CRAIG A. LITTLE

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PROFESSIONAL EXPERIENCE

Dec 2006 - pres	Principal, Two Lines, Inc. Conduct radiation dose and risk assessments, historical dose reconstructions, field surveys and radiation safety audits for a variety of clients. Involved in baseline environmental surveys and licensing for new uranium processing facilities. Conduct ALARA audits for facilities using radioactive materials. Teach radiation safety officer training courses.
2002 - 2006	Sr. Scientist, MFG, Inc. Served as leader of the Natural Resources and Environmental Assessment Group. Conducted radiation risk assessments, dose calculations and field assessments of radioactivity for a variety of clients nationwide. Developed project proposals, work plans and cost estimates. Produced site investigation reports and monthly reports. Managed projects.
2000 - 2001	Manager, Western Operations, Advanced Infrastructure Management Technologies, a division of the Department of Energy's Y-12 National Security Complex, Oak Ridge, Tennessee. Responsible for twenty-five project managers in offices in Grand Junction, Colorado; Sacramento, California; and Lancaster, California. Projects included a variety of site assessment, risk analysis, and infrastructure improvements at numerous federal facilities nationwide. Projects were funded by Dept. of Energy, Dept. of Defense, Environmental Protection Agency, and others.
1983 - 2000	Leader, Environmental Technology Section (ETS), Life Sciences Division, Oak Ridge National Laboratory located in Grand Junction. Established the group to support USDOE Uranium Mill Tailings Remedial Action Project (UMTRAP). Staff also developed and applied innovative technologies and methodologies to remedy chemical and radiological pollution at numerous locations nationwide. Projects were funded by Dept. of Defense, Dept. of Energy, and other agencies.
1987 - 1998	Adjunct Professor, Department of Radiological Health Sciences, Colorado State University. Served on graduate research committees.
Fall 1979	Guest scientist, Federal Health Office, Munich, Federal Republic of Germany. Assisted in planning and implementing a monitoring system for actinides released from nuclear power plants in the Federal Republic.
1976 - 1982	Research Staff, Health and Safety Research Division, ORNL. Developed and applied computer codes to predict transport of nuclear and non-nuclear pollutants through the environment and subsequent impacts on ecosystems and human systems. Conducted research to assess the accuracy of environmental transport models.
Fall 1976	Environmental Research Assistant, Department of Radiology and Radiation Biology, Colorado State University. Collected environmental samples of plutonium for analysis; analyzed, reduced and summarized subsequent data for publication.

EDUCATION AND TRAINING

1976	Ph.D., Radioecology. Department of Radiology and Radiation Biology, Colorado State University, Ft. Collins, CO. Dissertation title: *Plutonium in a Grassland Ecosystem*.
1971	M.S., Radiation Biology/Health Physics. Department of Radiology and Radiation Biology, Colorado State University, Ft. Collins, CO.
1970	B. A., Biology. McPherson College, McPherson, KS.
1993	The Effective Executive. American Management Association, New York, NY
1989	Strategic Planning. American Management Association, New York, NY. Senior Project Management. American Management Association, New Your, NY.
1986	Cost and Schedule Control Systems Criteria (C/SCSC). Humphreys and Associates, Santa Clara, CA. Included project planning, work breakdown structures, and control systems.
1986	The Management Course. American Management Association, New York, NY. Four-week course covering all aspects of management including financial analysis of businesses, human resource management, and business simulation.

SELECTED PROJECTS

- Molycorp Minerals LLC. 2011. Performed audit of radiation safety program for Mountain Pass rare earth mine, Mountain Pass, California.
- Texas Commission for Environmental Quality. 2011. With two others, developed and delivered 160-hr radiological protection course to satisfy requirements of State of Texas for Waste Control Specialists by-product and low-level waste disposal facility.
- Bureau of Land Management. 2010. Served as advisor to third party oversight contractor for cleanup of abandoned uranium mines in Utah.
- Sandia National Laboratories. Member of 2010 – 2011 advisory committee for Global Threat Reduction Initiative at Sandia National Laboratories, Albuquerque, NM.
- U.S. Forest Service. 2010. Conducted radiological characterization and verification surveys at abandoned uranium mines on US Forest Service land in North Cave Hills area of South Dakota.
- Energy Fuels Resources, Inc. 2010. Modeled potential dose to members of the public for the proposed Pinon Ridge Uranium Milling Facility, Paradox CO. Energy Fuels Resources was awarded a license for the first commercial uranium milling facility in 30 yrs.
- UR Energy, Inc. 2010. Developed public dose estimates to support application for Nuclear Regulator Commission license for Lost Creek In Situ Uranium Recovery Facility, Wyoming.
- Cotter Corp. Annually. Develop estimates of potential public dose from uranium mill operations for Canon City Milling Facility.
- Annually, team-teach Radiation Safety Officer courses for uranium workers for a variety of facilities in western US.
- Los Alamos National Laboratory. 2009. Conducted audit of Rad-NESHAPS program at Los Alamos National Laboratory, Los Alamos, NM.
- Exxon/Mobil. Conducted ALARA audits of 2005 – 2009 radiation safety programs for the Highlands, Wyoming and Felder, Texas uranium recovery facilities.
- Cotter Corp, 2009. Developed 3-dimensional estimate of potential contamination using surface gamma scanning and bore hole sampling to support revision of financial surety bond.
- Energy Employee Occupational Illness Compensation Act Dose Reconstruction Project/Oak Ridge Associated Universities (ORAU), Cincinnati, Ohio. 2006 – 2009. Research, review and document
  technical bases for worker radiation exposure at former weapons manufacturing facilities. Development of Technical Basis Documents, Site Profiles and User's Guides for use in estimating historic worker exposure.
- Chamokane Creek Ecological and Human Health Risk Assessment, Washington. 2005. Conducted a human health risk assessment of potentially contaminated water seeping into a publicly accessible stream.
- Sequoyah Fuels Corporation, Oklahoma. 2005. Performed a human health risk assessment of uranium and heavy metal-bearing materials leaching from a former uranium concentration facility.
- Rocky Flats Environmental Technology Site (RFETS). 2004. Conducted a review of potential radiation
  doses and dose limits to terrestrial biota resident on the site. Compared existing dose limits in use at the site with approaches published for other facilities.
- Water Remediation Technology, Arvada, Colorado. Developed spreadsheet-based dose estimation software to calculate radiation exposure and dose to municipal employees from radium-bearing materials in water treatment tanks.
- Remedial Technology Evaluation, Department of Defense, Environmental Protection Agency. Evaluated a variety of novel remedial technologies to cleanup chemical and radiological pollutants in soil and groundwater at dozens of federal facilities nationwide.
- Uranium Mill Tailings Remedial Action Program (UMTRAP), Department of Energy. Conducted on-site radiation surveys on over 12,000 private and public properties in 10 states. Developed project schedule and allocated resources on this $40M effort.

OTHER ACTIVITIES

2005 - present	Editor-in-Chief, *Operational Radiation Safety* a quarterly supplement to *Health Physics,* the radiation protection journal published by Lippincott Williams and Wilkins for the Health Physics Society.
1999 – present	Member, Board of Trustees. McPherson College, McPherson, Kansas. Currently board chair.
1991 – present	Associate Editor, *Health Physics*, the radiation protection journal published by Lippincott Williams and Wilkins for the Health Physics Society.
2003 - 2009	Member, Board of Directors Marillac Clinic. Provides low-cost medical, dental and vision care to uninsured, low-income patients. Previously served as board president.
2000 - 2003	Member, Board of Director Health Physics Society.
1994 - 1996	Member, Board of Directors, Environmental Radiation Section, Health Physics Society.
1998 - 2001	Member, Board of Directors, Joint Utilization Commission and Riverview Technology Corp.; groups founded to negotiate and receive the DOE/Grand Junction property into private, non-for-profit ownership.

PUBLICATIONS AND PRESENTATIONS

Author or co-author of over 90 papers, publications and reports on a variety of topics. Presented numerous papers at professional meetings, as both contributing and invited speaker. Served on speaker's bureau of Oak Ridge Associated Universities for several different terms.

JANET A. JOHNSON, PHD, CHP, CIH

President, Sopris Environmental, Inc.

EDUCATION

PhD, Microbiology / Environmental Health, Colorado State University, 1986
MS, Health Physics, AEC Health Physics Fellow, University of Rochester, 1959
BS, Chemistry, University of Massachusetts, 1958

REGISTRATIONS/CERTIFICATIONS

Certified in the Comprehensive Practice of Health Physics, American Board of Health Physics since 1976
Certified Industrial Hygienist (Radiological Aspects) since 1986

EXPERIENCE SUMMARY

Dr. Johnson has extensive experience in radiation health physics including radiation worker training, NRC and Agreement State radioactive materials license applications; uranium recovery facility environmental and occupational radiation protection; radiation safety for naturally occurring radioactive materials; Radiation Safety Officer (RSO) training; radiation risk assessment; radon measurements and radon risk assessment; radiological site surveys Including MARSSIM-based characterization and RESRAD dose analyses.

Dr. Johnson has evaluated radiation dose and risk from facilities with residual radioactive materials from both licensed activities and from naturally occurring radioactive materials, with a primary focus for the last seventeen years on uranium recovery facilities and mine remediation. She has developed and implemented radiation safety training programs for workers and radiation safety officers. Dr. Johnson taught in the Department of Radiological Health Sciences at Colorado State University for fourteen years, and is a member of the Department's Advisory Board (currently the Department of Environmental and Radiological Health Sciences). She is working on radiological aspects of the reclamation plans for several uranium mills and has performed risk assessments for a variety of uranium recovery facilities. She is the Radiation Safety Officer of record for the Dawn Mining Company Millsite.

Dr. Johnson was a member of the Environmental Protection Agency Science Advisory Board (SAB) Radiation Advisory Committee (RAC) from 1995 to 2003. She chaired the RAC from 1999 through 2003. During her tenure on the committee the RAC reviewed the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and the Multi-Agency Radiation Laboratory Analytical Protocols Manual (MARLAP) as well as the EPA's approach to diffuse NORM. She was also on the EPA SAB panel that reviewed the Multi-Agency Survey and Assessment of Materials and Equipment Manual (MARSAME). In 2011 she served on an EPA SAB Panel providing advice to the Multi-Agency work group on revisions to MARSSIM.

Dr. Johnson is a member of Scientific Committee 64-22 of the National Council on Radiation Protection and Measurements (NCRP) updating the NCRP Report on Environmental Surveillance. She is currently a member of ANSI N 13.8 Committee redeveloping standards for the protection of uranium miners. She is part of a team that annually presents refresher training classes for uranium recovery facility RSOs. In 2011 the team presented a four weeks of uranium-specific training for the Texas Commission on Environmental Quality (TCEQ).

Dr. Johnson managed the environmental health and safety program at Colorado State University from 1993 to 1995. The program included industrial hygiene, radiation protection, hazardous waste management, and biosafety. Dr. Johnson served on the Westinghouse Government Operations Nuclear Safety and Environmental Oversight Committee. In that capacity she visited six of the major facilities for which Westinghouse was a contractor during the late 1980s and early 1990s.

REPRESENTATIVE PROJECT EXPERIENCE

- ***Radiological Site Assessment.*** Background radiation measurement and assessment of impacts of uranium recovery operations in regard to the reclamation plan.

- ***MARSSIM Site Characterization.*** Preparation and oversight of site characterization based on MARSSIM.

- ***Risk Assessment for Uranium Mill Reclamation Plans.*** Preparation of dose/risk assessment under routine operating conditions and potential accident scenarios for a reclamation plan.

- ***Uranium Mill Tailings Remedial Action Program Health and Safety Audit.*** Industrial hygiene and radiation protection.

- ***Westinghouse Government Operations Nuclear Safety and Environmental Oversight Committee.*** Review of safety and environmental programs at DOE sites managed and operated by Westinghouse, including evaluation of Total Quality Management programs as they pertained to environmental protection and safety.

- ***Health Risk Assessment Panel Subcommittee.*** Preparation of toxicity profiles and radiation risk assessment (Cotter Corporation Canon City Uranium Mill)

- ***Radiation Training.*** Development and presentation of Radiation Safety Training and Hazardous Waste Operations Training, including training and regulatory compliance for radioactive materials licensees.

- ***NORM Risk Assessment.*** Risk assessment for Naturally Occurring Radioactive Materials (NORM).

- ***University Environmental Health and Safety Program.*** Managed the environmental health and safety program for Colorado State University including routine operations, strategic planning, budgeting and personnel.

- ***University Hazardous Waste Program.*** Managed hazardous waste program for Colorado State University including routine disposal, environmental restoration and emergency response.

- ***Industrial Hygiene Course.*** Taught basic industrial hygiene course.

- ***Radiation Courses.*** Taught radiation physics and radiochemistry laboratories and radiation chemistry course.

- ***Occupational Health and Safety Review.*** Occupational health and safety review for a gold mine in Peru.

- ***Radiological Survey.*** Baseline radiological survey for an in situ uranium recovery operation in Kazakhstan.

- ***Radiation Safety Officer Course.*** Taught and developed a training manual for a 40-hour radiation safety officer (RSO) training class for NORM and Uranium facilities.

SUMMARY OF CURRENT AND PREVIOUS PROFESSIONAL AFFILIATIONS

American Industrial Hygiene Association

American Academy of Health Physics

American Academy of Industrial Hygiene

Colorado Radiation Advisory Committee, 1988-present

Colorado Hazardous Waste Commission, 1993-1997

EPA Science Advisory Board, Radiation Advisory Committee, 1994-2003 (Chair 1999-2003)
EPA Science Advisory Board, Executive Committee, 1999 – 2003

Governor's Rocky Flats Scientific Panel on Monitoring, 1989-1992.
Chair, Radiation Committee

Health Physics Society
Fellow
Chair, Nominating Committee, 1990
Chair, Public Education Committee, 1992-1995
Board of Directors, 2000
Secretary-Treasurer, Radon Section, 1996
President, Environmental/Radon Section, 2009-2010
Chair, Ad Hoc Committee, HPS Position Statement on Indoor Radon
2009 Summer School on NORM, faculty and co-author of the text chapter on uranium recovery

National Academy of Sciences Committee on Low-Level Radioactive Waste Siting, New York State, 1993-1996

NCRP Scientific Committee 64-22 (Environmental Measurements)

REPRESENTATIVE JOURNAL PUBLICATIONS AND PROCEEDINGS

Johnson, J.A. Riding the RCRA Roller Coaster - Adventures in closing a micro-mixed waste site. Managing Radioactive and Mixed Waste, *Proceedings of the Twenty-seventh Midyear Topical Meeting of the Health Physics Society.* February 1994.

Johnson, J.A., R.M. Buchan and J.S. Reif. Effect of waste anesthetic gas and vapor exposure on reproductive outcome in veterinary personnel. *American Industrial Hygiene Association Journal* 48(1): 62-66, 1987.

Johnson, J.E. and J.A. Johnson: Radioactivity and detection limit problems of environmental surveillance at a gas-cooled reactor. *ACS symposium Series 361, detection in Analytical Chemistry, Importance, Theory, and Practice.* American Chemical Society, Washington, DC, 1988.

Borak, T.B., J.A. Johnson and K.J. Schiager. A comparison of radioactivity and silica standards for limiting dust exposures in uranium mines. In *Radiation Hazards in Mining: Control, Measurement and Medical Aspects*, M. Gomez, ed. Society of Mining Engineers. New York, NY, 1981.

Borak, T.B., E. Franko, K.J. Schiager, J.A. Johnson and R.F. Holub. Evaluation of recent developments in radon progeny measurements. In *Radiation Hazards in Mining: Control, Measurement and Medial Aspects,* M. Gomez, ed. Society of Mining Engineers, New York, NY, 1981.

Johnson, J.A., K.J. Schiager, T.B. Borak. Contribution of human errors to uncertainties in radiation measurements and implications for training. In Radiation *Hazards in Mining: Control, Measurement and Medical Aspects,* M. Gomez, ed. Society of Mining Engineers, New York, NY, 1981.

Schiager, J.J., J.A. Johnson and T.B. Borak. Radiation monitoring priorities for uranium miners. In *Radiation Hazards in Mining: Control, Measurement and Medical Aspects*, M. Gomez, ed. Society of Mining Engineers, New York, NY, 1981.

Johnson, J.A. "Basic Radiation Protection for Use of Radionuclides in Laboratories," 1991. Teaching manual for forty-hour course.

REPORTS

Hersloff, J., J.A. Johnson and S. Ibrahim. *Radiological Risk Assessment of Abandoned Mine Lands, Radium Land Clean-up Standard*. Wyoming Department of Environmental Quality, 1988.

Borak, T.B. and J.A. Johnson. *Estimating the Risk of Lung cancer from Inhalation of Radon Daughters Indoors: Review and Evaluation.* Colorado State University for USEPA, 1988.

Schiager, K.J., T.B. Borak and J.A. Johnson*. Radiation Monitoring for Uranium Miners: Evaluation and Optimization.* U.S. Department of the Interior, Bureau of Mines. Final Report on contract.

TECHNICAL PRESENTATIONS

Dr. Johnson has presented numerous technical papers at Health Physics Society Annual Meetings, Mid-year Symposia, Mill Tailings Conferences, American Industrial Hygiene Association Conferences, and a meeting of the American Veterinary Medicine Association. In addition she presented an oral paper and a poster at a conference on uranium in groundwater in Frieburg Germany (1998) and presented an invited paper on uranium mining at a SCOPE Radsite meeting in Munich in September 2000. Dr. Johnson presented an invited paper on the effects of radon and smoking at the American Radiation Safety Conference and Exposition in San Diego in June 2003.

H. ROBERT MEYER, Ph.D.

EDUCATION

Ph.D., Radiation Biology, Colorado State University, 1977

M.S., Health Physics, CSU, 1973

Graduate, U.S. Navy Officer Candidate School, Newport, Rhode Island, 1969

B.A., Physics, St. Olaf College, 1967

CERTIFICATIONS/CLEARANCES

RESRAD risk assessment certified, Argonne National Laboratory

ASTM Phase 1 Site Assessment Professional, certified via ASTM course

Accreditation Board for Engineering and Technology, Certified University Health Physics Program Evaluator

Commissioned Line Officer, U.S. Naval Reserve (1969-72 active shipboard duty)

Security Clearance: U.S. DOE Q (inactive); U.S. Navy Secret (inactive)

SUMMARY OF 35 YEARS EXPERIENCE IN RADIATION PROTECTION AND MEASUREMENTS

- Seven years on the research staff at Oak Ridge National Laboratory. Environmental assessment research: nuclear fuel cycle human health risk assessment, alternative energy source risk assessment.
- Seven years managing uranium-related remedial action radiation protection, measurement and environmental modeling on the Uranium Mill Tailings Remedial Action Project. Responsible for worker and environmental radiation protection, and verification of cleanup.
- Radiation protection and measurement expertise including development of RTRAK, a patented environmental radiation gamma scanning mobile data collection system.
- Vice President and Project Manager, Low Level Radioactive Waste siting and design contract from the Commonwealth of Pennsylvania – project included development of 88-layer GIS-linked mapped database describing key geotechnical and other features of the Commonwealth.
- Researcher and project spokesman, Environmental Dose Reconstruction projects for the USCDC at Savannah River National Laboratory, and for the State of Colorado at the Rocky Flats Plant.
- Researcher and subcontract manager – NIOSH-funded worker dose reconstruction and compensation project. Subcontracted to Oak Ridge Associated Universities, Cincinnati.
- Uranium mill site license-designated Radiation Safety Officer for remedial actions at Conquista and Felder Ray Point sites in Texas, and Highlands site in Wyoming.
- Licensing consultant: new uranium mine facilities in Wyoming, specializing in regulatory compliance and site characterization.
- Public involvement experience including some 150 public meeting presentations on radioactive materials cleanup and protection.
- Instructor:
  - Radiation Safety Officer 40-hour training - annual courses presented to practicing RSO's during the last 10 years;
  - Radiation protection and measurements short course presented to California regulatory authorities;
  - Texas license-required 240 hour training program in byproduct uranium-related materials and low-level radioactive waste management, for Waste Control Specialists, Andrews TX;
  - 240-hour course on radiation protection and measurements for Texas Commission on Environmental Quality staff and uranium facility licensees, in Austin TX;
  - Radiation protection and safety annual training instructor for ExxonMobil, ConocoPhillips and Rio Tinto corporations at facilities in Texas and Wyoming
- Co-editor and co-author, "Radiological Assessment", USNRC, USDOE-sponsored 900 page graduate hardcover textbook on radioactive materials environmental transport, modeling, uptake and human health risk assessment.

Examples of Specific Projects:

UMTRA Project. Managed all radiation worker and environmental protection and measurements from startup for 7 years, 20 remedial action sites, up to 138 HP staff, total of some 2000 workers.

Savannah River National Laboratory, Rocky Flats Plant, Idaho National Laboratory. Environmental dose reconstruction projects, research staff member and project spokesman for 7 years.

AATA/JV Inkai. Developed and performed portions of radiation environmental assessment for proposed in situ leach uranium mine in central Kazakhstan.

Cotter Corporation. State license application assistance, radiation protection consulting, annual report MILDOS operation evaluations, management consulting.

MolyCorp Inc. State license application assistance, remedial action consulting. Cost-effectiveness evaluation of remedial action project underway in Pennsylvania.

City of Fallon, NV. Health risk assessment, assistance in coordination with State and Federal agencies.

EMC2, Phelps Dodge Corporation. Developed and performed NORM site scanning and sampling project, performing health risk assessment to evaluate need for remedial action.

B. Thomas Cook Esq. Health risk evaluation for confidential client related to uranium mine/mill operations.

Cogema Inc. ASTM Phase I pre-purchase property evaluations, including radiation health risk.

Accreditation Board for Engineering and Technology. Review of five University health physics programs (undergraduate and graduate) for ABET accreditation.

ConocoPhillips and ExxonMobil. Remedial action planning, execution, radiation protection, measurements, regulatory compliance. RSO-of-Record on Conoco-Phillips license at facilities completing remedial actions in Texas and Wyoming.

Uranium ISL facility licensing assistance for Ur-Energy, Uranium One, Energy Metals, STRATA, Titan Uranium, AUC Inc.. Site characterization and environmental assessment work supporting license applications.

PROFESSIONAL AFFILIATIONS

Health Physics Society

National Council on Radiation Protection and Measurements (committee member)

US EPA Science Advisory Board, Radiation Advisory Committee

National Academy of Sciences, Board on Radioactive Waste Management

National Academy of Sciences, Subcommittees: Review of the New York State Low Level Waste Siting Project; DOE Site Decommissioning; The National Low Level Radioactive Waste Problem

International Atomic Energy Agency, Consultant: Uranium mill tailings characterization systems; Response methods for nuclear accidents.

TRAINING AND CONSULTING ACTIVITIES

High intensity training: “Dealing with the Media”, 1-week course directed by Dr. Leonard Roller, 1989.

Consultant, International Atomic Energy Agency. Co-authored IAEA Technical Report STI/DOC/10/327, “Planning for Cleanup of Large Areas Contaminated as a Result of a Nuclear Accident,” 1988.

Consultant to the USEPA Science Advisory Board, technical review of National Emissions Standards for Hazardous Air Pollutants, 1988.

Consultant to the Centers for Disease Control, Fernald Dose Assessment Project, 1987.

Invited participant, “European Seminar on the Risks from Tritium Exposure,” Mol, Belgium, November 1982.

Invited participant, “Light Water Reactor Accident Mitigation Workshop,” West Germany, April 1981.

Faculty Affiliate, Colorado State University, Ph.D. committee member, 1980 to 1982.

Governor's Planning Committee for the Management of Radioactive and Hazardous Wastes for the State of Tennessee, 1979 to 1980.

SELECTED PUBLICATIONS

Coffman, J., **H.R. Meyer**, and D. Skinner. 1984. “Radiological Measurements to Support Remedial Action on Uranium Mill Tailings.” Proceedings of the American Nuclear Society Annual Meeting.

Meyer, H.R., D. Skinner, J. Coffman, and J. Arthur. 1984. "Environmental Protection in the UMTRA Project." Proceedings of the Fifth U.S. Department of Energy Environmental Protection Information Meeting. CONF-841187, Volume 2. November.

Meyer, H.R and J. Purvis. 1985. "Development of an Interference-Corrected Soil Radium Measurement System." Proceedings of the American Nuclear Society Annual Meeting. San Francisco, California. November. 184–186.

Meyer, H.R, D. Skinner, and J. Coffman. 1985. "Environmental Monitoring in the UMTRA Project." Proceedings of the Health Physics Society Midyear Symposium on Environmental Radioactivity. Colorado Springs, Colorado. January.

Skinner, D. and **H.R. Meyer**. 1985. "Demonstration of 10CFR20 Air Particulate Compliance Requirements on the UMTRA Project." Proceedings of the Health Physics Society Midyear Symposium on Environmental Radioactivity. Colorado Springs, Colorado. January.

Meyer, H.R and D. Skinner. 1986. "Public Information Experience in the UMTRA Project." Proceedings of the Health Physics Society Midyear Symposium. Knoxville, Tennessee. February.

Skinner, D., **H.R. Meyer**, and L.G. Hoffman. 1986. "Environmental Monitoring Requirements During Remedial Action and Stabilization of the Uranium Mill Tailings Project." Proceedings of the Health Physics Society Midyear Symposium. Knoxville, Tennessee. February.

Meyer, H.R. 1987. "Hazardous and Radioactive Wastes: Public Health Issues and Concerns." Proceedings of the American Institute of Chemical Engineers Meeting. Houston, Texas. March.

Meyer, H.R. and C. Daily. 1987. "QA Verification Procedures in Uranium Mill Tailings Processing Site Remedial Action." Proceedings of the American Society for Quality Control, Second Topical Conference on Nuclear Waste Management Quality Assurance. Las Vegas, Nevada, February 9-11, 1987.

Meyer, H.R., C. Begley, and C. Daily. 1987. "Field Instruments Developed for Use on the UMTRA Project." Proceedings of the Waste Management 1987 Annual Meeting. University of Arizona, Tucson. March.

Reith, C.H., R. Richey, M. Matthews, **H.R. Meyer**, C. Daily, F. Petelka, W. Glover, D. Lechel, and J.E. Till. 1988. "Characterization and Remedial Planning for Non-Radiological Toxicants at UMTRA Project Sites." In Waste Management 88. Edited by R.G. Post and M.E. Wacks. Tucson, Arizona: University of Arizona Press.

J.A. Johnson, **H.R. Meyer**, and M. Vidyasagar, "Characterization of Surface Soils at a Former Uranium Mill. Operational Radiation Safety," Supplement to Health Physics, Vol. 90, (February, 2006).

H.R. Meyer, M. Shields, and S. Green, "A GPS-based system for preliminary or remedial action gamma scanning," American Nuclear Society Topical Meeting on Decommissioning, Decontamination, & Reutilization. Denver, Colorado, (August 7-11, 2005).

H.R. Meyer, M. Shields, S. Green, and J. Johnson, "A GPS-based system for radium/uranium contamination gamma scanning. Uranium Mining and Hydrogeology IV. Broder J. Merkel, Andrea Hasche-Berger (Editors). Uranium in the Environment, conference proceedings, Freiberg, Germany (September 2005).

H.R. Meyer, "Parallel Universes: GPS-Based Radiation Mapping for Both Pre-Licensing and License Termination, Proceedings," WM2010, Phoenix (March 2010).

Meyer, H.R., and J.E. Till. 1978. "Global/Generic Studies." In HTGR Fuel Recycle Development Program Annual Report. ORNL-5423. Oak Ridge National Laboratory.

Meyer, H.R., J.E. Till, E.A. Bondietti, D.E. Dunning, C.S. Fore, C.T. Garten, Jr., and S.V. Kaye. 1978. Nonproliferative Alternative Systems Assessment Program - Preliminary Environmental Assessment of Thorium/Uranium Fuel Cycle Systems. ORNL/TM-6069. Oak Ridge National Laboratory. June.

Meyer, H.R., and J.E. Till. 1978. "Radiological Hazards of Denatured U-233 Fuel." In Interim Assessment of the Denatured U Fuel Cycle. Edited by L.S. Abbott, D.E. Bartine and T.J. Burns. ORNL-5388. Oak Ridge National Laboratory. December.

Tennery, V.J., E.S. Bomar, W.D. Bond, L.E. Morse, **H.R. Meyer** and J.E. Till. 1978. Environmental Assessment of Alternate FBR Fuels: Radiological Assessment of Reprocessing and Refabrication of Thorium/Uranium Carbide Fuels. ORNL/TM-6493. Oak Ridge National Laboratory. August.

Tennery, V.J., E.S. Bomar, W.D. Bond, L.E. Morse, **H.R. Meyer**, J.E. Till and M.G. Yalcintas. 1978. Environmental Assessment of Advanced FBR Fuels: Radiological Assessment of Airborne Releases from Thorium Mining and Milling. ORNL/TM-6474. Oak Ridge National Laboratory. October.

Faust, R.A., C.S. Fore, M.V. Cone, **H.R. Meyer** and J.E. Till. 1979. Biomedical and Environmental Aspects of the Thorium Fuel Cycle. ORNL/EIS-111. Oak Ridge National Laboratory. July.

Meyer, H.R. and J.E. Till. 1979. "Anticipated Radiological Impacts of the Mining and Milling of Thorium for the Nonproliferative Fuels." Proceedings of the Symposium–Radioactivity and Environment. Edited by W. Feldt. German-Swiss Society for Radiation Protection, Norderney, Federal Republic of Germany, October 2–6, 1978, IRPA.

Meyer, H.R, C.A. Little, J.P. Witherspoon and J.E. Till. 1979. "A Comparison of Potential Radiological Impacts of U-233 and Pu-239 Fuel Cycles." Transactions of the American Nuclear Society, Winter Meeting, November 12–16, 1979.

Meyer, H.R, J.E. Till, E.S. Bomar, W.D. Bond, L.E. Morse, V.J. Tennery, and M.G. Yalcintas. 1979. "Radiological Impacts of Thorium Mining and Milling." Nuclear Safety 20 (3). June.

Meyer, H.R, D.E. Dunning, D.C. Kocher and K.K. Kanak. 1980. "Dose Conversion Factors." In Recommendations Concerning Models and Parameters Best Suited to Breeder Reactor Environmental Radiological Assessments. Edited by C.W. Miller. ORNL-5529. Oak Ridge National Laboratory. May.

Tennery, V.J., E.S. Bomar, W.D. Bond, **H.R. Meyer**, L.E. Morse, J.E. Till and M.G. Yalcintas. 1980. Summary of the Radiological Assessment of the Fuel Cycle for a Thorium-Uranium Carbide-Fueled Fast Breeder Reactor. ORNL/TM-6953. Oak Ridge National Laboratory. January.

Till, J.E., **H.R. Meyer**, V.J. Tennery, E.S. Bomar, M.G. Yalcintas, L.E. Morse, and W.D. Bond. 1980. "Reprocessing Nuclear Fuels of the Future: A Radiological Assessment of Advanced (Th, U) Carbide Fuel." Nuclear Technology 48 (1). April.

Travis, C.C., **H.R. Meyer**, and C.S. Dudney. 1980. "Health and Environmental Effects of Residential Wood Heat." Proceedings of the National Conference on Renewable Energy Technologies. Honolulu, Hawaii, December 7–11, 1980.

Meyer, H.R. 1981. "Radiological Assessment of an Alternate Breeder Reactor Fuel Cycle." In Symposium on Intermediate Range Atmospheric Transport Processes and Technology Assessment. Edited by C.W. Miller, S.J. Cotter and S.R. Hanna. U.S. Department of Energy CONF-801064. October.

Meyer, H.R. 1982. "Health and Environmental Effects." In Life Sciences Synthetic Fuels Semi-Annual Progress Report. Edited by K.E. Cowser. ORNL/TM-8229. Oak Ridge National Laboratory. May.

Meyer, H.R., J.P. Witherspoon, J.P. McBride, and E.J. Frederick. 1982. Comparison of the Radiological Impacts of Thorium and Uranium Nuclear Fuel Cycles. NUREG/CR-2184. U.S. Nuclear Regulatory Commission. April.

Smith, W.J., F.W. Whicker, and **H.R. Meyer**. 1982. "A Review and Categorization of Saltation, Suspension, and Resuspension Models." Nuclear Safety 23 (6). November–December.

DesRosiers, A.E., **H.R. Meyer**, R.E. Swaja, and K. Brusserman. 1983. "Emergency Planning for Accident Mitigation." In Report of the Workshop on the Evaluation and Mitigation of the Consequences of Accidental Releases of Radioactivity: Identification of Uncertainties. Bad Munstereifel, Federal Republic of Germany.

Killough, G.G., **H.R. Meyer**, and D.E. Dunning. "Radionuclide Dosimetry." In Models and Parameters for Environmental Radiological Assessments. Edited by C.W. Miller. U.S. Department of Energy Critical Review Series.

Meyer, H.R, and G. Holton, "Modeling the Potential Public Health Impacts of Airborne Releases." In Proceedings of the Health and Environmental Risk Analysis Workshop. Brookhaven National Laboratory, Upton, New York.

Meyer, H.R., C.W. Miller, A.E. DesRosiers, G. Stoetzel, D. Strenge, and R.E. Swaja. 1983. "Assessment of Accidental Releases of Radionuclides." In Radiological Assessment: A Textbook on Environmental Dose Analysis. Chapter 14. Edited by J.E. Till and H.R. Meyer. NUREG/CR-3332, ORNL-5968. U.S. Nuclear Regulatory Commission.

Faraday, M.A., B. Legrand, and **H.R. Meyer**. 1991. Planning for Cleanup of Large Areas Contaminated as a Result of a Nuclear Accident. IAEA STI/DOC/10/327. Vienna.

Wiltshire, S., R. Ahrens, G. Anderson, C. Baskerville, R. Bassett, L. Brothers, H. Brown, G. Cederberg, J. Croes, W. Dornsife, J. Ebel, W. Freudenburg, R. Hatcher, C. Hornibrook, J. Johnson, L. Lehman, **H.R. Meyer**, D. Roy, M. Salamon, L. Slosky, and A. Socolow. 1996. Review of New York State Low-Level Radioactive

Waste Siting Process. National Research Council, National Academy of Sciences. Washington, D.C.: National Academy Press.

Till, J.E., A.S. Rood, P.G. Voillequé, P.D. McGavran, K.R. Meyer, H.A. Grogan, W.K. Sinclair, J.W. Aanenson, **H.R. Meyer**, S.K. Rope, and M.J. Case. 2002. Risks to the public from historical releases of radionuclides and chemicals at the Rocky Flats Nuclear Weapons Plant. Journal of Exposure Analysis and Epidemiology 12(5): 355-372.

Chen, Shih-Yew, D.J. Strom, J.G. Yusko, A. LaMastra, **H.R. Meyer**, D.W. Moeller. 2002. Managing potentially radioactive scrap metal. National Council on Radiation Protection and Measurements Report No. 141. November.

SELECTED PRESENTATIONS

Meyer, H.R. 1984. "Environmental Assessment in the UMTRA Project." Health Physics Society Annual Meeting, New Orleans, Louisiana, June.

Meyer, H.R. 1984. "Relative Risks Associated with the Uranium Mill Tailings Remedial Action (UMTRA) Program." Series of public meetings held in Canonsburg, Pennsylvania, before cleanup of the uranium mill tailings site. August 21–24.

Meyer, H.R. 1984. "Environmental Protection in the UMTRA Project." Fifth U.S. Department of Energy Environmental Protection Information Meeting, Albuquerque, New Mexico, November.

Meyer, H.R. 1985. "Analysis of Radon and Air Particulate Data in the UMTRA Project." Health Physics Society Midyear Symposium on Environmental Radioactivity, Colorado Springs, Colorado, January.

Meyer, H.R. 1985. "The UMTRA Project Health Physics Program." Presented to the U.S. Department of Energy Policy, Safety and Environment Appraisal Team, C. Welty, Chair, Albuquerque, New Mexico, April.

Meyer, H.R. 1985. "Relative Risks Associated with the Uranium Mill Tailings Remedial Action (UMTRA) Program." Presented in a series of public meetings held in Tuba City, Window Rock, and Moenkopi, Arizona, before the cleanup of mill tailings sites, October 8–9.

Meyer, H.R. and J. Purvis. 1985. "Development of an Interference-Corrected Soil Radium Measurement System." American Nuclear Society Annual Meeting (invited paper), San Francisco, California, November.

Meyer, H.R. 1986. "Review of Uranium Mill Tailings Remedial Action Project." Presented at the U.S. Department of Energy Remedial Action Contractors Annual Meeting, Oak Ridge, Tennessee, May 5–6.

Meyer, H.R. 1986. "Relative Risks Associated with the Uranium Mill Tailings Remedial Action (UMTRA) Program." Presented at a public meeting to explain the UMTRAP radiation protection program before cleanup work began. Lakeview, Oregon, May 20.

Meyer, H.R. 1986. "Health Risk Experience on the UMTRA Project." Presented at a U.S. Dept. of Energy Seminar on Concerns of Insurance Companies Regarding Remedial Action Risk, Denver CO, November.

Meyer, H.R. 1987. "Instrumentation and Quality Control Techniques for Mill Tailings Remedial Action." Invited presentation at a U.S. Nuclear Regulatory Commission Workshop for Mill Owners, Denver, Colorado, June 3.

Meyer, H.R. 1987. "Relative Risks Associated with the Uranium Mill Tailings Remedial Action (UMTRA) Program." A series of public meetings held to discuss the UMTRA Project radiation protection program before cleanup began. Held in Durango, Colorado, January 20; Rifle, Colorado, May 21; Gunnison, Colorado, July 7; and Mexican Hat, Utah, July 14.

Meyer, H.R. et al. 1978. "Thorium Mining and Milling—An Analysis of Radiological Impacts." Health Physics Society Annual Meeting, Minneapolis, Minnesota, June.

Meyer, H.R. 1979. "An Overview of the Radiological Risks Associated with Thorium Mining in the Lemhi Pass Region." Department of Radiology and Radiation Biology Seminar Series, Colorado State University, Fort Collins, Colorado, May.

Meyer, H.R., C.A. Little, J.P. Witherspoon, and J.E. Till. 1979. "A Comparison of Potential Radiological Impacts of 233U and 239Pu Fuel Cycles." American Nuclear Society Winter Meeting, San Francisco, California, November.

Meyer, H.R. et al. 1979. "Recycle of Thorium-Uranium Fuels—A Radiological Assessment." Health Physics Society Annual Meeting, July.

Meyer, H.R. 1980. "Radiological Assessment of an Alternate Breeder Reactor Fuel Cycle." Presented at the Symposium on Intermediate Range Atmospheric Transport Processes and Technology Assessment, Gatlinburg, Tennessee, October 1–3.

Meyer, H.R. 1982. "Reactor Emergency Planning—Analysis of Key Uncertainties." Presented at the Annual Health Physics Society Meeting, Las Vegas, Nevada, June 30.

Meyer, H.R. 1982. "Long Range Transport and Effects Modeling." Invited presentation at the U.S. Department of Energy Workshop on Risk Assessment Modeling, Airlie House, Virginia, August 2–4.

Meyer, H.R. 1982. "Assessment of Dose from Tritium Releases—Application of Environmental Transport Models" and "Tritium Source Terms." Invited presentations at the European Seminar on the Risks from Tritium Exposure. Sponsored jointly by CEC, CEN/SCK, Mol, Belgium, November 22.

Meyer, H.R. 1989. "Risk Assessment—Disposal in Arid Lands." American Association for the Advancement of Science, Southwest Chapter, topical meeting, Las Cruces, New Mexico, April 6.

Meyer, H.R. 1989. "Proposed LLRW Facility Contract Status and Schedule, Site Screening and Characterization, Design and Operation." Invited presentation, Penn State University, State College, Pennsylvania, November 4.

Meyer, H.R. 1989. "Site Screening and Characterization, Facility Design, Contract Status." Invited presentation, Sierra Club, Pennsylvania PA Chapter, and Environmental Coalition on Nuclear Power joint meeting, State College, Pennsylvania, November 18.

Meyer, H.R., V.J. Barnhart, and M.T. Ryan. 1989. "Developing a Low Level Radioactive Waste Site for the Commonwealth." A series of seven public presentations throughout Pennsylvania, January–February.

Meyer, H.R. 1990. "Political, Administrative and Public Information Aspects." Invited lecture, Management and Disposal of Radioactive Wastes, Harvard School of Public Health, Boston, Massachusetts, July 18.

Meyer, H.R. 1991. "Siting a Low-Level Radioactive Waste Facility for the Commonwealth." Invited presentation, Three Mile Island Alert Annual Meeting, Harrisburg, Pennsylvania, March 28.

Meyer, H.R. 1991. "The Pennsylvania Low-Level Radioactive Waste Facility Siting Process; Host Community Benefits." Invited presentation, North West Planning Commission, Franklin, Pennsylvania, May 3.

Meyer, H.R. 1991. "Low Level Radioactive Waste." Invited presentation, Pennsylvania League of Women Voters Annual Meeting, Ligonier, Pennsylvania, May 11.

Meyer, H.R. 1991. "Political, Administrative and Public Information Aspects." Invited lecture in "Management and Disposal of Radioactive Wastes." Harvard School of Public Health, Boston, Massachusetts, July 17.

Meyer, H.R. 1991. "Siting a Low Level Radioactive Waste Facility in Pennsylvania—Risk Communication in the Correct Direction." Opening invited paper, Plenary Session, Risk Communication for the 90's, Annual Health Physics Society National Meeting, Washington, D.C. July 22.

Meyer, H.R. 1991. "Risk Communication in the Right Direction." Invited presentation, joint meeting, American Nuclear Society Northern Ohio Section and Health Physics Society Northern Ohio Section, Independence, Ohio, September 11.

Meyer, H.R. 1994. "Windblown Suspension of Plutonium from the Rocky Flats Plant." Public workshop, Boulder, Colorado, June.

Meyer, H.R. 1998. Instructor, Risk Assessment Modeling, RAC-sponsored public course in Radiological Risk Assessment, Seattle, Washington.

PROFESSIONAL EMPLOYMENT HISTORY

Vice President, Keystone Scientific, Inc., 1992 to present

Senior Scientist/Project Manager, Tetra Tech Inc., 2001 to 2011

Vice President, Chem-Nuclear Systems, Inc., 1990 to 1992

Executive Director, Chem-Nuclear Systems, Inc., 1983 to 1990

Research Staff Member, Oak Ridge National Laboratory, 1976 to 1983

Line Officer, U.S. Naval Reserve, 1969 to 1972

AWARDS

Society for Technical Communications 1985 Award for “Radiological Assessment – A Textbook on Environmental Dose Analysis," edited by John E. Till and **H. Robert Meyer**, NUREG/CR-3332.

Society for Technical Communications 1980 Award for “Radiological Impact of Thorium Mining and Milling,” H.R. Meyer et al., Nuclear Safety 20 (3).

American Nuclear Society's P.W. Jacoe Award–outstanding nuclear science student, 1976.

Phi Kappa Phi Graduate Honor Society, 1976.

Distinguished Naval Graduate, Officer Candidate School, 1969.

NASA Summer Fellowship, 1966.

PATENT

RTRAK auto-locating mobile gamma scanning system, U.S. Patent #5,025,150, J. Oldham, **H.R. Meyer**, C. Begley, C. Spencer, 1991.

EDGAR D. BAILEY, P.E., CHP
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512-934-2357
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Bachelor of Engineering Science (Nuclear Power Option), The University of Texas, 1965
Master of Science in Environmental Health Engineering (Radiological Health), The University of Texas, 1967
Certified by the American Board of Health Physics since 1985
Registered Professional Engineer since 1976

PROFESSIONAL EXPERIENCE

- 2007 – Present: Consultant on Radiation and Nuclear Safety and Security, Health Physics, and Radiation Protection Engineering
- 2009 – Present: Principal Engineer Analyst, Qi Tech, LLC
- 2006 – Present: Principal System Analyst, Advanced Systems Technology and Management, Inc.
- 2006 – 2007: Chief, Waste Licensing Program, Radiation Safety Licensing Branch, Texas Department of State Health Services
- 1989 – 2006: Chief, Radiologic Health Branch, California Department of Health Services (Retired 2006)
- 1971 – 1989: Chief, Division of Licensing, Registration, and Standards (and various other positions), Bureau of Radiation Control, Texas Department of Health
- 1969 – 1971: Active Duty as Officer in the U. S. Army (Retired 2000)
- 1968 – 1969: License Reviewer, Radiation Control Branch, Texas Department of Health
- 1965 – 1968: Assistant Corporate Health Physicist, Texas Nuclear Corporation

PRESENT PROFESSIONAL AFFILIATIONS AND ACTIVITIES

- Conference of Radiation Control Program Directors, Life Member
  - Advisor, SR-U Part U of the Suggested State Regulations for Control of Radiation
  - Advisor, G-34 Committee on Industrial Radiography
- Health Physics Society, Plenary Member since 1966, Fellow (2004)
  - Member, Board of Directors
  - Member, Military Health Physics Section
  - Member, Environmental Section
  - Member, Decommissioning Section
- South Texas Chapter of HPS
  - Member
  - Member, Program Committee
  - Treasurer Elect
- Northern California Chapter of HPS
  - Member
- Southern California Chapter of HPS
  - Member
- National Council on Radiation Protection and Measurements
  - Member, Program Area Committee 2 – Operational Radiation Safety
  - Member, Scientific Committee 46-17 – Radiation Protection in Educational Institutions (NCRP Report No. 157)
  - Member, Scientific Committee 2-4 –Self Assessment of Radiation-Safety Programs (NCRP Report No. 162)

PAST PROFESSIONAL ACTIVITIES

- Conference of Radiation Control Program Directors
  - Chair-Elect, Chair, Past Chair, and Member-at-Large of the Board
  - Chair, NARM Committee
  - Member, Part E of the Suggested State Regulations for Control of Radiation
  - Member, Part W of the Suggested State Regulations for Control of Radiation
  - Chair, SR-U Part U of the Suggested State Regulations for Control of Radiation
  - Chair and Member, Nominating Committee
  - Chair and Member, Awards Committee
  - Chair and Member, Poster Committee
  - Chair and Member, Technical Program Committee
  - Member, *ad hoc* Committee on the Future of the OED
  - Chair, G-61 International Outreach and Relations Committee
- Organization of Agreement States
  - Chair (twice)
  - Liaison to HPS
  - OAS Liaison to USNRC Management Review Boards
- Health Physics Society, Plenary Member since 1966, Fellow (2004)
  - Nominating Committee
  - Governmental Relations Committee
- American Academy of Health Physics
  - Treasurer
  - Past Treasurer
  - ex officio Member of Finance Committee
  - Member, Finance Committee
  - Chairman, Finance Committee
- American Board of Health Physics (1999-2003)
  - Chair, Vice Chair, Secretary, and Parliamentarian
- HPS Governmental Section
  - President and President-Elect
- South Texas Chapter of HPS
  - President, President-Elect, and Treasurer
- Northern California Chapter of HPS
  - President and President-Elect
- Southern California Chapter of HPS
  - Member Board of Directors
- U. S Nuclear Regulatory Commission
  - Member, Advisory Committee on the Medical Uses of Isotopes
  - Member, Energy Policy Act Steering Committee
  - Member, National Materials Program Steering Committee
  - Member, Interagency Coordinating Committee on the National Source Tracking System
  - Member, NARM Guidance Writing Group
  - Member, CsCl Dispersibility Working Group
  - State Liaison, IMPEP Management Review Board
  - Member, NARM Task Force – Radiation Sources Subgroup
- International Atomic Energy Agency
  - Member, Radiation Safety and Security of Radiation Sources Infrastructure Appraisal Team for the Republic of Armenia
  - Team Leader, Integrated Regulatory Review Service to the Republic of Kenya
  - Member, Expert Team to Develop Training Materials for Radioactive Waste Processing Facilities Regulatory Evaluations
  - Participant, International Symposium of the Disposal of Low Activity Radioactive Wastes, Cordoba, Spain, 2004
  - U.S. Observer, IAEA Regional Training Course on Radiation Sources for Regulators, Tanzania, 2008

RESUME
GEORGE C. PATTERSON

GENERAL INFORMATION

NAME:	George Cameron Patterson
ADDRESS:	200 Summit Ave Thunder Bay ON P7B 3P6
PHONE NUMBER:	(807) 768 8649
E-MAIL:	george.patterson@tbaytel.net
HIGHEST EDUCATION:	Ph.D., Geology (1980) Carleton University, Ottawa
OTHER EDUCATION:	Classes towards an MBA (mid to late 1980's) Lakehead University, Thunder Bay M.Sc., Geology (1976) University of Toronto B.Sc.(Hons), Geology (1974) University of Toronto
OTHER TRAINING:	Professional Geoscientist Saskatchewan and Professional Geologist of Ontario Windows Microsoft Office (Word, Excel, Outlook, Access) Microsoft Project, Photoshop CS4 training Explorer GIS Photography (Saskatchewan Institute of Applied Science and Technology - SIAST) Ontario Drivers License

RESUME
GEORGE C. PATTERSON

EMPLOYMENT HISTORY

- April 2011- Current:
  Contractor with Ovalbay Geological Consulting: Logging Core
  Contractor with Derrik Murray Consulting on Potash Mining and Mining Development
- Sept 2010-April 2011
  Executive Director of Major Projects, Government of Saskatchewan, Regina
- 1994-2010
  Executive Director of Exploration and Geological Services, Government of Saskatchewan, Regina
- 1988-1994
  Director Mineral Policy, Government of the NWT, Yellowknife
- 1982-1988
  Resident Geologist, Government of Ontario, Thunder Bay
- 1981-1982
  Office Manager, Denison Mines Limited, Thunder Bay, ON
- 1980-1981
  Project Geologist, Ontario Geological Survey, Toronto, ON
- 1973-1979
  Geophysical Assistant to Project Manager, UMEX Corporation, Pickle Lake, ON

BOARDS AND COMMITTEES

- Saskatchewan representative for the Intergovernmental Working Group (IGWG) on the mining industry reporting to the Energy and Mines Ministers Council.
- Co-chair of the IGWG Working Group on Regulatory Efficiency.
- Member of IGWG Committee on Mining Social Responsibility.
- Member of IGWG Aboriginal Involvement in Mining Industry.
- Technical Representative on the Saskatchewan Mineral Sector Team (economic development team for the mineral industry.)
- Board member on the Canadian Mining Innovation Council (CMIC.)
- Member of the International Mining Innovation Institute (IMII) steering committee.
- Member of the Association of Professional Engineers and Geologists of Saskatchewan (APEGS) Education Committee.
- Member of three major land claims negotiation team for the NWT – TFN, Dena Métis, and Sahto.
- Co-chair of the NWT Environmental Impact Review Board for Commissioner's Land.
- Member of 20 different committees conducting land-use plans in Ontario, NWT and Saskatchewan.

- Member of 20 different committees conducting land-use plans in Ontario, NWT and Saskatchewan

ADDITIONAL INFORMATION

- Born and raised in Toronto, Ontario.
- Married to Marie with two children, Grégoire and Gabrielle.
- Recipient of the Government of Saskatchewan Premier's Award for Excellence for the development of the Saskatchewan Mineral Strategy and Associated Incentive Programs.
- Recipient of the Association of Professional Engineers and Geologists of Saskatchewan (APEGS) Environmental Award for "Best Management Guidelines for Mineral Exploration."
- Extensive media experience including over 100 interviews with CBC's noon hour shows in Thunder Bay (on mining history and activities) and 30 to 40 newspaper and TV interviews in Saskatchewan.
- Straugh Distinguished Guest Lecturer (eight talks to eastern Canadian universities on the Hemlo gold deposit.)
- Has written over 1000 briefing notes.
- Extensive knowledge of the diamond industry gained from tours of sorting facilities in the NWT and London, England; diamond cutting facilities in Belgium, Israel, and Australia.
- Technical Advisor for Saskatchewan Uranium Development Committee

RESUME
GEORGE C. PATTERSON

REFERENCES

Kent Campbell: Deputy Minister of Energy and Resources
Government of Saskatchewan
(306) 787-9580
2103 11th Avenue, 11th Floor
Regina SK S4S 3Z8

Pam Schwann: Executive Director
Saskatchewan Mining Association (SMA)
(306) 757-9505
1500-2002 Victoria Ave
Regina SK S4P 0R7

Engin Ozberk: Vice-president, Innovation and Research
Cameco
(306) 956-8093
Operation Center
1131 Ave S
Saskatoon, SK, S7M 4E8

Tony Baumgartner: Vice-president, Enterprise Saskatchewan
(306) 787-9580
11th Avenue
Regina SK S4S 3Z8

Eric Cline: Vice-president, Corporate Affairs, Shore Gold Incorporated
(Former Minister of Industry and Resources, Government of Saskatchewan)
(306) 664.2202
300-224 4th Avenue South
Saskatoon SK S7K 5M5

Christine Kaszychi: Assistant Deputy Minister, Ontario Northern Development and Mines
Government of Ontario
(705) 670-5877
Willet Green Miller Center
833 Ramsey Lake Road, 6th Floor
Sudbury ON P3E 0B0

(Global Permission to contact additional references)

LEONARD (TOBY) M. WRIGHT, III

Principal Owner\Senior Engineer and Hydrogeologist

EDUCATION

MS, Civil/Geotechnical Engineering, Colorado State University, 1999
BS, Geology, University of Arizona, 1985

REGISTRATIONS

Professional Geologist: Wyoming (#PG-3241)

EXPERIENCE SUMMARY

Mr. Wright formed his own consulting firm, Wright Environmental Services Inc. in March of 2010 to service mining clients throughout the western United States. Mr. Wright is a registered professional geologist with a masters degree in geotechnical engineering and decades of experience in applied hydrology related to mining and milling projects. He also has extensive experience in project and program management for mining related environmental and regulatory programs.

Since forming his own company Mr. Wright has been responsible for new licensing of a uranium mine and recovery site in Wyoming, supporting a radioactive materials license application amendment for a conventional mill to accept alternate feed materials, supported an Alternate Concentration Limit (ACL) application for a reclaimed uranium recovery project, and acting as the Remedial Action Program Manager for a uranium mill undergoing remedial action under CERCLA.

Mr. Wright served as the Environmental Manager for the Conventional Mining Group of Uranium One Americas from March of 2007 through March of 2010. In this role he was responsible for all permitting, environmental compliance and H&S activities for Uranium One's conventional mining and mill operations in the United States. In addition to his responsibilities for staff management, environmental monitoring and regulatory compliance he also assisted company environmental and regulatory due diligence reviews of potential acquisitions.

Mr. Wright also has over 20 years of experience in environmental consulting. For 12 years since 1994, Mr. Wright focused almost exclusively on management of reclamation and remediation projects for uranium mill tailings sites. From 2002 through 2005, Mr. Wright served as the US Department of Energy's Technical Assistance Contract Project Manager for the Moab UMTRA Project. In this capacity Mr. Wright managed a multi-million dollar annual budget with a technical staff of over 40 personnel and a diverse array of programs including operation and maintenance of inactive uranium mill sites, the site health and safety programs, design and implementation of ground water remedial actions, site environmental monitoring and development of a major Environmental Impact Statement. Mr. Wright has also managed or supported several uranium mill tailings reclamation projects in Texas, Utah, Washington and Wyoming.

KEY PROJECT EXPERIENCE

- ***Remedial Action Program (RAP) Manager, Confidential Client, (September 2011-Current).*** Mr. Wright is the contract RAP Program Manager for the remedial actions associated with decommissioning of a uranium mill under the US EPA Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Mr. Wright's responsibilities include development of RAP investigation work plans, technical data reports, remedial action design reports as well as supporting the client with regulatory compliance.

- ***Environmental Manager, Uranium One Americas, Conventional Mining Group (March 2007- March 2010).*** Manager for all environmental, permitting and H&S for the conventional mining group activities in the United States. Key responsibilities included development of an application for amending the Shootaring Canyon Uranium Mill Radioactive Materials License for return to full operations, permitting of various hard rock mining projects in Utah and Wyoming, performing as the Corporate Radiation Safety Officer for the Utah projects and oversight of all conventional group environmental and regulatory compliance obligations. Mr. Wright managed and administrated the Mill personnel and the associated operational budgets.

- ***Reclamation Program Manager, Department of Energy (DOE); Technical Assistance Contract Program, Colorado (June 2002- June 2005).*** Moab Program Manager for the Technical Assistance Contract with DOE Legacy Management office in Grand Junction, Colorado. Mr. Wright was managed all reclamation activities of the uranium mill tailings facilities in Moab and Monticello, Utah. Mr. Wright was also the DOE contract Project Manager for the Monticello Mill Tailings Site CERCLA cleanup. For the Moab Project, Mr. Wright was responsible for managing all aspects of this program including staff, budget as well as the development of an Environmental Impact Statement, operation and maintenance of the site, and construction of interim ground water remedial actions.

- ***Groundwater and Surface Water Characterization, Moab Uranium Tailings Facility, Utah***. Project Manager for a yearlong $1million groundwater and surface water characterization program at the Moab uranium tailings facility. As part of this project Mr. Wright lead technical discussions with the Moab groundwater technical advisory group which consisted of members from the Grand Junction DOE office, EPA, the Park Service, the Fish and Wildlife Service, Utah DEQ, Grand County and the Grand Canyon Trust. Technical issues that he managed included characterization of surface water quality, characterization of groundwater flow and transport, ecological risk assessment (including an assessment of the impact on the endangered species – Colorado Pikeminnow) and evaluation of remedial action alternatives.

- ***Groundwater Characterization, Split Rock Uranium Tailings Facility, Wyoming.*** Managed a multi-year $12 million groundwater characterization and evaluation for a uranium mill tailings impoundment. This evaluation included the installation of more than 100 wells and at its peak included the management of more than 30 staff and multiple contractors. The program resulted in an application to the NRC for alternative concentration limits (ACL) for the site. The NRC is currently evaluating this application and Mr. Wright is managing the response effort to the NRC. A critical part of the application for ACLs is the use of institutional controls. The proposal included some innovative institutional controls. Mr. Wright has been involved with discussion with the Grand Junction DOE office regarding these controls. The Grand Junction DOE office is involved since the site will be in their LTSP program.

- ***Groundwater Characterization, Sequoyah Fuels, Oklahoma***. Mr. Wright managed a groundwater characterization study for the Sequoyah Fuels uranium fuel fabricating facility in Gore, Oklahoma. This project included the characterization of the hydrogeologic and geochemical conditions at the site to predict the transport of key constituents in the groundwater system.

- ***Surface Reclamation and Groundwater Evaluation, Sherwood Uranium Tailings Facility, Washington***. Mr. Wright served as the task leader for surface reclamation and groundwater evaluation for the Sherwood uranium reclamation project. This facility was successfully reclaimed and the license terminated. This facility was transferred to the Grand Junction DOE office as part of the LTSP program and was the first UMTRCA Title II site in an Agreement State to be transferred.

- ***Environmental Management, Batu Hijau Gold-Copper Mine, Indonesia***. Mr. Wright served as the Site Environmental Manager during the permitting and development of this $1.8 billion gold-copper mining project in Sumbawa, Indonesia. For over nine months he resided in Sumbawa, Indonesia and was responsible for all site environmental activities including developing groundwater and surface water monitoring programs, developing and implementing associate QA/QC programs, coordinating off-site consultants developing the Indonesian Environmental Impact Statement and mine permit (ANDAL), management of environmental staff consisting entirely of indigenous personnel.

PUBLICATIONS

Davis, M., Abshire, M., Overton, D., Strachan, C., and **Wright, T.**, 2009. “Best Available Technology Design for a Uranium Tailings Storage Facility.” Proceedings of the Tailings and Mine Waste ’09, Banff, Alberta Canada, November.

Malusis, M., Davis, M., Overton, .M, Castelbaum, D., **Wright, T.**, 2009. “Laboratory Evaluation For Design Of A Mixed Clay/Sand Tailings Impoundment Liner.” Proceedings of the Tailings and Mine Waste ’09, Banff, Alberta Canada, November.

Kaback, D., B. Looney, J. Corey, **L.M. Wright**, and J. Steele. 1989. "Horizontal Wells For In-situ Remediation of Groundwater and Soils." Proceedings of the NWWA 3rd National Outdoor Action Conference on Aquifer Restoration, Groundwater Monitoring and Geophysical Methods, Orlando, Florida, May.

Wright, L.M. and C.D. Shackelford. 1995. "Compatibility of Soil Admixed With Fly Ash to Acetic Acid." Proceedings of the ASCE Specialty Conference Geoenvironment 2000, New Orleans, Louisiana, February.

Wright, L.M. 2001. "Groundwater Characterization and Alternative Evaluation for the Split Rock Uranium Mill Tailings Project." Proceedings of the Tailings and Mine Waste '01, Fort Collins, Colorado, January.

Kirk, Alan R., Kirk, Lisa B., **Wright, Toby**. 2007. "Risk Based Management in Uranium Mine and Mill Design and Operations". Proceedings of the U2007: Global Uranium Symposium, Corpus Christi, Texas, May.

PROFESSIONAL EMPLOYMENT HISTORY

Principal Owner, Engineer & Hydrogeologist, Wright Environmental Services Inc. March 2010 to present
Environmental Manager, Uranium One USA, March 2007 to March 2010
Senior Engineer\Project Manager, Tetra Tech, September 2001 to February 2007
Senior Engineer\Project Manager, Shepherd Miller, Inc., June 1992 to September 2001
Hydrogeologist, Brierley & Lyman Inc., 1990
Hydrogeologist, Sirrine Environmental Consultants Inc., 1986 to 1989
Field Geologist, CRS Sirrine Inc., 1986
Geologist, Arizona Hillside Mining Co., 1983

CHRISTOPHER D. LIDSTONE
President

Education

Cornell University
B.A. in Geology and Classics, 1977

Colorado State University
M.S. in Fluvial Geomorphology, 1981

Registration

Professional Geologist - Wyoming
Certified Professional Geological Scientist- AIPG

Experience Summary

Mr. Lidstone is founder and president of the engineering, geology and water resource consulting firm Lidstone and Associates, Inc. (LA). His professional experience covers a wide range of individual, yet interrelated fields including geology; geochemistry; fluvial geomorphology; surface and ground water hydrology; river mechanics; erosion and sedimentation; environmental studies and wetland assessments; and, environmental regulation. Mr. Lidstone has been actively involved in mining and mining related studies since 1974, first as an exploration geologist and later as a hydrologic consultant. He began his uranium geological career in the Beaverlodge District of the Northwest Territories (Canada) in 1975 and was involved in both surface and subsurface exploration. He completed tenure as a mine geologist underground at the El Dorado Mine near Uranium City, Saskatchewan. He was contracted to explore for epigenetic uranium deposits in the Elkhead Range, northwestern Colorado and hard rock deposits in southeast Alaska. As a regulator (Wyoming DEQ/LQD) and a member of the Technical Support Group, he served as a liaison with the NRC and addressed interim stabilizations and final closure of uranium mines and mill tailings in the Gas Hills, Powder River Basin and Shirley Basin. As a consultant he completed uranium mining and mine reclamation studies, including design and construction for the Wyoming Abandoned Mine Land (AML) program in Wyoming in 1988 and was responsible for final closure and clean-up of over 20 Wyoming abandoned uranium mine reclamation projects. In 1993 he was awarded Reclamation of the Year award for his design and construction of the Little Medicine Bow River Restoration project. His corporate uranium mining clients have included Power Resources, Inc., now Cameco Resources, Umetco Minerals, Pathfinder Mines and Titan Uranium, USA. He has completed ground and surface water studies, mine permitting, geochemistry and tailings closures studies for these entities since 1994.

Since 1986 he has completed numerous mining-related and mine permitting studies in 17 states and internationally. Besides his work in the Rocky Mountains and Pacific Northwest, he has completed surface water, water quality, and geomorphic stability studies in Alabama, Florida, Georgia, Indiana, Maryland, including the North Fork of the Potomac River, and West Virginia. His regulatory guidance experience has included a Mine Drainage Handbook for the State of Maryland, Geomorphic Guidance Documents for the State of Wyoming, short courses to the Missouri DNR and Oregon DOGAMI and most recently is responsible for the preparation of guidance document for Underground Coal Gasification for the State of Wyoming and Office of Surface Mining.

Abandoned Mined Land Reclamation

Mr. Lidstone has been the project manager for over 40 Wyoming AML reclamation projects, including: the $15M Day Loma Mine Reclamation Project; the $5M Little Medicine Bow River Channel Relocation Project; the $1M AML Statewide Inventory, the $5M Sagebrush Tablestakes Mine Reclamation Project; the $600,000 Carissa Tailings Reclamation Project and the $1.5M Statewide Non-Coal Mine Closure Project. He has completed AML coal related reclamation projects in nine Wyoming counties. His most recent work addressed surface subsidence, coal waste isolation and clean-up, and the closure of the immediate hazards associated with open portals, collapsed adits and tunnels, and partially open ventilation shafts. His non coal AML reclamation experience includes the preparation of reclamation plans and final hydrologic restoration designs for over 40 bentonite pits, 20 uranium mines, eight gravel mines, four gold mines, lead-zinc, copper and molybdenum underground and surface mine disturbances.

Mr. Lidstone has provided the Wyoming AML program with specialty expertise in fluvial geomorphology, in particular the development of a stable land surface and surface drainages. He has developed geochemical protocol, which has been used by AML to address post reclamation water quality and surface reclamation including acid base accounting.

Permitting for Active and Proposed Mines

Mr. Lidstone has been the lead scientist and project manager for Kennecott Corporation, Umetco Minerals, Cloud Peak, Rio Tinto, Cameco Corporation, Umetco Minerals, Mobil Coal Producing Inc., Amax Coal, Caballo Rojo, Inc., JTL Corp. and Lafarge within the State of Wyoming. He has completed mine plan hydrology, design of diversions and sediment control and final reclamation plans for major coal producers in the Powder River Basin. He has also worked extensively on mine permitting projects for the in-situ recovery uranium industry in the Gas Hills and southern Powder River Basin. He is currently involved in mine permitting, environmental evaluation and environmental assessment efforts for Cameco. He has been extensively involved in mine permitting through both federal and state agencies for sand and gravel and hard rock mines throughout the United States. Since 1981, Mr. Lidstone has worked extensively with the mine regulatory programs in Colorado, Oregon, Utah, and Wyoming and the federal programs administered by the Office of Surface Mining, Environmental Protection Agency, US Army Corps of Engineers and the National Marine Fisheries. He has completed due diligence investigations in 14 states for MDU Resources and has addressed environmental liabilities associated with mining under these various state programs. Additional consulting work has included mine permitting efforts for placer and hardrock gold, industrial minerals, basalt, coal and other uranium mines in the western United States. He served as an advisor to the Indonesian National Coal Industry (PTBA) on erosion and sediment control and developed a program for the elimination of environmental liabilities associated with their state-owned coal program.

Channel Stability Analysis and River Construction

Mr. Lidstone has performed numerous channel stability analyses on rivers and streams in Arizona, California, Colorado, Florida, Idaho, Maryland, Missouri, Nevada, Oregon, Utah, West Virginia, and Wyoming. These studies have included evaluations of the geomorphic stability, hydrology, hydraulics and sediment transport characteristics of rivers affected by mining (Belle Fourche River, Wyoming), by dredging to sustain navigation (Apalachicola River, Florida), by channel encroachments such as highways and bridges, by diking and by local development along rivers banks . A number of these projects have led to final design, permitting and construction. Mr. Lidstone managed the restoration construction of 3.5 miles of the Little Medicine Bow River, planning and design of 14 miles of the Provo River (Utah), three construction phases of the Rogue River Restoration Project, river stabilization projects along the Bear, Salt, and Little Snake rivers in Wyoming.

Geochemistry and Water Quality Evaluations

Mr. Lidstone is well versed in geochemistry, water quality and adverse quality discharge issues throughout the United States. His geochemical studies have included salt and phosphate loading to both surface and ground water systems, kinetics and thermodynamics of geothermal systems, and long-term water quality changes for both hard rock and uranium-mined aqueous systems. His uranium transport studies have included bench scale modeling, thermodynamic predictions and transport evaluations of seepage from uranium mill tailings as well as the impacts of the backfill of uranium spoils into the ground water table. Acid mine drainage mitigation and wetland designs have been completed for coal, uranium, bentonite, copper and gold mines. He has testified on the impacts of salt loading to perennial, intermittent and ephemeral streams in Wyoming.

He has completed unsaturated flow studies for landfills, tailings, waste disposal projects, and waste water lagoons throughout the western United States. This work has included the installation of lysimeters, monitor wells and horizontal drains and collection systems associated with tailings and waste disposal sites. He has provided expert witness testimony on water quality impacts related to Coal Bed Methane discharges within Wildcat Creek Basin in northeast Wyoming and addressed rule making for water quality standards as they apply to perennial stream flow versus ephemeral stream flow. His testimony addressed the concept of washover, initial flush and recessional flow water quality.

Reserve Evaluation and Geological Mapping

Mr. Lidstone has completed reserve evaluations, geologic mapping and due diligence investigations for the mining industry and development interests. This involvement has included geologic exploration, geologic mapping, mine

planning, fatal flaw analysis and mine permitting throughout the United States. These studies have been supported by surface and subsurface exploration programs, geophysical and remote sensing techniques.

Mr. Lidstone has geologically mapped over 250 square miles in the U.S., Canada, and Mexico and has been involved in mining consulting from the exploration, production, reclamation and environmental point of view. His field experience involved the geologic mapping and interpretation of igneous, metamorphic and sedimentary deposits in Alaska, Arkansas, California, Colorado, Idaho, Iowa, Minnesota, Montana, New York, Oregon, Tennessee, Texas, Utah, Wyoming, northern Saskatchewan, Canada, and Mexico. This work has included: oil shale, trona and industrial mineral investigations for mine plan development; exploration for base and precious metal deposits in structurally complex terrain; exploration for heavy mineral placers; sedimentologic and petrologic studies of oil shale, coal and epigenetic uranium deposits; hydrogeologic studies; analysis of environments of deposition and ore reserve evaluation. His master's thesis involved the development of an exploration model for placer gold deposits, which related sediment transport processes to river dynamics.

As a geologist Mr. Lidstone has logged over 13,000 feet of diamond drill core and cuttings for both exploration geology and ground water evaluation projects. His drilling projects have included studies in Carbon, Fremont, Hot Springs, Laramie, Natrona, Sweetwater, and Teton Counties, Wyoming; Oneida and Washington County, Idaho and Summit County, Colorado.

Ground Water Investigations

As a principal hydrogeologist for LA, Mr. Lidstone has been involved in complex ground water studies since 1982 and has served as an expert witness on ground water-related projects in Wyoming, Oregon and Nebraska. His expert witness testimony has addressed well interference, ground water contamination, source supply availability, ground water and surface water interaction in Nebraska, Oregon, and Wyoming. Planning projects include the Platte River Water Basin Planning and the Wind Big Horn River Basin projects, which involved a technical assessment of ground water availability for domestic, municipal, and recreational water use. He has also supervised Wyoming ground water supply investigations for the towns of Bairoil, Cheyenne, Dixon, Greybull, Hawk Springs, Hyattville, Pine Bluffs, Ten Sleep, and Thermopolis, Wyoming; the Shoshone Utility Organization; and Umetco Minerals, Inc. Finally he has served as principal in charge of ground water studies associated with uranium ISR mine permitting efforts, including water level and water quality monitoring, aquifer testing and impact analysis. He has completed ground water modeling studies for Mobil Coal, Amax Coal, the States of Wyoming and Oregon, Rogue Aggregates, Teichert Sand and Gravel, and the Public Service Company of Colorado.

Environmental Permitting and Expert Witness

Mr. Lidstone's experience has made him familiar with federal, state and county permitting procedures and regulations. His expert witness services have included appearance before US District Court, Wyoming State Board of Control, Wyoming Environmental Quality Council, Nebraska State Engineer and numerous County Land Use Hearings in Oregon. He has served as an expert witness on gold, gravel, rock quarry, construction, water storage and coal-mining related projects throughout the western United States. He has worked extensively with federal agencies including the US Army Corps of Engineers, US Fish and Wildlife Service, Office of Surface Mining, Environmental Protection Agency and the Nuclear Regulatory Commission and the permitting requirements of state and local environmental agencies in most of the western states.

TECHNICAL SOCIETIES

Geological Society of America

Society of Mining Engineers

National Water Well Association

American Water Resources Association

American Society of Surface Mining and Reclamation

PUBLICATIONS AND TECHNICAL PAPERS

Lidstone, C.D., 1981. "Geomorphic and Hydraulic Controls Associated with the Development of Alluvial Placer Deposits." Technical paper presented to the USGS Branch of Exploration Research, Lakewood, Colorado.

Lidstone, C.D., 1982. "Stream Channel Reconstruction and Drainage Basin Stability." Technical paper presented at the AIME/GAGMO (Gillette Area Groundwater Monitoring Organization) Symposium, Gillette, Wyoming.

Lidstone, C.D., and P.M. Schmittdeil, 1984. "Geomorphology and Depth of Potential Downcutting, Green River Basin, Wyoming." Open-file report, Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne, Wyoming.

Lidstone, C.D., 1987. "Stream Channel and Wetland Reconstruction Techniques." Paper presented at the Eighth Annual Meeting of the Society of Wetland Scientists, Seattle, Washington.

Lidstone, C.D., and B.A. Anderson, 1989. "Considerations in the Design of Erosionally Stable channels on Reclaimed Lands." Paper presented at the Evolution of Abandoned Mine Land Technologies Symposium in Riverton, Wyoming.

Lidstone, C.D., 1991. "Design Concepts in Hillslope Morphology." Paper presented at the 13th Annual Abandoned Mined Land Conference, Lake Ozark, Missouri.

Lidstone, C.D., and C.M. Jones, 1993. "Hydrologic Considerations in the Design of Wetlands." Paper presented at the 15th Annual Abandoned Mined Land Conference, Jackson, Wyoming.

Jones, C.M., and C.D. Lidstone, 1996. "Drop Structures" in *Handbook of Western Reclamation Techniques*, F.K. Ferris, ed., USDI Office of Surface Mining, Washington, D.C., pp. II-21 - 32.

Lidstone, C.D., and C.M. Jones, 1996. "Hillslope Shaping and Morphology" in *Handbook of Western Reclamation Techniques*, F.K. Ferris, ed., USDI Office of Surface Mining, Washington, D.C., pp. III-3 - 12.

Ferris, F.K., C.D. Lidstone, and C.M. Jones, 1996. "Small Drainage Waterway Construction" in *Handbook of Western Reclamation Techniques*, F.K. Ferris, ed., USDI Office of Surface Mining, Washington, D.C., pp. II-67 - 74.

Gibbens, G.A., Hyde, B., Thompson, K., and, Lidstone, C.D., 2002. "River Restoration Planning for the Rio Grande Headwaters, Colorado." Paper presented at the Rio Grande Restoration Vision Workshop hosted by the World Wildlife Fund and Alliance for the Rio Grande Heritage, Albuquerque, New Mexico.

Lidstone, C.D., and M. Pole, 2006. "In-Stream Mining: The Trial and Tribulations of the Federal Permitting Process: A Case Study: Umpqua River Navigation." Paper presented at the 2006 SME Annual Meeting, St. Louis, Missouri.

Wampler, P., E. Schnitzer, D. Cramer, and C. Lidstone, 2006. "A Meander Cutoff into a Gravel Extraction Pond, Clackamas River, Oregon: Instream and Floodplain Mining Implications." Paper presented at the 2006 SME Annual Meeting, St. Louis, Missouri.

Lidstone, Christopher D., 2006. "Applied Geomorphology: Hydrologic Design Considerations to the Stabilization and Reclamation of Mining Disturbed Lands." Keynote Presentation. OSM Conference, National Interactive Forum on Geomorphic Reclamation. Farmington, NM. September 12-14, 2006.

Lidstone, Christopher D. and Abby Korte, 2011. "Water and Sediment Control Systems" (Chapter 16.4) in SME Mining Engineering Handbook, Third Edition, ed. Peter Darling, Society for Mining, Metallurgy and Exploration, Inc., Littleton CO.

KATHERINE J. LAUDON
Principal Engineer/Vice President

Education

University of Wisconsin, Oshkosh
B.S. Geology, 1979

Washington State University
M.S. Geologic Engineering, 1983

Registration

Professional Engineer – Colorado, Wyoming
Professional Geologist - Wyoming

Experience Summary

Ms. Laudon combines over 30 years of consulting, regulatory, and educational experience in groundwater hydrogeology and geological engineering including the design, installation, and operation of groundwater monitoring systems, groundwater quality monitoring, hydrogeologic investigations, groundwater supply and development, computer modeling, and geophysical investigations. While designing water supply wells, preparing environmental permit applications and conducting hydrogeologic investigations for clients throughout the western United States, Ms. Laudon has become familiar with the state and local regulatory agencies, as well as the regulatory requirements of the EPA, BLM, and NRC.

Environmental Permitting

Ms. Laudon has been involved with all aspects of the environmental permitting and regulation process with respect to groundwater issues. As a groundwater engineer with the Wyoming Department of Environmental Quality, she reviewed applications for waste disposal permits for mining, industrial, utility, and domestic facilities and prepared permits for groundwater monitoring systems and underground injection wells. As a consultant she has implemented groundwater monitoring programs in which she was responsible for the contracting of drillers and laboratories, the permitting and construction of monitoring wells, aquifer testing, the collection of water quality and soil samples, and the analysis and reporting of data. While preparing a permit application for the Cameco in-situ recovery (ISR) uranium mine in the Gas Hills, Wyoming, Ms. Laudon supervised field data collection of aquifer hydraulic properties and water quality data, then combined this information with existing historical data to establish baseline conditions and to predict potential impacts to the aquifer resulting from past mining activities and the proposed in-situ operation. Ms. Laudon prepared Plans of Operations for the Gas Hills and Buss Pit sites that were quickly approved by the BLM. She completed the Probable Hydrologic Impact sections of Source Material Licenses submitted to the NRC for the Titan Uranium Sheep Mountain Project and the Smith Ranch License Renewal Project. She has evaluated the interactions between surface water and groundwater and the potential impacts to wetlands associated with aggregate mining in Colorado, Minnesota and Oregon. Currently Ms. Laudon is under contract with both the states of Colorado and Wyoming and to provide permit review services and develop guidelines related to groundwater issues. The combination of regulatory and consulting experience has helped Ms. Laudon gain valuable insight into the technical, economic, environmental, and regulatory issues that often accompany groundwater and waste disposal projects.

Ground Water Development and Supply

Ms. Laudon has been actively involved in municipal groundwater supply investigations for the towns of Greeley, Colorado; Norway, Michigan; and Cheyenne, Dixon, Greybull and Pine Bluffs, Wyoming. She was the Project Manager for several Cheyenne Board of Public Utilities (BOPU) Well Rehabilitation Projects, and the Pine Bluffs Groundwater Exploration Grant; responsible for test hole drilling, well completion and aquifer testing and analysis. For the Town of Greybull she worked with the Wyoming Department of Environmental Quality/Water Quality Division to resolve NPDES permitting issues associated with the discharge of water from the new well after treatment by acid fracing. Ms. Laudon has supervised the drilling and installation of domestic water supply wells at the Giberson Preserve near Frisco, Colorado, and the Squaw Creek Subdivision near Jackson, Wyoming. Ms. Laudon has provided technical oversight to other LA hydrologists and engineers on the Belvoir Ranch, Bairoil, Hot Springs County, Lander, Sand Draw and Shoshone, Wyoming water supply projects; the Linn Grove Cemetery project in

Greeley, Colorado; and on impacts to water supply users associated with uranium mining in Wyoming, and aggregate mining in Minnesota, Oregon and Wyoming.

Geohydrologic Investigations

Geohydrologic investigations conducted by Ms. Laudon include the evaluation of impacts associated with large capacity water supply and irrigation wells completed in the Arikaree Aquifer in the Prairie Center Groundwater Control Area north of Torrington, and along Horse Creek, in Wyoming; exploratory drilling and evaluation of municipal water supply wells for the BOPU; the evaluation of water levels in the alluvial aquifer adjacent to the Yampa River near Steamboat Springs, Colorado to determine potential impacts to wetlands; a regional evaluation of the hydrogeology and water rights of the Gas Hills Uranium Mining District in Wyoming; more detailed investigations of the groundwater impacts associated with reclamation activities in the East Gas Hills and the Day Loma area; the mitigation of seepage from wastewater ponds at large livestock facilities in southeastern Wyoming; unsaturated zone monitoring beneath domestic wastewater disposal systems in Colorado; and investigations of the nature and extent of hydrocarbon contamination of RCRA facilities and underground storage tank sites in Colorado, Wyoming and other western states. For her Master's thesis, she utilized geophysical methods to investigate groundwater recharge and discharge areas associated with glacial terrace deposits adjacent to the Okanogan River in Washington State. She has designed and sampled monitoring systems at uranium mines, power plants, municipal landfills, refineries, domestic and agricultural waste disposal sites, and leaking underground storage sites in several different states.

Groundwater Engineering

As a professional engineer and a professional geologist, Ms. Laudon brings expertise in both disciplines to the design of water supply wells, and to wastewater or other facilities with the potential to impact groundwater. She has designed, contracted drilling, and supervised the construction of numerous water supply and monitoring wells. For the Gas Hills, Smith Ranch, North Butte, and Ruby Ranch ISR uranium projects, she worked closely with the operating engineers to design injection, production and monitoring wells which will optimize uranium production and minimize potential environmental impacts to the adjacent aquifers. She has designed a leak detection system for a wastewater collection sump at a livestock facility near Albin, Wyoming, and infiltration galleries in the alluvium of the Little Snake River for the Town of Dixon water supply, and beneath the Big Horn River to provide cooling water to facilities at Hot Springs State Park. She has calculated design inflows and prepared conceptual designs for an underdrain system for a commercial development in Breckenridge, Colorado. For the North Platte River groundwater investigation she prepared conceptual designs for a Paleozoic wellfield and transmission line to provide replacement water to the North Platte River in Wyoming. In 2010 Ms. Laudon served as a technical editor of several chapters of the 3rd Edition of the Society of Mining Engineers Mine Engineers Handbook dealing with solution mining, dewatering, waste piles, and waste management.

Technical Societies

Association of Groundwater Scientists and Engineers

American Council of Engineering Companies

Publications and Technical Papers

Laudon, K.J., Contributing Editor, 2011. SME Mining Engineering Handbook. Third Edition, Principal Editor Peter Darling, Society for Mining, Metallurgy and Exploration, Inc., Littleton, CO.

Laudon, K.J., D. Erskine, and C.O. Seely, 1999. "Degradation of Ground Water Quality Caused by Surface Reclamation of Open Pit Mines, Gas Hills, Wyoming," Abstract of a technical paper presented at the 1999 SME Annual Meeting and Exhibit, Denver, Colorado.

Underwood, J.E., K.J. Laudon, and T.S. Laudon, 1984. "Seismic and Resistivity Investigations Near Norway, Michigan," Ground Water Monitoring Review, Vol. 4, No. 4, pp. 86-91.

Laudon, K.J., 1984. "Geophysical Investigation of the Duck Lake Ground-Water Subarea near Omak, Washington," Proceedings for the Third National Symposium and Exposition on Aquifer Restoration and Ground-Water Monitoring, Columbus, Ohio, pp. 223-230.

Laudon, K.J., R. Lennox, and P. Pucle, 1983. “Proposed Well Construction Standards in Wyoming,” Abstract of a technical paper presented at the 13th Annual Rocky Mountain Ground-Water Conference, Billings, Montana.

MARY WILSON-NICHOLS

631 Glacier Drive • Grand Junction, Colorado, 81503 • (970) 243-9602 • mjwnichols@gmail.com

ENVIRONMENTAL GEOLOGIST AND TECHNICAL WRITER

- Over 30 years of experience in environmental management and environmental assessments
- Adept at process coordination, business communications, project planning and finance
- Familiar with requirements for permitting for Forest Service, BLM, Corps of Engineers, and others.
- Experienced technical writer versed at research and reporting
- Knowledgeable in third party contracts and independent verification for regulatory agencies

EDUCATION

M.A. in Public Administration, Environmental Emphasis, 1994
University of Colorado at Denver, Denver, Colorado

B. S. in Geology, 1984
Mesa State College, Grand Junction, Colorado

A. S. in Biology and A.A. in Business, 1979
Community College of Denver, Red Rocks Campus, Golden, Colorado

EXPERIENCE

Glacier Group, Inc., Grand Junction, Colorado/Owner 2001 – Present

- Contract to environmental firms as a liaison/third party in order to prepare Federal NEPA Environmental Assessments and Permitting documentation for oil, gas and mining development in Western Colorado and various water/waste water projects for local municipalities. Contract to private and public entities for technical and management tasks including well data input and analysis, geological and Phase I environmental surveys for real estate development, technical writing, office management, computer input, pharmaceutical research, and laboratory analysis. Familiar with Corps of Engineers 404b process.
- Establish and maintain health and safety programs, as well as expedite various service agreements (MSAs and proposals) to clients.

Oak Ridge National Laboratory (ORNL), Grand Junction Office, Oak Ridge, Tennessee 1984 - 2001
Project Manager/Site Characterization Leader/Environmental Technician

- Planned, instituted, and managed environmental assessment and independent verification projects
- Researched and prepared project budgets, cost analyses, and project progress reports
- Organized, supervised and monitored personnel in the collection of environmental samples and data
- Developed work for the ORNL Group by securing funding, preparing plans, technical reports and schedules
- Prepared and delivered public relations and informational presentations and briefings
- Ensured effective communications and teaming between project, corporate, DOE, EPA and other agencies
- Conducted over 500 radiological and environmental surveys supervising technical, clerical, and PR staff

TRAINING

OSHA 20 hour training, Technical Project Management, Radiation Worker Training, HAZWOPER, Technical Writing, Publications/Editing, Cost/Schedule Control Systems, CPR/First Aid Certification, Health and Safety, Industrial Hygiene, Hazardous Waste Handling and all Department of Energy Mandated Training (up to 2001).

ACHIEVEMENTS

Managed EA and EIS preparation for BLM, Forest Service and Garfield Counties over the past ten years. Also, managed radiological survey projects to verify adequacy of remedial action on UMTRAP sites, Monticello Uranium Mill Tailings Site, Grand Junction Projects Office Remedial Action Project, and Johnston Atoll Plutonium D&D Project. Assisted in the management and fieldwork of two RCRA field investigations at the Kansas City Plant. Managed data and reporting of the Annual Groundwater Monitoring Report at the Kansas City Plat. Managed a CERCLA/RCRA field investigation at Naval Air Station North Island, Shoreline Slag. Prepared Environmental Assessments and Impact Statements for Oil and Gas, and Water Resource Projects in Western Colorado.

Supervised hazardous waste and radiologic technicians, clerical, public relations and other technical staff in the conduct of over 500 radiological surveys at UMTRAP sites nation-wide. Also, lead diverse professionals in the development of NEPA documents. Became familiar with BLM and Forest Service leaders in Western Colorado and the requirements for permitting for these agencies.

Developed work for the ORNL Environmental Technology Section; securing funding, preparing RI/FS work plans, technical reports and cost/schedule proposals.

Authored over a dozen technical publications including research on naturally occurring radioactive material, concrete decontamination, project-associated investigations. Prepared numerous proposals, work plans, and investigation reports, including an annual groundwater monitoring report for the Kansas City Plant and various military facilities.

Participated in field environmental assessments on uranium mill tailings sites and numerous military and DOE sites. This included the drilling and installation of groundwater monitoring wells, collection of soil samples, collection of biota samples, measurement of gamma, beta and alpha exposure rates, and measurement of radon daughter concentrations.

Conducted geologic and environmental assessment for real estate studies as a contractor. This included all public relations and small business communications, record-keeping and accounting.

SPECIFIC SKILLS

- Technical writing and review
- Soil and groundwater and radiological sampling
- Project management, budgeting, finance, coordination and mediation
- Software proficiency in MS Project, Excel, Word, Publisher, Photoshop
- NEPA process, assessment of existing resources, and impact analysis

H. JUSTIN MOHLER
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Belgrade, MT 59714
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Education

M.S., Environmental Health Physics, Colorado State University, Fort Collins, Colorado, 1997
B.S., Biology, Southwest Missouri State, Springfield, Missouri, 1993

Professional Experience

Scientific Consultant
(January 1997–present)

Analyzing spatial and temporal trends of plutonium distribution in soil and investigating the potential impacts of burrowing animals on plutonium dispersal at U.S. Department of Energy and Colorado Department of Public Health and Environment sites.

Providing environmental monitoring assessment services for dose reconstruction projects. Working with *Risk Assessment Corporation (RAC)* to conduct studies for the Centers for Disease Control and Prevention and the Colorado Department of Public Health and Environment. These studies focus on historical releases of radioactive and nonradioactive materials and estimating potential risk to surrounding populations.

For the Savannah River Site Dose Reconstruction Project, summarizing environmental monitoring data and evaluating its usefullness for direct exposure assessment and source term model validation. Evaluating temporal and spatial trends in radionuclide concentrations measured for fish, wild game, and vegetation. Assessing mercury concentrations in several environmental media and estimating uranium and plutonium atmospheric releases and associated uncertainty. Maintaining and utilizing a fully relational database containing data for more than 9000 historical documents identified during Phase I of the dose reconstruction project. Developing and producing an electronic report on CD, including reference and glossary hyperlinks as well as embedded and linked spreadsheets.

For Task Order 5, screening and prioritizing historical radionuclide releases from the Idaho National Environmental and Engineering Laboratory. Reconstructing and calculating source term or release estimates for various episodic release events, including reactor operations and accidents as well as fuel element burning tests. Evaluating downwind dispersion and potential exposure by pathway for each event. For Task Order 6, managing and coordinating the review of historical documents to identify information that may be useful for completing a future detailed dose reconstruction. Maintaining and developing a relational database to store information for identified useful documents.

Working with *RAC* to conduct three technical audits focused on assessing the Los Alamos National Laboratory's compliance with the Clean Air Act. Evaluating the accuracy and completeness of radionuclide usage at Site facilities and reviewing various other compenents of the compliance program. Responsible for interviewing laboratory personnel, working with interested members of the public, and assessing the methodology in place during 1996, 1999, and 2001 for its adequacy in demonstrating compliance with the Clean Air Act.

Assisting *RAC* to assess the appropriateness of soil action levels or cleanup criteria developed by the Department of Energy, Environmental Protection Agency, and Colorado Department of Public Health and Environment for the Rocky Flats Environmental Technology Site. Evaluating distributions and assessing uncertainty and sensitivity for the parameters used in a dose calculation model.

Working with *RAC* to assess exposure and risk through both the air and surface water pathways as a result of the Cerro Grande Fire at the Los Alamos National Laboratory. Managing the collection and compilation of all relevant environmental monitoring data, as well as data available for source term characterization of contaminated sites impacted by the fire. Leading Task 3, which documented observations and recommendations resulting from the process of completing this risk assessment.

Assisting *RAC* to develop an independent and comprehensive data access and risk assessment process to guide understandable, consistent, and transparent management of risk from both chemical and radionuclide sources at industrial or government facilities, or as part of long term recovery following an emergency event. Leading data identification and management activities, as well as development of web- and pc-based applications designed to enable automated, timely, and effective use of large quantities of environmental measurement data, ranging from basic data analysis to complex risk calculations.

Supporting *RAC* to estimate doses for veterans involved with nuclear weapons tests at the Nevada Test Site and Pacific Proving Grounds. Managing existing information and implementing dose calculation methodology in support of a study to acquire knowledge on the lifetime risk of cancer following relatively low-dose exposures received gradually over time.

For all of the above projects, presenting technical material to various panels and committees and interested members of the public. Working with the public and Site personnel to obtain data and understand issues of concern.

Colorado State University
Research Associate, Fort Collins, Colorado (September 1996–January 1997)

Performed gamma spectra analyses of Rocky Flats Plant soil samples. Operated and calibrated HPGe and Ge(Li) detector and conducted spectral analysis and interpretation using Acuspec®, Peakfit®, Minitab®, and various spreadsheet applications.

Laboratory Technician (September 1993–May 1994)

Involved with environmental sampling. Collected and prepared soil samples from the U.S. Department of Energy’s Rocky Flats Environmental Technology Site for actinide analysis.

Additional Experience

Courses
Microsoft Access advanced programming course for application developers (summer 1999)

Enhanced understanding of the data modeling requirements for developing a relational database. Focused on the programming necessary for custom database design as well as the fundamental structural elements of a relational database.

Research
U.S. Department of Energy's Par Pond Radioecology Laboratory
Savannah River Site, Aiken, South Carolina (summer 1994)

Conducted M.S. thesis research, which focussed on evaluating temporal trends of ^{137}Cs in an aquatic system. Also involved the development of a multi-compartment model to predict the distribution of ^{137}Cs in various ecosystem compartments.

U.S. Department of Energy Health Physics Fellow
Idaho National Engineering Laboratory, Idaho Falls, Idaho (summer 1996)

Analyzed the effects of building downwash for facility regulatory compliance using current air dispersion codes (ISC3) and computer (PC/workstation) software (Surfer® and GIS ARC/INFO®).

Honors

U.S. Department of Energy Applied Health Physics Fellowship, 1994–1996
Burton J. Moyer Memorial Fellowship, 1994–1995
Colorado Graduate Fellowship, 1994–1995
Soutwest Missouri State University Scholar (undergraduate academic scholarship)
Graduated Magna Cum Laude in the Honors College
Member in Phi Eta Sigma (honor society)

Peer-Reviewed Publications

Till, J.E., H.A. Grogan, **H.J. Mohler**, J.R. Rocco, and S.S. Mohler. 2012. RACER: An integrated approach to data management, risk assessment, and decision making. Accepted for publication in *Health Physics*.

Mohler, H.J., H.A. Grogan, J.R. Rocco, R.F. Kiefer, and J.E. Till. 2012. RACER: Dynamic Use of Environmental Measurement Data for Decision Making and Communication. *Operational Radiation Safety*, Vol. 102, Suppl 1. February.

Mohler, H.J., K.R. Meyer, H.A. Grogan, J.W. Aanenson, and J.E. Till. 2004. Application of NCRP Air Screening Factors for Evaluating both Routine and Episodic Radionuclide Releases to the Atmosphere. *Health Physics* 86(2):135-144.

Till, J.E., A.S. Rood, P.G. Voillequé, P.D. McGavran, K.R. Meyer, H.A. Grogan, W.K. Sinclari, J.W. Aanenson, H.R. Meyer, **H.J. Mohler**, S.K. Rope, and M.J. Case. 2002. "Risks to the Public from Historical Releases of Radionuclides and Chemicals at the Rocky Flats Environmental Technology Site." *Journal of Exposure Analysis and Environmental Epidemiology* 12: 355-372.

Mohler, H.J., F.W. Whicker, and T.G. Hinton. 1997. "Temporal Trends of ^{137}Cs in an Abandoned Reactor Cooling Reservoir". *Journal of Environmental Radioactivity* 37 (3): 251-268.

Technical Reports

Risk Assessment Corporation (RAC). Contributing Authors; J.W. Aanenson, H.A. Grogan, B. Jacobs, G.G. Killough, K.R. Meyer, **H.J. Mohler**, S. Mohler, J.R. Rocco, A.S. Rood, P. Shanahan, E.A. Stetar, L. Hay Wilson, J.E. Till. 2009. *Risk Analysis, Communication, Evaluation, and Reduction at LANL. Ranking Tool Methodology*. RAC Report No. 35-RACER LANL-2008-FINAL. Risk Assessment Corporation. Neeses, South Carolina. April.

Hay Wilson, L., J.R. Rocco, S.S. Mohler, and **H.J. Mohler**. 2005. *Decision Support Tool Methodology*. *RAC* Report No. 18-RACER LANL-2005-DRAFT. *Risk Assessment Corporation*, Neeses, SC. November.

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REQUEST FOR PROPOSALS (RFP)

RFP # 1200001-999

Issue Date:	March 5, 2012
Title:	Uranium Study
Commodity Code:	91843
Issuing Agency:	Commonwealth of Virginia Department of Health Office of Purchasing & General Services Attn: Daniel Wilborn, Contract Officer 109 Governor Street, Room 1214 Richmond, VA 23219
Using Agency And/Or Location Where Work Will Be Performed:	Department of Health

Initial Period of Contract: From Date of Award through **November 30, 2012**.

Sealed Proposals Will Be Received Until 2:00 p.m. on April 4, 2012 For Furnishing The Services Described Herein.

All Inquiries for Information Should Be Directed To: Daniel Wilborn, Contract Officer, Phone: (804) 864-7519 or E-mail: daniel.wilborn@vdh.virginia.gov. **Questions will be accepted until close of business on March 14, 2012.**

IF PROPOSALS ARE MAILED, SEND DIRECTLY TO THE ISSUING AGENCY SHOWN ABOVE. IF PROPOSALS ARE DELIVERED BY COURIER OR HAND DELIVERED, DELIVER TO: THE ISSUING AGENCY SHOWN ABOVE, Attn: Daniel Wilborn, Contract Officer.

In Compliance With This Request For Proposals And To All The Conditions Imposed Therein And Hereby Incorporated By Reference, The Undersigned Offers And Agrees To Furnish The Services In Accordance With The Attached Signed Proposal Or As Mutually Agreed Upon By Subsequent Negotiation.

State Corporation Commission ID Number: An out-of-state business entity that does not regularly and continuously maintain as part of its ordinary and customary business any employees, agents, offices, facilities, or inventories in Virginia.
(See Special Terms and Conditions)

Name and Address Of Firm:
Wright Evnvironmental Services Inc.
201 Lindent St.
Suite 301
Fort Collins, CO Zip Code: 80524
eVA Vendor ID or DUNS # VS0000087802
E-mail: Wrightenv@gmail.com

Date: April 4, 2012
By: [signature] (Signature in Ink)
Name: Leonard (Toby) Wright (Please Print)
Title: President
Phone: (970) 231-1160
Fax: (970) 689-3486

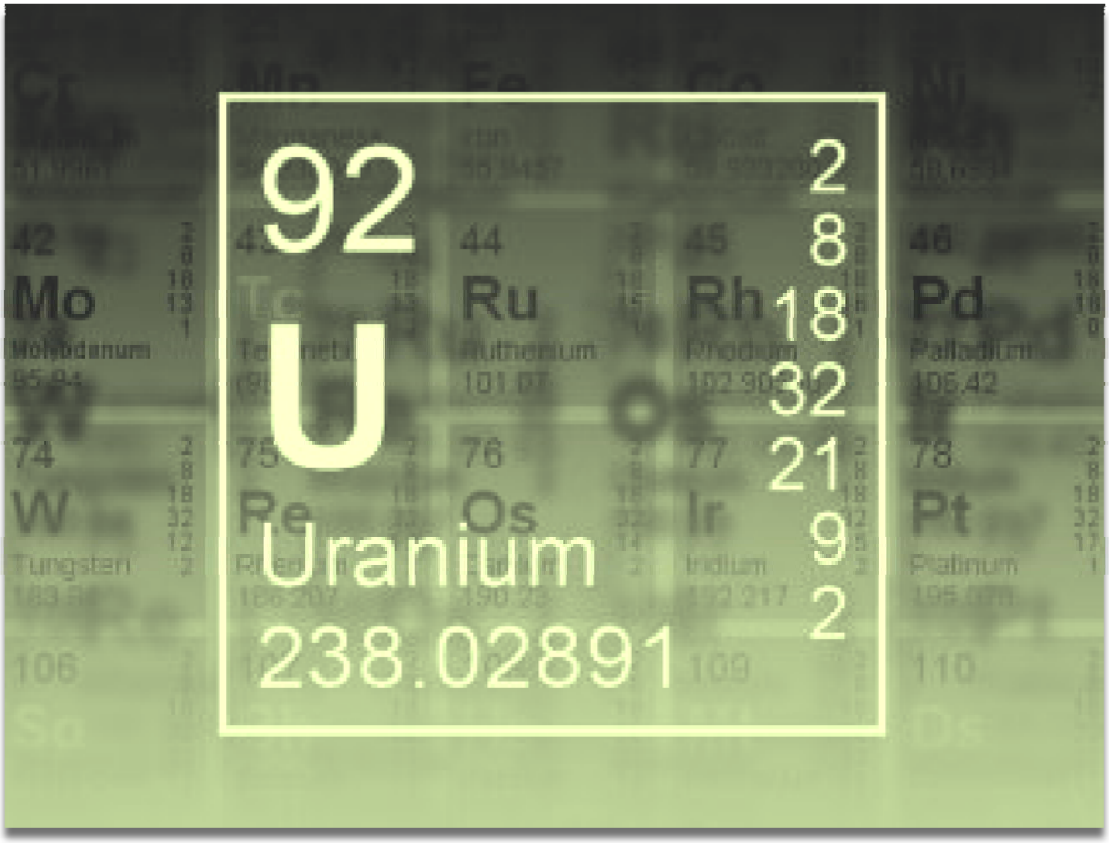
PREPROPOSAL CONFERENCE: A mandatory pre-proposal conference will be held at 2:00 p.m. on March 16, 2012 at the Department of Health, 109 Governor Street Room 1218, Richmond, VA, 23219. Reference: Section VII herein. NO ONE WILL BE ADMITTED AFTER 2:10 p.m. If special ADA accommodations are needed, please contact Daniel Wilborn at 804-864-7519 by March 13, 2012.

Note: This public body does not discriminate against faith-based organizations in accordance with the *Code of Virginia*, § 2.2-4343.1 or against an offeror because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment.

Proposal
Commonwealth of Virginia
Department of Health

109 Governor Street
Richmond, VA 23219

Date: April 3, 2012
RFP No.: RFP 1200001-999
RFP Title: Uranium Study



201 Linden St., Suite 301
Fort Collins, Colorado 80524(970) 231-1160

Table of Contents

Tables

Figures

Appendixes

1.0 Introduction

Wright Environmental Services Inc. is please to present this proposal to the Commonwealth of Virginia to support their ongoing efforts assessing the potential environmental, public health and regulatory impacts of uranium mining and milling.

1.1 Purpose and Objective

The purpose of this submittal is to propose a technical approach and team of experts to provide information and expert analysis of uranium mining and milling issues in Virginia. The project is relevant to the statutory jurisdictions of the Department of Health in response to RFP 1200001-999 Uranium Study. The objective of this proposal is to demonstrate that the proposed technical approach to this RFP, and the exceptional qualifications of the proposed team, will provide the Commonwealth of Virginia with the best resources to meet their statement of need.

2.0 Project Organization and Team Member Experience

Wright Environmental Services Inc. has assembled a team of experts to advise the Commonwealth of Virginia's Department of Health (VDH) concerning gaps in the existing State regulatory framework, requirements and standards. This information will be required should Virginia lift its moratorium on uranium mining. Our team's expertise encompasses many decades of experience in the regulatory and operational aspects of uranium mining and milling, with a focus on environmental and occupational monitoring, and the potential health impacts to workers and members of the public. The team is well versed in regulations promulgated by the Mine Safety and Health Administration, the Nuclear Regulatory Commission, and the various states that host uranium production facilities. It is the unmatched diversity and depth of this proposed team that will provide VDH with detailed, accurate, insightful and timely counsel.

The following sections outline the proposed project organization, and summarize experience and qualifications of team members. Detailed curricula vitae (CV) for all team members are provided in Appendix D.

2.1 Project Organization

Figure 1 illustrates the organization we propose for this project. The Project Manager will be the primary point of contact with the State of Virginia. Technical Leads have been assigned to ensure accountability and clear communication within each area of technical expertise.

2.1.1 Project Management

Dr. Craig Little (Ph.D., Health Physics and Radioecology)

Dr. Little is proposed as Project Manager for the study. In this role, Dr. Little will be the primary point of contact for the State of Virginia, coordinating contractual matters, communications, meetings, development and submittal of deliverables, and ensuring work product quality control and adherence to schedule. Craig was leader of the Environmental Technology Section of the Health and Safety Research Division for Oak Ridge National Laboratory. Among other projects, in the role, Dr. Little managed radiological surveys of over 13,000 properties that were suspected

of being contaminated with uranium mill tailings from historical milling operations in 24 states. He also managed a variety of projects to develop and provide novel remedial technologies for Department of Energy and Department of Defense facilities.

In all, Dr. Little has more than 35 years of experience in radioecology and radiation protection. He is currently focused on occupational and environmental dose modeling, licensing of new uranium production facilities, training of radiation workers, and oversight of remedial action projects for a variety of private clients. Dr. Little serves as Editor-in-Chief of *Operational Radiation Safety*, a publication of the Health Physics Society, and is associate editor of the Health Physics Journal. He has published over 90 reports and journal articles and given numerous presentations at professional meetings.

2.1.2 Radiation Health Physics and Radioecology

Wright Environmental Services Inc. has assembled a group of experts in the fields of radiation health physics and radioecology, to ensure that the Commonwealth has solid resources for assessing its programs and regulatory framework. These individuals combine more than 140 years of experience in appropriate disciplines, spanning applications in the Federal, State and private sectors including the permitting, operational and reclamation phases of uranium mining and milling. Below are brief introductions to the team members.

Dr. Janet A. Johnson (CHP, CIH, Ph.D. - Health Physics and Industrial Hygiene)

Dr. Johnson is the President of Sopris Environmental, a specialty consulting company focused on uranium health physics. She has extensive expertise in radiation protection, risk assessment, and environmental health. Dr. Johnson holds a B.S. in Chemistry from the University of Massachusetts, an M.S. in Radiological Physics from the University of Rochester, and a Ph.D. in Microbiology (Environmental Health) from Colorado State University. She is a Certified Industrial Hygienist (CIH) and a Certified Health Physicist (CHP). She is or has been an active member of numerous radiation health-oriented professional organizations, and has been honored as a Fellow of the Health Physics Society (HPS), with which she has been a Board of Directors member. She has served as President of the HPS Environmental/Radon Section. She is currently a member of the Colorado Radiation Advisory Committee, advising the Health Department, and has served on the Colorado Hazardous Waste Commission. Dr. Johnson's consulting work is centered around the mining industry, with emphasis on uranium extraction. She is currently the Radiation Safety Officer of record for a uranium recovery facility. She has helped develop technical basis documents for the National Institutes of Occupational Safety and Health (NIOSH) dose reconstruction project under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). Dr. Johnson is a former chair of the EPA Science Advisory Board, Radiation Advisory Committee.

Dr. Robert Meyer (Ph.D. - Health Physics)

Dr. Meyer's degrees are in physics, radiation protection and radiation biology. After a tour as a U.S. Navy officer, he has accrued some 36 years of experience in radiation protection and measurements, focused primarily on uranium-chain radiation protection, uranium mill remedial action and new uranium facility licensing. As an example, he ran all radiation protection and

measurements work on the UMTRA Project for its first 6 years; This project involved the largest single set of uranium remedial actions in U.S. history.

After completing his M.S. and Ph.D. degrees, Dr. Meyer began his professional career in 1976 on the environmental research staff at the Oak Ridge National Laboratory. Beginning in 1983, Dr. Meyer managed UMTRA Project radiation protection. Those responsibilities covered members of the public and more than 2000 workers at 22 U.S. uranium mill tailings sites. He went on to manage the low level radioactive waste disposal siting project for the Commonwealth of Pennsylvania, then entered private and corporate consulting to focus on environmental and worker radiation protection. Dr. Meyer has been involved in independent human health risk assessments of several U.S. nuclear weapons facilities, and since 2001 has been worked in both uranium remedial action and new facility licensing activities.

Dr. Meyer has been a member of the National Academy of Sciences Board on Radioactive Waste Management, the USEPA's Radiation Advisory Committee, National Council on Radiation Protection and Measurements project review committees, and currently consults for the International Atomic Energy Agency on field contamination characterizations issues. He is the Radiation Safety Officer (RSO) of Record on three uranium mill tailings remedial action sites in Wyoming and Texas. He has organized courses and instructed uranium facility RSO's at many one- to four-week radiation protection refresher courses, since 2002. He is co-editor and an author of the 900-page graduate-level textbook, "Radiological Assessment".

2.1.3 Regulatory

Our team members have extensive and broad regulatory experience spanning U.S. Nuclear Regulatory Commission (USNRC) agreement States, and U.S. Department of Energy (USDOE) rules and regulations related to uranium mining and milling as well as regulations in Canada and other international and emerging standards. Table 1 summarizes some of the national standards and guidance for regulation of uranium mining and milling the U.S.

Ed Bailey (CHP, PE, Health Physics)

Edgar D. Bailey is an Independent Consultant specializing in radiation and nuclear safety and security. He has more than 40 years of radiation safety experience, including 17 years as the Branch Chief of the California Radiologic Health Branch. In this position Mr. Bailey was responsible for the management of the State of California's radiation protection program including the Agreement State Program for the licensing, inspection, and enforcement of the California laws and regulations for the possession, use, and disposal of radioactive materials. He also had California regulatory responsibility for the registration, inspection, and enforcement programs for x-ray machines and accelerators and the testing and state certification programs for doctors and technologists supervising and using these machines and for nuclear medicine technologists. Prior to that Mr. Bailey worked for 19 years for the Texas Bureau of Radiation Control where he held positions as the Director of the Division of Licensing, Registration, and Standards, as the Director of Inspections and Enforcement, and as a Radioactive Materials License Reviewer.

While employed by the Texas Radiation Control Program, Mr. Bailey began his career in the regulation of uranium recovery facilities as a radioactive materials license reviewer for license applications for new facilities and license renewals of existing facilities. Unlike the federal uranium licensing agency, the Texas program included both the uranium mill and the tailings produced by those facilities. He was the principal license reviewer for the last two conventional mills and tailings ponds built in Texas. During his watch, numerous *in situ* uranium recovery facilities were licensed and built in Texas.

Following the passage of the federal Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), Mr. Bailey was the Project Manager to develop the Texas program for the regulation of uranium recovery operations. This work included service as the technical advisor to the sponsor of State legislation necessary to meet the new requirements under UMTRCA, and preparation of the Texas application to the U. S. Nuclear Regulatory Commission (NRC) for an Amended Agreement allowing Texas to continue to regulation uranium recovery facilities. These resulted in new State laws and NRC approval of an Amended Agreement with the State of Texas. Mr. Bailey's experience set is a perfect fit with the current needs of Virginia.

Mr. Toby Wright (M.S., P.G.)

Mr. Wright brings both a broad technical background and extensive management expertise to the Team, with a consistent record of strong communication and organizational skills. Mr. Wright, a geotechnical engineer and a registered professional geologist, has more than 20 years of experience in conducting and managing technical studies and investigations related to protection of public health, safety and the environment. Most of this experience relates to uranium mining and milling. Mr. Wright has designed radon and erosion barriers for uranium mill tailings disposal cells, successfully developed Alternative Concentration Limit (ACL) applications for NRC approval, and managed the development of NRC license applications and amendments for uranium recovery facilities in Wyoming and Utah. Mr. Wright is also an experienced hydrologist, having performed and managed numerous hydrologic investigations, design and implementation of ground water corrective action programs and development of ACL applications for NRC uranium mill licensees. In his previous role as Environmental Manager of conventional mining operations for a U.S. uranium mining company, Mr. Wright was responsible for health and safety, regulatory compliance, licensing and permitting for one of the few active uranium mills in the U.S. Mr. Wright's expertise includes detailed understanding of several NRC agreement state regulations as well as regulations related to the Department of Energy responsibilities for uranium mill tailings; Mr. Wright was the contract project manager of the Moab Uranium Mill Tailings Remedial Action (UMTRA) Project site for three years.

George Patterson (Ph.D.)

Dr. Patterson has more than 30 years experience in regulatory oversight of mining and uranium recovery operations in Canada, serving in a variety of roles including Director of Mineral Policy for the Government of the Northwest Territories, Executive Director of Exploration and Geological Services for the Government of Saskatchewan, and Executive Director of Major Projects for the Government of Saskatchewan. His regulatory expertise and experience with mining and exploration in the Canadian regulatory environment will provide an excellent resource to the Commonwealth in assessing international and emerging regulatory standards and programs for uranium mining and milling.

2.1.4 Groundwater and Surface Water

Christopher Lidstone (PG)
Mr. Lidstone is founder and president of the engineering, geology and water resource consulting firm Lidstone and Associates, Inc. (LA). His professional experience covers a wide range of individual, yet interrelated fields of study, which include geology; geochemistry; fluvial geomorphology; surface and ground water hydrology; and environmental regulation. Mr. Lidstone has been actively involved in mining and mining related studies since 1974. As a regulator for the Wyoming Department of Environmental Quality, Land quality Division (DEQ/LQD) he served as the state's liaison with the USNRC responsible for negotiating interim stabilization and final closure of uranium mines and mill tailings in the Gas Hills, Powder River Basin, and Shirley Basin. As a consultant he has completed uranium mining and reclamation studies including final closure and clean-up design and construction for over 20 Wyoming abandoned uranium mine land reclamation projects the Wyoming Abandoned Mine Land program in Wyoming. Since 1986 he has completed numerous mining-related and mine permitting studies in 17 states and internationally. He co-authored the Wyoming DEQ/LQD Guideline 8 (Hydrology) and has authored the Mine Drainage Handbook for the State of Maryland as well as other guidance documents for the State of Wyoming. In 1993 he was awarded Reclamation of the Year award for his design and construction of the Little Medicine Bow River Restoration project.

Kate Laudon (PE, PG)
Ms. Laudon is Vice President of Lidstone Associates - a registered professional engineer and professional geologist. Ms. Laudon has more than 25 years of experience in the design, installation, and operation of groundwater supply wells, aquifer testing, geophysical logging, water quality monitoring, hydrogeological investigations and contaminant transport. She has completed mine permit and NRC license applications for both ISR and conventional uranium mines. She has overseen the installation and operation of groundwater monitoring systems, groundwater quality monitoring, hydrogeological investigations, groundwater development and supply, computer modeling, and geophysical investigations. Currently Ms. Laudon is the lead groundwater hydrologist under contract to the State of Colorado to review uranium mine permit applications, and to the state of Wyoming to review a research and development permit application for an underground coal gasification (UCG) project. For the Wyoming project she is tasked with assisting the state in the development of guidelines for commercial scale UCG permitting. Ms. Laudon has served as technical editor for the Society for Mining, Metallurgy and Exploration (SME) Mining Engineering Handbook, Third Edition, ed. (Peter Darling, 2011).

2.1.5 Other Technical Staff

Mary Wilson-Nichols (MPA, Geologist)
Mary Nichols is a geologist and environmental scientist specializing in technical writing and project coordination. She has more than 25 years of experience in radiological and hazardous materials field assessments, along with preparation of proposals, work plans, health and safety plans, and technical publications. Ms. Nichols worked for Oak Ridge National Laboratory leading field assessments in support of the Uranium Mill Tailings Remedial Action Project for

the US Department of Energy, and CERCLA and RCRA sites for DOD. Recently, she has been involved in the preparation of NEPA documentation and permitting for mining sites on Forest Service and BLM lands. Ms. Nichols specializes in independent verification of compliance with regulatory standards for surface and groundwater, and soils on federal lands.

Justin Mohler (MS, Environmental Health Physics)

H. Justin Mohler has more than 13 years of experience in various aspects of environmental health physics, including environmental sampling and measurement, tabular and spatial data management and interpretation, environmental transport, exposure and risk assessment, and communication and presentation of technical information. Mr. Mohler has extensive experience in database design and management, developing, using and maintaining relational databases for several large projects. He has completed a Microsoft Access advanced programming course for developers, and has worked with several database platforms, including Microsoft Access, SQL Server, MySQL, and FoxPro. This expertise is especially useful in projects such as the current proposal, requiring quick and accurate assembly of readily-retrievable information to be provided to Virginia.

3.0 Technical Approach to the RFP's Tasks

Wright Environmental Services has assembled a team whose expertise spans not only the Commonwealth's regulations, but many other State, Federal and International regulatory structures as well. In addition, Wright has selected subject matter experts with solid credentials, to ensure that the highest quality of expertise is available to the Commonwealth. This diverse and extensive knowledge base, combined with effective project management, will provide efficient treatment of the requested tasks utilizing a broad, experience-based perspective.

Section III of the RFP (***Statement of Needs***) identifies two Work Tasks (Work Tasks A and B) for which the State of Virginia seeks advice, counsel and technical support. The Work Tasks are subdivided in to specific subtasks. This proposal has assigned sequential numbers to each subtask for each work task. The proposed approach for each work task and subtask is identified directly below the requested subtask from the RFP.

The RFP Statement of Needs for each work task and subtask are repeated below in italics followed directly by the proposed technical approach for that subtask. The description of the deliverable for each task and the commitment to meet the requested schedule for delivery is outlined at the end of the proposal for each Work Task.

3.1 RFP Section III, Work Task A (Initial Literature Analysis and Recommendations)

Section III, Work Task A of the RFP identifies three subtasks for which the Commonwealth seeks a written report.

3.1.1 Work Task A, Subtask 1(Virginia & Other Relevant Studies)

Utilizing summary information prepared by the Uranium Working Group agencies from the existing Virginia uranium mining studies (that is, National Academy of Sciences/National

Academies Press [NAS/NAP], Virginia Beach, Roanoke River Basin, Chmura, as well as other relevant studies), and make recommendations relevant to the Board of Health's mission to protect public health and the environment. The summary should include, but not be limited to: uranium milling and mining, public drinking water systems, private wells, cisterns, springs, and recreational water issues, human and animal health (including occupational and reproductive health; teratogenesis; mutagenesis; carcinogenesis; unintentional injury; chronic disease; and toxic exposures (both acute and chronic), silicosis, and other unusual occurrences of diseases of public health concern with special attention to vulnerable populations such as infants and children).

Within 3 weeks, the team will review information summarized in the listed studies, including the National Academy of Sciences (NAS) report, the Virginia Beach Uranium Mining Impact Study, studies by the Roanoke River Basin, RTI and Chmura Economics and Analytics, as well as other relevant studies that are available. In addition to the items listed in the RFP, the team will also look at potential health and disease impacts of releases from a mine or milling facility, possible occupational hazards associated with mines and mills and other potential concerns.

Examples of other studies to be considered by the Project Team include:

- Reports by Cameco Resources concerning recent uranium solubility studies
- Health effects evaluations for Kazakh uranium mine/mill workers
- French uranium miner cerebrovascular disease mortality vs. cumulative radon exposures
- Extrapulmonary cancers potentially associated with radon exposures of German uranium miners
- Grants NM uranium miner potentially increased mortality experience
- Lung cancer and leukemia studies related to Wismut, Germany mine worker exposures
- Long-term chromosomal aberration evaluations in Hungarian and Czech uranium miners
- Attempts to develop statistically defensible studies of Saskatchewan uranium miners
- Native American uranium miner increased risks of nonmalignant respiratory disease
- Recent models developed to assist in transport and effects characterization of lung damage.

The Project Team will review and summarize the topics and materials by assigning specific, expert team members to each topic; a time-efficient division of labor to quickly digest the large set of materials. All work will be coordinated using a SharePoint™ system to minimize the potential for simultaneous work on individual sections. In addition, the team can draw on workgroup resources with expertise in the existing Commonwealth regulatory framework. This will allow the Team to efficiently assess key elements identified in the studies, within the context of the Commonwealth's regulatory framework, such that appropriate recommendations applicable to uranium mining and milling can be made. Mr. Wright's experience managing large groups of technical experts will be brought to bear to ensure coordinated and efficient application of resources in a timely manner, ensuring that all work products are of high quality and delivered on schedule.

3.1.1.1 Work Task A, Subtask 1a

Review available scientific literature on: 1) epidemiologic studies measuring long-term effects of exposures to radioactive materials and toxic substances as might be encountered in mining operations of the type proposed for Virginia; 2) limitations of available studies and recommendations of public health experts on design of relevant studies.

There is a large body of scientific data that describes potential long-term risks from both acute and chronic exposure to radiation. Much of the understanding of potential cancer risk results from three specific populations: Japanese atomic bomb survivors, radium dial painters, and uranium miners. Studies on those populations, as well as more recent studies on effects of residential radon exposure, will be summarized with special attention to limitations on their interpretations and conclusions. Potential designs to improve the power of such studies will be described.

3.1.1.2 Work Task A, Subtask 1b

Assist VDH with development of surveillance and epidemiologic studies to evaluate short and long term health effects associated with mining. Studies must include consideration of sources for accurate, valid baseline levels of materials of concern in the environment and in animals and humans.

The team will assist staff of VDH to develop or evaluate surveillance and epidemiologic studies to evaluate both short and long-term health effects associated with mining. Mining studies are an important body of data that have augmented an understanding of risks of lung cancer to members of the public from residential radon. Recent studies on radon risk have been evaluated in a report prepared by a committee of the Health Physics Society (see: Update on Perspectives and Recommendations on Indoor Radon at hps.org). The committee was chaired by Dr. Janet A. Johnson of our team; Dr. Craig Little was also a member of the committee.

3.1.2 Work Task A, Subtask 2 (Existing Regulatory Programs)

Compares existing uranium mining and milling regulatory programs including Nuclear Regulatory Commission (NRC), any agreement state programs, and international programs (such as Canada and France) and recommends provisions from within those regulatory programs that are relevant to the Board of Health's mission as described above. Identify where additional requirements may be appropriate to accommodate Virginia-specific population density, rainfall, climate, water table levels, and unique geography.

The team will satisfy this subtask by reviewing federal uranium regulatory programs from the NRC, EPA, DOE and states with a history of uranium mining and milling. State programs which may be reviewed include: Colorado, Nebraska, New Mexico, Wyoming, Texas and Utah. It is important to note that Colorado, Utah and Texas are NRC agreement states with regard to uranium production, while uranium production in the other states listed is regulated directly by the USNRC. Colorado recently licensed the Piñon Ridge uranium mill, which will be the first conventional uranium mill developed in the last 35 years. Dr. Little performed the required public dose modeling for the Piñon Ridge mill. The team will focus on domestic regulations, but

[Work Task A, Subtask 2 continued]

will also review selected international regulatory requirements, which may have applicability to the Commonwealth. These international entities will initially include the International Atomic Energy Agency (IAEA), and uranium radiation protection practices in Australia, Canada, France and Argentina. A best practices matrix will be developed to guide the team in presenting recommendations to the Commonwealth. The matrix will include an analysis of the various programs reviewed. Specifically, the analysis will show whether those requirements are relevant to the Commonwealth. The analysis will cover elements assessed to be effective for the Commonwealth's purposes.

3.1.3 Work Task A, Subtask 3 (International Emerging Standards)

Summarizes pertinent information and studies from such groups as the International Atomic Energy Agency, the World Nuclear Association, etc. and provides recommendations based on this review that are relevant to the Commonwealth's regulation of the life span of uranium mining and milling including recommendations regarding modem best international practices and other emerging standards and technologies. Identify internationally accepted best practices that can be implemented to mitigate the risk of radioactive releases, discussing technologies available to reduce emissions and maintain a focus on pollution prevention and reduction.

The team will capture a snapshot of the most current set of emerging international standards. Some examples are given below.

Canada

The Canadian regulatory system has been vigorously maintained and modified to deal with what are often with very rich uranium deposits with significant worker and environmental health risk. U.S. uranium mining is more limited in scope, but NRC and the parallel Agreement State regulations are now being revised and linked to current technology and health effects studies. The Canadian mining and milling regulatory structure is driven by the Nuclear Safety and Control Act. The licensing process is divided into tighter segments than the current U.S. system, encouraging a clear focus on each step. Our team members have attended and presented papers

[*Work Task A, Subtask 3 (International Emerging Standards) continued]*

on licensing characterization technology and regulatory systems at conferences such as the Canadian Uranium 2010 Conference in Saskatoon. Such meetings afford opportunities for discussion of human and environmental protection systems being developed worldwide. For example, Dr. Patterson has extensive experience in the Canadian system, most currently as Executive Director of Major Projects, Government of Saskatchewan, Regina. His knowledge of, for example, the currently changing Regulatory Standard S-296 is an example of knowledge that will be extremely useful during the project's rapid enumeration of key emergent international uranium mining philosophies.

[Work Task A, Subtask 3 continued]

International Atomic Energy Agency

Our team's breadth and depth of experience allows not only efficient characterization of emerging international standards, but also the development of suggestions enabling Virginia regulatory staff to link emerging work to the State regulatory guidance system. As an example, one way to ensure that the most up to date standards are being considered during mine/mill licensing, is to take advantage of the Uranium Production Site Appraisal Team process offered by the IAEA. The IAEA website (IAEA.org) may be paraphrased as follows:

> An UPSAT mission is a peer review of one or more phases of a uranium production cycle by a team of selected international experts having direct experience in the technical areas specific to that operation. Judgments of the performance are made with reference to the IAEA Safety Standards and best international practices on the basis of the collective expertise of the review team.
>
> The review is a technical exchange of experience and work practices aimed at strengthening the programs and procedures and their implementation at the subject facility. The benefit of such a review for the requesting Member State or organization is to obtain independent, international expert opinion and advice on proposed or ongoing resource development programs and their implementation; on upgrading present and future safety programs; and on regulatory matters. An UPSAT mission may also be useful in improving communication with the community. The UPSAT service is intended to … "facilitate the exchange of knowledge and experience between team members and industry personnel."

While the UPSAT process was designed to review an operating facility, a central goal of the IAEA is the safe use of nuclear power; applying expert review to a new facility's development is the most powerful way to focus on best, most current practices.

As an example of such a team approach, Dr. Meyer is currently a member of an IAEA group of five experts charged to develop a portable system to be used to characterize uranium-related contamination on large sites. He has also been a member of five Accreditation Board on Engineering Technology (ABET) teams, convened to review university radiation protection degree programs. He has also been a member of the National Academy of Sciences Board on Radioactive Waste Management, National Council on Radiation Protection and Measurement review teams, and the USEPA's Science Advisory Board while the first public radon exposure guidance was being developed. All of these projects involve familiarization with international radiation protection planning, and our other team members have been similarly active in the national and international community.

Our experience with such opportunities has been very positive – a group assembled by a respected agency is populated with experienced and enthusiastic volunteers. Such a group operates within an established review program; members are familiar with current and developing standards and equipment. The team combines an international regulatory familiarity with the multi-language capability necessary to quickly evaluate changing systems. It can be enormously efficient in identifying a project's weak links, for example, recommending solutions that work elsewhere. Requiring comprehensive reviews by competent teams at various licensing stages could constitute a new, unique and effective regulatory requirement, among other goals encouraging a pre-licensee to become aware of the latest international innovations.

[Work Task A, Subtask 3 continued]

World Nuclear Organization

Emerging standards may also be tracked by periodically reviewing information published by the WNA. The WNA is dedicated to providing industry leadership associated with the risks of radon in uranium mining, achievement of widespread agreement on indicators that demonstrate adherence to strong sustainable development performance, and promoting universal adherence to the WNA policy document on uranium mining standards through communication with stakeholders (industry, government and external) and promoting the use of common indicators to encourage compliance. Our team members routinely perform radiation protection training for staff within these organizations, providing a route of useful access to concepts and emerging thought within the WNA.

International Commission on Radiation Protection

The ICRP develops detailed reports prepared by expert committees; the reports often become the bases for radiation protection regulations. Through our decades of participation in the Health Physics Society's meetings and journals, and as active participants in national and international work, committees, conferences and specialized groups, our team members maintain up-to-date awareness of the activities and plans of the ICRP. Dr. Little, for example, is the long-time editor of our Society's Operational Radiation Safety journal, identifying and reviewing new work from throughout the world. The ICRP's recent "Lung Cancer Risk from Radon and Progeny, and Statement on Radon", ICRP Publication 115, and the Draft Recommendations, Radiological Protection Against Radon Exposure are of particular interest in the context of this proposed project.

3.1.4 DELIVERABLE: (Initial Report)

Initial Report - Due: three (3) weeks after contract award date. The contractor shall provide one (1) copy of the report electronically and six (6) hard copies.

Wright Environmental Services will provide one (1) electronic copy and six (6) hard copies of the initial report with an electronic copy of all materials within three weeks of contract award, as required. The initial report will compare Commonwealth programs with existing uranium mining and milling regulatory structures and requirements, including Nuclear Regulatory Commission (NRC), selected NRC agreement state programs, and international programs. In addition, the initial report will summarize pertinent information and studies from such groups as the International Atomic Energy Agency and the World Nuclear Association.

Based on the assessments identified above, the initial report will make recommendations relevant to the Board of Health's mission regarding:

- findings of the summaries prepared by the Workgroup of existing Virginia uranium mining studies (and other studies) that are relevant to Virginia's existing regulatory framework that would apply to potential health impacts from uranium mining and milling;
- provisions from within the reviewed regulatory programs that are relevant to the Commonwealth and would be effective in Virginia;

[Work Task A, Deliverable continued]

- findings that are relevant to the Commonwealth's assessment of potential long-term health impacts of uranium mining and milling.

The initial report will present much of the program summary information in tabular format, to provide for efficient and effective comparison of the requested information, supplemented by narrative in a parallel structure. Recommendations will be structured according to regulatory topics (i.e., Environmental Protection, Engineering Controls, Public Health, etc.) and will address policy, statutory and technical issues. The document will contain a reference list of all literature, websites and personal communications. A compendium of relevant documents will be assembled from the references and delivered in electronic format.

3.2 RFP Section III, Work Task B (Ongoing Technical to Commonwealth of Virginia Staff)

RFP Section III, Work Task B identifies two subtasks with multiple activities under each subtask for which the State seeks monthly progress reports/interim analyses of issues, and the development of a final written report. The RFP Statement of Needs for each work task and subtask are repeated below followed directly by the proposed technical approach the subtask. The description of the deliverable and the commitment to meet the requested schedule for delivery is outlined at the end of the proposal for each work task.

3.2.1 Work Task B, Subtask 1 (Coordinate with VDH Staff)

Coordinate with VDH staff and be available to attend at least monthly progress meetings to develop analyses of the following items and to develop and provide a final report. The Contractor must be available to meet with VDH staff, either face-to-face or via conference calls, as needed to develop interim deliverables and the final report.

Team members will be available either in person, by phone, video conference or web seminar (webinar) to develop interim deliverables and a final report. In recent experience, webinars have been very successful in achieving team goals and allow more flexible scheduling and considerable cost savings over personnel travel. Face-to-face meetings would be valuable until VDH staff and the team members achieve a certain level of familiarity with the team members. Monthly progress reports will be submitted to VDH.

3.2.1.1 Work Task B, Subtask 1a – 1d

a)Compares the Commonwealth's existing statutes and regulations to recommendations in the initial report;
b) Identifies areas where VDH's existing regulations might need to be modified or expanded to ensure protection of public health and the environment.
c) Recommends changes (including statutory changes) to meet these needs (listed below);
d) Evaluation must include a review of the following:
1) Waterworks Regulations (12VAC5-590 et seq.);
2) Disease Reporting and Control Regulations (12VAC5-90-90 et seq.) (requirements for

reporting by healthcare providers and laboratories);
3) Private Well Regulations (12VAC5-630 et seq.) Develops conceptual framework and initial project costs to determine the impact on quantity and quality of water in private wells and springs and recommended procedures for replacing or remediating affected supplies. Framework should be capable of characterizing an inventory of impacted wells, springs, recreational waters and cisterns.
[Work Task B, Subtask 1a-1d continued]

4) Facilitate the stakeholder process, including any potentially inspected regulated community (at least 5 statewide meetings with separate final report) to gauge concerns and identify possible solutions concerning regulation of public water supplies and private wells as to water quality and quantity.
5) Regulations concerning recreational use of waters (campgrounds, summer camps, etc.).

Ed Bailey, who has extensive experience in state regulations from several perspectives, will lead this section of the effort. Having worked for several states, Mr. Bailey is also a life member of the Council of Radiation Control Program Directors (CRCPD) for which he has served on a variety of committees. He will compare the listed Commonwealth regulations with the CRCPD Suggested State Regulations for Control of Radiation to determine applicability. He will also examine similar regulations in states with active or permitted operating uranium recovery facilities.

Mr. Bailey as well as Drs. Johnson, Little and Meyer have extensive experience in conducting public meetings with regard to siting and operation of uranium production and processing facilities and low-level waste disposal facilities. Recent information on improving stakeholder involvement has been presented at several national meetings, including the Health Physics Society Topical Meeting on Waste Disposal. Those presentations will be reviewed and appropriate recommendations for improvements in public involvement will be carried forward.

3.2.1.2 Work Task B, Subtask 1e

Final report *determines and characterizes available data (including national and Virginia-specific data) on potential health outcomes related to exposures of concern. Determines if current reporting requirements and laboratory testing capability cover chemicals likely to be encountered in mining operations under consideration. Determines if current tobacco use surveillance is adequate for establishing baseline data for rates of lung cancer, silicosis, and radon-associated health problems using standard epidemiological analytic methods. Determines whether other available data is sufficient to establish baseline rates for conditions of concern (e.g., current silicosis reporting data) or if retrospective or other studies are indicated to determine baseline rates. Evaluate and propose changes to cancer, congenital malformation reporting if necessary.*

Dr. Johnson will lead this task. The exposures of concern for uranium mining include uranium and other radionuclides as well as other chemical constituents of ore and processing materials. Depending on the type of mining employed, diesel fumes may be a significant concern as well. Virginia registries and national cancer databases such as the Surveillance Epidemiology and End

[Work Task B, Subtask 1e continued]

Results (SEER) will be reviewed to determine whether they are sufficient to provide the data on cancer incidence needed to establish baseline values. Since uranium is chemically toxic as well as radioactive, the potential for examining non-cancer adverse effects, i.e., kidney damage, from existing databases will be reviewed. Tobacco use, smoking and chewing, has a very significant impact on the risk of cancer and other chronic diseases and must be taken into consideration in establishing baseline rates of specific health outcomes that could be related to uranium mining in the future. The tobacco use data for Virginia will be reviewed. Standard laboratory analytical procedures will be reviewed to determine whether they are sufficiently sensitive to detect constituent concentrations of concern for occupational and environmental health. Congenital malformations have not been associated with radiation at environmental levels or with uranium exposure. However, certain chemicals involved in mining specifically in Virginia may be teratogenic. This aspect will be explored. If a need for additional data is indicated or more specific health reporting necessary to establish baseline levels, the team will make such recommendations. Dr. Johnson has experience in reviewing epidemiologic studies and evaluating potential health impacts to both uranium recovery workers and members of the public. She provides Clinical Laboratory Improvement Amendments (CLIA) oversight to the Cotter Corp. Cañon City uranium mill's analytical laboratory. Dr. Johnson is a co-author of a 1988 report to EPA that reviewed and evaluated the epidemiologic and dosimetric data available at that time with regard to lung cancer risks from indoor radon.

3.2.1.3 Work Task B, Subtask 1f

Final report must *develop and test case report investigation worksheets and other documents for local Health Department and Central Office use in any necessary investigations for relevant health outcomes.*

In conjunction with VDH staff, team members will examine the Commonwealth's existing report investigation worksheets, if any, as well as those of other uranium producing states, and propose changes that improve data completeness, accuracy and information flow. Discussions with VDH staff will help us ascertain what content each worksheet should contain, specifically keeping in mind the potential development of a state-wide database to house the information that is developed. Recommendations regarding the application of electronic and web based data reporting and data management tools will be included as part of the final report. Further, the team will provide draft report investigation worksheets to the VDH staff and support VDH staff in performing worksheet test assessments for design functionality. Other potential documents relevant to investigations of health outcomes (i.e., those from disciplines in addition to radiation studies) will be discussed with VDH staff to establish their potential usefulness and design, as needed.

3.2.1.4 Work Task B, Subtask 1g

Final report must d*etermine locus of responsibility for the long-term monitoring of adverse health effects ensuring worker health and safety as well as additional recommended monitoring.*

It is clear that a uranium monitoring facility will require state of the art worker and public exposure monitoring and modeling. The NRC's regulations in 10 CFR Part 20, "Standards for

[Work Task B, Subtask 1g continued]

Protection Against Radiation," deal with the protection of workers: § 20.1501 requires adequate surveys, § 20.1201provides occupational dose limits for adults, § 20.1208 provides dose limits for declared pregnant women, § 20.1502 requires personnel radiation dosimeters in certain instances, § 20.1902 requires posting of warning signs, § 20.1602 requires controlling access to areas with high radiation levels, § 20.2106 requires records of radiation surveys and personnel monitoring reports, and § 20.2203 requires reports of over exposures. Any uranium production facility with the Commonwealth would be subject to the same restrictions. Our team members are familiar with the NRC's current redevelopment of key portions of this regulatory structure, and are thus able to assist Virginia in ensuring that potential modifications are considered.

The Federal Mine Safety and Health Act of 1977 gave to the U.S. Department of Labor the authority to issue and enforce health and safety standards related to the working conditions in underground and surface mining, milling, and related operations. Within the Department of Labor, the Mine Safety and Health Administration (MSHA) is responsible for oversight and enforcement related to the mine safety act; the Occupational Safety and Health Administration has authority over occupational health and safety matters not regulated by MSHA. Code of Federal Regulations 30CFR57.5037 – 30CFR57.5047 covers monitoring of radiation exposures in underground mines. Topics include protection against radon gas and radon decay products, gamma radiation surveys, annual exposure limits, maximum permissible concentration, and annual exposure limits, among others.

Tracking of long-term adverse health effects is not required by either MSHA or NRC regulations. A worker health survey program for all uranium miners or uranium recovery workers can be developed, but unless created by statute and enforced, it is unlikely that mining companies or uranium milling companies would do so voluntarily. Federal regulations require tracking of cumulative radiation dose for any worker who may receive a dose in excess of 500 millirems per year; however, there are no requirements for surveying or tracking health status of workers once they are no longer employed at the site.

The Team will provide a summary of existing regulatory programs for monitoring occupational exposures to licensed and non-licensed materials and adverse health effects. Based on discussions with VDH staff, the final report can include recommendations regarding options for modifying the Commonwealth's regulatory framework to provide for long-term tracking of adverse health effects from occupational exposures as there is currently no such national or federal requirement.

3.2.1.5 Work Task B, Subtask 1h

Final report must evaluate monitoring work spaces, monitoring exposures for mine workers, tracking of worker cumulative exposures, adequacy of existing MSHA regulations and comparisons with international standards for radon and radon daughters.

As mentioned above in the response to Task B 1 g, both the NRC and MSHA have requirements for monitoring work spaces and potential exposures to workers. MSHA regulations specifically will be compared to regulations from Canada, where ore grades can be much higher than in U.S.

[Work Task B, Subtask 1h continued]

uranium mines. The team will summarize the NRC and MSHA regulations in a table along with proposed state regulations and will recommend methods for state compliance review. The Canadian regulations will be summarized in a separate table and will inform the team's proposed state occupational radiation safety regulations, as applicable to conditions in Virginia mines.

3.2.1.6 Work Task B, Subtask 1i

Final report must develop a recommended framework for environmental, human health and animal health monitoring so that data can be maintained in compatible systems for analyzing health effects, including long term monitoring.

Mr. Justin Mohler would be the member involved in leading this subtask. The Team will discuss with VDH staff the specific purpose, objectives and scope of the described monitoring framework to ensure that subsequent recommendations are focused and concise. Inter-agency and intra-agency standardization for communications and reporting as well as robust database design and management are key factors in effective monitoring and managing of health effects data. A database can be created to allow reporting from multiple sources and of multiple types to be integrated into a single reporting application. Team members have extensive experience in development of databases to harmonize environmental and monitoring data from a variety of inputs. A framework for the development of an environmental, human health and animal health monitoring program and associated database could be outlined, if directed by VDH staff. An example of such an integrated system was recently published in *Health Physics* (see "An Integrated Approach to Data Management, Risk Assessment, and Decision Making," Health Physics: April 2012, volume 102- Issue 4 – pg 367-377).

3.2.1.7 Work Task B, Subtask 1j

Final report must determine potential impacts (if any) on cisterns and onsite sewage systems.

The potential for uranium or processing fluids to migrate away from a potential mine or mill site into cisterns and on-site sewage systems depends on project-specific and site-specific elements such as facilities design and configuration, meteorological (i.e., precipitation) as well as surface water and groundwater hydrologic conditions. Assessment of potential impacts to these systems would have to be based on a range of hypothetical conditions or a programmatic monitoring program. The team's experience with mine waste remediation, operation of *in situ* recovery facilities in Texas and Wyoming, and conventional milling of uranium in Colorado allows access to a wide variety of resources having to do with the details of facility operation. Publicly available documents for site licensing are available on the NRC, Colorado and Texas websites that provide a description of the processes used to mine and refine uranium. These experiences and data will be applied to assess potential impacts to cisterns or sewage systems.

3.2.2 Work Task B, Subtask 2 (Assist the Workgroup in preparing reports)

The recommendations should address VDH-related issues, including those listed below, as well as any other issues identified by the Contractor as being necessary and relevant for effective life

cycle regulation of uranium mining and milling in Virginia:

The team has proposed to perform a parallel assessment for the Virginia Department of Environmental Quality (VDEQ; Uranium Study RFP No. 12-06-PJ). If awarded both contracts the team will be able to leverage internal labor efficiencies in developing the assessment of the requested surface water and groundwater monitoring plans. Even if the team is not awarded the VDEQ contract, we will endeavor to coordinate the VDH assessment of surface water and groundwater monitoring plan elements, to the level that is reasonably effective, in order to minimize duplication of effort and maximize value to the Commonwealth.

3.2.2.1 Work Task B, Subtask 2, Item a

a). Water Quality Monitoring Plan for surface waters, including but not limited to:

(1) Human health risks associated with chemical toxicity;

(2) Human health risks associated with radiological toxicity;

(3) Human health risks associated with consumption of affected animal and marine populations

The team will assess existing Commonwealth surface water monitoring programs including requirements for laboratory sampling and analysis to allow detection of low-levels of uranium and its progeny as well as uranium processing by-product concentrations in water. Members of the project team have been involved in monitoring for pre-operational (baseline) and operational water sampling at numerous uranium production facilities are familiar with requirements in all of the uranium producing states as well as California. Estimates of potential risk typically address potential contaminants, exposure pathways and provide for mitigation measures if risk thresholds are exceeded. Examples of requirements for risk assessments typically included as part of the permitting process will be researched and provided to the department. NRC and agreement state regulations for surface water monitoring will be summarized.

3.2.2.2 Work Task B, Subtask 2, Item b

b) Water Quality Monitoring plan for groundwater, including but not limited to:

1) Human health risks associated with chemical toxicity;

2) Human health risks associated with radiological toxicity;

3) Human health risks associated with consumption of affected animal and marine populations; and,

4) The potential impact on groundwater quality and quantity as these affect public wells, private wells and springs.

The team will assess existing Commonwealth surface water monitoring programs including requirements for laboratory sampling and analysis to allow detection of low-levels of uranium and uranium by-product concentrations in water. Members of the project team have been involved in monitoring for pre-operational (baseline) and operational water quality at numerous uranium production facilities and are familiar with requirements in all of the uranium producing states as well as California.

[Work Task B, Subtask 2b continued]

The project team will evaluate the adequacy of Virginia's current regulations and guidance to establish pre-operational baseline groundwater conditions, operational monitoring, and the mitigation of potential impacts to groundwater quantity and quality. It is essential that groundwater monitoring efforts be defined through reclamation and project closure. The project team will review guidance for the characterization of the hydrogeology, potentially impacted formations and aquifers. The project team will assist the Commonwealth in the determination of general, if not site-specific requirements that might dictate the number of wells, the amount of groundwater data required to adequately characterize baseline groundwater conditions. NRC, Canadian and agreement state regulations for groundwater monitoring will be summarized.

3.2.2.3 Work Task B, Subtask 2, Item c

c) Adequacy of Virginia's Water Quality Standards for groundwater and surface waters, and Virginia's Waterworks Regulations as they relate to human health outcomes:

1) To address water-soluble radionuclides or absorbed chemicals;

2) To address the potential for undiluted tailings liquids to exceed existing Safe Drinking Water Act standards for uranium; and,

3) To address the potential for revised Public Drinking Water System's monitoring schedules for radiological contaminants and other hazardous substances within potentially impacted areas.

The State's Water Quality Standards and other regulations will be compared to other similar standards in geographic areas where Uranium mining is on-going. Baseline data from the USGS Virginia Water Science center will be evaluated if available. Reports and publications from the Virginia DEQ will also be reviewed. The final report will provide recommendations or suggested amendments to existing standards as they pertain to Uranium milling and mining.

3.2.2.4 Work Task B, Subtask 2, Item d

d) Evaluate the existing standards for the safe disposal of mine waste as it pertains to human health..

Disposal of mine waste for human health protection involves correct siting, adequate containment during operations as well as adequate stable, long-term isolation and reclamation design. The team members have extensive experience with the design and management of mine waste including their potential impact on human and environmental health. The State standards will be assessed within the context of this experience and with respect to best management practices employed in the US and throughout the world.

3.2.2.5 Work Task B, Subtask 2, Item e

e) Evaluate necessary components of full environmental impact analysis.

The final report will provide a list of physical, biological, heritage and human resources that may be affected directly, indirectly and on a cumulative basis from Uranium mining in the State of

[Work Task B, Subtask 2e continued]

Virginia. Elements from the National Environmental Protection Act (NEPA) process would be used to summarize components in a tabular form. Resources listed might include, but not be limited to: air quality and climate, geologic resources, mineral resources, soils, surface and groundwater, threatened or endangered species, vegetation, wetlands and riparian zones, wildlife, cultural, paleontological, visual, social, economic, noise, transportation and access, recreation, and public lands, and waste management.

3.2.2.6 Work Task B, Subtask 2, Item f

f) Methods for incorporating "As Low As Reasonably Achievable" (ALARA) standards into Commonwealth regulations, like those that exist for radiological protection.

The ALARA concept is derived from the radiation protection principles originally put forth by the International Commission on Radiological Protection (ICRP) in its 1977 Recommendations: Justification Optimization, and Limitation. Optimization, or the ALARA concept, provides for the use of radiation and radioactive material for the benefit of mankind while keeping radiation doses as low as reasonably achievable ***below*** the standards established to limit radiation doses. The international radiation protection community has embraced these three principles and the ALARA concept. ICRP and International Atomic Energy Agency (IAEA) guidance and most regulatory authorities have incorporated ALARA. The same essential concept is expressed by the American Conference of Governmental Hygienists (ACGIH) as maintaining chemical concentrations “As Low As Practicable”.

The evolution and implementation of ALARA in international guidance such as the recommendations in ICRP Publication 103 and the IAEA Safety Standard Number SF-1 as well as state, national and international regulations will be summarized and specific recommendations developed to guide the Commonwealth of Virginia in incorporating ALARA into the applicable regulations. The team includes Dr. Janet Johnson, an individual with professional credentials in both industrial hygiene (Certified Industrial Hygienist) and radiation protection (Certified Health Physicist) as well as extensive experience in working with and applying the ALARA principles. For example, Dr. Johnson applied the ALARA concept and regulatory requirements in development and augmentation of Radiation Safety Manuals for the Molycorp Mountain Pass rare earth facility and the Dawn Mining Company uranium mill site. In the 1990s,she reviewed the “total quality” programs, including implementation of ALARA, for Westinghouse Government-owned, Contractor-operated (GOCO) facilities, such as portions of the Hanford and Savannah River laboratories, as a member of the Westinghouse Nuclear Safety and Environmental Oversight Committee.

3.2.2.7 Work Task B, Subtask 2, Item g

g) Recommendations for compliance period financial assurance mechanisms providing for minimization of long-term impacts to water resources and necessary remediation.

The team will evaluate the Commonwealth’s mining and financial assurance regulations to determine if their regulations are adequate to ensure that mine pits, declines and other infrastructure are reclaimed contemporaneously as mining advances and not postponed until the

[Work Task B, Subtask 2g continued]

end of the project. Contemporaneous reclamation is a major factor in minimizing the reclamation liability for both the Commonwealth and the operator. The team also will review the Commonwealth's financial assurance regulations and requirements for covering contemporaneous reclamation costs and annual financial assurance updates. Annual financial assurance updates are crucial to maintain adequate coverage of reclamation and decommissioning liabilities. The NRC requirements and NUREG-1757 also will be considered and compared to the Commonwealth's requirements as they relate to mill and mill tailing closure and decommissioning. Practices and requirements of various agreement states will be documented and compared.

3.2.2.8 Work Task B, Subtask 2, Item h

h) Recommendations for environmental monitoring, including but not limited to:

1) Required components of an environmental monitoring plan;

2) Recommended goals to include in an environmental monitoring plan; and,

3) Recommended baseline and characterization data.

The team has extensive practical experience in environmental monitoring for pre-operational, operational, and post reclamation phases of uranium facility lifetimes. The NRC provides guidance for uranium mills in Regulatory Guide 4.14. However, that guidance is outdated and is in the process of revision. Modifications to the NRC guidance to more adequately assess site radiological conditions have been recommended and implemented by members of the team. These modifications have improved the efficiency of data collection and the accuracy of the resulting data. Recommendations for elements of required environmental monitoring will take into account the unique environmental and ecological conditions that exist in Virginia.

3.2.2.9 Work Task B, Subtask 2, Item i

i) Evaluation of NRC regulations for milling and tailings management given state-specific climate (e.g., rainfall) and hydrologic considerations

The team is very familiar with NRC regulations for milling and tailings management and recognizes that the existing requirements may not be adequate to protect the environment under the climatic and hydrologic conditions that exist in Virginia. Mr. Lidstone has extensive experience in surface and groundwater hydrology. He has studied water quality in states in the south with climatic and hydrologic conditions similar to those that exist in Virginia. The NRC regulations will be reviewed and modifications recommended to provide adequate protection to the unique Virginia environment.

3.2.2.10 Work Task B, Subtask 2 Deliverable: Interim Analysis of Issues (Due: As needed for meetings with VDH staff.)

During the period following delivery of the initial report three weeks after contract initiation, our team members will be available to attend, by phone or in person, monthly progress meetings with VDH staff. This period will extend to October 15th, when a final report covering all of the issues identified above will be submitted. To track progress on work being performed by our

team on these issues, and to discuss that progress and assist VDH staff in their preparations for public and other meetings to discuss the issues, interim deliverables will be drafted by our team for discussion at the meetings. These interim deliverables will, over time, be revised and assembled into the final report, as detailed below. We have allocated budget in this proposal to support conference calls in which several team members working on a specific issue set will make themselves available for the monthly meetings. We have also planned for the possibility that one or more team members may be requested to attend several of the meetings in person, to more closely interact with VDH staff on particularly complex issue sets. A number of our team members have had opportunities for professional training in public speaking, several have each made 100 or more presentations at such meetings, often under tense, volatile conditions. We anticipate not only providing assistance in the preparation of clear and complete presentation materials for use by VDH staff, but also being able to provide help, if requested, in the art of dealing with the public and media under difficult conditions. We have found, for example, that training and very specific preparation for interactions with radio and TV reporters can lead to very productive exchanges with the media. Such groundwork can also provide assurance of success to staff required to be involved in such interactions. For example, during the courses we regularly offer for Radiation Safety Officer license-required refresher training, we routinely provide training on "Dealing with the Media", and have found the segment to be of great value to individuals required to deal with such situations.

3.2.2.11 Work Task B, Subtask 2, Deliverable: Final Report (due October 15, 2012)

As noted in the preceding task description, the sets of items covered under this proposal will be fulfilled via preparation of interim deliverables in an order agreed upon after contract initiation. We understand that conditions and situations to which VDH staff may be required to quickly respond during the project timeline will require our own rapid response to VDH requests for quick input on specific topics. Flexibility on our part in dealing with timeline changes will be required. Our goal is to provide timely support to VDH staff, while ensuring that all issues identified here and in the RFP are comprehensively and adequately covered in the interim deliverables. We plan to use feedback from VDH to enhance and perfect those deliverables over the course of the contract. The result will be a collection of linked reports and datasets, many supplemented by PowerPoint™ and other presentation materials, covering all of the topics identified here, provided as a Final Report to VDH by October 15, 2012.

3.2.3 Work Task C (Assist VDH in Preparing and Presenting Reports)

The Contractor will assist VDH in preparing and presenting information and assist in VDH staff's presentations.

As is apparent in our response to Item 3.2.2.11 above, we see our presentation preparation assistance to VDH staff as being intimately linked to our development of interim and final information and reports on the variety of issues discussed here and in the RFP. Our team members, given their multi-decade experience base with large projects closely related to the

[Work Task C continued]

topics to be covered under this contract, arrive fully prepared to assist. We anticipate our involvement to include not only information gathering, analysis and documentation. We are also ready and willing to provide assistance to VDH in the preparation of useful presentation materials, and the development of other informational materials as requested, including perhaps Q&A sets that can be as helpful to a presenter as to his or her audience. We particularly look forward to this project task, given successful work in the field of public and media interactions on many past occasions.

3.2.4 Work Task D (Assist VDH in Formulating a Draft Conceptual Regulatory Framework)

Discuss the reports and recommendations enumerated above with VDH and assist staff in implementing findings/recommendations into a draft conceptual regulatory framework that would address VDH-issues for the entire life-cycle compliance period of milling projects in Virginia, as well as other impacted Commonwealth of Virginia regulations.

The team has unique expertise in the development of state regulatory programs for uranium recovery operations. Mr. Bailey was the Project Manager for the State of Texas when it developed its Amended Agreement State program for the regulation of uranium under the Uranium Mill Tailings Radiation Control Act of 1978. He was the technical advisor to the author of the Texas legislation, developed the regulatory staffing plan and budget for the program, was manager over the staff that developed the regulations for the uranium activities in Texas, and prepared the Texas application to the U. S. Nuclear Regulatory Commission for amendment of its Agreement. Subsequently as the Director of the Division of Licensing, Registration, and Standards, Mr. Bailey managed the license application review and evaluation process for the Texas Bureau of Radiation Control for all uranium recovery facilities including conventional uranium mills using ores from open pit mines and in situ uranium recovery operations.

4.0 RFP Section XI: Cost Proposal/Pricing Schedule

The proposed cost for this project is $440,140.

Table 2 summarizes the cost basis by Work Task and Subtask. Many assumptions regarding scope, the due date and form of deliverables and interim analyses of issues and the associated level of effort to respond to the Statement of Needs have been made in developing this cost proposal. The following presents the assumptions upon which this cost estimate is based. Should the work awarded deviate from these assumptions we would appreciate the opportunity to revisit the project budget with the Commonwealth.

Assumptions:

- General
  - The Commonwealth provides all necessary guidance and materials in a timely manner that does not impact the contractor's ability to complete the scope of work and deliverables in a timely manner.

[Cost Proposal/Pricing Schedule continued]

  - The proposal purposely attempts to overestimate the time requirements of various tasks. As the nature of the tasks become clear via conversations with VDH staff, it is likely that work can be accomplished for fewer hours than budgeted.
- Work Task A
  - The Project Manager and two technical staff travel to Richmond, Virginia for a one day meeting to initiate the project.
  - The Project Manager and two technical staff travel to Richmond, Virginia for a one day meeting to present the Initial Report and associated findings.
  - No substantial additional issues or items requiring substantial additional labor effort or schedule than those identified in the RFP are requested or required.
- Wok Task B.1
  - Discussions with VDH staff will clarify terms and any potential misunderstandings of existing regulations
- Work Task B.2
  - Actual and complete Surface Water and Groundwater Monitoring Plans are ***not*** required but rather assessment of the existing surface water, and groundwater monitoring capabilities insofar as the list of requirements in the RFP, including data gap analyses and recommendations.
  - The final report is a synthesis of Work Task A and B efforts with no substantial additions in topics or materials to be addressed.
- Work Task C
  - By the nature of the RFP, contractor effort on this task will be limited to the number of hours proposed, unless additional scope is added by VDH.
- Work Task D
  - By the nature of the RFP, contractor effort on this task will be limited to the number of hours proposed, unless additional scope is added by VDH.

Table 1 Applicable Regulations and Guidance Documents

Federal Regulations	
AEA	U.S. Atomic Energy Act of 1954, as amended
CAA	Clean Air Act of 1970, as amended
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWA	Clean Water Act, Federal Water Pollution Control Amendments of 1972, as amended
ESA	Endangered Species Act
NEPA	National Environmental Policy Act of 1970, as amended
NHPA	National Historic Preservation Act
RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act of 1974, as amended
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978, as amended

Code of Federal Regulations	
6 CFR 27	Chemical Facility Anti-Terrorism Standards
10 CFR 2	Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders
10 CFR 20	Standards for Protection Against Radiation
10 CFR 40	Domestic Licensing of Source Material
10 CFR 51	Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions
29 CFR 1910	Occupational Safety and Health Standards
36 CFR 800	Protection of Historic Properties
40 CFR 50	National Primary and Secondary Ambient Air Quality Standards
40 CFR 52	Approval and Promulgation of Implementation Plans
40 CFR 60	Standards of Performance for New Stationary Sources
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 68	Chemical Accident Prevention Provisions
40 CFR 122	EPA Administered Permit Programs: The National Pollutant Discharge Elimination System
40 CFR 131	Water Quality Standards
40 CFR 141	National Primary Drinking Water Regulations
40 CFR 190	Environmental Radiation Protection Standards for Nuclear Power Operations
40 CFR 192	Standards for the Control of Residual Radioactive Materials from Inactive Uranium Processing Sites
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 355	Emergency Planning and Notification
40 CFR 440	Ore Mining and Dressing Point Source Category

Code of Federal Regulations	
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
50 CFR 402	Interagency Cooperation--Endangered Species Act of 1973, As Amended

NRC Guidance Documents	
NUREG-0706	Generic Environmental Impact Statement on Uranium Milling
NUREG-1569	Standard Review Plan for In Situ Leach Uranium Extraction License Applications
NUREG-1620	Standard Review Plan for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act of 1978
NUREG-1623	Design of Erosion Protection for Long-Term Stabilization
NUREG-1748	Environmental Review Guidance for Licensing Actions associated with NMSS Programs
NUREG-5849	Manual for Conducting Radiological Surveys in Support of License Termination

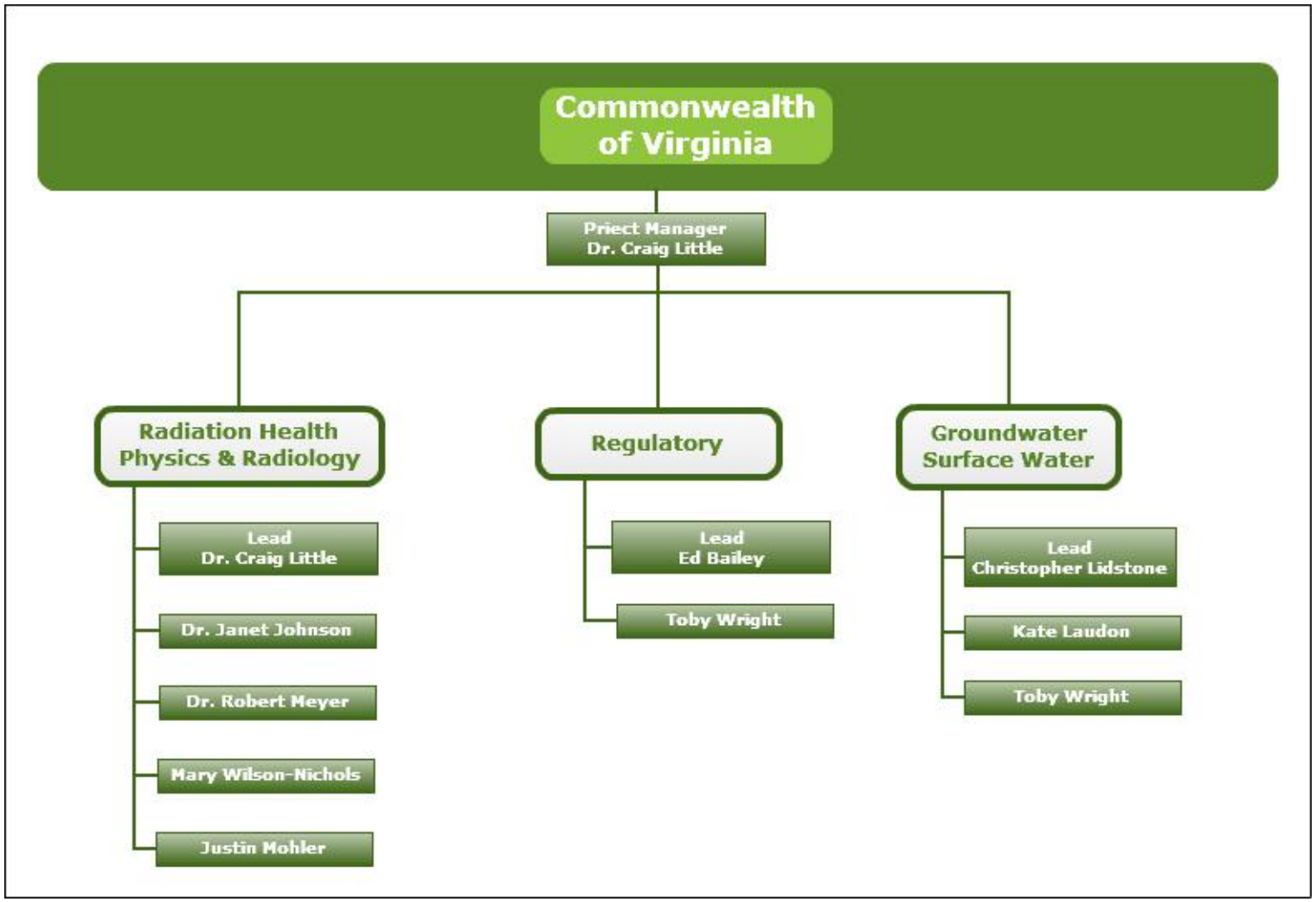
NRC Regulatory Guides	
RG-1.86	Termination of Operating Licenses for Nuclear Reactors
RG-3.5	Standard Format and Content of License applications For Uranium Mills
RG-3.8	Preparation Of Environmental Reports For Uranium Mills
RG-3.11	Design, Construction, and Inspection of Embankment Retention Systems at Uranium Recovery Facilities
RG-3.11.1	Operational Inspection And Surveillance Of Embankment Retention Systems For Uranium Mill Tailings
RG-3.46	Standard Format and Content of License Applications, Including Environmental Reports, for In Situ Uranium Solution Mining
RG-3.5 (Nov., 1977)	Standard Format And Content of License Applications For Uranium Mills
RG-3.56	General Guidance For Designing, Testing, Operating, And Maintaining Emission Control Devices At Uranium Mills
RG-3.59	Methods for Estimating Radioactive and Toxic Airborne Source Terms for Uranium Operations
RG-3.63	Onsite Meteorological Measurements Program for Uranium Recovery Facilities--Data Acquisition and Reporting
RG-4.14	Radiological Effluent and Environmental Monitoring at Uranium Mills
RG-4.15	Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination) -- Effluent Streams and the Environment
RG-8.10	Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Reasonably Achievable
RG-8.22	Bioassay at Uranium Mills

NRC Regulatory Guides	
RG-8.25	Air Sampling in the Workplace
RG-8.30	Health Physics Surveys in Uranium Recovery Facilities
RG-8.31	Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Recovery Facilities Will Be as Low as is Reasonably Achievable
RG-8.34	Monitoring Criteria and Methods to Calculate Occupational Radiation Doses

Table 1. Cost Proposal Summary

RFP Section III			
Work Task A: Initial Literature Review & Reccomnedations		**Total**	**Subtask Total**
Subtask 1	Virginia & Other Relevant Studies	$ 32,280	
Subtask 2	Existing Regulatory Programs	$ 25,300	
Subtask 3	International Emerging Standards	$ 20,900	
Travel		$ 6,900	
Deliverable	Initial Report	$ 300	**$ 85,680**
Work Task B: Assist Workgroup in Preparing Reports		**Total**	
B1	Monthly progress meetings	$ 41,400	
B1a	Compare Initial recommendations with Statutory Jurisdiction	$ 7,420	
B1b	Identify areas for new/modified/expanded regulatory coverage	$ 5,740	
B1c	Recommend Stutory Changes as needed	$ 11,340	
B1d	Review of specific listed regulations	$ 9,660	
B1e	Determine and characterize available data on potential health outcomes	$ 8,940	
B1f	Develop and test case report investigation worksheets	$ 9,660	
B1g	Determine locus of responsibility for the long-term monitoring of adverse health effects	$ 7,080	
B1h	Adequacy of MSHA reguations regarding monitoring of workspaces, etc.	$ 13,800	
B1i	Develop a recommended framework for env., human health and animal health monitoring so that data	$ 15,080	
B1j	Determine potential impacts (if any) on cisterns and onsite sewage systems.	$ 4,940	**$ 135,060**
B2a	Water Quality Monitoring Plan for surface waters	$ 12,580	
B2b	Water Quality Monitoring plan for groundwater	$ 11,280	
B2c	Subtask 2c: Adequacy of Va water quality standards	$ 8,940	
B2d	Subtask 2d.: Evaluate existing stds for safe disposal of mine waste as pertains to human health	$ 7,140	
B2e	Evaluate necessary components of full EIA	$ 8,540	
B2f	Methods for incorporating ALARA in Va regulations	$ 8,340	
B2g	Recommendations for compliance period financial assurance mechanisms	$ 5,340	
B2h	Recommendations for env monitoring plan, including required components, goals to include, and baseline and characterization data needed	$ 14,540	
B2i	Evaluation of NRC regs for milling and tailings management given state-specific conditions	$ 6,860	
	Deliverable: Interim Reports (6)	$ 21,120	
	Deliverable: Final Report	$ 21,120	**$ 125,800**
Work Task C: Assist VDH in preparing and presenting reports		$ 46,800	**$ 46,800**
Work Task D: Assist VDHwith a draft conceptual regulatory framework		$ 46,800	**$ 46,800**
	Proposal Grand Total:		**$ 440,140**

Figure 1 Proposed Project Organization



APPENDIX A

Offeror Data Sheet

ATTACHMENT A

OFFEROR DATA SHEET

Note: The following information is required as part of your response to this solicitation. Failure to complete and provide this sheet may result in your proposal being scored lower.

1. Qualification: The vendor must have the capability and capacity in all respects to satisfy fully all of the contractual requirements.

2. Vendor's Primary Contact:

   Name: Leonard (Toby) Wright Phone: (970) 231-1160

3. Years in Business: Indicate the length of time you have been in business providing this type of good or service:

   2 Years 0 Months

4. Vendor Information:

   eVA Vendor ID or DUNS Number: VS0000087802 (eVA Vendor Number)

5. Indicate below a listing of at least four (4) current or recent accounts, either commercial or governmental, that your company is servicing, has serviced, or has provided similar goods. Include the length of service and the name, address, and telephone number of the point of contact.

   A. Company: Cameco Resources Contact: Scott Bakken
   Phone: (307) 316-7586 Fax: (307) 635-9949
   Project: Smith Ranch-Highland CLI
   Dates of Service: 1/7/11 - Current $ Value: $253,000.00

   B. Company Titan Uranium USA Inc. Contact: Frank Filas
   Phone: (303) 974-2146 Fax: (303) 974-2141
   Project: Sheep Mountain Project Licensing
   Dates of Service: 3/10/10 - Current $ Value: $255,000.00

   C. Company: Uranium One Americas Contact: Norman Schwab
   Phone: (303) 325-2379 Fax: (303) 325-0110
   Project: Conventional Mining Regulatory Assistance
   Dates of Service: 3/31/10 - Current $ Value: $45,000

   D. Company: Cotter Corporation Contact: John Hamrick
   Phone: (719) 275-7413 Fax: (719) 275-1669
   Project: Remedial Action Program Manager
   Dates of Service: 10/1/2011 - current $ Value: $100,000.00

I certify the accuracy of this information.

Signed: _____ Title: President Date: 3/30/12

APPENDIX B

DMBE Small Business Certification

ATTACHMENT B

Small Business Subcontracting Plan

Definitions

Small Business: "Small business " means a business, independently owned or operated by one or more persons who are citizens of the United States or non-citizens who are in full compliance with United States immigration law, which, together with affiliates, has 250 or fewer employees, or average annual gross receipts of $10 million or less averaged over the previous three years.

Women-Owned Business: Women-owned business means a business concern that is at least 51% owned by one or more women who are citizens of the United States or non-citizens who are in full compliance with United States immigration law, or in the case of a corporation, partnership or limited liability company or other entity, at least 51% of the equity ownership interest is owned by one or more women who are citizens of the United States or non-citizens who are in full compliance with United States immigration law, and both the management and daily business operations are controlled by one or more women who are citizens of the United States or non-citizens who are in full compliance with the United States immigration law.

Minority-Owned Business: Minority-owned business means a business concern that is at least 51% owned by one or more minority individuals or in the case of a corporation, partnership or limited liability company or other entity, at least 51% of the equity ownership interest in the corporation, partnership, or limited liability company or other entity is owned by one or more minority individuals and both the management and daily business operations are controlled by one or more minority individuals.

All small businesses must be certified by the Commonwealth of Virginia, Department of Minority Business Enterprise (DMBE) by the due date of the solicitation to participate in the SWAM program. Certification applications are available through DMBE online at www.dmbe.virginia.gov (Customer Service).

Offeror Name: Wright Environmental Services Inc.

Preparer Name: Leonard (Toby) Wright **Date:** 4/3/12

Instructions

A. If you are certified by the Department of Minority Business Enterprise (DMBE) as a small business, complete only Section A of this form. This shall not exclude DMBE-certified women-owned and minority-owned businesses when they have received DMBE small business certification.

B. If you are not a DMBE-certified small business, complete Section B of this form. For the proposal to be considered and the offeror to be declared responsive, the offeror shall identify the portions of the contract that will be subcontracted to DMBE-certified small business in Section B.

Section A

If your firm is certified by the Department of Minority Business Enterprise (DMBE), are you certified as a (**check only one below**):

__X__ Small Business

_____ Small and Women-owned Business

_____ Small and Minority-owned Business

Certification number: 699614 Certification Date: 3/22/12

APPENDIX C

State Corporate Commission Form

ATTACHMENT C

STATE CORPORATION COMMISSION FORM

Virginia State Corporation Commission (SCC) registration information. The offeror:

☐ is a corporation or other business entity with the following SCC identification number: _____ **-OR-**

☐ is not a corporation, limited liability company, limited partnership, registered limited liability partnership, or business trust **-OR-**

☒ is an out-of-state business entity that does not regularly and continuously maintain as part of its ordinary and customary business any employees, agents, offices, facilities, or inventories in Virginia (not counting any employees or agents in Virginia who merely solicit orders that require acceptance outside Virginia before they become contracts, and not counting any incidental presence of the offeror in Virginia that is needed in order to assemble, maintain, and repair goods in accordance with the contracts by which such goods were sold and shipped into Virginia from offeror's out-of-state location) **-OR-**

☐ is an out-of-state business entity that is including with this offer an opinion of legal counsel which accurately and completely discloses the undersigned offeror's current contacts with Virginia and describes why those contacts do not constitute the transaction of business in Virginia within the meaning of § 13.1-757 or other similar provisions in Titles 13.1 or 50 of the Code of Virginia.

****NOTE**** >> Check the following box if you have not completed any of the foregoing options but currently have pending before the SCC an application for authority to transact business in the Commonwealth of Virginia and wish to be considered for a waiver to allow you to submit the SCC identification number after the due date for offers (the Commonwealth reserves the right to determine in its sole discretion whether to allow such waiver): ☐

APPENDIX D

Team Member Resumes

CRAIG A. LITTLE

896 Overview Rd.

Grand Junction, Colorado 81506

970-260-281 0 (cell) 309-214-2569 (efax)

twolines@bresnan.net

PROFESSIONAL EXPERIENCE

Dec 2006 - pres	Principal, Two Lines, Inc. Conduct radiation dose and risk assessments, historical dose reconstructions, field surveys and radiation safety audits for a variety of clients. Involved in baseline environmental surveys and licensing for new uranium processing facilities. Conduct ALARA audits for facilities using radioactive materials. Teach radiation safety officer training courses.
2002 - 2006	Sr. Scientist, MFG, Inc. Served as leader of the Natural Resources and Environmental Assessment Group. Conducted radiation risk assessments, dose calculations and field assessments of radioactivity for a variety of clients nationwide. Developed project proposals, work plans and cost estimates. Produced site investigation reports and monthly reports. Managed projects.
2000 - 2001	Manager, Western Operations, Advanced Infrastructure Management Technologies, a division of the Department of Energy's Y-12 National Security Complex, Oak Ridge, Tennessee. Responsible for twenty-five project managers in offices in Grand Junction, Colorado; Sacramento, California; and Lancaster, California. Projects included a variety of site assessment, risk analysis, and infrastructure improvements at numerous federal facilities nationwide. Projects were funded by Dept. of Energy, Dept. of Defense, Environmental Protection Agency, and others.
1983 - 2000	Leader, Environmental Technology Section (ETS), Life Sciences Division, Oak Ridge National Laboratory located in Grand Junction. Established the group to support USDOE Uranium Mill Tailings Remedial Action Project (UMTRAP). Staff also developed and applied innovative technologies and methodologies to remedy chemical and radiological pollution at numerous locations nationwide. Projects were funded by Dept. of Defense, Dept. of Energy, and other agencies.
1987 - 1998	Adjunct Professor, Department of Radiological Health Sciences, Colorado State University. Served on graduate research committees.
Fall 1979	Guest scientist, Federal Health Office, Munich, Federal Republic of Germany. Assisted in planning and implementing a monitoring system for actinides released from nuclear power plants in the Federal Republic.
1976 - 1982	Research Staff, Health and Safety Research Division, ORNL. Developed and applied computer codes to predict transport of nuclear and non-nuclear pollutants through the environment and subsequent impacts on ecosystems and human systems. Conducted research to assess the accuracy of environmental transport models.
Fall 1976	Environmental Research Assistant, Department of Radiology and Radiation Biology, Colorado State University. Collected environmental samples of plutonium for analysis; analyzed, reduced and summarized subsequent data for publication.

EDUCATION AND TRAINING

1976	Ph.D., Radioecology. Department of Radiology and Radiation Biology, Colorado State University, Ft. Collins, CO. Dissertation title: *Plutonium in a Grassland Ecosystem*.
1971	M.S., Radiation Biology/Health Physics. Department of Radiology and Radiation Biology, Colorado State University, Ft. Collins, CO.
1970	B. A., Biology. McPherson College, McPherson, KS.
1993	The Effective Executive. American Management Association, New York, NY
1989	Strategic Planning. American Management Association, New York, NY. Senior Project Management. American Management Association, New Your, NY.
1986	Cost and Schedule Control Systems Criteria (C/SCSC). Humphreys and Associates, Santa Clara, CA. Included project planning, work breakdown structures, and control systems.
1986	The Management Course. American Management Association, New York, NY. Four-week course covering all aspects of management including financial analysis of businesses, human resource management, and business simulation.

SELECTED PROJECTS

- Molycorp Minerals LLC. 2011. Performed audit of radiation safety program for Mountain Pass rare earth mine, Mountain Pass, California.
- Texas Commission for Environmental Quality. 2011. With two others, developed and delivered 160-hr radiological protection course to satisfy requirements of State of Texas for Waste Control Specialists by-product and low-level waste disposal facility.
- Bureau of Land Management. 2010. Served as advisor to third party oversight contractor for cleanup of abandoned uranium mines in Utah.
- Sandia National Laboratories. Member of 2010 – 2011 advisory committee for Global Threat Reduction Initiative at Sandia National Laboratories, Albuquerque, NM.
- U.S. Forest Service. 2010. Conducted radiological characterization and verification surveys at abandoned uranium mines on US Forest Service land in North Cave Hills area of South Dakota.
- Energy Fuels Resources, Inc. 2010. Modeled potential dose to members of the public for the proposed Pinon Ridge Uranium Milling Facility, Paradox CO. Energy Fuels Resources was awarded a license for the first commercial uranium milling facility in 30 yrs.
- UR Energy, Inc. 2010. Developed public dose estimates to support application for Nuclear Regulator Commission license for Lost Creek In Situ Uranium Recovery Facility, Wyoming.
- Cotter Corp. Annually. Develop estimates of potential public dose from uranium mill operations for Canon City Milling Facility.
- Annually, team-teach Radiation Safety Officer courses for uranium workers for a variety of facilities in western US.
- Los Alamos National Laboratory. 2009. Conducted audit of Rad-NESHAPS program at Los Alamos National Laboratory, Los Alamos, NM.
- Exxon/Mobil. Conducted ALARA audits of 2005 – 2009 radiation safety programs for the Highlands, Wyoming and Felder, Texas uranium recovery facilities.
- Cotter Corp, 2009. Developed 3-dimensional estimate of potential contamination using surface gamma scanning and bore hole sampling to support revision of financial surety bond.
- Energy Employee Occupational Illness Compensation Act Dose Reconstruction Project/Oak Ridge Associated Universities (ORAU), Cincinnati, Ohio. 2006 – 2009. Research, review and document
  technical bases for worker radiation exposure at former weapons manufacturing facilities. Development of Technical Basis Documents, Site Profiles and User's Guides for use in estimating historic worker exposure.
- Chamokane Creek Ecological and Human Health Risk Assessment, Washington. 2005. Conducted a human health risk assessment of potentially contaminated water seeping into a publicly accessible stream.
- Sequoyah Fuels Corporation, Oklahoma. 2005. Performed a human health risk assessment of uranium and heavy metal-bearing materials leaching from a former uranium concentration facility.
- Rocky Flats Environmental Technology Site (RFETS). 2004. Conducted a review of potential radiation
  doses and dose limits to terrestrial biota resident on the site. Compared existing dose limits in use at the site with approaches published for other facilities.
- Water Remediation Technology, Arvada, Colorado. Developed spreadsheet-based dose estimation software to calculate radiation exposure and dose to municipal employees from radium-bearing materials in water treatment tanks.
- Remedial Technology Evaluation, Department of Defense, Environmental Protection Agency. Evaluated a variety of novel remedial technologies to cleanup chemical and radiological pollutants in soil and groundwater at dozens of federal facilities nationwide.
- Uranium Mill Tailings Remedial Action Program (UMTRAP), Department of Energy. Conducted on-site radiation surveys on over 12,000 private and public properties in 10 states. Developed project schedule and allocated resources on this $40M effort.

OTHER ACTIVITIES

2005 - present	Editor-in-Chief, *Operational Radiation Safety* a quarterly supplement to *Health Physics,* the radiation protection journal published by Lippincott Williams and Wilkins for the Health Physics Society.
1999 – present	Member, Board of Trustees. McPherson College, McPherson, Kansas. Currently board chair.
1991 – present	Associate Editor, *Health Physics*, the radiation protection journal published by Lippincott Williams and Wilkins for the Health Physics Society.
2003 - 2009	Member, Board of Directors Marillac Clinic. Provides low-cost medical, dental and vision care to uninsured, low-income patients. Previously served as board president.
2000 - 2003	Member, Board of Director Health Physics Society.
1994 - 1996	Member, Board of Directors, Environmental Radiation Section, Health Physics Society.
1998 - 2001	Member, Board of Directors, Joint Utilization Commission and Riverview Technology Corp.; groups founded to negotiate and receive the DOE/Grand Junction property into private, non-for-profit ownership.

PUBLICATIONS AND PRESENTATIONS

Author or co-author of over 90 papers, publications and reports on a variety of topics. Presented numerous papers at professional meetings, as both contributing and invited speaker. Served on speaker's bureau of Oak Ridge Associated Universities for several different terms.

JANET A. JOHNSON, PHD, CHP, CIH

President, Sopris Environmental, Inc.

EDUCATION

PhD, Microbiology / Environmental Health, Colorado State University, 1986
MS, Health Physics, AEC Health Physics Fellow, University of Rochester, 1959
BS, Chemistry, University of Massachusetts, 1958

REGISTRATIONS/CERTIFICATIONS

Certified in the Comprehensive Practice of Health Physics, American Board of Health Physics since 1976
Certified Industrial Hygienist (Radiological Aspects) since 1986

EXPERIENCE SUMMARY

Dr. Johnson has extensive experience in radiation health physics including radiation worker training, NRC and Agreement State radioactive materials license applications; uranium recovery facility environmental and occupational radiation protection; radiation safety for naturally occurring radioactive materials; Radiation Safety Officer (RSO) training; radiation risk assessment; radon measurements and radon risk assessment; radiological site surveys Including MARSSIM-based characterization and RESRAD dose analyses.

Dr. Johnson has evaluated radiation dose and risk from facilities with residual radioactive materials from both licensed activities and from naturally occurring radioactive materials, with a primary focus for the last seventeen years on uranium recovery facilities and mine remediation. She has developed and implemented radiation safety training programs for workers and radiation safety officers. Dr. Johnson taught in the Department of Radiological Health Sciences at Colorado State University for fourteen years, and is a member of the Department's Advisory Board (currently the Department of Environmental and Radiological Health Sciences). She is working on radiological aspects of the reclamation plans for several uranium mills and has performed risk assessments for a variety of uranium recovery facilities. She is the Radiation Safety Officer of record for the Dawn Mining Company Millsite.

Dr. Johnson was a member of the Environmental Protection Agency Science Advisory Board (SAB) Radiation Advisory Committee (RAC) from 1995 to 2003. She chaired the RAC from 1999 through 2003. During her tenure on the committee the RAC reviewed the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and the Multi-Agency Radiation Laboratory Analytical Protocols Manual (MARLAP) as well as the EPA's approach to diffuse NORM. She was also on the EPA SAB panel that reviewed the Multi-Agency Survey and Assessment of Materials and Equipment Manual (MARSAME). In 2011 she served on an EPA SAB Panel providing advice to the Multi-Agency work group on revisions to MARSSIM.

Dr. Johnson is a member of Scientific Committee 64-22 of the National Council on Radiation Protection and Measurements (NCRP) updating the NCRP Report on Environmental Surveillance. She is currently a member of ANSI N 13.8 Committee redeveloping standards for the protection of uranium miners. She is part of a team that annually presents refresher training classes for uranium recovery facility RSOs. In 2011 the team presented a four weeks of uranium-specific training for the Texas Commission on Environmental Quality (TCEQ).

Dr. Johnson managed the environmental health and safety program at Colorado State University from 1993 to 1995. The program included industrial hygiene, radiation protection, hazardous waste management, and biosafety. Dr. Johnson served on the Westinghouse Government Operations Nuclear Safety and Environmental Oversight Committee. In that capacity she visited six of the major facilities for which Westinghouse was a contractor during the late 1980s and early 1990s.

REPRESENTATIVE PROJECT EXPERIENCE

- ***Radiological Site Assessment.*** Background radiation measurement and assessment of impacts of uranium recovery operations in regard to the reclamation plan.

- ***MARSSIM Site Characterization.*** Preparation and oversight of site characterization based on MARSSIM.

- ***Risk Assessment for Uranium Mill Reclamation Plans.*** Preparation of dose/risk assessment under routine operating conditions and potential accident scenarios for a reclamation plan.

- ***Uranium Mill Tailings Remedial Action Program Health and Safety Audit.*** Industrial hygiene and radiation protection.

- ***Westinghouse Government Operations Nuclear Safety and Environmental Oversight Committee.*** Review of safety and environmental programs at DOE sites managed and operated by Westinghouse, including evaluation of Total Quality Management programs as they pertained to environmental protection and safety.

- ***Health Risk Assessment Panel Subcommittee.*** Preparation of toxicity profiles and radiation risk assessment (Cotter Corporation Canon City Uranium Mill)

- ***Radiation Training.*** Development and presentation of Radiation Safety Training and Hazardous Waste Operations Training, including training and regulatory compliance for radioactive materials licensees.

- ***NORM Risk Assessment.*** Risk assessment for Naturally Occurring Radioactive Materials (NORM).

- ***University Environmental Health and Safety Program.*** Managed the environmental health and safety program for Colorado State University including routine operations, strategic planning, budgeting and personnel.

- ***University Hazardous Waste Program.*** Managed hazardous waste program for Colorado State University including routine disposal, environmental restoration and emergency response.

- ***Industrial Hygiene Course.*** Taught basic industrial hygiene course.

- ***Radiation Courses.*** Taught radiation physics and radiochemistry laboratories and radiation chemistry course.

- ***Occupational Health and Safety Review.*** Occupational health and safety review for a gold mine in Peru.

- ***Radiological Survey.*** Baseline radiological survey for an in situ uranium recovery operation in Kazakhstan.

- ***Radiation Safety Officer Course.*** Taught and developed a training manual for a 40-hour radiation safety officer (RSO) training class for NORM and Uranium facilities.

SUMMARY OF CURRENT AND PREVIOUS PROFESSIONAL AFFILIATIONS

American Industrial Hygiene Association

American Academy of Health Physics

American Academy of Industrial Hygiene

Colorado Radiation Advisory Committee, 1988-present

Colorado Hazardous Waste Commission, 1993-1997

EPA Science Advisory Board, Radiation Advisory Committee, 1994-2003 (Chair 1999-2003)
EPA Science Advisory Board, Executive Committee, 1999 – 2003

Governor's Rocky Flats Scientific Panel on Monitoring, 1989-1992.
Chair, Radiation Committee

Health Physics Society
Fellow
Chair, Nominating Committee, 1990
Chair, Public Education Committee, 1992-1995
Board of Directors, 2000
Secretary-Treasurer, Radon Section, 1996
President, Environmental/Radon Section, 2009-2010
Chair, Ad Hoc Committee, HPS Position Statement on Indoor Radon
2009 Summer School on NORM, faculty and co-author of the text chapter on uranium recovery

National Academy of Sciences Committee on Low-Level Radioactive Waste Siting, New York State, 1993-1996

NCRP Scientific Committee 64-22 (Environmental Measurements)

REPRESENTATIVE JOURNAL PUBLICATIONS AND PROCEEDINGS

Johnson, J.A. Riding the RCRA Roller Coaster - Adventures in closing a micro-mixed waste site. Managing Radioactive and Mixed Waste, *Proceedings of the Twenty-seventh Midyear Topical Meeting of the Health Physics Society.* February 1994.

Johnson, J.A., R.M. Buchan and J.S. Reif. Effect of waste anesthetic gas and vapor exposure on reproductive outcome in veterinary personnel. *American Industrial Hygiene Association Journal* 48(1): 62-66, 1987.

Johnson, J.E. and J.A. Johnson: Radioactivity and detection limit problems of environmental surveillance at a gas-cooled reactor. *ACS symposium Series 361, detection in Analytical Chemistry, Importance, Theory, and Practice.* American Chemical Society, Washington, DC, 1988.

Borak, T.B., J.A. Johnson and K.J. Schiager. A comparison of radioactivity and silica standards for limiting dust exposures in uranium mines. In *Radiation Hazards in Mining: Control, Measurement and Medical Aspects*, M. Gomez, ed. Society of Mining Engineers. New York, NY, 1981.

Borak, T.B., E. Franko, K.J. Schiager, J.A. Johnson and R.F. Holub. Evaluation of recent developments in radon progeny measurements. In *Radiation Hazards in Mining: Control, Measurement and Medial Aspects,* M. Gomez, ed. Society of Mining Engineers, New York, NY, 1981.

Johnson, J.A., K.J. Schiager, T.B. Borak. Contribution of human errors to uncertainties in radiation measurements and implications for training. In Radiation *Hazards in Mining: Control, Measurement and Medical Aspects,* M. Gomez, ed. Society of Mining Engineers, New York, NY, 1981.

Schiager, J.J., J.A. Johnson and T.B. Borak. Radiation monitoring priorities for uranium miners. In *Radiation Hazards in Mining: Control, Measurement and Medical Aspects*, M. Gomez, ed. Society of Mining Engineers, New York, NY, 1981.

Johnson, J.A. "Basic Radiation Protection for Use of Radionuclides in Laboratories," 1991. Teaching manual for forty-hour course.

REPORTS

Hersloff, J., J.A. Johnson and S. Ibrahim. *Radiological Risk Assessment of Abandoned Mine Lands, Radium Land Clean-up Standard*. Wyoming Department of Environmental Quality, 1988.

Borak, T.B. and J.A. Johnson. *Estimating the Risk of Lung cancer from Inhalation of Radon Daughters Indoors: Review and Evaluation.* Colorado State University for USEPA, 1988.

Schiager, K.J., T.B. Borak and J.A. Johnson*. Radiation Monitoring for Uranium Miners: Evaluation and Optimization.* U.S. Department of the Interior, Bureau of Mines. Final Report on contract.

TECHNICAL PRESENTATIONS

Dr. Johnson has presented numerous technical papers at Health Physics Society Annual Meetings, Mid-year Symposia, Mill Tailings Conferences, American Industrial Hygiene Association Conferences, and a meeting of the American Veterinary Medicine Association. In addition she presented an oral paper and a poster at a conference on uranium in groundwater in Frieburg Germany (1998) and presented an invited paper on uranium mining at a SCOPE Radsite meeting in Munich in September 2000. Dr. Johnson presented an invited paper on the effects of radon and smoking at the American Radiation Safety Conference and Exposition in San Diego in June 2003.

H. ROBERT MEYER, Ph.D.

EDUCATION

Ph.D., Radiation Biology, Colorado State University, 1977

M.S., Health Physics, CSU, 1973

Graduate, U.S. Navy Officer Candidate School, Newport, Rhode Island, 1969

B.A., Physics, St. Olaf College, 1967

CERTIFICATIONS/CLEARANCES

RESRAD risk assessment certified, Argonne National Laboratory

ASTM Phase 1 Site Assessment Professional, certified via ASTM course

Accreditation Board for Engineering and Technology, Certified University Health Physics Program Evaluator

Commissioned Line Officer, U.S. Naval Reserve (1969-72 active shipboard duty)

Security Clearance: U.S. DOE Q (inactive); U.S. Navy Secret (inactive)

SUMMARY OF 35 YEARS EXPERIENCE IN RADIATION PROTECTION AND MEASUREMENTS

- Seven years on the research staff at Oak Ridge National Laboratory. Environmental assessment research: nuclear fuel cycle human health risk assessment, alternative energy source risk assessment.
- Seven years managing uranium-related remedial action radiation protection, measurement and environmental modeling on the Uranium Mill Tailings Remedial Action Project. Responsible for worker and environmental radiation protection, and verification of cleanup.
- Radiation protection and measurement expertise including development of RTRAK, a patented environmental radiation gamma scanning mobile data collection system.
- Vice President and Project Manager, Low Level Radioactive Waste siting and design contract from the Commonwealth of Pennsylvania – project included development of 88-layer GIS-linked mapped database describing key geotechnical and other features of the Commonwealth.
- Researcher and project spokesman, Environmental Dose Reconstruction projects for the USCDC at Savannah River National Laboratory, and for the State of Colorado at the Rocky Flats Plant.
- Researcher and subcontract manager – NIOSH-funded worker dose reconstruction and compensation project. Subcontracted to Oak Ridge Associated Universities, Cincinnati.
- Uranium mill site license-designated Radiation Safety Officer for remedial actions at Conquista and Felder Ray Point sites in Texas, and Highlands site in Wyoming.
- Licensing consultant: new uranium mine facilities in Wyoming, specializing in regulatory compliance and site characterization.
- Public involvement experience including some 150 public meeting presentations on radioactive materials cleanup and protection.
- Instructor:
  - Radiation Safety Officer 40-hour training - annual courses presented to practicing RSO's during the last 10 years;
  - Radiation protection and measurements short course presented to California regulatory authorities;
  - Texas license-required 240 hour training program in byproduct uranium-related materials and low-level radioactive waste management, for Waste Control Specialists, Andrews TX;
  - 240-hour course on radiation protection and measurements for Texas Commission on Environmental Quality staff and uranium facility licensees, in Austin TX;
  - Radiation protection and safety annual training instructor for ExxonMobil, ConocoPhillips and Rio Tinto corporations at facilities in Texas and Wyoming
- Co-editor and co-author, "Radiological Assessment", USNRC, USDOE-sponsored 900 page graduate hardcover textbook on radioactive materials environmental transport, modeling, uptake and human health risk assessment.

Examples of Specific Projects:

UMTRA Project. Managed all radiation worker and environmental protection and measurements from startup for 7 years, 20 remedial action sites, up to 138 HP staff, total of some 2000 workers.

Savannah River National Laboratory, Rocky Flats Plant, Idaho National Laboratory. Environmental dose reconstruction projects, research staff member and project spokesman for 7 years.

AATA/JV Inkai. Developed and performed portions of radiation environmental assessment for proposed in situ leach uranium mine in central Kazakhstan.

Cotter Corporation. State license application assistance, radiation protection consulting, annual report MILDOS operation evaluations, management consulting.

MolyCorp Inc. State license application assistance, remedial action consulting. Cost-effectiveness evaluation of remedial action project underway in Pennsylvania.

City of Fallon, NV. Health risk assessment, assistance in coordination with State and Federal agencies.

EMC2, Phelps Dodge Corporation. Developed and performed NORM site scanning and sampling project, performing health risk assessment to evaluate need for remedial action.

B. Thomas Cook Esq. Health risk evaluation for confidential client related to uranium mine/mill operations.

Cogema Inc. ASTM Phase I pre-purchase property evaluations, including radiation health risk.

Accreditation Board for Engineering and Technology. Review of five University health physics programs (undergraduate and graduate) for ABET accreditation.

ConocoPhillips and ExxonMobil. Remedial action planning, execution, radiation protection, measurements, regulatory compliance. RSO-of-Record on Conoco-Phillips license at facilities completing remedial actions in Texas and Wyoming.

Uranium ISL facility licensing assistance for Ur-Energy, Uranium One, Energy Metals, STRATA, Titan Uranium, AUC Inc.. Site characterization and environmental assessment work supporting license applications.

PROFESSIONAL AFFILIATIONS

Health Physics Society

National Council on Radiation Protection and Measurements (committee member)

US EPA Science Advisory Board, Radiation Advisory Committee

National Academy of Sciences, Board on Radioactive Waste Management

National Academy of Sciences, Subcommittees: Review of the New York State Low Level Waste Siting Project; DOE Site Decommissioning; The National Low Level Radioactive Waste Problem

International Atomic Energy Agency, Consultant: Uranium mill tailings characterization systems; Response methods for nuclear accidents.

TRAINING AND CONSULTING ACTIVITIES

High intensity training: “Dealing with the Media”, 1-week course directed by Dr. Leonard Roller, 1989.

Consultant, International Atomic Energy Agency. Co-authored IAEA Technical Report STI/DOC/10/327, “Planning for Cleanup of Large Areas Contaminated as a Result of a Nuclear Accident,” 1988.

Consultant to the USEPA Science Advisory Board, technical review of National Emissions Standards for Hazardous Air Pollutants, 1988.

Consultant to the Centers for Disease Control, Fernald Dose Assessment Project, 1987.

Invited participant, “European Seminar on the Risks from Tritium Exposure,” Mol, Belgium, November 1982.

Invited participant, “Light Water Reactor Accident Mitigation Workshop,” West Germany, April 1981.

Faculty Affiliate, Colorado State University, Ph.D. committee member, 1980 to 1982.

Governor's Planning Committee for the Management of Radioactive and Hazardous Wastes for the State of Tennessee, 1979 to 1980.

SELECTED PUBLICATIONS

Coffman, J., **H.R. Meyer**, and D. Skinner. 1984. “Radiological Measurements to Support Remedial Action on Uranium Mill Tailings.” Proceedings of the American Nuclear Society Annual Meeting.

Meyer, H.R., D. Skinner, J. Coffman, and J. Arthur. 1984. "Environmental Protection in the UMTRA Project." Proceedings of the Fifth U.S. Department of Energy Environmental Protection Information Meeting. CONF-841187, Volume 2. November.

Meyer, H.R and J. Purvis. 1985. "Development of an Interference-Corrected Soil Radium Measurement System." Proceedings of the American Nuclear Society Annual Meeting. San Francisco, California. November. 184–186.

Meyer, H.R, D. Skinner, and J. Coffman. 1985. "Environmental Monitoring in the UMTRA Project." Proceedings of the Health Physics Society Midyear Symposium on Environmental Radioactivity. Colorado Springs, Colorado. January.

Skinner, D. and **H.R. Meyer**. 1985. "Demonstration of 10CFR20 Air Particulate Compliance Requirements on the UMTRA Project." Proceedings of the Health Physics Society Midyear Symposium on Environmental Radioactivity. Colorado Springs, Colorado. January.

Meyer, H.R and D. Skinner. 1986. "Public Information Experience in the UMTRA Project." Proceedings of the Health Physics Society Midyear Symposium. Knoxville, Tennessee. February.

Skinner, D., **H.R. Meyer**, and L.G. Hoffman. 1986. "Environmental Monitoring Requirements During Remedial Action and Stabilization of the Uranium Mill Tailings Project." Proceedings of the Health Physics Society Midyear Symposium. Knoxville, Tennessee. February.

Meyer, H.R. 1987. "Hazardous and Radioactive Wastes: Public Health Issues and Concerns." Proceedings of the American Institute of Chemical Engineers Meeting. Houston, Texas. March.

Meyer, H.R. and C. Daily. 1987. "QA Verification Procedures in Uranium Mill Tailings Processing Site Remedial Action." Proceedings of the American Society for Quality Control, Second Topical Conference on Nuclear Waste Management Quality Assurance. Las Vegas, Nevada, February 9-11, 1987.

Meyer, H.R., C. Begley, and C. Daily. 1987. "Field Instruments Developed for Use on the UMTRA Project." Proceedings of the Waste Management 1987 Annual Meeting. University of Arizona, Tucson. March.

Reith, C.H., R. Richey, M. Matthews, **H.R. Meyer**, C. Daily, F. Petelka, W. Glover, D. Lechel, and J.E. Till. 1988. "Characterization and Remedial Planning for Non-Radiological Toxicants at UMTRA Project Sites." In Waste Management 88. Edited by R.G. Post and M.E. Wacks. Tucson, Arizona: University of Arizona Press.

J.A. Johnson, **H.R. Meyer**, and M. Vidyasagar, "Characterization of Surface Soils at a Former Uranium Mill. Operational Radiation Safety," Supplement to Health Physics, Vol. 90, (February, 2006).

H.R. Meyer, M. Shields, and S. Green, "A GPS-based system for preliminary or remedial action gamma scanning," American Nuclear Society Topical Meeting on Decommissioning, Decontamination, & Reutilization. Denver, Colorado, (August 7-11, 2005).

H.R. Meyer, M. Shields, S. Green, and J. Johnson, "A GPS-based system for radium/uranium contamination gamma scanning. Uranium Mining and Hydrogeology IV. Broder J. Merkel, Andrea Hasche-Berger (Editors). Uranium in the Environment, conference proceedings, Freiberg, Germany (September 2005).

H.R. Meyer, "Parallel Universes: GPS-Based Radiation Mapping for Both Pre-Licensing and License Termination, Proceedings," WM2010, Phoenix (March 2010).

Meyer, H.R., and J.E. Till. 1978. "Global/Generic Studies." In HTGR Fuel Recycle Development Program Annual Report. ORNL-5423. Oak Ridge National Laboratory.

Meyer, H.R., J.E. Till, E.A. Bondietti, D.E. Dunning, C.S. Fore, C.T. Garten, Jr., and S.V. Kaye. 1978. Nonproliferative Alternative Systems Assessment Program - Preliminary Environmental Assessment of Thorium/Uranium Fuel Cycle Systems. ORNL/TM-6069. Oak Ridge National Laboratory. June.

Meyer, H.R., and J.E. Till. 1978. "Radiological Hazards of Denatured U-233 Fuel." In Interim Assessment of the Denatured U Fuel Cycle. Edited by L.S. Abbott, D.E. Bartine and T.J. Burns. ORNL-5388. Oak Ridge National Laboratory. December.

Tennery, V.J., E.S. Bomar, W.D. Bond, L.E. Morse, **H.R. Meyer** and J.E. Till. 1978. Environmental Assessment of Alternate FBR Fuels: Radiological Assessment of Reprocessing and Refabrication of Thorium/Uranium Carbide Fuels. ORNL/TM-6493. Oak Ridge National Laboratory. August.

Tennery, V.J., E.S. Bomar, W.D. Bond, L.E. Morse, **H.R. Meyer**, J.E. Till and M.G. Yalcintas. 1978. Environmental Assessment of Advanced FBR Fuels: Radiological Assessment of Airborne Releases from Thorium Mining and Milling. ORNL/TM-6474. Oak Ridge National Laboratory. October.

Faust, R.A., C.S. Fore, M.V. Cone, **H.R. Meyer** and J.E. Till. 1979. Biomedical and Environmental Aspects of the Thorium Fuel Cycle. ORNL/EIS-111. Oak Ridge National Laboratory. July.

Meyer, H.R. and J.E. Till. 1979. "Anticipated Radiological Impacts of the Mining and Milling of Thorium for the Nonproliferative Fuels." Proceedings of the Symposium–Radioactivity and Environment. Edited by W. Feldt. German-Swiss Society for Radiation Protection, Norderney, Federal Republic of Germany, October 2–6, 1978, IRPA.

Meyer, H.R, C.A. Little, J.P. Witherspoon and J.E. Till. 1979. "A Comparison of Potential Radiological Impacts of U-233 and Pu-239 Fuel Cycles." Transactions of the American Nuclear Society, Winter Meeting, November 12–16, 1979.

Meyer, H.R, J.E. Till, E.S. Bomar, W.D. Bond, L.E. Morse, V.J. Tennery, and M.G. Yalcintas. 1979. "Radiological Impacts of Thorium Mining and Milling." Nuclear Safety 20 (3). June.

Meyer, H.R, D.E. Dunning, D.C. Kocher and K.K. Kanak. 1980. "Dose Conversion Factors." In Recommendations Concerning Models and Parameters Best Suited to Breeder Reactor Environmental Radiological Assessments. Edited by C.W. Miller. ORNL-5529. Oak Ridge National Laboratory. May.

Tennery, V.J., E.S. Bomar, W.D. Bond, **H.R. Meyer**, L.E. Morse, J.E. Till and M.G. Yalcintas. 1980. Summary of the Radiological Assessment of the Fuel Cycle for a Thorium-Uranium Carbide-Fueled Fast Breeder Reactor. ORNL/TM-6953. Oak Ridge National Laboratory. January.

Till, J.E., **H.R. Meyer**, V.J. Tennery, E.S. Bomar, M.G. Yalcintas, L.E. Morse, and W.D. Bond. 1980. "Reprocessing Nuclear Fuels of the Future: A Radiological Assessment of Advanced (Th, U) Carbide Fuel." Nuclear Technology 48 (1). April.

Travis, C.C., **H.R. Meyer**, and C.S. Dudney. 1980. "Health and Environmental Effects of Residential Wood Heat." Proceedings of the National Conference on Renewable Energy Technologies. Honolulu, Hawaii, December 7–11, 1980.

Meyer, H.R. 1981. "Radiological Assessment of an Alternate Breeder Reactor Fuel Cycle." In Symposium on Intermediate Range Atmospheric Transport Processes and Technology Assessment. Edited by C.W. Miller, S.J. Cotter and S.R. Hanna. U.S. Department of Energy CONF-801064. October.

Meyer, H.R. 1982. "Health and Environmental Effects." In Life Sciences Synthetic Fuels Semi-Annual Progress Report. Edited by K.E. Cowser. ORNL/TM-8229. Oak Ridge National Laboratory. May.

Meyer, H.R., J.P. Witherspoon, J.P. McBride, and E.J. Frederick. 1982. Comparison of the Radiological Impacts of Thorium and Uranium Nuclear Fuel Cycles. NUREG/CR-2184. U.S. Nuclear Regulatory Commission. April.

Smith, W.J., F.W. Whicker, and **H.R. Meyer**. 1982. "A Review and Categorization of Saltation, Suspension, and Resuspension Models." Nuclear Safety 23 (6). November–December.

DesRosiers, A.E., **H.R. Meyer**, R.E. Swaja, and K. Brusserman. 1983. "Emergency Planning for Accident Mitigation." In Report of the Workshop on the Evaluation and Mitigation of the Consequences of Accidental Releases of Radioactivity: Identification of Uncertainties. Bad Munstereifel, Federal Republic of Germany.

Killough, G.G., **H.R. Meyer**, and D.E. Dunning. "Radionuclide Dosimetry." In Models and Parameters for Environmental Radiological Assessments. Edited by C.W. Miller. U.S. Department of Energy Critical Review Series.

Meyer, H.R, and G. Holton, "Modeling the Potential Public Health Impacts of Airborne Releases." In Proceedings of the Health and Environmental Risk Analysis Workshop. Brookhaven National Laboratory, Upton, New York.

Meyer, H.R., C.W. Miller, A.E. DesRosiers, G. Stoetzel, D. Strenge, and R.E. Swaja. 1983. "Assessment of Accidental Releases of Radionuclides." In Radiological Assessment: A Textbook on Environmental Dose Analysis. Chapter 14. Edited by J.E. Till and H.R. Meyer. NUREG/CR-3332, ORNL-5968. U.S. Nuclear Regulatory Commission.

Faraday, M.A., B. Legrand, and **H.R. Meyer**. 1991. Planning for Cleanup of Large Areas Contaminated as a Result of a Nuclear Accident. IAEA STI/DOC/10/327. Vienna.

Wiltshire, S., R. Ahrens, G. Anderson, C. Baskerville, R. Bassett, L. Brothers, H. Brown, G. Cederberg, J. Croes, W. Dornsife, J. Ebel, W. Freudenburg, R. Hatcher, C. Hornibrook, J. Johnson, L. Lehman, **H.R. Meyer**, D. Roy, M. Salamon, L. Slosky, and A. Socolow. 1996. Review of New York State Low-Level Radioactive

Waste Siting Process. National Research Council, National Academy of Sciences. Washington, D.C.: National Academy Press.

Till, J.E., A.S. Rood, P.G. Voillequé, P.D. McGavran, K.R. Meyer, H.A. Grogan, W.K. Sinclair, J.W. Aanenson, **H.R. Meyer**, S.K. Rope, and M.J. Case. 2002. Risks to the public from historical releases of radionuclides and chemicals at the Rocky Flats Nuclear Weapons Plant. Journal of Exposure Analysis and Epidemiology 12(5): 355-372.

Chen, Shih-Yew, D.J. Strom, J.G. Yusko, A. LaMastra, **H.R. Meyer**, D.W. Moeller. 2002. Managing potentially radioactive scrap metal. National Council on Radiation Protection and Measurements Report No. 141. November.

SELECTED PRESENTATIONS

Meyer, H.R. 1984. "Environmental Assessment in the UMTRA Project." Health Physics Society Annual Meeting, New Orleans, Louisiana, June.

Meyer, H.R. 1984. "Relative Risks Associated with the Uranium Mill Tailings Remedial Action (UMTRA) Program." Series of public meetings held in Canonsburg, Pennsylvania, before cleanup of the uranium mill tailings site. August 21–24.

Meyer, H.R. 1984. "Environmental Protection in the UMTRA Project." Fifth U.S. Department of Energy Environmental Protection Information Meeting, Albuquerque, New Mexico, November.

Meyer, H.R. 1985. "Analysis of Radon and Air Particulate Data in the UMTRA Project." Health Physics Society Midyear Symposium on Environmental Radioactivity, Colorado Springs, Colorado, January.

Meyer, H.R. 1985. "The UMTRA Project Health Physics Program." Presented to the U.S. Department of Energy Policy, Safety and Environment Appraisal Team, C. Welty, Chair, Albuquerque, New Mexico, April.

Meyer, H.R. 1985. "Relative Risks Associated with the Uranium Mill Tailings Remedial Action (UMTRA) Program." Presented in a series of public meetings held in Tuba City, Window Rock, and Moenkopi, Arizona, before the cleanup of mill tailings sites, October 8–9.

Meyer, H.R. and J. Purvis. 1985. "Development of an Interference-Corrected Soil Radium Measurement System." American Nuclear Society Annual Meeting (invited paper), San Francisco, California, November.

Meyer, H.R. 1986. "Review of Uranium Mill Tailings Remedial Action Project." Presented at the U.S. Department of Energy Remedial Action Contractors Annual Meeting, Oak Ridge, Tennessee, May 5–6.

Meyer, H.R. 1986. "Relative Risks Associated with the Uranium Mill Tailings Remedial Action (UMTRA) Program." Presented at a public meeting to explain the UMTRAP radiation protection program before cleanup work began. Lakeview, Oregon, May 20.

Meyer, H.R. 1986. "Health Risk Experience on the UMTRA Project." Presented at a U.S. Dept. of Energy Seminar on Concerns of Insurance Companies Regarding Remedial Action Risk, Denver CO, November.

Meyer, H.R. 1987. "Instrumentation and Quality Control Techniques for Mill Tailings Remedial Action." Invited presentation at a U.S. Nuclear Regulatory Commission Workshop for Mill Owners, Denver, Colorado, June 3.

Meyer, H.R. 1987. "Relative Risks Associated with the Uranium Mill Tailings Remedial Action (UMTRA) Program." A series of public meetings held to discuss the UMTRA Project radiation protection program before cleanup began. Held in Durango, Colorado, January 20; Rifle, Colorado, May 21; Gunnison, Colorado, July 7; and Mexican Hat, Utah, July 14.

Meyer, H.R. et al. 1978. "Thorium Mining and Milling—An Analysis of Radiological Impacts." Health Physics Society Annual Meeting, Minneapolis, Minnesota, June.

Meyer, H.R. 1979. "An Overview of the Radiological Risks Associated with Thorium Mining in the Lemhi Pass Region." Department of Radiology and Radiation Biology Seminar Series, Colorado State University, Fort Collins, Colorado, May.

Meyer, H.R., C.A. Little, J.P. Witherspoon, and J.E. Till. 1979. "A Comparison of Potential Radiological Impacts of 233U and 239Pu Fuel Cycles." American Nuclear Society Winter Meeting, San Francisco, California, November.

Meyer, H.R. et al. 1979. "Recycle of Thorium-Uranium Fuels—A Radiological Assessment." Health Physics Society Annual Meeting, July.

Meyer, H.R. 1980. "Radiological Assessment of an Alternate Breeder Reactor Fuel Cycle." Presented at the Symposium on Intermediate Range Atmospheric Transport Processes and Technology Assessment, Gatlinburg, Tennessee, October 1–3.

Meyer, H.R. 1982. "Reactor Emergency Planning—Analysis of Key Uncertainties." Presented at the Annual Health Physics Society Meeting, Las Vegas, Nevada, June 30.

Meyer, H.R. 1982. "Long Range Transport and Effects Modeling." Invited presentation at the U.S. Department of Energy Workshop on Risk Assessment Modeling, Airlie House, Virginia, August 2–4.

Meyer, H.R. 1982. "Assessment of Dose from Tritium Releases—Application of Environmental Transport Models" and "Tritium Source Terms." Invited presentations at the European Seminar on the Risks from Tritium Exposure. Sponsored jointly by CEC, CEN/SCK, Mol, Belgium, November 22.

Meyer, H.R. 1989. "Risk Assessment—Disposal in Arid Lands." American Association for the Advancement of Science, Southwest Chapter, topical meeting, Las Cruces, New Mexico, April 6.

Meyer, H.R. 1989. "Proposed LLRW Facility Contract Status and Schedule, Site Screening and Characterization, Design and Operation." Invited presentation, Penn State University, State College, Pennsylvania, November 4.

Meyer, H.R. 1989. "Site Screening and Characterization, Facility Design, Contract Status." Invited presentation, Sierra Club, Pennsylvania PA Chapter, and Environmental Coalition on Nuclear Power joint meeting, State College, Pennsylvania, November 18.

Meyer, H.R., V.J. Barnhart, and M.T. Ryan. 1989. "Developing a Low Level Radioactive Waste Site for the Commonwealth." A series of seven public presentations throughout Pennsylvania, January–February.

Meyer, H.R. 1990. "Political, Administrative and Public Information Aspects." Invited lecture, Management and Disposal of Radioactive Wastes, Harvard School of Public Health, Boston, Massachusetts, July 18.

Meyer, H.R. 1991. "Siting a Low-Level Radioactive Waste Facility for the Commonwealth." Invited presentation, Three Mile Island Alert Annual Meeting, Harrisburg, Pennsylvania, March 28.

Meyer, H.R. 1991. "The Pennsylvania Low-Level Radioactive Waste Facility Siting Process; Host Community Benefits." Invited presentation, North West Planning Commission, Franklin, Pennsylvania, May 3.

Meyer, H.R. 1991. "Low Level Radioactive Waste." Invited presentation, Pennsylvania League of Women Voters Annual Meeting, Ligonier, Pennsylvania, May 11.

Meyer, H.R. 1991. "Political, Administrative and Public Information Aspects." Invited lecture in "Management and Disposal of Radioactive Wastes." Harvard School of Public Health, Boston, Massachusetts, July 17.

Meyer, H.R. 1991. "Siting a Low Level Radioactive Waste Facility in Pennsylvania—Risk Communication in the Correct Direction." Opening invited paper, Plenary Session, Risk Communication for the 90's, Annual Health Physics Society National Meeting, Washington, D.C. July 22.

Meyer, H.R. 1991. "Risk Communication in the Right Direction." Invited presentation, joint meeting, American Nuclear Society Northern Ohio Section and Health Physics Society Northern Ohio Section, Independence, Ohio, September 11.

Meyer, H.R. 1994. "Windblown Suspension of Plutonium from the Rocky Flats Plant." Public workshop, Boulder, Colorado, June.

Meyer, H.R. 1998. Instructor, Risk Assessment Modeling, RAC-sponsored public course in Radiological Risk Assessment, Seattle, Washington.

PROFESSIONAL EMPLOYMENT HISTORY

Vice President, Keystone Scientific, Inc., 1992 to present

Senior Scientist/Project Manager, Tetra Tech Inc., 2001 to 2011

Vice President, Chem-Nuclear Systems, Inc., 1990 to 1992

Executive Director, Chem-Nuclear Systems, Inc., 1983 to 1990

Research Staff Member, Oak Ridge National Laboratory, 1976 to 1983

Line Officer, U.S. Naval Reserve, 1969 to 1972

AWARDS

Society for Technical Communications 1985 Award for “Radiological Assessment – A Textbook on Environmental Dose Analysis," edited by John E. Till and **H. Robert Meyer**, NUREG/CR-3332.

Society for Technical Communications 1980 Award for “Radiological Impact of Thorium Mining and Milling,” H.R. Meyer et al., Nuclear Safety 20 (3).

American Nuclear Society's P.W. Jacoe Award–outstanding nuclear science student, 1976.

Phi Kappa Phi Graduate Honor Society, 1976.

Distinguished Naval Graduate, Officer Candidate School, 1969.

NASA Summer Fellowship, 1966.

PATENT

RTRAK auto-locating mobile gamma scanning system, U.S. Patent #5,025,150, J. Oldham, **H.R. Meyer**, C. Begley, C. Spencer, 1991.

EDGAR D. BAILEY, P.E., CHP
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Bachelor of Engineering Science (Nuclear Power Option), The University of Texas, 1965
Master of Science in Environmental Health Engineering (Radiological Health), The University of Texas, 1967
Certified by the American Board of Health Physics since 1985
Registered Professional Engineer since 1976

PROFESSIONAL EXPERIENCE

- 2007 – Present: Consultant on Radiation and Nuclear Safety and Security, Health Physics, and Radiation Protection Engineering
- 2009 – Present: Principal Engineer Analyst, Qi Tech, LLC
- 2006 – Present: Principal System Analyst, Advanced Systems Technology and Management, Inc.
- 2006 – 2007: Chief, Waste Licensing Program, Radiation Safety Licensing Branch, Texas Department of State Health Services
- 1989 – 2006: Chief, Radiologic Health Branch, California Department of Health Services (Retired 2006)
- 1971 – 1989: Chief, Division of Licensing, Registration, and Standards (and various other positions), Bureau of Radiation Control, Texas Department of Health
- 1969 – 1971: Active Duty as Officer in the U. S. Army (Retired 2000)
- 1968 – 1969: License Reviewer, Radiation Control Branch, Texas Department of Health
- 1965 – 1968: Assistant Corporate Health Physicist, Texas Nuclear Corporation

PRESENT PROFESSIONAL AFFILIATIONS AND ACTIVITIES

- Conference of Radiation Control Program Directors, Life Member
  - Advisor, SR-U Part U of the Suggested State Regulations for Control of Radiation
  - Advisor, G-34 Committee on Industrial Radiography
- Health Physics Society, Plenary Member since 1966, Fellow (2004)
  - Member, Board of Directors
  - Member, Military Health Physics Section
  - Member, Environmental Section
  - Member, Decommissioning Section
- South Texas Chapter of HPS
  - Member
  - Member, Program Committee
  - Treasurer Elect
- Northern California Chapter of HPS
  - Member
- Southern California Chapter of HPS
  - Member
- National Council on Radiation Protection and Measurements
  - Member, Program Area Committee 2 – Operational Radiation Safety
  - Member, Scientific Committee 46-17 – Radiation Protection in Educational Institutions (NCRP Report No. 157)
  - Member, Scientific Committee 2-4 –Self Assessment of Radiation-Safety Programs (NCRP Report No. 162)

PAST PROFESSIONAL ACTIVITIES

- Conference of Radiation Control Program Directors
  - Chair-Elect, Chair, Past Chair, and Member-at-Large of the Board
  - Chair, NARM Committee
  - Member, Part E of the Suggested State Regulations for Control of Radiation
  - Member, Part W of the Suggested State Regulations for Control of Radiation
  - Chair, SR-U Part U of the Suggested State Regulations for Control of Radiation
  - Chair and Member, Nominating Committee
  - Chair and Member, Awards Committee
  - Chair and Member, Poster Committee
  - Chair and Member, Technical Program Committee
  - Member, *ad hoc* Committee on the Future of the OED
  - Chair, G-61 International Outreach and Relations Committee
- Organization of Agreement States
  - Chair (twice)
  - Liaison to HPS
  - OAS Liaison to USNRC Management Review Boards
- Health Physics Society, Plenary Member since 1966, Fellow (2004)
  - Nominating Committee
  - Governmental Relations Committee
- American Academy of Health Physics
  - Treasurer
  - Past Treasurer
  - ex officio Member of Finance Committee
  - Member, Finance Committee
  - Chairman, Finance Committee
- American Board of Health Physics (1999-2003)
  - Chair, Vice Chair, Secretary, and Parliamentarian
- HPS Governmental Section
  - President and President-Elect
- South Texas Chapter of HPS
  - President, President-Elect, and Treasurer
- Northern California Chapter of HPS
  - President and President-Elect
- Southern California Chapter of HPS
  - Member Board of Directors
- U. S Nuclear Regulatory Commission
  - Member, Advisory Committee on the Medical Uses of Isotopes
  - Member, Energy Policy Act Steering Committee
  - Member, National Materials Program Steering Committee
  - Member, Interagency Coordinating Committee on the National Source Tracking System
  - Member, NARM Guidance Writing Group
  - Member, CsCl Dispersibility Working Group
  - State Liaison, IMPEP Management Review Board
  - Member, NARM Task Force – Radiation Sources Subgroup
- International Atomic Energy Agency
  - Member, Radiation Safety and Security of Radiation Sources Infrastructure Appraisal Team for the Republic of Armenia
  - Team Leader, Integrated Regulatory Review Service to the Republic of Kenya
  - Member, Expert Team to Develop Training Materials for Radioactive Waste Processing Facilities Regulatory Evaluations
  - Participant, International Symposium of the Disposal of Low Activity Radioactive Wastes, Cordoba, Spain, 2004
  - U.S. Observer, IAEA Regional Training Course on Radiation Sources for Regulators, Tanzania, 2008

RESUME
GEORGE C. PATTERSON

GENERAL INFORMATION

NAME:	George Cameron Patterson
ADDRESS:	200 Summit Ave Thunder Bay ON P7B 3P6
PHONE NUMBER:	(807) 768 8649
E-MAIL:	george.patterson@tbaytel.net
HIGHEST EDUCATION:	Ph.D., Geology (1980) Carleton University, Ottawa
OTHER EDUCATION:	Classes towards an MBA (mid to late 1980's) Lakehead University, Thunder Bay M.Sc., Geology (1976) University of Toronto B.Sc.(Hons), Geology (1974) University of Toronto
OTHER TRAINING:	Professional Geoscientist Saskatchewan and Professional Geologist of Ontario Windows Microsoft Office (Word, Excel, Outlook, Access) Microsoft Project, Photoshop CS4 training Explorer GIS Photography (Saskatchewan Institute of Applied Science and Technology - SIAST) Ontario Drivers License

RESUME
GEORGE C. PATTERSON

EMPLOYMENT HISTORY

- April 2011- Current:
  Contractor with Ovalbay Geological Consulting: Logging Core
  Contractor with Derrik Murray Consulting on Potash Mining and Mining Development
- Sept 2010-April 2011
  Executive Director of Major Projects, Government of Saskatchewan, Regina
- 1994-2010
  Executive Director of Exploration and Geological Services, Government of Saskatchewan, Regina
- 1988-1994
  Director Mineral Policy, Government of the NWT, Yellowknife
- 1982-1988
  Resident Geologist, Government of Ontario, Thunder Bay
- 1981-1982
  Office Manager, Denison Mines Limited, Thunder Bay, ON
- 1980-1981
  Project Geologist, Ontario Geological Survey, Toronto, ON
- 1973-1979
  Geophysical Assistant to Project Manager, UMEX Corporation, Pickle Lake, ON

BOARDS AND COMMITTEES

- Saskatchewan representative for the Intergovernmental Working Group (IGWG) on the mining industry reporting to the Energy and Mines Ministers Council.
- Co-chair of the IGWG Working Group on Regulatory Efficiency.
- Member of IGWG Committee on Mining Social Responsibility.
- Member of IGWG Aboriginal Involvement in Mining Industry.
- Technical Representative on the Saskatchewan Mineral Sector Team (economic development team for the mineral industry.)
- Board member on the Canadian Mining Innovation Council (CMIC.)
- Member of the International Mining Innovation Institute (IMII) steering committee.
- Member of the Association of Professional Engineers and Geologists of Saskatchewan (APEGS) Education Committee.
- Member of three major land claims negotiation team for the NWT – TFN, Dena Métis, and Sahto.
- Co-chair of the NWT Environmental Impact Review Board for Commissioner's Land.
- Member of 20 different committees conducting land-use plans in Ontario, NWT and Saskatchewan.

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ADDITIONAL INFORMATION

- Born and raised in Toronto, Ontario.
- Married to Marie with two children, Grégoire and Gabrielle.
- Recipient of the Government of Saskatchewan Premier's Award for Excellence for the development of the Saskatchewan Mineral Strategy and Associated Incentive Programs.
- Recipient of the Association of Professional Engineers and Geologists of Saskatchewan (APEGS) Environmental Award for "Best Management Guidelines for Mineral Exploration."
- Extensive media experience including over 100 interviews with CBC's noon hour shows in Thunder Bay (on mining history and activities) and 30 to 40 newspaper and TV interviews in Saskatchewan.
- Straugh Distinguished Guest Lecturer (eight talks to eastern Canadian universities on the Hemlo gold deposit.)
- Has written over 1000 briefing notes.
- Extensive knowledge of the diamond industry gained from tours of sorting facilities in the NWT and London, England; diamond cutting facilities in Belgium, Israel, and Australia.
- Technical Advisor for Saskatchewan Uranium Development Committee

RESUME
GEORGE C. PATTERSON

REFERENCES

Kent Campbell: Deputy Minister of Energy and Resources
Government of Saskatchewan
(306) 787-9580
2103 11th Avenue, 11th Floor
Regina SK S4S 3Z8

Pam Schwann: Executive Director
Saskatchewan Mining Association (SMA)
(306) 757-9505
1500-2002 Victoria Ave
Regina SK S4P 0R7

Engin Ozberk: Vice-president, Innovation and Research
Cameco
(306) 956-8093
Operation Center
1131 Ave S
Saskatoon, SK, S7M 4E8

Tony Baumgartner: Vice-president, Enterprise Saskatchewan
(306) 787-9580
11th Avenue
Regina SK S4S 3Z8

Eric Cline: Vice-president, Corporate Affairs, Shore Gold Incorporated
(Former Minister of Industry and Resources, Government of Saskatchewan)
(306) 664.2202
300-224 4th Avenue South
Saskatoon SK S7K 5M5

Christine Kaszychi: Assistant Deputy Minister, Ontario Northern Development and Mines
Government of Ontario
(705) 670-5877
Willet Green Miller Center
833 Ramsey Lake Road, 6th Floor
Sudbury ON P3E 0B0

(Global Permission to contact additional references)

LEONARD (TOBY) M. WRIGHT, III

Principal Owner\Senior Engineer and Hydrogeologist

EDUCATION

MS, Civil/Geotechnical Engineering, Colorado State University, 1999
BS, Geology, University of Arizona, 1985

REGISTRATIONS

Professional Geologist: Wyoming (#PG-3241)

EXPERIENCE SUMMARY

Mr. Wright formed his own consulting firm, Wright Environmental Services Inc. in March of 2010 to service mining clients throughout the western United States. Mr. Wright is a registered professional geologist with a masters degree in geotechnical engineering and decades of experience in applied hydrology related to mining and milling projects. He also has extensive experience in project and program management for mining related environmental and regulatory programs.

Since forming his own company Mr. Wright has been responsible for new licensing of a uranium mine and recovery site in Wyoming, supporting a radioactive materials license application amendment for a conventional mill to accept alternate feed materials, supported an Alternate Concentration Limit (ACL) application for a reclaimed uranium recovery project, and acting as the Remedial Action Program Manager for a uranium mill undergoing remedial action under CERCLA.

Mr. Wright served as the Environmental Manager for the Conventional Mining Group of Uranium One Americas from March of 2007 through March of 2010. In this role he was responsible for all permitting, environmental compliance and H&S activities for Uranium One's conventional mining and mill operations in the United States. In addition to his responsibilities for staff management, environmental monitoring and regulatory compliance he also assisted company environmental and regulatory due diligence reviews of potential acquisitions.

Mr. Wright also has over 20 years of experience in environmental consulting. For 12 years since 1994, Mr. Wright focused almost exclusively on management of reclamation and remediation projects for uranium mill tailings sites. From 2002 through 2005, Mr. Wright served as the US Department of Energy's Technical Assistance Contract Project Manager for the Moab UMTRA Project. In this capacity Mr. Wright managed a multi-million dollar annual budget with a technical staff of over 40 personnel and a diverse array of programs including operation and maintenance of inactive uranium mill sites, the site health and safety programs, design and implementation of ground water remedial actions, site environmental monitoring and development of a major Environmental Impact Statement. Mr. Wright has also managed or supported several uranium mill tailings reclamation projects in Texas, Utah, Washington and Wyoming.

KEY PROJECT EXPERIENCE

- ***Remedial Action Program (RAP) Manager, Confidential Client, (September 2011-Current).*** Mr. Wright is the contract RAP Program Manager for the remedial actions associated with decommissioning of a uranium mill under the US EPA Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Mr. Wright's responsibilities include development of RAP investigation work plans, technical data reports, remedial action design reports as well as supporting the client with regulatory compliance.

- ***Environmental Manager, Uranium One Americas, Conventional Mining Group (March 2007- March 2010).*** Manager for all environmental, permitting and H&S for the conventional mining group activities in the United States. Key responsibilities included development of an application for amending the Shootaring Canyon Uranium Mill Radioactive Materials License for return to full operations, permitting of various hard rock mining projects in Utah and Wyoming, performing as the Corporate Radiation Safety Officer for the Utah projects and oversight of all conventional group environmental and regulatory compliance obligations. Mr. Wright managed and administrated the Mill personnel and the associated operational budgets.

- ***Reclamation Program Manager, Department of Energy (DOE); Technical Assistance Contract Program, Colorado (June 2002- June 2005).*** Moab Program Manager for the Technical Assistance Contract with DOE Legacy Management office in Grand Junction, Colorado. Mr. Wright was managed all reclamation activities of the uranium mill tailings facilities in Moab and Monticello, Utah. Mr. Wright was also the DOE contract Project Manager for the Monticello Mill Tailings Site CERCLA cleanup. For the Moab Project, Mr. Wright was responsible for managing all aspects of this program including staff, budget as well as the development of an Environmental Impact Statement, operation and maintenance of the site, and construction of interim ground water remedial actions.

- ***Groundwater and Surface Water Characterization, Moab Uranium Tailings Facility, Utah***. Project Manager for a yearlong $1million groundwater and surface water characterization program at the Moab uranium tailings facility. As part of this project Mr. Wright lead technical discussions with the Moab groundwater technical advisory group which consisted of members from the Grand Junction DOE office, EPA, the Park Service, the Fish and Wildlife Service, Utah DEQ, Grand County and the Grand Canyon Trust. Technical issues that he managed included characterization of surface water quality, characterization of groundwater flow and transport, ecological risk assessment (including an assessment of the impact on the endangered species – Colorado Pikeminnow) and evaluation of remedial action alternatives.

- ***Groundwater Characterization, Split Rock Uranium Tailings Facility, Wyoming.*** Managed a multi-year $12 million groundwater characterization and evaluation for a uranium mill tailings impoundment. This evaluation included the installation of more than 100 wells and at its peak included the management of more than 30 staff and multiple contractors. The program resulted in an application to the NRC for alternative concentration limits (ACL) for the site. The NRC is currently evaluating this application and Mr. Wright is managing the response effort to the NRC. A critical part of the application for ACLs is the use of institutional controls. The proposal included some innovative institutional controls. Mr. Wright has been involved with discussion with the Grand Junction DOE office regarding these controls. The Grand Junction DOE office is involved since the site will be in their LTSP program.

- ***Groundwater Characterization, Sequoyah Fuels, Oklahoma***. Mr. Wright managed a groundwater characterization study for the Sequoyah Fuels uranium fuel fabricating facility in Gore, Oklahoma. This project included the characterization of the hydrogeologic and geochemical conditions at the site to predict the transport of key constituents in the groundwater system.

- ***Surface Reclamation and Groundwater Evaluation, Sherwood Uranium Tailings Facility, Washington***. Mr. Wright served as the task leader for surface reclamation and groundwater evaluation for the Sherwood uranium reclamation project. This facility was successfully reclaimed and the license terminated. This facility was transferred to the Grand Junction DOE office as part of the LTSP program and was the first UMTRCA Title II site in an Agreement State to be transferred.

- ***Environmental Management, Batu Hijau Gold-Copper Mine, Indonesia***. Mr. Wright served as the Site Environmental Manager during the permitting and development of this $1.8 billion gold-copper mining project in Sumbawa, Indonesia. For over nine months he resided in Sumbawa, Indonesia and was responsible for all site environmental activities including developing groundwater and surface water monitoring programs, developing and implementing associate QA/QC programs, coordinating off-site consultants developing the Indonesian Environmental Impact Statement and mine permit (ANDAL), management of environmental staff consisting entirely of indigenous personnel.

PUBLICATIONS

Davis, M., Abshire, M., Overton, D., Strachan, C., and **Wright, T.**, 2009. “Best Available Technology Design for a Uranium Tailings Storage Facility.” Proceedings of the Tailings and Mine Waste ’09, Banff, Alberta Canada, November.

Malusis, M., Davis, M., Overton, .M, Castelbaum, D., **Wright, T.**, 2009. “Laboratory Evaluation For Design Of A Mixed Clay/Sand Tailings Impoundment Liner.” Proceedings of the Tailings and Mine Waste ’09, Banff, Alberta Canada, November.

Kaback, D., B. Looney, J. Corey, **L.M. Wright**, and J. Steele. 1989. "Horizontal Wells For In-situ Remediation of Groundwater and Soils." Proceedings of the NWWA 3rd National Outdoor Action Conference on Aquifer Restoration, Groundwater Monitoring and Geophysical Methods, Orlando, Florida, May.

Wright, L.M. and C.D. Shackelford. 1995. "Compatibility of Soil Admixed With Fly Ash to Acetic Acid." Proceedings of the ASCE Specialty Conference Geoenvironment 2000, New Orleans, Louisiana, February.

Wright, L.M. 2001. "Groundwater Characterization and Alternative Evaluation for the Split Rock Uranium Mill Tailings Project." Proceedings of the Tailings and Mine Waste '01, Fort Collins, Colorado, January.

Kirk, Alan R., Kirk, Lisa B., **Wright, Toby**. 2007. "Risk Based Management in Uranium Mine and Mill Design and Operations". Proceedings of the U2007: Global Uranium Symposium, Corpus Christi, Texas, May.

PROFESSIONAL EMPLOYMENT HISTORY

Principal Owner, Engineer & Hydrogeologist, Wright Environmental Services Inc. March 2010 to present
Environmental Manager, Uranium One USA, March 2007 to March 2010
Senior Engineer\Project Manager, Tetra Tech, September 2001 to February 2007
Senior Engineer\Project Manager, Shepherd Miller, Inc., June 1992 to September 2001
Hydrogeologist, Brierley & Lyman Inc., 1990
Hydrogeologist, Sirrine Environmental Consultants Inc., 1986 to 1989
Field Geologist, CRS Sirrine Inc., 1986
Geologist, Arizona Hillside Mining Co., 1983

CHRISTOPHER D. LIDSTONE
President

Education

Cornell University
B.A. in Geology and Classics, 1977

Colorado State University
M.S. in Fluvial Geomorphology, 1981

Registration

Professional Geologist - Wyoming
Certified Professional Geological Scientist- AIPG

Experience Summary

Mr. Lidstone is founder and president of the engineering, geology and water resource consulting firm Lidstone and Associates, Inc. (LA). His professional experience covers a wide range of individual, yet interrelated fields including geology; geochemistry; fluvial geomorphology; surface and ground water hydrology; river mechanics; erosion and sedimentation; environmental studies and wetland assessments; and, environmental regulation. Mr. Lidstone has been actively involved in mining and mining related studies since 1974, first as an exploration geologist and later as a hydrologic consultant. He began his uranium geological career in the Beaverlodge District of the Northwest Territories (Canada) in 1975 and was involved in both surface and subsurface exploration. He completed tenure as a mine geologist underground at the El Dorado Mine near Uranium City, Saskatchewan. He was contracted to explore for epigenetic uranium deposits in the Elkhead Range, northwestern Colorado and hard rock deposits in southeast Alaska. As a regulator (Wyoming DEQ/LQD) and a member of the Technical Support Group, he served as a liaison with the NRC and addressed interim stabilizations and final closure of uranium mines and mill tailings in the Gas Hills, Powder River Basin and Shirley Basin. As a consultant he completed uranium mining and mine reclamation studies, including design and construction for the Wyoming Abandoned Mine Land (AML) program in Wyoming in 1988 and was responsible for final closure and clean-up of over 20 Wyoming abandoned uranium mine reclamation projects. In 1993 he was awarded Reclamation of the Year award for his design and construction of the Little Medicine Bow River Restoration project. His corporate uranium mining clients have included Power Resources, Inc., now Cameco Resources, Umetco Minerals, Pathfinder Mines and Titan Uranium, USA. He has completed ground and surface water studies, mine permitting, geochemistry and tailings closures studies for these entities since 1994.

Since 1986 he has completed numerous mining-related and mine permitting studies in 17 states and internationally. Besides his work in the Rocky Mountains and Pacific Northwest, he has completed surface water, water quality, and geomorphic stability studies in Alabama, Florida, Georgia, Indiana, Maryland, including the North Fork of the Potomac River, and West Virginia. His regulatory guidance experience has included a Mine Drainage Handbook for the State of Maryland, Geomorphic Guidance Documents for the State of Wyoming, short courses to the Missouri DNR and Oregon DOGAMI and most recently is responsible for the preparation of guidance document for Underground Coal Gasification for the State of Wyoming and Office of Surface Mining.

Abandoned Mined Land Reclamation

Mr. Lidstone has been the project manager for over 40 Wyoming AML reclamation projects, including: the $15M Day Loma Mine Reclamation Project; the $5M Little Medicine Bow River Channel Relocation Project; the $1M AML Statewide Inventory, the $5M Sagebrush Tablestakes Mine Reclamation Project; the $600,000 Carissa Tailings Reclamation Project and the $1.5M Statewide Non-Coal Mine Closure Project. He has completed AML coal related reclamation projects in nine Wyoming counties. His most recent work addressed surface subsidence, coal waste isolation and clean-up, and the closure of the immediate hazards associated with open portals, collapsed adits and tunnels, and partially open ventilation shafts. His non coal AML reclamation experience includes the preparation of reclamation plans and final hydrologic restoration designs for over 40 bentonite pits, 20 uranium mines, eight gravel mines, four gold mines, lead-zinc, copper and molybdenum underground and surface mine disturbances.

Mr. Lidstone has provided the Wyoming AML program with specialty expertise in fluvial geomorphology, in particular the development of a stable land surface and surface drainages. He has developed geochemical protocol, which has been used by AML to address post reclamation water quality and surface reclamation including acid base accounting.

Permitting for Active and Proposed Mines

Mr. Lidstone has been the lead scientist and project manager for Kennecott Corporation, Umetco Minerals, Cloud Peak, Rio Tinto, Cameco Corporation, Umetco Minerals, Mobil Coal Producing Inc., Amax Coal, Caballo Rojo, Inc., JTL Corp. and Lafarge within the State of Wyoming. He has completed mine plan hydrology, design of diversions and sediment control and final reclamation plans for major coal producers in the Powder River Basin. He has also worked extensively on mine permitting projects for the in-situ recovery uranium industry in the Gas Hills and southern Powder River Basin. He is currently involved in mine permitting, environmental evaluation and environmental assessment efforts for Cameco. He has been extensively involved in mine permitting through both federal and state agencies for sand and gravel and hard rock mines throughout the United States. Since 1981, Mr. Lidstone has worked extensively with the mine regulatory programs in Colorado, Oregon, Utah, and Wyoming and the federal programs administered by the Office of Surface Mining, Environmental Protection Agency, US Army Corps of Engineers and the National Marine Fisheries. He has completed due diligence investigations in 14 states for MDU Resources and has addressed environmental liabilities associated with mining under these various state programs. Additional consulting work has included mine permitting efforts for placer and hardrock gold, industrial minerals, basalt, coal and other uranium mines in the western United States. He served as an advisor to the Indonesian National Coal Industry (PTBA) on erosion and sediment control and developed a program for the elimination of environmental liabilities associated with their state-owned coal program.

Channel Stability Analysis and River Construction

Mr. Lidstone has performed numerous channel stability analyses on rivers and streams in Arizona, California, Colorado, Florida, Idaho, Maryland, Missouri, Nevada, Oregon, Utah, West Virginia, and Wyoming. These studies have included evaluations of the geomorphic stability, hydrology, hydraulics and sediment transport characteristics of rivers affected by mining (Belle Fourche River, Wyoming), by dredging to sustain navigation (Apalachicola River, Florida), by channel encroachments such as highways and bridges, by diking and by local development along rivers banks . A number of these projects have led to final design, permitting and construction. Mr. Lidstone managed the restoration construction of 3.5 miles of the Little Medicine Bow River, planning and design of 14 miles of the Provo River (Utah), three construction phases of the Rogue River Restoration Project, river stabilization projects along the Bear, Salt, and Little Snake rivers in Wyoming.

Geochemistry and Water Quality Evaluations

Mr. Lidstone is well versed in geochemistry, water quality and adverse quality discharge issues throughout the United States. His geochemical studies have included salt and phosphate loading to both surface and ground water systems, kinetics and thermodynamics of geothermal systems, and long-term water quality changes for both hard rock and uranium-mined aqueous systems. His uranium transport studies have included bench scale modeling, thermodynamic predictions and transport evaluations of seepage from uranium mill tailings as well as the impacts of the backfill of uranium spoils into the ground water table. Acid mine drainage mitigation and wetland designs have been completed for coal, uranium, bentonite, copper and gold mines. He has testified on the impacts of salt loading to perennial, intermittent and ephemeral streams in Wyoming.

He has completed unsaturated flow studies for landfills, tailings, waste disposal projects, and waste water lagoons throughout the western United States. This work has included the installation of lysimeters, monitor wells and horizontal drains and collection systems associated with tailings and waste disposal sites. He has provided expert witness testimony on water quality impacts related to Coal Bed Methane discharges within Wildcat Creek Basin in northeast Wyoming and addressed rule making for water quality standards as they apply to perennial stream flow versus ephemeral stream flow. His testimony addressed the concept of washover, initial flush and recessional flow water quality.

Reserve Evaluation and Geological Mapping

Mr. Lidstone has completed reserve evaluations, geologic mapping and due diligence investigations for the mining industry and development interests. This involvement has included geologic exploration, geologic mapping, mine

planning, fatal flaw analysis and mine permitting throughout the United States. These studies have been supported by surface and subsurface exploration programs, geophysical and remote sensing techniques.

Mr. Lidstone has geologically mapped over 250 square miles in the U.S., Canada, and Mexico and has been involved in mining consulting from the exploration, production, reclamation and environmental point of view. His field experience involved the geologic mapping and interpretation of igneous, metamorphic and sedimentary deposits in Alaska, Arkansas, California, Colorado, Idaho, Iowa, Minnesota, Montana, New York, Oregon, Tennessee, Texas, Utah, Wyoming, northern Saskatchewan, Canada, and Mexico. This work has included: oil shale, trona and industrial mineral investigations for mine plan development; exploration for base and precious metal deposits in structurally complex terrain; exploration for heavy mineral placers; sedimentologic and petrologic studies of oil shale, coal and epigenetic uranium deposits; hydrogeologic studies; analysis of environments of deposition and ore reserve evaluation. His master's thesis involved the development of an exploration model for placer gold deposits, which related sediment transport processes to river dynamics.

As a geologist Mr. Lidstone has logged over 13,000 feet of diamond drill core and cuttings for both exploration geology and ground water evaluation projects. His drilling projects have included studies in Carbon, Fremont, Hot Springs, Laramie, Natrona, Sweetwater, and Teton Counties, Wyoming; Oneida and Washington County, Idaho and Summit County, Colorado.

Ground Water Investigations

As a principal hydrogeologist for LA, Mr. Lidstone has been involved in complex ground water studies since 1982 and has served as an expert witness on ground water-related projects in Wyoming, Oregon and Nebraska. His expert witness testimony has addressed well interference, ground water contamination, source supply availability, ground water and surface water interaction in Nebraska, Oregon, and Wyoming. Planning projects include the Platte River Water Basin Planning and the Wind Big Horn River Basin projects, which involved a technical assessment of ground water availability for domestic, municipal, and recreational water use. He has also supervised Wyoming ground water supply investigations for the towns of Bairoil, Cheyenne, Dixon, Greybull, Hawk Springs, Hyattville, Pine Bluffs, Ten Sleep, and Thermopolis, Wyoming; the Shoshone Utility Organization; and Umetco Minerals, Inc. Finally he has served as principal in charge of ground water studies associated with uranium ISR mine permitting efforts, including water level and water quality monitoring, aquifer testing and impact analysis. He has completed ground water modeling studies for Mobil Coal, Amax Coal, the States of Wyoming and Oregon, Rogue Aggregates, Teichert Sand and Gravel, and the Public Service Company of Colorado.

Environmental Permitting and Expert Witness

Mr. Lidstone's experience has made him familiar with federal, state and county permitting procedures and regulations. His expert witness services have included appearance before US District Court, Wyoming State Board of Control, Wyoming Environmental Quality Council, Nebraska State Engineer and numerous County Land Use Hearings in Oregon. He has served as an expert witness on gold, gravel, rock quarry, construction, water storage and coal-mining related projects throughout the western United States. He has worked extensively with federal agencies including the US Army Corps of Engineers, US Fish and Wildlife Service, Office of Surface Mining, Environmental Protection Agency and the Nuclear Regulatory Commission and the permitting requirements of state and local environmental agencies in most of the western states.

TECHNICAL SOCIETIES

Geological Society of America

Society of Mining Engineers

National Water Well Association

American Water Resources Association

American Society of Surface Mining and Reclamation

PUBLICATIONS AND TECHNICAL PAPERS

Lidstone, C.D., 1981. "Geomorphic and Hydraulic Controls Associated with the Development of Alluvial Placer Deposits." Technical paper presented to the USGS Branch of Exploration Research, Lakewood, Colorado.

Lidstone, C.D., 1982. "Stream Channel Reconstruction and Drainage Basin Stability." Technical paper presented at the AIME/GAGMO (Gillette Area Groundwater Monitoring Organization) Symposium, Gillette, Wyoming.

Lidstone, C.D., and P.M. Schmittdeil, 1984. "Geomorphology and Depth of Potential Downcutting, Green River Basin, Wyoming." Open-file report, Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne, Wyoming.

Lidstone, C.D., 1987. "Stream Channel and Wetland Reconstruction Techniques." Paper presented at the Eighth Annual Meeting of the Society of Wetland Scientists, Seattle, Washington.

Lidstone, C.D., and B.A. Anderson, 1989. "Considerations in the Design of Erosionally Stable channels on Reclaimed Lands." Paper presented at the Evolution of Abandoned Mine Land Technologies Symposium in Riverton, Wyoming.

Lidstone, C.D., 1991. "Design Concepts in Hillslope Morphology." Paper presented at the 13th Annual Abandoned Mined Land Conference, Lake Ozark, Missouri.

Lidstone, C.D., and C.M. Jones, 1993. "Hydrologic Considerations in the Design of Wetlands." Paper presented at the 15th Annual Abandoned Mined Land Conference, Jackson, Wyoming.

Jones, C.M., and C.D. Lidstone, 1996. "Drop Structures" in *Handbook of Western Reclamation Techniques*, F.K. Ferris, ed., USDI Office of Surface Mining, Washington, D.C., pp. II-21 - 32.

Lidstone, C.D., and C.M. Jones, 1996. "Hillslope Shaping and Morphology" in *Handbook of Western Reclamation Techniques*, F.K. Ferris, ed., USDI Office of Surface Mining, Washington, D.C., pp. III-3 - 12.

Ferris, F.K., C.D. Lidstone, and C.M. Jones, 1996. "Small Drainage Waterway Construction" in *Handbook of Western Reclamation Techniques*, F.K. Ferris, ed., USDI Office of Surface Mining, Washington, D.C., pp. II-67 - 74.

Gibbens, G.A., Hyde, B., Thompson, K., and, Lidstone, C.D., 2002. "River Restoration Planning for the Rio Grande Headwaters, Colorado." Paper presented at the Rio Grande Restoration Vision Workshop hosted by the World Wildlife Fund and Alliance for the Rio Grande Heritage, Albuquerque, New Mexico.

Lidstone, C.D., and M. Pole, 2006. "In-Stream Mining: The Trial and Tribulations of the Federal Permitting Process: A Case Study: Umpqua River Navigation." Paper presented at the 2006 SME Annual Meeting, St. Louis, Missouri.

Wampler, P., E. Schnitzer, D. Cramer, and C. Lidstone, 2006. "A Meander Cutoff into a Gravel Extraction Pond, Clackamas River, Oregon: Instream and Floodplain Mining Implications." Paper presented at the 2006 SME Annual Meeting, St. Louis, Missouri.

Lidstone, Christopher D., 2006. "Applied Geomorphology: Hydrologic Design Considerations to the Stabilization and Reclamation of Mining Disturbed Lands." Keynote Presentation. OSM Conference, National Interactive Forum on Geomorphic Reclamation. Farmington, NM. September 12-14, 2006.

Lidstone, Christopher D. and Abby Korte, 2011. "Water and Sediment Control Systems" (Chapter 16.4) in SME Mining Engineering Handbook, Third Edition, ed. Peter Darling, Society for Mining, Metallurgy and Exploration, Inc., Littleton CO.

KATHERINE J. LAUDON
Principal Engineer/Vice President

Education

University of Wisconsin, Oshkosh
B.S. Geology, 1979

Washington State University
M.S. Geologic Engineering, 1983

Registration

Professional Engineer – Colorado, Wyoming
Professional Geologist - Wyoming

Experience Summary

Ms. Laudon combines over 30 years of consulting, regulatory, and educational experience in groundwater hydrogeology and geological engineering including the design, installation, and operation of groundwater monitoring systems, groundwater quality monitoring, hydrogeologic investigations, groundwater supply and development, computer modeling, and geophysical investigations. While designing water supply wells, preparing environmental permit applications and conducting hydrogeologic investigations for clients throughout the western United States, Ms. Laudon has become familiar with the state and local regulatory agencies, as well as the regulatory requirements of the EPA, BLM, and NRC.

Environmental Permitting

Ms. Laudon has been involved with all aspects of the environmental permitting and regulation process with respect to groundwater issues. As a groundwater engineer with the Wyoming Department of Environmental Quality, she reviewed applications for waste disposal permits for mining, industrial, utility, and domestic facilities and prepared permits for groundwater monitoring systems and underground injection wells. As a consultant she has implemented groundwater monitoring programs in which she was responsible for the contracting of drillers and laboratories, the permitting and construction of monitoring wells, aquifer testing, the collection of water quality and soil samples, and the analysis and reporting of data. While preparing a permit application for the Cameco in-situ recovery (ISR) uranium mine in the Gas Hills, Wyoming, Ms. Laudon supervised field data collection of aquifer hydraulic properties and water quality data, then combined this information with existing historical data to establish baseline conditions and to predict potential impacts to the aquifer resulting from past mining activities and the proposed in-situ operation. Ms. Laudon prepared Plans of Operations for the Gas Hills and Buss Pit sites that were quickly approved by the BLM. She completed the Probable Hydrologic Impact sections of Source Material Licenses submitted to the NRC for the Titan Uranium Sheep Mountain Project and the Smith Ranch License Renewal Project. She has evaluated the interactions between surface water and groundwater and the potential impacts to wetlands associated with aggregate mining in Colorado, Minnesota and Oregon. Currently Ms. Laudon is under contract with both the states of Colorado and Wyoming and to provide permit review services and develop guidelines related to groundwater issues. The combination of regulatory and consulting experience has helped Ms. Laudon gain valuable insight into the technical, economic, environmental, and regulatory issues that often accompany groundwater and waste disposal projects.

Ground Water Development and Supply

Ms. Laudon has been actively involved in municipal groundwater supply investigations for the towns of Greeley, Colorado; Norway, Michigan; and Cheyenne, Dixon, Greybull and Pine Bluffs, Wyoming. She was the Project Manager for several Cheyenne Board of Public Utilities (BOPU) Well Rehabilitation Projects, and the Pine Bluffs Groundwater Exploration Grant; responsible for test hole drilling, well completion and aquifer testing and analysis. For the Town of Greybull she worked with the Wyoming Department of Environmental Quality/Water Quality Division to resolve NPDES permitting issues associated with the discharge of water from the new well after treatment by acid fracing. Ms. Laudon has supervised the drilling and installation of domestic water supply wells at the Giberson Preserve near Frisco, Colorado, and the Squaw Creek Subdivision near Jackson, Wyoming. Ms. Laudon has provided technical oversight to other LA hydrologists and engineers on the Belvoir Ranch, Bairoil, Hot Springs County, Lander, Sand Draw and Shoshone, Wyoming water supply projects; the Linn Grove Cemetery project in

Greeley, Colorado; and on impacts to water supply users associated with uranium mining in Wyoming, and aggregate mining in Minnesota, Oregon and Wyoming.

Geohydrologic Investigations

Geohydrologic investigations conducted by Ms. Laudon include the evaluation of impacts associated with large capacity water supply and irrigation wells completed in the Arikaree Aquifer in the Prairie Center Groundwater Control Area north of Torrington, and along Horse Creek, in Wyoming; exploratory drilling and evaluation of municipal water supply wells for the BOPU; the evaluation of water levels in the alluvial aquifer adjacent to the Yampa River near Steamboat Springs, Colorado to determine potential impacts to wetlands; a regional evaluation of the hydrogeology and water rights of the Gas Hills Uranium Mining District in Wyoming; more detailed investigations of the groundwater impacts associated with reclamation activities in the East Gas Hills and the Day Loma area; the mitigation of seepage from wastewater ponds at large livestock facilities in southeastern Wyoming; unsaturated zone monitoring beneath domestic wastewater disposal systems in Colorado; and investigations of the nature and extent of hydrocarbon contamination of RCRA facilities and underground storage tank sites in Colorado, Wyoming and other western states. For her Master's thesis, she utilized geophysical methods to investigate groundwater recharge and discharge areas associated with glacial terrace deposits adjacent to the Okanogan River in Washington State. She has designed and sampled monitoring systems at uranium mines, power plants, municipal landfills, refineries, domestic and agricultural waste disposal sites, and leaking underground storage sites in several different states.

Groundwater Engineering

As a professional engineer and a professional geologist, Ms. Laudon brings expertise in both disciplines to the design of water supply wells, and to wastewater or other facilities with the potential to impact groundwater. She has designed, contracted drilling, and supervised the construction of numerous water supply and monitoring wells. For the Gas Hills, Smith Ranch, North Butte, and Ruby Ranch ISR uranium projects, she worked closely with the operating engineers to design injection, production and monitoring wells which will optimize uranium production and minimize potential environmental impacts to the adjacent aquifers. She has designed a leak detection system for a wastewater collection sump at a livestock facility near Albin, Wyoming, and infiltration galleries in the alluvium of the Little Snake River for the Town of Dixon water supply, and beneath the Big Horn River to provide cooling water to facilities at Hot Springs State Park. She has calculated design inflows and prepared conceptual designs for an underdrain system for a commercial development in Breckenridge, Colorado. For the North Platte River groundwater investigation she prepared conceptual designs for a Paleozoic wellfield and transmission line to provide replacement water to the North Platte River in Wyoming. In 2010 Ms. Laudon served as a technical editor of several chapters of the 3rd Edition of the Society of Mining Engineers Mine Engineers Handbook dealing with solution mining, dewatering, waste piles, and waste management.

Technical Societies

Association of Groundwater Scientists and Engineers

American Council of Engineering Companies

Publications and Technical Papers

Laudon, K.J., Contributing Editor, 2011. SME Mining Engineering Handbook. Third Edition, Principal Editor Peter Darling, Society for Mining, Metallurgy and Exploration, Inc., Littleton, CO.

Laudon, K.J., D. Erskine, and C.O. Seely, 1999. "Degradation of Ground Water Quality Caused by Surface Reclamation of Open Pit Mines, Gas Hills, Wyoming," Abstract of a technical paper presented at the 1999 SME Annual Meeting and Exhibit, Denver, Colorado.

Underwood, J.E., K.J. Laudon, and T.S. Laudon, 1984. "Seismic and Resistivity Investigations Near Norway, Michigan," Ground Water Monitoring Review, Vol. 4, No. 4, pp. 86-91.

Laudon, K.J., 1984. "Geophysical Investigation of the Duck Lake Ground-Water Subarea near Omak, Washington," Proceedings for the Third National Symposium and Exposition on Aquifer Restoration and Ground-Water Monitoring, Columbus, Ohio, pp. 223-230.

Laudon, K.J., R. Lennox, and P. Pucle, 1983. “Proposed Well Construction Standards in Wyoming,” Abstract of a technical paper presented at the 13th Annual Rocky Mountain Ground-Water Conference, Billings, Montana.

MARY WILSON-NICHOLS

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ENVIRONMENTAL GEOLOGIST AND TECHNICAL WRITER

- Over 30 years of experience in environmental management and environmental assessments
- Adept at process coordination, business communications, project planning and finance
- Familiar with requirements for permitting for Forest Service, BLM, Corps of Engineers, and others.
- Experienced technical writer versed at research and reporting
- Knowledgeable in third party contracts and independent verification for regulatory agencies

EDUCATION

M.A. in Public Administration, Environmental Emphasis, 1994
University of Colorado at Denver, Denver, Colorado

B. S. in Geology, 1984
Mesa State College, Grand Junction, Colorado

A. S. in Biology and A.A. in Business, 1979
Community College of Denver, Red Rocks Campus, Golden, Colorado

EXPERIENCE

Glacier Group, Inc., Grand Junction, Colorado/Owner 2001 – Present

- Contract to environmental firms as a liaison/third party in order to prepare Federal NEPA Environmental Assessments and Permitting documentation for oil, gas and mining development in Western Colorado and various water/waste water projects for local municipalities. Contract to private and public entities for technical and management tasks including well data input and analysis, geological and Phase I environmental surveys for real estate development, technical writing, office management, computer input, pharmaceutical research, and laboratory analysis. Familiar with Corps of Engineers 404b process.
- Establish and maintain health and safety programs, as well as expedite various service agreements (MSAs and proposals) to clients.

Oak Ridge National Laboratory (ORNL), Grand Junction Office, Oak Ridge, Tennessee 1984 - 2001
Project Manager/Site Characterization Leader/Environmental Technician

- Planned, instituted, and managed environmental assessment and independent verification projects
- Researched and prepared project budgets, cost analyses, and project progress reports
- Organized, supervised and monitored personnel in the collection of environmental samples and data
- Developed work for the ORNL Group by securing funding, preparing plans, technical reports and schedules
- Prepared and delivered public relations and informational presentations and briefings
- Ensured effective communications and teaming between project, corporate, DOE, EPA and other agencies
- Conducted over 500 radiological and environmental surveys supervising technical, clerical, and PR staff

TRAINING

OSHA 20 hour training, Technical Project Management, Radiation Worker Training, HAZWOPER, Technical Writing, Publications/Editing, Cost/Schedule Control Systems, CPR/First Aid Certification, Health and Safety, Industrial Hygiene, Hazardous Waste Handling and all Department of Energy Mandated Training (up to 2001).

ACHIEVEMENTS

Managed EA and EIS preparation for BLM, Forest Service and Garfield Counties over the past ten years. Also, managed radiological survey projects to verify adequacy of remedial action on UMTRAP sites, Monticello Uranium Mill Tailings Site, Grand Junction Projects Office Remedial Action Project, and Johnston Atoll Plutonium D&D Project. Assisted in the management and fieldwork of two RCRA field investigations at the Kansas City Plant. Managed data and reporting of the Annual Groundwater Monitoring Report at the Kansas City Plat. Managed a CERCLA/RCRA field investigation at Naval Air Station North Island, Shoreline Slag. Prepared Environmental Assessments and Impact Statements for Oil and Gas, and Water Resource Projects in Western Colorado.

Supervised hazardous waste and radiologic technicians, clerical, public relations and other technical staff in the conduct of over 500 radiological surveys at UMTRAP sites nation-wide. Also, lead diverse professionals in the development of NEPA documents. Became familiar with BLM and Forest Service leaders in Western Colorado and the requirements for permitting for these agencies.

Developed work for the ORNL Environmental Technology Section; securing funding, preparing RI/FS work plans, technical reports and cost/schedule proposals.

Authored over a dozen technical publications including research on naturally occurring radioactive material, concrete decontamination, project-associated investigations. Prepared numerous proposals, work plans, and investigation reports, including an annual groundwater monitoring report for the Kansas City Plant and various military facilities.

Participated in field environmental assessments on uranium mill tailings sites and numerous military and DOE sites. This included the drilling and installation of groundwater monitoring wells, collection of soil samples, collection of biota samples, measurement of gamma, beta and alpha exposure rates, and measurement of radon daughter concentrations.

Conducted geologic and environmental assessment for real estate studies as a contractor. This included all public relations and small business communications, record-keeping and accounting.

SPECIFIC SKILLS

- Technical writing and review
- Soil and groundwater and radiological sampling
- Project management, budgeting, finance, coordination and mediation
- Software proficiency in MS Project, Excel, Word, Publisher, Photoshop
- NEPA process, assessment of existing resources, and impact analysis

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Education

M.S., Environmental Health Physics, Colorado State University, Fort Collins, Colorado, 1997
B.S., Biology, Southwest Missouri State, Springfield, Missouri, 1993

Professional Experience

Scientific Consultant
(January 1997–present)

Analyzing spatial and temporal trends of plutonium distribution in soil and investigating the potential impacts of burrowing animals on plutonium dispersal at U.S. Department of Energy and Colorado Department of Public Health and Environment sites.

Providing environmental monitoring assessment services for dose reconstruction projects. Working with *Risk Assessment Corporation (RAC)* to conduct studies for the Centers for Disease Control and Prevention and the Colorado Department of Public Health and Environment. These studies focus on historical releases of radioactive and nonradioactive materials and estimating potential risk to surrounding populations.

For the Savannah River Site Dose Reconstruction Project, summarizing environmental monitoring data and evaluating its usefullness for direct exposure assessment and source term model validation. Evaluating temporal and spatial trends in radionuclide concentrations measured for fish, wild game, and vegetation. Assessing mercury concentrations in several environmental media and estimating uranium and plutonium atmospheric releases and associated uncertainty. Maintaining and utilizing a fully relational database containing data for more than 9000 historical documents identified during Phase I of the dose reconstruction project. Developing and producing an electronic report on CD, including reference and glossary hyperlinks as well as embedded and linked spreadsheets.

For Task Order 5, screening and prioritizing historical radionuclide releases from the Idaho National Environmental and Engineering Laboratory. Reconstructing and calculating source term or release estimates for various episodic release events, including reactor operations and accidents as well as fuel element burning tests. Evaluating downwind dispersion and potential exposure by pathway for each event. For Task Order 6, managing and coordinating the review of historical documents to identify information that may be useful for completing a future detailed dose reconstruction. Maintaining and developing a relational database to store information for identified useful documents.

Working with *RAC* to conduct three technical audits focused on assessing the Los Alamos National Laboratory's compliance with the Clean Air Act. Evaluating the accuracy and completeness of radionuclide usage at Site facilities and reviewing various other compenents of the compliance program. Responsible for interviewing laboratory personnel, working with interested members of the public, and assessing the methodology in place during 1996, 1999, and 2001 for its adequacy in demonstrating compliance with the Clean Air Act.

Assisting *RAC* to assess the appropriateness of soil action levels or cleanup criteria developed by the Department of Energy, Environmental Protection Agency, and Colorado Department of Public Health and Environment for the Rocky Flats Environmental Technology Site. Evaluating distributions and assessing uncertainty and sensitivity for the parameters used in a dose calculation model.

Working with *RAC* to assess exposure and risk through both the air and surface water pathways as a result of the Cerro Grande Fire at the Los Alamos National Laboratory. Managing the collection and compilation of all relevant environmental monitoring data, as well as data available for source term characterization of contaminated sites impacted by the fire. Leading Task 3, which documented observations and recommendations resulting from the process of completing this risk assessment.

Assisting *RAC* to develop an independent and comprehensive data access and risk assessment process to guide understandable, consistent, and transparent management of risk from both chemical and radionuclide sources at industrial or government facilities, or as part of long term recovery following an emergency event. Leading data identification and management activities, as well as development of web- and pc-based applications designed to enable automated, timely, and effective use of large quantities of environmental measurement data, ranging from basic data analysis to complex risk calculations.

Supporting *RAC* to estimate doses for veterans involved with nuclear weapons tests at the Nevada Test Site and Pacific Proving Grounds. Managing existing information and implementing dose calculation methodology in support of a study to acquire knowledge on the lifetime risk of cancer following relatively low-dose exposures received gradually over time.

For all of the above projects, presenting technical material to various panels and committees and interested members of the public. Working with the public and Site personnel to obtain data and understand issues of concern.

Colorado State University
Research Associate, Fort Collins, Colorado (September 1996–January 1997)

Performed gamma spectra analyses of Rocky Flats Plant soil samples. Operated and calibrated HPGe and Ge(Li) detector and conducted spectral analysis and interpretation using Acuspec®, Peakfit®, Minitab®, and various spreadsheet applications.

Laboratory Technician (September 1993–May 1994)

Involved with environmental sampling. Collected and prepared soil samples from the U.S. Department of Energy’s Rocky Flats Environmental Technology Site for actinide analysis.

Additional Experience

Courses
Microsoft Access advanced programming course for application developers (summer 1999)

Enhanced understanding of the data modeling requirements for developing a relational database. Focused on the programming necessary for custom database design as well as the fundamental structural elements of a relational database.

Research
U.S. Department of Energy's Par Pond Radioecology Laboratory
Savannah River Site, Aiken, South Carolina (summer 1994)

Conducted M.S. thesis research, which focussed on evaluating temporal trends of ^{137}Cs in an aquatic system. Also involved the development of a multi-compartment model to predict the distribution of ^{137}Cs in various ecosystem compartments.

U.S. Department of Energy Health Physics Fellow
Idaho National Engineering Laboratory, Idaho Falls, Idaho (summer 1996)

Analyzed the effects of building downwash for facility regulatory compliance using current air dispersion codes (ISC3) and computer (PC/workstation) software (Surfer® and GIS ARC/INFO®).

Honors

U.S. Department of Energy Applied Health Physics Fellowship, 1994–1996
Burton J. Moyer Memorial Fellowship, 1994–1995
Colorado Graduate Fellowship, 1994–1995
Soutwest Missouri State University Scholar (undergraduate academic scholarship)
Graduated Magna Cum Laude in the Honors College
Member in Phi Eta Sigma (honor society)

Peer-Reviewed Publications

Till, J.E., H.A. Grogan, **H.J. Mohler**, J.R. Rocco, and S.S. Mohler. 2012. RACER: An integrated approach to data management, risk assessment, and decision making. Accepted for publication in *Health Physics*.

Mohler, H.J., H.A. Grogan, J.R. Rocco, R.F. Kiefer, and J.E. Till. 2012. RACER: Dynamic Use of Environmental Measurement Data for Decision Making and Communication. *Operational Radiation Safety*, Vol. 102, Suppl 1. February.

Mohler, H.J., K.R. Meyer, H.A. Grogan, J.W. Aanenson, and J.E. Till. 2004. Application of NCRP Air Screening Factors for Evaluating both Routine and Episodic Radionuclide Releases to the Atmosphere. *Health Physics* 86(2):135-144.

Till, J.E., A.S. Rood, P.G. Voillequé, P.D. McGavran, K.R. Meyer, H.A. Grogan, W.K. Sinclari, J.W. Aanenson, H.R. Meyer, **H.J. Mohler**, S.K. Rope, and M.J. Case. 2002. "Risks to the Public from Historical Releases of Radionuclides and Chemicals at the Rocky Flats Environmental Technology Site." *Journal of Exposure Analysis and Environmental Epidemiology* 12: 355-372.

Mohler, H.J., F.W. Whicker, and T.G. Hinton. 1997. "Temporal Trends of ^{137}Cs in an Abandoned Reactor Cooling Reservoir". *Journal of Environmental Radioactivity* 37 (3): 251-268.

Technical Reports

Risk Assessment Corporation (RAC). Contributing Authors; J.W. Aanenson, H.A. Grogan, B. Jacobs, G.G. Killough, K.R. Meyer, **H.J. Mohler**, S. Mohler, J.R. Rocco, A.S. Rood, P. Shanahan, E.A. Stetar, L. Hay Wilson, J.E. Till. 2009. *Risk Analysis, Communication, Evaluation, and Reduction at LANL. Ranking Tool Methodology*. RAC Report No. 35-RACER LANL-2008-FINAL. Risk Assessment Corporation. Neeses, South Carolina. April.

Hay Wilson, L., J.R. Rocco, S.S. Mohler, and **H.J. Mohler**. 2005. *Decision Support Tool Methodology*. *RAC* Report No. 18-RACER LANL-2005-DRAFT. *Risk Assessment Corporation*, Neeses, SC. November.

Aanenson, J.W., J. Goldberg, H.A. Grogan, L. Hay Wilson, G.G. Killough, K.R. Meyer, **H.J. Mohler**, S. Mohler, J.R. Rocco, A.S. Rood, P. Shanahan, W.K. Sinclair, C. Slack, E.A. Stetar, P.G. Voillequé, J. Wilson, and J.E. Till. 2004. *Risk Analysis, Communication, Evaluation, and Reduction at LANL. Contemporary Risk Assessment: Demonstration of an Integrated Methodology*. RAC Report No. 11-RACER LANL-2004-DRAFT. July.

K.R. Meyer, **H.J. Mohler**, J.W. Aanenson, and J.E. Till. 2002. *Identification and Prioritization of Radionuclide Releases from the Idaho National Engineering and Environmental Laboratory*. Task Order 5-Center for Disease Control and Prevention. RAC Report No. 3-CDC Task Order 5-2000-FINAL. Risk Assessment Corporation, Neeses, South Carolina. October 8.

Aanenson, J.W, H.A. Grogan, S.J. Maheras, **H.J. Mohler**, A.S. Rood, P.G. Voillequé, J.E. Till. 2002. *Independent Technical Audit of Los Alamos National Laboratory for Compliance with the Clean Air Act, 40 CFR 61, Subpart H in 2001*. RAC Report No. 6-DOJ-LANL Audit-2002-FINAL. Risk Assessment Corporation, Neeses, South Carolina. October.

Rood, A.S., J.W. Aanenson, S.S. Mohler, P.D. McGavran, **H.J. Mohler**, H.A. Grogan, and J.E. Till. 2002. *Analysis of Exposure and Risks to the Public from Radionuclides and Chemicals Released by the Cerro Grande Fire at Los Alamos. Task 1.7: Final Report on Estimated Risks from Releases to Air*. RAC Report No. 3-NMED-2002-FINAL(Rev.1). June 12.

Rocco, J.R., K.R. Meyer, **H.J. Mohler**, J.W. Aanenson, L. Hay Wilson, A.S. Rood, P.D. McGavran, and J.E. Till. 2002. *Analysis of Exposure and Risks to the Public from Radionuclides and Chemicals Released by the Cerro Grande Fire at Los Alamos. Task 2.7: Estimated Risks from Releases to Surface Water*. Final Report, *RAC* Report No.4-NMED-2002-FINAL(Rev.1). *Risk Assessment Corporation*, Neeses, South Carolina. June 12.

Mohler, H.J., K.R. Meyer, J.W. Aanenson, H.A. Grogan, and J.E. Till. 2002. *Analysis of Exposure and Risks to the Public from Radionuclides and Chemicals Released by the Cerro Grande Fire at Los Alamos. Task 3: Calculating and Communicating Risks: Observations and Recommendations*. *RAC* Report No.15-NMED-2001-FINAL(Rev.1). *Risk Assessment Corporation*, Neeses, South Carolina. June 12.

Aanenson, J.W., Boelter, P.J., M.J. Case, M. Dreicer, H.A. Grogan, M.O. Langan, P.D. McGavran, K.R. Meyer, R. Meyer, **H.J. Mohler**, A.S. Rood, R.C. Rope, S.K. Rope, L.A. Stetar, J.E. Till, P.G. Voillequé, T.F. Winsor, W. Yang. 2001. *Evaluation of Materials Released from the Savannah River Site. Savannah River Site Environmental Dose Reconstruction Project.* Phase II: Source Term Calculation and Ingestion Pathway Data Retrieval. RAC Report No.1-CDC-SRS-1999-Final. April 30. *Risk Assessment Corporation.*

Aanenson, J.W., **H.J. Mohler**, P.G. Voillequé, S.J. Maheras, A.S. Rood, H.A. Grogan, and J.E. Till. 2000. *Independent Technical Audit of Los Alamos National Laboratory for Compliance with the Clean Air Act, 40 CFR 61, Subpart H in 1999*. *RAC* Report No. 4- DOJ-LANL Audit-2000-Final. *Risk Assessment Corporation*, Neeses, South Carolina. November.

Weber J.M., S.J. Maheras, **H.J. Mohler**, P.G. Voillequé, and J.E. Till. 1999. *Independent Audit of Los Alamos National Laboratory for Compliance with the Clean Air Act, 40 CFR 61, Subpart H. RAC* Report No. 3-DOJ-LANL Audit-1998-Final. *Risk Assessment Corporation,* Neeses, South Carolina. November.

Grogan, H.A., P.D. McGavran, H.R. Meyer, K.R. Meyer, **H.J. Mohler**, A.S. Rood, W.K. Sinclair, P.G. Voillequé and J.M. Weber. 1999. *Technical Summary Report for the Historical Public Exposures Studies for Rocky Flats Phase II*. RAC Report No. 14-CDPHE-RFP-1999-FINAL. *Radiological Assessments Corporation*. Neeses, South Carolina. September.

Whicker, F.W., T.E. Hakonson, and **J. Mohler**. 1997. "Environmental Plutonium at Hanford: A Review of Literature and Monitoring Data." Prepared for Kirkland and Ellis, 200 East Randolph Drive, Chicago, IL 60601. May.

Other Papers

Rood, AS, B. Jacobs, P. Shanahan, **H.J. Mohler**, J.W. Aanenson, J.R. Rocco, L. Hay Wilson, H.A. Grogan, and J.E. Till. 2009. "Overview of Environmental Transport Models Contained in the Risk Analysis, Communication, Evaluation, and Reduction (RACER) Software Tools at Los Alamos National Laboratory." Waste Management for the Nuclear Renaissance, WM09 Conference, paper number 9070, 13 pages, March 1-5. Phoenix, AZ.

H.A. Grogan, J.W. Aanenson, P.D. McGavran, K.R. Meyer, S.S. Mohler, **H. J. Mohler**, J.R. Rocco, A.S. Rood, J.E. Till and L.H. Wilson. 2006 “Applied Modeling of the Cerro Grande Fire at Los Alamos: An Independent Analysis of Exposure, Health Risk, and Communication with the Public.” In *Applied Modeling and Computations in Nuclear Science*. ACS Symposium Series 945. Edited by T.M. Semkow, S. Pommé, S.M. Jerome, and D.J. Strome. American Chemical Society, Washington, DC.

Mohler, H. Justin, Jill Weber Aanenson, Helen Grogan, and John Till. 2005. "Creating Spatially-Linked Data and Risk Evaluation Tools to Support Community Participation and Decision Making for a Contaminated Site." Presented at 19th International Conference on Informatics for Environmental Protection, Masaryk University Brno, Brno, Czech Republic, Informatics for Environmental Protection - Networking Environmental Information (Volume 2), ISBN: 80-210-3780-6, p. 937 – 940, September 7-9.

Grogan, H.A., J.E. Till, K.R. Meyer, and **H.J. Mohler**. 2004. "Involving Stakeholders and Tailoring Environmental Databases for Shared Analysis of a Contaminated Site." Proceedings of the 18th International Conference Informatics for Environmental Protection, Sharing, CERN, Geneva, Switzerland, Editions du Tricorne, ISBN: 28 29 30 275-3, p. 242-245. October 21-23.