Response to Request for Information (RFI)

Statewide Mobile Monitoring Initiave (SMMI)

Date: November 3, 2023

PICARRO

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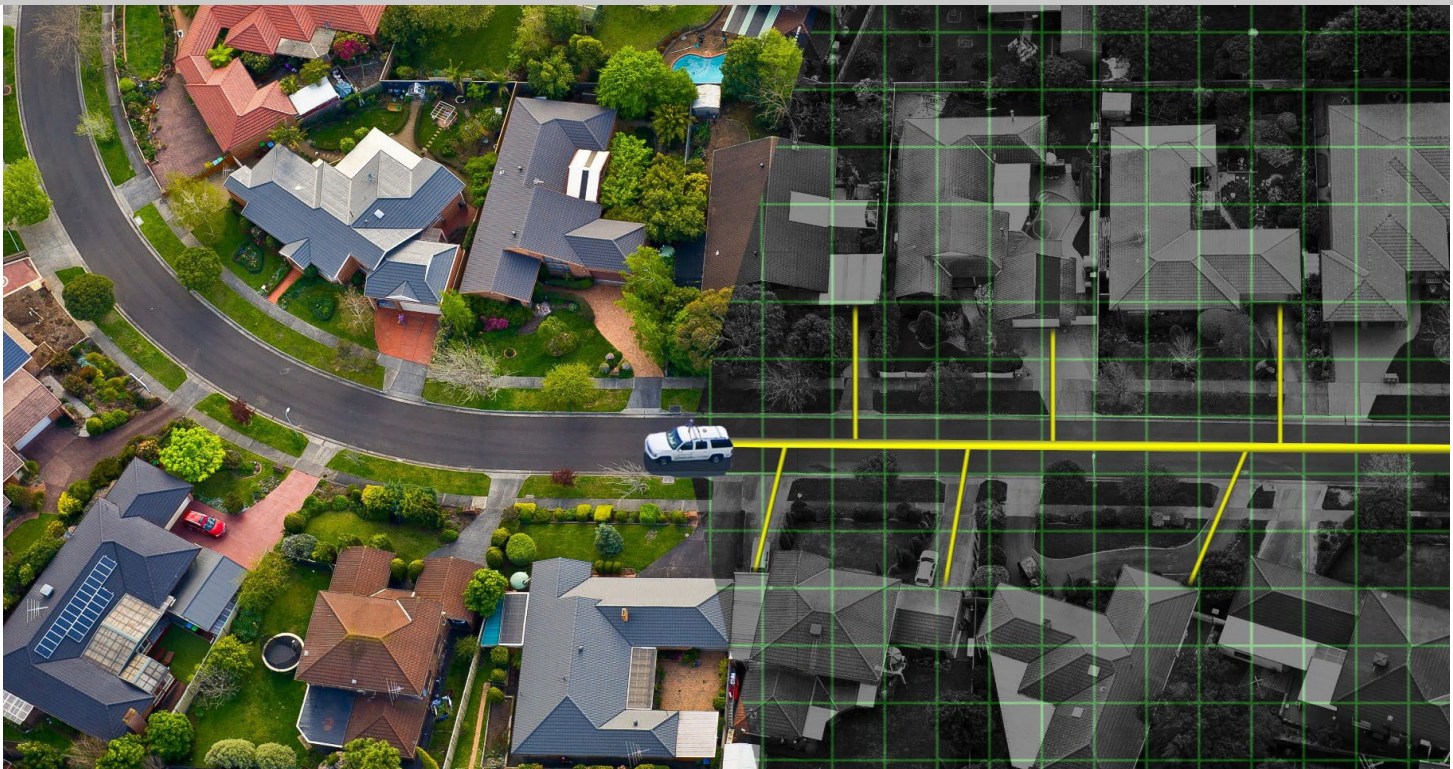
Prepared For

California Air Resources Board (CARB)



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COVER LETTER

November 3, 2023

California Air Resources Board (CARB)

Attn: David Ridley (david.ridley@arb.ca.gov)

Subject: Response to Request for Information (RFI) - Statewide Mobile Monitoring Initiative (SMMI)

Dear Mr. Ridley,

We are writing in response to the Request for Information (RFI) for the Statewide Mobile Monitoring Initiative (SMMI) issued by the California Air Resources Board (CARB). We are excited about the potential to collaborate on this initiative, given its transformative potential for California's communities. Picarro's solutions ensure accurate data, broad coverage, community engagement, and cost efficiency, aligning perfectly with the SMMI's objectives.

At Picarro, we pride ourselves on pioneering advancements in precision gas detection technology, precisely aligning with CARB's mission of safeguarding our environment. Our innovative monitoring services, backed by state-of-the-art hardware and real-time analytics, is tailor-made to revolutionize emissions monitoring. We are excited about the opportunity to collaborate with CARB to implement effective strategies for mobile monitoring, data analysis, and emissions reduction. Together with CARB, we have an opportunity to set new standards in healthy communities.

As part of our response to the RFI, we would like to offer the following:

1. An overview of our company's experience, including Picarro's advanced solutions.
2. Information about our capabilities and technologies that align with the objectives of the SMMI.
3. Insights and recommendations on how our expertise can be leveraged to address the specific requirements and challenges outlined in the RFI.
4. Our commitment to transparency, collaboration, and responsive engagement with CARB throughout the SMMI process.
5. Vendor information outlined in the RFI.

We are prepared to work closely with CARB to tailor our solutions to meet the unique needs of the SMMI.

Thank you for considering our response to the RFI for the Statewide Mobile Monitoring Initiative. We look forward to the opportunity to further discuss our capabilities, explore potential collaborations, and contribute to the success of this important endeavor.

Sincerely,

Dave Miller
Director, Environmental Systems
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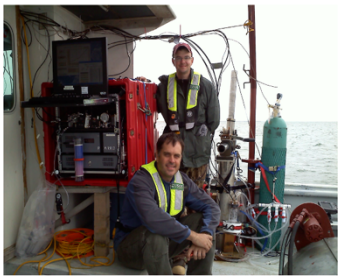
ABOUT US

Cutting-Edge Monitoring Solutions

Picarro's History as an Industry Leader

- Picarro, with over 25 years of expertise, is a global leader in measuring hazardous pollutants and greenhouse gas monitoring, serving medical, energy, chemical, and scientific sectors.
- Founded in Santa Clara, California, Picarro boasts ISO 9001:2015 certification, over 45 patents, and a dedicated team of 60+ STEM PhDs among its 300+ employees.
- With a presence in 100+ countries, Picarro's innovative solutions are used by thousands of customers worldwide, a testament to our industry leading solutions.
- A global network of 5 offices, 40+ partners, and strong industry partnerships ensures Picarro remains at the forefront of environmental monitoring solutions.
- Picarro stands distinct as one of the few global entities offering comprehensive end-to-end solutions, bridging advanced monitoring systems to complete environmental management programs.

25+	100+	5000+
YEARS OF EXPERIENCE	**COUNTRIES GLOBALLY**	**INSTALLATIONS**



WHAT WE DO

Our Solutions & Services

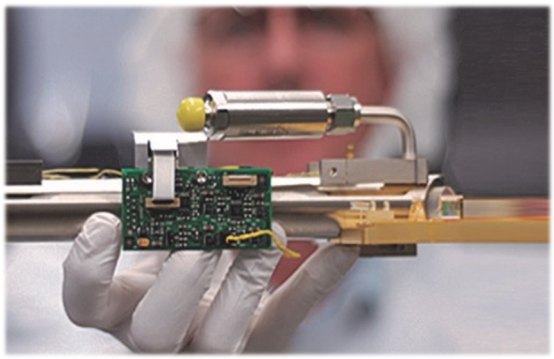
Emissions Management Solution

- One Stop Solution for Air Quality & Emissions Management
- Monitoring Systems, Service, Support, Consultation
- Solutions Adaptable to Regulatoy Change
- Monitoring Program Compliance Tracking
- 24 Hour Onsite, Remote, & Global Support
- Integrated Data Solutions Combining Monitoring Systems with Industry Best Practices

Data Acquisition System (DAS) & Analytics

- EPA Compliance Reporting (ERT & CEDRI)
- Custom Reports, Dashboards, Alarming
- Notifications & Alarming
- Secure Protocols & User Access Layers
- Automated Regulatory Reports
- Audit Trail, Events & Actions, & Exceedence Reports
- Air Dispersion & Emissions Modeling
- Remote Access & Cloud Support (optional)

Advanced Technology



- Cavity Ring-Down Spectroscopy (CRDS)
- Specific & Sensitive to over 400 Target Analytes
- Parts Per Trillion Limit of Detection (LOD) for 100's of VOCs
- Span over 1000 ppm
- Response Time in Seconds
- <2 Second Measurement Time
- Multi-Gas Capability in Real-Time
- CEMS, Workplace, Fenceline, and Mobile Systems

Compliance Management & Reporting

- Monitoroing System Installation, Maintenance, & Operation
- Factory & Site Acceptance Testing (FAT & SAT)
- Performance Specification Testing (PST)
- Site Specific Quality Assurance Plan (QA/QC Plan or QAPP)
- Relative Accuracy Test Audits (RATA)
- Quarterly Cylinder Gas Audits (CGA)
- Emission Inventories & Permit Documentation
- Daily, Monthly, Quarterly, & Annual Reporting Services

MEET OUR TEAM

Experts Dedicated to Your Project

At Picarro, we believe a highly effective and experienced team is crucial to our customers project success. For your project, we have a dedicated and skilled team for the SMMI to provide end-to-end project support and ongoing services. We'd like to introduce you to a few leaders of that team who will be managing your project:

Dave Miller - Director

Provides strategic oversight, overall project direction, and stakeholder management ensuring alignment with regulatory and customer goals. Previously with Baxter Medical & Dassault Aviation, Dave has experience in leading large-scale projects aimed at improving environmental, health, and safety compliance programs including emissions monitoring systems at medical device sterilization facilities and chemical plants.

Sean Cronin - Project Manager

Customer dedicated Project Manager for emissions monitoroing systems and associated regulatory compliance services such as RATA's & reporting. Previously with Trinity Consultants, Sean has strong experience with environmental regulatory compliance, ethylene oxide rules, permitting, stack testing, and CEMS QA/QC plan development.

Gregor Lucic, PhD - Senior Product Manager

Leads the product management process for Picarro environmental monitoring systems and services including project documentation and system configuration. Many years of experience in the technical domain of gas monitoring including the development of multiple products at Picarro.

Jonathan Bent, PhD - Senior Technical Lead

Leads the projects technical oversight by ensuring monitoring systems are robust, efficient, and aligned with customer requirements. Many years of experience in the technical domain of emissions monitoring and atmospheric chemistry, Jonathan previously work for NOAA as a leading expert in metrology and emissions monitoring.

Dan Cohen - Product Manager

Leads the technical feasibility and system configuration processes for each project. Previously a Consulting Scientist at Jacobs, Dan leverages his industry knowledge of emissions monitoring and environmental monitoroing systems to assist customers with achieving compliance and overall process optimization.

SOLUTION PORTFOLIO

Our Emissions Monitoring Solutions

Our proposal goes beyond the offerings of traditional service providers to offer a full compliance strategy. Our Managed Services Agreement (MSA) combines reliable, continuous monitoring technology, regulatory compliance testing and reporting, with the expertise and consulting service model to helps you meet growing regulatory demands, making us a strong partner for your environmental and sustainability goals.

WORKPLACE	CEMS	FENCELINE	MOBILE

COMPREHENSIVE EMISSIONS MONITORING SOLUTIONS & SERVICES

Picarro's mobile solutions integrate a vehicle-based hardware system with proprietary analytical software with cloud support that culminates a robust reporting platform.

By harnessing real-time, quantitative gas concentration data from continuous mobile measurements, analyzed using advanced proprietary algorithms, Picarro provides a digital overview of emissions sources. This real-time attribution and reporting yields actionable insights necessary for emissions reduction and community exposure mitigation.

Methodology and Workflow The workflow encompasses three distinct phases:

1. **Data Collection** – VOC data is captured across the survey area using a Picarro-equipped vehicle. The aim is to maximize community coverage using our unique mapping technology, which determines the areas covered by the vehicle.
2. **Data Analytics** – Target gas concentration data gathered by the mobile monitoring system is merged with diverse data sources, including weather conditions, atmospheric details, GPS, vehicle position and speed, and other layers.
3. **Reporting** – Picarro's software platform reduces data to actionable reports and analytical findings to support the strategic goals of CARB's SMMI.

CHOSEN BY INDUSTRY LEADERS

Hear It From Our Customers

Process Optimization & Workplace Safety

"I had received very good reports from industry contacts... blown away with the ease of use, versatility, specificity and range of accurate measurement. The low maintenance and ease of use are very welcome... Using the system with great success to help commission a new Catalytic Abatement Plant (CAP) at another of our facilities. We look forward to an ongoing relationship and adding more units across our plants."

- John Irwin, General Manager, Steritech - Australia

EtO Abatement Monitoring & Compliance

"This partnership combines more than 60 years of experience in emissions monitoring and abatement to deliver industry-leading solutions not found with competing technologies. We are confident that our partnership will will help sterilization facilities operate more safely and sustainably."

- Jan S. Hjort, CEO, LESNI - Denmark

Safety & Workplace Exposure Mitigation

"By incorporating Picarro's advanced emissions management solutions into our plants, we can provide our clients with the best possible safety and compliance solutions while minimizing the environmental impact of their operations."

- Jordi Serrat, Project & Technology Director, Telstar - Spain

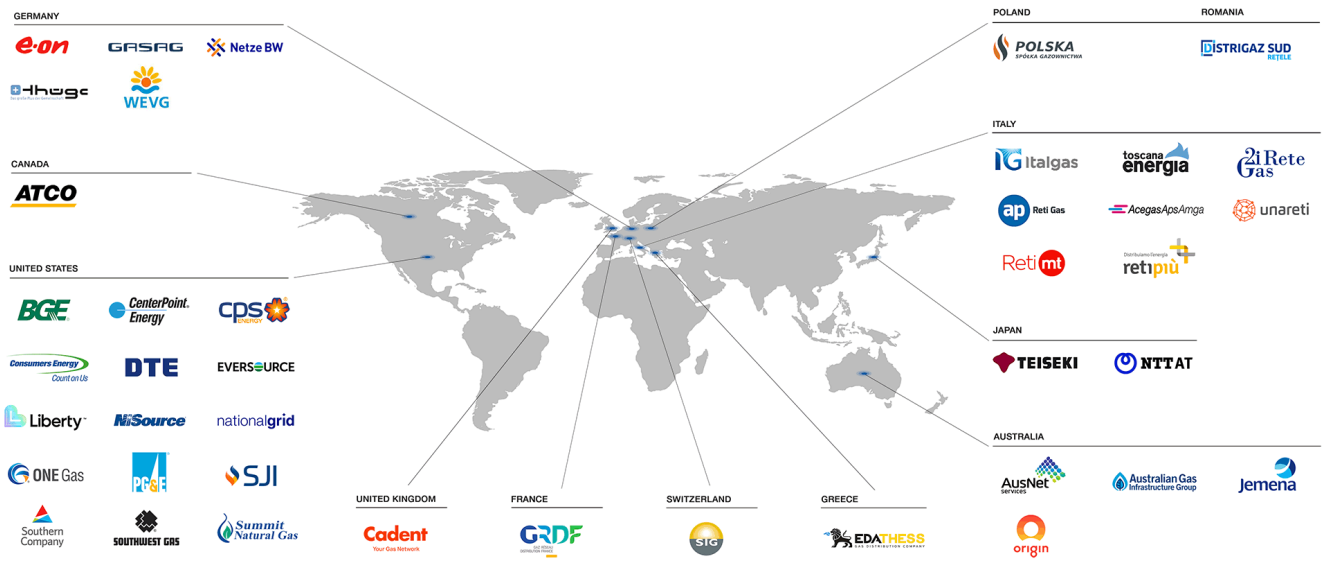
Exceeding Regulatory Standards

"Our selection of Picarro as the primary technology for EtO emissions monitoring and joint process efficiency studies is a testament to our commitment to provide the best available technologies to the market. Together, we aim to push the boundaries of what is possible in EtO emissions management."

- Richard Landtiser, Vice President, Carus – United States

HISTORY OF MOBILE SURVEYS

Our Mobile Monitoring Customers Globally

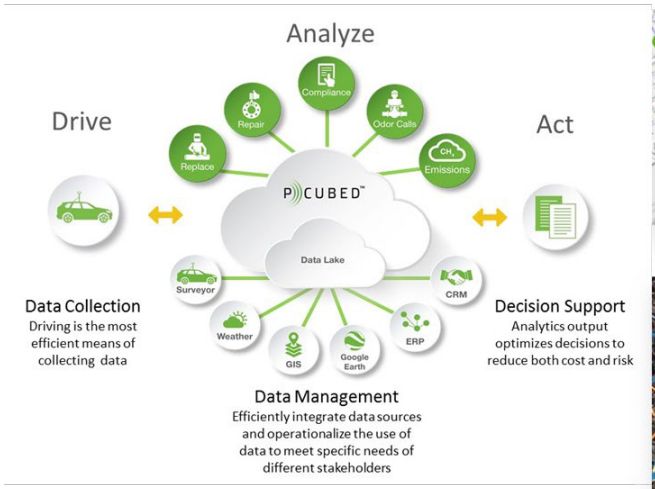


"Picarro has developed an incredible solution for combining methane data with the Distribution Integrity Management Program (DIMP) and external data sets to more effectively manage pipe replacement, fugitive emissions, and the leak survey and repair process."

Chief Risk Officer - Major West Coast United States Utility Company

"Picarro has built the industry's leading methane analytics platform. It has enabled Italgas, as well as the world's leading gas utilities companies, to evolve gas infrastructure towards a more sustainable future."

Chief Executive Officer - Italgas



ADVANCED TECHNOLOGY

Cavity Ring-Down Spectroscopy (CRDS)

In the complex landscape of industrial emissions monitoring, the need for accurate and reliable solutions has never been more important. As industries and regulations grow and diversify, so do the challenges in ensuring environmental compliance and safety. Designed for the intricacies of industrial environments, CRDS offers unparalleled accuracy with analyte-specific measurements in real-time. This ensures that actual emissions of target gases are detected and differentiated with the highest data confidence. In industries where every reading can have significant operational and regulatory implications, the reliability offered by Picarro's CRDS technology is invaluable. It not only aids in regulatory compliance but also paves the way for industries to adopt best practices in process optimization and confidently monitor their emissions. Picarro systems alleviate many of the issues found with complex, less precise technologies by addressing key performance metrics such as lower limit of detection, response time, stability, precision, and reliability.

	PICARRO	FTIR (Optically Enhanced)	Gas Chromatograph	Low Cost Sensor (Electrochemical, PID, FID)
Compliance	EPA OTM-47, PS-19 EtO Specific Test Method	No EtO Specific Test Methods, Methods Don't Allow OE or TOM	No EtO Specific Methods PS-8 or PS-9	EPA Methods Not Applicable Not Regulatory Compliant
Ease Of Use	Fully Automated, Turn-key	Frequent User Input, Complicated Thermal Oxidation Method, Spectroscopic Adjustments	Frequent User Input, Common Downtimes due to Service	Failure to Generate Defensible Data Outweighs Ease of Use
Robustness & Uptime	Industry Leading Uptime Continuous Operation	Frequent Downtimes due to Maintenance	High Downtimes due to Referencing & Maintenance	Frequent Downtimes due to Maintenance Interferences
Interference	Interference Free Specific & Sensitive to EtO	Requires Complex Thermal Oxidizer to Remove Interference	Highly Susceptible (Sample Residues, Ghost Peaks & Broadening Resulting in False Spikes)	Carbon Monoxide, Methane, other Hydrocarbons & Alcohols, Temperature & Humidity
Real-Time Monitoring	<2 Sec Measurement <10 Sec Response Instant Spike Recovery	1-5 Minute Measurement Slow Recovery & Poor Averaging	1-10 Minute Measurement Slow Recovery & Poor Averaging	Not Real-Time, Not Applicable for Stack or Indoor
Data Quality	Fully Automated Validation Reference Gas QA/QC	Frequent Post-Processing, Optical Filter Adjustment	Difficult to QA/QC (False Spikes, Retention Time Shifts, & Column Deterioration)	No QA/QC Automation Frequent Failure & Drift Calibrations Not Traceable
Detection Limits	0.25 Parts-Per-Billion (ppb)	10-500 ppb (Requires Optical Enhancement)	100-1,000 ppb	1,000 ppb-5 ppm
Maintenance	Maintenance Free Sealed Optics & Mirror Assembly Requires No Cleaning	Liquid Nitrogen, Detectors, Mirrors, Optics, Thermal Oxidizer, HVAC. Requires Complex Thermal Oxidizer to Remove Interference	Frequent Repair & Maintenance of Columns, Detector Components	Frequent Sensor Replacement Electrical Safety Testing
Service & Support	Experienced Global Service & Support Team	Ongoing Service Costs & Support from Multiple Providers	Expensive Maintenance Contracts	Expensive Maintenance Contracts
Systems Deployed	Adoption in 100 Countries Over 25 Years Experience	Limited Deployments New Technology (2019)	Aging Technology Platform Not Initially Designed for EtO	Many Implementations with No Fundamental Technology or Performance Improvements

Picarro systems are renowned for their spectral precision and reliability, a credit to two pivotal features. Firstly, our patented wavelength monitor (WLM) which measures the laser wavelength with unparalleled precision. This precision aids in pinpointing absorption intensities around peak absorption values. Secondly, the systems maintain rigorous temperature and pressure control. While the sample cavity benefits from thermal insulation and an active solid-state heating system, ensuring temperature stability within 20 mK, pressure within the cavity is meticulously monitored and adjusted via a feedback loop controlling inlet and outlet gas flows. This intricate control system minimizes measurement drift, solidifying the system's reliability and offering a distinct advantage over traditional FTIR and GC systems.

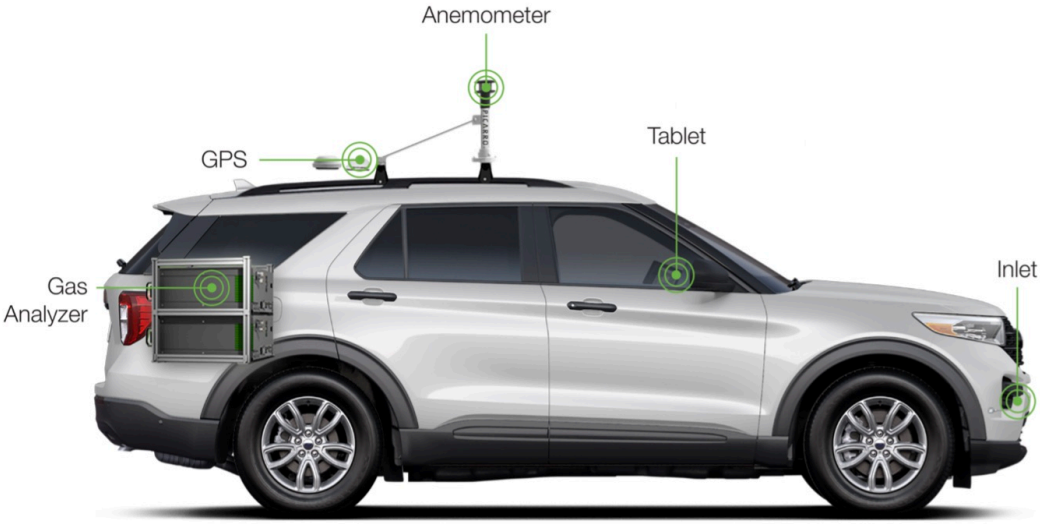
MOBILE MONITORING SYSTEM

Community Monitoring & Reporting

Picarro's Mobile Monitoring System is a combination of hardware, software, and data reporting provided to customers for identifying leaks and quantifying low-levels of target VOCs and HAPs at facility fencelines and communities. This survey is designed to provide precise, real-time monitoring data and reporting for fugitive emissions reduction. On-board data acquisition of concentration-based values, GPS positioning, and emissions maps provide indications of elevated concentrations in areas from which fugitive emission sources originate.

The Picarro solution for Mobile Monitoring realizes several benefits including:

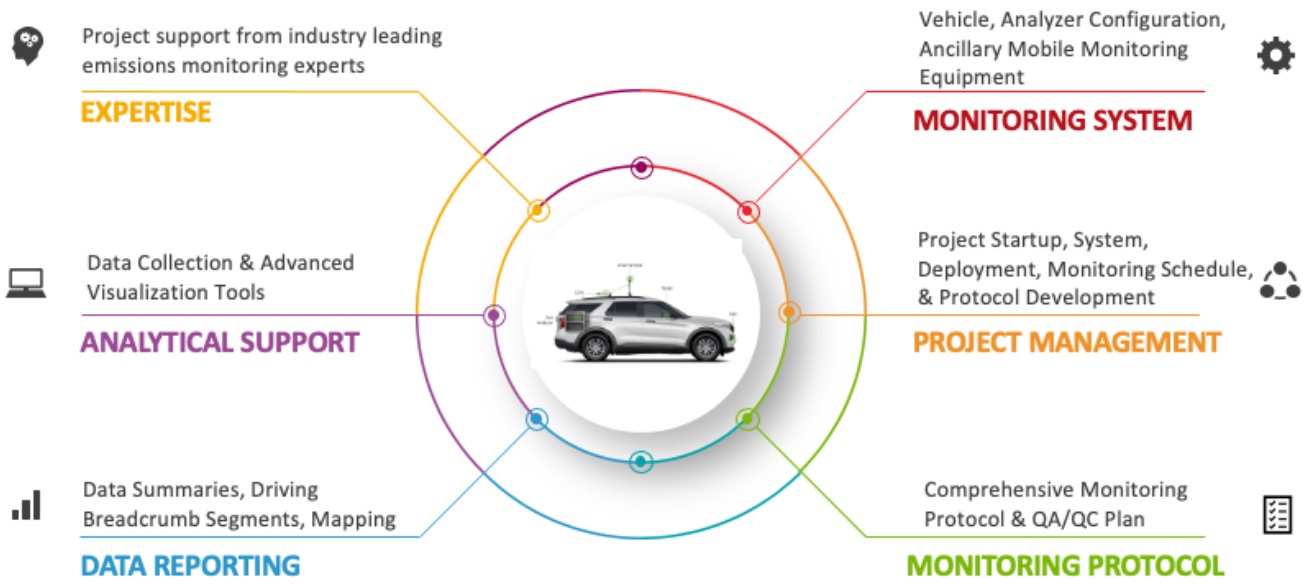
- **Improves emissions reduction** strategies by detecting and localizing leaks at a sensitivity, accuracy, speed, and scale not possible with traditional technologies and processes.
- **Fully integrated hardware and data acquisition** platform for comprehensive solution that enables actionable data for emissions source identification and reduction.
- **Provides real-time data** during the survey and reporting of concentrations and mapping of survey coverage areas.



The inherent benefit of Picarro's mobile monitoring solution lies in its robust measurement principle. As the vehicle traverses the infrastructure, air samples are continuously funneled into the gas analyzer. Leveraging CRDS, the analyzer swiftly scans infrared spectrum of target analytes, efficiently calculating concentrations of key compounds like ethylene oxide, formaldehyde, hydrogen sulfide, water vapor, methane, carbon dioxide and many other compounds. The Mobile Monitoring Solution is not only about detection, but also about precision and actionable data. While real-time concentrations can be visualized in the vehicle, an array of data outputs, from concentration averages to vector-based plume maps, can be analyzed, allowing industries to address and rectify emission sources effectively. Furthermore, Picarro's methodology workflow - encompassing data collection, sophisticated analytics, reporting, and emissions management support – ensures comprehensive coverage and high-resolution analysis of potential process issues, ultimately serving as an indispensable tool for industries and communities aiming for emissions reduction.

Picarro presents an advanced mobile monitoring solution geared towards identifying and quantifying ambient concentrations of target gases in communities. The Picarro System Hardware, mounted on a mobile platform, comprises of the PI9210 mult-gas analyzer, which leverages innovative Cavity Ring-Down Spectroscopy (CRDS) technology capable of detecting concentrations less than 1 ppb for most compounds. This analyzer is complemented by a robust sonic anemometer for real-time assessments of wind speed and direction, an ultra-precise GPS antenna for vehicle positioning and speed tracking, and a user-friendly interface for real-time operation and visualization. Additional support equipment ensures smooth operation, ranging from various power supplies, gas handling tools, and a strategically positioned gas sample inlet.

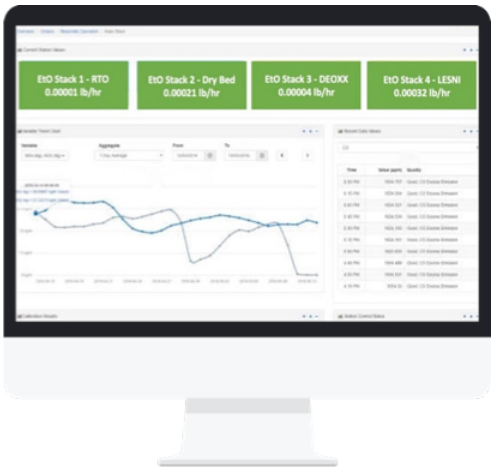
Picarro's approach ensures a seamless transition from data collection to reporting. As the mobile monitoring system takes measurements, it processes the data in real-time, for both heat map visualization and custom reporting. Beyond just detection, the focus is on generating a comprehensive overview of the target gas concentrations in surveyed areas, combined with atmospheric conditions and precise GPS coordinates. Once the fieldwork concludes, Picarro's robust backend processes will provide detailed reports. These encapsulate concentration summary reports for each facility surveyed and segment maps providing a holistic view of the emission sources. All of this invaluable data is provided for further analysis and in summarized reports, ensuring industries have every tool at their disposal to reduce emissions.



DATA MANAGEMENT

Data Acquisition System (DAS) & Software

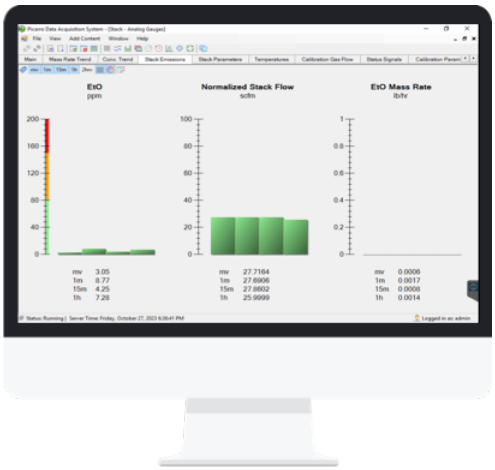
Data Acquisition Systems (DAS) are an integral part of effective emissions monitoring and environmental compliance. Picarro monitoring systems incorporate advanced features to create robust monitoring, control, and reporting capabilities for real-time insights and simplified data management.



REAL-TIME DATA VISUALIZATION

Picarro DAS software features customizable, user-friendly dashboards with a variety of widgets, gauges, charts, and alarms. The interface allows for detailed monitoring, including tracking CEMS downtimes, excess emissions, and the assignment of actions to specific alarms.

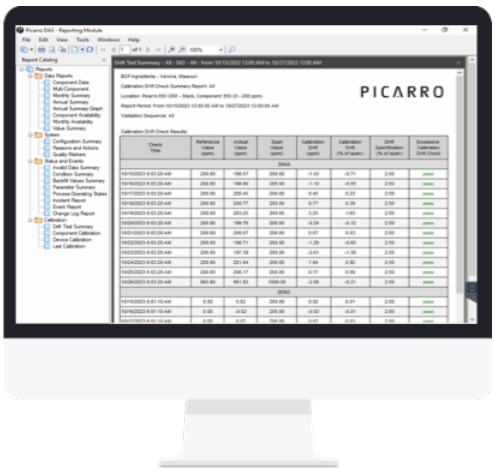
- Remote access, cloud support & extended displays
- Graphical representations & facility overlay
- Display real-time & reduced time intervals
- Interface, log, report data from digital/analog inputs



REGULATORY COMPLIANCE

DAS oftware tools compliant with regulations under 40 CFR Part 60, 63, & 75. Diligant tracking of compliance events, system occurrences, and alarms, while providing comprehensive multi-parameter reports.

- User access layers, change logs, & audit trails
- Automated daily calibrations for concentration & flow
- Automated compliance tasks (Above Span Cals, CGAs)
- Streamlined compliance & process data tracking



EMISSIONS REPORTING

Picarro's reporting software adheres to strict environmental reporting standards and is able to calculate and display compliance parameters based on the specific regulatory requirements for each source.

- Supports both EPA ERT & CEDRI reporting requirements
- Automated email reports at specified intervals
- Tracks compliance events, alarms, and system events
- Assign reasons and actions to specific alarms
- Standard & custom emissions reports

Please note that the information provided in this response serves as a broad overview of Picarro's capabilities and is not intended as an offer to bid on the SMMI. To proceed with a formal bid, we would require further details from CARB regarding the specific application scope, survey duration, logistics, and precise reporting requirements. Once we have a complete understanding of these elements, Picarro will be able to tailor a comprehensive proposal that aligns with the SMMI's objectives and delivers on our promise of excellence in emissions monitoring. This response does not include detailed cost estimates and other specific information in our preliminary RFI response for the CARB SMMI. Picarro Inc. is prepared to provide a Rough Order of Magnitude cost estimate, a breakdown of costs, timelines, capacity details, and our eligibility for RFP processes and state contracts as part of a comprehensive proposal during the formal bidding process. Our commitment to transparency and the provision of high-quality monitoring solutions will be fully reflected in our formal bid submission for the SMMI.