Statewide Mobile Monitoring Initiative (SMMI)

2023CARB_SMMI-RFI001

Request for Information

Submitted to:

David Ridley
California Air Resources Board
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Eastern Research Group, Inc.

November 16, 2023

ERG Attachment A
Vendor Profile Response Form for 2023CARB_SMMI-RFI001

1. Identify the Company Name, address, city, state, and zip code, telephone.

Eastern Research Group, Inc. (ERG)
8950 Cal Center Drive, Suite 368
Sacramento CA 95826
(916) 540-9236

2. Identify the name, title, address, phone number, and email address of the primary contact person for this RFI.

Sandeep Kishan, Vice President
3508 Far West Blvd., Suite 210
Austin, TX 78731
(512) 680-5121
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3. Provide a brief overview of your company including number of years in business, number of employees, nature of business, and description of clients.

ERG is a multidisciplinary research and consulting firm with nearly 500 staff supporting federal, state, and local air agencies in performing stationary and mobile source emission measurements, inventory development, stationary source regulatory support and permitting, and regulatory compliance and enforcement assessment, among other areas. Over 55 percent of ERG's work is for U.S. EPA and over 88 percent is for government agencies – we do very limited industry work, so we have no conflict of interest (COI) issues. All data collected by ERG for their clients is wholly owned by the client. ERG provides CARB with a long track record of over 35 years in support of the key missions of the agency.

4. Identify any parent corporation and/or subsidiaries, if applicable.

N/A

5. Give a brief description of your company's product(s), platform(s), service(s), etc. that may be relevant to this RFI.

ERG staff bring decades of experience in designing, developing, implementing, and refining novel ambient air measurement programs and platforms for a variety of federal and state clients. ERG scientists have led several U.S. EPA Office of Research & Development (ORD) programs including mobile monitoring, next generation fenceline and fugitive emissions and community low-cost sensors programs amongst others. ERG engineers and scientists were instrumental in the design and development of the original U.S. EPA ORD all-electric mobile measurements vehicle and have worked on the development of several newer generations of mobile measurements platforms for U.S. EPA ORD over the past 15 years. These mobile measurement platforms (wholly owned by the U.S. EPA) are modular in design allowing for outfitting of the vehicle with a variety of high-resolution instrumentation depending on the pollutant of interest.

Through this RFI, ERG aims to provide CARB with an alternative approach by utilizing our mobile measurements systems design expertise in designing, operating, and maintaining a custom-built mobile measurement platform. Mobile monitoring provides the ability to conduct high, spatially resolved air quality characterization in an area of interest. This monitoring technique can enhance air quality assessments by expanding the number of locations sampled along with understanding temporal changes in pollutant concentrations. These data can be especially useful in understanding how local sources and environmental conditions impact community level air quality. This mobile monitoring data can be used to evaluate air pollution impacts and population exposures from very micro-scales to between community variability depending on specific data needs and objectives.

Benefits to CARB:

- Custom-built, modular system providing CARB with a system built to specification based on CARB's current priorities.
- High degree of flexibility allowing for integration of newer instruments depending on CARB's pollutant of interest at the time of sampling.
- State-of-the-art measurement instrumentation on a brand-new platform providing high resolution air quality measurements data.
- 100 percent ownership of all raw and final data collected.
- Mobile monitoring data collection and processing expertise with decades of experience in conducting month-long mobile measurement studies in communities.

Additionally, as a low-cost and nimble alternative, ERG also proposes the ERG-DART, which was engineered and designed by ERG. The DART is a low-cost and easy to operate mobile monitoring system that can be rapidly deployed for geospatial monitoring. The DART can be

shipped to any location and adapted to any vehicle and provides a low-cost PID detection system.

ERG currently owns and operates two DART units for geospatial monitoring, but more could be built based on client need. Other sensors and monitoring devices have and can be paired with the DART units for measuring other compounds that the PID cannot be used for.

6. 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.

ERG engineers and scientists have led several mobile monitoring campaigns over the past 15 years.

Measurement study	Client	Location	No. of measurement days/ Measurement Frequency	Sources	Target pollutants
Cicero Rail Yard Study (CIRYS)	U.S. EPA-ORD; U.S. EPA Region 2	Cicero, Chicago, Illinois	30 days/ 1 second data	Railyards	Particulate Matter, Black Carbon, Nitrogen Dioxide, Carbon Monoxide, Sulfur Dioxide.
I-275/I-96 Vegetation Barrier Study	U.S. EPA-ORD	Detroit, Michigan	30 days/ 1 second data	On-road traffic	Particulate Matter, Black Carbon, Nitrogen Dioxide, Carbon Monoxide
Research Triangle Area Mobile Source Emissions Study (RAMSES)	U.S. EPA-ORD	RTP, North Carolina	30 days/ 1 second data	On-road traffic	Particulate Matter, Black Carbon, Nitrogen Dioxide, Carbon Monoxide
Brake and Tire Wear Emissions	U.S. EPA-ORD; U.S. EPA-OTAQ	RTP, North Carolina; Garysburg, North Carolina	30 days/ 1 second data	Non-exhaust emissions	Grid samples for Transmission Electron Microscopy (TEM), Scanning Electron Microscopy (SEM) Filters for Inductively coupled plasma mass spectrometry (ICP-MS) and Elemental-Organic Carbon (EC/OC) analysis. Particulate Matter, Black Carbon

Measurement study	Client	Location	No. of measurement days/ Measurement Frequency	Sources	Target pollutants
Near-Port Air Quality Assessment Study	U.S. EPA-ORD	Charleston, South Carolina	30 days/ 1 second data	Port activities	Particulate Matter, Black Carbon, Nitrogen Dioxide, Carbon Monoxide, Sulfur Dioxide.
Near-Road Solid Barrier studies	U.S. EPA-ORD	Phoenix, Arizona Detroit, Michigan	45 days/ 1 second data	On-road traffic	Particulate Matter, Black Carbon, Nitrogen Dioxide
Near-Road Vegetation Barrier studies	U.S. EPA-ORD	Woodside and Palo Alto, California	60 days/ 1 second data	On-road traffic	Particulate Matter, Black Carbon, Nitrogen Dioxide
Oakland School Vegetation Barrier and Community Outreach Mobile Measurement Studies [1]	U.S. EPA-ORD; U.S. EPA Region 9	Oakland, California	120 days/ 1 second data	On-road traffic	Particulate Matter, Black Carbon, Nitrogen Dioxide
Kemeny Park Vegetation Barrier and Community Outreach Mobile Measurement Studies	U.S. EPA-ORD	Detroit, Michigan	120 days/ 1 second data	On-road traffic	Particulate Matter, Black Carbon, Nitrogen Dioxide
Kansas City TRansportation and Local-scale Air Quality Study (KC-TRAQS) [2]	U.S. EPA-ORD; U.S. EPA Region 6	Kansas City, Kansas	60 days/ 1 second data	Transportation sources	Particulate Matter, Black Carbon, Nitrogen Dioxide
Louisville Next Generation Emissions Measurements (NGEM)	U.S. EPA-ORD	Louisville, Kentucky	14 days/ 1 second	Stochastic industrial sources	Volatile organic compounds (VOC), hazardous air pollutants (HAPs)

Measurement study	Client	Location	No. of measurement days/ Measurement Frequency	Sources	Target pollutants
Assessment of Chemical Facility Ethylene Oxide Emissions Using Mobile Monitoring [3]	U.S. EPA-ORD	Kansas City, Kansas	4 days/ 1 second	EtO chemical facility	Ethylene oxide (EtO)
DART Rhode Island Clean Air Act Targeting/ Inspection[4]	U.S. EPA-OECA	Providence, Rhode Island	5 days/ 1 second	Ports, fuel terminals, EJ communities, permitted facilities	VOCs and HAPs
DART New Mexico Clean Air Act Targeting/ Inspection	U.S. EPA-OECA	Albuquerque and Farmington NM	5 days/ 1 second	Permitted facilities, oil and natural gas infrastructure	VOCs, HAPs, and methane
DART Puerto Rico Clean Air Act Targeting/ Inspection	U.S. EPA-OECA	San Juan, Aguadilla, Ponce and surrounding areas, Puerto Rico	5 days/ 1 second	EJ communities, permitted, and unpermitted facilities	VOCs, HAPs, and methane

Select Study Description 1
Oakland School Vegetation Barrier and Community Outreach Mobile Measurement Studies

With increasing public interest in the development of roadside barriers as air quality mitigation tools, there was a need to add to the existing database of near-road air quality measurements to validate U.S. EPA dispersion models and develop guidance for different U.S. EPA Regions and local Air Quality Management Districts (AQMDs). ERG staff served as the contractor technical lead for the EPA study on vegetation barrier designs in the state of California. ERG staff set up multiple mobile and stationary air quality and meteorological measurement platforms. ERG staff developed and deployed the U.S. EPA's Geospatial Monitoring of Air Pollution (GMAP) electric vehicle was deployed to map air pollutants on the highway and in near-road neighborhoods with and without a vegetation barrier. Two types of portable air monitoring stations were also deployed. An SUV outfitted with real-time air quality monitoring equipment located near the highway, collecting air quality data at a fixed location, as well as collocated data with the GMAP vehicle during a portion of time each day. Air sensor and meteorological measurement platforms consisting of sonic anemometers and black carbon sensors were located at two locations near the highway, one at the SUV site and one behind the vegetation.

Our research team worked with U.S. EPA Region 9, partner agencies (Bay Area Air Quality Management District), non-governmental organizations, and local community partners (CAL FIRE, Urban Releaf, Higher Ground LLC,) in California to establish roadside vegetation barriers at locations of mutual interest. This project included advising on the design of the barrier using the latest research on air quality and other environmental impacts; assisting community groups with planting, building, and caring for the barrier; and working with partners to monitor environmental benefits after the barrier is planted. Our research team also worked with partners to develop educational and outreach materials related to public health concerns and mitigation of traffic-related emission impacts. Using an array of high precision mobile and stationary air quality instrumentation, we conducted measurements before planting the vegetation barriers to identify any local variability in air quality that might affect the evaluation of the planted barrier in the second phase of the project. We then conducted measurements after planting the vegetation barriers to assess the mitigation potential of the barrier. This multi-year activity is expected to continue over several years with annual measurements to determine the impact of the vegetation barriers as the planted trees grow. As part of the community outreach program, ERG staff held in-field sampling demonstration sessions for project partners and community members to provide them with an understanding of mobile and stationary air quality sampling methodologies.

Relevant Publications authored/co-authored by ERG staff:

- ***Design & Evaluation of Fixed and Mobile Sensor-Based systems for collection of Local Air Quality Data*** – P Deshmukh, R Baldauf, K Davidson, S Batka, R Dodder, W Richardson, R Logan- Air Sensors International Conference, September 2018
- ***The effects of roadside vegetation characteristics on local, near-road air quality*** – P. Deshmukh, V. Isakov, A.Venkatram, B. Yang, K.Max Zhang, R.Logan, R.Baldauf ; *Air Quality, Atmosphere & Health* DQI: 10.1007/s11869-018-0651-8 (December 2018).
- ***Evaluation and development of tools to quantify the impacts of roadside vegetation barriers on near-road air quality*** – K.Max Zhang, P.Deshmukh, A.Venkatram, V.Isakov, R.Baldauf; *International Journal of Environment and Pollution* 62 (2/3/4): 127 (January 2017).
- ***Roadside vegetation barrier designs to mitigate near-road air pollution impacts*** – Z.Tong, R.Baldauf, V.Isakov, P.Deshmukh, K. Max Zhang; *Science of The Total Environment* 541: 920-927

Select Study Description 2 **Kansas City TRansportation and Local-scale Air Quality Study (KC-TRAQS)**
Mobile monitoring was conducted in the Kansas City, Kansas (USA) metropolitan area as part of the Kansas City Transportation and Local- Scale Air Quality Study (KC-TRAQS). This study focused on assessing air quality in the neighborhoods of Turner, Argentine, and Armourdale in southeast Kansas City, Kansas. These neighborhoods are surrounded by a complex mixture of transportation and industrial air pollution sources including a large railyard, another smaller railyard, two major interstate highways, light industries, and numerous commercial distribution facilities. Two mobile monitoring intensive studies were conducted from October 10, 2017 to November 14, 2017 (Fall season) and from February 19, 2018 to March 18, 2018 (Winter season). Mobile monitoring routes were designed to provide spatially resolved pollutant concentration measurements in and around the three communities as well as six fixed measurement sites in the area.
Relevant Publications authored/co-authored by ERG staff:
▪ ***Identifying Air Pollution Source Impacts in Urban Communities Using Mobile Monitoring.*** P. Deshmukh, S. Kimbrough, S. Krabbe, R. Logan, V. Isakov, R. Baldauf. Science of the Total Environment, 715: 136979. 2020. ▪ ***The Kansas City Transportation and Local-Scale Air Quality Study (KC-TRAQS): Integration of Low-Cost Sensors and Reference Grade Monitoring in a Complex Metropolitan Area. Part 1: Overview of the Project.*** S. Kimbrough, S. Krabbe, R. Baldauf, T. Barzyk, M. Brown, S. Brown, C. Croghan, M. Davis, P. Deshmukh, R. Duvall, S. Feinberg, V. Isakov, R. Logan, T. McArthur, A. Shields. Chemosensors, 7(2): 26. 2019.

Select Study Description 3 **Assessment of Chemical Facility Ethylene Oxide Emissions Using Mobile Monitoring**
Ethylene oxide (EtO) is a hazardous air pollutant that can be emitted from a variety of difficult to measure industrial sources, such as fugitive leaks, wastewater handling, and episodic releases. Mobile measurement techniques along with emerging next generation emission measurement (NGEM) approaches capable of time-resolved, low parts per billion by volume (ppbv) method detection limits (MDLs) can help regulators understand and reduce EtO and other air pollutant emissions from these sources yielding a range of environmental and public health benefits. ERG scientists worked with U.S. EPA ORD in developing an EtO mobile measurement system capable of collecting highly spatially and temporally resolved data in a mobile format. Based on cavity ring-down spectroscopy (CRDS), 1 hertz mobile measurements data was collected over a 4-day period to assess EtO concentrations in and around major facility operations.
Relevant Publications authored/co-authored by ERG staff:
▪ ***Assessment of chemical facility ethylene oxide emissions using mobile and multipoint monitoring,*** Eben D. Thoma, Ali Gitipour, Ingrid George, Peter Kariher, Megan MacDonald, Gustavo Queiroz, Parikshit Deshmukh, Josh Childers, Tim Rodak, Volker Schmid. Atmospheric Environment: X, Volume 18, 2023, 100214, ISSN 2590-1621, https://doi.org/10.1016/j.aeaoa.2023.100214.

Select Study Description 4 DART Monitoring Rhode Island Clean Air Act Targeting and Inspection
Prior to a U.S. EPA GMAP inspection in the State of Rhode Island, the ERG DART was deployed to visit a list of 50 permitted facilities and perceived environmental justice communities as a pre-survey. During the span of one week, the DART visited all 50 locations – finding fugitive plumes at several giving cause to pare down the list for a focused 12 facilities for the U.S. EPA GMAP and inspectors to focus on. In one community where odor complaints were often received, a facility was found to be emitting high levels of VOCs through a window air duct as an obvious odor source. Also, while deployed in a port area, several industrial sites had been targeted to determine the source of nuisance odors affecting nearby communities and a nearby hospital. A batch asphalt plant, a port petrol storage tank battery, and a metal shredder were considered potential sources. Over several days of driving the area, the DART located tVOC plumes originating from the batch asphalt plant. The DART was able to monitor emissions for multiple days, wind patterns, climates, and levels of operation. Aside from focusing the list for inspectors and the U.S. EPA GMAP, other findings were presented in a report to U.S. EPA for follow up by federal or state inspectors.
Relevant Publications authored/co-authored by ERG staff:
N/A

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

ERG proposes building a modular and custom-built mobile monitoring platform for CARB based on the decades of mobile measurements experience of ERG staff. ERG staff has extensive experience in designing and operating mobile measurement platforms housing high-resolution instrumentation capable of measuring the following pollutants listed in the RFI:

- Particulate Matter ($PM_{2.5}$ and PM_{10})
- Black Carbon (BC)
- Carbon Monoxide (CO)
- Carbon Dioxide (CO_2)
- Nitrogen Oxides (NO and NO_2)
- Methane (CH_4)
- Hydrogen Sulfide (H_2S)
- Benzene, Toluene, Ethyl Benzene, Xylenes (BTEX)
- Formaldehyde
- Ethylene Oxide (EtO)
- 1,3-Butadiene
- Sulfur-containing compounds
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Metals

The DART is a mobile total VOC monitor and while it can see 95 percent of volatiles, there are some compounds which it cannot detect well or cannot detect at all. To aid in understanding, refer to the table below of common compounds and their detection levels. RF refers to Response Factor, which can be used to characterize the PID's sensitivity to a certain compound. A low RF means a higher sensitivity, higher sensitivity means the PID is more likely to detect the compound at lower concentrations.

Table 1. PID Chemical Detection Grid

	Isobutylene	Methane	Ethylene Oxide	H_2S	1-3 Butadiene
Lamp RF	1.0	Zero	9.0	4.0	0.8
	Benzene	Toluene	Ethylbenzene	O-Xylene	Carbon Monoxide
Lamp RF	0.5	0.56	0.56	0.5	0.0

ERG Attachment B
Vendor Questions Response Form for 2023CARB_SMMI-RFI001

I. General Questions

1. What scale of operation would be required to bid on a future RFP of the concept described here? Are there any minimum requirements necessary at which below you would not be interested in bidding on a proposal of this nature?

ERG is ready to develop and implement a mobile measurements platform catering to CARB's needs. No minimum level is required; however, our pricing would vary based on the duration of the project.

2. What types of monitoring objectives have you explored using your company's mobile monitoring approaches?

ERG staff has developed mobile monitoring approaches and conducted high spatial and temporal resolution mobile monitoring studies for the following monitoring objectives:

- Characterize the spatial variability and gradients of air pollutants to identify the contribution of railyard and related sources on community-level air quality in a complex urban environment.
- Characterize local impacts from an intermodal rail yard including the magnitude of impact for specific pollutants and assessing the spatial variability of concentrations, and downwind extent of elevated concentrations over the upwind background levels.
- Collect field measurements data for validating near-road air pollution dispersion models along with providing information driving health effects discussions in near-road noise barrier conditions.
- Quantify the direct impact of port related activity on local scale air quality including determining air pollution gradients within local communities.
- Examine the associations of short-term changes in physiological health endpoints with temporal-spatial variations in mobile source emissions, including particulate matter (PM) constituents and gaseous co-pollutants.
- Characterize the effects of vegetation on near-road air quality, measuring the variability of traffic-related pollutant concentrations in areas considered to be representative of urban background and the variability of traffic-related pollutants on the highway and in near-road neighborhoods (within 50 meters of major roadways).
- Evaluate air quality impacts of woodburning fireplaces.
- Characterize EtO and other air pollutant emissions from stochastic industrial sources.

Additionally, ERG currently supports U.S. EPA's Office of Compliance in inspections and surveying to ensure compliance with the Clean Air Act. The DART and other monitoring

equipment are deployed on a mobile platform to survey areas of concern, facility fence lines, and onsite at facilities to help reduce fugitive, leaks, or unpermitted emissions.

3. What are the advantages and limitations of your company's mobile monitoring services?

Through this RFI, ERG aims to provide CARB with an alternative approach by utilizing our mobile measurements systems design expertise in designing, operating, and maintaining a customized mobile measurement platform.

Benefits to CARB:

- Custom-built, modular system providing CARB with a system built to specification based on CARB's current priorities.
- State-of-the-art measurement instrumentation on a brand-new platform providing high resolution air quality measurements data.
- Mobile monitoring data collection and processing expertise with decades of experience in conducting month-long mobile measurement studies in communities.

As a significantly lower cost alternative, the ERG DART provides CARB with a cost-effective mobile detection tool that can help pinpoint potential sources of air pollution allowing for identification of areas for further investigation.

II. Engagement and Coordination

1. Describe your interpretation of what community engagement should look like throughout the process of conducting mobile air monitoring in communities.

Data collection using mobile air monitoring requires repetitive laps along designed driving routes, often within and in close proximity to densely populated communities. Community outreach efforts to ensure transparency and community engagement during the planning process, during the actual measurement campaign, and in the post-collection data output phases, are critical for an efficient and effective mobile monitoring campaign. Conducting an open dialogue with the community and working with community leaders provides a local perspective ensuring that all potential concerns can be taken into account while designing a mobile air monitoring sampling plan. If open to share stories of their experience or contention with local industry due to perceived environmental impact, those will be considered when planning targeting, routes, or choosing the appropriate target pollutants for data collection.

2. What experience do you have with community and public engagement? Is any of this experience directly related to air monitoring activity and data dissemination?

ERG staff has decades of experience in developing community outreach efforts to ensure transparency and community engagement during the planning process, during the actual measurement campaign and in the post-collection data output phases of mobile monitoring studies for the U.S. EPA. As part of our community and public engagement efforts directly related to mobile measurements, we bring experience in:

- Arranging and attending public engagement meetings to seek input from the general public on air quality concerns.
- Providing in-field demonstrations and training workshops on the use of air quality measurement techniques and instrumentation.
- Designing public surveys and easy-to-read handouts that can be handed out to the public while conducting mobile measurements.
- Hosting online and in-person data output presentations for disseminating findings from air monitoring activities.

ERG staff has conducted numerous community and public engagement activities for U.S. EPA-ORD. Moreover, as a prime contractor for the Centers for Disease Control's Agency for Toxic Substances and Disease Registry (ATSDR), ERG has performed numerous exposure investigations in urban and rural communities across the country. For most of these exposure investigations interaction and community buy-in are essential. Sites are placed in and around homes, community centers, and schools. We have led and participated in community meetings as well as sat in the homes of concerned citizens to speak with them about their experiences to determine appropriate methodologies and prime monitoring locations.

3. What is your experience coordinating with community members, CBOs, regulated industry, academia, and governmental agencies when planning monitoring objectives and data analysis and communication?

Over the years, ERG staff has led numerous studies involving co-ordination between some or all of community members, CBOs, regulated industry, academia, and governmental agencies. Some notable examples involving a wide range of stakeholders include:

- Oakland School and Kemeny Park Vegetation Barrier and Community Outreach Studies included coordination between U.S. EPA Region 9, partner agencies (Bay Area Air Quality Management District), non-governmental organizations, and local community partners (CAL FIRE, Urban Releaf, Higher Ground LLC,) in California. This project included advising on the design of the barrier using the latest research on air quality and other environmental impacts; assisting community groups with planting, building, and caring for the barrier; and working with partners to monitor environmental benefits after the barrier is planted. Our research team also worked with partners to develop educational and outreach materials related to public health concerns and mitigation of traffic-related emission impacts.
- Louisville Next Generation Emissions measurement study involving the set-up of monitoring stations near-road in close proximity to the community and industrial facilities.
- Research on detection limits of optical gas imaging for natural gas leak detection conducted at the Colorado State University involving numerous government, academic, and industry stakeholders.

- Well pad pneumatic controller emissions research conducted in the Uinta Basin in Utah, requiring close coordination between federal agencies, state agencies, the Uinta tribe, well pad operators and academic research institutes.

4. Please provide the number and size ($) of technical projects previously managed for coordination and communication with both community and technical contractors.

ERG can provide a comprehensive list of current and past contracts at the RFQ stage.

5. How would you apply your engagement and coordination model on a statewide scale?

ERG will build on our experience in developing engagement and coordination materials to expand our outreach efforts on a statewide scale. We anticipate engaging with all 35 local air districts in California, tribal communities, appropriate businesses, local air quality districts and the public. Utilizing online, print and in-person tools, we look forward to establishing and running an effective and efficient statewide engagement platform.

III. Mobile Monitoring Technologies and Capabilities

1. How many mobile monitoring platforms do you currently own and operate? How long have these platforms been in operation?

ERG proposes building custom mobile monitoring platforms as part of this work. ERG staff has built and operated several mobile monitoring platforms for clients over the past 15 years and conducted over 500 days of mobile measurements collecting 1 second air quality data. Our mobile measurements experience spans over numerous states including California, North Carolina, South Carolina, Illinois, Michigan, Kentucky, Kansas, Missouri, Colorado and Texas. ERG staff has maintained mobile measurements platforms for clients for over a decade.

To address a gap in low-cost geospatial monitoring applications, ERG developed the DART utilizing commercially available sensor technology and electronics to be able to detect volatile organic compounds in communities, at fence lines of facilities, or in response to complaints about odor.

The DART, engineered and designed by ERG in 2020, is a low-cost and easy to operate mobile monitoring system that can be rapidly deployed for geospatial monitoring. The DART can be shipped to any location and adapted to any vehicle.

ERG currently owns and operates two DART units for geospatial monitoring, but more could be built based on client need. Other sensors and monitoring devices have and can be paired with the DART units for measuring other compounds that the PID cannot be used for. For example, ERG has utilized a LI-COR trace gas analyzer to monitor methane around oil and gas facilities in tandem with the DART.

a. What areas/sources/locations do you have experience conducting mobile monitoring?

ERG staff has conducted mobile measurements looking at the following sources listed in the RFI:

- Metal working and metal finishing industries
- Sterilization facilities
- Oil and gas extraction, production, and distribution (including refineries and retail gas stations)
- Chemical manufacturing
- Ports
- Airports
- Railyards
- Warehouses and distribution centers (other truck-related businesses)
- Other large, permitted sources (e.g., wastewater treatment plants, landfills, cement plants)

Additionally, ERG has deployed the DART for multiple U.S. EPA investigations including surveying areas of complaint, underserved communities, industrial fence lines, and onsite at facilities for leak detection support. In one instance, the DART visited 50 facilities in the span of a week to focus the investigation list prior to a visit from the NEIC's advanced geospatial monitoring (GMAP) vehicle.

b. Has collected data been used to support community emission reduction, enforcement, or other actions? Please provide examples.

Community emission reduction- Vegetation Barrier Planting

The mobile monitoring data collected as part of U.S. EPA-ORD's studies in Oakland, California and Detroit, Michigan was used to identify the need and effectiveness of vegetation barrier planting in near-road community environments experiencing disproportionately highly air quality impacts due to high traffic. We conducted mobile measurements for several months before planting of the barrier, during the barrier growth stages and after barrier development to quantify the air quality benefits of the planted vegetation barrier.

Fugitive Odor Pinpointing

The DART was deployed to a port area where several industrial sites had been targeted to determine the source of nuisance odors affecting nearby communities and a nearby hospital. A batch asphalt plant, a port petrol storage tank battery, and a metal shredder were considered potential sources. Over several days of driving the area, the DART located tVOC plumes originating from the batch asphalt plant. The DART was able to monitor emissions on multiple days, various wind patterns, climates, and levels of operation.

Identifying Non-Targeted Sources

In another case, the DART was monitoring around an underserved community and found a plume of tVOC in excess of three parts per million (ppm) being released through a dryer vent exiting a building window. This facility was not listed as a target for the inspection but was located by targeted monitoring in the community. A FLIR camera was then used to visually document the tVOC plume exiting the facility. Information was provided to the state inspectors for follow up.

2. Please provide operational information on your company's current mobile monitoring capabilities. This should answer the following questions:

a. What frequency can platforms be deployed?

ERG designed high-resolution mobile measurements platforms can be deployed daily for 6-10 hours of continuous mobile monitoring. Replaceable on-road battery packs can extend measurement hours for additional sampling times as needed.

The DART units can be deployed almost continuously for use.

b. What days/hours are the platforms generally in use?

Mobile measurements platforms can be deployed at any time of the day depending on the air pollutant of interest and the specific objectives of the monitoring. For example, when deployed to collect air quality data looking at near-road impacts, mobile measurements are generally conducted between 6:30 AM – 10:30 AM and 3 PM – 7 PM to coincide with highest interstate and highway traffic volumes.

The DART units can be utilized at any time or day other than conditions of heavy rain or wind which typically are not good for monitoring.

c. What pollutants can be monitored and with what frequency?

As mentioned in Attachment A, ERG staff has extensive experience in designing and operating mobile measurement platforms housing high-resolution instrumentation capable of measuring the following pollutants listed in the RFI:

- Particulate Matter ($PM_{2.5}$ and PM_{10})
- Black Carbon (BC)
- Carbon Monoxide (CO)
- Carbon Dioxide (CO_2)
- Nitrogen Oxides (NO and NO_2)
- Methane (CH_4)
- Hydrogen Sulfide (H_2S)
- Benzene, Toluene, Ethyl Benzene, Xylenes (BTEX)
- Formaldehyde
- Ethylene Oxide (EtO)
- 1,3-Butadiene
- Sulfur-containing compounds
- Polycyclic Aromatic Hydrocarbons (PAHs)

A majority of the above listed compounds can be collected at a frequency of 1 hertz. The collection of certain gaseous pollutants may be at a lower frequency depending on the latest available measurements instrumentation.

Moreover, the DART monitors real-time total volatile organic compounds (tVOC) measurements at 1 hertz (Hz), and plots the data live over a graphical user interface on an included display tablet.

The DART measures many common VOCs like benzene, toluene, ethylene, and xylene from 0.5 to 3,000 parts per billion (ppb). As an alternative, an 11.7 eV PID with a range of 100 ppb to greater than 100 parts per million (ppm) can also be employed as well. The 10.6 eV lamp enables the PID to detect about 95 percent of volatile species, notable exceptions being most one carbon atom volatiles, acetylene, ethane, propane and saturated (H)CFCs.

d. What types of instrumentation do you use? Describe all relevant methodologies.

ERG will design a mobile measurements platform with instrumentation specific to CARB's current priorities. An example table of previously designed mobile measurements systems by ERG staff is shown below:

Measurement	Rate (seconds)	Measurement Technique
Nitrogen dioxide (NO_2)	1	Cavity-attenuated phase shift (CAPS)
Carbon Monoxide	1	Quantum Cascade Laser (QCL)
Carbon Dioxide	1	Non-dispersive, Infrared (NDIR)
Particle number concentration (size range 5.6–560 nm)	1	Particle sizer
Particle number concentration (size range 0.5–20 µm)	1	Particle sizer
Black carbon (BC)	1	Aethalometer
Longitude and latitude	1	High accuracy Global Positioning System (GPS)
Video of route	< 1	Webcam

Additionally, the DART measures many common VOCs like benzene, toluene, ethylene, and xylene from 0.5 to 3,000 ppb. As an alternative, an 11.7 eV PID with a range of 100 ppb to greater than 100 ppm can also be employed as well. The 10.6 eV lamp enables the PID to detect about 95 percent of volatile species, notable exceptions being most one carbon atom volatiles, acetylene, ethane, propane and saturated (H)CFCs. Simultaneous to the tVOC measurements, the DART can acquire whole air canister samples with the push of a button. These samples can be analyzed to verify tVOC readings and speciate constituents by U.S. EPA Compendium Method TO-15/TO-15A analysis. To further enhance the data, the DART also has an integrated weather station that measures wind speed, wind direction, pressure, relative humidity, and temperature.

e. What level of coverage or scale of monitoring can be accomplished within a community? (For example, how would you approach characterizing emissions from a source or identifying a leak? How long would that take?)

The design of a mobile monitoring sampling plan depends on several factors:

- Targeted pollutants and sources.
- Accessibility for driving mobile monitoring vehicle upwind and downwind of potential sources (availability of public roads upwind and downwind).
- Roadway design at target locations. Block by block measurements are best obtained when there are public roads present both parallel and perpendicular to the source of interest within communities. This allows data gathering covering all possible emission points and accounts for variability in wind direction.

As described in the ERG staff led article, for high-spatial analysis, [1] 50-meter grids were created, and median values reported using all measurement data points collected by the mobile measurements platform within each grid cell. This process creates spatially resolved maps of median air pollution concentrations at a 50-meter grid resolution.

For industrial facility focused studies, ERG could access permit records to understand the processes that may be operating on a facility to ensure the appropriate monitoring equipment and methods are utilized. Wind roses can be developed so the upwind and downwind orientation of the facility is understood. Stationary or transect monitoring can be conducted upwind and downwind of the facility to characterize any stochastic industrial source (SIS) emissions from the targeted facility. If a plume of fugitive emissions is found the vehicle can be parked in the plume to determine if the SIS emission is intermittent or continuous.

Secondary samples, like air canisters, can also be collected in plume for more robust analysis, confirmation of mobile platform measurements, and speciation.

f. How do you determine that you've adequately characterized a given area?

While developing a mobile monitoring sampling plan, the following criteria need to be evaluated:

- Accessible near-source areas for driving mobile monitoring vehicle.
- At-grade roadways allowing isolation of potential sources from nearby buildings and vegetation.
- Traffic volumes or activity information (for industrial operations) of the target source.
- Nearby U.S. EPA or state near-road monitoring sites allowing for daily collocation of mobile monitoring platform for quality assurance data points.
- Avoidance of other potentially confounding emission sources (e.g., industrial emissions, roadway traffic, etc.).

[1] *Identifying air pollution source impacts in urban communities using mobile monitoring by P. Deshmukh, S. Kimbrough, S Krabbe, R Logan, V Isakov, R Baldauf; Published in Science of the Total Environment in January 2020*

- Near-source populations, overall and air-pollution sensitive populations.
- Available space of implementing potential mitigation measures (e.g., vegetation or solid barriers, engineering controls, etc.)

For conducting effective high resolution mobile measurements, a mobile monitoring route allowing for 10-20 repetitions within communities around the source(s) of interest will be designed. The number of repetitive laps can be adjusted depending on the spread of the area of interest depending on the power limitations and drive time of the mobile monitoring platform. For example, mobile monitoring studies focused on near-road air pollution impacts will include a sampling study schedule occurring between 7 AM and 4 PM to have the highest likelihood of achieving two objectives successfully: (1) characterizing air quality concentrations downwind of the highway, and (2) measuring differences in air pollutant concentrations with and without vegetation barriers between the samplers and the highway since the highest ambient air pollutant concentrations typically occur during mornings.

At the end of each sampling day, the mobile monitoring platform will be collocated with a nearby National Ambient Air Quality Standards (NAAQS) near-road monitoring site or other State-designated monitoring sites housing instruments measuring the air pollutant of interest. At the end of each day, data with date, time, measurements, GPS coordinates, and available wind data can be downloaded and processed to visualize the monitoring vehicles path. This visualization overlays on a satellite image to make it clear where the vehicle operated, what concentrations were measured at any given location, and what direction the wind was blowing at the time of the measurement.

g. What workflow processes or software do you have for managing mobile monitoring?

All air monitoring data collected by on-board instrumentation is collected on a central computer thereby ensuring that data from all instruments are time synchronized. Prior to sampling with the EV vehicle, the on-board data logging computers are manually time-synchronized to the satellite-based time recorded by the on-board GPS. All raw data files are downloaded and backed up daily from the main mobile monitoring computer. All field notes are transcribed to electronic files with raw notes retained for QA.

Following consolidation and validation of raw data, the mobile monitoring data is processed using several standard algorithms developed in MATLAB or other programming languages including R, Python, and html to process and visualize data for ease of understanding by operators, ARB, and community members.

For DART specifically the same software engineering team generated and updates the DART software the operates the DART units, visualizes data in real-time, and manages the data set generated during operation. This software can be altered to meet ARB's needs if necessary.

3. Describe your usual approach or strategy to mobile monitoring. Include, if possible:

a. Drive plan and operational logistics

Section 2 describes some of our initial approaches to mobile monitoring including frequency of measurements, the number of days/times, target pollutants, instrumentation, scale of community monitoring, and effective characterization of a target area. Mobile monitoring route design considerations are also described in the sections above. Briefly, a mobile monitoring drive plan includes:

- Ensuring the mobile monitoring platform is fully ready (e.g., refueled for gas vehicles, charging for EV platforms).
- Ensuring all on-board battery packs are fully charged.
- Completing daily calibrations, zero-checks, and other QC checks on all on-board instrumentation.
- Transporting the mobile measurements platform to the field site (if using an EV with limited drive time).
- Completing mobile measurement platform safety checks to ensure all on-board instrumentation and accessories are secured.
- Installing meteorological stations for determination of wind speed and wind direction during the sampling period.
- Conducting mobile monitoring along the established route for the designated time period in the day.
- Periodically pausing mobile monitoring to conduct mid-day calibration and zero checks and conducting platform safety checks.
- After completion of sampling, parking the mobile measurements platform at the storage location and conducting post- study calibration checks on the air quality monitoring instrumentation.
- Shutting down analyzers and conducting data downloading and back up procedures at the end of the sampling day.

The use of the ERG DART includes the application of most mobile monitoring principles. After a route has been established, the vehicle operator should drive around a facility or through an area of interest at a low speed (15 mph). If a PID response is observed, the operator should take note of wind direction and attempt to locate the plume by retracing their driving course or by switching to stationary monitoring. Stationary monitoring can also be used to confirm a suspected source. Here the driver will position the vehicle inside a suspected plume, stopping the vehicle to allow the PID to stabilize and provide a more accurate reading. This also allows the operator to collect a secondary sample, like a canister, if desired. Stationary monitoring can also be conducted upwind and downwind of a facility in pre-determined locations for potential process related emissions or intermittent SIS. The stationary monitoring site should be free from trees, buildings, and wind obstructions.

b. Staffing

Most mobile monitoring activities will involve a 2-person ERG team ensuring that all operations are conducted efficiently and safely. While one employee will be the driver for the mobile measurement platform, a second will serve as a backup and operate stationary measurement platforms or the meteorological stations depending on the objectives of the monitoring activity. Staff will be deployed from ERG's Sacramento, CA; Oakland, CA; or Research Triangle Park, NC, offices.

c. Power requirements (e.g., battery powered, requires generator, etc.)

ERG-designed and -operated mobile measurement platforms will include on-board lithium-ion battery packs providing up to 9,000 watt-hours of on-board power for operating all on-board air quality instrumentation.

For DART related operations, the DART and other monitoring equipment will run off either vehicle power via a 12-volt outlet or a separate battery-powered generator bank.

d. Consumables

Most on-board mobile monitoring instrumentation will not require day-to-day consumables apart from maintenance needs. For specific target pollutants, filter samples could be collected in a mobile format requiring replacement filters and filter handling supplies.

e. Quality control procedures

ERG staff operated mobile measurement platforms follow set procedures established in U.S. EPA approved Quality Assurance Project Plans (QAPP). These QA/QC procedures include extensive procedures for each air quality instrument used as part of the mobile measurements platform. ERG staff has worked with the U.S. EPA in developing QAPPs for mobile measurements work for over a decade and will apply the same level of detail in establishing QA/QC protocols for this work.

All quality procedures for each testing will be documented with and approved by CARB prior to deployment. Calibrations, calibration verifications, response factor determinations, blanks, leak tests, and other QA/QC procedures will all be documented and reported.

ERG currently operates all geospatial monitoring projects from U.S. EPA Tier 1 Quality Assurance Protocol Plans (QAPP) with oversight by our Quality Assurance and Quality Control (QA/QC) staff.

All quality procedures for each testing will be documented with and approved by CARB prior to deployment. Calibrations, calibration verifications, response factor determinations, blanks, leak tests, and other QA/QC procedures will all be documented and reported.

Any canister samples collected will be subsequently analyzed using U.S. EPA Compendium Method TO-15/TO-15A, *Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography–Mass Spectrometry (GC-MS)*.

f. Performance and acceptance criteria (e.g., precision, bias, limit of detection)

ERG staff operated mobile measurement platforms follow set procedures established in U.S. EPA-approved Quality Assurance Project Plans (QAPP). These QA/QC procedures include performance and acceptance criteria for each air quality instrument used as part of the mobile measurements platform. ERG staff has worked with the U.S. EPA in developing QAPPs for mobile measurements work for over a decade and will apply the same level of detail in establishing performance and acceptance criteria for this work.

The table below provides a summary of typical DART QA targets:

Table 1. Summary of Typical DART Project Measurement Quality Objectives

Parameter	Method	Limit	Comments
DART PID	Determination of plume detects by analysis of PID sensor	Positive determination of inflection of baseline during bump test.	3 sequential bump tests no less than 20 seconds apart for a duration of 30 seconds each.
Temperature, pressure, and relative humidity measured by DART	Determination of 5-min period plume detects by analysis of sensor data and reasonableness check against NWS*		±10 °C@, ±4 kPa, ±20% RPD**
Wind speed by DART	Post analysis reasonableness check against NWS		±15 m/s
Wind direction by DART	Post analysis reasonableness check against NWS		±10°
Canister VOC	TO-15	Standard TO-15 limits.	TO-15 Quality objectives based on ERG's U.S. EPA-approved QAPP for support of U.S. EPA's National Monitoring Programs[2]

*National Weather Service
**Relative Percent Difference

g. Data logging and storage

On-board instrumentation data will be logged to a central mobile platform laptop ensuring time synchronization of all mobile measurements data points. Data will be backed up daily on an external drive and stored on internal data servers.

ERG will utilize established data validation and reduction procedures to generate data processing ready files for CARB. ERG staff can also provide data processing services as requested by CARB. Data will be sent by ERG Task Manager to the CARB Project Lead via email, a password-protected ERG ftp server, or another predetermined information transfer route. Only appointed ERG staff and the ARB Project Lead will have access to the password protected ERG ftp server.

[2] EPA, 2016 Battelle/OAQPS Technical Assistance Document for the National Air Toxics Trends Stations Program, C304-06 Revision Number: 3, October 2016. Available at: https://www3.epa.gov/ttnamti1/files/ambient/airtox/NATTS%20TAD%20Revision%203_FINAL%20October%202016.pdf. (accessed October 30, 2023).

ERG will retain all files and records for a period of at least five years after the close of the project and for an extended duration per ARB's request.

h. Notifications and communication

Communication is key to ensuring ongoing operation of the monitoring and quality data. Project decisions, such as mobile transects and stationary monitoring locations, may have to be made quickly to ensure collection of the best data. Any pertinent information and/or potential issue will be brought to the attention of the ARB Project Lead immediately.

ERG can prepare summary reports for geospatial monitoring data for the ARB Project Lead on a daily, weekly, monthly, or per deployment basis. ERG will prepare report summaries to compare data elements. The report summaries will also include any QA efforts conducted according to the preapproved monitoring plan or QAPP

ERG will report secondary sample data, along with applicable Minimum Detection Limits (MDLs), as available. Any quality deficiencies detected by technical reviewers or QA Manager will be communicated to the CARB Project Lead. The CARB Project Lead and ERG's Task Manager will then determine the appropriate corrective action to be taken.

4. Please provide an estimated cost to operate all applicable mobile monitoring platforms as a function of time (e.g., 1 week of monitoring) deployed and/or measurements taken.

a. These cost estimates should include all costs associated with mobile monitoring operation. This includes but is not limited to:

i. Direct costs – instrumentation consumables and repairs, vehicle operation costs, staff cost to operate platforms, recharging requirements.

ii. Indirect costs – support staff costs, associated insurance for operation, administrative overhead, any required permits.

iii. Data Management – costs to move data from raw data collected by instrumentation to the final data products requested by CARB.

ERG's cost estimates for this work are provided in Attachment C.

b. How often are invoices and payments typically required?

ERG typically bills clients monthly or at the completion of a task with net 30-day expectation of payment. If other timing is necessary, that can typically be accommodated based on the contract.

5. **If an RFP is developed based on the information provided here, how much preparation time is required to deploy the platforms and begin monitoring?**

   a. **Do you have recommendations for a minimum timeline to achieve potential monitoring objectives described here?**

      ERG staff has built numerous mobile measurements platforms over the years; the minimum timeline to deploy this will depend on the estimated delivery time for instrumentation to be deployed on-board the mobile measurement platform. ERG will work with CARB in determining the appropriate project schedule to meet project objectives.

   b. **What is the maximum number of platforms that you could deploy by early 2025?**

      Depending on the start date timeline of this project, ERG can build and deploy several mobile measurements platforms by early 2025. ERG currently owns 2 DART units and can build several more by early 2025 for rapid deployment.

6. **Do you have experience developing Community Air Monitoring Plans (CAMPs) as defined by the CARB Community Air Protection Program Blueprint or similar? Please provide examples of community-focused monitoring plans or similar.**

   ERG staff operated mobile measurement platforms follow set procedures established in U.S. EPA approved Quality Assurance Project Plans (QAPPs). These QA/QC procedures include extensive procedures for each air quality instrument used as part of the mobile measurements platform. ERG has worked with the EPA in developing QAPPs for mobile measurements work for over a decade and will apply the same level of detail in establishing QA/QC protocols for this work.

7. **Do you have existing standard operating procedures (SOPs) or quality assurance project plans (QAPPs) for your mobile monitoring approach?**

   ERG staff have developed numerous QAPPs and SOPs for mobile measurements for U.S. EPA ORD and OECA. We will use our existing QAPP development expertise in designing project specific QAPPs and SOPs for CARB.

IV. Data Collection, Storage, Reporting

1. **In what format do you generally provide data to your clients? What is your final data product?**

   Typical instrument files are collected in .txt format to the on-board mobile measurements central computer. ERG can provide these files in any requested format, with Excel being the most requested format based on experience. Additionally, kmz files can also be provided for visualization data while interim reports can be provided as Word, PowerPoint or PDF documents as requested.

2. **Do you have off-the-shelf, or modifiable-off-the-shelf, data management products compatible with mobile monitoring data?**

   All on-board mobile measurements data will be logged to a central computer. ERG staff has experience using a wide range of mobile measurements data processing software including MATLAB, R, Excel, etc.

3. **What is your experience in mobile monitoring data analysis and visualization? Specifically, do you have any experience using ESRI products to manage and visualize data?**

   ERG staff has significant experience in mobile monitoring data analysis and visualization using MATLAB, R and other software.

4. **What is your experience in public dissemination of complex information? To what extent have you generated data visualization for the public?**

   ERG has decades of experience in hosting workshops, presenting at conferences, publishing in peer-reviewed journals and participating in other events disseminating complex data to the public.

5. **What suggestions do you have for handling large amounts of data from a variety of sources (e.g., multiple mobile monitoring platforms) into cohesive data visualizations?**

   ERG staff has significant experience in mobile monitoring data analysis and visualization using MATLAB, R and other software. These techniques can be applied to data from multiple mobile monitoring platforms as requested.

V. Feedback

1. **Provide input on the requirements or areas listed in this RFI. Specifically, CARB is looking for:**

   a. **Availability of existing systems that perform all or a portion of the requirements in Section II – C. New systems cannot be built using funds in a potential RFP.**

      ERG proposes building a custom, modular mobile measurements system for this work. As stated above, we believe this approach will provide several significant technical and efficiency benefits to CARB. ERG proposes using its own funds to build the custom mobile measurements platform and then leasing for the work defined in a potential RFP.

   b. **Questions, suggested modifications, or additions to the proposed environment that would allow or encourage potential bidders. Please include justifications for any suggested changes and concept modifications.**

      None.

ERG Attachment C
Rough Order of Magnitude Cost Estimate
Response Form for 2023CARB_SMMI-RFI001

Rough Order of Magnitude	
A. Custom-built mobile measurement platform Estimated range of cost per month of full-time monitoring. This includes costs required to: • Design, develop and maintain the custom mobile measurements platform. • Conducting pre-deployment testing of the mobile measurements platform along with QA/QC calibration and testing of all instrumentation. • Development of a Quality Assurance Project Plan, Health & Safety Plan, and related activities. • Conducting 30 days of measurements in a month including weekday and weekend sampling for an 8-hour sampling day (including pre-and-post daily QA/QC checks and collocated sampling). • Data validation and data reduction activities.	$180,000-$250,000
B. DART based measurements Estimated range of cost of one month of DART monitoring with two California based ERG staff for one month. This includes pre-deployment testing, 20 sample canisters analyzed, visualizations of data, and full inspection report with findings, QA, and data narratives. **"Full-time monitoring"** includes 30-days of mobile measurements data collection per month, including sampling on all days of the week including weekends. Some sampling days may not involve full data collection due to maintenance requirements for instrumentation. A typical full-time sampling day consists of an 8-hour day including 1 hour of pre-sampling set up and 1 hour of post-sampling activities. ERG will provide flexibility for an extended hours of sampling as needed by CARB.	$60,000-$90,000.
Estimated range of cost to complete a full year of mobile monitoring using custom built mobile measurement platform.	$1,600,000-$2,000,000.
Estimated range of cost of one year of DART monitoring with two California based ERG staff for one year. This includes pre-deployment testing, 20 sample canisters per month analyzed, visualizations of data, and full inspection report with findings, QA, and data narratives.	$600,000-$900,000.

Answers and Assumptions Used in Cost Estimate
Please answer, in as much detail as possible, the State's questions (1-4) below. *Also, please provide details pertaining to the assumptions, expectations, and/or performance parameters used as the basis of the cost estimate.*

THE STATE's QUESTIONS and VENDOR'S RESPONSE/ANSWERS:

1. ***What is the timeline for your mobile platform(s) (that is, how many platforms do you have operational right now, and what is your timeline for launching more)? Will your platform(s) depend on additional funding to reach and sustain maximum planned capacity?***

   ERG proposes building a custom, modular mobile measurements system for this work. As stated above, we believe this approach will provide several significant technical and efficiency benefits to CARB. ERG proposes using its own funds to build the custom mobile measurements platform and then leasing for the work defined in a potential RFP.

   ERG currently owns 2 DART units and can build several more by early 2025 for rapid deployment.

2. ***Approximately how much monitoring can be accomplished in the period of a month? A year?***

   "Full-time monitoring" includes 30-days of 1-second mobile measurements data collection per month, including sampling on all days of the week including weekends. Some sampling days may not involve full data collection due to maintenance requirements for instrumentation. A typical full-time sampling day consists of an 8-hour day including 1 hour of pre-sampling set up and 1 hour of post-sampling activities. ERG will provide flexibility for an extended hours of sampling as needed by CARB.

3. ***Are there any requirements that would preclude you from competing should an RFP be released? If yes, what suggested changes would allow you to compete?***

   N/A

4. ***Are any of the goods, products, or services you've identified in your RFI response available on a Federal GSA or State of CA LPA? If yes, please identify the contract type, name, and number.***

N/A

VENDOR'S ASSUMPTIONS:

What assumptions have you made in preparing a response to this RFI?

- ERG proposes building a custom, modular mobile measurements system for this work. As stated above, we believe this approach will provide several significant technical and efficiency benefits to CARB. ERG proposes using its own funds to build the custom mobile measurements platform and then leasing for the work defined in a potential RFP.
- "Full-time monitoring" includes 30-days of 1-second mobile measurements data collection per month, including sampling on all days of the week including weekends. Some sampling days may not involve full data collection due to maintenance requirements for instrumentation. A typical full-time sampling day consists of an 8-hour day including 1 hour of pre-sampling set up and 1 hour of post-sampling activities.
- Costs assume two local field personnel will conduct mobile measurements at the CARB designated area of interest in California. Travel costs are not included in the estimate.
- Costs assume normal maintenance procedures for the mobile measurements platform and all instrumentation.
- Costs assume three days of pre-deployment on-road mobile platform and data collection activities.