

Partners in Business and the Environment  
**STATEMENT OF QUALIFICATIONS**

- Stack Emission Testing
- Relative Accuracy Test Audits (RATA)
- Continuous Emission Monitoring System (CEMS)
- Air/Water Permitting Services
- National Pollutant Release Inventory (NPRI)



- **HORIBA Equipment Sales – Service - Calibrations**

112-3950 191 Street  
Surrey, BC, V3Z 0Y6  
1.888.550.6346

D101-1943 Baltic Avenue  
Ferndale WA, 98248  
1.888.550.6346

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## Our Mission

Air Research Group Inc. (ARG) provides accurate, high quality, professional technical services to our customers. Our goal is to maintain long-term relationships with our clients by providing safe, reliable, accurate, high-quality service, with our client's goals in the forefront. To help fulfill this mission, we provide our clients project management that fits the situation, accompanied with a certified team of professionals. ARG strives to lead the air quality industry in professionalism, performance, and safety.

## Corporate Profile

ARG is a progressive environmental firm comprised of engineers, technologists, and technicians with over 100 years of combined air emissions testing experience. The team members are considered experts in the field of stack emission testing and flue gas characterization. Besides the standardized EPA test methods, ARG routinely conducts complex emission surveys, engineering research and development studies.

ARG offers the skills, technical knowledge, and experience needed for successful and cost-effective air quality solutions and project completion, backed by technical credentials. Our advanced understanding of the physics, chemistry, engineering, and training required to the applied science of air emission measurement sets us apart as industry leaders.

## Quality & Consistency

ARG approaches air quality compliance and characterization from a comprehensive manner that begins with an understanding of each pollutant, its formation, interferences, and the measurement techniques. With this knowledge, ARG's environmental engineers formulate a research-based solution to manage and improve air quality challenges.

The measurement, determination and reporting of air pollution impacts are complex. In many aspects, it is unmatched in the environmental field due to the degree of difficulty determining what to test for, collecting accurate samples, determining the impacts and clearly reporting the results. ARG placed "Research" into our company name because a higher level of expertise and depth of research is required to perform this service with accuracy and reliability.

To meet regulatory requirements, it is important that emission testing be conducted by highly qualified and experienced individuals in accordance with the complex procedures and protocol set forth by the state/provincial and federal agencies.

Additionally, to meet regulatory requirements, it is important for authors of air permit applications to have a full understanding of the systems, and determine how best to represent the emission unit(s) and air pollution control devices, and to clearly report the characterization of the pollutant impacts.

## Safety

At ARG, safety is a core value. ARG incorporates both our comprehensive safety program and the client's safety program into every project. ARG is committed to providing up-to-date training and awareness that ensures general safety and safe work practices are kept at the forefront of each project. Each member of the ARG team is required to adhere to all industry safety standards and any additional client-specific standards. ARG works with clients, staff, and regulators to ensure safety is a priority. As such, ARG provides safety training for our clients. ARG will always work to the highest standards of safety, and provides the following training:

- ❑ Level 1 First Aid
- ❑ H<sub>2</sub>S Safety Training
- ❑ WHMIS- Workplace Hazardous Information System
- ❑ TDG- Transportation of Dangerous Goods
- ❑ Man Lift Training
- ❑ Fall Arrest
- ❑ Confined Space
- ❑ Job Safety Analysis (JSA)
- ❑ Field Level Risk Assessment (FLRA)

## Teamwork

ARG works closely with operators, managers and regulators to achieve high-quality accurate results, efficiently, and safely. ARG ensures technical expertise and commitment to safety is maintained using the following project management techniques:

- ❑ Monthly Safety Meetings
- ❑ Continuous In-House Technical Training
- ❑ Extensive Consultation with Clients
- ❑ Regular On-Site Meetings with Operators
- ❑ Daily Tailgate Meetings

# Services

ARG provides a variety of technical services that assists clients in meeting their regulatory requirements for air emission compliance. These services include:

- **Stack Emission Compliance Testing**
  - Relative Accuracy Test Audits (RATA),
  - Engineering Studies / Emission Characterization Efficiency Testing / Mass Balance / Inlet - Outlet
  - Vapor Recovery / Vapor Combustion Unit (VRU/VCU)
  - Source Sampling Training
  
- **Continuous Emission Monitoring System (CEMS)**
  - Annual CEMS auditing,
  - CEMS certification,
  - Mobile CEMS (Back-up Analyzers),
  
- **Air Emission Inventories**
  - National Pollutant Release Inventories (NPRI),
  - Annual Emission Inventory Reports (EIRs),
  - Toxic Release Inventories (TRI),
  - Environmental Auditing
  
- **Air/Water Permitting**
  - Major Source
  - Minor Source
  - Small Source Exemptions
  - Regulatory & Compliance Determinations
  
- **Equipment Sales, Repair, and Calibration.**
  - Major Source
  - Minor Source

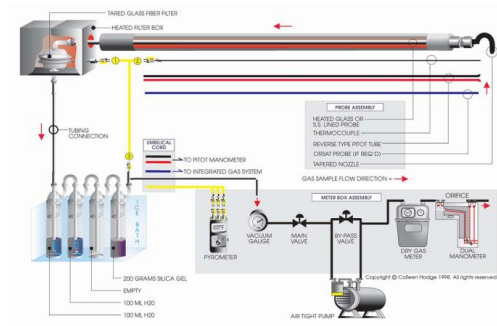
Our professional staff perform emissions testing using United States EPA CFR40 Part 60 EPA & CFR40 Part 75 approved methods. ARG senior staff have over 80 years of experience in most industrial control units including cyclones, wet/dry scrubbers, ESPs, baghouses, fabric filters, oxidation catalyst, demisters, condensers, WESPs and RTOs

# Stack Emission Testing, Compliance, Engineering Studies

ARG regularly performs complex emission surveys throughout North America, providing customized test programs for permit compliance, engineering, and characterization studies. Air emission surveys range from testing for single compounds to sampling of several compounds, at multiple locations, simultaneously. ARG excels at determining what tests are required and their frequency. ARG first reviews operations and, if requested, provides suggestions on emission reduction adjustments.



EPA Method 5 Sample System



EPA Method 5 Schematic Diagram

## Compounds Tested

### Particulates

- Total Particulate Matter (PM)
- Condensable Particulate Matter (CPM)
- Filterable
- Particle Size Distribution
- PM<sub>10</sub> / PM<sub>2.5</sub>

### Green House Gases (GHG's)

- Carbon Dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous Oxide (NO)
- Fluorinated Gases

### Organics

- Total Hydrocarbons (THC)
- Carbon Monoxide (CO)
- Dioxin/Furan, PCDD/PCDF (Semi-VOC's)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Volatile Organic Compounds (VOC's)
- Phenols, formaldehyde
- Methylene Diphenyl Diisocyanate (MDI)
- Toluene Diisocyanate (TDI)

### Inorganics

- Sulphur Oxides (SO<sub>2</sub>, SO<sub>3</sub>),
- H<sub>2</sub>SO<sub>4</sub>, H<sub>2</sub>S, TRS Compounds
- Sulphuric Acid Mist
- Nitrogen Oxides (NO, NO<sub>2</sub>, NO<sub>x</sub>)
- Ammonia (NH<sub>3</sub>)
- Hydrogen Chloride (HCl),
- Hydrogen Fluoride (HF)
- Chlorine (Cl<sub>2</sub>), Chlorine Dioxide (ClO<sub>2</sub>)
- Metals & Mercury

## Efficiency Testing and Energy Conservation

As climate change legislation is passed and energy conservation becomes increasingly important, ARG can assist clients with energy efficiency surveys. ARG provides efficiency surveys for boilers, natural gas combustion units and coal-fired units, to improve their energy efficiency and benefit through fuel savings.

## Relative Accuracy Test Audit (RATA)

A RATA or Relative Accuracy Test Audit compares data from a facility Continuous Emissions Monitor (CEM) system to independent Reference Method data. ARG provides RATA services for the following but not limited to:

- NO<sub>x</sub> - SO<sub>2</sub> - CO - THC/VOC - O<sub>2</sub> - CO<sub>2</sub> - Flow Rate

## Continuous Emission Monitoring System (CEMS)

Continuous Emissions Monitoring (CEM) utilizing approved instrumental methods for compliance testing, engineering studies and flue gas characterization. ARG can provide CEM services for the following but not limited to:

NO<sub>x</sub> - SO<sub>2</sub> - CO - THC/VOC - O<sub>2</sub> - CO<sub>2</sub> - Flow Rate

- ARG CEMS Measurement Equipment



- Horiba VA-5000
- SO<sub>2</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub> O<sub>2</sub>



- Horiba VS-5000
- Gas Conditioner



- Horiba PG-350
- SO<sub>2</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub> O<sub>2</sub>



- Thermo 42i/43i/48i/60i
- SO<sub>2</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub> O<sub>2</sub>



- AMETEK 9900
- Photometric SO<sub>2</sub>



- CAI - 600 HFID
- Total Hydrocarbon Analyzer



- CAI - 600/300HFID
- Total Hydrocarbon Analyzer



- EnviroNics 2020
- Cal Gas Divider

## Mobile CEMS

- ❑ ARG offers a mobile CEMS providing continuous real-time emissions characterization for CEMS certification, RATA, engineering or as back-up system, during downtime to meet the minimum
- ❑ annual data acquisition requirements. With ARG's equipment inventory we can provide measurement of criteria pollutants such as SO<sub>2</sub>, NO-NO<sub>2</sub>-NO<sub>x</sub>, accurately at ppm down to ppb levels.



❑

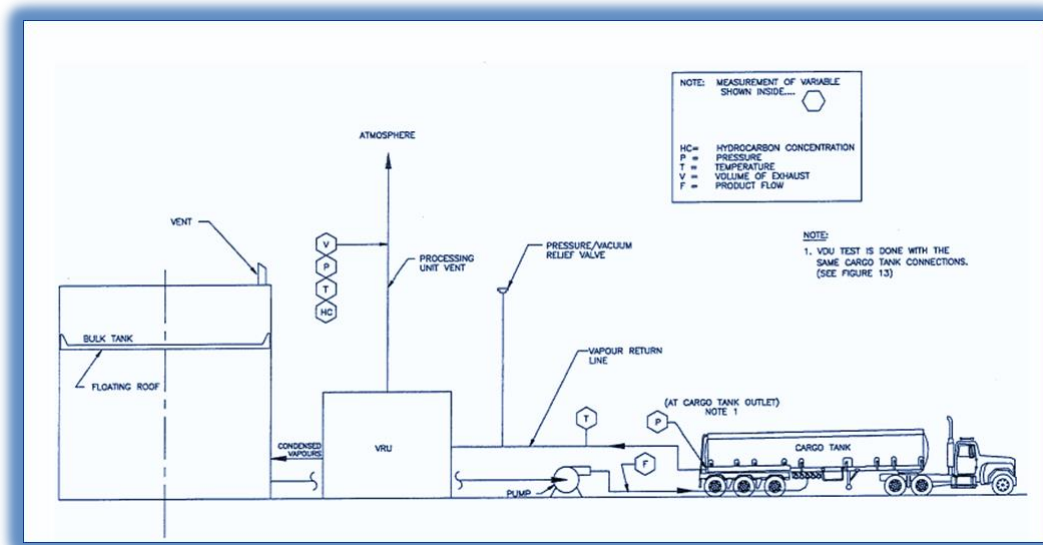
## CEMS - Back-Up

- ❑ On occasion our clients CEM systems experience some form of failure unexpectedly, or need to be replaced due to age. With ARG's supply of analyzers and data logging systems in stock we can customize a back-up system on relatively short notice and provide ongoing on-site support as required.



# Vapor Recovery / Combustion Unit Testing (VRU)

VRU is used to recover gasoline vapors displaced from tankers, trucks and barges as they are being filled. Gasoline vapors are removed by carbon adsorption from the displaced air volume as it passes through a bed of activated carbon prior to discharging into the atmosphere. With the Dual Bed VRU design, one carbon bed is being used to remove gasoline vapors, while the other bed undergoes a regeneration cycle which allows the gasoline vapors to desorb from the carbon bed and be collected. The desorption process is achieved by evacuating the carbon bed. The total flow rate and concentration of hydrocarbons in the VRU vents is determined using hydrocarbon analysers connected to the inlet and the outlet of the VRU. Using Method CAN/CGSB 3.1000-2013, outlined in Vapor Control Systems in Gasoline Distribution Networks for Vapor Recovery Unit Testing, ARG can determine Inlet and Outlet THC / VOC, Pressure, Temperature, Flow Rate and % Efficiency.



Typical VRU Performance Testing System Set-up

## ARG Volatile Organic Compound (VOC) / Total Hydrocarbon (THC) Analyzers



Infrared Industries IR208  
NDIR analyser



Thermo Model 55i  
Methane non-Methane  
Total Hydrocarbon



CAI - 300 HFID  
Total Hydrocarbon Analyzer

## Odor Evaluation

ARG can assist our clients in dealing with odor issues. We can facilitate the testing of odors and the development of mitigation measures or work on a control solution.

The ARG odor samples will be presented to an independent odor panel for determining detection and recognition thresholds. The Odor Study protocol requires the odor testing to be conducted within a nominal 24-hour time period after sample taking. Determining the "odor concentration" (odor strength) shall be performed using an olfactometer. The odor study is guided by the American Society of Testing and Materials (ASTM) E679 "Standard Practice for Determination of Odor and Taste Thresholds by a Forced-Choice Ascending Concentration Series Method of Limits."

Based on the results of the study, ARG will then work to develop an engineering-based solution or a process modification to alleviate the odors.

## Ambient Air Quality

ARG can be your complete ambient air monitoring provider. From station procurement and set up to training, operation and sample collection, ARG provides these services to our clients. The practices and procedures employed in stack sampling follow closely with the skills and techniques used in ambient air monitoring.

## Indoor Air Monitoring and Industrial Hygiene

Employing methods published by National Institute for Occupational Safety and Health (NIOSH) and American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), ARG can investigate your indoor air quality issue. Starting with employee surveys and site-visit assessments, ARG narrows the possibilities of pollutants first before the more expensive sampling and analyzes. The selective use of sampling and detection methods quickly evaluates the indoor air conditions and determines the levels to which employees are being exposed. From this survey a mitigation plan can be developed and implemented to achieve the desired results.

# Equipment Sales

ARG currently represents Horiba in equipment sales and service, for CEMS, as well as, portable emissions measurement equipment. Horiba's superior continuous analysis systems are adept in difficult exhaust gas measurements. Horiba instruments excel when measurement errors cannot be tolerated and feature intuitive touch panel makes every operation. The ENDA-5000/7000 series systems are also designed for faster, more efficient maintenance. They are ideal for a variety of uses, including monitoring steam boiler, refuse incinerator, and electric power generation plant emissions to assure pollution standards are being met.



ENDA 7000 CEMS



Multi Component Analyzers



PG350-Portable Multi Component Analyzer

## Calibration Services and Equipment Repair

ARG provides repair calibration services on the following measurement devices:

- Temperature Sensors
- Pressure Sensors
- Pitot Tubes
- Dry Gas Meters
- Critical Orifices
- Method 5 Control Console
- Constant Rate Sampler
- Dry Gas Meters
- Pumps
- Stack Sampling Probe

## Project Management Process

### Preparation

The principals of ARG are closely involved in all aspects of work performed to ensure the highest quality of services. Each project brings along experienced technical professionals which allows ARG to delivery of accurate and repeatable results.

Prior to the start of any project, ARG discusses job specifics with the client to assure proper understanding of all job and client requirements. For instance, on each stack emission testing project, the goals, objectives, proper testing procedures and methodologies are reviewed with both the client and regulators to ensure the test is applicable and regulatorily acceptable. ARG brings forth any options that may reduce costs, but still meets or exceeds the project's requirements.

## Field Testing

ARG is the leader in air field testing services. We are poised to focus on the quality factors that make a project a success. ARG staff have decades of stack testing field experience. Quality field work, testing, results and reporting are the result. Accurate and safe field testing is the backbone of ARG's stack emission testing services.

## Communication

ARG believes the success of each project relies on good solid communication between all parties: clients, co-workers, support personnel and regulators. Prior to each project, ARG ensures that the communication is well established, along with an understanding of project roles.

## Quality Control / Quality Assurance

ARG ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. ARG ensures all method quality assurance factors are employed along with all quality control (QC) factors. ARG equipment follows the strict calibration requirements using certified relevant standards.

ARG applies all relevant methods and QA/QC requirements, such as, but not limited to equipment calibration, field data recording, blank samples, replicate samples, spike samples, chain of custody documentation, contamination control, and record keeping.

## Data Reduction/Reporting

At ARG data reduction is performed using VBA enhanced Microsoft Excel® spreadsheets. Reports are written by senior staff and are reviewed by their peers. Each report includes all pertinent data gathered during the test program, tables, supporting calculations, field data sheets, laboratory results, equipment and gas calibrations, chain of custodies, executive summary and recommendations.

## Samples Analysis

Unlike many stack testing firms, ARG performs in-house gravimetric analysis for Total Particulate Matter, PM 10, PM 2.5, and barium-thorin titration method for Sulphur Dioxide when on-site analysis. ARG also uses accredited laboratories to provide additional analytical service for, Hydrogen Halide & Halogen, Nitrogen Oxides, Sulphur Oxides, VOC's, Semi-VOC's, POHC's etc. Accredited labs routinely contracted by ARG include ALS Laboratories, Maxxam Analytics, CARO, Elements, Edge Analytical and Pacific Rim Labs.

## Reporting

Test reports will be issued in accordance with government procedures and protocol. ARG provides our clients with a preliminary draft final report. Once all comments are addressed from the client's review, ARG makes the necessary changes for final submission to the regulatory authority. Upon acceptance of the preliminary report, ARG provides a complete project file in electronic format (i.e. PDF) to the client. Hard copies are available upon request.

## Regulatory Agency

ARG retains a professional role in facilitating compliance issues between our clients and the regulators. ARG works in concert with the lead agency to ensure compliance issues have been addressed and all monitoring, recordkeeping and reporting is acceptable. Agencies we have worked with include, but not limited to:

- ❑ BC Ministry of Environment
- ❑ Alberta Environment
- ❑ Metro Vancouver
- ❑ U.S. Environmental Protection Agency District

# Location and Facilities

Head Office - Shop/Lab

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V3Z 0Y6

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Warehouse

D101-1943 Baltic Way

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98248

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