



STATEMENT OF QUALIFICATIONS

ANALYTICAL SERVICES DIVISION

JANUARY 2009

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INTRODUCTION TO BROOKS RAND LABS

Brooks Rand Labs was founded in 1982 with a mission of developing cutting-edge environmental technologies. Today, Brooks Rand Labs continues on this mission while providing a variety of commercially available technologies that have been developed and brought to market over the last twenty years. These technologies include analytical equipment and analytical services with a focus on ultra-trace level metals analysis and metals speciation. Brooks Rand Labs also provides other services related to specialized trace metals analysis including contract research, method development, consulting, training, and instrument design.

ABOUT BROOKS RAND LABS

In the last 10 years, Brooks Rand Labs has developed new technologies on the ultra-trace level metals and metals speciation front. Brooks Rand Labs also extended its research and development (R&D) efforts in the environmental analytical realm beyond mercury to develop improved methods for analysis and speciation of a wide variety of elements.

Today, Brooks Rand Labs continues to develop new and innovative technologies for measuring trace metals in the environment with a constant focus on improving one or more of the following:

- Lower detection limits
- More precise and accurate measurements
- Measurement of metallic compounds and valence states of metals, or “speciation”
- Measuring metals and metal species in complex matrices

STAFF

Brooks Rand Labs hires intelligent and inquisitive individuals with valuable research and laboratory experience. Once employed at Brooks Rand Labs, employees are enriched by the collective institutional wisdom of Brooks Rand Labs, created by present and past employees. Brooks Rand Labs has a full research and analytical staff of professionals with varying educational backgrounds including Analytical Chemistry, Engineering, Physics, Biology, Ecology, Environmental Science, and Forestry. Brooks Rand Labs believes that the key to understanding the complexities of environmental problems is through a multidisciplinary approach. Brooks Rand Labs takes great pride in its employees and their accomplishments.

THE FACILITY

Brooks Rand Labs’ three-story facility is located in Seattle, Washington, in close proximity to a number of other high-level research institutions. The facilities were recently expanded to include a new mercury lab and office space as well as completely renovated sample preparation and sample receiving labs.

Brooks Rand Labs is located at:

3958 6th Avenue NW
Seattle, WA 98107
United States of America

T: 206-632-6206 F: 206-632-6017 email: brl@brooksrand.com web: www.brooksrand.com

HOURS OF OPERATION

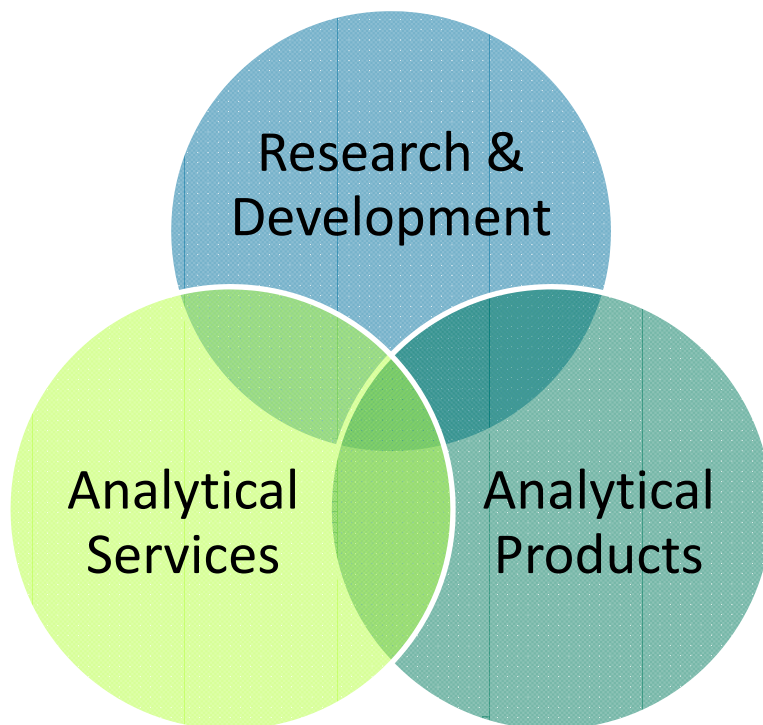
General Office: Open from 8:30 A.M., to 5:00 P.M. PST, Monday through Friday.

Sample Receiving: Open from 8:00 A.M. to 4:00 P.M. PST, Monday through Friday; 8:00 A.M. to 1:00 P.M. PST on Saturday with prior notification. Sample shipments can be received outside of normal business hours based on prior arrangements.



ANALYTICAL SERVICES DIVISION

The Analytical Services Division (ASD) of Brooks Rand Labs has a strong advantage over other labs by being able to leverage the resources and intellectual capital of both the Instrument Manufacturing Division (IMD) and the Research and Development Division (RDD). The relationship with IMD provides state-of-the-art, constantly updated instrumentation to ASD. The RDD arm of Brooks Rand Labs lends its technical expertise to assist ASD in overcoming challenges posed by difficult, non-routine matrices, and to develop and deploy new methods, which are then offered to Brooks Rand Labs' clients.



All three divisions of Brooks Rand Labs are located within a few blocks of each other and most equipment and personnel are shared among the divisions providing a comprehensive integration of business activities. This integration translates into clients receiving technically superior services and the highest quality data available.

SUPERIOR QUALITY

Recognizing the importance of accurate and precise measurements for both scientific and litigation purposes, our laboratory is dedicated to the production of the highest quality analytical data. As independent verification of this quality, Brooks Rand Labs maintains accreditation with a number of state and federal agencies. Brooks Rand Labs also routinely participates in numerous inter-laboratory comparison studies and works with various suppliers of Standard Reference Materials and Certified Reference Materials (SRMs and CRMs) to assist in the certification process of these materials.

All data generated at Brooks Rand Labs undergoes a rigorous series of QA review and validation steps prior to issuing final reports to our clients. All data is validated at three separate levels, ensuring that our data reports are of the highest quality available.

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OUTSTANDING CUSTOMER SERVICE

Brooks Rand Labs recognizes that providing outstanding customer service is vital to protecting and enhancing our excellent reputation. As a result, we go to great lengths to gain a clear understanding of our clients' projects and their specific requirements. In addition to providing standardized services and deliverables, we maintain flexibility to ensure that client- and project-specific requirements can be met. Whether this includes the analysis of non-routine samples, method development contracting, or customized reporting and deliverables, Brooks Rand Labs strives to fulfill clients' needs.



INNOVATIVE SOLUTIONS

All of the analytical methods we now offer as "routine" analytical services have been developed or refined at Brooks Rand Labs. In fact, Brooks Rand Labs is internationally recognized as a leader in the development of ultra-trace level analytical methods for metals detection. These methods are state-of-the-art, providing some of the lowest detection limits commercially available.

UNPARALLELED EXPERIENCE

Brooks Rand Labs has a great deal of experience providing services to a diverse customer base, including environmental consultants, government agencies, other analytical laboratories, large industrial companies, and research institutions. Past projects include remedial investigation, environmental site characterization, effluent monitoring, bioavailability and bioaccumulation studies, pollution source investigation, air monitoring, industrial process characterization, fate and transport, toxicology, and USEPA method validation studies.

CAPABILITIES

“ROUTINE” ANALYTICAL SERVICES

“Routine” services for Brooks Rand Labs are far from routine. Our standard methods are specialized for ultra-trace level metals analysis as well as organometallic and inorganic speciation. Brooks Rand Labs also has extensive experience with and specific preparation methods for a wide variety of matrices including fresh and saline waters, soils, sediments, sludges, filters, biota, pulp products, influents, effluents, ambient air, flue-gas, and various industrial and process liquids.

To obtain a quotation or to inquire about the availability of these and other analytical services, please contact a Brooks Rand Labs Project Manager at 206-632-6206 or by email at brl@brooksrand.com.

EPA AND BROOKS RAND LABS ANALYTICAL METHODS

Brooks Rand Labs follows a number of EPA and internal methods for our analytical services. Many of the 1600 series EPA methods were developed and offered on a commercial basis by Brooks Rand Labs prior to the EPA drafting these methods. In most cases Brooks Rand Labs has played a vital role in assisting the EPA in the validation of these 1600 series methods. Additionally, Brooks Rand Labs developed the world’s first commercially available atomic fluorescence spectrometer, which is referenced in EPA Methods 1630 and 1631, and is used for all mercury and mercury speciation services conducted at Brooks Rand Labs.

METHOD DEVELOPMENT AND FUTURE SERVICES

Brooks Rand Labs is continually developing new and improved analytical methods for lower detection limits, metal speciation, complex matrices, or improved data quality. For upcoming projects requiring non-routine trace metals analysis, please inquire about the availability of the services required.



BIOMONITORING

Brooks Rand Labs is continually advancing biomonitoring methodologies for the analysis of trace metals in biological matrices. One of our clients requested method reporting limits (MRLs) below what was previously commercially available for chromium and vanadium in urine. As a result, Brooks Rand Labs developed a new technique for analyzing these elements using dynamic reaction cell technology on an inductively-coupled plasma mass spectrophotometer (ICP-MS).

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HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY SPECIATION

Brooks Rand Labs has the ability to perform speciation analyses for trace metals using high-performance liquid chromatography (HPLC) coupled with our ICP-DRC-MS. This method is valuable for the speciation of selenium, arsenic, chromium, and iron. Please check with Brooks Rand Labs for current method availability as new methods are being developed all the time.

CONSUMER PRODUCTS

Brooks Rand Labs initiated the development of a method for determining leachable inorganic arsenic in consumer products in response to client inquiries for testing merchandise such as children's toys. Inorganic arsenic is a highly toxic substance which can be absorbed through the digestive tract and skin; ensuring low levels of inorganic arsenic in consumer products can be important for guaranteeing their safety.

DRY DEPOSITION

Brooks Rand Labs encourages our analysts and scientists to undertake research projects that may lead to the development of marketable services. For example, we now offer atmospheric mercury dry deposition services through the refinement of an analyst's endeavor which was presented at the 2007 SETAC annual conference.



ELUTRIATE

The need of our clients to assess the release of contaminants to a water source, resulting from open water disposal of dredged material, has led Brooks Rand Labs to develop an elutriate test to mimic this effect. This method involves combining dredged material and unfiltered water from the disposal site and simulating the physical and chemical processes that occur during dredging.

ULTRA-TRACE LEVEL SAMPLING

Brooks Rand Labs recognizes that many of our clients are not experienced with the additional precautions necessary when collecting samples for ultra-trace level metals. We offer a free limited preliminary consultation on proper sampling techniques to our clients.

“CLEAN HANDS/DIRTY HANDS” TRAINING COURSES

Brooks Rand Labs is committed to providing our clients with the essential information and support to understand the potential routes of metals contamination and to provide consultation on proper “clean” sampling techniques necessary to achieve low level metals detection limits.

Brooks Rand Labs offers extensive private or group training courses designed for anyone collecting water samples following the “Clean Hands/Dirty Hands” sampling techniques. Below is the course outline currently offered:

Overview of the Importance of Trace Metal Detection Limits: A brief discussion regarding the requirements of the Clean water Act, EPA Methods 1669 and 1631, and the need for low-level detection limits.

EPA Analytical Methods and Preservation Requirements: The instructor will go over various EPA analytical methods (1600-series) available for trace metals analysis. Instruction will also be provided for proper handling and preservation of samples prior to, or immediately following, lab receipt.

Potential Sources of Contamination: Participants will gain an understanding of different sources of contamination or interferences that can cause problems with trace metals analysis and ways to avoid contamination.

Sampling Considerations: In order to obtain credible and scientifically defensible data, sampling considerations will be discussed in order to determine the most appropriate sampling sites and sample collection techniques.

Sampling Supplies and Equipment: The course will review the correct equipment and supplies that must be used in order to successfully collect a water sample for trace-level metals analysis. Surface and subsurface sampling supplies will be discussed, including the equipment needed for proper field filtration.

Sampling Techniques: The instructors discuss EPA Method 1669 “Clean Hands/Dirty Hands” sampling techniques for several sampling methods. Participants will engage in hands-on field exercises where they will be given the opportunity to practice surface water sampling protocols.

Please contact your project manager for detailed course information.



SUBCONTRACTING CAPABILITIES

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Brooks Rand Labs prefers to focus on our specialty of ultra-trace level metals analysis and metals speciation. We believe that extending our capabilities to provide general analytical services or any organics analysis would detract from our innovative and cutting-edge approach. We do, however, clearly recognize that many projects require not only the specialized services that we offer, but also many general analytical services as well. While we do offer some general metals analytical services, we always subcontract organics and typically subcontract other general analytical services so that we can stay focused on providing customers with the best data quality possible in the area of trace metals analysis and metals speciation.

As a result, Brooks Rand Labs has established close partnerships with several other environmental laboratories. This network allows us to subcontract general analytical services to our partners, while still maintaining a single point of contact with the client. Brooks Rand Labs works closely with these partners to make certain they understand and meet our clients' requirements while upholding our level of integrity. Brooks Rand Labs reviews and validates all data generated by our subcontractors to ensure that the data meets our high standards for quality. Additionally, we can transfer sample and QA data into our Laboratory Information Management System so that data generated by Brooks Rand Labs and our subcontractors is reported in the same format, with the same look and feel. Clients benefit from this subcontract partnership arrangement by reducing their costs in contracting, lab coordination, sample collection, shipping, and data validation.

EXPERIENCE

Brooks Rand Labs has provided ultra-trace Hg analysis on a commercial basis since 1989. Our clients include scientists, consultants, industry, and government agencies worldwide. Brooks Rand Labs has been instrumental in transforming ultra-trace mercury methods from the research process into routine analytical procedures. Brooks Rand Labs has developed and refined mercury speciation methods (including methyl mercury, elemental mercury, mercuric sulfide, and acid-labile mercury) and offers these services commercially. Brooks Rand Labs' capabilities also include arsenic and selenium speciation as well as ultra-trace analysis for virtually any metal by ICP-MS. Brooks Rand Labs maintains focus on providing the highest quality analytical services and specializing in EPA 1600 Series Methods, ultra-trace level analyses, metals speciation, and analysis of non-routine, difficult matrices. Extremely low detection limits, stringent quality assurance, ultra-clean laboratory facilities, and exemplary customer service have earned Brooks Rand Labs its excellent international reputation.

The list of Brooks Rand Labs analytical projects is extensive and ranges from routine wastewater effluent monitoring to flue gas sampling from helicopters. Select projects highlighted below demonstrate the level and diversity of Brooks Rand Labs' analytical experience.

METHOD VALIDATION STUDIES

Brooks Rand Labs has worked closely with the EPA as a contracted laboratory to assist the EPA in validating several analytical methods for ultra-trace metals analysis. Brooks Rand Labs was awarded these method validation contracts in recognition of the extensive work that the company has provided over the years in developing and refining these methods. Brooks Rand Labs has held contracts for the following method validation studies:

EPA Method 1631, *Mercury in Water by Oxidation, Purge and Trap, and CVAFS*

EPA Method 1632, *Inorganic Arsenic in Water by Hydride Generation Quartz Furnace Atomic Absorption*

EPA Method 1639, *Determination of Trace Elements in Ambient Waters by Stabilized Temperature Graphite Furnace Atomic Absorption*

EPA Method 3200, *Mercury Species Fractionation and Quantification by Microwave Assisted Extraction, Selective Solvent Extraction and/or Solid Phase Extraction.*

Additionally, Brooks Rand Labs has worked with industry-sponsored organizations to investigate the applicability of various trace metals and metal speciation methods to industry-specific matrices.

AMBIENT MONITORING PROJECTS

WATER MONITORING

Since 1993, Brooks Rand Labs has been contracted to provide analytical services in support of the San Francisco Bay Regional Monitoring Program. The focus of this project is primarily to establish current baseline data and to monitor long-term trends for various pollutants. Brooks Rand Labs' involvement in the project involves the analysis and reporting of estuarine water and sediments for mercury and methyl mercury by CVAFS, selenium by HG-Cryo-AA and a variety of trace level metals by ICP-MS, ICP-DRC-MS, and HPLC-ICP-MS (See page 27 for descriptions).

In Washington State, Brooks Rand Labs worked with King County to perform ultra-trace level sampling and analysis for mercury to characterize the existing levels of mercury in Elliot Bay and the Duwamish Waterway.



AIR MONITORING

One possible pathway for mercury contamination of water and sediment is direct deposition from the air. In 1999, Brooks Rand Labs was selected by San Francisco Estuary Institute to perform mercury analyses of air deposition samples, with the use of Brooks Rand Gold Wire Traps and Brooks Rand Air Samplers. Known volumes of air passed over gold amalgam traps, which were subsequently analyzed for mercury at Brooks Rand Labs. The work performed was part of the RMP Air Deposition Pilot Study.

WET DEPOSITION

In 2006, the Idaho Department of Environmental Quality contracted Brooks Rand Labs to design a collection apparatus compatible with their deposition sampler. Precipitation was monitored weekly for total mercury concentration.

DRY DEPOSITION

At the 2007 National Atmospheric Deposition Program's Annual Conference in Boulder, Colorado, Brooks Rand Labs presented research into the dry deposition of atmospheric mercury and its contribution to mercury loads in urban run-off. Brooks Rand Labs has been employing research methods to assist the San Francisco Estuary Institute in determining the deposition levels of various mercury species in the San Francisco Bay Area as part of source/transport studies and is continuing method development in the determination of dry-deposited mercury species.

FLUE-GAS SAMPLING AND ANALYSIS

Brooks Rand Labs has many years of experience in stack sampling and analysis, including ducts, stacks, and plumes of coal-fired power plants and garbage combustion plants. In 1994, Brooks Rand Labs performed an extensive study for the Tennessee Valley Authority (TVA), which included simultaneous sampling at three duct locations, the stack, and the plume by helicopter. Through this important work, Brooks Rand Labs discovered many characteristics of stack gas and how to successfully sample and monitor such wastes. This work was presented at the 1994 Global Mercury Conference and at the 1995 ACS meeting in Chicago.



RIVER BASIN RESTORATIONS

From 1993 through 1994 Brooks Rand Labs performed total and methyl mercury analysis of water and sediment samples on a weekly and monthly basis for the Clinch River Restoration Project. This work was conducted for Martin Marietta in conjunction with the Oak Ridge National Laboratories.

REMEDICATION OF ARSENIC AND SELENIUM

Brooks Rand Labs has participated in numerous projects involving the testing of different remedial approaches. Many of these studies have looked at valence states and species of arsenic and selenium in an effort to design the most suitable and effective remedial technology.

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EMERGENCY RESPONSE/FIELD ANALYSIS

Brooks Rand Labs assisted the U.S. Navy in the efficient clean-up of a mercury spill in a marine bay. Within four days of notice, Brooks Rand Labs developed an analytical procedure suitable for field screening and was on-site performing field analyses. Over the following six weeks, approximately 1000 samples were analyzed to define the extent and spread of mercury contamination. Brooks Rand Labs worked closely with the Navy and its contractors to determine which remediation technique was most effective, assist in the monitoring of worker's health and exposure, and to separate dredged materials based on specified levels of mercury contamination. The success of this emergency-response project hinged on Brooks Rand Labs' ability to provide high-quality, accurate results within an hour of sample collection. The rapid availability of information enabled quicker and more informed decisions, resulting in significant savings and a quicker solution for the client and the various stakeholders.

ECOLOGICAL RISK ASSESSMENT

In 2000, Brooks Rand Labs worked with ENSR International to develop the sampling and analytical program in support of a Removal Action. Brooks Rand Labs gained NEESA-certification (i.e., certified to perform work for the U.S. Navy), for this project, and acquired soil and plant importation permits from the U.S. Department of Agriculture for the screening ecological risk assessment, which was performed in a wetland near the U.S. Navy's fuel supply depot on the island of Guam. The risk assessment was conducted to evaluate the potential threat to sensitive wetland animals and plants from compounds of potential concern in the wetland. Analysis of plants, seeds, gastropods, soil, and surface water was performed by Brooks Rand Labs for both methyl mercury and total mercury.



BIOACCUMULATION STUDIES

Brooks Rand Labs has been involved in numerous bioaccumulation studies since 1989. These studies have included projects managed by both consulting firms and government agencies. Previous bioaccumulation projects include a U.S. Fish & Wildlife investigation of the bioaccumulation of mercury in fish, birds, and the Everglades Panther. Brooks Rand Labs was also involved in a fascinating project with NOAA investigating the massive bioaccumulation of methyl mercury in the brain

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tissues of beached pilot whales. Another project, with the U.S. EPA Experiment Station in Corvallis, Oregon, showed a prodigious accumulation of mercury in feathers, which is believed to possibly be a mechanism to purge mercury.

In 1998, Brooks Rand Labs completed a large study funded by the U.S. Army Corps of Engineers investigating the bioaccumulation of mercury in earthworms. For this project Brooks Rand Labs worked with scientists at the University of Maryland to determine the possibility of earthworms serving as a pathway between mercury contaminated soils and mercury bioaccumulation in birds.

In 2000, Brooks Rand Labs was contracted to perform mercury testing for a survey of Montana sport fishes found at Flathead Lake. The lake trout (*Salvelinus namaycush*) had high mercury levels relative to fishes tested from other water bodies, while mercury contamination in the lake whitefish (*Coregonus clupeaformis*) was more moderate. These findings are of great concern considering the relatively pristine nature of the Flathead Lake watershed. The original study was performed on composited fish based on total length categories prior to mercury analysis. Composite samples are useful for large surveys because they reduce variability and analytical costs. However, they hindered a detailed assessment of fish versus contaminant relationships.

Flathead Lake currently supports a substantial sport and subsistence fishery primarily directed towards lake trout with smaller catches of yellow perch (*Perca flavescens*) and lake whitefish. An investigation of mercury in individual specimens of lake trout, lake whitefish, and their major diet items was conducted. Brooks Rand Labs performed the mercury testing of fish and invertebrate samples for this later study.



HUMAN BIOMONITORING

Assessing human exposure to toxic metals and their potential health effects has recently come to the forefront of public concern with frequent media stories of elevated metals in many products including fish, vaccines, and toys, as well as in some occupational and residential environments. An ever-increasing demand for definitive answers has prompted body burden studies across the country.

Metal speciation in biomonitoring has been gaining significance because a metal's valence state or the metallic compound frequently dictates its availability for uptake into the human body and the subsequent potential for deleterious effects. For more than a decade, Brooks Rand Labs has been providing services for analytical method development and specialized analyses for trace metals and metal species in a variety of human tissues and fluids including blood, urine, hair, and teeth. Over the years, Brooks Rand Labs has developed a number of analytical methods to overcome the common issues and

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interferences normally associated with analyzing these complex matrices. The laboratory staff at Brooks Rand Labs is also fully trained in the safe handling of potentially infectious materials.

Brooks Rand Labs' specialized metals analytical expertise in this area has been valuable to lawyers for litigation cases, university researchers, and non-profit organizations for public awareness campaigns. Some recent examples of public, non-confidential projects that Brooks Rand Labs has been involved in include:

POLLUTION IN PEOPLE STUDY

www.pollutioninpeople.org/results

In 2005, Brooks Rand Labs analyzed hair samples for mercury for the Washington Toxics Coalition for their "Pollution in People Study," a look at contaminant levels in people from Washington State.

BODY OF EVIDENCE STUDY

www.cleanandhealthyme.org/BodyofEvidenceReport/tabid/55/Default.aspx

In 2006, Brooks Rand Labs analyzed methyl mercury in hair, lead in blood, and arsenic species in urine samples from Maine residents for the Alliance for a Clean and Healthy Maine and their study "Body of Evidence: A Study of Pollution in Maine People".

METALS IN URINE

Environmental exposure to metallic compounds can often be determined by the quantification of those compounds in urine. In 2008, BRL developed methodology to assist the Harvard School of Public Health in a study of treatment regimes for foundry workers who were occupationally exposed to a variety of atmospherically suspended metals, resulting in the quantification of the target analytes in the vast majority of samples.



CLIENT REFERENCES

Client references are available upon request. Please contact a Brooks Rand Labs Project Manager for further information.

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METHODS AND MDLS

METHOD DESCRIPTIONS AND REFERENCES

WATER

Total Mercury in Water

EPA Method 1631E

Samples oxidized with the addition of bromine monochloride (BrCl) are analyzed by stannous chloride (SnCl₂) reduction, followed by gold amalgamation, thermal desorption, and cold vapor atomic fluorescence spectroscopy (CVAFS).

Methyl Mercury in Water

EPA Method 1630

Aqueous samples are distilled from Teflon™ distillation vials. Samples are then analyzed by ethylation, Tenax™ trap pre-concentration, gas chromatography separation, pyrolytic reduction, and AFS.

Reactive Mercury in Water

BRL In-house Procedure

Frozen samples are thawed in an oxygen-free atmosphere and exposure to light is minimized. Samples are analyzed by stannous citrate reduction, followed by gold amalgamation, thermal desorption, and CVAFS.

Elemental Mercury in Water

BRL SOP BR-0005

Aqueous samples are analyzed (with no oxidation or reduction) by direct purge and trap using gold amalgamation, thermal desorption, and CVAFS.

Acid-Labile Mercury in Water

BRL SOP BR-0003

Aqueous samples are analyzed (with no oxidation) by SnCl₂ reduction, followed by gold amalgamation, thermal desorption, and CVAFS.

Trace Metals in Water by ICP-MS

EPA Method 1638, Modified

Samples are closed-vessel oven digested with nitric acid (HNO₃). Digests are then analyzed by inductively coupled plasma mass spectrometry (ICP-MS) using internal standardization.

Trace Metals in Water by DRC

EPA Method 1638, Modified

Samples are closed-vessel oven digested with HNO₃. Digests are then analyzed by inductively coupled plasma – dynamic reactive cell – mass spectrometry (ICP-DRC-MS) using internal standardization.

Trace Metals in Seawater

EPA Method 1640, Modified

Samples are prepared by a reductive precipitation or Co(II)-ammonium pyrrolidinedithiocarbamate (Co-APDC) chelation. This procedure incorporates a chemical separation to remove the analyte of interest from the interfering matrix components. Sample extracts are then analyzed by ICP-MS or ICP-DRC-MS using internal standardization.

Total Arsenic in Water

EPA Method 1632, Modified

Samples are oxidized through the addition of sulfuric acid (H_2SO_4), potassium persulfate ($K_2S_2O_8$), and heat. The samples are then analyzed by hydride generation with sodium borohydride ($NaBH_4$) reduction, cryogenic trap precollection, hydrogen (H_2)/air flame quartz furnace decomposition, and atomic absorption spectroscopy (AAS).

Arsenic Species in Water

EPA Method 1632

Samples are pH adjusted to pH of six for trivalent arsenic (As[III]) and pH 1.5 for inorganic As, monomethylarsonic acid (MMAs), and dimethylarsinic acid (DMAs) with the addition of a buffer solution. Samples are then analyzed by hydride generation with $NaBH_4$ reduction, cryogenic trap precollection, H_2 /air flame quartz furnace decomposition and AAS. As(V) is determined as the difference between inorganic As and As(III).

Total Selenium in Water

BRL SOP BR-0020

Samples are digested and reduced with hydrochloric acid (HCl), $K_2S_2O_8$, and heat. After cooling, sulfanilamide ($NH_2C_6H_4SO_2NH_2$) is added and samples are analyzed by hydride generation with $NaBH_4$ reduction, cryogenic trap precollection, H_2 /air flame quartz furnace decomposition, and AAS.

Selenium Species in Water

BRL SOP BR-0060

Samples for Se(IV) and Se(VI) are analyzed directly by HPLC-ICP-DRC-MS. Samples are field-filtered or filtered at receipt through a 0.45- μm filter. Se(IV) and Se(VI) are measured sequentially following separation through an ion-exchange column with an ammonium phosphate/ammonium nitrate mobile phase. The analytes are detected by the ICP-MS as Se 78 in DRC mode using oxygen as a reaction gas.

Total Iron in Water

Method SM3500-B, Modified

Samples are oxidized with acetic acid, buffered, complexed with Ferrozine, and analyzed by colorimetry. Trivalent iron (Fe[III]) can be determined by the difference between total Fe and divalent Fe (Fe[II]).

Divalent Iron in Water

Method SM3500-B

Samples are buffered and complexed with Ferrozine and analyzed by colorimetry. Samples are analyzed in duplicate (with and without Fe[III] spike) to test for species conversion.

Hexavalent Chromium in Water

EPA SW7196a

Samples are analyzed colorimetrically with the use of diphenylcarbazide.

SEDIMENT/SOIL

Total Mercury in Sediment/Soil

EPA 1631, Appendix

Sediment/soil samples are digested with cold aqua-regia and further oxidized with BrCl. Samples are analyzed by SnCl₂ reduction, followed by gold amalgamation, thermal desorption, and CVAFS.

Methyl Mercury in Sediment/Soil

EPA 1630, Modified

Sediment/soil samples are prepared by acid bromide/methyl chloride extraction. Samples are then analyzed by ethylation, Tenax™ trap preconcentration, gas chromatography separation, pyrolytic reduction, and AFS.

Reactive Mercury in Sediment/Soil

BRL In-house Procedure

Frozen samples are thawed in an oxygen-free atmosphere and exposure to light is minimized. Working in a glove box, sample aliquots are placed in a vial and anoxic, dilute HCl is added. The samples are capped, vortexed, and then flash frozen and stored frozen until the time of analysis. Frozen sample aliquots are re-thawed in the glove box and analyzed by SnCl₂ reduction, followed by gold amalgamation, thermal desorption, and CVAFS.

Acid-Labile Mercury in Sediment/Soil

BRL SOP BR-0012

Solid samples are treated with repeated HCl extraction. Sample extracts are analyzed by SnCl₂ reduction, followed by gold amalgamation, thermal desorption, and CVAFS.

Mercury Sulfides in Sediment/Soil

BRL SOP BR-0012

If acid-labile Hg analysis is first performed on the samples (HCl extraction), the same solid aliquots may be extracted sequentially using a saturated sodium sulfide solution. Sample extracts are analyzed by SnCl₂ reduction, followed by gold amalgamation, thermal desorption, and CVAFS.

Mercury Speciation in Sediment/Soil

EPA 3200

Samples are sequentially extracted and separated using solid phase extraction to derive extractable inorganic Hg, extractable organic Hg, semi-mobile Hg, and non-mobile Hg. The specific mercury compounds found in each of these fractions is detailed in the method. Extract fractions are then oxidized and analyzed per EPA Method 1631 (CVAFS).

Mercury Speciation in Sediment/Soil by 5-Step Selective Sequential Extraction

BRL SOP BR-0013

Five-step selective sequential extraction procedure is used to quantify mercury fractions in sediments, soils, and mine tailings. Mercury is extracted via shaking from an accurately weighted sediment sample into five different solutions. These can broadly be linked to types of mercury compound. The extractants used are: deionized water, a synthetic "stomach acid," 1 M potassium hydroxide (KOH) solution, 12 M HNO₃, and aqua regia. After extraction, samples are analyzed in accordance with EPA Method 1631 (CVAFS).

Trace Metals in Sediment/Soil**EPA Method 1638, Modified**

Samples are closed-vessel oven digested in Teflon™ bombs with a variety of acids, depending upon the project requirements. Digests are then analyzed by ICP-MS or ICP-DRC-MS.

Total Arsenic in Soil/Sediment**EPA 1632, Modified**

Samples are digested using an aqua regia oven bomb digestion. The samples are then analyzed by hydride generation with NaBH₄ reduction, cryogenic trap precollection, H₂/air flame quartz furnace decomposition, and AAS.

Arsenic Species in Sediment/Soil**EPA 1632, Modified**

Sample aliquots for inorganic As, MMAs, and DMAs are extracted with HCl and adjusted to pH 1.5. Sample aliquots for As(III) are extracted with phosphoric acid (H₃PO₄) and adjusted to pH 6. Samples are then analyzed by hydride generation with NaBH₄ reduction, cryogenic trap precollection, H₂/air flame quartz furnace decomposition, and atomic absorption detection.

Hexavalent Chromium in Sediment/Soil**EPA SW3060a/7196a**

Samples are digested using a 0.28 M sodium carbonate (Na₂CO₃) and 0.5 M NaOH solution and heat to dissolve Cr(VI) and stabilize against reduction to Cr(III). Filtered sample extracts are then analyzed colorimetrically with the use of a diphenylcarbazide solution.

BIOLOGICAL TISSUE**Total Mercury in Tissue****EPA 1631, Appendix**

Tissue samples are acid digested with heat and further oxidized with BrCl. Samples are analyzed by SnCl₂ reduction, followed by gold amalgamation, thermal desorption, and CVAFS.

Methyl Mercury in Tissue**EPA 1630, Modified**

Biological samples are digested in a KOH/methanol solution. To achieve lower detection limits, the digestates can be distilled following digestion. Samples are then analyzed by ethylation, Tenax™ trap pre-concentration, gas chromatography separation, pyrolytic reduction, and CVAFS.

Trace Metals in Tissue**EPA 1638, Modified**

Samples are hot-block digested with HNO₃ and diluted to volume with DI water. Digests are then analyzed by ICP-MS.

Arsenic Species in Tissue**EPA 1632**

Sample aliquots are extracted with HCl. Aliquots for inorganic As, MMAs, and DMAs are adjusted to pH 1.5. Sample aliquots for As(III) are adjusted to pH 6. Samples are then analyzed by hydride generation with NaBH₄ reduction, cryogenic trap precollection H₂/air flame quartz furnace decomposition, and AAS.

BIOMONITORING**Total Mercury in Whole Blood, Plasma, and Hair****EPA 1631**

Whole blood and plasma samples are acid digested with heat and further oxidized with BrCl. Samples are analyzed by SnCl₂ reduction, followed by gold amalgamation, thermal desorption, and detection by CVAFS.

Total Mercury in Urine**EPA 1631E, Modified**

Samples are oxidized with the addition of BrCl. Samples are analyzed by SnCl₂ reduction, followed by gold amalgamation, thermal desorption, and detection by CVAFS.

Methyl Mercury in Whole Blood, Plasma, and Hair**EPA 1630, Modified**

Hair samples are washed and homogenized. Whole blood, plasma, and hair samples are digested in a KOH/methanol solution. To achieve lower detection limits, the digestates can be distilled following digestion. Samples are then analyzed by ethylation, Tenax™ trap pre-concentration, gas chromatography separation, pyrolytic reduction, and CVAFS.

Trace Metals in Whole Blood, Plasma, and Hair**EPA 1638, Modified**

Whole blood and plasma samples are diluted with a diluent comprised of EDTA, TMAH, ethanol, and Triton X-100 in DI water. Diluted samples are then analyzed by ICP-MS or ICP-DRC-MS.

Trace Metals in Urine**EPA 1638, Modified**

Samples are diluted with a HNO₃ solution. Diluted samples are then analyzed by ICP-MS or ICP-DRC-MS. Analytes that are best determined using the DRC include As, Se, Ni, Cr, and V.

AIR**Total Mercury in Air/Flue Gas****EPA 324 /1631**

Iodated carbon traps are digested with acid and further oxidized with BrCl. Samples are analyzed by SnCl₂ reduction, followed by gold amalgamation, thermal desorption, and detection by CVAFS.

Total Mercury in Air**EPA IO-5**

Gold amalgamation traps are heated to thermally desorb the mercury under argon gas which is then measured using CVAFS.

OTHER MATRICES

Total Mercury in Gasoline, Solvents, or Petroleum Products

Organo-mercury compounds in the solvent are oxidized while being extracted into the aqueous phase using an oxidant/acid solution or BrCl and HCl. The inorganic mercury is simultaneously extracted into the solution. The extracted mercury in the aqueous phase is then reduced to Hg^0 by SnCl_2 and detected by CVAFS.



METHOD DETECTION LIMITS

Analyte	Methodology	Fresh Water (µg/L)	Saline Water (µg/L)	Sed/Soil (mg/kg)	Biota (mg/kg)
Ag (Silver)	ICP-MS (EPA 1638/1640)	0.005	0.005	0.030	0.015
Al (Aluminum)	ICP-MS (EPA 1638/1640)	0.13	-	17	0.20
As (Arsenic)	ICP-MS (EPA 1638/1640)	0.04	0.03	0.40	0.04
	ICP-DRC-MS (EPA 1638/1640)	0.014	-	0.10	0.003
	HG-Cryo-AAS	0.040	-	0.010	-
Arsenite - As(III)	HG-CT-AAS (EPA 1632)	0.011	0.011	0.030	0.003
As, Inorganic	HG-CT-AAS (EPA 1632)	0.008	0.008	0.003	-
Arsenate - As(V)	Calculation(EPA 1632)	0.011	0.011	0.03	0.003
Monomethyl As - MMAs	HG-CT-AAS (EPA 1632)	0.008	0.008	0.003	0.005
Dimethyl As - DMAs	HG-CT-AAS (EPA 1632)	0.008	0.008	0.003	0.003
B (Boron)	ICP-MS(EPA 1638)	0.27	10	1.0	0.08
Ba (Barium)	ICP-MS(EPA 1638)	0.010	0.50	0.30	0.03
Be (Beryllium)	ICP-MS(EPA 1638/1640)	0.012	0.005	0.11	0.008
Ca (Calcium)	ICP-MS(EPA 1638)	6.0	-	30	8.0
Cd (Cadmium)	ICP-MS (EPA 1638/1640)	0.004	0.003	0.010	0.003
Co (Cobalt)	ICP-MS(EPA 1638/1640)	0.02	0.02	0.05	0.02
Cr (Chromium)	ICP-MS (EPA 1638/1640)	0.04	0.08	0.67	0.05
Cr (III)	Calculation	1.5	1.5	1.5	-
Cr(VI)	Colorimetric	1.5	1.5	0.67	-
Cu (Copper)	ICP-MS (EPA 1638/1640)	0.04	0.03	0.17	0.04

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Analyte	Methodology	Fresh Water (µg/L)	Saline Water (µg/L)	Sed/Soil (mg/kg)	Biota (mg/kg)
Fe (Iron)	ICP-MS (EPA 1638)	1.4	-	6.5	1.8
	ICP-DRC-MS (EPA 1638)	1.00	-	-	-
	Colorimetric	7.2	7.2	-	-
Fe (III)	Calculation	11	11	-	-
Fe(II)	Colorimetric	11	11	-	-
Hg (Mercury)	CVAFS (EPA 1631)	0.00015	0.00015	0.00005	0.00004
Methyl Hg	GC-CVAFS (EPA 1630)	0.000010 or 0.000020	0.000010 or 0.000020	0.000008	0.0010 or 0.00007
Elemental Hg	CVAFS	0.00015	0.00015	-	-
Misc Hg species	Various Extractions & CVAFS	0.00015	0.00015	0.00020 - 0.0020	0.00020 - 0.0020
K (Potassium)	ICP-MS (EPA 1638)	2.0	-	280	1.0
Mg (Magnesium)	ICP-MS (EPA 1638)	0.60	-	5.0	0.50
Mn (Manganese)	ICP-MS (EPA 1638)	0.07	0.500	0.06	0.01
Mo (Molybdenum)	ICP-MS (EPA 1638)	0.004	-	0.35	0.006
Na (Sodium)	ICP-MS (EPA 1638)	2.1	-	15	4.0
Ni (Nickel)	ICP-MS (EPA 1638/1640)	0.04	0.03	0.30	0.05
Pb (Lead)	ICP-MS (EPA 1638/1640)	0.015	0.036	0.05	0.008
Sb (Antimony)	ICP-MS (EPA 1638/1640)	0.005	0.004	0.05	0.004
Se (Selenium)	ICP-MS (EPA 1638/1640)	0.11	0.05	0.31	0.04
	ICP-DRC-MS (EPA 1638/1640)	0.017	0.05	0.20	0.04 (0.023 for egg)
	HG-Cryo-AA	0.018	0.020	0.005	-
Se (IV), Diss	HPLC-ICP-DRC-MS	0.400	-	-	-
Se(VI)	HPLC-ICP-DRC-MS	0.200	-	-	-

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Analyte	Methodology	Fresh Water (µg/L)	Saline Water (µg/L)	Sed/Soil (mg/kg)	Biota (mg/kg)
Sn (Tin)	ICP-MS (EPA 1638)	0.030	-	0.040	0.05
Sr (Strontium)	ICP-MS (EPA 1638)	0.010	-	0.010	0.014
Th (Thorium)	ICP-MS (EPA 1638)	0.003	-	0.039	-
Ti (Titanium)	ICP-MS (EPA 1638)	0.04	-	0.20	0.05
Tl (Thallium)	ICP-MS (EPA 1638/1640)	0.002	0.003	0.010	0.002
U (Uranium)	ICP-MS (EPA 1638)	0.002	-	-	0.008
V (Vanadium)	ICP-MS (EPA 1638/1640)	0.03	0.03	3.0	0.03
W (Tungsten)	ICP-MS (EPA 1638)	0.03	-	-	-
Zn (Zinc)	ICP-MS(EPA 1638/1640)	0.05	0.078	0.25	0.28

Method Detection Limits are determined based on 40 CFR Part 136 B. Actual detection limits can vary depending on the matrix and the sample-specific chemistry. Brooks Rand Labs always strives to produce the lowest detection limit, unless otherwise instructed by the client.

Listed Soil/Sediment MDLs are for a standard, total recoverable digestion. Please inquire if you are interested in MDLs for HF digestions (true total metals).

Method Info & Notes

ICP-MS	Inductively Coupled Plasma - Mass Spectrometry (in standard mode)
ICP-DRC-MS	Inductively Coupled Plasma - Dynamic Reaction Cell - Mass Spectrometry
HG-CT-AA	Hydride Generation - Cryogenic Trapping - Atomic Absorption Spectrometry
CVAFS	Cold Vapor Atomic Fluorescence Spectrometry
GC-CVAFS	Gas Chromatography - Cold Vapor Atomic Fluorescence Spectrometry
HPLC	High Performance Liquid Chromatography

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QA

QUALITY MANAGEMENT SYSTEM

The quality management system of Brooks Rand Labs is detailed in our Comprehensive Quality Assurance Plan (CQAP). The Brooks Rand Labs CQAP covers the following topics:

1. Statement of Policy
2. Organization and Responsibility
3. Training
4. Capabilities and Quality Assurance Objectives
5. Sampling Procedures and Requirements
6. Sample Custody
7. Analytical Procedures
8. Calibration Procedures
9. Preventative Maintenance
10. Quality Control Checks and Routines to Assess Precision, Accuracy and the Calculation of Method Detection Limits
11. Data Reduction, Validation, and Reporting and Storage
12. Document Control Policies
13. Laboratory Information Management System
14. Corrective Action
15. Performance and System Audits

Copies of our CQAP are available upon request.

QA AND DELIVERABLES

Brooks Rand Labs works with each client to ensure that the work performed meets or exceeds the project-specific requirements. The needs of our clients are paramount. As such, Brooks Rand Labs offers two fixed deliverable levels, as well as the flexibility to offer custom deliverables to meet specific needs. Please contact a Brooks Rand Labs' Project Manager for more information regarding custom deliverables options.

STANDARD VS. FULL DELIVERABLE LEVELS

Deliverable Levels	Standard <i>(Level II Equivalent)</i>	Full <i>(Level IV Equivalent)</i>
Case Narrative	Brief Narrative	Detailed Narrative
Sample Result Summary	Yes	Yes
QA Result Summary	Yes	Yes
Raw Data	No	Yes
Bench Sheets	No	Yes
Prep Sheets	No	Yes
Analytical Spreadsheets	No	Yes
Sample Receiving Logs	Yes	Yes
Chain of Custody (COCs)	Yes	Yes
Electronic Data Deliverables (EDDs)	Yes ¹	Yes

- Brooks Rand Labs' standard basic Excel EDDs are available upon request at no additional charge. Client-specific EDD requirements can be provided, although additional fees may be applicable.*

ACCREDITATIONS AND PERMITS

LABORATORY ACCREDITATIONS

Brooks Rand Labs is currently accredited by the following state agencies:

- National Environmental Laboratory Accreditation Conference (NELAC)
- California - Department of Health Services – certificate # 2617
- Florida Department of Health (Primary NELAC Accreditation) – accreditation # E87982-01
- Louisiana State Department of Environmental Quality (Secondary NELAC Accreditation)– certificate # 04171
- Maine - Department of Health and Human Services – certificate # 2008039
- New Jersey – Department of Environmental Protection – laboratory # WA010
- New York State Department of Health – accreditation # 11688
- Oregon ELAP (Secondary NELAC Accreditation) – accreditation #WA 200006-002
- Washington State - Department of Ecology - accreditation # C-1349



These laboratory accreditation programs require reviews of analytical Standard Operating Procedures (SOPs), Quality Assurance manual, and audits of the laboratory facilities, practices, documentation, and records. Clearly, these accreditations demonstrate our commitment to quality as well as provide customers with a high level of confidence in Brooks Rand Labs.

Brooks Rand Labs has received approval by the Navy for numerous past projects based on compliance with revision 3 of the Department of Defense Quality System Manual (DoD QSM). While this acceptance is on a project-by-project basis, the outstanding past performance of Brooks Rand Labs in the approval process all but ensures that obtaining approval for new DoD projects will be very straightforward.

Brooks Rand Labs is able to receive accreditation by other organizations or government agencies if required by a particular contract. As a result of Brooks Rand Labs' commitment to quality, difficulties in obtaining any additional accreditations as needed should be negligible.

PERMITS

TISSUE PERMIT

Brooks Rand Labs holds a license from the United States Fish and Wildlife Service for the import/export of biological tissues permitting receipt of tissue samples from overseas projects. This permit is required for any facility to receive and handle foreign tissues.

- Foreign Tissue Permit #LE092288-0

PLANT & SOIL IMPORT PERMIT

Brooks Rand Labs holds import permits from the United States Department of Agriculture to allow the receipt of admissible plants and soils from overseas projects and from areas of North America where soils are regulated.

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- Plant and Soil Import Permit #P330-08-00159

MIGRATORY BIRD PERMIT

Brooks Rand Labs holds a permit from the United States Fish and Wildlife Service to allow the import, export, and possession of migratory birds.

- Migratory Bird Permit #MB108035-0

PERSONNEL

The laboratory staff is organized in such a way that all analytical personnel are trained in a variety of laboratory duties. While each person is familiar with many aspects of laboratory work, individuals are specialized in their area of primary responsibility.

CONTACT INFORMATION FOR KEY PERSONNEL

Key Personnel	Title & Responsibilities	Email
Colin Davies	President Corporate operations, business development, consulting, instrument manufacturing, operations, and finances	colind@brooksrand.com
Michelle Briscoe	Vice President of Analytical Services Laboratory operations, contracting, business development, project management, quality assurance, client services, consulting	michelle@brooksrand.com
Amanda Fawley	Business Development Business development, marketing & sales, client services	amanda@brooksrand.com
Elizabeth Madonick	Business Development Business development, marketing & sales, client services	elizabeth@brooksrand.com
Citron Choice	Project Manger Primary client point of contact, communication of client requirements to lab staff, reporting	citron@brooksrand.com
Amy Durdle	Project Manger Primary client point of contact, communication of client requirements to lab staff, reporting	amy@brooksrand.com
Misty Kennard-Mayer	Project Manger Primary client point of contact, communication of client requirements to lab staff, reporting	misty@brooksrand.com
Tiffany Stillwater	Project Manger Primary client point of contact, communication of client requirements to lab staff, reporting	tiffany@brooksrand.com
Frank McFarland	QA/EH&S Manager Laboratory data quality oversight, lab audits, accreditations, data validation, document Control, EH&S	frank@brooksrand.com
Annie Carter	Mercury Lab Manager Mercury lab supervisor, analytical troubleshooting, method development, analyst	annie@brooksrand.com
Michela Powell	Trace Metals Group Leader Trace metals lab supervisor, analytical troubleshooting, method development, analyst	michela@brooksrand.com
Rick Manson	IT Manager Management of hardware, software, and network, including LIMS	rick@brooksrand.com
Katie Jahanmir	Sample Control Group Lead Oversees receipt of samples, lab purchasing, sample disposal, and equipment decontamination	katie@brooksrand.com

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RESUMES OF KEY PERSONNEL

COLIN DAVIES – PRESIDENT

In January of 2002, Mr. Davies acquired Brooks Rand with a vision of building upon Brooks Rand Labs' excellent reputation as the premier provider of technologically advanced environmental analytical services and products.

Mr. Davies initially joined Brooks Rand Labs in 1992 as the company's first QA Manager, working under the direction of Nicolas Bloom, and was instrumental in developing and implementing Brooks Rand Labs' QA Management System. From 1993 to 1998 Mr. Davies was the Director of Analytical Services and managed projects in value of over a million dollars. Mr. Davies developed technology for the rapid field analysis of mercury, which has been used to direct clean up of mercury spills in large emergency response projects.

Prior to joining Brooks Rand Labs, Mr. Davies worked for a medical diagnostics division of Baxter where he gained valuable experience with the rigorous QA systems required in the medical products industry, as well as production laboratory operations. After leaving Brooks Rand Labs in 1998 he worked for an internet start-up where he led cross-functional teams in the development, marketing and sales of client-server software, resulting in the sale of over 4 million licenses. In 2001, Mr. Davies worked for Battelle in the Environmental Technology Commercialization Center (ETC²).

Mr. Davies holds an MBA from the University of Washington, where he was a Bradford Scholar, graduating in the top 5% of his class. He also has a Certificate of Environmental Management from the University of Washington, and a bachelor's degree in Biology from Whitman College.

Qualification Summary

Over twelve years experience in the field of ultra-trace metals analysis and metals speciation including:

- Sample preparation and analysis - with a focus on mercury and methyl mercury
- Quality assurance - implemented entire QA program at Brooks Rand Labs
- Project Management - with projects ranging up to over \$1 million of analytical work.

Work Experience

- | | |
|--------------|--|
| 2002-present | <p><u>President - Brooks Rand Labs (Seattle, WA)</u></p> <ul style="list-style-type: none"> • Oversee company operations (returned company to profitability in first year of ownership) • Manage major projects (overall outstanding service rating from 2003 customer survey) • Business development, marketing, sales, and contracting (more than quadrupled sales in first four years of management) • Manage R&D efforts for new analytical services and products (led to multiple new and improved products and services) |
| 2001 | <p><u>Business Development Associate – Battelle (Seattle, WA)</u></p> <ul style="list-style-type: none"> • Worked with new technology developers to assist in commercialization efforts |
| 1999-2000 | <p><u>Product Manager – Webforia (Bellevue, WA)</u></p> <ul style="list-style-type: none"> • Managed client-server based software product • Led cross-functional teams in management of product (resulted in sale of over 4 million licenses) |
| 1992-1998 | <p><u>Lab Director / QA Manager - Brooks Rand Labs (Seattle, WA)</u></p> <ul style="list-style-type: none"> • Implemented entire QA program (QA Plan, SOPs, Accreditations) • Managed projects (ranging in size to over \$1 million in analytical services) |

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- New Service Development (developed and implemented a new method for mercury field screening emergency response, saving the client millions of dollars)

1989-1992 Associate Scientist II – Baxter Inc., Bartels Division (Issaquah, WA)

- Supervised laboratory technicians in manufacture of diagnostic products in ultra-clean room environments
- QA liaison between manufacturing and QA department (vastly improved communication between departments leading to increased product quality)
- Developed an improved production procedure (reduced rejection rate from 40% to <10% for division's most profitable product)

Education

2001 M.B.A. - University of Washington (Seattle, WA)

- Bradford Scholar – graduated in top 5% of class
- Dean's list for 4 out of 5 full-time quarters
- 4.0 GPA for 3 consecutive quarters
- Emphasis on Finance and Marketing

1998 Certificate in Environmental Management – Univ. of Washington (Seattle, WA)

- Led top team in project plan for environmental assessment, remediation, and redevelopment of abandoned brownfield site

1989 B.A. in Biology - Whitman College (Walla Walla, WA)

- Honor's at Entrance

Presentations

2008 – “Automated Methyl Mercury Analysis (MERX)”. Japan Analytical Instrument Manufacturer Association (JAIMA)

2008 – “Advances in Mercury Speciation Methodology”. National Monitoring Conference.

2008 – “Mercury and the Environment”. Taiwan National Institute of Science and Technology.

2008 – “Quality Assurance for Trace Metals Analysis”. Taiwan Environmental Protection Agency Workshop.

2008 – “Ultra-Trace Metals Sampling ‘Clean Hands – Dirty Hands’”. Taiwan Environmental Protection Agency Workshop.

2008 – “Recent Advances in Mercury Speciation”. The Pittsburg Conference (PittCon).

2006 – “Ultra-Trace Level Sampling for Mercury and Methyl Mercury”. California Water Environment Assoc. (CWEA).

2006 – “History and Background of Mercury and Methyl Mercury Issues”. California Water Environment Assoc. (CWEA).

2006 – “Dual Atomic Fluorescence System for Both Total and Methyl Mercury”. The Pittsburgh Conference (PittCon).

2004 – “Biomonitoring for Mercury: Low Detection Limits with Micro Samples”. The Pittsburgh Conference (PittCon).

MICHELLE BRISCOE – VP OF ANALYTICAL SERVICES

In July of 2004, Ms. Briscoe (formerly Michelle Gauthier) joined Brooks Rand Labs as Vice President of Analytical Services, laboratory manager, and technical director.

Prior to joining Brooks Rand Labs, Ms. Briscoe worked for 12 years at environmental laboratories focusing exclusively on the analysis of trace metals and other inorganic constituents. Ms. Briscoe's primary areas of technical expertise include analyses by ICP-MS, sample collection, consulting for Sampling & Analysis Plans, and operations management.

Qualification Summary

Over seventeen years of experience in the field of metals analysis including:

- Lab Operations and Management – extensive experience in managing all aspects of lab operations
- Sample preparation and analysis – Twelve years of experience in ultra-trace level metals analysis and speciation
- Quality assurance – in depth knowledge of QA for trace metals analysis and metals speciation
- Project Management - broad knowledge in management of varied and complex analytical projects.

Work Experience

2004-present	<u>Vice President of Analytical Services - Brooks Rand Labs (Seattle, WA)</u>	
	<ul style="list-style-type: none"> • Manage operations of Analytical Services Division (ASD) • Business development, sales, and marketing • Manage operations of Mercury and Trace Metals Laboratories • Client services and project management • Contracting and quoting • Quality assurance • Laboratory EH&S • Sample receipt and control 	
1995-2004	<u>Various - Frontier Geosciences (Seattle, WA)</u>	
	Vice President of Operations	2003-2004
	<ul style="list-style-type: none"> • Created and managed seven departmental budgets; oversaw all laboratory and research departments • Developed hiring and business plans • Negotiated vendor contracts 	
	Vice President of Administration & Analytical Services	2003
	<ul style="list-style-type: none"> • Management of analytical laboratory, QA, IT, safety, facilities, and administrative office staff 	
	QA Officer	2001 & 2003
	<ul style="list-style-type: none"> • Interim QA officer (approximately seven months each time) • Ensured compliance with all QA requirements • Managed state and national accreditations • Reviewed and approved SOPs, QA Plan 	
	Lab Manager	1998-2003
	<ul style="list-style-type: none"> • Managed all laboratory groups including trace metals analysis, mercury analysis, project management, QA, technical data services, shipping and receiving, and sample preparation • Responsible for \$5 M in revenue and 40 FTEs 	
	Project Manager and Project Management Leader	1996-2003
	<ul style="list-style-type: none"> • Hiring, training, and development of all project managers 	

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- Management of up to \$1.5 M of projects

Trace Metals Analyst and Trace Metals Group Leader

1995-1998

- Management of analysts, training, and scheduling
- Developed and performed new methods for analysis of trace metals and metals species using CVAFS, GFAAS, HG-AAS, and HG-AFS.

1992-1995

Inorganics Supervisor and Analyst - Laucks Testing Laboratory (Seattle, WA)

- Managed nine-member team
- Validated all inorganics data
- Analyzed anions by IC, mercury by CV-AAS, nutrients and cyanide by automated colorimetry, and TPH by FTIR.

Education

1992

B.S. in Chemistry and Physics – Western Oregon University (Monmouth, OR)

- Minor in Biology

Publications and Papers

Vandervort, A.F., and Gauthier, M.L., 2000. "A Comparison of Different Sediment Digestion Techniques," invited presentation for NOAA Quality Assurance Workshop, Washington, D.C., April 10, 2000.

Litten, S., Fowler, B., Gauthier, M., and Bloom N. 1999. "Containment Assessment and Reduction Project: Toxic Chemicals in New York Harbor and Vicinity – Sources and Ambient Concentrations of Pesticides, PAHs, Mercury and Cadmium," poster presentation at CETAC Conference, November 15-19, 1999, Pittsburgh, PA.

Gauthier, M.L., and Bloom, N.S. 1999. "ICP-MS as an Effective Screening Technique for Total Mercury Determination by CV-AFS (EPA Method 1631)," invited presentation for NOAA Quality Assurance Workshop, Richmond, CA, February 2, 1999.

Bloom, N.S, and Gauthier, M.L. 1998. "Lower MDLs and Better Accuracy for 'Total Recoverable Metals' in Water through the Use of Dilute HF/HNO₃ Digestion at 85°C in Sealed Teflon Bottles," invited presentation for EPA Conference on the Analysis of Water, Washington D.C., May 5-6, 1998.

Bloom, N.S, Gauthier, M.L., and Wallschläger, D. 1997. "Ultra-Trace Speciation of Selenium by Automated Hydride Generation-Flame Atomic Fluorescence Spectrometry (HG-AFS)," poster presentation for Geoanalysis '97, June 2-5, 1997, Vail, CO.

AMANDA FAWLEY – BUSINESS DEVELOPMENT

Ms. Fawley joined Brooks Rand Labs in 2006 bringing her extensive environmental and project management experience to the company. Prior to joining Brooks Rand Labs, she worked for the Arizona Department of Environmental Quality from 1998 to 2006 where she was most recently a project manager in charge of mercury TMDL studies. Her previous positions at Arizona DEQ included Hydrologist, Environmental Program Specialist, and Environmental Health Specialist. Ms. Fawley has extensive experience in field sampling for trace metals and project management from the laboratory-client perspective.

Prior to joining Brooks Rand Labs, Ms. Fawley was familiar with many of the analytical services provided by Brooks Rand Labs. Since joining Brooks Rand Labs, Ms. Fawley has rapidly gained more detailed knowledge in the laboratory handling and analytical procedures necessary to ensure good quality data. Having come from the client side of laboratory work, she is extremely conscientious of our clients' needs and the high value of good communication between the lab, the client project management, and the client's field sampling crew.

Ms. Fawley has a bachelor's degree in Environmental Resource Management from Arizona State University.

Qualification Summary

Strong project management and trace metals sampling experience:

- Eight years of field sampling experience for trace metals and project management.

Work Experience

2006-present	<u>Various - Brooks Rand Labs (Seattle, WA)</u> Business Development	2009-present
	<ul style="list-style-type: none"> • Prepare quotations and proposals • Business development tasks related to sales and marketing • Lead classes on Sampling Collection for Trace Metals Analysis 	
	Project Manager	2006-2008
	<ul style="list-style-type: none"> • Management of a wide variety of projects types • Communication between clients and analytical staff • Customizes reporting to meet clients' needs 	
1998-2006	<u>Project Manager – Arizona Department of Environmental Quality (Phoenix, AZ)</u>	
	<ul style="list-style-type: none"> • Supervised field sampling crew • Conducted complex review of regulatory investigations • Managed TMDL projects • Developed and managed field sampling plans • Sampling lead for ambient monitoring project • Conducted background research, wrote technical reports and facilitated public meetings. 	

Education

1996	<u>B.S. in Environmental Resource Management – Arizona State University (Tempe, AZ)</u>
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ELIZABETH MADONICK – BUSINESS DEVELOPMENT

Ms. Madonick joined Brooks Rand Labs in 2003 bringing her extensive laboratory and project management experience. Prior to joining Brooks Rand Labs, she was the laboratory manager for B&P Laboratories in Seattle where she managed the laboratory staff and developed and implemented QA processes. She also expanded the laboratory operations to include several new analytical services and worked closely with clients on their requirements and needs to fulfill their own regulatory and manufacturing quality requirements.

Since joining Brooks Rand Labs, Ms. Madonick has quickly become proficient and knowledgeable in the various analytical services provided at Brooks Rand Labs. In her role as Project Manager, Ms. Madonick worked closely with customers to ensure a complete understanding of their specific individual project requirements and ensured that these requirements were communicated to various lab personnel. In her current role as BD Manager, Ms. Madonick continues to utilize her attention to detail, strong customer focus, excellent communication skills, and her past experience in laboratory and project management to ensure that our customers' requirements are met.

Prior to her Lab Manager position at B&P, Ms. Madonick was the Microbiology Supervisor for A&L Laboratory in Maine, where she analyzed water samples for various microbiological tests and for a variety of different elements and general parameters. Ms. Madonick also worked with the Maine State Police Crime Lab where she was indoctrinated with strict chain of custody and evidentiary QA protocols. She also was a laboratory teaching assistant at University of Southern Maine where she prepared laboratory sessions for Chemistry, Natural and Applied Science, and Anatomy and Physiology. Ms. Madonick has a bachelor's degree in Natural and Applied Science from the University of Southern Maine where she graduated Summa Cum Laude, and was a recipient of prestigious academic achievement scholarships.

Qualification Summary

Strong leadership and project management skills and experience:

- Sample analysis and sample preparation – with focus on ultra-trace level analysis of mercury
- Project management of diverse clientele with varying requirements

Work Experience

2008-Present	<u>Various – Brooks Rand Labs (Seattle, WA)</u> Business Development	2008-Present
	<ul style="list-style-type: none"> • Business development, marketing, sales, and contracting 	
	Project Manager	2003-2007
	<ul style="list-style-type: none"> • Management of a wide variety of projects types • Communication between clients and analytical staff • Customized reporting to meet client needs 	
2002-2003	<u>Laboratory Manager - B&P Laboratories (Seattle, WA)</u>	
	<ul style="list-style-type: none"> • Supervised entire lab staff • Analyzed samples for metals, organics, and conventionals using variety of analytical instrumentation • Developed and implemented QA/QC procedures • Expanded operations with implementation of new analytical services • Continual communication with clients to discuss analytical requirements 	
2000-2002	<u>Teacher – Wiscasset and Newcastle School Districts (ME)</u>	
1999-2000	<u>Microbiology Supervisor - A&L Laboratories (Auburn, ME)</u>	
	<ul style="list-style-type: none"> • Analyzed and managed analysis for metals and conventionals • Handled all microbiology analysis and client reporting 	

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- Supported municipal, private and corporate clients

1997-1999

Lab Teaching Assistant – University of Southern Maine (Lewiston, ME)

- Supervised and prepared labs for Chemistry, Natural and Applied Science, and Anatomy and Physiology

1997

Intern – Maine State Police Crime Lab (Augusta, ME)

- Learned and performed forensic analysis using mass spectrometry
- Processed evidence using strict chain of custody protocols

Education

1999

B.A. in Natural and Applied Science – University of S. Maine (Lewiston, ME)

- Coursework included inorganic, organic and biochemistry, statistics, lab measurement
- Phi Kappa Phi and recipient of Helen L. Greenwood Scholarship for academic achievement

CITRON CHOICE – PROJECT MANAGER

Mr. Choice joined Brooks Rand Labs in 2007 bringing over ten years of laboratory experience with him. Mr. Choice brings a full breadth of knowledge to the Project Management group because of his vast experience as a laboratory technician, analyst, and familiarity with shipping and receiving. With years of experience and training on various instruments, he is considered a valuable member of the project management group. In addition to having spent many years in the lab, while at Frontier Geosciences, Mr. Choice has also spent time testing of mercury to support research and development.

Work Experience

2007- Present	<u>Various - Brooks Rand Labs (Seattle, WA)</u> Project Manager	2008-Present
	<ul style="list-style-type: none"> • Report generation and organization • Monitoring of multiple projects covering a variety of matrices and analytes • Coordination between lab staff and clients on a consistent basis 	
	Senior Analyst	2007-2008
	<ul style="list-style-type: none"> • Mercury and arsenic analysis • Research and development for analytical methods and procedures • Sample preparation • Maintained lab instrumentation • Troubleshoot analytical issues and problems, aid lab staff with solutions 	
2000-2007	<u>Various - Frontier Geosciences (Seattle, WA)</u> Senior Analyst	2003-2007
	<ul style="list-style-type: none"> • Analyzed mercury by cold vapor atomic fluorescence • Analyzed arsenic by hydride separation • Reviewed data and coordinated with Project Managers • Production and verification of Laboratory Standard • Supervised the water system • Safety Officer 	
	Lab Technician	2001-2003
	<ul style="list-style-type: none"> • Specialized in the preparation of metals analysis for environmental samples • Preservation and filtration of aqueous samples • Digestion of tissues, sediments/soils, iodated carbon traps, and coal into aqueous form for analysis These processes include: <ul style="list-style-type: none"> ○ Aqua regia digests, Iron co-precipitation, nitric/sulfuric tissue digests, microwave digestions, APDC digestion/filtration, distillations, methylene chloride extraction • Iodated carbon trap and gold trap production, • Organized and disposed of client samples • Total suspended solids in water and total solids in solid/sediment calculations • Responsible for the organization and cleanliness of the lab • Communicated with project managers and group leads on issues and solution to project procedures 	
	Shipping and Receiving/Bottle Washing Technician	2000-2001
	<ul style="list-style-type: none"> • Sample identification and organization • Delivery of samples and documentation to all areas of the lab • Shipping of equipment to client sampling events • Decontamination and storage of all clean sampling equipment 	

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- Managed waste disposal

1996-2000

Chemist – Aroma Creations (Seattle, WA)

- Specialized in the manufacturing of fragrance oils
- Compounded and created fragrances from formula
- Quality control on finished fragrances using reference materials and gas chromatography
- Research and Development

Education

2006

LECO Training Campus (Michigan Facilities)

- Automated Combustion Instrument (AMA-254)

2004-2005

Northwest Environmental Training Center (Seattle, WA)

- Fundamental Chemistry Workshop (CHEM-401 and CHEM-402)
- Contaminant Chemistry and Transport (CHEM-403 and CHEM403B)

AMY DURDLE – PROJECT MANAGER

Ms. Durdle began her position as a Project Coordinator in May 2006. Since joining Brooks Rand Labs, Ms. Durdle has quickly gained an understanding of the laboratory handling and analytical procedures necessary to ensure good quality data. At Brooks Rand Labs, Ms. Durdle has been a part of air quality projects that require strict turn-around times and intricate projects that require high attention to detail. With over a year of experience in the Project Management Group, Ms. Durdle was promoted to a Project Manager in October 2007.

Ms. Durdle has a bachelor's degree in Environmental and Resource Science from Trent University.

Qualification Summary

- Meets client project requirements by effective and timely planning, organization, and communication.
- First-hand experience with sample collection (EPA Method 1669) and sample receiving procedures
- Primary point of contact to over forty clients for project-specific inquiries, technical support, bottle orders, and quality data packages

Work Experience

2006-present	<u>Brooks Rand Labs (Seattle, WA)</u> Project Manager	2007-Present
	<ul style="list-style-type: none"> • Management of a wide variety of projects types • Communication between clients and analytical staff • Customizes reporting to meet client needs 	
	Project Coordinator	2006-2007
	<ul style="list-style-type: none"> • Assisted project managers with all aspects of their projects, including bottle-order preparation, report generation, and invoicing. • Communicated between project managers, clients, and analytical staff • Assembled customized reports to meet client needs 	
2003	<u>Field Laboratory Research Assistant – Trent University (Peterborough, ON Canada)</u>	
	<ul style="list-style-type: none"> • Assisted in regular sampling events to study the effects of urbanization on an existing natural stream • Prepared field sampling sheets, set up equipment, and recorded data 	

Education

2005	<u>B.S. in Environmental & Resource Science – Trent University (Peterborough, ON Canada)</u>
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MISTY KENNARD-MAYER – PROJECT MANAGER

Qualification Summary

Nearly ten years of experience in the field of environmental project management and business development including:

- Development of Business Plan and Sales Forecast for an environmental laboratory
- Expert in high quality environmental data review
- Experience in establishing and maintaining professional relationships with clients and highly technical scientific staff
- Strong in technical document development
- Oral presentation development and review of technical concepts
- Successful in meeting internal and external deadlines through six years of project management
- Highly experienced in analytical data review from ICP-MS and AFS instrumentation
- Knowledgeable of client's regulatory requirements

Work Experience

2008-present Project Manager- Brooks Rand Labs (Seattle, WA)

- Resolves highly complex analytical issues in scientific data submitted to clients
- Maintain daily interactions with analysts to ensure high quality analysis performed
- Reports high profile, litigation level technical reports to meet regulatory requirements

1999-2005 Various - Frontier Geosciences (Seattle, WA)

Project Manager

1998-2005

- Communicated daily with clients regarding technical material Resolved highly complex analytical issues in scientific data submitted to clients
- Maintained daily interactions with analysts to ensure high quality analysis performed
- Routinely reviewed QA/QC of inorganic analytical data – strong understanding of matrix interference issues and instrumentation troubleshooting
- Developed and reported high profile, litigation level technical reports to meet regulatory requirements
- Peer presentation at USGS on IC-ICP-MS chromium and arsenic speciation analysis
- Managed on-site trace level mercury laboratory in Cajamarca, Peru

Business Development Coordinator

2004-2005

- Performed Market research for analytical services offered
- Direct sales communication/100's of canvas calls
- Director and organizer of marketing exhibit
- Development of 15+ scientific business advertising documents
- Identified and responded to grant/bid opportunities
- 20+ company profile/scientific technical presentations

Education

1998

B.S. in Environmental Science – California State University (Chico, CA)

TIFFANY STILWATER - PROJECT MANAGER

Ms. Stilwater came to Brooks Rand Labs with a wide variety of experiences; all of which demonstrated her commitment to working with people and organizations in an effort to improve life-quality & the environment. Ms. Stilwater delights in providing excellent customer service, complex data packages, and continually strives to ensure individual project requirements are fulfilled with the highest level of detail and analytical data quality. With over a year of experience in the Project Management Group, Ms. Stilwater was promoted to Project Manager in June 2008.

Qualification Summary

- One-and-half years working direct under Brooks Rand Labs' Client Services Manager
- Management of projects relating to the development of new analytical methods

Work Experience

2006-Present	<u>Various - Brooks Rand Labs (Seattle, WA)</u> Project Manager	2008- Present
	<ul style="list-style-type: none"> • Management of a wide variety of projects types • Communication between clients and analytical staff • Customizes reporting to meet clients' needs 	
	Project Coordinator	2006- 2008
	<ul style="list-style-type: none"> • Assisted Project Mangers with report assembly, narrations, and client relations • Communicated between project managers, clients, and analytical staff • Worked with lab staff learning the intricacies analytical methods • Compiled and reviewed various electronic data deliverables 	
2005-2006	<u>Conservation Corp Intern – Student Conservation Association (Summersville, WV)</u>	
	<ul style="list-style-type: none"> • Co-wrote three recycling grants for West Virginia State funding (Awarded) • Successfully designed & executed an energy and waste auditing program • Monitored the energy use of 55 homeowners and ten businesses for over six months 	
2005	<u>Conservation Corp. Intern/ Manager – Student Conservation Association (McFadden, WY)</u>	
	<ul style="list-style-type: none"> • Worked as a liaison & educator between property owners, the local conservation district, and the Wyoming Natural Resource Conservation Service (USDA) • Mapped and recorded more than 12 square miles of invasive weed species in southeastern Wyoming highlands using GIS technology • Contracted & directed weed eradication efforts. This ranged from biological control (goat herding, insect releases, replanting) to mechanical removal and chemical applications 	

Education

2005	<u>B.A. Environmental Science – Northwest University (Kirkland, WA)</u>
	<ul style="list-style-type: none"> • Concentrations in Writing and Sustainable Development • Graduate Honors: Cum Laude • 2002 NAIA Cross Country Nation Team Champion, five time All-American athlete in cross country, indoor track & field, and outdoor track & field.
2005	<u>University of Washington – (Seattle, WA)</u>
	<ul style="list-style-type: none"> • Various Environmental Course Work

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- 2005 Au Sable Institute of Environmental Studies – (Mancelona, MI)
- Winter Stream Ecology

Presentations

2006 – “Invasive Species Management & Monitoring” Western Resource Conservation & Development Association Conference (USDA-NRCS). (Kearny, NE)

2005 – “Invasive Species Management”. Wyoming Association of Natural Resource Conservation & Development (USDA-NRCS). (Rawlins, WY)

FRANK MCFARLAND - QUALITY ASSURANCE MANAGER

Mr. McFarland joined Brooks Rand Labs in March 2000 as QA Manager. He is a research scientist with more than ten years of experience in developing and optimizing analytical methods. At Brooks Rand Labs, Mr. McFarland manages and implements stringent QA/QC policies and, in order to produce the highest quality data, works closely with laboratory staff to ensure the policies are well understood and closely followed.

Prior to joining Brooks Rand Labs, Mr. McFarland was a Quality Assurance Officer, Research Scholar, and Teaching Assistant at the University of Georgia. In these roles Mr. McFarland managed the technical review of laboratory generated raw data and monitored environmental control processes in clean room laboratories. Mr. McFarland also performed a variety of analytical procedures on water and tissue samples as part of a study on seasonal variation of biological parameters in reef building corals.

Mr. McFarland holds a Masters in Ecology from the University of Georgia where he was a UGA scholarship recipient. He also holds a BS in Biology from Western Washington University where he was awarded an NSF Undergraduate Research Grant resulting in his publication and presentations on marine symbiotic relationships using isotope analysis for determining rates of photosynthesis.

Qualification Summary

Over ten years of experience in quality assurance and development of analytical methods:

- Exhaustive experience in data review, SOP writing and review, and Quality Assurance Plan writing and implementation.

Work Experience

- 2000-present QA Manager - Brooks Rand Labs (Seattle, WA)
- Data review of all analytical batches
 - Oversees SOP reviews and revisions
 - Review of all Quality Assurance Project Plans and issues reports on project-specific requirements prior to initiation of major projects
 - Continual communication of QA feedback and suggested improvements to all lab staff
- 1993-1999 Quality Assurance Technician – University of Georgia (Athens, GA)
- Technical data review of all instrument data from spectroscopy and wet chemical analysis
 - Performed wet chemistry, titrations, and maintained documentation
 - Performed biological assays to ensure control processes were implemented and effective for clean rooms
- 1989-1992 Lab Technician – Western Washington University (Bellingham, WA)
- Designed and implemented original research on the symbiotic relationship between unicellular algae and marine nudibranch
 - Used C14 isotopes for determination of photosynthesis

Education

- 2000 M.S. in Ecology - University of Georgia (Athens, GA)
- UGA University-wide scholarship recipient
 - NSF Graduate Fellowship, honorable mention
 - California State University Graduate Fellowship
 - 3.9 GPA
- 1993 B.S. in Biology – Western Washington University (Bellingham, RI)
- Minor in Chemistry

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- Awarded NSF Undergraduate Research Grant
- Published in The Biological Bulletin

ANNIE CARTER – MERCURY LAB MANAGER

Ms. Carter began her position at Brooks Rand Labs as the Mercury Lab Manager in October 2007. With over a year and a half of supervisory experience in the mercury lab and over three years experience in all aspects of sample prep, analysis, and data management for EPA Methods 1631 and 1630, Ms. Carter is well qualified in this position. As Mercury Lab Manager, her responsibilities include analysis of both total and methyl mercury as well as various mercury species, instrumental troubleshooting, method development, personnel management, facilities management, and occasional on-and-off-site consultation.

Qualification Summary

Over 3000 hours of CVAFS analytical experience in a variety of sample matrices. Over 3000 hours of sample prep and clean sample-handling techniques. Detailed knowledge of all aspects of mercury analyses via CVAFS.

- Knowledgeable in CVAFS set up and trouble shooting.
- Current focus on ultra-trace level total and methyl mercury analysis.
- Manages six employees.

Work Experience

2004-present	<u>Brooks Rand Labs (Seattle, WA)</u> Mercury Lab Manager	2007-Present
	<ul style="list-style-type: none"> • Personnel management • Method development • Research in mercury speciation • Analysis of a variety of sample matrices for total mercury, methyl mercury, and mercury speciation 	
	Mercury Group Leader	2006- 2007
	<ul style="list-style-type: none"> • Analysis of a variety of sample matrices for total mercury, methyl mercury, and mercury speciation • Personnel management 	
	Analyst	2005- 2006
	<ul style="list-style-type: none"> • Analysis of total mercury and mercury species by CVAFS • Preparation of samples to be analyzed for total mercury and mercury species • Pipette calibration and maintenance 	
	Laboratory Technician	2004-2005
	<ul style="list-style-type: none"> • Receipt and preservation of samples • Ultra-clean sampling and handling technique 	
2004	<u>Chemist –Chateau Ste. Michelle Winery. (Woodinville, WA)</u>	
	<ul style="list-style-type: none"> • Analysis of pH, total acidity, and volatile acidity in juice and wine • Daily sampling and testing of juice for temperature and sugar content • Data entry 	

Education

2004	<u>B.S. in Cellular/Molecular Biology – Humboldt State University (Arcata, CA)</u>
	<ul style="list-style-type: none"> • Coursework based in biology, genetics, microbiology, and physiology. • 3.4 GPA
2004	<u>B.A. in Chemistry– Humboldt State University (Arcata, CA)</u>
	<ul style="list-style-type: none"> • Coursework based in chemistry, organic chemistry, analytical chemistry, and biochemistry.

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Presentations

- 2007 – “Recent Improvements in Analysis of Aqueous Samples for Methyl Mercury: Improvements in Accuracy, Precision and Detection Limits” (Poster Presentation) Society of Environmental Toxicology and Chemistry (SEATAC).
- 2006 – “A Comparison of Fluorinated HDPE Bottles to Teflon(TM) and Glass Bottles for Monomethyl Mercury Water Sample Storage” (Poster Presentation) International Conference on Mercury as a Global Pollutant (ICMGP).

MICHELA POWELL – TRACE METALS GROUP LEADER

Ms. Powell began her career at Brooks Rand Labs in 2006. With over two years experience in sample prep, analysis, and data management for EPA methods 1638 and 1632, Ms. Powell is well qualified in this position. As the Trace Metals Group Leader, her responsibilities include the analysis of total metals by ICP-DRC-MS, arsenic and selenium speciation by HPLC-ICP-DRC-MS, arsenic speciation and total arsenic/selenium by HGAAS, new methods development, and personnel management.

Qualification Summary

- Over eight years of lab experience, including nearly four years of experience working in commercial environmental laboratories.
- Knowledgeable in all aspects of ICP-MS and HGAAS analysis pertaining to environmental and biomonitoring samples.
- Current focus on method development for environmental metals speciation by HPLC-ICP-DRC-MS.

Work Experience

2006-present	<u>Various - Brooks Rand Labs (Seattle, WA)</u> Trace Metals Group Leader	2007 - Present
	<ul style="list-style-type: none"> • Analysis of a variety of sample matrices for metals by ICP-MS (standard mode and reaction cell "DRC" mode) and arsenic (total and speciation) by HGAAS. • Method development of speciated metals by HPLC-ICP-DRC-MS. • R&D for trace metals in complicated matrices. • Personnel management 	
	Trace Metal Analyst	2007- 2007
	<ul style="list-style-type: none"> • Analysis of a variety of sample matrices for metals by ICP-MS (standard mode and reaction cell "DRC" mode) and arsenic (total and speciation) by HGAAS. • Sample preparation for the above. • R&D for method development; Current focus: Trace Metals in Human Blood Samples 	
	Trace Metals Analyst and Lab Technician	2006- 2007
	<ul style="list-style-type: none"> • Temporary employee through On Assignment: Lab Support 	
2004-2006	<u>Laucks Testing Labs (Seattle, WA)</u> Chemist I	2005- 2006
	<ul style="list-style-type: none"> • Analysis of anions by ion chromatography in water and soil samples • Method development for the analysis of rocket fuel contaminants in onions and for low-level iodide in wastewater samples. • Operated various instrumentation including IC, TOC, UV/Vis Spec, conductivity meter, pH/ion meter, and analytical balances. 	
	Sample Entry Technician	2004-2005
	<ul style="list-style-type: none"> • Responsible for the secure sample control of all incoming samples. • Assisted in project management of long-term clientele. 	
2000-2003	<u>Student Research Technician - The Arizona Cancer Center (Tucson, AZ)</u>	
	<ul style="list-style-type: none"> • Designed and managed multiple pharmacological research projects regarding UVB and ionizing radiation • Organized a library of over 500 experimental drugs including structural analysis. 	

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- Create program that increased database calculation efficiency in the lab.
- Used various spectrometers, HPLC, CE, and microwave systems.

Education

2006

B.A. in Chemistry – University of Arizona (Tucson, AZ)

- Coursework based in analytical, inorganic, and organic chemistry.
- Minors in physics and mathematics.

Presentations

2007 “A comparative study for the Determination of Trace Metals in Blood using ICP-MS” (Poster Presentation) Society of Environmental Toxicology and Chemistry (SETAC)

Certifications

April 2008

Perkin Elmer “ICP-MS Mass Spec with ELAN Software”

April 2008

Perkin Elmer “ICP-MS ELAN DRC Accessory”

October 2007

Perkin Elmer “LC/ICP-MS Instrumentation-Metals Speciation”

KATIE JAHANMIR – SAMPLE RECEIVING

Ms. Jahanmir began her position as the Sample Control Group Leader in May 2008. With over a year and a half experience in all aspects of sample receipt, sampling equipment prep, and data management of sample information, Ms. Jahanmir was well qualified for this position. As Sample Control Group Lead, her responsibilities include overseeing sample disposal, equipment decontamination, lab purchasing, personnel management and facilities management.

Qualification Summary

- Manages four employees
- Responsible for the receipt of up to 3500 samples per month.
- Meets the varying needs of clients and project managers with effective time management, clear communication, and organization.

Education

2002

B.S in Hydrology/Environ. Sci. – The Evergreen State College (Olympia, WA)

- Coursework based in analytical chemistry, geo chemistry, GIS, and groundwater hydrology.

Work Experience

2006-present

Brooks Rand Labs (Seattle, WA)

- Present – Sample Control Group Lead
 - Overseeing of sample receipt, lab purchasing, sample disposal, and equipment decontamination.
 - Personnel management
- November 2006-May 2008 – Lead Sample Control Technician
 - Receipt and preservation of samples
 - Ultra-clean sampling and handling technique

2004-2006

Teacher (Special Enrichment Programs) – Pacific Science Center (Seattle, WA)

- Teaching science workshops and performing science demonstrations for children and adults on topics including chemistry, astronomy, entomology, and geology.
- Writing original curriculum for 2006 summer camp programs

RICK MANSON – IT/LIMS MANAGER

Qualification Summary

Nine years experience with small business information technology systems including:

- PC hardware and software installation and maintenance
- Designing, implementing, and using Microsoft® Access based LIMS

Work Experience

- 1999-present Brooks Rand Labs (Seattle, WA)
- IT Manager 1999-present
- PC hardware buildup and installation
 - Operating system and software installation
 - Network security and maintenance
 - Design and maintenance of LIMS developed in-house in the Microsoft® Access application
- Analytical Products Manager 1999-2005
- Manage manufacturing operation supplying mercury analysis equipment
 - Manufacturing mercury analysis equipment and components
 - Customer support for operation of equipment and methodology
- Analyst 1994-1999
- Analysis of a variety of sample matrices for total and methyl mercury by CVAFS
 - Analysis of a variety of sample matrices for total arsenic, total selenium, arsenic species, and selenium species by HGAAS
 - Sample preparation for total arsenic and arsenic species

Education

- 1990 B.S. in Physics – University of Washington (Seattle, WA)
- Emphasis on astronomy
- 2002 Classroom Learning – New Horizons Computer Learning Centers (Seattle, WA)
- 7 hour class Microsoft® Access 97 – Level 1
 - 7 hour class Microsoft® Access 97 – Level 2
- 2007 Online Course – Seattle Central Community College (Seattle, WA)
- Crystal Reports 10 Intro

FACILITIES

Brooks Rand Labs' three-story facility is located in Seattle, Washington, in close proximity to a number of other high-level research institutions. The facilities were recently expanded to include a new clean room laboratory and additional office space. The Analytical Services Division of Brooks Rand Labs currently leases approximately 7000 square feet of laboratory, office, and storage space. The analytical services division includes five state-of-the-art laboratories. The air handling system supplies each laboratory with ventilation passed through mercury removal filters, and all lab entrances are equipped with sticky mats to remove dust and particulate matter from shoes.

The laboratories of Brooks Rand Labs consist of the following:

1. Ultra-trace Mercury Lab –All samples for mercury and mercury speciation by CVAFS are analyzed in this laboratory. Our current mercury lab was built in June of 2005. As a testament to our ability to create appropriate environments for ultra-trace mercury analysis, the EPA used much of the information on how our previous mercury clean lab was set-up when they were writing their guidelines on establishing clean rooms for trace level metals analysis in the mid 1990's. Our new mercury lab meets all requirements of EPA Method 1631. We routinely monitor mercury levels in our lab air to ensure mercury air levels are below 10 ng/m³ and typical levels in our lab air are below 4 ng/m³.
2. Trace Metals Lab (ICP-MS and HG-Cryo-AA) – This lab is equipped with one laminar flow hood with HEPA-filtration and one venting fume hood. The lab air is constantly swept through by clean incoming HEPA-filtered air. The entrance to the lab consists of a double-door transition zone equipped with clean room sticky mats at each door to further remove particulate matter from entering the laboratory room. The ICP-MS is housed within a small room located within this lab to further isolate the instrument from potential contamination sources.
3. Sample Preparation Lab – This clean room lab is equipped with one clean air (HEPA) hood and one clean air (HEPA) / fume hood and is used for the majority of trace level sample preparations. This lab was completely renovated in December of 2005 and is virtually metal free.
4. Sample Receiving and Bottle Washing Laboratory – This lab is equipped with two vented fume hoods, and a class 100 laminar flow hood with HEPA-filtration.
5. New Sample Receiving Lab – This lab was completely renovated in July of 2006 to provide additional clean lab space for sample log-in and preservation.

Additional vital facilities include:

1. Instrument Manufacturing Division (IMD) – The facilities of IMD are where Brooks Rand Labs manufactures atomic fluorescence mercury analyzers and custom manufactures a variety of other analytical equipment, both for use in our laboratory and for sale internationally. This separate 4000 square foot building is located within walking distance of our main building and includes an instrument testing and training laboratory, manufacturing and assembly areas, a warehouse, and office space. Our manufacturing facilities provide us with an additional source of backup equipment and the best instrumentation engineers available in the rare event that instrument repair is required. This practically guarantees that we never have any significant down time due to mercury instrumentation issues.
2. Supply Inventory Room – This mini warehouse is where we stock all routine supplies, including bottles, gloves, and other sampling equipment. Tight inventory control is implemented with large stocking safety margins to ensure that we reliably maintain a supply of critical and/or routinely used equipment. This ensures that the lab does not experience any delays due to shortages of common supplies, which may otherwise affect the ability to meet client deadlines.

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3. Facilities Room – The facilities room houses our state-of-the-art walk-in refrigerator/freezer, gas, and DI water systems. The walk-in refrigerator/freezer is equipped with a telephonic alarm system to immediately notify personnel 24/7 if the temperature range is approaching unacceptable levels. The state-of-the-art gas system is remotely monitored by our gas vendor to ensure that there is never an interruption in our gas supply. The DI water system includes a 500 gallon reservoir to ensure DI water is always available.

The headquarters and Analytical Services Division of Brooks Rand Labs are located at:

3958 6th Ave. NW
Seattle, WA 98107
United States of America

General Office hours are from 8:30 A.M. to 5:00 P.M. PST, Monday through Friday.

Sample Receiving is open Monday through Friday, 8:00 A.M. – 4:00 P.M. PST, and 8:00 A.M. to 1:00 P.M. PST on Saturday, with prior notification. For availability of Sample Receiving for Saturday deliveries, please contact your project manager. Sample shipments can be received outside of normal business hours based on prior arrangements.

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