfuel mineral resource assessment; (2) resource and environmental assessments of iron and steel slag along the shore of Lake Michigan; and (3) a new integrated science

project with the USGS Biological Resources Division to investigate uses of “Mineral-Resource Assessments for Protecting Ecosystem Biodiversity and Health While Planning Nonfuel Mineral Supply in the Next Century.” Dr. Briskey serves on a number of committees for the American Geological Institute, Society of Economic Geologists, and International Association on the Genesis of Ore Deposits (IAGOD).

Thomas K. Bundtzen

Pacific Rim Geological Consulting, Inc., Fairbanks, Alaska, U.S.A.

Thomas K. Bundtzen is a senior mineral deposits and regional geologist for Alaska. While participating in the associated project for the paper in this volume, he was a senior geologist in the Alaska Division of Geological and Geophysical Surveys. Currently, he is the president of a major consulting company, Pacific Rim Geological Consulting, Inc., Fairbanks, Alaska.

Lesley Chorlton

Geological Survey of Canada, Ottawa, Canada

Lesley Chorlton is a graduate of McGill University (B.S., 1968; M.S., 1973) and Memorial University of Newfoundland (Ph.D., 1984). She was regional geologist, Southwest Newfoundland, for the Government of Newfoundland and Labrador during the federally and provincially funded agreement to complete geological mapping of Newfoundland, 1977–82. After working as a regional economic geologist for the Ontario Geological Survey, 1984–89, she redirected her career to geological applications of geographical information systems, obtaining a diploma at Sir Sanford Fleming School of Natural Resources. Developing an information system for the generalized geology of the world and functioning as data manager for the world mineral deposit databases of the World Minerals Geoscience Database Project, Geological Survey of Canada, have since been her principal occupations.

Charles G. (Skip) Cunningham

U.S. Geological Survey, Reston, Va., U.S.A.

Charles (Skip) Cunningham is a research geologist with the U.S. Geological Survey in Reston, Va. He is an economic geologist specializing in ore deposits in volcanic and subvolcanic environments, fluid-inclusion geothermometry and geobarometry, and light-stable isotopes, as applied to problems of ore genesis and mineral resource evaluation. He received his B.A. degree from Amherst College in 1967, a Masters from the University of Colorado in 1969, and his Ph.D. from Stanford University in 1973. Skip has worked at the USGS for almost 30 years on ore deposit projects throughout the Western United States and the Circum-Pacific. He has published numerous maps and papers about the Colorado Mineral Belt, Marysvale volcanic field, and

Nevada gold deposits and topical subjects such as paleothermal anomalies and fluid-inclusion studies of mineralizing systems. Skip is known throughout the Andes for his studies on ore-forming processes related to volcanic domes and calderas. His administrative responsibilities have included program coordinator for the Development of Assessment Techniques Program (USGS Ore Deposit Research Program), vice president of the Society of Economic Geologists, USGS acting eastern regional geologist, and co-manager of a cooperative project on volcanic processes and precious-metal mineralization in the central Andes with the geological surveys of Peru, Chile, and Bolivia.

Kenneth M. Dawson

Terra Geological Consultants, Vancouver, Canada

Kenneth M. Dawson is a senior mineral deposits geologist for the Canadian Cordillera. While participating in the associated project for the paper in this volume, he was a senior scientist at the Geological Survey of Canada in Vancouver, British Columbia. He is currently the leader of Terra Geological Consultants in Vancouver, British Columbia.

Nikolai L. Dobretsov

United Institute of Geology, Geophysics and Mineralogy, Siberian Branch, Russian Academy of Sciences (SB RAS), Novosibirsk, Russia

Academician Dobretsov was born in Leningrad (now St. Petersburg) in 1936. He graduated from the Leningrad Mine Institute in 1957. During 1957–60, he worked as a geologist, then a party chief in the Altai region. He was a research fellow, head of laboratory, and head of department in the Institute of Geology and Geophysics, SB RAS, Novosibirsk (1960–80); director of the Geological Institute, Buryat Affiliate of SB RAS, Ulan-Ude (1980–88); chairman of Presidium, Buryat Scientific Center (1987–89); director of the Institute of Geology and Geophysics, SB RAS, Novosibirsk (since 1988) and, after it was reorganized in 1990, director general of the United Institute of Geology, Geophysics and Mineralogy SB RAS. He served as the first deputy chairman (since 1990) and chairman (since 1997) of the Siberian Branch, Russian Academy of Sciences, vice president of RAS. He was a professor (1966–80) and head of a faculty at the Novosibirsk State University (1991–97).

Nikolai Dobretsov took an active part in and provided guidance for many national and international projects on ophiolites, geodynamics, mineral resources, and global environmental and climatic change; he helped promote the establishment of the Association of Asian Academies of Sciences. He was elected the first vice president (2000) and president (2002) of the association. Nikolai Dobretsov authored and coauthored more than 450 scientific articles, including 20 monographs dedicated to the problems of geology, mineralogy, magmatic and metamorphic petrology, tectonics, plutonic geodynamics, and mineral deposits.

Michael D. Doggett
Queen's University, Kingston, Canada

Michael Doggett is the director of the Mineral Exploration Master's Program and associate professor in the Department of Geological Sciences and Geological Engineering at Queen's University, Kingston, Canada. He is also a visiting international professor at the Western Australian School of Mines in Perth, Australia. He holds degrees in geology and mineral economics from Mount Allison University and Queen's University. Dr. Doggett has carried out a wide range of assignments on mineral policy and planning issues for exploration and mining companies, governments, and international agencies. His main areas of teaching and research relate to the economic analysis of mineral exploration and acquisition at both the corporate and industrywide levels. Current research includes evaluating mineral development potential in northern Canada, assessing mining legislation changes in China, and determining the impact of world-class deposits on corporate exploration and acquisition strategies.

Roman A. Eremin (retired)
formerly Russian Academy of Sciences, Magadan, Russia

Roman A. Eremin is a senior mineral deposits geologist for the Russian Northeast. While participating in the associated project for the paper in this volume, he was a senior research scientist at the Northeast Integrated Scientific Research Institute, Russian Academy of Sciences, Magadan, Russian. He currently is retired and lives in Belarus.

Nikolai A. Goryachev
Russian Academy of Sciences, Magadan, Russia

Nikolai A. Goryachev is a senior mineral deposits and regional geologist for the Russian Northeast. He is the associate director for the Northeast Integrated Scientific Research Institute, Russian Academy of Sciences, Magadan, Russia.

Erik Hammerbeck (deceased)
formerly Council for Geoscience, Pretoria, South Africa

Erik Hammerbeck was born and raised in Namibia and studied geology at the universities of Stellenbosch and Pretoria in South Africa. In 1969, he spent a year in Germany under a Von Humboldt Fellowship. After a short spell at the Tsumeb Mine in Namibia, he joined the Geological Survey of South Africa. He worked most of his life in economic geology and metallogeny and was instrumental in the production of various publications on the mineral resources of southern Africa, metallogenic maps, and the creation of mineral resource databases. The Mineral Resources Handbooks and Metallogenic Maps of South Africa (scale 1:1 million) and the "International

Digital Metallogenic Map of Africa" (scale 1:5 million), with its attendant database, are cases in point. Internationally he participated in various endeavors, notably the International Strategic Minerals Inventory (ISMI), the Commission for the Geological Map of the World (CGMW), and the International Association on the Genesis of Ore Deposits (IAGOD). He was formerly president of the CGMW's Subcommittee for Metallogenic Maps and president of IAGOD; he served the Geological Society of South Africa as president in 1992–93. Erik was manager of strategic planning for the Council for Geoscience (formerly the Geological Survey of South Africa). He passed away on April 24, 2006.

Lief R. Horwitz
U.S. Geological Survey, Seattle, Wash., U.S.A.

Lief Horwitz received an M.A. in urban and regional planning from the Virginia Polytechnic Institute and State University in 1998. He joined the Biological Resources Division of the USGS in 1998 as a Presidential Management Intern and initially worked in the capacity of a budget analyst. Since February 1999, he has been a program analyst in the USGS Gap Analysis Program, where he is primarily involved in new initiative and partnership development, education, and outreach.

Alexander V. Kanygin
**United Institute of Geology, Geophysics and Mineralogy,
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Alexander V. Kanygin was born in Omsk on January 10, 1936. He graduated from the Moscow State University in 1960. During 1960–62, he worked in the Novosibirsk geological party. He was a postgraduate, junior, and then senior research fellow at the Institute of Geology and Geophysics, SB RAS (since 1962); head of laboratory (since 1975), and head of paleontology and stratigraphy department (since 1987). After the reorganization of the Institute of Geology and Geophysics and foundation of the Institute of Geology (1989) and Institute of Petroleum Geology (1996) at the United Institute of Geology, Geophysics and Mineralogy, he occupied the same positions. He has served as professor (since 1998) and head of the faculty of historical geology and paleontology at the Novosibirsk State University (since 1999). A. Kanygin authored and coauthored more than 240 scientific articles, including 2 personal and 8 composite monographs dedicated to the problems of stratigraphy, paleogeography, paleontology, paleoecology, biosphere evolution, and regional and petroleum geology of Siberia. He took part in a number of regional, Federal, and international projects on geological correlation, global environmental change, and petroleum reserves of Siberia.

Stephen E. Kesler**University of Michigan, Ann Arbor, Mich., U.S.A.**

Steve Kesler is professor of economic geology and associate chair in the Department of Geological Sciences at the University of Michigan, Ann Arbor, Mich. His research and teaching interests include the geology and geochemistry of ore deposits, mineral exploration, and mineral economics, as well as environmental geochemistry related to the recovery and use of minerals. He is the author of "Our Finite Mineral Resources" (1976, McGraw-Hill, 120 p.) and "Mineral Resources, Economics and the Environment" (1994, Macmillan, 391 p.). Along with his students, he has worked on a wide range of geologic problems related to ore deposits with an emphasis on gold and porphyry copper deposits. He has also been active in exploration and mining efforts in a number of areas, particularly in the Caribbean-Central America region. Steve has been active in a number of professional organizations and served as president of the Society of Economic Geologists in 1998.

Alexander I. Khanchuk**Russian Academy of Sciences, Vladivostok, Russia**

Alexander I. Khanchuk is a senior regional geologist and tectonist for the Russian Southeast, director of the Far East Geological Institute, and vice president of the Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia.

Alexey E. Kontorovich**Institute of Petroleum Geology of the United Institute of Geology, Geophysics and Mineralogy, Siberian Branch, Russian Academy of Sciences (SB RAS), Novosibirsk, Russia**

Alexey Emilievich Kontorovich, born in 1934 in Kharkov, now the Ukraine, graduated from the Tomsk State University in 1956. In 1958–89, he served as senior scientist, head of laboratory, head of department, and deputy director of the Siberian Scientific Research Institute of Geology, Geophysics, and Mineral Resources. Beginning in 1989, he was deputy director general of the United Institute of Geology, Geophysics and Mineralogy SB RAS, and in 1997, he was director of the Institute of Petroleum Geology as a part of the United Institute of Geology, Geophysics and Mineralogy of the SB RAS. Since 1983, he has been a professor at the Novosibirsk State University (NSU) and, since 1988, head of the department of mineral deposits of the NSU. He is a full member of the Russian Academy of Sciences (1991), member of the Presidium of the Siberian Branch of RAS (1991), and chairman of the Scientific Council of RAS on the problems of geology and development of oil and gas fields (2002). He is the supervisor of regional and Federal state programs on the studies of oil and gas resources in Siberia and throughout Russia.

A. Kontorovich is the author and coauthor of more than 500 scientific works, including more than 30 monographs on

the problems of regional geology of Siberia, naphthidogenesis, petroleum geology, isotopic and molecular organic geochemistry, quantitative prediction of petroleum potential and methods of simulational mathematical modeling of geologic exploration, and prediction of development of the oil and gas complex in Siberia and Russia. He is the winner of the State Prize of the Russian Federation and prizes of the Russian Federation Government and was awarded orders and medals.

Penny Flick Langhammer**Conservation International, Washington, D.C., U.S.A.**

Penny Langhammer is senior manager for Africa-Eurasia Conservation Outcomes in the Center for Applied Biodiversity Science (CABS) at Conservation International (CI). In her role at CABS, Penny provides scientific and technical support to CI's regional programs and partners in the definition of biodiversity conservation targets at the species, site, and landscape levels. Her region of focus includes the biodiversity hotspots and wilderness areas in Africa and Eurasia. She holds a degree in environmental management from Duke University's Nicholas School of the Environment.

Robert Laramée**Geological Survey of Canada, Ottawa, Canada**

Robert Laramée is a geologist and computer scientist. He obtained his B.S. in geology in 1969 from the Université de Montréal and a Certificat en informatique de gestion in 1984 from the Université du Québec à Hull. Robert first worked for the Geological Survey of Canada in 1967 and joined the Geomathematics Section, Mineral Resources Division, in the fall of 1971. He also taught computer science at the Université du Québec à Hull in 1989. Robert's main interest is in the application of information technology to the solution of geological (especially mineral deposit) problems. His activities have ranged from programming geographic coordinate conversions to designing mineral deposit databases. Robert is currently working on the World Minerals Geoscience Database Project as mineral deposits database specialist. His main activity is the development of a database schema suitable for any type of mineral deposits on a world scale and of accompanying software tools to enter and edit data, to safely upgrade the database schema, to interrogate the database, and to produce output in a variety of formats.

Bruce R. Lipin**U.S. Geological Survey, Reston, Va., U.S.A.**

Bruce R. Lipin was born in New York City, U.S.A., in 1947. He attended undergraduate school at City College of New York and graduated with a B.S. in geology. He received his Ph.D. in mineralogy-petrology from The Pennsylvania State University in 1975. He has been with the U.S. Geological

cal Survey since 1974 and has done research in lunar experimental petrology and the origin and distribution of mineral deposits—specializing in chromite and platinum, layered igneous complexes, especially the Stillwater Complex in Montana, U.S.A. He is currently the chief of the USGS minerals database project and is a part of the global mineral resource assessment feasibility team.

Gregory Ellis McKelvey

Global Mine Discovery Partnership, LLC, Scottsdale, Ariz., U.S.A.

Gregory E. McKelvey has 35 years of exploration and mineral discovery experience. He is presently manager of Global Mine Discovery Partnership, LLC, a private consulting and mineral discovery company that he founded after retiring from Phelps Dodge Exploration Corporation as vice president for Latin America exploration. He has held positions with the U.S. Geological Survey (1989–91), Cominco American Resources, Incorporated (1975–88), Homestake Mining Company (1974 and 1975), Bear Creek Mining Company (1965–74), and Nicol Industrial Minerals (summers of 1961–64). He received a B.A. in geology from the University of Montana at Missoula in 1966 and an M.S. degree in geology from Franklin and Marshall College, Lancaster, Pa., in 1967.

James W. H. Monger

Geological Survey of Canada, Vancouver, Canada

James W.H. Monger is a senior regional tectonist for the Canadian Cordillera. While participating in the associated project for the paper in this volume, he was a senior research scientist for the Geological Survey of Canada, Vancouver, British Columbia. He is currently an emeritus research geologist for the Geological Survey of Canada.

Warren J. Nokleberg

U.S. Geological Survey, Menlo Park, Calif., U.S.A.

Dr. Warren J. Nokleberg is a research geologist in the Western Mineral Resources Team of the U.S. Geological Survey, based in Menlo Park, Calif. His current assignment is regional coordinator for Northeast Eurasia for the Global Mineral Resource Assessment Project (Russia, Belarus, Ukraine, Mongolia, and China, South Korea, and Japan). His past assignment was leader of a project on the Mineral Resources and Metallogenesis of Northeast Asia (Siberia, Mongolia, northeastern China, South Korea, and Japan). Since starting graduate school in 1965, his major research emphases have been on the mineral deposits, metallogenesis, bedrock geology, and tectonics of the central Sierra Nevada in California, the Stillwater Complex in Montana, eastern Alaska, the Russian Far East, and Northeast Asia. He received a B.A. in geol-

ogy from the University of California Los Angeles in 1961 and a Ph.D. in geology from the University of California Santa Barbara in 1970. He is a fellow of the Geological Society of America, a fellow of the Society of Economic Geologists, and a member of the American Geophysical Union. He has been employed by the USGS on a part-time or full-time basis since 1966 and recently completed 32 years of full-time U.S. Government service. He was a Regular Line Officer, U.S. Navy for 4 years (1961–65), was an associate professor of geology at California State University, Fresno, for 6 years (1970–76), and is author or coauthor of more than 240 scientific papers.

George A. Nooten (retired)

formerly United Nations Revolving Fund for Natural Resources Exploration (UNRFNRE), New York, U.S.A.

George A. Nooten has been in the service of UNRFNRE for the past 21 years. He has acquired extensive international experience through designing, planning, negotiating agreements, and managing the execution of mineral exploration programs in several developing countries, including Tanzania, Mozambique, Cote d'Ivoire, Sierra Leone, Ghana, Yemen, and Sri Lanka. His most recent discoveries are the Geita Hill and Nyamulilima gold deposits in northwestern Tanzania. The 12-million-ounce Geita mine was opened on August 3, 2000. Prior to joining the UNRFNRE in 1979, he worked as chief geologist for the bauxite mines in Linden, Guyana, and as a geologist for the Iron Ore Company of Canada, INCO, and the Quebec Ministry of Natural Resources. He took his undergraduate studies in geology at Queen's University, Kingston, Canada, and received a M.S. (Minex) from the same university. George retired in 2002.

Alexander A. Obolenskiy

Russian Academy of Sciences, Novosibirsk, Russia

Alexander A. Obolenskiy is a senior mineral deposits geologist for eastern Siberia. For more than 50 years, he has studied the mineral deposits and regional geology of this region as a senior scientist in the Institute of Geology, Russian Academy of Sciences, Novosibirsk, Russia.

Leonid M. Parfenov (deceased)

formerly Russian Academy of Sciences, Yakutsk, Russia

Leonid M. Parfenov was a senior regional geologist and tectonist for eastern Siberia and the Russian Far East. He was a senior scientist and laboratory chief in institutes of the Russian Academy of Sciences in Novosibirsk, Khabarovsk, and Yakutsk. Most recently, he was vice president of the Yakutian Academy of Sciences and director of the Institute of Diamonds and Noble Metal Geology, Russian Academy of Sciences, Yakutsk. Leonid passed away in August of 2002.

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Vladimir V. Ratkin is a senior mineral deposits geologist for the Russian Southeast. While participating in the associated project for the paper in this volume, he was a senior scientist and laboratory chief in the Far East Geological Institute, Russian Academy of Sciences, Vladivostok. He is currently a consulting geologist in European Russia.

Sergey M. Rodionov
Russian Academy of Sciences, Khabarovsk, Russia

Sergey M. Rodionov is a senior mineral deposits and regional geologist for the Russian Southeast. He is also the associate director of the Institute of Tectonics and Geophysics, Russian Academy of Sciences, Khabarovsk.

Klaus J. Schulz
U.S. Geological Survey, Reston, Va., U.S.A.

Dr. Klaus J. Schulz is a research geologist with the U.S. Geological Survey in the Eastern Mineral Resources Team, Reston, Va. He currently directs USGS efforts to evaluate the feasibility of conducting quantitative global assessments of undiscovered nonfuel mineral resources. He has previously directed and (or) participated in several regional and detailed-scale mineral resource assessments, including the USGS-Costa Rican National Mineral Resource Assessment and the U.S. National Mineral Resource Assessment for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc. He has also organized and co-directed several workshops, the most recent being the IUGS/UNESCO (International Union of Geological Sciences/United Nations Educational, Scientific and Cultural Organization) Deposit-Modeling Workshop on Base- and Precious-Metal Deposits in the Arabian Shield, November 12–19, 1999, in Jiddah, Saudi Arabia. Dr. Schulz's research has focused on the metallogeny of Precambrian terranes and on volcanic-hosted and magmatic sulfide mineral deposits. He is the current USGS member of the IUGS/UNESCO Deposit Modeling Program steering committee. He served as the chief of the USGS Branch of Eastern Mineral Resources from 1989 to 1996. Dr. Schulz holds a B.S. degree in geology from the University of Wisconsin, an M.S. degree in petrology from the University of Minnesota, and a Ph.D. in igneous petrology/geochemistry from the University of Minnesota.

Deborah J. Shields
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Dr. Deborah Shields is principal mineral economist for the U.S. Department of Agriculture (USDA), Forest Service, Research and Development Division. She directs the agency's energy and mineral economics and mineral policy research

programs, providing technical and scientific input to the Forest Service Strategic Plan, the Resource Planning Act Assessment, and the National Forest planning process. In addition, she leads the agency's effort to include nonrenewable resources in sustainable forest management, working with stakeholders in other government agencies, Tribal governments, industry, academia, and nongovernmental organizations to develop indicators of sustainability for energy and mineral resources. She has organized and will be co-director of an advanced research workshop (ARW) entitled "Sustainable Mineral Resource Management in Karst Areas." The ARW is sponsored by the NATO (North Atlantic Treaty Organisation) Scientific Affairs Division and by UNESCO (United Nations Educational, Scientific and Cultural Organization), UNEP (United Nations Environment Programme), the USDA Forest Service, and the Geological Survey of Slovenia. Deborah also provides technical support on sustainability issues to the U.S. delegation to the meetings of the Mining Ministers of the Americas. Finally, she is program manager for human dimensions research for the Front Range Ecosystem Management Project.

Prior to working for the Forest Service, Dr. Shields worked for the U.S. Department of the Interior, Bureau of Mines, specializing in international mineral supply and trade analysis and forecasting. She has published in the areas of sustainability policy and theory, utility theory and welfare economics, decision theory and decision-support systems, and network modeling. She holds a B.S. in wildlife management from Colorado State University, an M.S. in mineral economics from the Colorado School of Mines, and a Ph.D. in rangeland ecosystem science from Colorado State University.

Vladimir I. Shpikerman
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Vladimir I. Shpikerman is a senior mineral deposits and regional geologist for the Russian Northeast. While participating in the associated project for the paper in this volume, he was a senior scientist and laboratory chief in the Northeast Integrated Scientific Research Institute, Russian Academy of Sciences, Magadan, Russia. He is currently a senior mineral deposits geologist in the All-Russian Geological Research Institute (VSEGEI) in St. Petersburg, Russia.

W. David Sinclair
Geological Survey of Canada, Ottawa, Canada

Dave Sinclair is a graduate of the University of Toronto (B.S., 1966) and the University of Wisconsin (M.S., 1970; Ph.D., 1973). From 1973 to 1977, he was employed by the Department of Indian Affairs and Northern Development in Whitehorse, Yukon Territory, as a district geologist and was acting resident geologist in 1976–77. In 1977, he joined the Geological Survey of Canada in Ottawa, where he has specialized

in the geology of granite-related mineral deposits. He currently manages the World Minerals Geoscience Database Project.

Donald A. Singer

U.S. Geological Survey, Menlo Park, Calif., U.S.A.

Donald Singer is primarily interested in the application of quantitative methods to mineral resource assessments and exploration. He has written more than 200 papers on resource assessments, deposit models, quantitative methods, and exploration strategies. Recent work has been on developing and testing methods such as neural networks to integrate geoscience information for resource assessments and exploration. The Society of Economic Geologists awarded him its Silver Medal in 1999. He has been a geologist with the U.S. Geological Survey in Menlo Park, Calif., since 1973. Prior to this, he was a system analyst with Kennecott Copper. Don holds a Ph.D. in mineralogy and petrology from The Pennsylvania State University.

Milica Veselinovic-Williams

Council for Geoscience, Pretoria, South Africa

Mrs. Milica Veselinovic-Williams studied at Belgrade University, Yugoslavia, and obtained her B.S. (Hons.) in geology in 1985. Subsequently, she worked as an exploration geologist for the Geoinstitut, Belgrade. In 1992, she obtained her M.S. in exploration geology from Rhodes University, South Africa. She joined the Council for Geoscience (formerly the Geological Survey of South Africa) in 1994 and became the main author of the "1:5 000 000 International Digital Metallogenic Map of Africa" and its database. Under her supervision, the first edition of sheets 5 and 6 (south of the Equator) was published in digital GIS format on a CD-ROM in June 1999. Milica is also extensively involved in the design and development of a number of GIS database models for the production of metallogenic maps.

Gotthard Walser

World Bank, Washington, D.C., U.S.A.

Dr. Walser is a senior mining specialist at the Mining Department of the World Bank, Washington, D.C. Through advising services or technical assistance loans, the focus of

his activity is to assist governments to develop their mining sector and promote investments leading to sustainable development through policy, legal, and institutional reforms, as well as capacity building, environmental protection, and improved community participation. He is particularly interested in the reform of public mining institutions and strengthening of governance; in the development of geoscientific, environmental, and mining information systems; and in environmental and social issues related to mining. He currently leads or participates in projects in Algeria, Argentina, Burkina Faso, Ecuador, Madagascar, Mauritania, and Mozambique.

Prior to joining the World Bank in 1994, Dr. Walser worked with the Swedish Geological Survey, and later with its International Division, for more than 15 years, gaining broad professional and management experience. Responsibilities during this period included the planning and management of regional mapping and mineral resource assessment programs, as well as ore exploration, mine evaluation, and development projects; this work occurred through assignments both in Sweden and overseas, including many African and, particularly after 1982, Latin American countries. Dr. Walser holds a B.S., M.S. and Ph.D. in earth sciences from the University of Geneva in Switzerland.

Friedrich-Wilhelm Wellmer

Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover, Germany

Professor Wellmer (Dr.-Ing., Dr. h.c.) became president of the Bundesanstalt für Geowissenschaften und Rohstoffe (Federal Institute for Geosciences and Natural Resources and the Lower Saxony Geological Survey) in 1996. He studied mining and geology at the Technical Universities of Berlin and Clausthal. He worked for the German mining company Metallgesellschaft AG and its Canadian and Australian subsidiaries in Europe, North and South America, Australia, Oceania, and the Far East. Before joining the Federal Institute for Geosciences and Natural Resources, the Federal German Geological Survey BGR in Hannover, he was director of exploration at the Metallgesellschaft of Australia Pty. Ltd. in Melbourne. Professor Wellmer also teaches raw materials policy and economic geology at the Technical University of Berlin. He was awarded an honorary doctorate of the Technical University Mining Academy of Freiberg in 1999 and of the Technical University of Clausthal in 2003.

Author Biographies

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Walter J. Bawiec is a research geologist in the Eastern Mineral Resources Team of the U.S. Geological Survey (USGS), based in Reston, Va. His current assignments are (1) project leader responsible for geographic information systems (GIS) and computer infrastructure of the Eastern Mineral Resources Team, (2) task leader responsible for GIS in the Global Mineral Resource Assessment Project (GMRAP), and (3) participant in a project to make data produced by the Minerals Program of the USGS available to the public. He has been involved in studies related to the assessment of mineral and petroleum resources and is considered an expert in GIS. He received a B.S. in geology from Waynesburg College, Pa., and an M.S. in geology from the George Washington University, Washington, D.C. He is a member of the Geological Society of America and the American Geophysical Union. He has been employed by the U.S. Geological Survey full time since 1974. He served 3 years (1970–73) in the U.S. Army field artillery. He is author or coauthor of more than 35 scientific papers.

Jens Dieter Becker-Platen

**Bundesanstalt für Geowissenschaften und Rohstoffe,
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Dr. Becker-Platen has been vice president of the Bundesanstalt für Geowissenschaften und Rohstoffe BGR (Federal Institute for Geosciences and Natural Resources and the Lower Saxony Geological Survey NLfB) since 1992. Beginning in 1958, he studied geology at the Universities of Freiburg i. Br., Braunschweig, and Bonn. He received his doctorate from the University of Hannover. He was involved in technical cooperation projects concerned with lignite exploration in Greece and Turkey. He joined the NLfB and BGR in 1968, and since then he has held various management positions in the NLfB, mainly in the mineral deposits and applied geology fields. He was president of the International Peat Society from 1995 to 2000.

Vladimir I. Berger

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Dr. Berger was born in 1931 in Moscow, Russia. In Tadjikistan, he graduated from Dushanbe State University in 1953 as an economic geologist. A career in prospecting and exploration began in 1949 in the Pamirs Mountains and

continued in central Kazakhstan and Yakutia until 1962. Then he became a research geologist followed by team leader in the All-Russian Geological Research Institute (VSEGEI) in St. Petersburg. He received degrees of Candidate of Sciences in Geology (1964) in St. Petersburg School of Mines and Doctor of Sciences in Geology (1979) in VSEGEI. His main research and publications are related to geology and exploration of rock crystal, mercury, antimony, and gold-antimony deposits; regional metallogeny; and assessment of mineral resources. In 1991, he immigrated to the United States and settled in California after a year in Maryland. He worked as a volunteer in the Maryland University and in the U.S. Geological Survey, Menlo Park, Calif. As a consulting geologist, he participated in gold prospecting in Australia for the Varuno Company and for ASARCO and, briefly, Newmont, in the Russian Far East. During the last 7 years, he worked as a contract geologist with the USGS, compiling worldwide databases of major ore deposit types with Don Singer and assisting Ted Theodore in geologic mapping in northeastern Nevada.

Joseph A. Briskey

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Dr. Briskey graduated from Oregon State University in 1975 with a Ph.D. in geology and economic geology and a doctoral thesis on the “Geology, Petrology, and Geochemistry of the Jersey, East Jersey, Huestis, and Iona Porphyry Copper-Molybdenum Deposits, Highland Valley, British Columbia.” He joined the U.S. Geological Survey in Menlo Park, Calif., in 1975, where he conducted geologic and mineral deposit modeling research and served as commodity geologist for zinc and lead. His research there also included geologic research and mineral resource assessments of 2-degree quadrangles and of Indian lands in the Western United States, together with studies of Mississippi-Valley-type zinc deposits in the southern Appalachians. In 1985, Dr. Briskey became associate chief of the Branch of Western Mineral Resources and, in 1988, was transferred to USGS headquarters in Reston, Va., to become deputy chief of the Office of Mineral Resources and program coordinator for the National Mineral Resources Assessment Program. In 1994, Dr. Briskey was awarded a Brookings Institution LEGIS Congressional Fellowship and served for 2 years on personal and committee staff of the United States Senate.

Dr. Briskey presently is conducting research and research development in three major areas: (1) a feasibility study for a global nonfuel mineral resource assessment; (2) resource and environmental assessments of iron and steel slag along the shore of Lake Michigan; and (3) a new integrated science

project with the USGS Biological Resources Division to investigate uses of “Mineral-Resource Assessments for Protecting Ecosystem Biodiversity and Health While Planning Nonfuel Mineral Supply in the Next Century.” Dr. Briskey serves on a number of committees for the American Geological Institute, Society of Economic Geologists, and International Association on the Genesis of Ore Deposits (IAGOD).

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Thomas K. Bundtzen is a senior mineral deposits and regional geologist for Alaska. While participating in the associated project for the paper in this volume, he was a senior geologist in the Alaska Division of Geological and Geophysical Surveys. Currently, he is the president of a major consulting company, Pacific Rim Geological Consulting, Inc., Fairbanks, Alaska.

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Lesley Chorlton is a graduate of McGill University (B.S., 1968; M.S., 1973) and Memorial University of Newfoundland (Ph.D., 1984). She was regional geologist, Southwest Newfoundland, for the Government of Newfoundland and Labrador during the federally and provincially funded agreement to complete geological mapping of Newfoundland, 1977–82. After working as a regional economic geologist for the Ontario Geological Survey, 1984–89, she redirected her career to geological applications of geographical information systems, obtaining a diploma at Sir Sanford Fleming School of Natural Resources. Developing an information system for the generalized geology of the world and functioning as data manager for the world mineral deposit databases of the World Minerals Geoscience Database Project, Geological Survey of Canada, have since been her principal occupations.

Charles G. (Skip) Cunningham

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Charles (Skip) Cunningham is a research geologist with the U.S. Geological Survey in Reston, Va. He is an economic geologist specializing in ore deposits in volcanic and subvolcanic environments, fluid-inclusion geothermometry and geobarometry, and light-stable isotopes, as applied to problems of ore genesis and mineral resource evaluation. He received his B.A. degree from Amherst College in 1967, a Masters from the University of Colorado in 1969, and his Ph.D. from Stanford University in 1973. Skip has worked at the USGS for almost 30 years on ore deposit projects throughout the Western United States and the Circum-Pacific. He has published numerous maps and papers about the Colorado Mineral Belt, Marysvale volcanic field, and

Nevada gold deposits and topical subjects such as paleothermal anomalies and fluid-inclusion studies of mineralizing systems. Skip is known throughout the Andes for his studies on ore-forming processes related to volcanic domes and calderas. His administrative responsibilities have included program coordinator for the Development of Assessment Techniques Program (USGS Ore Deposit Research Program), vice president of the Society of Economic Geologists, USGS acting eastern regional geologist, and co-manager of a cooperative project on volcanic processes and precious-metal mineralization in the central Andes with the geological surveys of Peru, Chile, and Bolivia.

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Kenneth M. Dawson is a senior mineral deposits geologist for the Canadian Cordillera. While participating in the associated project for the paper in this volume, he was a senior scientist at the Geological Survey of Canada in Vancouver, British Columbia. He is currently the leader of Terra Geological Consultants in Vancouver, British Columbia.

Nikolai L. Dobretsov

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Academician Dobretsov was born in Leningrad (now St. Petersburg) in 1936. He graduated from the Leningrad Mine Institute in 1957. During 1957–60, he worked as a geologist, then a party chief in the Altai region. He was a research fellow, head of laboratory, and head of department in the Institute of Geology and Geophysics, SB RAS, Novosibirsk (1960–80); director of the Geological Institute, Buryat Affiliate of SB RAS, Ulan-Ude (1980–88); chairman of Presidium, Buryat Scientific Center (1987–89); director of the Institute of Geology and Geophysics, SB RAS, Novosibirsk (since 1988) and, after it was reorganized in 1990, director general of the United Institute of Geology, Geophysics and Mineralogy SB RAS. He served as the first deputy chairman (since 1990) and chairman (since 1997) of the Siberian Branch, Russian Academy of Sciences, vice president of RAS. He was a professor (1966–80) and head of a faculty at the Novosibirsk State University (1991–97).

Nikolai Dobretsov took an active part in and provided guidance for many national and international projects on ophiolites, geodynamics, mineral resources, and global environmental and climatic change; he helped promote the establishment of the Association of Asian Academies of Sciences. He was elected the first vice president (2000) and president (2002) of the association. Nikolai Dobretsov authored and coauthored more than 450 scientific articles, including 20 monographs dedicated to the problems of geology, mineralogy, magmatic and metamorphic petrology, tectonics, plutonic geodynamics, and mineral deposits.

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Michael Doggett is the director of the Mineral Exploration Master's Program and associate professor in the Department of Geological Sciences and Geological Engineering at Queen's University, Kingston, Canada. He is also a visiting international professor at the Western Australian School of Mines in Perth, Australia. He holds degrees in geology and mineral economics from Mount Allison University and Queen's University. Dr. Doggett has carried out a wide range of assignments on mineral policy and planning issues for exploration and mining companies, governments, and international agencies. His main areas of teaching and research relate to the economic analysis of mineral exploration and acquisition at both the corporate and industrywide levels. Current research includes evaluating mineral development potential in northern Canada, assessing mining legislation changes in China, and determining the impact of world-class deposits on corporate exploration and acquisition strategies.

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Roman A. Eremin is a senior mineral deposits geologist for the Russian Northeast. While participating in the associated project for the paper in this volume, he was a senior research scientist at the Northeast Integrated Scientific Research Institute, Russian Academy of Sciences, Magadan, Russian. He currently is retired and lives in Belarus.

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Erik Hammerbeck was born and raised in Namibia and studied geology at the universities of Stellenbosch and Pretoria in South Africa. In 1969, he spent a year in Germany under a Von Humboldt Fellowship. After a short spell at the Tsumeb Mine in Namibia, he joined the Geological Survey of South Africa. He worked most of his life in economic geology and metallogeny and was instrumental in the production of various publications on the mineral resources of southern Africa, metallogenic maps, and the creation of mineral resource databases. The Mineral Resources Handbooks and Metallogenic Maps of South Africa (scale 1:1 million) and the "International

Digital Metallogenic Map of Africa" (scale 1:5 million), with its attendant database, are cases in point. Internationally he participated in various endeavors, notably the International Strategic Minerals Inventory (ISMI), the Commission for the Geological Map of the World (CGMW), and the International Association on the Genesis of Ore Deposits (IAGOD). He was formerly president of the CGMW's Subcommittee for Metallogenic Maps and president of IAGOD; he served the Geological Society of South Africa as president in 1992–93. Erik was manager of strategic planning for the Council for Geoscience (formerly the Geological Survey of South Africa). He passed away on April 24, 2006.

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Lief Horwitz received an M.A. in urban and regional planning from the Virginia Polytechnic Institute and State University in 1998. He joined the Biological Resources Division of the USGS in 1998 as a Presidential Management Intern and initially worked in the capacity of a budget analyst. Since February 1999, he has been a program analyst in the USGS Gap Analysis Program, where he is primarily involved in new initiative and partnership development, education, and outreach.

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Alexander V. Kanygin was born in Omsk on January 10, 1936. He graduated from the Moscow State University in 1960. During 1960–62, he worked in the Novosibirsk geological party. He was a postgraduate, junior, and then senior research fellow at the Institute of Geology and Geophysics, SB RAS (since 1962); head of laboratory (since 1975), and head of paleontology and stratigraphy department (since 1987). After the reorganization of the Institute of Geology and Geophysics and foundation of the Institute of Geology (1989) and Institute of Petroleum Geology (1996) at the United Institute of Geology, Geophysics and Mineralogy, he occupied the same positions. He has served as professor (since 1998) and head of the faculty of historical geology and paleontology at the Novosibirsk State University (since 1999). A. Kanygin authored and coauthored more than 240 scientific articles, including 2 personal and 8 composite monographs dedicated to the problems of stratigraphy, paleogeography, paleontology, paleoecology, biosphere evolution, and regional and petroleum geology of Siberia. He took part in a number of regional, Federal, and international projects on geological correlation, global environmental change, and petroleum reserves of Siberia.

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Steve Kesler is professor of economic geology and associate chair in the Department of Geological Sciences at the University of Michigan, Ann Arbor, Mich. His research and teaching interests include the geology and geochemistry of ore deposits, mineral exploration, and mineral economics, as well as environmental geochemistry related to the recovery and use of minerals. He is the author of "Our Finite Mineral Resources" (1976, McGraw-Hill, 120 p.) and "Mineral Resources, Economics and the Environment" (1994, Macmillan, 391 p.). Along with his students, he has worked on a wide range of geologic problems related to ore deposits with an emphasis on gold and porphyry copper deposits. He has also been active in exploration and mining efforts in a number of areas, particularly in the Caribbean-Central America region. Steve has been active in a number of professional organizations and served as president of the Society of Economic Geologists in 1998.

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Alexey Emilievich Kontorovich, born in 1934 in Kharkov, now the Ukraine, graduated from the Tomsk State University in 1956. In 1958–89, he served as senior scientist, head of laboratory, head of department, and deputy director of the Siberian Scientific Research Institute of Geology, Geophysics, and Mineral Resources. Beginning in 1989, he was deputy director general of the United Institute of Geology, Geophysics and Mineralogy SB RAS, and in 1997, he was director of the Institute of Petroleum Geology as a part of the United Institute of Geology, Geophysics and Mineralogy of the SB RAS. Since 1983, he has been a professor at the Novosibirsk State University (NSU) and, since 1988, head of the department of mineral deposits of the NSU. He is a full member of the Russian Academy of Sciences (1991), member of the Presidium of the Siberian Branch of RAS (1991), and chairman of the Scientific Council of RAS on the problems of geology and development of oil and gas fields (2002). He is the supervisor of regional and Federal state programs on the studies of oil and gas resources in Siberia and throughout Russia.

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the problems of regional geology of Siberia, naphthidogenesis, petroleum geology, isotopic and molecular organic geochemistry, quantitative prediction of petroleum potential and methods of simulational mathematical modeling of geologic exploration, and prediction of development of the oil and gas complex in Siberia and Russia. He is the winner of the State Prize of the Russian Federation and prizes of the Russian Federation Government and was awarded orders and medals.

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Penny Langhammer is senior manager for Africa-Eurasia Conservation Outcomes in the Center for Applied Biodiversity Science (CABS) at Conservation International (CI). In her role at CABS, Penny provides scientific and technical support to CI's regional programs and partners in the definition of biodiversity conservation targets at the species, site, and landscape levels. Her region of focus includes the biodiversity hotspots and wilderness areas in Africa and Eurasia. She holds a degree in environmental management from Duke University's Nicholas School of the Environment.

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Robert Laramée is a geologist and computer scientist. He obtained his B.S. in geology in 1969 from the Université de Montréal and a Certificat en informatique de gestion in 1984 from the Université du Québec à Hull. Robert first worked for the Geological Survey of Canada in 1967 and joined the Geomathematics Section, Mineral Resources Division, in the fall of 1971. He also taught computer science at the Université du Québec à Hull in 1989. Robert's main interest is in the application of information technology to the solution of geological (especially mineral deposit) problems. His activities have ranged from programming geographic coordinate conversions to designing mineral deposit databases. Robert is currently working on the World Minerals Geoscience Database Project as mineral deposits database specialist. His main activity is the development of a database schema suitable for any type of mineral deposits on a world scale and of accompanying software tools to enter and edit data, to safely upgrade the database schema, to interrogate the database, and to produce output in a variety of formats.

Bruce R. Lipin**U.S. Geological Survey, Reston, Va., U.S.A.**

Bruce R. Lipin was born in New York City, U.S.A., in 1947. He attended undergraduate school at City College of New York and graduated with a B.S. in geology. He received his Ph.D. in mineralogy-petrology from The Pennsylvania State University in 1975. He has been with the U.S. Geological

cal Survey since 1974 and has done research in lunar experimental petrology and the origin and distribution of mineral deposits—specializing in chromite and platinum, layered igneous complexes, especially the Stillwater Complex in Montana, U.S.A. He is currently the chief of the USGS minerals database project and is a part of the global mineral resource assessment feasibility team.

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Gregory E. McKelvey has 35 years of exploration and mineral discovery experience. He is presently manager of Global Mine Discovery Partnership, LLC, a private consulting and mineral discovery company that he founded after retiring from Phelps Dodge Exploration Corporation as vice president for Latin America exploration. He has held positions with the U.S. Geological Survey (1989–91), Cominco American Resources, Incorporated (1975–88), Homestake Mining Company (1974 and 1975), Bear Creek Mining Company (1965–74), and Nicol Industrial Minerals (summers of 1961–64). He received a B.A. in geology from the University of Montana at Missoula in 1966 and an M.S. degree in geology from Franklin and Marshall College, Lancaster, Pa., in 1967.

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ogy from the University of California Los Angeles in 1961 and a Ph.D. in geology from the University of California Santa Barbara in 1970. He is a fellow of the Geological Society of America, a fellow of the Society of Economic Geologists, and a member of the American Geophysical Union. He has been employed by the USGS on a part-time or full-time basis since 1966 and recently completed 32 years of full-time U.S. Government service. He was a Regular Line Officer, U.S. Navy for 4 years (1961–65), was an associate professor of geology at California State University, Fresno, for 6 years (1970–76), and is author or coauthor of more than 240 scientific papers.

George A. Nooten (retired)

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George A. Nooten has been in the service of UNRFNRE for the past 21 years. He has acquired extensive international experience through designing, planning, negotiating agreements, and managing the execution of mineral exploration programs in several developing countries, including Tanzania, Mozambique, Cote d'Ivoire, Sierra Leone, Ghana, Yemen, and Sri Lanka. His most recent discoveries are the Geita Hill and Nyamulilima gold deposits in northwestern Tanzania. The 12-million-ounce Geita mine was opened on August 3, 2000. Prior to joining the UNRFNRE in 1979, he worked as chief geologist for the bauxite mines in Linden, Guyana, and as a geologist for the Iron Ore Company of Canada, INCO, and the Quebec Ministry of Natural Resources. He took his undergraduate studies in geology at Queen's University, Kingston, Canada, and received a M.S. (Minex) from the same university. George retired in 2002.

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Alexander A. Obolenskiy is a senior mineral deposits geologist for eastern Siberia. For more than 50 years, he has studied the mineral deposits and regional geology of this region as a senior scientist in the Institute of Geology, Russian Academy of Sciences, Novosibirsk, Russia.

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Leonid M. Parfenov was a senior regional geologist and tectonist for eastern Siberia and the Russian Far East. He was a senior scientist and laboratory chief in institutes of the Russian Academy of Sciences in Novosibirsk, Khabarovsk, and Yakutsk. Most recently, he was vice president of the Yakutian Academy of Sciences and director of the Institute of Diamonds and Noble Metal Geology, Russian Academy of Sciences, Yakutsk. Leonid passed away in August of 2002.

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Sergey M. Rodionov is a senior mineral deposits and regional geologist for the Russian Southeast. He is also the associate director of the Institute of Tectonics and Geophysics, Russian Academy of Sciences, Khabarovsk.

Klaus J. Schulz
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Dr. Klaus J. Schulz is a research geologist with the U.S. Geological Survey in the Eastern Mineral Resources Team, Reston, Va. He currently directs USGS efforts to evaluate the feasibility of conducting quantitative global assessments of undiscovered nonfuel mineral resources. He has previously directed and (or) participated in several regional and detailed-scale mineral resource assessments, including the USGS-Costa Rican National Mineral Resource Assessment and the U.S. National Mineral Resource Assessment for Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc. He has also organized and co-directed several workshops, the most recent being the IUGS/UNESCO (International Union of Geological Sciences/United Nations Educational, Scientific and Cultural Organization) Deposit-Modeling Workshop on Base- and Precious-Metal Deposits in the Arabian Shield, November 12–19, 1999, in Jiddah, Saudi Arabia. Dr. Schulz's research has focused on the metallogeny of Precambrian terranes and on volcanic-hosted and magmatic sulfide mineral deposits. He is the current USGS member of the IUGS/UNESCO Deposit Modeling Program steering committee. He served as the chief of the USGS Branch of Eastern Mineral Resources from 1989 to 1996. Dr. Schulz holds a B.S. degree in geology from the University of Wisconsin, an M.S. degree in petrology from the University of Minnesota, and a Ph.D. in igneous petrology/geochemistry from the University of Minnesota.

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Dr. Deborah Shields is principal mineral economist for the U.S. Department of Agriculture (USDA), Forest Service, Research and Development Division. She directs the agency's energy and mineral economics and mineral policy research

programs, providing technical and scientific input to the Forest Service Strategic Plan, the Resource Planning Act Assessment, and the National Forest planning process. In addition, she leads the agency's effort to include nonrenewable resources in sustainable forest management, working with stakeholders in other government agencies, Tribal governments, industry, academia, and nongovernmental organizations to develop indicators of sustainability for energy and mineral resources. She has organized and will be co-director of an advanced research workshop (ARW) entitled "Sustainable Mineral Resource Management in Karst Areas." The ARW is sponsored by the NATO (North Atlantic Treaty Organisation) Scientific Affairs Division and by UNESCO (United Nations Educational, Scientific and Cultural Organization), UNEP (United Nations Environment Programme), the USDA Forest Service, and the Geological Survey of Slovenia. Deborah also provides technical support on sustainability issues to the U.S. delegation to the meetings of the Mining Ministers of the Americas. Finally, she is program manager for human dimensions research for the Front Range Ecosystem Management Project.

Prior to working for the Forest Service, Dr. Shields worked for the U.S. Department of the Interior, Bureau of Mines, specializing in international mineral supply and trade analysis and forecasting. She has published in the areas of sustainability policy and theory, utility theory and welfare economics, decision theory and decision-support systems, and network modeling. She holds a B.S. in wildlife management from Colorado State University, an M.S. in mineral economics from the Colorado School of Mines, and a Ph.D. in rangeland ecosystem science from Colorado State University.

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Dave Sinclair is a graduate of the University of Toronto (B.S., 1966) and the University of Wisconsin (M.S., 1970; Ph.D., 1973). From 1973 to 1977, he was employed by the Department of Indian Affairs and Northern Development in Whitehorse, Yukon Territory, as a district geologist and was acting resident geologist in 1976–77. In 1977, he joined the Geological Survey of Canada in Ottawa, where he has specialized

in the geology of granite-related mineral deposits. He currently manages the World Minerals Geoscience Database Project.

Donald A. Singer

U.S. Geological Survey, Menlo Park, Calif., U.S.A.

Donald Singer is primarily interested in the application of quantitative methods to mineral resource assessments and exploration. He has written more than 200 papers on resource assessments, deposit models, quantitative methods, and exploration strategies. Recent work has been on developing and testing methods such as neural networks to integrate geoscience information for resource assessments and exploration. The Society of Economic Geologists awarded him its Silver Medal in 1999. He has been a geologist with the U.S. Geological Survey in Menlo Park, Calif., since 1973. Prior to this, he was a system analyst with Kennecott Copper. Don holds a Ph.D. in mineralogy and petrology from The Pennsylvania State University.

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Mrs. Milica Veselinovic-Williams studied at Belgrade University, Yugoslavia, and obtained her B.S. (Hons.) in geology in 1985. Subsequently, she worked as an exploration geologist for the Geoinstitut, Belgrade. In 1992, she obtained her M.S. in exploration geology from Rhodes University, South Africa. She joined the Council for Geoscience (formerly the Geological Survey of South Africa) in 1994 and became the main author of the "1:5 000 000 International Digital Metallogenic Map of Africa" and its database. Under her supervision, the first edition of sheets 5 and 6 (south of the Equator) was published in digital GIS format on a CD-ROM in June 1999. Milica is also extensively involved in the design and development of a number of GIS database models for the production of metallogenic maps.

Gotthard Walser

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Dr. Walser is a senior mining specialist at the Mining Department of the World Bank, Washington, D.C. Through advising services or technical assistance loans, the focus of

his activity is to assist governments to develop their mining sector and promote investments leading to sustainable development through policy, legal, and institutional reforms, as well as capacity building, environmental protection, and improved community participation. He is particularly interested in the reform of public mining institutions and strengthening of governance; in the development of geoscientific, environmental, and mining information systems; and in environmental and social issues related to mining. He currently leads or participates in projects in Algeria, Argentina, Burkina Faso, Ecuador, Madagascar, Mauritania, and Mozambique.

Prior to joining the World Bank in 1994, Dr. Walser worked with the Swedish Geological Survey, and later with its International Division, for more than 15 years, gaining broad professional and management experience. Responsibilities during this period included the planning and management of regional mapping and mineral resource assessment programs, as well as ore exploration, mine evaluation, and development projects; this work occurred through assignments both in Sweden and overseas, including many African and, particularly after 1982, Latin American countries. Dr. Walser holds a B.S., M.S. and Ph.D. in earth sciences from the University of Geneva in Switzerland.

Friedrich-Wilhelm Wellmer

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Professor Wellmer (Dr.-Ing., Dr. h.c.) became president of the Bundesanstalt für Geowissenschaften und Rohstoffe (Federal Institute for Geosciences and Natural Resources and the Lower Saxony Geological Survey) in 1996. He studied mining and geology at the Technical Universities of Berlin and Clausthal. He worked for the German mining company Metallgesellschaft AG and its Canadian and Australian subsidiaries in Europe, North and South America, Australia, Oceania, and the Far East. Before joining the Federal Institute for Geosciences and Natural Resources, the Federal German Geological Survey BGR in Hannover, he was director of exploration at the Metallgesellschaft of Australia Pty. Ltd. in Melbourne. Professor Wellmer also teaches raw materials policy and economic geology at the Technical University of Berlin. He was awarded an honorary doctorate of the Technical University Mining Academy of Freiberg in 1999 and of the Technical University of Clausthal in 2003.