

Analytical Chemical Methods Workshop Participants

Kesavalu Bagawandoss, Corporate Technical Director and Laboratory Director, Air Laboratory Operations, Accutest Laboratories, Inc.

Kesavalu Bagawandoss is a Corporate Technical Director and is the Laboratory Director for the Air Laboratory Operations at Accutest Laboratories, Inc. Bagawandoss has been involved in the environmental testing industry for over 30 years, providing analytical services to industrial clients, the Department of Defense, the US EPA Superfund and state agencies. He serves as a Technical Liaison to the Marketing group at Accutest Laboratories and is responsible for the laboratory's hydraulic fracturing and industrial initiatives. He oversees the company's efforts in providing analytical testing for the hydraulic fracturing industry. He was invited as a subject matter expert by the US EPA to present at the 2011 Hydraulic Fracturing Workshop and served as a Theme Lead for the Field and Analytical Challenges session. He delivers presentations on various topics both nationally and regionally at conferences as well as client-specific topics. He holds a BS in Chemistry from the University of Madras, Loyola College in India, a MS in Chemistry from Wichita State University, a PhD in Environmental Science Engineering from the University of Oklahoma and a JD from Southern University Law Center.

Fred Baldassare, Owner and Senior Geoscientist, ECHELON Applied Geoscience Consulting

Fred Baldassare is the owner and a Senior Geoscientist of ECHELON Applied Geochemistry Consulting. Baldassare is an instructor on the application of isotope geochemistry to constrain gas origin and in stray gas migration response. He is an expert in the application of isotope geochemistry to constrain gas origin and to identify specific sources of stray gas in the environment. Baldassare has more than 25 years of experience as a geologist and 19 years of experience investigating more than 200 incidents of stray gas migration. Baldassare has helped to pioneer the application and advancement of isotope geochemistry to identify and distinguish the origin of microbial and thermogenic gases in the Appalachian Basin. He previously served as the statewide consultant for the Pennsylvania Department of Environmental Protection (PADEP) for investigating and characterizing source(s) of stray carbon dioxide and natural gases. Baldassare developed PADEP's guidance document for stray gas incident response and co-authored § 78.89. Gas migration response, of Title 25—PA. Code Chpt. 78 of PADEP's Oil & Gas regulations. Baldassare also served on the technical advisory committee for the Marcellus Shale Coalition (MSC) and was the lead author for the MSC's Recommended Practices to Respond to Stray Combustible Gas Incidents. He received his BS in Geology from the University of Pittsburgh.

Kay Bjornen, Analytical Chemist, ConocoPhillips Global Production Excellence

Kay Bjornen is an Analytical Chemist employed by ConocoPhillips Global Production Excellence. Bjornen has more than 20 years of experience in a variety of roles related to analysis in the oil and gas industry. She began her career as a Field Chemist in the oilfield service industry and

gained an extensive background in wet chemistry methods for support of cementing, acidizing and hydraulic fracturing, including testing of produced fluids and surface water. That experience was followed by a position as an Analytical Chemist for Dowell Schlumberger, where she gained experience in techniques for instrumental analysis of a variety of research and field samples. After obtaining her PhD, she was hired as a product scientist for the lubricants business unit of Conoco/ConocoPhillips. In that capacity she supervised product testing in the research and development labs, supported seven plant labs by troubleshooting instrument issues and doing method development for product quality control and published and made presentations at industry conferences in the areas of tribology, gear and motor oil development and determination of water in lubricant products. Following her experience in lubricants she transferred to research and development as a Team Lead for the Water Research Group where she launched research projects for water treatment issues specific to the oil and gas industry. Most recently she served as Director of the Chromatography Group for ConocoPhillips Analytical Sciences prior to the company split. She holds a BS in Chemistry from New Mexico Institute of Mining and Technology and a PhD in Inorganic Analytical Chemistry from the University of Oklahoma.

Helen Boylan, Associate Professor of Chemistry and Chair of Environmental Programs, Westminster College

Helen Boylan is an Associate Professor of Chemistry and Chair of Environmental Programs at Westminster College. She is an Analytical Chemist with expertise in method development for the analysis of environmental samples. For her doctoral thesis, Boylan developed methods for the analysis of mercury and mercury species in a variety of environmental matrices (water, soil, biologicals, coal and by-products) and established the protocol and quality control for US EPA Method 7473. Since receiving her PhD, Boylan has established an active research agenda with undergraduates that focuses on the development and application of analytical methodology. For the last two years, Boylan has been working with undergraduates on the analysis of produced and flowback water. This work has included novel solid phase extraction approaches for gas chromatography-mass spectrometry of organic analytes, quality control for routine metals analysis by flame atomic absorption spectroscopy and application of laser-induced breakdown spectroscopy for monitoring of inorganics in produced water and its precipitates. Boylan has served as a consultant and expert witness on the topics of analytical data and scientific protocol for Allegheny Energy, Squire Sanders Law Firm and Manion, McDonough & Lucas, PC. Boylan has a BS in Environmental Science from Westminster College and a PhD in Analytical/Environmental Chemistry from Duquesne University.

Tim Buscheck, Chevron Fellow and Consulting Hydrogeologist, Chevron Energy Technology Company

Tim Buscheck is a Chevron Fellow and Consulting Hydrogeologist in the Site Assessment and Remediation Team of the Health, Environment and Safety Department with Chevron, where he has worked since 1985. Prior to this he worked with Sohio Petroleum Company, Energy Resources Company and Exxon Research and Engineering Company. At Chevron, Buscheck leads a Remediation Strategic Research program and provides consulting to Chevron Operating

Companies on site assessments and remediation for marketing, chemical, refining and upstream facilities throughout the US and internationally. In 2008 he wrote a guidance document for Compound Specific Isotope Analysis, which has been widely distributed to Chevron consultants responsible for demonstrating monitored natural attenuation. Buscheck led an Oxygenates Research program from 1998 to 2003. He led a Remediation Long Range Research program from 1992 to 1997. He has authored papers on the subjects of compound specific isotope analysis, natural attenuation, ethanol fate and transport and multi-site plume studies, as well as several Chevron protocols for monitoring natural attenuation of contaminants in ground water. He holds a BS in Chemical Engineering from Lafayette College and a MS in Geological Engineering from the University of California, Berkeley.

Lucy Mar Camacho, Research Assistant Professor, Center for Inland Desalination Systems, University of Texas at El Paso

Lucy Camacho is a Research Assistant Professor in the Center for Inland Desalination Systems at the University of Texas at El Paso in El Paso, Texas. She is also Affiliate Professor in the Department of Chemical Engineering at New Mexico State University, Las Cruces, New Mexico. She is a Chemical Engineer with expertise in water treatment technologies, novel adsorbent materials for removal of heavy metals including arsenic and uranium and fate and transport of contaminants in water, with over ten years of research and professional experience in environmental management as chemical engineer. In 2008-2010, she worked as post-doctoral fellow in the Department of Chemical Engineering at New Mexico State University, where she conducted research on membrane distillation technology for desalination and removal of heavy metals from brine waters. During that time she was also trained on metal speciation methodology using liquid chromatography-inductively coupled plasma-mass spectrometry. She recently joined the Center for Inland Desalination Systems, where she is conducting research on electro dialysis metathesis technology for treatment and recovery of minerals from concentrated brine generated at desalination facilities. She also continued research on membrane distillation for brine recovery and adsorption of heavy metals from drinking water. She has been participating in the radiochemistry webinars organized by the National Analytical Management Program at the US Department of Energy Carlsbad Field Office. In the area of hydraulic fracturing and drinking water, she is especially interested in recovering produced water, including removal of total dissolved solids (TDS), heavy metals and radionuclide. She is also interested on the fate and transport of heavy metals from produced water and its impact to drinking was ground water. She has a BS in Chemistry, a MS in Electrochemistry and a PhD in Chemical Engineering.

Thomas Darrah, Research Scientist, Earth and Ocean Sciences Division, Nicholas School of the Environment, Duke University

Thomas Darrah is currently a Research Scientist in the Earth and Ocean Sciences Division of the Nicholas School of the Environment at Duke University. He founded GeoMed Analytical to patent and developed technologies and methods for using trace element and noble gas geochemistry to characterize the source, migration and extractability of crustal fluids. His activities at GeoMed Analytical include establishing and running a clinically-certified laboratory

for the analysis of inorganic elements in biological materials. Darrah received his BS and PhD in Geological Sciences and Geochemistry from the University of Rochester. After graduation, he completed a post-doc in Medical Geochemistry at the University of Massachusetts-Boston and Dana-Farber Harvard Cancer Center.

David Dobb, Manager, SW-846 Methods Development Program, TechLaw, Inc.

David Dobb is the Manager of the SW-846 Methods Development Program for TechLaw, Inc. He is an analytical chemist with more than 30 years of experience with chemical methods development and implementation for Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act programs, with technical expertise in inorganic chemistry and all facets of environmental laboratory procedures and management. He oversees US EPA's Methods Information Communication Exchange hotline, Methods Development Support and Updates of the SW-846 Manual, in addition to providing technical input. He has extensive experience via the ESAT program in conducting and overseeing several land-use issues connected to hydraulic fracturing, such as geoprobe sampling and surface/subsurface drilling, as well as environmental protection of wells/drinking water. He has a BS in Chemistry, a MS in Metallurgy from the Montana College of Mineral Science and Technology and a PhD in Chemistry from Montana State University.

Paul Edmiston, Chief Science Officer, ABS Materials, Inc.

Paul Edmiston is a Professor of Chemistry at the College of Wooster in Ohio and Chief Science Officer at ABS Materials, Inc. As an Analytical Chemist, he has expertise in identification and quantitation of organics by gas and liquid chromatography. His specialized area of research involves passive sampling methods of air and water through the development and testing of novel sorbents. Edmiston has received several grants from the National Science Foundation including an NSF-CAREER award for research into the detection of explosives via molecularly engineered organosilica materials. Edmiston was a finalist for the World Technology Award (Materials) for the discovery of swellable silica-based materials. These materials are being developed for the analysis and treatment of flowback water with funding from the US Department of Energy (DOE). Through the DOE work, Edmiston has completed the analysis of many flowback water samples from various plays in the US with particular emphasis on the organic fraction. As such, he was recently invited by the American Institute of Chemical Engineers (AIChE) to present his findings at the AIChE and Air & Waste Management Association joint workshop, *Shale Oil & Gas E&P: Water Challenges & Opportunities*. He is a member of the American Chemical Society (ACS) and is Co-Chair of the ACS Division of Analytical Chemistry Graduate Fellowship Committee. Edmiston was awarded the fellowship in 1996 and received both the Tomas Hirschfeld Award in Analytical Chemistry and Graduate Student of the Year Award from the Society for Applied Spectroscopy. He holds a BS in Chemistry from Pepperdine University and a PhD in Analytical Chemistry from the University of Arizona.

Kyle Felling, Senior Chemist and Laboratory Supervisor, Southwestern Energy

Kyle Felling is a Senior Chemist and Laboratory Supervisor at Southwestern Energy in Damascus, AR. He is an inorganic/analytical chemist with expertise in the analysis of all sources of water used and resulting from the process of hydraulic fracturing, with over 11 years of research and professional experience as a chemist. He has worked on all types of aqueous systems used during oil and gas exploration and development. He has evaluated environmental conditions at many such sites in the State of Arkansas. In his current position he has conducted analysis on natural gas, oil-field brines, metals determinations and analytical chemistry techniques. He has developed a laboratory that is certified by the Arkansas Department of Environmental Quality in over 47 analytes. He is a member of the American Chemical Society and the Society of Professional Engineers. In the area of hydraulic fracturing, he is especially interested in baseline water quality monitoring, produced and flowback water quality and the potential transport of chemicals used in hydraulic fracturing to ground water and surface water resources. He has a BS in Chemistry from Hendrix College and PhD in Inorganic Chemistry from the University of Texas at Austin.

Jennifer Field, Professor, Department of Environmental and Molecular Toxicology, Oregon State University

Jennifer Field is a Professor in the Department of Environmental and Molecular Toxicology at Oregon State University. As an environmental analytical chemist, Field has over 22 years of post-PhD experience in developing quantitative analytical methods for trace levels of polar organic chemicals in ground water, surface (fresh and saline) water, wastewater, sediment and soil. The developed methods are then applied to solve problems related to organic micropollutant transport and behavior in natural and engineered systems. Early in her career, she focused on field-based research to investigate the fate and transport of surfactants in ground water and wastewater treatment systems. She participated in interdisciplinary research with hydrologists and engineers in order to develop “push-pull” tracer test methods for determining in-situ rates of reductive dechlorination and anaerobic biodegradation of aromatic hydrocarbons. She was a pioneer in the area of fluorochemical occurrence and behavior with a focus on ground water contaminated by fire-fighting foams, municipal wastewater treatment systems and in municipal landfill leachates. Field’s current research in the area of environmental analytical chemistry concentrates on the use of large-volume injections with liquid chromatography-mass spectrometry as a quantitative yet cost- and time-saving approach for the analysis of aqueous environmental samples. She has a PhD in Geochemistry from the Colorado School of Mines.

Ruth Forman Principal Chemist, Environmental Standards, Inc.

Ruth Forman is a Principal Chemist at Environmental Standards, Inc., in Valley Forge, PA. Forman has over 26 years of field and analytical quality assurance experience. She is experienced in the fields of organic and inorganic data validation, and her knowledge of validation, coupled with her experience in the use of various data management systems, has enabled her to develop and test logic for both commercially available and project-specific electronic data verification tools. Forman is also knowledgeable and experienced in the

preparation and third-party review of analytical standard operating procedures, field operation standard operating procedures, quality assurance project plans, performance evaluation studies and the implementation of corporate laboratory programs. Prior to joining Environmental Standards, Forman was a chemist with a primary Superfund contractor for US EPA Region 3. During her tenure in this position, Forman was responsible for developing and maintaining the office quality assurance program, performing field audits, writing field and procedural standard operating procedures, performing data validation and managing various preliminary assessment site investigations and hazardous ranking system projects. She has a BA in Chemistry from Franklin and Marshall College.

Jay Gandhi, Regulatory Affairs Manager, Metrohm USA, Inc.

Jay Gandhi is the Regulatory Affairs Manager for Metrohm USA. He has over 27 years of experience in teaching, training and leading research in numerous fields of chemistry. Most recently, in collaboration with US EPA Region 6 and the Office of Groundwater and Drinking Water, he shepherded the method update for Hexavalent Chromium in drinking water by Ion Chromatography(IC)-UVPCR. He actively participates in various ASTM committees for Petroleum, Polymers, Soils & Rock, Analytical Methods, Coal, Chemicals and Water (D19). In his last ten years of participation in ASTM he successfully developed simple direct inject method for fuel grade Ethanol using IC instrumentation. He has also successfully collaborated with US EPA for various IC methods, hyphenation of IC with mass spectrometry and inductively coupled plasma mass spectrometry. In recent years, in collaboration with various universities and US EPA Office of Solid Waste, he has developed methods for metals speciation such as chromium, arsenic, mercury and selenium. In his distinguished career so far, he has worked with all analytical instrumentation techniques. He is currently working with US EPA Region 6 on three methods for analyzing target compounds in the energy extraction (hydraulic fracturing) process. He is particularly interested in issues of water quality problems, related to toxicity, health effects for water used in energy extraction (hydraulic fracturing) and drinking water. His educational background includes BS in Chemistry, MS in Organic and Inorganic Chemistry, MS in Computer Science and double PhD in Chemistry and Analytical Chemistry.

John Gardner, Environmental Specialist, Encana Oil & Gas (USA), Inc.

John Gardner is an Environmental Specialist at Encana Oil & Gas (USA), Inc. in Denver, CO. He is a chemist with over 15 years of experience, specializing in the areas of organic chemistry, analytical chemistry and remediation technologies. He has more than seven years of experience in the oil and gas industry with a good working knowledge of well drilling and completion operations. He has several years of laboratory experience, both developing analytical methods and performing analyses. He has a BS in Chemistry from the Colorado School of Mines and performed graduate research in Molecular Biology at Michigan Tech University.

Peter Gintautas, Environmental Protection Specialist, Colorado Oil and Gas Conservation Commission

Peter Gintautas has more than 30 years of experience in geology, geochemistry and environmental chemistry. Gintautas has performed research on the interaction and transport of

metals and organic compounds from natural and anthropogenic sources in ground waters, soils, sediments and surface waters. He earned a PhD in Geochemistry at Colorado School of Mines while researching the composition of landfill leachates and their interactions with aquifer mineral surfaces.

Mark Hollingsworth, Manager-Environmental, Chesapeake Energy Corporation

Mark Hollingsworth is an Environmental Manager at Chesapeake Energy Corporation, Oklahoma City, OK. He oversees the Baseline Water Sampling activities for Chesapeake Energy in all operating areas. Prior to joining Chesapeake, he was a Program Manager of National Accounts for TestAmerica, Inc. in Nashville, TN. His focus was on new program development, implementation and project management including technical review of analytical reports. Hollingsworth has a BS degree in Chemistry from David Lipscomb University in Nashville, TN.

Richard Jack, Manager of Market Development, Thermo Fisher Scientific, Inc.

Richard Jack is currently the Manager of Market Development, Thermo Fisher Scientific Corporation and has been involved with environmental applications for over 15 years. Working with regulatory agencies around the world, he assists these agencies in developing robust analytical methods that are eventually used for compliance monitoring by bringing customer problems to his company to develop new applications, hardware, software or column chemistries. Jack is a co-author for US EPA 557 and has also drafted several methods through ASTM and is a member of the D19 Water committee's task force on hydraulic fracturing. Previously, Jack was a product manager for Dionex and Hitachi High Technologies where he designed analytical instrumentation including ion chromatography, high performance liquid chromatography systems, pumps, autosamplers and a variety of detectors. Jack received his PhD in Biochemistry and Anaerobic Microbiology from Virginia Tech University in Blacksburg, VA, and his MS in Ecology from the University of Tennessee in Knoxville, TN.

Detlef Knappe, Professor of Civil, Construction and Environmental Engineering, North Carolina State University

Detlef Knappe is a Professor of Civil, Construction and Environmental Engineering at North Carolina State University in Raleigh, NC. He has been involved in research on water treatment processes for over 20 years. Knappe has been the recipient of numerous grants and contracts related to activated carbon adsorption and oxidation process research, with a special focus on the control of emerging contaminants in drinking water. Knappe's research routinely involves the use and development of analytical methods, primarily in the realms of gas chromatography, liquid chromatography and ion chromatography. Knappe received his BS, MS and PhD degrees from the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign.

Deyuan (Kitty) Kong, Senior Research Scientist, Chevron Energy Technology Company

Deyuan (Kitty) Kong is a Senior Research Scientist in Chevron Energy Technology Company. She has worked for Chevron since August 2006. She worked on heavy oil upgrading technology

development and molecular diamondoids focus on nanotechnology before she took on the lead role in environmental chemistry related to spill and release cases from 2009. She is very experienced with stable isotope analysis. She also serves as a peer reviewer for several journals. Prior to Chevron, she worked at Texas A&M University as a research scientist. She graduated from the Chinese Academy of Sciences with a PhD in Organic Chemistry.

Yan Liu, R&D Director, Dionex Products, Thermo Fisher Scientific, Inc.

Yan Liu is an R&D Director for Dionex Products at Thermo Fisher Scientific located in Sunnyvale, CA, where he is responsible for the research and development of Reagent-Free Ion Chromatography systems and consumable products including electrolytic eluent generators, suppressors and columns. He is also responsible for research and development activities in electrochemical detectors and their applications in ion chromatography. He served as a Project Manager for the development of capillary ion chromatography systems with electrolytic eluent generation and suppression and capillary ion chromatography consumables including columns, eluent generators and suppressors. He developed a number of novel electrolytic devices based on electrically polarized ion exchange beds for generation and recycle of acid, base and salt solutions for use as eluents in ion chromatography systems. He also served previously as a Principal Chemist at Midwest Research Institute, California Operations, Mountain View, CA, where he was a Principal Investigator and Project Manager in contract research and method development projects for clients including US EPA. His representative project experience included the development and validation of analytical method for the determination of haloacetic acids in drinking water using ion chromatography and the development of an off-line Supercritical fluid extraction and gas chromatography with atomic emission detection methods for determination of organotin, organolead and organomercury compounds in solid samples. He has more than 25 years of experience in the research and development of analytical methodologies and ion chromatography instruments and consumables. He received a PhD in Analytical Chemistry from Oregon State University in 1987.

Rick McCurdy, Senior Engineering Advisor, Chesapeake Energy Corporation

Rick McCurdy is a Senior Engineering Advisor for Chesapeake Energy Corporation in Oklahoma City, OK. He has over 32 years of experience working directly with specialty chemicals used in drilling, hydraulic fracturing and production operations. During his career, McCurdy has worked in and supervised several wet chemistry laboratories devoted to oilfield brine analysis and has personally developed methods for direct coupled plasma-optical emission spectroscopy and inductively coupled plasma-optical emission spectroscopy focused on accurate mineral and metal detection in difficult high total dissolved solids matrices. At the 55th Southwestern Petroleum Short Course in 2008, he presented the paper "Selecting and Applying Biocides and Oxygen Scavengers in High Volume, High Rate Hydraulic Fracture Stimulations." McCurdy has an AAS degree in Petroleum Technology and he has been actively involved primarily in chemical usage in US oilfields from the Appalachians to California and from South Texas to the North Slope of Alaska.

Glenn Miller, Professor, Department of Natural Resources and Environmental Science, University of Nevada, Reno

Glenn Miller is a Professor of Environmental and Resource Sciences at the University of Nevada, Reno (UNR). He is also presently Director of the Graduate Program in Environmental Sciences and Health at UNR. Current areas of research include precious metals pit water quality and acid mine remediation using anaerobic sulfate reducing systems. He also is working on a variety of issues related to the measurement and fate of organic contaminants in the environment. He was also involved in a project providing comments on the New York Environmental Impact Statement on hydraulic fracturing. After completing his graduate studies, he spent a year of postdoctoral study at US EPA's Environmental Research Laboratory in Athens, Georgia. He has a BS in Chemistry from the University of California, Santa Barbara and a PhD in Agricultural and Environmental Chemistry from the University of California, Davis.

Johnny Mitchell, Program Manager, TestAmerica Laboratories, Inc.

Johnny Mitchell serves as the Program Manager for all oil- and gas-related programs for TestAmerica. In that role, Mitchell maintains an active presence in industry groups. Mitchell has served on the Technical Committee of the Marcellus Shale Coalition for three years and was instrumental in the update and development of the Best Management Practice for Baseline Sampling Programs. During the continuing retrospective and prospective sampling efforts, Mitchell has worked with consultants and operators in the analysis and reporting of data for the US EPA studies. Prior to assuming his current role, Mitchell served for 24 years as the Director or Senior Technical Manager for the TestAmerica Nashville laboratory. In that role, Mitchell assisted in the development of robust methodologies for the analysis of compounds of interest to the oil and gas industry with an emphasis on hydraulic fracturing techniques.

Michael Moyer, Chief Operating Officer, Environmental Service Laboratories, Inc.

Michael Moyer is the Chief Operating Officer at Environmental Service Laboratories, Inc. (ESL) in Indiana, PA. He started his analytical career as a laboratory technician intern at ESL while in college. Prior to completing his BS degree, he stepped out of the laboratory and into a sales position at ESL. He focused on the natural gas industry market, of which ESL has over two decades of experience in collecting and analyzing pre-drill ground water samples in Pennsylvania. He was promoted to Vice President of Business Development in 2008 and Chief Operating Officer in 2011. Under his direction, ESL has expanded its analytical capabilities and operating areas to better service the Marcellus Shale and Utica Shale markets. He is experienced and especially interested in pre-drill baseline water quality sampling and analytical methodologies. He has a BS in Chemistry from the Indiana University of Pennsylvania.

Jeffrey Oxenford, Principal and Owner, Oxenford Consulting, LLC

Jeffrey Oxenford is the Principal and Owner of Oxenford Consulting, LLC. He has also worked for Stratus Consulting, the American Water Works Association Research Foundation and the New Jersey Department of Environmental Protection. He has over 25 years experience in water quality and treatment and has managed and directed cutting edge water quality research on

issues such as volatile and synthetic organic chemicals, natural organic matter, disinfectants and disinfection by-products, arsenic, algal toxins, taste and odor, *Cryptosporidium* and distribution system water quality. He has also led research on water treatment technologies that include source water protection strategies, alternative disinfectants, granular and powdered activated carbon and membrane technology. He is particularly interested in the potential impact of hydraulic fracturing on drinking water quality and strategies that utilities should employ to protect water quality. He has a MSE in Environmental Engineering from the University of North Carolina at Charlotte and a BA in Chemistry and Environmental Management from Warren Willson College.

Tommy Phelps, Chief Scientist for Applied Research, Biosciences Division, Oak Ridge National Laboratory

Tommy Phelps is the Chief Scientist for Applied Research within the Biosciences Division at Oak Ridge National Laboratory in Oak Ridge, TN. He is a Microbial Ecologist with considerable experience examining biogeochemical processes and use of conservative tracers in ground water during over 25 years of research experience. He has served on a number of national and international committees related to drilling, sampling and analysis of subsurface environments including perfluorocarbon tracer analyses for deep subsurface carbon sequestration projects. In the area of hydraulic fracturing and drinking water, he is particularly interested in facilitating the use of conservative perfluorocarbon tracers added at ppm concentrations with 5-plus orders of magnitude detection limits as mechanisms of monitoring migration of fluids within and between subsurface formations. Phelps received his BS degrees in Chemistry and Biology, a MS in Microbiology and a PhD Bacteriology from the University of Wisconsin.

Nelyn Quitoviera, Metropolitan Water District of Southern California

Nelyn Quitoviera has over 20 years of experience working as a chemist in several environmental laboratories on samples from remediation and superfund sites, and is currently working on a high volume of samples from lakes and distribution system at Metropolitan Water District. Quitoviera's expertise includes sample preparation and analysis of water, wastewater, soil and air samples for Volatile and Semivolatile Organic Compounds using the US EPA methodologies such as US EPA 524, 8270, 8260, 8080, TO-13 and instruments such as gas chromatography-mass spectrometry and gas chromatography-electron capture detector. Quitoviera is proficient in generating quality assurance/quality control packages for Data Validation; she developed and applied methods using gas chromatography-mass spectrometry for non-routine analysis and set-up new US EPA Method in the lab to be put on line for routine analysis.

Kinga Revesz, Research Chemist, U.S. Geological Survey

Since the beginning of her U.S. Geological Survey employment in 1983, Kinga Revesz has been concerned broadly with the use of stable isotopes, primarily hydrogen, carbon nitrogen and oxygen, to examine the dynamics of hydrological systems and associated geochemical problems. She has been performing studies in the source identification of stray natural gas in drinking water wells, as well as identification and quantification of ground water recharge, discharge and surface water/ground water interaction, redox processes in contaminated

aquifers. Revesz also has been developing new sample preparation techniques in the laboratory including inlet systems for continuous flow isotope ratio analytical techniques. She is expecting a compound-specific continuous flow isotope ratio mass spectrometer system installed in March 2013, capable of concentration and carbon and hydrogen stable isotopic composition analysis of natural gas components. Revesz received her PhD in Colloid Chemistry and Physical Chemistry from József Attila University in Szeged, Hungary, and her Diploma of Chemistry in Colloid Chemistry and Analytical Chemistry from Eötvös Lóránd University in Budapest, Hungary.

Ileana Rhodes, Principal Scientist, Shell Global Solutions (US)

Ileana Rhodes is Shell's Principal Scientist and Global Subject Matter Expert in environmental chemistry, chemical analysis and forensics with more than 30 years of experience. She has extensive knowledge of gas chromatography, gas chromatography-mass spectrometry and atomic spectroscopy methods. She worked closely with several states in the development and implementation of methods for characterization of petroleum hydrocarbons in soil and ground water. She is an expert in issues related to historical fuel chemistry, processes, additives, blending components and regulations related to fuel properties for the industry. Prior to focusing on environmental related activities, she worked for seven years specializing in gas chromatographic and atomic spectroscopy in method development and analysis in support to research, product quality, process optimization for all aspects in petrochemical exploration, production, process, transportation and produced water, waste characterization with primary focus on looking for traces of compounds that may impact color, taste, odor or affect processes. Since 2010, she has focused on shale gas and shallow gas characterization and all issues related to sampling and analysis related to hydraulic fracturing activities including interpretation of gas and ground water analytical results from multiple hydraulic fracturing sites.

David Stewart, Chief Science Officer, Energy Water Solutions, LLC

David Stewart is the Chief Science Officer for Energy Water Solutions as well as the President and CEO of Stewart Environmental Consultants, LLC. He is an environmental engineer and has run an environmental testing laboratory for 35 years. In addition, he has done extensive research on the chemical characteristics of produced water and flowback water. He holds several patents in the treatment of produced water and flowback waters. He is overseeing the design and construction of several water treatment facilities and is utilizing the analytical analysis of several produced water and flowback waters in these designs. He has a BS and PhD in Environmental Engineering from Colorado State University, a MS in Environmental Engineering from the University of Arizona and a MBA from Colorado State University.

Wilma Subra, President, Subra Company

Wilma Subra is president of Subra Company and provided technical assistance to Louisiana Environmental Action Network. She has over 45 years of experience in sampling and chemical and microbiologic analysis of ground water and surface water resources, monitoring of impacts on water resources, monitoring the environmental impacts of oil and gas drilling and

production activities, oil and gas waste treatment and disposal practices and associated environmental and human health impacts, environmental and human health impacts of injection well operations, analysis of chemical components in drilling fluids, pit construction and resulting contamination from pit operations and environmental and human health impacts of shale development. Her current work is focused on the environmental impacts of various aspects of shale development, the human health impacts associated with various specific units and activities of shale development, the development of appropriate parameters for monitoring ground water and surface water resources to detect impacts of shale development and the development of guidelines for the regulation of state programs dealing with shale gas development. She is a member of the American Chemical Society. She has a BS and MS in Microbiology and Chemistry from the University of Southwestern Louisiana, currently known as the University of Louisiana at Lafayette.

David Thal, Quality Assurance Specialist and Associate Principal, Environmental Standards, Inc.

David Thal is a Quality Assurance Specialist/Associate Principal at Environmental Standards, Inc. in Kingston, Tennessee. Thal has more than 20 years of diversified experience in the field of environmental chemistry. This experience includes research design, oversight of laboratory and inter-laboratory research, development, validation and application of advanced analytical methods and laboratory technical management, quality assurance project planning and consultation on the development of data quality objectives for environmental studies. He specializes in the design, management and evaluation of laboratory studies involving sediment, tissues, soil and waters, studies focused on contaminant bioavailability of and on source identification and source allocation of mixed contaminants. He has a BS in Psychology and a BS in Chemistry from the University of Tennessee at Chattanooga.

Denise Tuck, Senior Product Champion for Production Enhancement, Halliburton Energy Services, Inc.

Denise Tuck is a Senior Product Champion for Production Enhancement at Halliburton. She provides technical support on chemistry and fluids for stimulation and hydraulic fracturing. Formerly, she held the positions of Environmental Compliance and Permitting Manager and Global Chemical Compliance Manager in Health, Safety and Environment for Halliburton. She joined Halliburton in 1990 and has over 30 years of experience in environmental pollution control systems design and regulatory permitting and compliance for the upstream and downstream oil and gas industry. She co-authored two sections in the National Petroleum Council Report on Prudent Development – Realizing the Potential of North America’s Abundant Natural Gas and Oil Resources and participates on several American Petroleum Institute and Society of Petroleum Engineers committees. She has a BS in Chemical Engineering from Auburn University.

Taru Upadhyay, Technical Director, Bureau of Laboratories, Pennsylvania Department of Environmental Protection

Taru Upadhyay is a Technical Director at the Bureau of Laboratories (BOL) in the Department of Environmental Protection for the Commonwealth of Pennsylvania. Her responsibilities include oversight of six analytical sections: Organic Chemistry, Trace Metals, Microbiology, Inorganic Nonmetals, Air Chemistry and Gravimetric and Radiation Measurement. Under her direction, the laboratory technical staff focuses on producing and providing quality data in timely and efficient manner to help the environmental program in making consistent and sound decisions. The scope of her responsibilities include researching, developing and implementing new and innovative analytical methods to advance the Bureau's operational systems and laboratory capacity and address environmental program needs. With the increase in Marcellus Shale drilling in PA, the demand for methane analysis in water samples has surged. In response, the Organic section of the BOL and Teledyne Tekmar has partnered to develop a new method for purge-and-trap analysis of methane in water. In 2011, BOL participated in the analysis of water samples collected at Dimock residential site. In 2012, the BOL Radiation Measurement Section participated in a short-term study of sludge samples collected from waste water treatment plants for Naturally-Occurring Radioactive Material (NORM) and technologically-enhanced NORM (TENORM) related to the oil and gas exploration activity. She earned a BS in Chemistry and MS in Organic Chemistry from the M.S. University of Baroda in India.

Nathan Valentine, Applications Manager, Teledyne Tekmar

Nathan Valentine has worked in research and development, production and environmental labs, creating and evaluating testing protocols. For the last five years, Valentine has worked in environmental analysis of water and soils. He now possesses familiarity and experience with a wide variety of US EPA-approved methodologies for environmental testing. Within the last three years, Valentine developed applications for purge and trap, headspace, TOC and sample prep for Teledyne Tekmar. Currently, he is the Applications Manager at Teledyne Tekmar in charge of all applications, presentations and customer evaluations on a variety of analytical instruments and methods. Valentine has participated in studies with regional US EPA and state labs are ongoing, wrote and developed a purge and trap method for analyzing light hydrocarbons in drinking water and worked with state and federal agencies on writing and implementing their own testing protocols for samples associated with hydraulic fracturing. Valentine graduated with a degree in Chemistry from Walsh University in 2004.

Avner Vengosh, Professor of Geochemistry and Water Quality, Duke University

Avner Vengosh is an aqueous geochemist with expertise in the fate and transport of natural and anthropogenic contaminants in ground water and surface water, with over 25 years of research and professional experience as a geochemist. He has worked on natural systems as well those that have been impacted by industrial activities, especially mountaintop mining, coal ash disposal and conventional and unconventional oil and gas exploration and development. He has developed new methodologies for monitoring water quality degradation and evaluated environmental conditions at many such sites in the United States, the Middle East (Israel, Jordan, Palestine), Eastern (Ethiopia) and Northern (Morocco) Africa and Southeastern Asia

(Vietnam). After completing his PhD at the Australian National University, he was a Research Geochemist in the Israel Hydrological Service, followed by an Associate Professor position at Ben Gurion University in Israel. In 2005 he moved to Duke University where he is a Professor of Geochemistry and Water Quality. His research includes development and utilization of stable and radioactive isotopes (carbon and hydrogen in methane, oxygen, hydrogen, boron, strontium, carbon in dissolved inorganic carbon, radium isotopes) for delineating the magnitude and mechanisms of ground water and surface water contamination. In the area of hydraulic fracturing and drinking water, he is especially interested in baseline water quality monitoring, the direct impact of shale gas exploration and hydraulic fracturing on water quality, stray gas contamination, produced and flowback water quality and their direct impact on the environment and the potential transport of chemicals used in hydraulic fracturing to ground water and surface water resources. He has a BS in Geology and a MS in Isotope Geology from Hebrew University in Jerusalem and PhD in Environmental Geochemistry from the Australian National University.

Rock Vitale, Technical Director of Chemistry and Principal, Environmental Standards, Inc.

Rock Vitale is the Technical Director of Chemistry and a Principal at Environmental Standards, Inc. in Valley Forge, Pennsylvania. Vitale has 30 years of analytical quality assurance experience. Vitale is a recognized expert in the following fields: organic and inorganic data validation (including specialty analyses), laboratory auditing, preparation or third-party review of quality assurance project plans, design of specialty analyses to accommodate project-specific data quality objectives, quality assurance oversight of complex projects (sediment projects, biomonitoring projects) and agency negotiations. Vitale previously served as the Quality Assurance Manager for an environmental firm with 26 offices nationwide. Vitale is a Certified Environmental Analytical Chemist through the National Registry of Certified Chemists. He has a BS in Environmental Science and Biology from Marist College. He completed additional post-graduate Chemistry courses at Villanova University and Rider College and Chemistry Graduate Course Work at Villanova University.

Lawrence Wackett, Distinguished McKnight University Professor, Department of Biochemistry, Molecular Biology and Biophysics, University of Minnesota, Twin Cities

Lawrence Wackett is the Distinguished McKnight University Professor in the Department of Biochemistry, Molecular Biology and Biophysics at the University of Minnesota, Twin Cities. His research has focused on water and soil pollutants, methods of detection and bioremediation. He co-developed the University of Minnesota Biocatalysis/ Biodegradation Database for 17 years before its transfer to the Swiss Federal Water Research Institute. His major current research interest involves analytical methods for analysis of flowback and produced water from the Marcellus and Bakken shales and investigating methods of remediation. He is the Principal Investigator for the National Science Foundation grant, "Silica-based Bioremediation Technology Platform for a Clean and Efficient Shale Gas/Oil Industry" that started in September 2012. Wackett was an NIH Postdoctoral Fellow with Christopher Walsh in the Chemistry

Department at MIT from 1984 to 1987. Wackett started as an Assistant Professor at the University of Minnesota in 1987. He was awarded a Distinguished McKnight Professorship at Minnesota in 2001. He is a Fellow of the American Association for the Advancement of Science and the American Academy of Microbiology. Wackett, with Douglas Hershberger, authored the textbook Biocatalysis and Biodegradation, published by ASM Press in 2001. Biocatalysis and Biodegradation has now been translated into Chinese where it is available from Chemical Industry Press in Beijing.

Beizhan Yan, Lamont Research Assistant Professor, Lamont-Doherty Earth Observatory, Columbia University

Beizhan Yan is a Lamont Research Assistant Professor at Lamont-Doherty Earth Observatory of Columbia University in New York. He is an organic geochemist with expertise in the fate and transport of natural and anthropogenic organic contaminants in ground water and surface water, with over ten years of research and professional experience as a geochemist. He joined Columbia University in 2007 to develop an Environmental Organic Chemistry program and since then, he have established a lab with ability to extract, isolate and identify organic contaminants and biomarkers from environmental and biological samples. His expertise is in isolating organics from environmental and biological matrices and identifies them using various modern technologies, including gas chromatography-mass spectrometry-mass spectrometry, liquid chromatography-mass spectrometry-mass spectrometry, comprehensive two-dimensional gas chromatography-time-of-flight, as well as high mass resolution fourier transform ion cyclotron resonance mass spectrometer. Together with other researchers from Columbia University, he recently collected private ground water samples from 30 New York homes in south-central New York. He is conducting analysis to analyze dissolved organic compounds in these samples.