Attachment – A: Vendor Profile

45 Manning Road
Billerica, Massachusetts 01821-3934
Phone (978) 663-9500 Fax (978) 663-4918

2. Business Official/Contact Person:
Mr. David Gordon
Chief Financial Officer
45 Manning Rd
Billerica, MA 01821-3934
proposals@aerodyne.com
978-663-9500

3. Company Overview

Aerodyne Research was founded in 1970 by a couple scientists specializing in Aerosol and Atmospheric Chemistry work. It has grown into a small business of around 70 employees, with many holding advanced degrees in fields of physics, chemistry, geophysical sciences, mathematics, computer sciences and chemical, electrical, mechanical, and aeronautical engineering.

Aerodyne Research provides research and development services and advanced sensor and software products to industrial, academic, and government customers for addressing global environmental challenges. Teams of Aerodyne scientists and engineers perform fundamental laboratory and theoretical studies; build, run and analyze complex computer models and system simulations; design and execute mobile and fixed-site field measurements; and develop, demonstrate, and deploy advanced measurement instruments and systems.

Located outside of Boston in Billerica, MA, Aerodyne Research occupies a 40,000 square foot building with half of the building devoted to several laboratories (optics, lasers, chemistry, electronics), computer facilities, and a machine shop. Aerodyne also has two mobile laboratories that are outfitted with a suite of instruments customized to the desired measurements of the field campaign. It is capable of fenceline monitoring & leak detection, quantifying emission rates, and creating pollution heat maps.

Aerodyne is well equipped to respond to the measurements specified in this RFI due to its ability to supply or operate operate state-of-the-art research instruments (Vocus PTR-TOF-MS, AMS, CAPS, and TILDAS) operated in a mobile laboratory. Aerodyne's scientists and technicians are experienced in mobile monitoring of a variety of industrial sources, including specific sources in California.

Aerodyne's laboratory facilities include wet labs with associated glassware, storage refrigerators/freezers, and chemical storage. Aerodyne has a small machine shop with a high-quality milling machine and lathe as well as various grinders, sheet metal benders and other machines. We have ready access to high quality machine shops, printed circuit board manufacturers, and other outside support facilities. Aerodyne has technicians and contract machinists who can design and produce custom components as needed.

4. Parent Corporations and/or Subsidiaries

Aerodyne Research does not have any parent corporations or subsidiaries.

5. Aerodyne Research Products & Services Relevant to this RFI

Aerodyne can provide both mobile measurement services (including planning and analysis) with our in-house instrumentation and mobile laboratories, or we can provide a mobile laboratory with a custom manifest of Aerodyne instruments as a product.

- Measurement Services:
  Aerodyne routinely conducts mobile measurement projects for a variety of customers including academic, government and commercial institutions. Such projects use either the mini Aerodyne Mobile Laboratory (minAML) or the larger Aerodyne Mobile Laboratory (AML) depending on scope. Instrument manifests are chosen based on project goals (an example manifest is included in Attachment C). Aerodyne can respond to nearly all requested species, but not all in the same deployment. Aerodyne mobile measurements leverage many Aerodyne-produced instruments. Projects to last ~1 month, 2-3 per year.
- Mobile Laboratory Sales:
  Construction of an Aerodyne Mobile Laboratory (AML) with infrastructure to support instruments, including pump lines, electrical breaker board, on-board generators, GPS and wind measurements, live data display and mapping. This mobile lab can accept Aerodyne or 3rd-party instruments flexibly. Integration of Aerodyne instruments included.
- Instrument Sales:
  Aerodyne instruments are sold individually or integrated into an AML. Aerodyne provides best-in-market detectivity for the following species. This instrumentation list is not exhaustive.
  - Ethylene Oxide via Tunable-Infrared Direct Absorption Spectrometer via Tunable Infrared Direct Absorption Spectrometer (TILDAS)
  - Formaldehyde (TILDAS)
  - Ethane (TILDAS)
  - Fast 1-second volatile organic compounds (VOCs) including Hazardous Air Pollutants (HAPS) like benzene, toluene, the sum of ethylbenzene and xylenes (BTEX) via Vocus Proton Transfer Reaction Mass Spectrometer (PTR-MS).
  - Isomer-speciated VOCs and HAPS via Gas-Chromatography Electron-Impact Ionization Time-of-Flight Mass-Spectrometry (GC-EI-ToF) (BTEX, 1,3-butadiene, chlorinated and other halogenated species, etc.)
  - Particulate matter mass and composition via Soot-Particle Aerosol Mass Spectrometer (SP-AMS)
  - NO_2 or NOx via Cavity-Attenuated Phase-Shift Spectrometry (CAPS)
  - Carbon Monoxide and carbon dioxide (TILDAS)
  - Acrolein (TILDAS)
  - And more…
- Consulting services:
  Scientists to advise the State on developing additional in-house mobile monitoring capabilities. Contact Aerodyne for costing.

Aerodyne Research Similar Projects

1. List and briefly describe the projects and/or activities your company was engaged within the last ten (10) years that are similar to the project identified in the RFI.

   Aerodyne has specific experience measuring emissions from California industrial facilities including ethylene oxide sterilizers, refineries, wellpads, natural gas distribution systems, rendering facilities, dairy farms, airports, warehouses and distribution centers, landfills, cement plants, auto repair shops, metal working, metal finishing and foundries and others. California projects are listed below.

   <u>Measurement Services Projects for California SCAQMD</u>

   - 2022 06: SCAQMD EtO "Performance Evaluation of a Recently Developed Ethylene Oxide Monitor for Mobile Monitoring Application"
     - Aerodyne participated in a measurement campaign to evaluate the performance of our novel Tunable Infrared Laser Direct Absorption Spectroscopy (TILDAS) EtO Analyzer. The instrument was used on the AML for 4 weeks to conduct mobile community-scale measurements of EtO near sterilization facilities and in nearby residential areas located in or near AB 617 communities in the South Coast Air Basin. Intercomparisons were also done with SCAQMD flask measurements of EtO. Several emitting sources were identified. SCAQMD's ongoing EtO work is summarized here: https://www.aqmd.gov/home/eto
   - 2019 06 and 2019 11: "Application of Next Generation Air Monitoring Methods in the South Coast Air Basin"
     - During this pair of studies, the Aerodyne Mobile Laboratory, equipped with an advanced suite of instrumentation focusing on VOCs, trace gases and particulate matter composition and metals, visited several sites in the South Coast Air Basin, including several animal processing/rendering facilities, a bus depot, natural gas pipeline, a chrome plating facility, and a ranch.
   - 2018 03 SCAQMD HexChrome: "Application of Next Generation Air Monitoring Methods in the South Coast Air Basin"
     - Aerodyne, with collaborator Desert Research Institute (DRI), conducted a comprehensive study to locate emission sources of hexavalent chromium, Cr(VI), in several areas of the SCAB using a suite of near-real-time next generation analytical equipment on board of Aerodyne Mobile Laboratory. Additional species measured include methane, ethane, VOCs including HAPs, and particulate matter composition. The final report to SCAQMD is publicly available here: http://www.aqmd.gov/docs/default-source/compliance/Paramount/mobile-monitoring.pdf?sfvrsn=8

   <u>Other Related Measurement Services Projects:</u>

   - 2021 Michigan Ontario Ozone Source Experiment: [*Olaguer et al.*, 2023] Aerodyne operated the AML in and around Detroit, Michigan to study ozone precursors and hazardous air pollutants. Aerodyne visited numerous source

types including automakers, steel manufacturers, a refinery, industrial cleaning and solvent use facilities. [*Yacovitch et al.*, 2023]

- On-site refinery measurements, multiple in California and more elsewhere [Unpublished]. Through these industry-sponsored measurements, Aerodyne has developed insider knowledge of refinery operations.
- 2016 Methane Cattle Measurements in CA Central Valley. [*Arndt et al.*, 2018] Aerodyne performed tracer-release quantification of methane emissions from a dairy farm in the Central Valley using the minAML.
- 2016 EDF Natural Gas Distribution Network Leaks. Aerodyne conducted mobile measurements of natural gas distribution system leaks in and around Indianapolis, Indiana [*Lamb et al.*, 2016] and Boston, Massachusetts [*Weller et al.*, 2018].
- 2013 ARYS Railyard project. Mobile monitoring around a railyard in Georgia. [*Brantley et al.*, 2019]
- SUNNEX – HCl measurements on aircraft
- 2015-12 Aliso Canyon measurements. The Aerodyne miniAML was contracted to measure emissions from the Aliso Canyon natural gas leak.

<u>Instruments and/or Mobile Laboratories for California SCAQMD</u>

Aerodyne has sold a handful of mobile laboratories equipped with select instruments. This includes the sale of a minAML equipped with a Vocus PTR-ToF to SCAQMD:

- Mini Aerodyne Mobile Laboratory (minAML) with equipment including CO_2 analyzer, GPS and wind. Includes live display and mapping software.
- Vocus Proton Transfer Reaction Mass Spectrometer, integrated into above minAML

2. Are there any of the requirements described in the *Proposed Environment* section not technologically feasible with your existing service(s), product(s), platform(s)?

- Not all requested species can be measured at once. This is especially true in a smaller platform like the minAML
- Aerodyne will need to build (TILDAS) or purchase 3rd party instrumentation to measure certain species like hydrogen sulfide. Aerodyne Mobile Laboratories are flexible and can host external collaborator instruments.
- No in-house measurement capabilities currently for: Hexavalent Chromium (only elemental chromium via SP-AMS), total metals (only small-particle metals via SP-AMS), total polycyclic aromatic hydrocarbons (only select gas-phase PAH like naphthalene via PTR-MS, or specific particulate phase PAH masses via AMS), arsenic (only atomic particulate matter arsenic via SP-AMS). Aerodyne has hosted collaborator instruments from Desert Research Institute for Cr(VI); and from Cooper for metals (Xact).

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