Vendor Questions

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?**
   The lack of extended opportunities for mobile monitoring over the past several years has prevented the allocation of resources to this space and therefore the project must justify the expense of building and staffing this capability at Entanglement Technologies. In order to bid on a future RFP, a project scope is required that can utilize the operating expenses for a time period of no less than a year and have sufficient revenue to allow for the recovery of the equipment costs within that timeframe and still include some profit. For this reason, we feel that we are unable to provide a response to Attachment C for the State of California that would be useful.
2. **What types of monitoring objectives have you explored using your company's mobile monitoring approaches?**
   We have explored several monitoring objectives previously including large-area ozone precursor measurements (LabScan Mode for speciated VOCs running over hundreds of miles), virtual fenceline monitoring and leak detection (RapidScan Mode) and hyper-local community monitoring (RapidScan for mobile monitoring and LabScan for short-term stationary monitoring).
3. **What are the advantages and limitations of your company's mobile monitoring services?**
   Entanglement Technologies is largely an instrumentation manufacturer and provider of air toxics and greenhouse gas (methane and carbon dioxide specifically) monitoring equipment. While we do have a mobile platform (Ford Transit Van) to conduct mobile monitoring, we rarely provide monitoring services as we don't have dedicated personnel to conduct fieldwork. We typically partner with environmental consultants, such as Sonoma Technology, to support projects using our AROMA analyzers and, when needed, our mobile platform as well.
   <u>Advantages</u>: Entanglement Technologies is located in the Bay Area, so our mobile platform is in the state of California. Entanglement Technologies analyzer, AROMA, has been used in a wide variety of mobile monitoring studies over the past 6 years (listed in Attachment A). AROMA has a very simple data output as concentration in a .csv file format.
   <u>Limitations</u>: Entanglement Technologies currently has limited personnel to support long-term mobile monitoring projects. Additionally, there are several pollutants in the *Proposed Environment* section that AROMA cannot measure, and we do not have previously identified vendors to supply this equipment.

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.**
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?**
   We have limited experience with direct community and public engagement. As a technology provider, and when we have been contracted for monitoring, it has typically been done in collaboration with other groups experienced with community and public engagement. This has included the Environmental Defense Fund, state and federal air quality agencies, and environmental consultants such as Sonoma Technology. We have supported data dissemination

to communities and the public, but typically as a technical expert and not as the lead organization or main point of contact for communications.

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?**
   We have assisted with activities such as route planning, data collection, analysis, and interpretation, and preparing reports. We've also assisted a variety of the groups listed with writing grants for funding.
4. **Please provide the number and size ($) of technical projects previously managed for coordination and communication with both community and technical contractors.**
5. **How would you apply your engagement and coordination model on a statewide scale?**

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?**
   Entanglement Technologies currently owns one Ford Transit Van (Figure 1) outfitted for mobile monitoring purposes. We also own four AROMA analyzers that can be used for a variety of field deployments (various configurations depending on the compounds of interest and mobile monitoring goals). We also have the capability to manufacture AROMA analyzers for specific field campaign needs.

   a. **What areas/sources/locations do you have experience conducting mobile monitoring?**
      Texas - San Antonio and Houston – Oil and gas operations (wells, tank storage, refineries), chemical manufacturing, ship channel monitoring
      New Mexico - Carlsbad Caverns - Oil and gas operations (extraction)
      Georgia – Atlanta – Sterilization facilities
      Colorado – Longmont and Denver, CO – Oil and gas operations (extraction, tank storage, refineries)
      Louisiana - Baton Rouge and New Orleans – sterilization and chemical manufacturing
      Netherlands – Rotterdam – Port monitoring of chemical manufacturing and oil and gas operations (refineries, tank storage)
      North Carolina – large area air toxics surveys
      California – various location - community monitoring, oil and gas operations, sterilization facilities
   b. **Has collected data been used to support community emission reduction, enforcement, or other actions? Please provide examples.**
      The data collected with our analyzers has been used in a variety of ways. We encourage you to reach out to our customers and would be happy to provide references.
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?**

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

c. **What pollutants can be monitored and with what frequency?**
In-motion mobile platform (1-10 second response rate): For the AROMA, this measurement would be made in RapidScan Mode in approximately 5 second intervals. The following compounds can be measured with this Mode of operation: water, methane, carbon dioxide, ethylene oxide, hydrogen cyanide, hydrogen sulfide, carbon monoxide, ammonia. The following compound classes can also be measured: alkanes, aromatics, dienes, and chlorinated compounds.

Short-term mobile laboratories (portable measurements in minutes): For the AROMA, this measurement would be made in LabScan Mode which ranges from 8 minutes to 50-minute intervals depending on the analytes of interest.

8-minute analysis: Trichloroethylene, Isoprene, Benzene, 1,3-butadiene, 1,2-dichloroethylene, Styrene, Toluene, 1,1,2-trichloroethane, Ethylbenzene, Chlorobenzene, Xylene (mixed), Acrolein
20-minute analysis: 1,3-butadiene, 1,1,2-trichloroethane, Acrolein, Ethylene Oxide, Isopropanol, Acetone, Methanol, Ethanol, Propane, Butane
50-minute analysis: Isopropanol, Acetone, Methanol, Ethanol, Propane, Butane, Vinyl Chloride, 1,1-dichloroethene, Methyl Chloride, 1,1-Dichloroethane, Chloroform, Methylene Chloride, 1,2-Dichloropropane, Bromochloromethane, Bromodichloromethane, Dibromochloromethane, 1,2-dichloroethane, Methyl tert-butyl ether (MTBE), 1,2,3-Trichloropropane, acrylonitrile (2-propenenitrile), tert-butanol.

d. **What types of instrumentation do you use? Describe all relevant methodologies.**
AROMA analyzers are thermal desorption, broadband cavity ring-down spectroscopy (TD-CRDS) systems capable of multi-VOC analysis. By utilizing a broadband, tunable laser system for the CRDS core and combining it with a thermal desorption separation, the detection of a broad range of specific chemical species within complex pollutant mixtures at low detection limits is possible. The thermal desorption separation before CRDS detection is unique to the AROMA platform and enhances the chemical sensing capabilities in numerous ways. Two of the most important are pre-concentration and separation of specific chemical species from background and interfering compounds enabling lower detection limits and more specificity. AROMA analyzers have two main modes of operation: RapidScan and LabScan. RapidScan is a direct spectroscopy mode, where an air sample is directly analyzed by the CRDS core. This allows for real-time measurement of small molecules (methane, H2S, HCN, etc.) and large molecule compound classes. The LabScan operating mode utilizes the thermal separation front-end before CRDS detection. This provides near real-time measurements of ethylene oxide, BTEX, and other VOCs at detection limits as low as 2 pptv.

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?)**

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

g. **What workflow processes or software do you have for managing mobile monitoring?**
During mobile monitoring, data can be viewed in real-time on a laptop connected to the instrument (by the person not operating the vehicle). Data is reported as a concentration value and includes data qualifier flags if appropriate. There is a GPS connected to the

analyzer such that data is tied to GPS coordinates. The data from our analyzers can be exported as a .csv or .kml file. .kml files can be exported into Google Earth for mobile monitoring maps as seen in Figure 2. Data integration through RS-232, ModBus TCP/IP, and others are also available.

3. **Describe your usual approach or strategy to mobile monitoring. Include, if possible:**
   a. **Drive plan and operational logistics**
   b. **Staffing**
   c. **Power requirements (e.g. battery powered, requires generator, etc.)**
      During mobile campaigns AROMA can be powered by an external battery (e.g. 12V, 300 AHr) or run off of a generator or vehicle power.
   d. **Consumables**
      AROMA running in RapidScan Mode does not have any consumables. AROMA running in LabScan mode uses < 5 L/hr of ultra-high purity nitrogen gas as a carrier gas. There are two sorbent beds in the analyzer that are recommended to be changed every 6-12 months.
   e. **Quality control procedures**
      There is a list of data qualifier flags. Additionally, the software has a scheduler, where calibration checks and blanks can be scheduled to be run at specific times.
   f. **Performance and acceptance criteria (e.g. precision, bias, limit of detection)**
   g. **Data logging and storage**
   h. **Notifications and communication**
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.**
   Further evaluation of project scope would be needed to accurately determine estimated costs. **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.**

   a. **How often are invoices and payments typically required?**
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?**
   b. **What is the maximum number of platforms that you could deploy by early 2025?**
6. **Do you have experience developing Community Air Monitoring Plans (CAMPs) as defined by the CARB Community Air Protection Program Blueprint5 or similar? Please provide examples of community-focused monitoring plans or similar.**
7. **Do you have existing standard operating procedures (SOPs) or quality assurance project plans (QAPPs) for your mobile monitoring approach?**
   Yes, several SOPs have been developed for mobile monitoring with AROMA analyzers. These include SOPs developed by Houston Health Department and Colorado State University, which we have access to.

IV. Data Collection, Storage, Reporting

1. **In what format do you generally provide data to your clients? What is your final data product?**
   We typically provide raw data and/or quality controlled raw data to clients. This typically comes in the form of excel files. We have also provided generated maps, time series graphs, flux estimations, and other outputs depending on the need of the project.
2. **Do you have off-the-shelf, or modifiable-off-the-shelf, data management products compatible with mobile monitoring data?**
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?**
4. **What is your experience in public dissemination of complex information? To what extent have you generated data visualization for 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?**

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.**
   To our knowledge, there are not many groups with multiple existing mobile monitoring set-ups ready to be deployed for this type of project. Many groups have one or two mobile monitoring platforms, and we are not aware of many capable of meeting all of the listed requirements without enabling the build out of capabilities to capture all pollutants.
   Entanglement Technologies has one Ford Transit that would be considered a mobile monitoring platform for the previously listed volatile organic compounds (VOCs). We have 3-4 AROMA analyzers that could be deployed in standard vehicles for mobile monitoring. A dedicated vehicle is not required for our analyzers to be used for mobile monitoring.
   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.**
   Please see our response to V.1.a., but in brief, it could be beneficial to allow the development of mobile platforms or the use of state vehicles to deploy equipment in.