apcd air pollution control district SANTA BARBARA COUNTY

Agenda Item: D-7
Agenda Date: August 21, 2025
Agenda Placement: Admin
Estimated Time: N/A
Continued Item: No

Board Agenda Item

TO: Air Pollution Control District Board

FROM: Aeron Arlin Genet, Air Pollution Control Officer

CONTACT: Alex Economou, Planning Division Manager, (805) 979-8333

SUBJECT: Santa Maria Valley Particulate Matter Study Contract

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RECOMMENDATION:

Consider recommendations as follows:

1. Delegate authority to the Air Pollution Control Officer to execute the attached Agreement for Services of Independent Contractor (Agreement) with Trinity Consultants to assist the District with preparing a special study of particulate matter (PM) in the Santa Maria Valley for a total cost not to exceed $296,258, subject to review and approval by District Counsel, Risk Management, and the Auditor-Controller;

2. Delegate authority to the Air Pollution Control Officer to execute minor updates or amendments to the attached Agreement with Trinity Consultants in the future, subject to review and approval by District Counsel, Risk Management, and the Auditor Controller; and

3. Authorize the District to purchase air monitoring equipment and related parts from Met One Instruments and ARA Instruments to be used for the Santa Maria Valley PM Study, as sole source procurements without being required to conduct a formal bid process, for a total cost not to exceed $50,000, including tax and shipping.

BACKGROUND:

In December 2024, the District was awarded $662,446 from an Air Monitoring Grant under the Inflation Reduction Act from the Environmental Protection Agency (EPA) to perform a special

study of particulate matter (PM) speciation in the Santa Maria Valley. The Santa Maria Valley spans approximately 132 square miles and includes the cities of Santa Maria and Guadalupe as well as the unincorporated communities of Orcutt, Garey, and Sisquoc. The project was designed to build a better understanding of the PM pollution in the Santa Maria Valley and what species are present in the PM.

As part of the study, the District will collect PM samples at several locations, analyze the data, prepare a report, and include a community engagement component to share the data with community members and organizations. Over the past 10 years, this study area has experienced nearly 25 exceedances annually of the state PM_{10} standard (50 $\mu g/m^3$), which Santa Barbara County is currently designated as nonattainment for.
Project goals are as follows:

1. Gain a better understanding of the PM concentrations and sources throughout the Santa Maria Valley by conducting extensive PM monitoring in the region's cities and communities.
2. Conduct particulate sampling and laboratory analysis to better understand the particulate species that are present in the air and how they are affected by location, time of year, and weather conditions.
3. Identify potential strategies and best practices to reduce PM pollution in the Santa Maria Valley.
4. Engage residents of this region in an extensive, collaborative, multi-lingual education campaign to increase community-level awareness about air quality and provide community members with the information and tools to help protect themselves from exposure to high levels of PM.

DISCUSSION:

In April 2025, the District issued a request for proposals (RFP) seeking assistance from a qualified air monitoring consultant with the preparation of a special study of PM speciation in the Santa Maria Valley. The RFP included the following project deliverables:

- Develop and implement an air monitoring plan and detailed quality assurance procedures.
- Select sites to collect PM data (in consultation with the District).
- Select which equipment to procure for the study (in consultation with the District).
- Review and analyze the monitoring and sampling results and produce a final report.
- Present the PM study data to community members and organizations (in coordination with the District).

The District circulated the RFP to air monitoring consultants in the region and received 5 proposals by the submittal deadline. District staff reviewed and scored the proposals and selected Trinity Consultants as the successful proposal to the District's Santa Maria Valley PM Study RFP. Trinity Consultants is highly qualified for this project and have much experience working with the District's monitoring network since 1986. The company has a lot of experience conducting PM monitoring in the region, including recent projects in San Luis Obispo County. Trinity Consultant's cost estimate for the project is $246,258, which excludes the cost of the air

monitoring equipment that will be used in the study. Furthermore, as one of the project deliverables scoped in their proposal, Trinity Consultants has been working in consultation with the District to select which equipment to procure for the study. As part of that task, Trinity Consultants has developed an air monitoring equipment proposal that would result in the District owning some of the equipment used in the study, and Trinity owning the remaining equipment and leasing back to the District at a discounted rate. The cost of the equipment lease to the District is not to exceed $50,000 and will also be covered by the EPA grant. Since Trinity Consultant's combined cost estimate of $296,258 is greater than $200,000, Board approval is needed to execute a contract for professional services. Pending your Board's consideration, the District plans to execute the attached Agreement with Trinity Consultants to assist with preparation of the Santa Maria Valley PM Study.

Additionally, since the quoted cost for the air monitoring equipment that the District will purchase exceeds the District's authority to issue a purchase order without completing a bid process, the District requests a competitive bid waiver to move forward with the purchase of the Met One Instruments and ARA Instruments equipment. The air monitoring equipment that will be purchased for this PM study is specialized and is the instrumentation that is being recommended by Trinity Consultants due to their experience using the equipment for other similar projects.

FISCAL IMPACTS:

Your Board adopted the Fiscal Year (FY) 2025-26 budget on June 26, 2025. That budget includes professional services funds to hire an air monitoring consultant to assist with the preparation of the Santa Maria Valley PM Study as well as equipment funds to cover the cost of equipment for the study. The contract with Trinity Consultants is within the parameters that were included in that approved budget. The project duration will span over multiple fiscal years, and future costs will be included in next year's proposed budget for your Board consideration. Additionally, this project is being supported by an EPA Air Monitoring Grant from the Inflation Reduction Act. There are no fiscal impacts to the Budget.

ATTACHMENT:

A. Agreement for Services of Independent Contractor.

ATTACHMENT A

Agreement for Services of Independent Contractor.

August 21, 2025

Santa Barbara County Air Pollution Control District
Board of Directors

260 San Antonio Road, Suite A
Santa Barbara, California 93110

AGREEMENT FOR SERVICES OF INDEPENDENT CONTRACTOR

THIS AGREEMENT (hereafter Agreement) is made by and between the Santa Barbara County Air Pollution Control District (hereafter DISTRICT) and Trinity Consultants with an address at 26368 Ruether Avenue, Santa Clarita, CA, 91350, (hereafter CONTRACTOR) wherein CONTRACTOR agrees to provide and DISTRICT agrees to accept the services specified herein.

WHEREAS, CONTRACTOR represents that it is specially trained, skilled, experienced, and competent to perform the special services required by DISTRICT and DISTRICT desires to retain the services of CONTRACTOR pursuant to the terms, covenants, and conditions herein set forth;

NOW, THEREFORE, in consideration of the mutual covenants and conditions contained herein, the parties agree as follows:

1. DESIGNATED REPRESENTATIVE

Alex Economou at phone number (805) 979-8333 is the representative of DISTRICT and will administer this Agreement for and on behalf of DISTRICT. David Yoho at phone number (661) 212-3008 is the authorized representative for CONTRACTOR. Changes in designated representatives shall be made only after advance written notice to the other party.

2. NOTICES

Any notice or consent required or permitted to be given under this Agreement shall be given to the respective parties in writing, by personal delivery or facsimile, or with postage prepaid by first class mail, registered or certified mail, or express courier service, as follows:

To DISTRICT: Alex Economou, Santa Barbara County Air Pollution Control District, 260 N. San Antonio Road, Suite A, Santa Barbara, CA, 93110

To CONTRACTOR: David Yoho, Trinity Consultants, 26368 Ruether Avenue, Santa Clarita, CA, 91350

or at such other address or to such other person that the parties may from time to time designate in accordance with this Notices section. If sent by first class mail, notices and consents under this section shall be deemed to be received five (5) days following their deposit in the U.S. mail. This Notices section shall not be construed as meaning that either party agrees to service of process except as required by applicable law.

3. SCOPE OF SERVICES

CONTRACTOR agrees to provide services to DISTRICT in accordance with EXHIBIT A attached hereto and incorporated herein by reference.

4. TERM

CONTRACTOR shall commence performance on August 21, 2025 and end performance upon completion, but no later than February 28, 2028 unless otherwise directed by DISTRICT or unless earlier terminated.

5. COMPENSATION OF CONTRACTOR

In full consideration for CONTRACTOR's services, CONTRACTOR shall be paid for performance under this Agreement in accordance with the terms of EXHIBIT B attached hereto and incorporated herein by reference. Billing

shall be made by invoice, which shall include the contract number assigned by DISTRICT and which is delivered to the address given in Section 2 NOTICES above following completion of the increments identified on EXHIBIT B. Unless otherwise specified on EXHIBIT B, payment shall be net thirty (30) days from presentation of invoice.

6. **INDEPENDENT CONTRACTOR**

It is mutually understood and agreed that CONTRACTOR (including any and all of its officers, agents, and employees), shall perform all of its services under this Agreement as an independent contractor as to DISTRICT and not as an officer, agent, servant, employee, joint venturer, partner, or associate of DISTRICT. Furthermore, DISTRICT shall have no right to control, supervise, or direct the manner or method by which CONTRACTOR shall perform its work and function. However, DISTRICT shall retain the right to administer this Agreement so as to verify that CONTRACTOR is performing its obligations in accordance with the terms and conditions hereof. CONTRACTOR understands and acknowledges that it shall not be entitled to any of the benefits of a DISTRICT employee, including but not limited to vacation, sick leave, administrative leave, health insurance, disability insurance, retirement, unemployment insurance, workers' compensation and protection of tenure. CONTRACTOR shall be solely liable and responsible for providing to, or on behalf of, its employees all legally-required employee benefits. In addition, CONTRACTOR shall be solely responsible and save DISTRICT harmless from all matters relating to payment of CONTRACTOR's employees, including compliance with Social Security withholding and all other regulations governing such matters. It is acknowledged that during the term of this Agreement, CONTRACTOR may be providing services to others unrelated to the DISTRICT or to this Agreement.

7. **STANDARD OF PERFORMANCE**

CONTRACTOR represents that it has the skills, expertise, and licenses/permits necessary to perform the services required under this Agreement. Accordingly, CONTRACTOR shall perform all such services in the manner and according to the standards observed by a competent practitioner of the same profession in which CONTRACTOR is engaged. All products of whatsoever nature, which CONTRACTOR delivers to DISTRICT pursuant to this Agreement, shall be prepared in a first class and workmanlike manner and shall conform to the standards of quality normally observed by a person practicing in CONTRACTOR's profession. CONTRACTOR shall correct or revise any errors or omissions, at DISTRICT'S request without additional compensation. Permits and/or licenses shall be obtained and maintained by CONTRACTOR without additional compensation.

8. **DEBARMENT AND SUSPENSION**

CONTRACTOR certifies to DISTRICT that it and its employees and principals are not debarred, suspended, or otherwise excluded from or ineligible for, participation in federal, state, or DISTRICT government contracts. CONTRACTOR certifies that it shall not contract with a subcontractor that is so debarred or suspended.

9. **TAXES**

CONTRACTOR shall pay all taxes, levies, duties, and assessments of every nature due in connection with any work under this Agreement and shall make any and all payroll deductions required by law. DISTRICT shall not be responsible for paying any taxes on CONTRACTOR's behalf, and should DISTRICT be required to do so by state, federal, or local taxing agencies, CONTRACTOR agrees to promptly reimburse DISTRICT for the full value of such paid taxes plus interest and penalty, if any. These taxes shall include, but not be limited to, the following: FICA (Social Security), unemployment insurance contributions, income tax, disability insurance, and workers' compensation insurance.

10. **CONFLICT OF INTEREST**

CONTRACTOR covenants that CONTRACTOR presently has no employment or interest and shall not acquire any employment or interest, direct or indirect, including any interest in any business, property, or source of income, which would conflict in any manner or degree with the performance of services required to be performed under this

Agreement. CONTRACTOR further covenants that in the performance of this Agreement, no person having any such interest shall be employed by CONTRACTOR. CONTRACTOR must promptly disclose to DISTRICT, in writing, any potential conflict of interest. DISTRICT retains the right to waive a conflict of interest disclosed by CONTRACTOR if DISTRICT determines it to be immaterial, and such waiver is only effective if provided by DISTRICT to CONTRACTOR in writing.

11. **OWNERSHIP OF DOCUMENTS AND INTELLECTUAL PROPERTY**

DISTRICT shall be the owner of the following items incidental to this Agreement upon production, whether or not completed: all data collected, all documents of any type whatsoever, all photos, designs, sound or audiovisual recordings, software code, inventions, technologies, and other materials, and any material necessary for the practical use of such items, from the time of collection and/or production whether or not performance under this Agreement is completed or terminated prior to completion. CONTRACTOR shall not release any of such items to other parties except after prior written approval of DISTRICT.

Unless otherwise specified in Exhibit A, CONTRACTOR hereby assigns to DISTRICT all copyright, patent, and other intellectual property and proprietary rights to all data, documents, reports, photos, designs, sound or audiovisual recordings, software code, inventions, technologies, and other materials prepared or provided by CONTRACTOR pursuant to this Agreement (collectively referred to as "Copyrightable Works and Inventions"). DISTRICT shall have the unrestricted authority to copy, adapt, perform, display, publish, disclose, distribute, create derivative works from, and otherwise use in whole or in part, any Copyrightable Works and Inventions. CONTRACTOR agrees to take such actions and execute and deliver such documents as may be needed to validate, protect and confirm the rights and assignments provided hereunder. CONTRACTOR warrants that any Copyrightable Works and Inventions and other items provided under this Agreement will not infringe upon any intellectual property or proprietary rights of any third party. CONTRACTOR at its own expense shall defend, indemnify, and hold harmless DISTRICT against any claim that any Copyrightable Works or Inventions or other items provided by CONTRACTOR hereunder infringe upon intellectual or other proprietary rights of a third party, and CONTRACTOR shall pay any damages, costs, settlement amounts, and fees (including attorneys' fees) that may be incurred by DISTRICT in connection with any such claims. This Ownership of Documents and Intellectual Property provision shall survive expiration or termination of this Agreement.

12. NO PUBLICITY OR ENDORSEMENT

CONTRACTOR shall not use DISTRICT's name or logo or any variation of such name or logo in any publicity, advertising or promotional materials. CONTRACTOR shall not use DISTRICT's name or logo in any manner that would give the appearance that the DISTRICT is endorsing CONTRACTOR. CONTRACTOR shall not in any way contract on behalf of or in the name of DISTRICT. CONTRACTOR shall not release any informational pamphlets, notices, press releases, research reports, or similar public notices concerning the DISTRICT or its projects, without obtaining the prior written approval of DISTRICT.

13. **DISTRICT PROPERTY AND INFORMATION**

All of DISTRICT's property, documents, and information provided for CONTRACTOR's use in connection with the services shall remain DISTRICT's property, and CONTRACTOR shall return any such items whenever requested by DISTRICT and whenever required according to the Termination section of this Agreement. CONTRACTOR may use such items only in connection with providing the services. CONTRACTOR shall not disseminate any DISTRICT property, documents, or information without DISTRICT's prior written consent.

14. **RECORDS, AUDIT, AND REVIEW**

CONTRACTOR shall keep such business records pursuant to this Agreement as would be kept by a reasonably prudent practitioner of CONTRACTOR's profession and shall maintain such records for at least four (4) years following the termination of this Agreement. All accounting records shall be kept in accordance with generally

accepted accounting principles. DISTRICT shall have the right to audit and review all such documents and records at any time during CONTRACTOR's regular business hours or upon reasonable notice. In addition, if this Agreement exceeds ten thousand dollars ($10,000.00), CONTRACTOR shall be subject to the examination and audit of the California State Auditor, at the request of the DISTRICT or as part of any audit of the DISTRICT, for a period of three (3) years after final payment under the Agreement (Cal. Govt. Code Section 8546.7). CONTRACTOR shall participate in any audits and reviews, whether by DISTRICT or the State, at no charge to DISTRICT.

If federal, state or DISTRICT audit exceptions are made relating to this Agreement, CONTRACTOR shall reimburse all costs incurred by federal, state, and/or local governments associated with defending against the audit exceptions or performing any audits or follow-up audits, including but not limited to: audit fees, court costs, attorneys' fees based upon a reasonable hourly amount for attorneys in the community, travel costs, penalty assessments and all other costs of whatever nature. Immediately upon notification from DISTRICT, CONTRACTOR shall reimburse the amount of the audit exceptions and any other related costs directly to DISTRICT as specified by DISTRICT in the notification.

15. **INDEMNIFICATION AND INSURANCE**

CONTRACTOR agrees to the indemnification and insurance provisions as set forth in EXHIBIT C attached hereto and incorporated herein by reference.

16. **NONDISCRIMINATION**

DISTRICT hereby notifies CONTRACTOR that DISTRICT's Unlawful Discrimination Ordinance (Article XIII of Chapter 2 of the Santa Barbara County Code) applies to this Agreement and is incorporated herein by this reference with the same force and effect as if the ordinance were specifically set out herein and CONTRACTOR agrees to comply with said ordinance.

17. **NONEXCLUSIVE AGREEMENT**

CONTRACTOR understands that this is not an exclusive Agreement and that DISTRICT shall have the right to negotiate with and enter into contracts with others providing the same or similar services as those provided by CONTRACTOR as the DISTRICT desires.

18. **NON-ASSIGNMENT**

CONTRACTOR shall not assign, transfer or subcontract this Agreement or any of its rights or obligations under this Agreement without the prior written consent of DISTRICT and any attempt to so assign, subcontract or transfer without such consent shall be void and without legal effect and shall constitute grounds for termination.

19. **TERMINATION**

A. By DISTRICT. DISTRICT may, by written notice to CONTRACTOR, terminate this Agreement in whole or in part at any time, whether for DISTRICT's convenience, for nonappropriation of funds, or because of the failure of CONTRACTOR to fulfill the obligations herein.

1. **For Convenience**. DISTRICT may terminate this Agreement in whole or in part upon thirty (30) days written notice. During the thirty (30) day period, CONTRACTOR shall, as directed by DISTRICT, wind down and cease its services as quickly and efficiently as reasonably possible, without performing unnecessary services or activities and by minimizing negative effects on DISTRICT from such winding down and cessation of services.

2. **For Nonappropriation of Funds**. Notwithstanding any other provision of this Agreement, in the event that no funds or insufficient funds are appropriated or budgeted by federal, state or local

governments, or funds are not otherwise available for payments in the fiscal year(s) covered by the term of this Agreement, then DISTRICT will notify CONTRACTOR of such occurrence and DISTRICT may terminate or suspend this Agreement in whole or in part, with or without a prior notice period. Subsequent to termination of this Agreement under this provision, DISTRICT shall have no obligation to make payments with regard to the remainder of the term.

3. **For Cause**. Should CONTRACTOR default in the performance of this Agreement or materially breach any of its provisions, DISTRICT may, at DISTRICT's sole option, terminate or suspend this Agreement in whole or in part by written notice. Upon receipt of notice, CONTRACTOR shall immediately discontinue all services affected (unless the notice directs otherwise) and notify DISTRICT as to the status of its performance. The date of termination shall be the date the notice is received by CONTRACTOR, unless the notice directs otherwise.

B. By CONTRACTOR. Should DISTRICT fail to pay CONTRACTOR all or any part of the payment set forth in EXHIBIT B, CONTRACTOR may, at CONTRACTOR's option terminate this Agreement if such failure is not remedied by DISTRICT within thirty (30) days of written notice to DISTRICT of such late payment.

C. Upon termination, CONTRACTOR shall deliver to DISTRICT all data, estimates, graphs, summaries, reports, and all other property, records, documents or papers as may have been accumulated or produced by CONTRACTOR in performing this Agreement, whether completed or in process, except such items as DISTRICT may, by written permission, permit CONTRACTOR to retain. Notwithstanding any other payment provision of this Agreement, DISTRICT shall pay CONTRACTOR for satisfactory services performed to the date of termination to include a prorated amount of compensation due hereunder less payments, if any, previously made. In no event shall CONTRACTOR be paid an amount in excess of the full price under this Agreement nor for profit on unperformed portions of service. CONTRACTOR shall furnish to DISTRICT such financial information as in the judgment of DISTRICT is necessary to determine the reasonable value of the services rendered by CONTRACTOR. In the event of a dispute as to the reasonable value of the services rendered by CONTRACTOR, the decision of DISTRICT shall be final. The foregoing is cumulative and shall not affect any right or remedy which DISTRICT may have in law or equity.

20. **SECTION HEADINGS**

The headings of the several sections, and any Table of Contents appended hereto, shall be solely for convenience of reference and shall not affect the meaning, construction or effect hereof.

21. **SEVERABILITY**

If any one or more of the provisions contained herein shall for any reason be held to be invalid, illegal or unenforceable in any respect, then such provision or provisions shall be deemed severable from the remaining provisions hereof, and such invalidity, illegality or unenforceability shall not affect any other provision hereof, and this Agreement shall be construed as if such invalid, illegal or unenforceable provision had never been contained herein.

22. **REMEDIES NOT EXCLUSIVE**

No remedy herein conferred upon or reserved to DISTRICT is intended to be exclusive of any other remedy or remedies, and each and every such remedy, to the extent permitted by law, shall be cumulative and in addition to any other remedy given hereunder or now or hereafter existing at law or in equity or otherwise.

23. **TIME IS OF THE ESSENCE**

Time is of the essence in this Agreement and each covenant and term is a condition herein.

24. **NO WAIVER OF DEFAULT**

No delay or omission of DISTRICT to exercise any right or power arising upon the occurrence of any event of default shall impair any such right or power or shall be construed to be a waiver of any such default or an acquiescence therein; and every power and remedy given by this Agreement to DISTRICT shall be exercised from time to time and as often as may be deemed expedient in the sole discretion of DISTRICT.

25. **ENTIRE AGREEMENT AND AMENDMENT**

In conjunction with the matters considered herein, this Agreement contains the entire understanding and agreement of the parties and there have been no promises, representations, agreements, warranties or undertakings by any of the parties, either oral or written, of any character or nature hereafter binding except as set forth herein. This Agreement may be altered, amended or modified only by an instrument in writing, executed by the parties to this Agreement and by no other means. Each party waives their future right to claim, contest or assert that this Agreement was modified, canceled, superseded, or changed by any oral agreements, course of conduct, waiver or estoppel.

26. **SUCCESSORS AND ASSIGNS**

All representations, covenants and warranties set forth in this Agreement, by or on behalf of, or for the benefit of any or all of the parties hereto, shall be binding upon and inure to the benefit of such party, its successors and assigns.

27. **COMPLIANCE WITH LAW**

CONTRACTOR shall, at its sole cost and expense, comply with all local, State and Federal ordinances and statutes now in force or which may hereafter be in force with regard to this Agreement. The judgment of any court of competent jurisdiction, or the admission of CONTRACTOR in any action or proceeding against CONTRACTOR, whether DISTRICT is a party thereto or not, that CONTRACTOR has violated any such ordinance or statute, shall be conclusive of that fact as between CONTRACTOR and DISTRICT.

28. **CALIFORNIA LAW AND JURISDICTION**

This Agreement shall be governed by the laws of the State of California. Any litigation regarding this Agreement or its contents shall be filed in the County of Santa Barbara, if in state court, or in the federal district court nearest to Santa Barbara County, if in federal court.

29. **EXECUTION OF COUNTERPARTS**

This Agreement may be executed in any number of counterparts and each of such counterparts shall for all purposes be deemed to be an original; and all such counterparts, or as many of them as the parties shall preserve undestroyed, shall together constitute one and the same instrument.

30. **AUTHORITY**

All signatories and parties to this Agreement warrant and represent that they have the power and authority to enter into this Agreement in the names, titles and capacities herein stated and on behalf of any entities, persons, or firms represented or purported to be represented by such entity(ies), person(s), or firm(s) and that all formal requirements necessary or required by any state and/or federal law in order to enter into this Agreement have been fully complied with. Furthermore, by entering into this Agreement, CONTRACTOR hereby warrants that it shall not have breached the terms or conditions of any other contract or agreement to which CONTRACTOR is obligated, which breach would have a material effect hereon.

31. **SURVIVAL**

All provisions of this Agreement which by their nature are intended to survive the termination or expiration of this Agreement shall survive such termination or expiration.

32. **PRECEDENCE**

In the event of conflict between the provisions contained in the numbered sections of this Agreement and the provisions contained in the Exhibits, the provisions of the Exhibits shall prevail over those in the numbered sections.

33. BUSINESS ASSOCIATE

The parties agree to the terms and conditions set forth in Exhibit D - HIPAA Business Associate Agreement (BAA), attached hereto and incorporated herein by reference.

Agreement for Services of Independent Contractor between the **SANTA BARBARA COUNTY AIR POLLUTION CONTROL DISTRICT** and **TRINITY CONSULTANTS**.

IN WITNESS WHEREOF, the parties have executed this Agreement to be effective on the date executed by DISTRICT.

ATTEST:

AERON ARLIN GENET
CLERK OF THE BOARD

By: _____
Deputy

SANTA BARBARA COUNTY AIR POLLUTION CONTORL DISTRICT, STATE OF CALIFORNIA:

By: _____
Aeron Arlin Genet
Air Pollution Control Officer

Date: _____

APPROVED AS TO FORM:
RACHEL VAN MULLEM
COUNTY COUNSEL

By: _____
District Counsel

CONTRACTOR: TRINITY CONSULTANTS

By: _____
Authorized Representative

Name: _____

Title: _____

APPROVED AS TO FORM:

GREG MILLIGAN, ARM, RISK MANAGER

By: _____
Risk Manager

APPROVED AS TO ACCOUNTING FORM:

BETSY M. SCHAFFER, CPA
AUDITOR-CONTROLLER

By: _____
Deputy

EXHIBIT A

SCOPE OF WORK
Part 1: Santa Maria Valley PM Study – Trinity Consultants Proposal

PROPOSAL TO PERFORM A SPECIAL STUDY OF PARTICULATE MATTER IN THE SANTA MARIA VALLEY

Prepared By:

David Yoho
Project Manager, Monitoring Services

Casey Lenhart
Director, Monitoring Services

TRINITY CONSULTANTS
26368 Ruether Avenue
Santa Clarita, CA 91350
Phone: (661) 309-6225

Date: May 15, 2025

Trinity Consultants

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1.0 INTRODUCTION

This proposal is presented by Trinity Consultants Company (Trinity) to the Santa Barabara County Air Pollution Control District (District) to provide air monitoring services in support of a special study of particulate matter in the Santa Maria Valley. The proposed monitoring program's primary objectives noted in the RFP are listed below:

1. To gain a better understanding of the particulate matter (PM) concentrations and sources throughout the Santa Maria Valley by conducting extensive PM monitoring in the region's cities and communities.
2. Conduct particulate sampling and laboratory analysis to better understand the particulate species that are present in the air and how they are affected by location, time of year, and weather conditions.
3. Identify potential strategies and best practices to reduce PM pollution in the Santa Maria Valley.
4. Engage all residents of this region in an extensive, collaborative, multilingual education campaign to increase community-level awareness about air quality and provide community members with the information and tools to help protect themselves from exposure to high levels of PM *(this project goal is outside the scope of this request for proposals*).

Like the District's example work plan outlined in the RFP, Trinity has provided a proposed work plan in this proposal that includes Trinity's recommended monitoring equipment, sample analysis services and source apportionment recommendations that we feel would best accomplish the goals of this project, including recommending monitoring equipment that we have successfully used in projects over the years that may be more cost-effective than traditional equipment. Additionally, the purpose of our proposed work plan is to provide a measure for estimated costing and for an evaluation tool for the District of our proposed ideas. Trinity has proposed costs for a one-year monitoring contract for the requested scope of work.

1.1 Trinity Qualifications and Background

Founded in 1974, Trinity Consultants provides expert consulting, technology, training, and staffing solutions to help organizations navigate complex environmental, health, and safety (EHS), engineering, and scientific challenges. We serve clients worldwide across diverse industries, including industrial, energy, manufacturing, mining, life sciences, and commercial sectors.

Ambient Air Quality & Meteorological Monitoring Expertise

Trinity's ambient air quality and meteorological monitoring services ensure the collection of accurate, defensible data to support environmental assessments, regulatory compliance, and permitting. With over 150 years of combined experience, our team has installed and operated approximately 1,000 monitoring stations across the U.S. We deliver turnkey solutions that are technically robust, cost-effective, and fully compliant with regulatory standards.

We integrate advanced software for real-time data monitoring, retrieval, analysis, reporting, and visualization. Our quality assurance and control programs align with the highest industry standards, ensuring data integrity, completeness, and compliance with U.S. Environmental Protection Agency (EPA), state, and local regulations.

Comprehensive Air Quality & Meteorological Monitoring Services

Trinity provides end-to-end monitoring solutions, including:

- Site selection & Regulatory Compliance
  - Regulatory agency negotiations
  - Monitoring and quality assurance plan development
  - EPA-approved monitoring methods

- Installation & Data Collection
  - Turnkey equipment installation and calibration
  - Meteorological towers (2m tripods to 100m multi-level towers with solar options)
  - Continuous monitoring of criteria pollutants (NO_2, O_3, SO_2, CO, PM_{10}, $PM_{2.5}$, THC, CH_4)
  - Air toxic sampling (canister, DNPH, Auto-GC)
  - Optical Gas Imaging (OGI)
  - Automated data retrieval, verification, and reporting

- Data Management & Reporting
  - Remote communication options (cellular, satellite, telemetry, Meteosat)
  - Automated quality control (zero, span, precision verification)
  - Data validation and reporting in state and EPA-compliant formats
  - Cloud-based real-time data access and visualization
  - Customizable alarms and alerts for instant mobile or desktop notifications

- Audit & Performance Assurance
  - Meteorological and air quality system audits
  - Performance evaluations with NIST, NVLAP, and A2LA-traceable reference standards
  - Cloud-based real-time data access and visualization
  - Customizable alarms and alerts for instant mobile or desktop notifications

- Audit & Performance Assurance
  - Meteorological and air quality system audits
  - Performance evaluations with NIST, NVLAP, and A2LA-traceable reference standards

Trinity's Experience & Capabilities working with SBCAPCD

Trinity has built a strong reputation for technical excellence in air quality monitoring and maintains well- established relationships with state and federal regulators. We currently conduct quarterly performance audits of five monitoring stations for the District and include a full range of continuous gas, meteorological and particulate monitoring equipment.

T&B Systems, acquired by Trinity in March 2023, has provided these Quality Assurance/Quality Control (QA/QC) services using some of the same staff since 1986 when there were up to 20 sites within the monitoring network. Until 1994, T&B staff also performed technical reviews of meteorological and air quality data submitted by the monitoring network contractors to the District to assess their validity and determine whether the data QA/QC requirements were met. These reviews involved routine, detailed checks of contractors' procedures for monitoring quality control, data processing and editing.

In 1994, using procedures and training provided by T&B Systems staff, the District assumed responsibility for this data validation effort. Mr. Bush was the project manager from 1987 through 1992, participating in all tasks associated with the contract and managing the seven-person office that serviced the contract. He continues to manage the current audit effort. Mr. Yoho who would oversee the Santa Maria PM study has been conducting the District's quarterly audits of the monitoring network for the past 25 years.

As outlined above, our team is highly experienced in EPA Quality Assurance guidelines. With our existing QA/QC services in the District's region as well as other projects near Santa Maria, we can seamlessly integrate monitoring capabilities while maintaining exceptional response times. We proactively expand our team of skilled field technicians and data management experts to ensure high availability and optimized workload distribution.

Currently, Trinity staff operate at an average of 75% utilization, ensuring immediate responsiveness to new projects. Our extensive network of environmental professionals, spanning 80+ offices nationwide, allows us to rapidly deploy technical support when needed. Our real-time cloud-based data solutions would provide the District personnel with anytime, anywhere access to critical monitoring information.

Unlike competitors, Trinity offers same-day emergency response and repairs, leveraging company-owned instrumentation to maximize data completeness—at no additional cost. With personnel frequently present in surrounding communities, we ensure rapid response times, typically within 24 hours.

By combining industry-leading expertise, advanced technology, and a commitment to service excellence, Trinity delivers best-in-class air quality and meteorological monitoring solutions tailored to meet the needs of the District.

2.0 PROPOSED AIR QUALITY SERVICES

This section of the proposal discusses the Scope of Work to be performed in the execution of this project. The Scope of Work is developed around the following tasks:

- Task A – Develop an Air Monitoring Plan and Quality Assurance procedures
- Task B – Select sites to collect PM data (in consultation with the District)
  - A minimum of 5 sites will be selected and the siting locations will be geographically representative of the entire Santa Maria Valley, to the maximum extent feasible.
- Task C – Equipment selection to procure for the study
  - The District will cover the cost of equipment for the study
- Task D – Implement the monitoring plan, including installing, maintaining and removing all the monitoring and sampling equipment, and collecting and shipping samples for lab analysis
- Task E – Review and analyze the monitoring and sampling results and produce a final report
  - Present PM study data to community members and groups
- Task F – Laboratory analysis
  - Trinity will use a reputable laboratory approved by the District to speciate the samples. The cost of the analysis scope is included as an expense in this proposal.

2.1 Task A – Develop an Air Monitoring Plan and Quality Assurance Procedures

A Quality Assurance Project Plan (QAPP) for the Santa Maria PM study will be developed to ensure that all protocols for the monitoring and sampling of PM, including monitor/sampler placement, equipment specifications including calibration, equipment backup provisions, and quality control and quality assurance procedures are clearly defined and are consistent with the goals of U.S. EPA's Ambient Air Monitoring Networks.

The QAPP developed for monitoring will be a formal document describing, in detail, the quality system that must be implemented for the PM parameters to ensure that the results of work performed will satisfy the stated objectives. The PM QAPP developed will describe in comprehensive detail all necessary quality assurance/quality control and other technical activities that will be implemented to ensure the results of the work will satisfy the stated performance criteria. QAPP specifications are detailed in the following documents:

1. EPA's Guide to Writing Quality Assurance Project Plans for Ambient Air Monitoring Networks (EPA-454/B-18-006, August 2018),
2. EPA's Guidance for Quality Assurance Project Plans EPA QA/G-5 (EPA/240/R-02/009, December 2002),
3. EPA's Requirements for Quality Assurance Project Plans EPA QA/R-5 (EPA/240/B-01/003, March 2001),
4. CIO 2105-S-02.1 IT/IM Directive, and
5. EPA's Guidance for Preparing Standard Operating Procedures (SOPs), EPA QA/G-6, (EPA/600/B-07/001, April 2007).

The QAPP will be comprised of four basic element groups covering project management and information/data quality objectives, implementing environmental information operations, assessment, response actions, and oversight, and environmental information review and usability determination. Each element group is subsequently divided into elements covering various topics. Each group of the QAPP will describe the objectives and the procedures to be followed to achieve those objectives for each monitoring parameter.

The information that will be presented in each group in the QAPP is summarized below and in Table 2-1. The QAPP developed for the PM monitoring will be provided to the District for approval.

In Group A, the elements address project management including project history and roles and responsibilities of the personnel involved in the project. These elements document that the project has defined information/data quality objectives, that strategies are in place to help personnel understand the approach to be used, and that the planning has occurred.

In Group B, the elements will identify and address all aspects of environmental information operations to help to ensure products and services are of known and documented quality and to evaluate the products and services delivered under the project. This section of the QAPP will describe in comprehensive detail the implementation of necessary QA and QC requirements and other technical activities to ensure that the results of the environmental information operations performed will satisfy the intended purpose, and the information/data quality objectives and performance/acceptance criteria in the Group A4 and A6 Elements. The QA section of Group B will contain goals that are consistent with EPA's Ambient Air Monitoring Networks.

In Group C, the elements in this group will address assessment, response actions and oversight activities. Assessments ensure that the planned project activities in the QAPP are implemented as approved. Assessments can be internal and/or external and should be conducted throughout the project to ensure that usable environmental information are obtained. Response actions address findings, corrective actions and non-conformances identified from the assessments.

Oversight activities ensure that response actions and reporting mechanisms are in place to capture the project status and any QA issues that arise during implementation and through assessments.

Lastly, in Group D, the elements in this group will address the activities associated with environmental information review for the purpose of determining whether the environmental information meets the established environmental/data quality objectives, the performance/acceptance criteria, and are useable for its intended purpose. Information review activities ensure that products and services resulting from the environmental information operations are of known and documented quality for their intended use(s) and that any limitations concerning its intended use is documented and communicated.

Although environmental information review takes place after the environmental information operations have been conducted, determination of the type of information/data verification, information/data validation, and information/data quality assessment activities needed to determine whether the project's environmental information/data quality objectives are met begins during the planning phase of the project and are documented in the QAPP.

Table 2-1 QAPP Elements

Group A. Project Management and Information/Data Quality Objectives	Group B. Implementing Environmental Information Operations	Group C. Assessment, Response Actions and Oversight	Group D. Environmental Information Review and Usability Determination
A1. Title Page.	B1. Identification of Project Environmental Information Operations	C1. Assessment and Response Actions	D1. Environmental Information Review
A2. Approval Page.	B2. Methods for Environmental Information Acquisition	C2. Oversight and Reports to Management	D2. Usability Determination
A3. Table of Contents, Document Format, and Document Control	B3. Integrity of Environmental Information		
A4. Project Purpose, Problem Definition, and Background	B4. Quality Control		
A5. Project Task Description	B5. Instruments/Equipment Calibration, Testing, Inspection, and Maintenance		
A6. Information/Data Quality Objectives and Performance Acceptance Criteria	B6. Inspection/Acceptance of Supplies and Services		
A7. Distribution List	B7. Environmental Information Management		
A8. Project Organization			
A9. Project QAM Independence			
A10. Project Organizational Chart and Communications			
A11. Personnel Training/Certification			
A12. Documents and Records			

2.2 Task B – Select Sites to Collect PM Data

For this task, Trinity will consult with the District to determine the most representative locations for the siting of PM equipment in the Santa Maria Valley that will provide the greatest geographical spatial coverage to meet the project goals. The District is proposing a minimum of five (5) monitoring site locations for the study. Areas in the Santa Maria Valley outlined by the District include the following: The City of Santa Maria as well as the City of Guadalupe and the unincorporated communities of Orcutt, Garey and Sisquoc. These sites may include a combination of monitoring equipment (continuous and sampling) as well as meteorological instrumentation. Consideration of solar powered monitoring sites will be made for areas that are not amenable to commercial power sources.

Trinity has extensive experience related to solar power configurations to operate monitoring equipment when commercial power is not available. Our proposed work plan below includes an estimate of initial site placement, estimated number of site locations and recommended equipment for each of the sites.

2.3 Task C – Study Equipment Selection

Trinity understands that the District is open to ideas for the selection of monitoring equipment to use for the Santa Maria PM study and that the District will cover the cost of the agreed upon equipment. As such, Trinity will consult with the District and will make recommendations of equipment that may be best suited to use for this study. Our recommendations are based on intimate experience and knowledge of monitoring equipment that we have used and have many years of experience operating for various monitoring projects. In fact, we have included some of our past colocation results in Appendix A of the proposal of instrumentation (Met One EBAM and Met One Model 212) that we sited next to Met One BAM 1020 instruments for our Oceano Dunes monitoring project in San Luis Obispo County to determine correction factors for the monitors. Based upon these comparisons, we are recommending the use of certain monitors for this study. We also value using equipment that is cost-effective and requires fewer logistics related to installation and operations, better performance and accuracy and the limited amounts of maintenance and troubleshooting that may be required during the operations. Our proposed work plan below provides more detail related to our recommendations for equipment based upon past performance and the dependability of certain monitoring equipment and costing of this equipment has been provided for the evaluation.

After receiving notification of the intent to award the contract to our team and only after receiving input and comments from the District regarding the final proposed community monitoring network design, we will notify the equipment vendors and request final cost and delivery quotes for the equipment. We have estimated that most equipment will ship within 8 to 12 weeks following order placement. We will have the equipment shipped to the Trinity office located in Santa Clarita, CA. We will integrate and test the equipment from the Santa Clarita office prior to deployment to the field. Actual equipment orders will be placed following the execution of the contract.

Once the equipment is received at our office, we will integrate, acceptance test and verify calibrations of the monitors prior to deployment. We will test the communications and verify that data flows to the real-time website. It is imperative that all the monitors and meteorological sensors are verified to be working, are calibrated with communications pushing data to the website prior to deployment. This will make the field installations much more seamless. Final calibrations will be performed on the equipment once they are deployed to the field.

2.4 Task D – Implement Monitoring Plan: Equipment Installation, Operations and Removal

Trinity will install a minimum of 5 monitoring site locations (following approval from the District) and will provide routine monitoring operations for the sites. Our proposed work plan below has assumed that the monitoring sites will be equipped with a combination of continuous, near real time monitors, as well as samplers that will collect PM on filters. A combination of samplers collecting on Teflon and Quartz filters have been assumed for the collection of PM to be used for the analysis of the following: XRF (metals speciation), gravimetric (mass), Sulfates and Nitrates and Elemental and Organic Carbon. Additionally, most if not all sites will record, at a minimum, wind speed and wind direction data to be used for analysis and source apportionment modeling.

The routine operations will include continuous operation of the PM (1-in-6-day filter runs of the filter samplers) and meteorological monitoring equipment, regular calibration, and maintenance schedules, in accordance with established Standard Operational Procedures (SOP) as part of the monitoring plan.

Following the completion of the study, Trinity will decommission and remove the equipment from the monitoring locations.

2.4.1 Site Visits

Trinity will perform weekly site visits as defined by the 1-in-6-day sampling schedule for the loading and unloading of filters. During these site visits, a general inspection of each site (e.g. tripod condition, power supply (solar system), meteorological instrumentation and PM monitors/samplers) will be conducted to ensure that all equipment is in proper working condition and in accordance with manufacturer's specifications and the SOP. Sampling filters will be unloaded from previous sample runs and will be reloaded for the next sample run. An appropriate chain of custody form will be used for the documentation of each filter run and will be submitted to the laboratory. If power to the sampling and meteorological monitoring equipment is down at any time, Trinty's data management team will notified immediately by email or text alert via Trinity's remote data management software, My Trinity Data (MTD). MTD is discussed in more detail below. Trinity's instrumentation specialist will receive these alerts and will respond within a 24-hour period of site(s) losing power.

All site visits, equipment maintenance, and all site activities conducted will be documented in an electronic logbook using OneNote. The District will have access to the site notes, calibrations, equipment and site checks. All activities will be documented in the electronic logbook in a format approved by the District.

2.4.2 Monthly QC Activities and Equipment Maintenance

During each monthly site visit, Trinity will perform QC (flow, temperature, pressure) and leak checks on the PM equipment and perform the required maintenance such as sample inlet cleaning and cleaning the PM inlet particle traps. Equipment clock times will be verified and adjusted to the current time, as needed. Calibration of the continuous PM monitors and the PM samplers consist of several procedures which include measuring the flow with a National Institute of Standards and Technology (NIST) certified flow transfer standard and calculating the deviations from the set point flowrates. In addition to the flow check, a leak test is also performed. The ambient temperature and pressure sensors of each sampler will be compared to calibrated reference sensors during calibration. Calibrations and flow checks will be documented and maintained with records in a format approved by the District in the electronic logbook.

The meteorological sensors will also be visually examined during each monthly site visit. If after examination of the physical sensor or data from the sensor indicates that the sensor may not be operating properly, the sensor will be removed for repair or replacement. Proper operation of the sensor will be verified in accordance with manufacturer specifications and the SOP developed for their operation.

The meteorological sensors will be calibrated every six months or after sensor repair or replacement. Meteorological equipment calibrations will be performed with equipment that is in current calibration and is traceable to NIST standards. The meteorological parameters will be calibrated in accordance with guidance found in EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements Version 2.0 (Final).

Horizontal wind speed response checks will be performed using a synchronous motor. Sensor readings taken from the DAS will be compared to calibration values obtained from transfer functions provided in the sensor manufacturer's specifications. If the wind speed error exceeds EPA's acceptance criteria, then the instrument will be recalibrated. The horizontal wind speed sensor starting threshold will also be checked using a torque gauge or a torque disc. The torque device is placed on the sensor shaft and the torque is measured. If the measured torque exceeds manufacturer's tolerance specifications for wind speed sensor starting threshold, then the bearings will be replaced, and the instrument will be recalibrated.

To calibrate the wind direction sensor, the cross-arm orientation will be checked using a professional compass. The wind vane will be aligned with the cross arm and set to true north. True north is distinguished from magnetic north by reading a magnetic compass and applying a correction factor for the magnetic declination. The declination will be determined from a declination calculation computer program. If the overall wind direction error (orientation plus linearity) exceeds ±5 degrees from true North, the sensor will be re-calibrated.

The wind direction sensor starting threshold will be checked using a torque gauge. The torque gauge is placed on the sensor shaft and the torque is measured. The wind direction linearity will be checked using a direction template. The sensor response will be checked at a minimum at 30-degree increments in both clockwise and counterclockwise rotations and compared with the DAS readings. If the indicated wind direction linearity plus orientation error exceeds ±5 degrees, the sensor will be repaired and re-calibrated.

2.4.3 Data Management

Trinity will provide the District with complete remote data management, which includes data collection and validation of the PM and meteorological sensor data. To preserve data integrity and high rates of data recovery, Trinity is proposing ongoing (7 days per week, 24 hours per day) interrogation and download of each monitoring station's data from Trinity's Santa Clarita, CA office, and subsequent electronic and personal scanning of these data. This approach identifies problems quickly, so that a site technician can be alerted and dispatched promptly to repair or replace defective measurement systems, as necessary, so that minimum data capture rate of 80% for the PM monitors are met.

Trinity's data management team will monitor the performance of the PM and meteorological sensors, compile, and archive quality-assured data sets, generate quarterly data summaries, and notify the District and Trinity Project Manager of sensor malfunctions. Data management will follow established procedures that meet the requirements of the monitoring program.

Trinity will utilize a user-interactive, password protected web site for data review that allows the user to select the date range and time span to view data allowing for inspection of not only current data but historical data. In addition, the site will allow for the generation of data reports and wind roses. Trinity provides a cloud-based data hosting website accessible at MyTrinityData.com (MTD). This site offers our clients a simple user-friendly interface to visualize their data in near real-time and can be customized to show current values of pertinent parameters, wind roses, historical trends, and live camera images (if applicable). In addition, the site can alarm on parameters of interest with visual, audible, as well as email or SMS notifications. These alarms can be tailored to the user's needs and provide instant feedback to your phone or desktop. Historical data can be downloaded into user-defined formats or custom charts can be created for instant analysis and exported from the website.

Figures 2.1 and 2.2 present examples of the login page and type of graphics that will be posted on the web site. The District will be able to access the web site via any standard web browser or mobile device.

Figure 2.1 Login Page to MyTrinityData Web Site

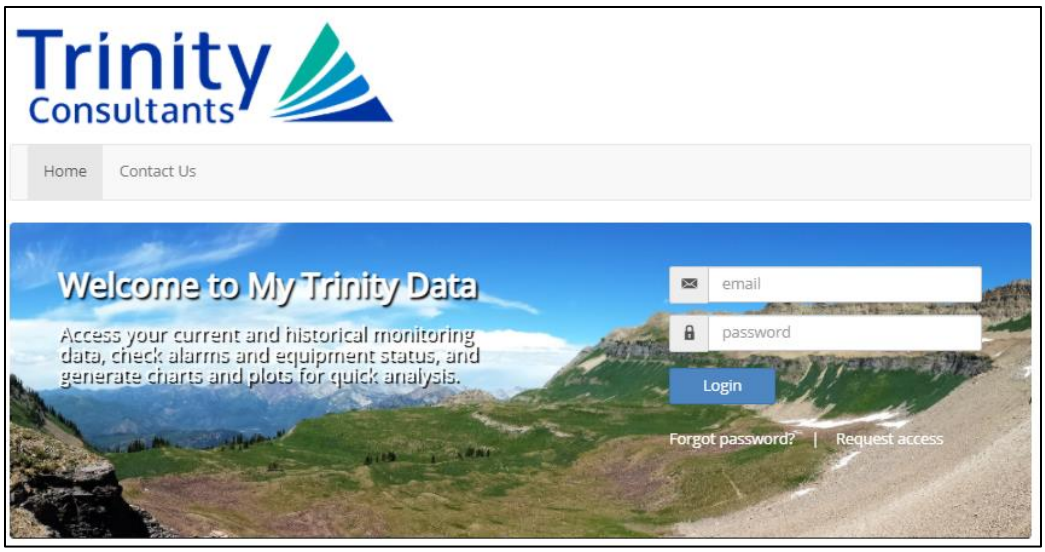
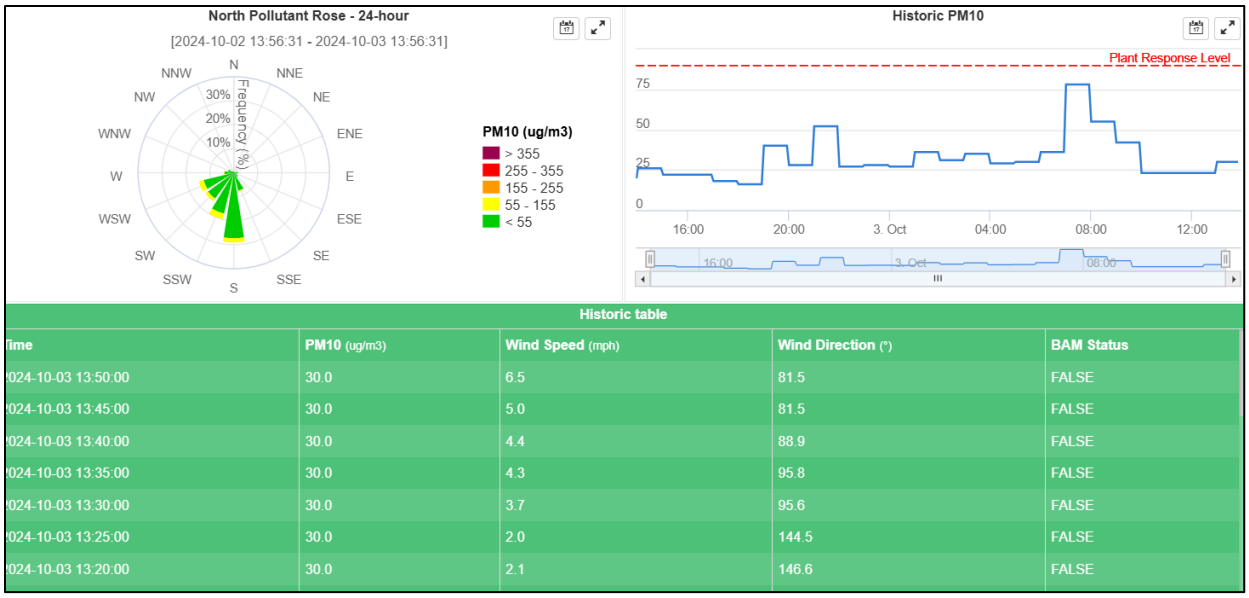


Figure 2.2 Example PM_{10} and Wind Information Data



Historic table

Time	PM10 (ug/m3)	Wind Speed (mph)	Wind Direction (°)	BAM Status
2024-10-03 13:50:00	30.0	6.5	81.5	FALSE
2024-10-03 13:45:00	30.0	5.0	81.5	FALSE
2024-10-03 13:40:00	30.0	4.4	88.9	FALSE
2024-10-03 13:35:00	30.0	4.3	95.8	FALSE
2024-10-03 13:30:00	30.0	3.7	95.6	FALSE
2024-10-03 13:25:00	30.0	2.0	144.5	FALSE
2024-10-03 13:20:00	30.0	2.1	146.6	FALSE

The web site provides additional tools for Trinity meteorologists and data management personnel to quickly note and resolve any potential instrumentation problems. Any data anomalies would generate an automated e-mail or text message to the Trinity site technician, and data and project managers. Routine maintenance will be performed at the site to ensure that equipment is operating properly, and data are accurate. This approach will ensure that high quality data, which are reliable, verifiable and reproducible, will continue to be obtained from the continuous monitoring program.

2.4.3.1 Data Validation

Data validation is the process designed to ensure that reported values meet the quality goals of the project. A systematic approach will be used to data validation. Three levels (0 to 2) of data validation for the meteorological data will be carried out for this project. The three levels of data validation are defined as follows:

- Level 0: Level 0 data are obtained directly from the datalogger or analyzer in the field. Level 0 data have not been edited for downtime, nor have procedural adjustments for baseline changes been applied. The Level 0 process ascertains that the instrumentation is functioning properly.

- Level 1: Level 1 data features include:

    - Removal of data values and replacement with -99 when monitoring instruments did not function within procedural tolerances,
    - Flagging of samples when significant deviations from measurement assumptions have occurred,
    - Verification of computer file entries against data sheets,
    - Replacement of data from a backup data acquisition system in the event of failure of the primary system,
    - Elimination of values for measurements known to be invalid because of instrument malfunctions,
    - Adjustment of values for quantifiable calibration interference biases, and
    - Identification, investigation, and flagging of data beyond reasonable bounds or unrepresentative of the variable being measured.

- Level 2: Level 2 data validation takes place after data from various measurement methods have been assembled in a database. Level 2 data validation involves comparisons with other independent data sets. This includes inter-comparing collocated measurements or making comparison with other measurement systems or analyses.

Continuous data will be reviewed by using time-series plots. The graphs quickly reveal any data abnormalities due to power failure or instrument malfunction. Significant events will be checked against the graphs for consistency. Calibration data will be reviewed to assess the precision of the data. If the calibrations indicate invalid or low precision, data values may be invalidated or adjusted as necessary, and the appropriate flags will be applied. Means, maxima, and minima for the month are computed. Especially high values will be checked to be sure that audit or calibration data were not inadvertently included; if a concentration reaches an elevated concentration action limit, a notification will be sent to the Trinity project manager. Suspect data will be reported but flagged as "suspect".

2.4.4 Data Flags

Per EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Quality Monitoring Program, EPA recommends the use of flags or result qualifiers to identify potential problems with data or samples. According to EPA, a flag is an indicator of the fact that a data value (a) did not produce a numeric result, (b) produced a numeric result but is qualified in some respect relating to the type or validity of the result, or (c) produced a numeric result but for administrative reasons is not to be reported outside the organization. Thus, quality control flags consisting of a letter will be assigned to each datum to indicate its quality. Multiple flags can be applied to each data point, such as data invalid due to calibration (I, CA). It is preferred to assign multiple flags if a problem is known. Example data flags are presented in Table 2-2.

Table 2-2 List of Data Flags

Flag	Code	Description
V	0	Valid
C	1	Corrected or Estimated
S	7	Suspect: data appears to be a data spike or outside normal data range
I	8	Invalid data
M	9999	Missing data: measurement not taken
BC	9995	Calibration
AN	9980	Instrument Malfunction
AO	9981	Acts of Nature
BH	9965	Local Interference
BA	9993	Maintenance
BJ	9963	Operator Error
AZ	9992	Performance Audit
AV	9988	Power Failure
AQ	9983	Datalogger or Collection Failure
TO	9961	Datalogger Time Off
AP	9982	Site Vandalism

In addition to electronic logbook entries, data flags also indicate when measurement equipment was off-line. Data flags are set remotely or by the site technician during calibrations, audits, or maintenance.

In summary, the approach presented above will ensure that high quality data, which are reliable, verifiable and reproducible will continue to be obtained from the continuous monitoring program.

2.5 Task E – Review and Analyze the Monitoring and Sampling Results and Produce a Final Report and Present Data to Community Members and Groups

As noted in the section above, Trinity will validate all monitoring data using industry and EPA approved QA/QC procedures. Trinity proposes using CHESTER Lab Net (CLN) for the analysis of filters for the study. The continuous PM and meteorological monitoring data will be reviewed and analyzed by Trinity and filter analysis performed by CLN will be reviewed and summarized by Trinity. A final report for the monitoring effort including a compiling of validated electronic data sets will be provided to the District.

In coordination with the District, Trinity will present the PM study findings to community members and groups. As this task is somewhat undefined, our costing for meetings has made some assumptions about the level of effort that will be required for this task.

Within 30 days following the completion of the monitoring effort, Trinity will provide a draft final report that summarizes the monitoring program, measurement methodologies and data summaries. A significant portion of the final report will include the results of the source apportionment analysis modeling. All laboratory analysis results will be included in the final report. Relevant data compilations will be provided in electronic format, as will the report. After receiving comments from the District the report will be finalized and submitted. The results provided in the final report will be used to address community members and groups to provide informative information as it relates to the PM measurements in the Santa Maria Valley.

2.6 Task F – Laboratory Analysis

Upon seeking approval from the District, Trinity will subcontract CLN for the analysis task for the 1-in-6-day filter collection. CLN is a reputable, NELAP accredited laboratory located in Tigard, Oregon. Trinity and CLN have had a long-standing relationship that spans decades with monitoring projects with similar analysis requirements that have been requested in this RFP. Table 1 presents the analysis that CLN will perform for this study and is a part of our proposed work plan that follows. Estimated lab costs have been included in the cost section of this proposal. Although Trinity has designed the monitoring to include 1-in-6-day filter collection, we are assuming that only a percentage of the 1-in-6-day filters will be analyzed for this project. This assumption will make for a cost-effective approach as to not have CLN analyze "clean" filters during periods of low concentrations. Trinity has provided an estimate of the percentage of filters to be analyzed within our proposed work plan and has been determined from reviewing annual PM_{10} data from the SBCAPCD Santa Maria monitoring station. All unanalyzed sample filters will be stored for later analysis if additional funding can be made available.

The proposed work plan section that follows includes the following recommended analysis that will provide the necessary dataset for the source apportionment task. Table 2-3 below provides the recommended analytical services from CLN that will best meet the project goals for source apportionment. As noted in the table below, two different filter media types (Teflon, Quartz) will be required for the collection of all recommended elements for this study thereby requiring the need for the use of multiple samplers for the collection of the recommended elements.

Table 2-3 CHESTER Lab Net PM Analysis Recommendations

ANALYTICAL METHOD	ELEMENTS	FITER MEDIA
X-Ray Fluorescence (XRF)	Metals	47 mm Teflon
Ion Chromatography	Sulfates and Nitrates	47 mm Teflon
Gravimetry	Mass	47 mm Teflon or Quartz
Carbon Analysis (NIOSH 5040)	Elemental and Organic Carbon	47 mm Quartz

2.7 Task G – Source Apportionment Analysis

Trinity is proposing to perform a quantitative source apportionment of ambient PM concentrations using the Positive Matrix Factorization (PMF), which is a source attribution method identified in the CARB AB 617 Source Attribution Guidance Document[1]. EPA's PM Model Version 5.0 will be used to perform the analysis. PMF mathematically deconstructs the matrix of air pollutant concentrations measured at a receptor site to resolve "factors" that are associated to unique chemical signatures and time series. These factors describe the characteristics of potential sources that contributed to the air pollutants measured at a receptor location.

[1] California Air Resources Board, AB 617 Recommended Source Attribution Technical Approaches (August 2018)

The analysis will begin with the preparation of two input matrices required by the PMF model: a concentration matrix and an uncertainty matrix. The concentration matrix will contain the measured values of all PM species across all samples (including toxic and tracer compounds), while the uncertainty matrix will reflect the estimated analytical uncertainty for each measurement. These uncertainties will be calculated according to EPA guidance, which accounts for factors such as detection limits and laboratory precision. Interpreting the factors will involve evaluating the composition of each factor profile and comparing dominant species to known source signatures from literature and emissions inventories. For example, a factor dominated by EC and OC may indicate traffic emissions, while one dominated by sulfate may be associated with secondary aerosol formation. Time series of factor contributions will be used to examine temporal trends, including daily and seasonal variations.

Wind speed and wind direction data will be used to assess potential source directions. These analyses will link factor contributions with the wind speed and wind direction data to provide insight into the geographic origin of the emissions.

This project will produce a comprehensive set of outputs, including detailed source profiles and their quantitative contributions to observed particulate matter and the species identified. Results will be visualized through time series plots, factor composition charts, and spatial analyses when applicable. A technical report will summarize all steps in the modeling process, describe the model diagnostics, and present a complete interpretation of the sources identified.

3.0 PROPOSED WORK PLAN

Section 2 above discusses the details of how Trinity will accomplish the tasks necessary to successfully complete the project. This section presents our proposed work plan, detailing our thoughts on the actual network design. These details provides a means for the District to evaluate our proposed work plan and for Trinity to keep costs within the $250,000 budget requested by the District.

3.1 Trinity's Proposed Work Plan

Below are Trinity's proposed work plan assumptions for costing this study. Trinity will consult with the District regarding our proposed work plan, including the recommended equipment and associated costs to best tailor the project to the needs of the project goals. If the District has other ideas, access to monitoring equipment, etc. Trinity can incorporate these into a final work plan.

1. Trinity has estimated costs for an air monitoring program that will operate for an one-year period.
2. A site survey of perspective sites within the Santa Maria Valley will be conducted with Trinity and the District.
3. Costs are included for the installation of sites, as well as removal of the equipment at the end of the study.
4. Trinity has proposed equipment (purchased or supplied by the District) to include continuous PM monitoring, scheduled 1-in-6-day PM filter sampling (for speciation to use for the source apportionment task), and meteorological monitoring for up to 5 site locations.
5. Trinity's equipment recommendations presented in the proposed work plan are based upon previous and current experience with the recommended equipment, as well as with other monitoring equipment that we are not recommending for various reasons.
6. Trinity has assumed using the continuous PM_{10} data as an indicator for which periods that the collected sample filters will be analyzed by the laboratory. Note, our costing has estimated that 4 of the 5 sites will collect filter data and that 40% of the 1-in-6-day filters will be analyzed by the laboratory. Costs for the filter analysis to be conducted by CLN (if approved by the District) are included in our cost estimate section.
7. Sample filters will have the following analysis performed by CLN: Mass, XRF (metals), Ion Chromatography (Sulfates, Nitrates) and Carbon Analysis (Elemental and Organic Carbon).
8. Data will undergo monthly QA/QC screening and validation.
9. Sites will be visited at least weekly for the 1-in-6-day sampling schedule. Equipment will have QC checks performed on a monthly schedule.
10. Up to two colocations of the continuous PM profilers to the District's BAMs have been assumed as part of the proposed work plan and in our cost estimate.
11. A final report will be developed including data analysis, QA/QC checks, historical data, colocation results and the source apportionment modeling results.
12. A password protected web-based data display system will be provided to the District for the 5 monitoring site locations.
13. The RFP did not provide any guidance regarding the anticipated scope of the community outreach/engagement effort for this project.

Trinity's monitoring network design methodology was developed with thoughtful consideration to best serve the community's interests and monitoring objectives for determining fugitive emissions sources that may be present within the communities in and near the Santa Maria Valley. While there are several methods available for monitoring the proposed air pollutants, we are confident that our rationale for choosing the monitoring technologies and methods proposed herein will provide a cost-effective solution that will meet the community's needs for this program. Trinity's rationale for the recommended proposed network design is summarized below:

1. Trinity is familiar and experienced with the small, relatively low-cost PM sensors that are proposed. This equipment has been proven to perform well in harsh environments.
2. The equipment proposed can be operated using solar powered systems, giving flexibility for siting of stations.
3. The use of these non-FEM PM sensors can be "calibrated" to PM FEM monitors using colocation methodologies to establish adjustment ("K") factors, of which Trinity has considerable experience.
4. Trinity's experience and understanding of E-BAM monitors have shown measurement biasing relative to FEM-grade monitors based upon environmental conditions in coastal environments.
5. Small, relatively inexpensive, battery powered PM_{10} filter samplers operating at 16.7 lpm are proposed, providing near-FRM quality data for particle speciation analysis used for source apportionment.
6. There are significant cost differences using small sensors versus more traditional PM monitoring systems, including lower maintenance overhead.
7. The network design includes a cost-effective approach to using the District's Santa Maria air monitoring site for the PM study, by enhancing the current measurements at the site by including filter samplers for PM speciation, while using the existing BAM instrumentation for continuous PM measurements.
8. The continuous PM data from the proposed PM profilers and District BAM monitors will be used to determine potential filter loading, which will be used to decide which filters would be optimal for analysis by the laboratory. This method will provide a cost-effective approach of analyzing only filters that have sufficient loading to provide information for the source apportionment analyses.

Trinity will work in close collaboration with the District to identify and secure appropriate monitoring sites. Traditional siting criteria such as accessibility, security and power, though power requirements are mitigated by using the low power equipment proposed utilizing solar or battery power. The provided community site network map, presented in Figure 3.1, is conceptual and to be used for illustrative purposes only. The location of the sites and/or monitors noted at each of the sites will likely change once we have had a chance to meet with the District.

As noted, we are proposing a community monitoring network that will mainly monitor continuously for PM_{10} but may also include other PM size fractions, including $PM_{2.5}$. In addition, portable filter samplers will be used for the collection of PM_{10} onto 47 mm filters that will be analyzed by the laboratory. These measurements will be used for documenting the airmass environment and monitoring potential sources and impacts mainly from wind-driven dust events in the Santa Maria Valley.

Table 3-1 provides a description of each of the proposed monitoring groups located on the map, the proposed number of sites and measurements at each of the sites, and our rationale for our site and measurement selections. Again, the placement of the sites on the map is used for illustrative purposes only and to show general locations where sites may be installed within the community.

Figure 3.1 Conceptual Map of Proposed Community Monitoring Site Locations

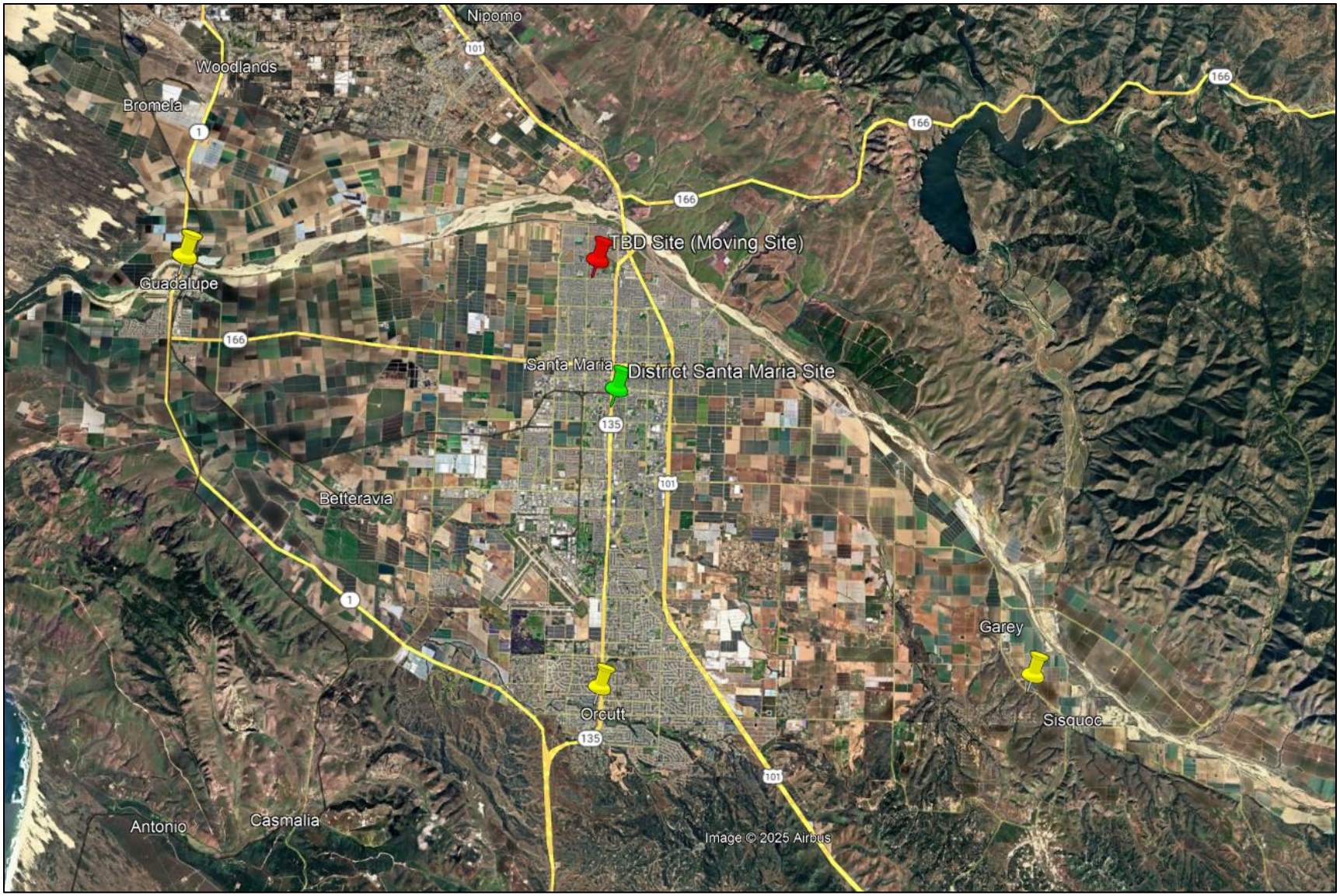


Table 3-1 Proposed Monitoring Sites, Number of Sites, Measurements, and Rationale

Map Icon	Proposed Number of Sites	Proposed Measurements	Site Selection and Measurement Rationale
	3	Continuous PM, Filter Samplers (Teflon & Quartz), Meteorology	These monitoring sites would serve as community boundary monitoring sites in the areas of Guadalupe, Orcutt, Garey and Sisquoc. These sites would remain in these locations for the entire study
	1	Continuous PM, Meteorology	This monitoring site would serve as a community mobile site that would be installed temporarily at selected sites to survey for high continuous PM concentrations over the course of the study. Filter samplers would not be included unless the District felt the necessity for their inclusion.
	1	Filter Samplers (Teflon & Quartz)	This monitoring site would be located at the District's Santa Maria monitoring site. Filter samplers would be installed in conjunction with the District's exsiting BAM and meteorological measurements.

3.2 Proposed Equipment and Equipment Specifications

Trinity is proposing using the following equipment outlined below for the Santa Maria Valley PM study. Continuous PM monitors, filter samplers and meteorological sensors have been included and would be installed at or near the five monitoring site locations shown in Figure 3.1. Our experience using this equipment over the years has led to our recommendations below.

3.2.1 Met One Model 212 Ambient Particle Profiler

The Met One Model 212 Ambient Particle Profiler provides continuous ambient profiling of aerosol particulates and counts particles in eight digital bins. The typical range is from 0.3 um to 10 um. The profiler is relatively low cost and is low power and can be operated using solar power. The profiler uses laser-diode based optical sensor and uses light scatter technology to detect, size and count particles. The specifications are noted below:

Measurement Principle	Optical, Light-Scatter Using a Laser Diode
Flow Rate	1.0 LPM
Measuring Ranges	0.3 µm to 10 µm (eight selectable sizes)
Concentration	0-9,000,000 Particles per cubic ft.
Sample Flow Rate	1 LPM
Sample Interval	1 - 3600 seconds (1 hour)
Accuracy	+/- 10% to calibration aerosol
Communication	RS232 Output; RS422 or RS485 available as special order
Power	12 VDC 240 mA maximum; Inlet Heater, additional 750 mA
Temperature	
Operating	0 to +50 Degrees Celsius
Storage	-20 to +60 Degrees Celsius
Physical	
Weight:	3 lb (1.2 kg)
Size:	Diameter 4.0 in, Length 7.5 in + 12" for inlet tube
Software Included	Real-time datalogging

Trinity has used the Model 212 profilers for several projects, including for the Oceano Dunes PM_{10} studies over several years. In fact, the Model 212 replaced E-BAMs in 2019 as the accuracy of E-BAMs when compared to FEM BAM monitors was found to be limited. Appendix A presents colocation results for E-BAMs used for the Oceano Dunes PM_{10} studies in 2016 and in 2018 and a colocation study for Model 212 profilers from a study in 2020. The instrumentation was collocated next to a San Luis Obispo District operating a BAM 1020 PM_{10} monitor near Oceano Dunes. Figure 3.2 shows an image of the colocation setup of sixteen Model 212 profilers. For this proposed work plan, Trinity is proposing conducting a similar colocation of the Model 212 Particle Profilers to the District's Met One BAMs located at the Santa Maria site. A pre-study colocation and a post-study colocation will be performed to establish a relationship (K-factors) between the profilers and the District's BAMs. The reliability and accuracy of the Model 212 is unmatched, especially for the relatively low cost.

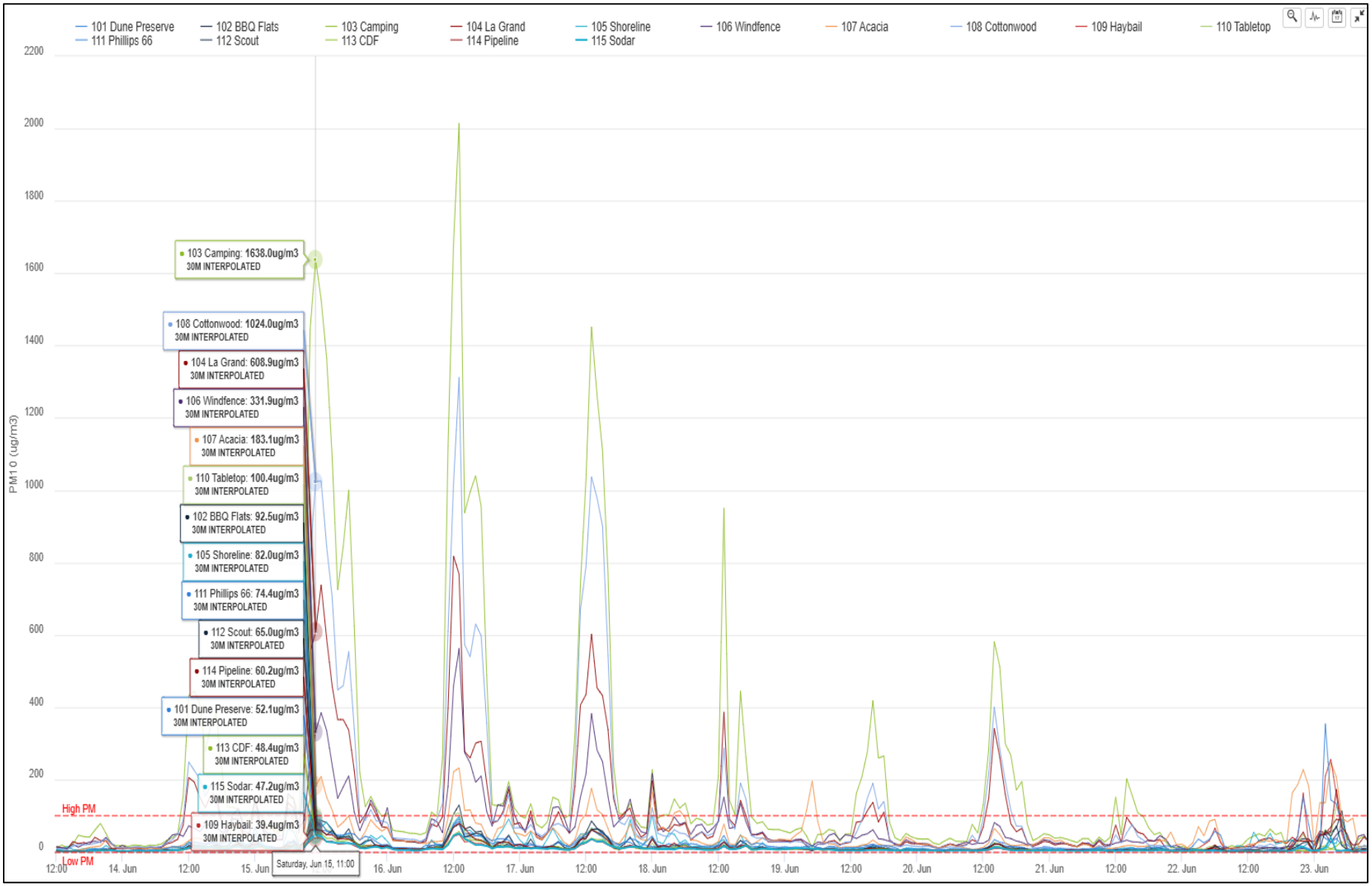
Figure 3.2 Colocation of Model 212 Profilers to SLO District BAM

Except for the proposed monitoring site at the District's Santa Maria monitoring site, where Met One BAMs are installed, the Model 212 Particle Profilers would be used continuous PM measurements at all the proposed Santa Maria Valley monitoring sites noted above.

The typical installation of the Model 212 Profiler includes integration of the profiler into a Campbell Scientific datalogger, mounted on a tripod with a wind sensor. A cellular modem is used for near-real-time communications and data polling of the Model 212 Profiler. Figure 3.3 presents Model 212 Particle Profiler data from Oceano Dunes.

Trinity also has experience with the Met One ES-405 profiler. ES-405 profiler operates using essentially the same components and principle of operation as the Model 212 profiler, but sums up bins differently. Met One has invested more effort in developing specific algorithms for generating $PM_{2.5}$ and PM_{10} concentrations, in contrast to the Model 212 algorithms which are left to the user to establish. $PM_{2.5}$ and PM_{10} readings from the ES-405 have compared well in tests by South Coast AQMD's AQ-SPEC sensor evaluation program and can easily be used instead of the Model 212 for the role described above. However, they are approximately $1,600 more per sampler. Furthermore, our extensive experience with the Model 212 at Oceano Dunes contributes to our primary recommendation of the Model 212.

Figure 3.3 Example Data from Model 212 Profilers at Oceano Dunes



3.2.2 ARA N-FRM Sampler

The ARA N-FRM Sampler is a portable, rapidly deployable, battery powered "Near FRM" particulate sampling device. It integrates with many additional components for unmatched versatility. The compact sampler collects 24-hour TSP, PM10, or PM2.5 filter samples and can simultaneously measure local meteorological parameters. It can also be equipped with a Real-Time Particulate (RTP) Profiler to log temporal particulate variations. For added versatility, the N-FRM Sampler can be operated in directional wind sampling mode or meteorological mode. The N-FRM Sampler offers near FRM performance, while costing a fraction of traditional site-based air samplers. Its compact size and battery-powered function, gives the N-FRM Sampler many advantages over traditional air samplers. Deployment and relocation is quick and easy, and allows monitoring in locations that are inaccessible with traditional air samplers. Flexible mounting options allow for standalone support or the use of existing poles and structures. The ability of the N-FRM to operate on rechargeable batteries also significantly reduces the cost of establishing a monitoring site. The N-FRM inertial separators (PM10 Impactor) are designed to operate at a nominal sampling rate of 1 cubic meter per hour (16.7 liters per minute). The N-FRM Sampler incorporates a microprocessor-based active flow control to maintain the sampling rate as ambient conditions and filter loading changes. The sampling rate is monitored and adjusted several times a second and logged at 5-min intervals along with all other

important sampling parameters. The ARA N-FRM Sampler specifications are listed below:

- Flow Range: 10-20 LPM
- Nominal Flow: 16.7 LPM
- Flow Accuracy: ±2% Flow
- Precision: ±2%
- Li-Ion Batteries: 18V/5aH
- Recharge Time: 1-Hour
- Battery Operation:30+ hours
- Data Output: USB Flash
- Dimensions: 10" x 12" x 7"
- Sampler Weight: 15 lbs
- Shipping Weight: 25 lbs

Trinity is using ARA N-FRM samplers for several projects, including for the City of Paramount 1-in-6-day hexavalent chromium monitoring project. Trinity is proposing using two ARA samplers at each of the monitoring site locations (except for the mobile site). Two samplers would be required at each site due to the need for the collection of PM_{10} onto a Teflon filter for mass, metal and ion analysis, and for the collection of PM_{10} onto a quartz filter for carbon analysis. Therefore, it would be possible that up to eight ARA samplers at four sites could be required for the collection of all recommended PM_{10} samples for the speciation and source apportionment task.

As noted above, although Trinity has provided costs for a proposed work plan to conduct 1-in-6-day filter collection, only a certain percentage of filters would be analyzed by the laboratory to make for a more cost-effective program by not analyzing filters during periods of minimal PM collection. Trinity would identify these periods by using the 24-hour averaged PM_{10} concentrations from the continuous monitoring provided by the Model 212 Particle Profilers as well as the District's BAMs located at the Santa Maria monitoring station. A recent review of the District's PM_{10} data from the Santa Maria monitoring site for 2023 revealed that 60% of the 24-hour average PM_{10} concentrations measured at the Santa Maria site were under 20 ug/m^3 and, therefore, of little interest in investigating source contributing to exceedances of the State's 50 ug/m^3 standard. Thus, we have made the assumption that only 40% of the filter samples collected merit laboratory analysis with concentrations informative for the source apportionment analysis.

3.2.3 Meteorological Measurements

Trinity is proposing using RM Young Model AQ wind sensors at each of the monitoring site locations to measure wind speed and wind direction. In addition, some sites will measure temperature and relative humidity. The sensors will be mounted on the same tripod as the Met One Model 212 profilers.

4.0 EXPERIENCE & STAFFING

Trinty's experience and proposed staffing is discussed in this section.

4.1 Experience

The following are recent and ongoing projects which demonstrate our experience with PM monitoring and experience working with the District.

Quality Assurance Support for PSD Monitoring for Santa Barbara County APCD

Period of performance: 1986 to present
Client: Santa Barbara County Air Pollution Control District
Reference: Alex Economou, (805) 979-8050
Trinity Personnel: D. Yoho, D. Bush

T&B Systems (now Trinity) is performing quarterly performance audits of the PSD monitoring network operated for the Santa Barbara County Air Pollution Control District. Network monitoring includes a full range of continuous gas, meteorological, and particulate monitoring equipment for up to 20 sites during the late 1980s. This project is a continuation of QA/QC services provided to the District by T&B staff since 1986. Until 1994, T&B staff also performed technical reviews of meteorological and air quality data submitted by the monitoring network contractors to the District to assess their validity and determine whether the data quality control/QA requirements were met. These reviews involved routine, detailed checks of contractors' procedures for monitoring quality control, data processing and editing. In 1994, using procedures and training provided by T&B Systems staff, the District assumed responsibility for this data validation effort.

The City of Paramount – Hexavalent Chromium Monitoring Network

Period of performance: September 2021 to present
Client: City of Paramount, California
Reference: John King, (562) 220-2049
Trinity Personnel: R. Baxter, M. Santimauro, D. Yoho, D. Bush,

After completing five years of hexavalent chromium in the City of Paramount, the South Coast Air Quality Management District (SCAQMD) turned over routine monitoring to the City of Paramount. In September 2021, the City award the contract for air monitoring services to T&B Systems. Trinity/T&B Systems is responsible for installing, operating, and maintaining a five-site particulate and meteorological monitoring network obtaining filter air samples on a one-in-six-day basis at five community locations throughout the City. Following strict timelines and shipping procedures, the samples are sent to a certified laboratory for immediate analysis for hexavalent chromium, which T&B Systems uploads immediately onto the City's air monitoring website. Sampling has been conducted routinely since November 2021. Access to the public data display can be found at https://paramountenvironment.org/air/.

Oceano Dunes SVRA Particulate and Meteorological Monitoring
Period of performance: April 2016 – present
Client: California Department of Parks and Recreation
Project Manager: Ronnie Glick (805) 773-7180, Ronnie.Glick@parks.ca.gov
Trinity Personnel: D. Yoho, R. Baxter, M. Santimauro, G. Dunn, C. Elliot and P. Bush

From 2011 through 2016, Trinity provided routine operational service of a 10-meter meteorological monitoring tower located at Oceano Dunes SVRA. In addition to maintaining and calibrating the sensors, Trinity conducted real-time remote polling and validation of the data. The transfer of the operations from the prior contractor to Trinity was very smooth and seamless with the data polling, validation and submittal performed in a timely and cost-effective manner. In addition, we installed and operated 3 temporary meteorological wind towers between 2012 and 2014 as part of the ongoing study.

Beginning in 2013 Trinity provided support to uninstall, test, calibrate and refurbish E-BAM, particle profiling and meteorological equipment used to evaluate the PM_{10} impact problem at the Oceano Dunes State Vehicular Recreation Area. Included in this effort was a review of the previously conducted co-location project and collected data to determine the quality of the measurements and validity of the information collected. A critical review of the procedures, criteria and methods used provided valuable insight into the future studies to be performed at the Dunes. Additional support included assessment of the equipment, inventory and operational status of the various monitors and recommendations for future studies. In 2016 and again in 2019, Trinity was awarded the PM_{10} monitoring contract to conduct measurements from May through October of each year, currently through 2021. Through 2018, this included the testing, installation, operation, and maintenance of five E-BAM samplers at one permanent and four temporary locations on the Dunes. The scope of the monitoring network was changed significantly in 2019, expanding to 15 monitoring locations using Met One Model 212 Particle Profiler samplers and meteorological measurements at all sampling locations.

Oceano Dunes SVRA E-BAM Studies Project Support
Period of performance: October 2013 – 2019
Client: California Department of Parks and Recreation
Project Manager: Ronnie Glick (805) 773-7180, Ronnie.Glick@parks.ca.gov
Trinity Personnel: D. Yoho and R. Baxter

T&B Systems provided support to uninstall, test, calibrate and refurbish E-BAM, particle profiling and meteorological equipment used to evaluate the PM_{10} impact problem at the Oceano Dunes State Vehicular Recreation Area. Included in the program was a review of the previously conducted co-location project and collected data to determine the quality of the measurements and validity of the information collected. Subsequent support included assessment of the equipment, inventory and operational status of the various monitors and recommendations for future studies.

Oceano Dunes SVRA Meteorological Tower Support
Period of performance: December 2011 – 2019
Client: California Department of Parks and Recreation
Project Manager: Ronnie Glick (805) 773-7180, Ronnie.Glick@parks.ca.gov
Trinity Personnel: D. Yoho, P. Bush and R. Baxter

T&B Systems provided routine operational service of a 10-meter meteorological monitoring tower located at Oceano Dunes SVRA. In addition to maintaining and calibrating the sensors, Trinity conducted real-time remote polling and validation of the data. The transfer of the operations from the prior contractor to Trinity was very smooth and seamless with the data polling, validation and submittal performed in a timely and cost-effective manner. Since the initial transition, we also installed three additional meteorological monitoring stations atop mile marker poles.

Mono Basin Air Quality Monitoring Network
Period of performance: April 2023 – present
Client: Formation Environmental
Project Manager: Carrie MacDougall
Trinity Personnel: D. Yoho, P. Bush and R. Baxter

As a subcontractor for Formation Environmental for a Los Angeles Department of Water and Power support contract, Trinity is responsible for the design, purchase, installation and operation of a five-station air quality monitoring network measuring PM_{10} around Mono Lake. The monitoring network is providing the data needed to characterize emissions from several PM_{10} sources within the air basin and validate a model that can be used to demonstrate the reduction in PM_{10} concentrations from control measures, as well as provide concentrations of PM_{10} at the boundaries of the air basin. Each station is equipped with meteorological measurements and a Met One ES-405 continuous PM monitor, and is powered by a solar/battery power system.

4.2 Staffing

Our project team is composed of highly skilled professionals who bring extensive experience to the District. A detailed list of team members is provided below, and full resumes can be found in Appendix B.

Title	Name
Director, Monitoring Services	Casey Lenhart
Project Manager	David Yoho
Instrumentation Technician	Gregory Dunn
Instrumentation Technician	Michael Santimauro
Instrumentation Technician	Cameron Elliot
Instrumentation Technician	Clint Dominguez
Meteorologist/Managing Consultant	Scott Adamson, CCM
Administration/Invoicing	Angela Tate

5.0 FUNDING

During the one-year program, Trinity will be responsible for the following tasks and a cost estimate has been provided below and is based upon our understanding of the requested scope of work and on our proposed work plan. While equipment cost estimates are provided in this proposal, costs for the equipment are being covered by the District, per the RFP.

- Task A – Develop an Air Monitoring Plan and Quality Assurance procedures
- Task B – Select sites to collect PM data (in consultation with the District)
  - A minimum of 5 sites will be selected and the siting locations will be geographically representative of the entire Santa Maria Valley, to the maximum extent feasible.
- Task C – Equipment selection to procure for the study
  - The District will cover the cost of equipment for the study
- Task D – Implement the monitoring plan, including installing, maintaining and removing all the monitoring and sampling equipment, and collecting and shipping samples for lab analysis
- Task E – Review and analyze the monitoring and sampling results and produce a final report
- Task F – Lab analysis, Trinity will use a reputable laboratory approved by the District to speciate the samples. The cost of the analysis scope is included as an expense in this proposal.
- Task G – For source apportionment, Trinity will use particulate species for the analysis results to run analysis models to support recommendations and produce a final report. The cost of the source apportionment scope has been included as an expense in this proposal.

Trinity assumes that this work will be performed on a time-and-materials basis, with invoices submitted on a monthly schedule. Based upon Trinity's understanding of the scope of work in the RFP and on our developed proposed work plan, estimated equipment costs for equipment that Trinity recommends using for this project are shown in Table 5-1 and the estimated one-year project costs for the requested tasks for a not-to-exceed budget of up to $250,000 are shown in Table 5-2.

Table 5-1 Estimated Equipment Costs

Item	Quantity	Cost Each	Total	Comments
PM Monitor/Sampler				
Met One 212 (PM1, PM2.5, PM10)	5	$4,625	$23,125	
ARA N-FRM PM_{10} Sampler with mount and tripod	8	$4,300	$34,400	2 samplers needed per site (4 sites)
Datalogger				
CR310 Data Logger System	5	$1,100	$5,500	
Data Logger Enclosure	5	$375	$1,875	
Telemetry				
RV50X Cellular Modem	5	$600	$3,000	
Telemetry Hardware Antennas	5	$200	$1,000	
1 Year VZ Campbell 250mb month	5	$300	$1,500	
Tripod				
6' Campbell Scientific Tripod	5	$700	$3,500	
Meteorological Sensors				
Campbell HygroVUE10 (Temp/RH)	1	$500	$500	
Shield for Temp RH Sensor	1	$210	$210	
Met Sensor RMY 5305 AQ (Winds)	4	$1,200	$4,800	
Misc., Solar, Batteries	5	$800	$4,000	
		Total:	**$83,410**	

Table 5-2 Estimated PM Study costs

Task	Cost	Comments
Task A: Develop Air Monitoring Plan	$8,000	
Task B: Site Survey & Selection	$3,150	
Task C: Equipment Selection & Procurement	$0	Costs covered by the District
Task D: Installation and Operations of Five Sites	$81,660	Installation,1-in-6-Day Sampling Setup; Monthly QC Checks; Colocations (2x); Removal of Equipment
Task E: Data Review, Analysis & Final Report	$41,000	Monthly Data Validation; MTD Data Displays; Final Report; Community Meetings
Task F: Laboratory Analysis Costs	$32,448	40% of 1-in-6-day filters analyzed from 4 sites with 2 samplers at each site (192 filters)
Task G: Source Apportionment Analysis	$75,000	
Project Management	*$5,000*	
TOTAL:	**$246,258**	

2016 Oceano Dunes E-BAM Colocation Memo

MEMORANDUM

Summary

Throughout the summer and early fall of 2016, T&B Systems (T&B) performed collocation comparisons at the Mesa 2 site with the E-BAMs deployed and operated in the Oceano Dunes State Vehicle Recreation Area (ODSVRA) in San Luis Obispo County, California. Over the course of the study, at least 4-weeks of collocated data were collected for each sampler. Collected data were then used to develop factors to be used on the data attained through the use of the five E- BAMS during deployment at the ODSVRA in 2016.

The final statistical relationships should provide reasonable estimates of PM10 when averaged over many observations, but may provide erroneously high or low values for individual hours. For a 24-hr period, we anticipate these estimates will be more reliable when estimated concentrations are within the range observed during the collocation study.

Background

The California Department of Parks and Recreation (CDPR) Oceano Dunes District retained T&B to install and maintain PM10 monitoring and meteorological devices at ODSVRA in San Luis Obispo County, California. The PM10 monitors that were deployed at the Dunes are E-BAMs from Met One Instruments. These monitors are designed for rapid deployment and are a scaled-down version of the FEM Model BAM 1020. In previous work, the San Luis Obispo Air Pollution Control District (SLOAPCD) determined that E-BAM instruments systematically underestimate PM10 concentrations compared to BAM 1020 FEM instruments when particles are large (>7 µm). Because CDPR is using the E-BAM as the primary instrument in the current study, it is necessary to assess E-BAM instrument response compared to BAM 1020 FEM instrument response. This memorandum describes the quality assurance (QA) activities taken to assess the E-BAM instruments, the results from those QA activities, and our proposed approach for correcting the E-BAM instrument readings to ensure comparable spatial assessments and traceable estimates of PM10 concentrations relative to the BAM instrument.

Quality Assurance Activities

Prior to deployment, a zero test or background test, of the E-BAM instruments at the Oceano District storage facility was conducted. The E-BAMs were warmed up for at least 10 hours. Following the warm-up period, but before commencement of the zero test, instrument setup parameters were reviewed for proper values (the settings recommended by the manufacturer) and uniformity across instruments. The BX-302 zero filter assembly was placed on top of the inlet tube in place of the PM10 inlet and cyclone, and the instruments sampled for approximately 60 hours. At the conclusion of the zero test, hourly data values from each instrument were averaged. These results are provided in the table below. Following the zero test, QC checks of the flow rates were conducted on each instrument. Additionally, a membrane test was also conducted and all units passed.

Table 1. Zero Test Results – Pre-deployment

	E-BAM 1	E-BAM 2	E-BAM 3	E-BAM 4	E-BAM 5
Serial #	N14567	P12490	N5670	N5673	N5674
Zero Test Start	5/6/2016, 18:00	5/6/2016, 18:00	5/6/2016, 18:00	5/9/2016, 18:00	5/9/2016, 18:00
Zero Test Stop	5/8/2016, 17:00	5/8/2016, 17:00	5/8/2016, 17:00	5/11/2016, 17:00	5/11/2016, 17:00
Avg. Conc. ($\mu g/m^3$)	-0.001	0.000	0.000	0.000	-0.001

Table 2. Zero Test Results – Post-deployment

	E-BAM 1	E-BAM 2	E-BAM 3	E-BAM 4	E-BAM 5
Serial #	N14567	P12490	N5670	N5673	N5674
Zero Test Start	10/19/2016, 12:00	10/19/2016, 12:00	10/3/2016, 14:00	10/19/2016, 12:00	10/19/2016, 12:00
Zero Test Stop	10/21/2016, 11:00	10/21/2016, 11:00	10/5/2016, 13:00	10/21/2016, 11:00	10/21/2016, 11:00
Avg. Conc. ($\mu g/m^3$)	-0.001	0.001	0.001	-0.001	-0.001

Based upon the above results, the factory Zero settings were not adjusted for the field study.

Collocation Studies

As in previous years, a pre-deployment collocation study and post-deployment collocation study against the BAM monitoring at the Mesa-2 site were planned, each for approximately two weeks. However, delays in establishing the monitoring contract resulted in the need to begin season sampling immediately after award of the contract. It was therefore agreed that three of the samplers would be deployed prior to undergoing a collocated comparison, and would then then be cycled into a comparison, as shown in Table 3. All samplers were collocated together for the post-deployment comparison.

Table 3. Collocation Schedule

	E-BAM 1	E-BAM 2	E-BAM 3	E-BAM 4	E-BAM 5
Serial #	N14567	P12490	N5670	N5673	N5674
Initial Comparison	7/6/2016 – 7/27/2016	6/13/2016 – 6/27/2016	7/28/2016 – 8/12/2016	5/19/2016 – 6/13/2016	5/19/2016 – 6/13/2016
Post-deployment Comparison	9/14/2016 – 10/14/2016	9/15/2016 – 10/14/2016	8/18/2016 – 9/30/2016	9/15/2016 – 10/14/2016	9/15/2016 – 10/14/2016

During the collocation studies, the horizontal and vertical separation distance between the inlets of any two adjacent monitors was at least one meter and not more than two meters. However, relative to the Mesa 2 site BAM monitor, the inlet height of the BAM monitor was about 7 m higher than the E-BAMs, and thus did not strictly meet collocation siting requirements. Installation was identical for both the initial and post-deployment collocation studies. During the course of the collocation studies, additional leak and flow checks were conducted on the E-BAMs according to manufacturer specifications and the project QAPP.

Initial Collocated Comparison:

Initial collocated monitoring at the Mesa 2 site began on May 19 and continued through August 12 in order to provide collocated data for all samplers. As noted above, not all samplers were collocated at the same time, due to the need to commence ambient sampling. Thus, collocation concentrations varied for each sampler. However, this period in general was not characterized by particularly high concentrations. Of the 115 complete days when at least one sampler was collocated at Mesa 2, only 11 days (10%) had 24-hr averages of PM10 greater than 50 µg/m^3 as observed by the BAM, though 24-hr averages as high as 112 µg/m^3 (on July 10) were noted. The average concentration during this period was 27 µg/m^3.

Post-Deployment Collocated Comparison:

Collocated monitoring at the Mesa 2 site began on September 15 and continued through October 14. However, E-BAM #3 (SN N-5670) had invalid data from the October 3 through the end of the comparison when a zero filter inadvertently was left installed after a zero test. This still results in 14 days of collocated data for E-BAM #3. Of the 26 complete days of collocated monitoring, there were 10 days (38%) with 24-hr averages of PM10 greater than 50 µg/m^3 as observed by the BAM. The highest 24-hr average was 92 µg/m^3 on September 22. There were 64 hourly values with concentrations above 80 µg/m^3 during the post-deployment collocation period as measured by the BAM. In contrast to the concentrations noted during the initial collocation period, the average PM10 concentration for the post-deployment period was 41 µg/m^3.

Analysis Methodology

Analysis of the E-BAM data began by comparing raw E-BAM values with the FEM (BAM) values. As in previous collocation studies conducted for the ODSVRA PM10 monitoring efforts, we considered three possible approaches to adjusting for the negative bias in the E-BAM concentrations. First, we considered a similar approach to that employed in the SCCMP study, using a high and low adjustment factor. The second approach was to employ a single linear adjustment factor. The third approach was to employ a non-linear adjustment factor using a multi- order polynomial best-fit. Each approach has pros and cons, and arguments could be made to use any of them, as discussed in previous technical memos (STI 2013, SCS Tracer 2014 & 2015).

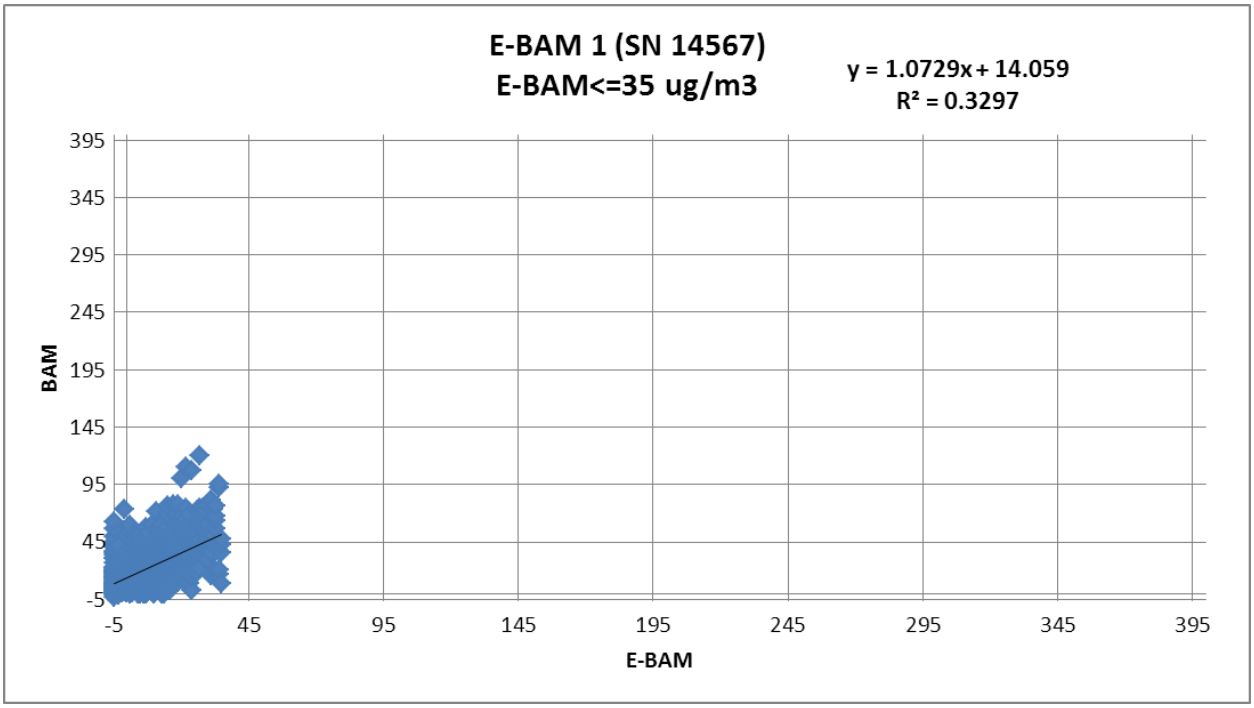
After looking at the data, and consistent with previous contractors' efforts, we decided that employing a high and low adjustment factor approach would provide us the most robust solution for the available collocation data. However, our approached differed from previous efforts in two ways:

- Prior contractors elected to force the "low" regression equation through zero, based on zero test results which averaged very close to zero. However, these tests only show the sampler response specifically at zero, ignoring the best-fit regression for the actual non-zero data, which yield a positive intercept. We therefore did not force the lower regression equation through zero.
- Prior contractors set all negative readings to zero. Since our "low" regression equations have positive intercepts, our corrected data contained no negative values.
- Prior contractors used 80 µg/m^3 as a transition point in transitioning from the "high" to the "low" regression equation, based on a visual observation of the BAM / E-BAM relationship as a function of BAM measured concentrations. Note that this is equal to an E-BAM reading of about 60 µg/m^3, based on the slopes typically derived during previous efforts. We used a different approach, where we determined a transition point specific for each sampler that minimized the discontinuity that can arise when transitioning from the "low" equation to the "high" equation. This was typically around 35 µg/m^3, as measured by the E-BAM.

For this analysis, periods of higher measured concentrations are desired. There were many days, particularly during the initial collocation period, with very low ambient concentrations. These days resulted in the greatest percentage difference between the BAM 1020 and E-BAM samplers, as small differences in particulate concentration can result in significant percentage differences due to the small denominator. However, the number of relatively high 24-hr and 1-hr PM10 concentrations provided sufficient data for analysis of high and low PM10 concentrations to assess the bias of the E-BAM instruments at the ranges measured during the collocation study.

Collocation Study Results

Figures 1 through 5 present scatter plot comparisons of raw E-BAM versus BAM readings for each sampler, using all available collocated data. Included in the plots are the best fit least-squares regression equations and lines, as well as the transition point determined for each E-BAM sampler. These are summarized in Table 4. Data for the initial and post-deployment collocation efforts were first viewed separately and found to be sufficiently comparable to allow for the combining of the two data sets for the calculation of study-long factors.



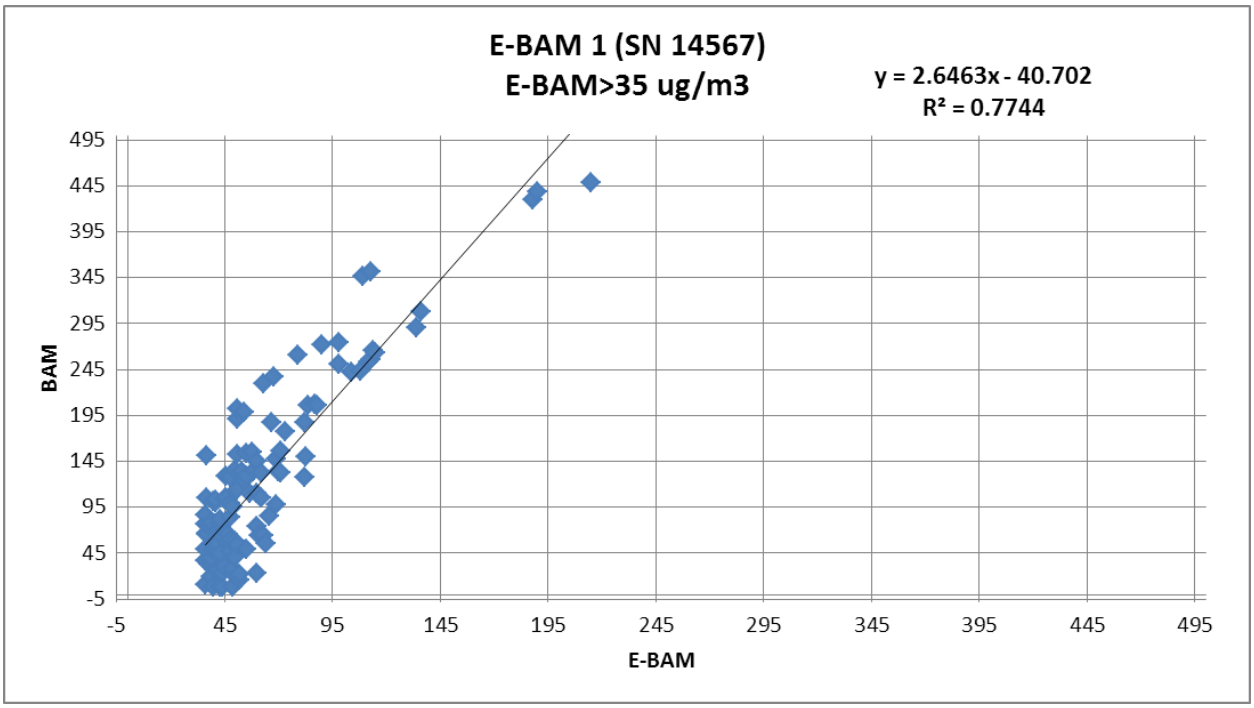
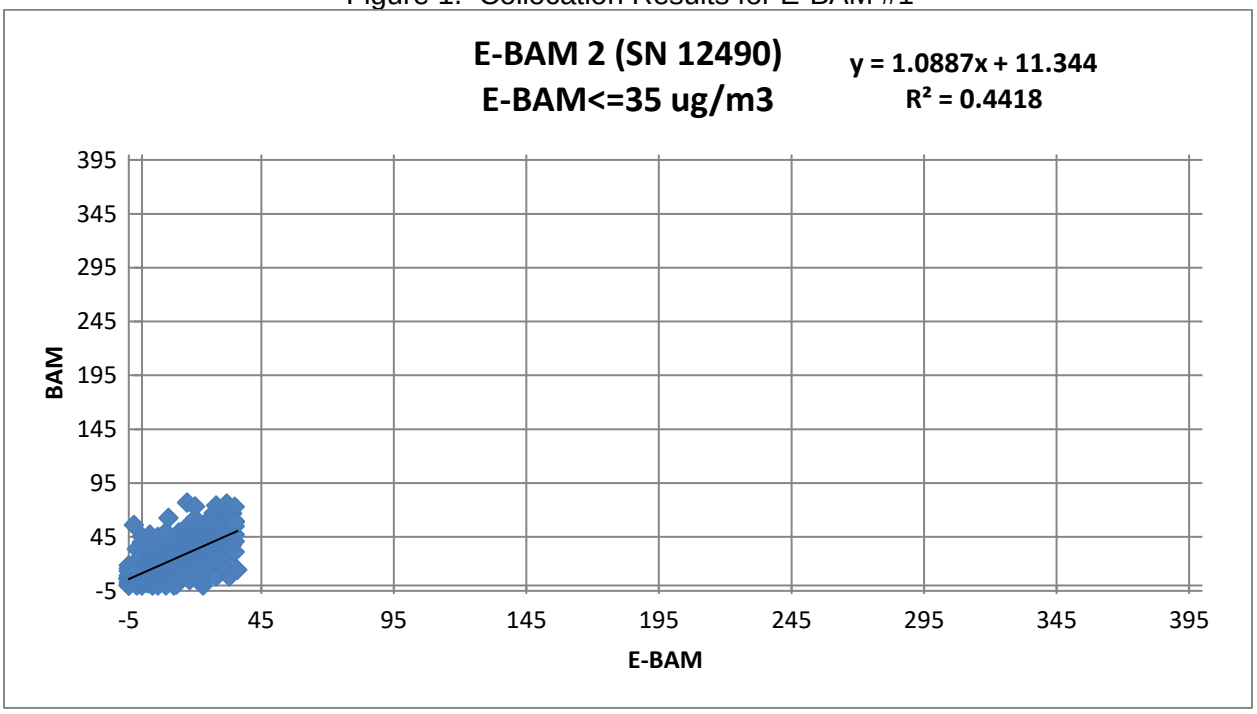


Figure 1. Collocation Results for E-BAM #1



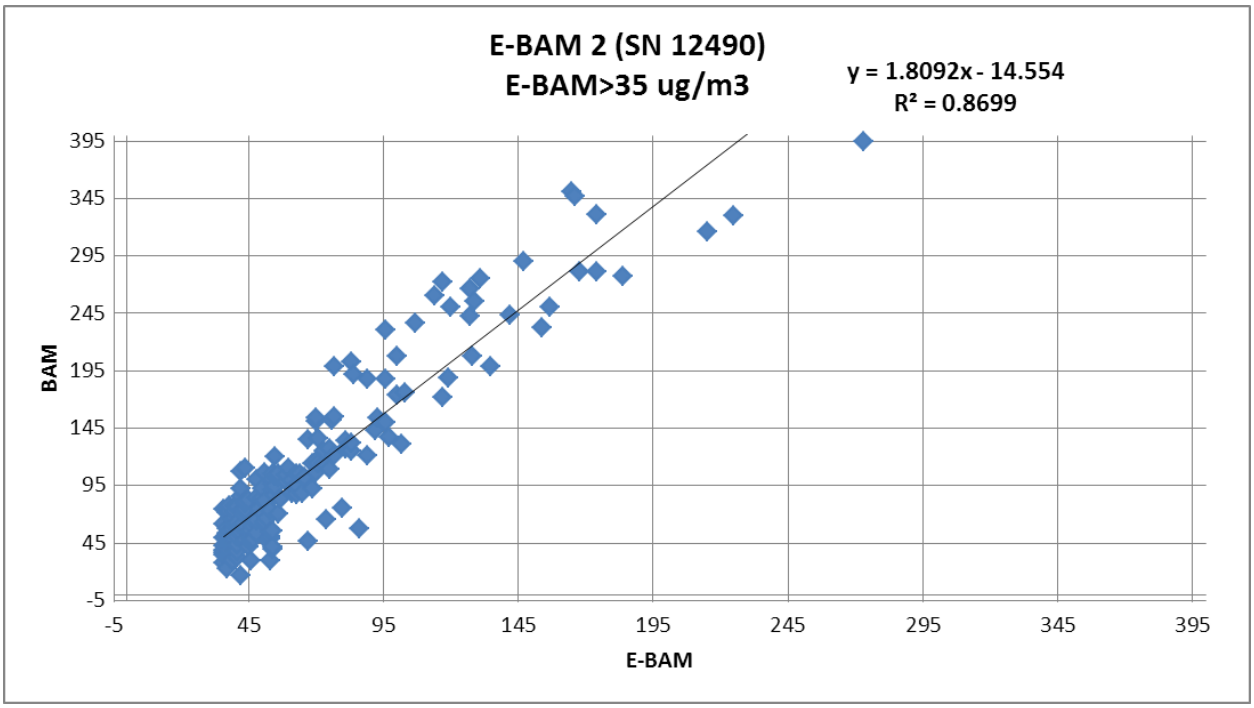
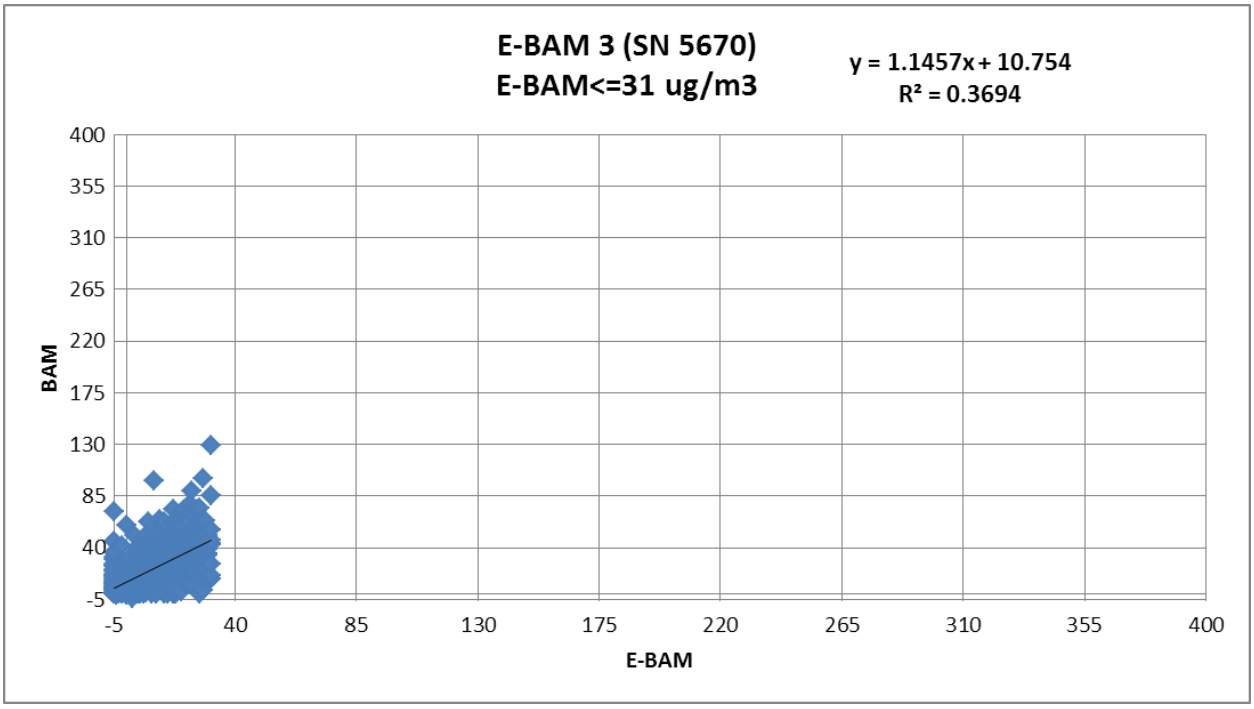


Figure 2. Collocation Results for E-BAM #2



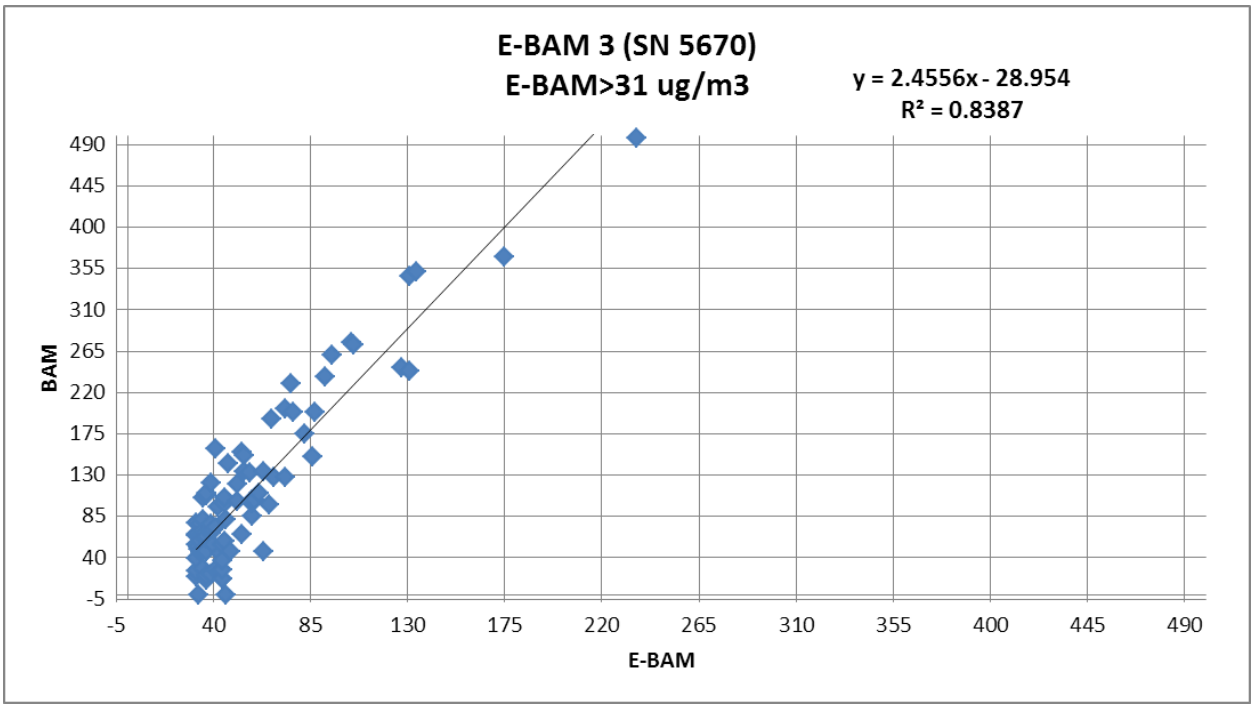
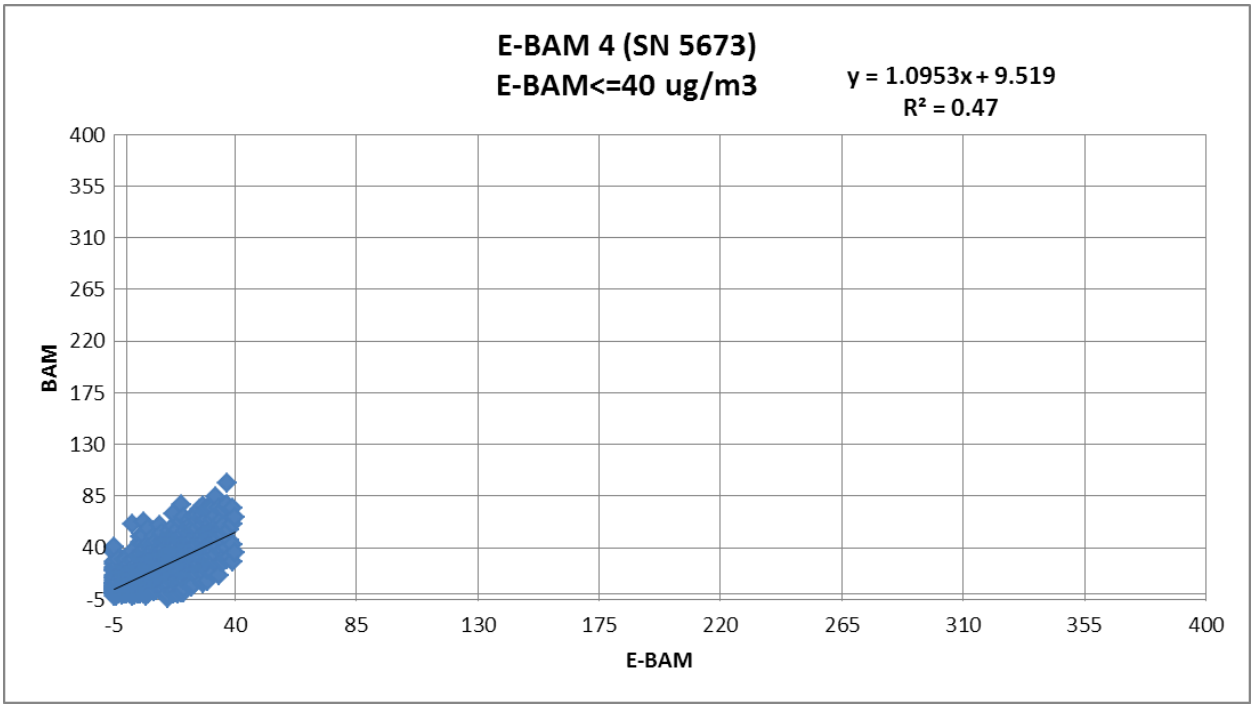


Figure 3. Collocation Results for E-BAM #3



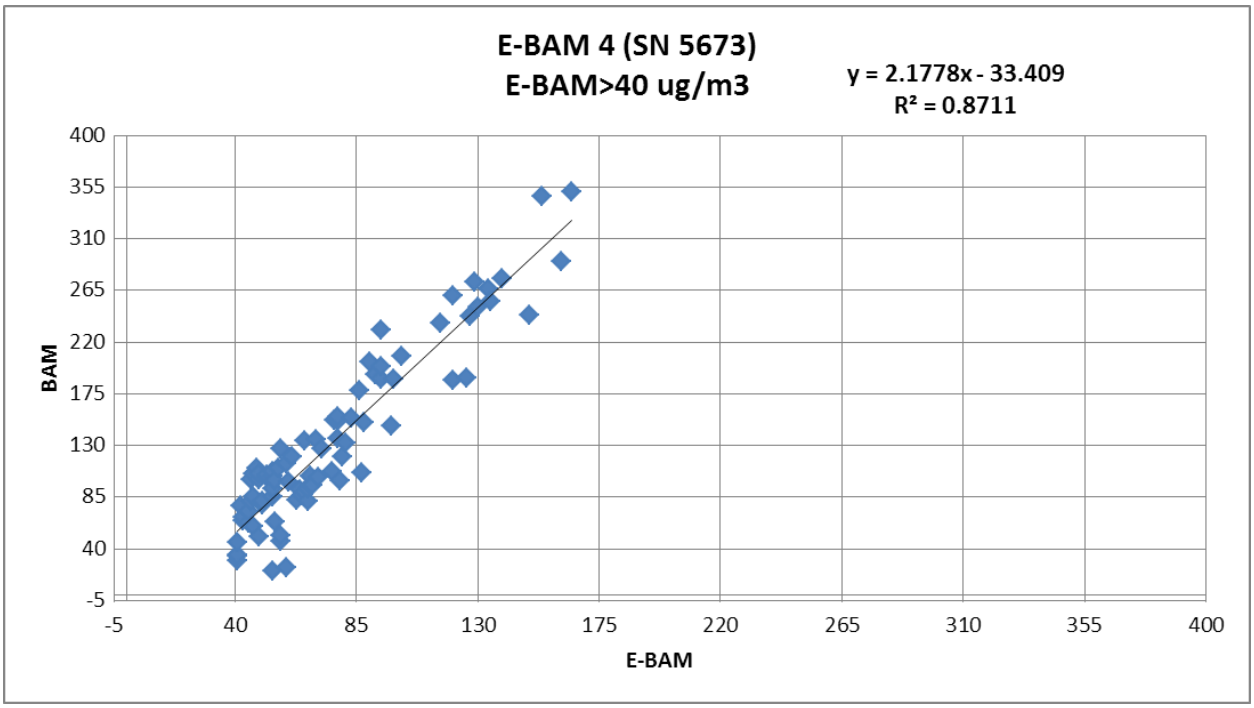
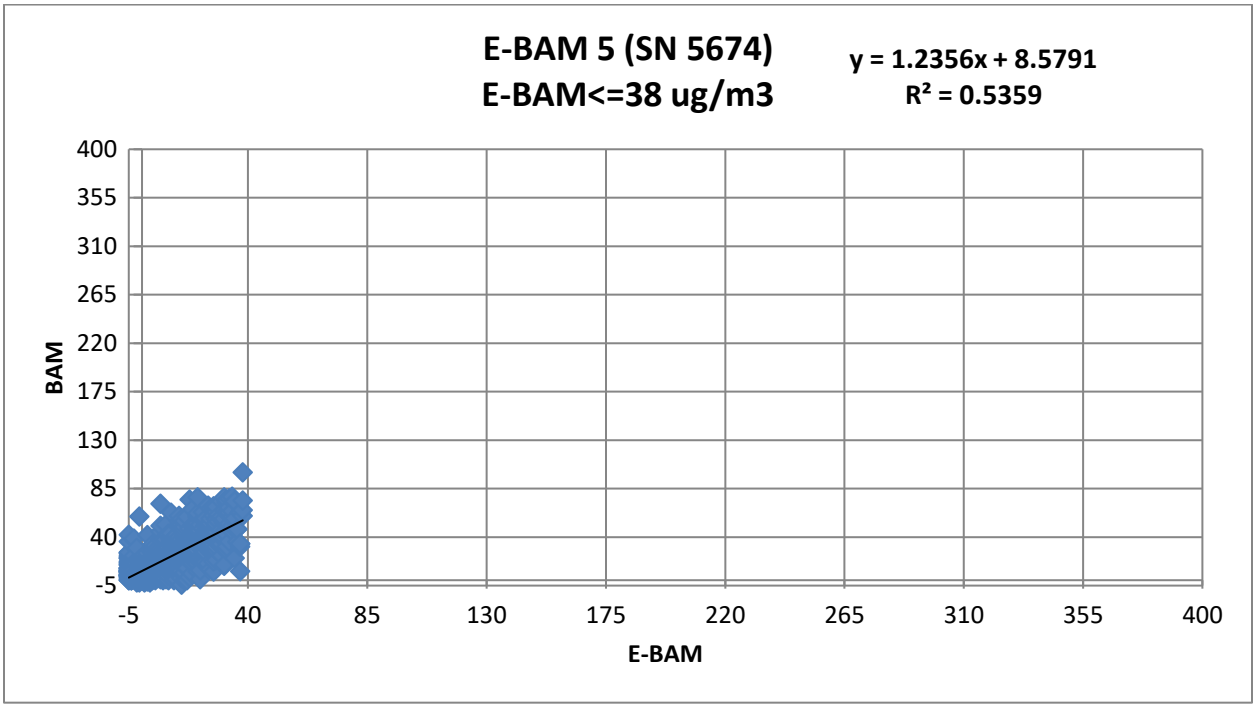


Figure 4. Collocation Results for E-BAM #4



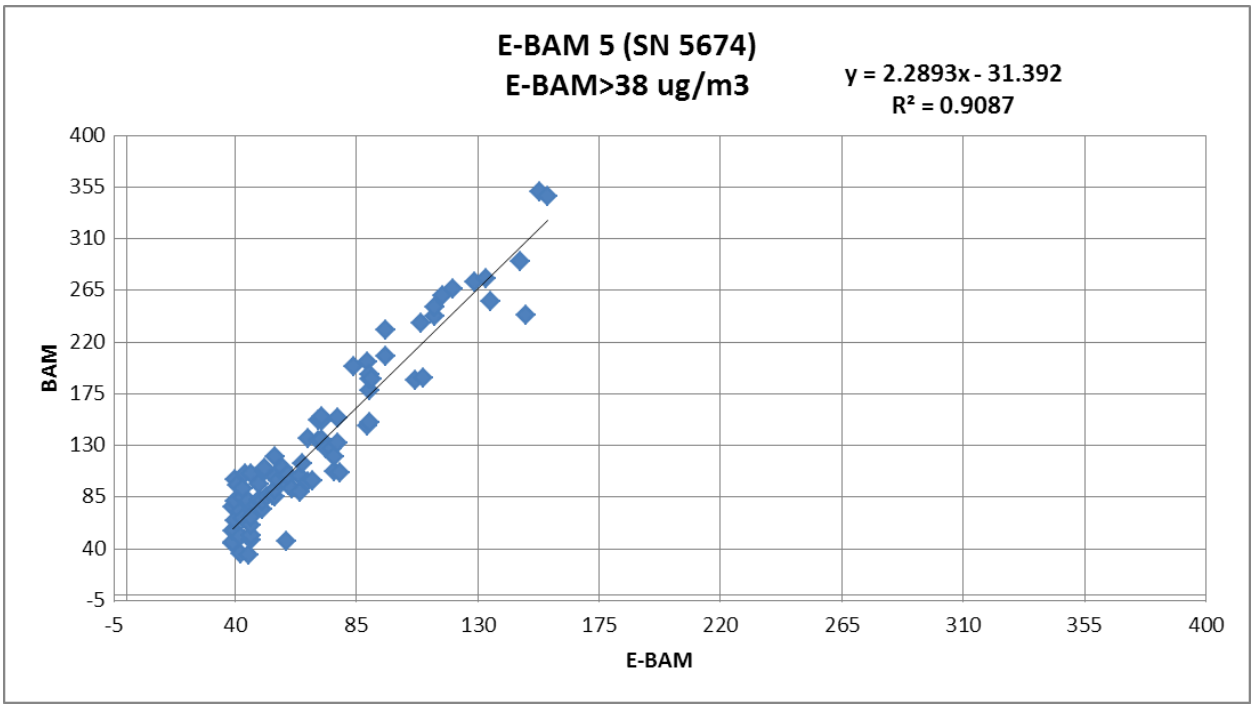


Figure 5. Collocation Results for E-BAM #5

Table 4. Summary of Correction Factors

EBAM ID	EBAM SN	Low Concentrations		High Concentrations		Transition	Discontinuity
		Slope	Int (µg/m^3)	Slope	Int (µg/m^3)	> µg/m^3)	(µg/m^3)
1	14567	1.0729	14.059	2.6463	-40.702	35	52,52
2	12490	1.0887	11.344	1.8092	-14.554	35	49,49
3	5670	1.1457	10.754	2.4556	-28.954	31	46,47
4	5673	1.0953	9.519	2.1778	-33.409	40	53,53
5	5674	1.2356	8.579	2.2893	-31.392	38	56,56

- Low Concentration factors are used for all EBAM readings less than or equal to the transition value
- High Concentration factors are used for all EBAM readings greater than the transition value

To evaluate the effectiveness of the derived correction factors, 24-hr averages were calculated for each collocation day, and the deviation versus the BAM FEM measurements calculated. Table 5 provides the average 24-hr deviation of each E-BAM relative to the collocated BAM FEM at the Mesa 2 Site using all available collocated data. While showing improvement in the calculated percent difference, all samplers go from an underreporting of concentrations by about -50% to an over-reporting by about 20%. In contrast, the average absolute difference is very close to 0 µg/m^3 for all samplers, though this is not an unexpected result given the least-squares regression methodology used to derive the correction factors.

Table 5. Deviations versus FEM – All Collocated Data.

		Uncorrected		Corrected	
EBAM ID	EBAM SN	Diff (%)	Diff (µg/m^3)	Diff (%)	Diff (µg/m^3)
1	14567	-55.7%	-18.7	24.1%	0.3
2	12490	-38.1%	-18.2	7.4%	0.1
3	5670	-47.7%	-15.4	25.6%	0.0
4	5673	-42.2%	-14.0	24.0%	-0.2
5	5674	-47.6%	-15.1	20.8%	-0.3

Thus, the 24-hr deviations, although improved, are still significant despite correction. This is due to the significant amount of time the E-BAMS experienced low concentrations. Low measurements result in significant percent deviations even when differentials are minimal. As noted above, the initial collocation period in particular was characterized by significantly lower concentrations than those measured during the post-deployment collocation effort. Table 6 provides the average 24-hr percent difference of each E-BAM relative to the collocated BAM FEM at the Mesa 2 Site during the post-deployment collocation study only, when higher concentrations were present. This comparison demonstrates more dramatically the effectiveness of the correction efforts, particularly for the higher concentrations of interest for this study. On average, the percent difference is within 10% for all samplers, versus an uncorrected difference of greater than 50%. The absolute differences in concentration show an overall under-reporting relative to BAM readings of about 5 µg/m^3.

Table 6. Difference versus FEM – Post-deployment Data.

		Uncorrected		Corrected	
EBAM ID	EBAM SN	Diff (%)	Diff (µg/m^3)	Diff (%)	Diff (µg/m^3)
1	14567	-60.3%	-25.1	-1.9	-5.6
2	12490	-43.3%	-19.5	3.0	-3.6
3*	5670	-56.3%	-23.6	-1.4	-4.8
4	5673	-51.4%	-21.2	-9.2	-5.9
5	5674	-52.3%	-21.4	-5.0	-4.2

* E-BAM #3 not operational for last 10 days of comparison

In addition to more effectively demonstrating agreement with the BAM, the results in Table 6 provide an evaluation of the responses of each sampler relative to each other. As can be seen, all samplers agree within a range of 12% of each other. Figure 6 is a time series plot of all corrected collocated data during the post-deployment comparison. The plot demonstrates much of the above conclusions: generally good agreement between samplers, with a noticeable under-reporting of higher concentrations and a possible over-reporting of low concentrations. The most notable deviations occur during high concentrations, such as those reported on September 22, during wind events which may inherently introduce variability even between collocated samplers. Yet even during September 22, all E-BAM samplers agreed to with ±14% of the average reported concentration, and averaged ±10% for all comparison days, demonstrating overall comparability.

In addition to investigating average differences during the collocation comparisons, we also reviewed the standard deviation of the measured difference to quantify error bars associated with the measurements. Again, for the reasons presented above, the post-deployment data are used for this evaluation, as they better represent the higher concentrations of interest. Table 7 presents the results of this comparison. As can be seen, when all collocated data from this period are considered, the standard deviations of the percent differences is high – averaging about 25%. Again, these high values are a product of the large number of low concentrations included in the comparison, which results in large and variable percent differences. With this in mind, the results are repeated by first dividing the data set into two groups, one with concentrations (reported by the BAM) greater than 30 µg/m^3 and the other with concentrations less than 30 µg/m^3, as shown in Table 7. The impact on the results is significant, with the standard deviations for the percent differences for concentrations greater than 30 µg/m^3 averaging 10% and relatively consistent between samplers. For concentrations less than 30 µg/m^3, the standard deviations of the differences average about 4 µg/m^3.

Table 7. Standard Deviation of Differences for Post-deployment Data

EBAM ID	EBAM SN	All post-deployment data - Std Dev of % Diff	> 30 µg/m^3 - Std Dev of % Diff	< 30 µg/m^3 Std Dev of Diff (µg/m^3)
1	14567	32.0%	12.0%	4.9
2	12490	28.7%	8.0%	3.7
3*	5670	24.5%	12.0%	3.9
4	5673	16.6%	10.0%	3.0
5	5674	17.0%	7.5%	3.6

* E-BAM #3 not operational for last 10 days of comparison

It should be noted that field observations from instruments moved to the Oceano Dunes have significantly exceeded the measured range observed for E-BAMs at the Mesa 2 site. Extrapolating the provided correction equations beyond the concentration ranges used to develop them will result in greater uncertainties in the PM10 concentration estimates than would result from using the equations for data within the concentration ranges experienced during the collocation studies. A collocation study of a BAM 1020 with at least one E-BAM on the Dunes during high winds would be beneficial in order to better capture the dynamic range of PM10 concentrations on the Dunes. However, we understand that the logistical difficulties of such a study would be significant.

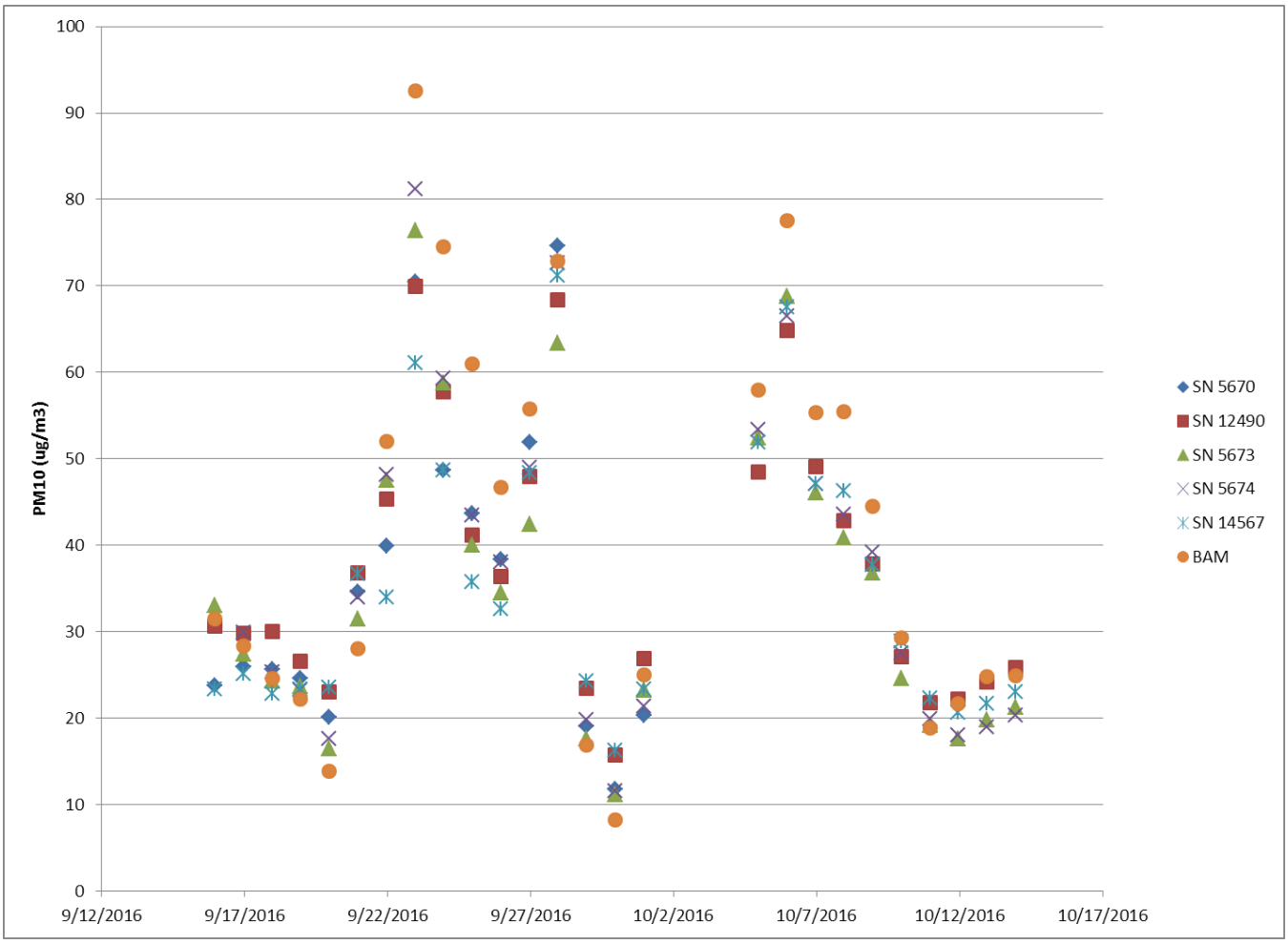


Figure 6. Time-series Plot of Corrected E-BAM 24-hr Averages during Post-deployment Collocation Effort

In summary, the following conclusions apply when using the E-BAM data:

- The correction factors, as presented in Table 4 significantly improve the accuracy of the E-BAM measurements relative to the FEM BAM 1020 measurements.
- Sampler to sampler agreement is good – within about ±15%.
- Error ranges, based on the standard deviation of the collocated differences, appear to be on the order of ±4 µg/m^3 for concentrations less than 30 µg/m^3 and ± 10% for concentrations greater than 30 µg/m^3.
- The derived corrections are most applicable for concentrations that range within those experienced during the collocation studies (less than 100 µg/m^3).
- Corrected E-BAM data will likely still under-report very high concentrations.
- Corrected E-BAM data may over-report low concentrations.

REFERENCES

STI Technical Memorandum to Ronnie Glick, June 18, 2013
SCS Tracer Technical Memorandum to Ronnie Glick, June 19, 2014
SCS Tracer Technical Memorandum to Ronnie Glick, January 21, 2015

2018 Oceano Dunes E-BAM Colocation Memo

MEMORANDUM

Summary

During the spring and early fall of 2018, T&B Systems (T&B) performed collocation comparisons at the Mesa 2 site with the E-BAMs deployed and operated in the Oceano Dunes State Vehicle Recreation Area (ODSVRA) in San Luis Obispo County, California. Eight weeks of collocated data were collected for each sampler. Collected data were then used to develop factors to be used on the data attained through the use of the five E-BAMS during deployment at the ODSVRA in 2018.

The final statistical relationships should provide reasonable estimates of PM10 when averaged over many observations, but may provide erroneously high or low values for individual hours. For a 24-hr period, we anticipate these estimates will be more reliable when estimated concentrations are within the range observed during the collocation study.

Background

The California Department of Parks and Recreation (CDPR) Oceano Dunes District retained T&B to install and maintain PM10 monitoring and meteorological devices at ODSVRA in San Luis Obispo County, California. The PM10 monitors that were deployed at the Dunes are E-BAMs from Met One Instruments. These monitors are designed for rapid deployment and are a scaled-down version of the FEM Model BAM 1020. In previous work, the San Luis Obispo Air Pollution Control District (SLOAPCD) determined that E-BAM instruments systematically underestimate PM10 concentrations compared to BAM 1020 FEM instruments when particles are large (>7 µm). Because CDPR is using the E-BAM as the primary instrument in the current study, it is necessary to assess E-BAM instrument response compared to BAM 1020 FEM instrument response. This memorandum describes the quality assurance (QA) activities taken to assess the E-BAM instruments, the results from those QA activities, and our proposed approach for correcting the E-BAM instrument readings to ensure comparable spatial assessments and traceable estimates of PM10 concentrations relative to the BAM instrument.

Quality Assurance Activities

Prior to deployment, a zero test or background test, of the E-BAM instruments at the Oceano District storage facility was conducted. The E-BAMs were warmed up for at least 10 hours. During the warm-up period, instrument setup parameters were reviewed for proper values (the settings recommended by the manufacturer) and uniformity across instruments. The BX-302 zero filter assembly was placed on top of the inlet tube in place of the PM10 inlet and cyclone, and the instruments sampled for approximately 70 hours. At the conclusion of the zero test, hourly data values from each instrument were averaged. These results are provided in the **Table 1**. Following the zero test, audits of the flow rates were conducted on each instrument. Additionally, a membrane test was also conducted and all units passed. Based upon the results in Table 1, the factory Zero settings were not further adjusted prior to deployment.

Table 1. Zero Test Results – Pre-deployment

	SN 5670	SN 5673	SN 5674	SN 12490	SN 14567
Zero Test Start	3/30/2018 20:00	3/30/2018 20:00	3/30/2018 20:00	3/30/2018 20:00	3/30/2018 20:00
Zero Test Stop	4/3/2018 16:00	4/3/2018 16:00	4/3/2018 16:00	4/3/2018 16:00	4/3/2018 16:00
Avg. Conc. (µg/m^3)	-0.004	0.000	0.000	0.000	-0.001

Zero checks were similarly conducted as the first step of the post-deployment collocation effort. Results are shown in **Table 2**. The results show some minor degrading of the zero response over the course of the deployment for SN 14567 and SN 12490.

Table 2. Zero Test Results – Post-deployment

	SN 5670	SN 5673	SN 5674	SN 12490	SN 14567
Zero Test Start	10/31/2018 12:00	10/31/2018 12:00	10/31/2018 12:00	10/31/2018 12:00	10/31/2018 12:00
Zero Test Stop	11/7/2018 10:00	11/7/2018 10:00	11/7/2018 10:00	11/7/2018 10:00	11/7/2018 10:00
Avg. Conc. ($\mu g/m^3$)	-0.001	0.001	-0.001	0.007	0.006

Collocation Studies

As in previous years, a pre-deployment collocation study and post-deployment collocation study against the BAM monitoring at the Mesa-2 site were conducted, each for approximately three to four weeks. During the collocation studies, the horizontal and vertical separation distance between the inlets of any two adjacent monitors was at least one meter and not more than two meters. However, relative to the Mesa 2 site BAM monitor, the inlet height of the BAM monitor was about 7 m higher than the E-BAMs, and thus did not strictly meet collocation siting requirements. Installation was identical for both the initial and post-deployment collocation studies. During the course of the collocation studies, additional leak and flow checks were conducted on the E-BAMs according to manufacturer specifications and the project QAPP.

Pre-deployment Collocated Comparison:

Initial collocated monitoring at the Mesa 2 site began on April 4 and continued through May 1, providing collocated data for all samplers. There was an initial period when SN 5674 was not operating properly. Consequently, the first 7 days of collocated data were lost for SN 5674. The average concentration during the collocation period was 37 $\mu g/m^3$, as reported by the BAM. Of the 26 complete days of collocated monitoring, there were 6 days (23%) with 24-hr averages of PM10 greater than 50 $\mu g/m^3$ as observed by the BAM. The highest 24-hr average was 84 $\mu g/m^3$ on April 8. There were 66 hourly values with concentrations above 80 $\mu g/m^3$ during the pre-deployment collocation period as measured by the BAM.

Post-deployment Collocated Comparison:

Collocated monitoring at the Mesa 2 site began on September 20 and continued through October 31. However, SN 5673 had invalid data from September 23 through October 8 due to a flow failure error that caused the system to stop all sampling operations. This still results in 24 days of collocated data for SN 5673. Of the 40 complete days of collocated monitoring, there were 4 days (10%) with 24-hr averages of PM10 greater than 50 $\mu g/m^3$ as observed by the BAM. The highest 24-hr average was 74 $\mu g/m^3$ on October 6. There were 34 hourly values with concentrations above 80 $\mu g/m^3$ during the post-deployment collocation period as measured by the BAM. The average PM10 concentration for the post-deployment period was 32 $\mu g/m^3$, as measured by the BAM.

Analysis Methodology and Collocation Study Results

Analysis of the E-BAM data began by comparing raw E-BAM values with the FEM (BAM) values, following procedures similar to those used with the 2017 collocation data set. As noted in the 2017, comparison of the 2018 BAM and E-BAM data revealed that the collocated data displayed a similar "forked" distribution that cannot be adequately described by a single regression line, or by two high/low equations based on the measured EBAM value. **Figure 1** shows the pre-deployment collocation data for SN 5673 which demonstrates this distribution and is representative of all of the samplers. **Figures 2 and 3** show the regressions equations obtained for sampler SN 5673 using high/low humidity criteria, demonstrating the effectiveness of using sample RH to describe the distribution. Sample RH transition values were determined by trial, with the goal of optimizing the correlation for both the high and low sample RH linear regressions.

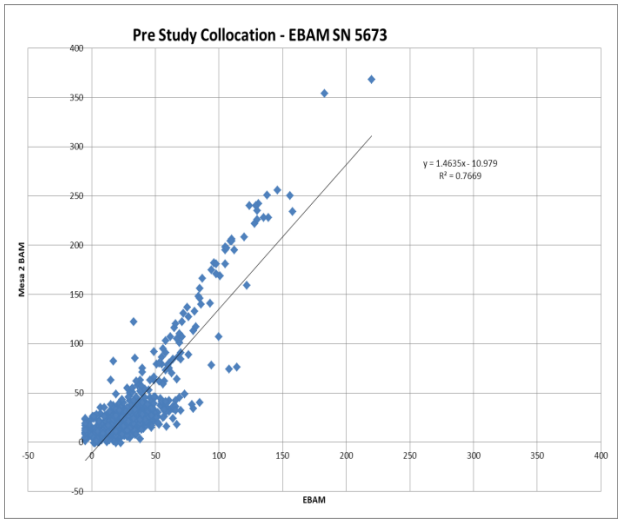


Figure 1. Example Pre-deployment Collocated Data

Comparison of the pre- and post-deployment results shows notable differences in the response for several samplers. For all samplers, the general trend in the derived factors between the pre- and post-deployment collocation studies consisted of a further decrease in response (underreporting of concentrations) during low humidity conditions (during which higher concentrations are generally recorded), and even further overreporting of concentrations during high humidity conditions. In addition, the correlations (R^2) between the E-BAMs and BAM were significantly lower for the post-deployment collocation study. Finally, different sample RH transition values, relative to those derived for the pre-deployment study, were required to optimize correlations for the high and low RH linear regressions. **Figures 4 and 5** show the post-deployment results for sampler SN 5673, demonstrating the above observations.

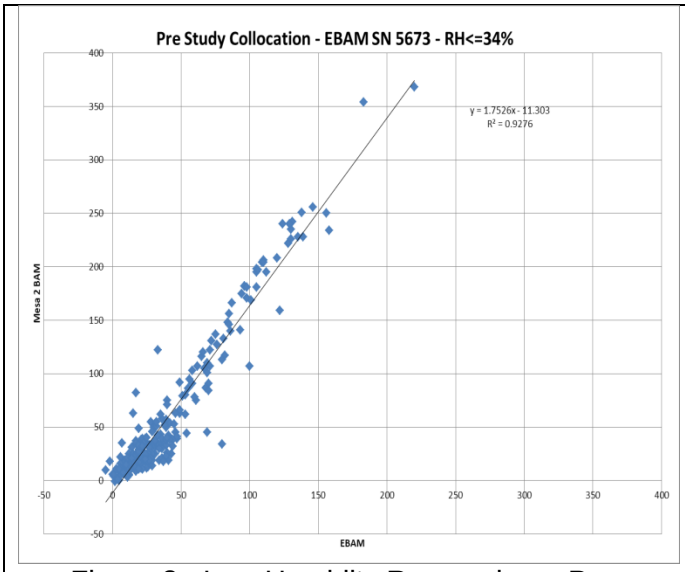


Figure 2. Low Humidity Regression – Pre-deployment

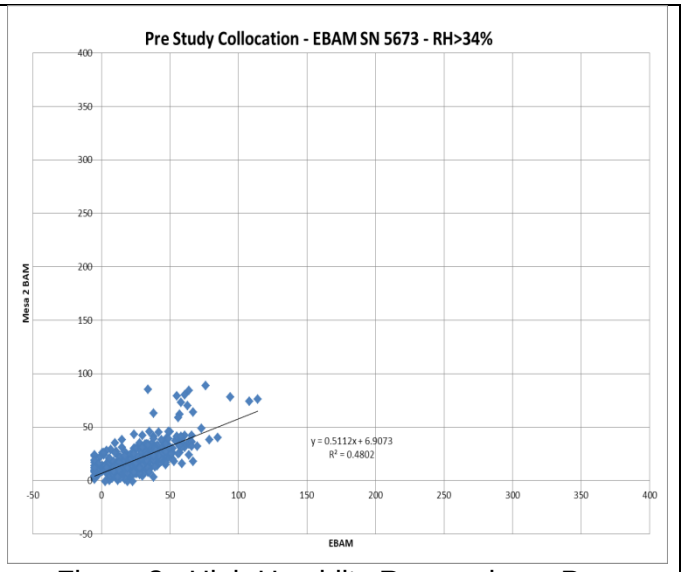


Figure 3. High Humidity Regression – Pre-deployment

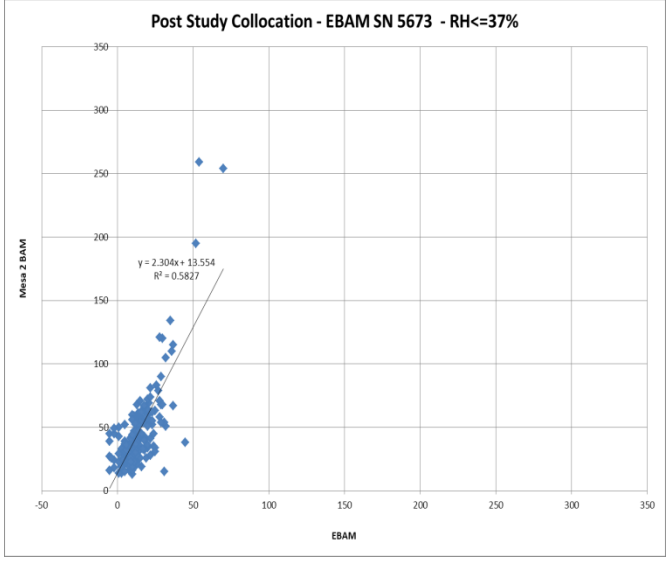


Figure 4. Low Humidity Regression – Post Study

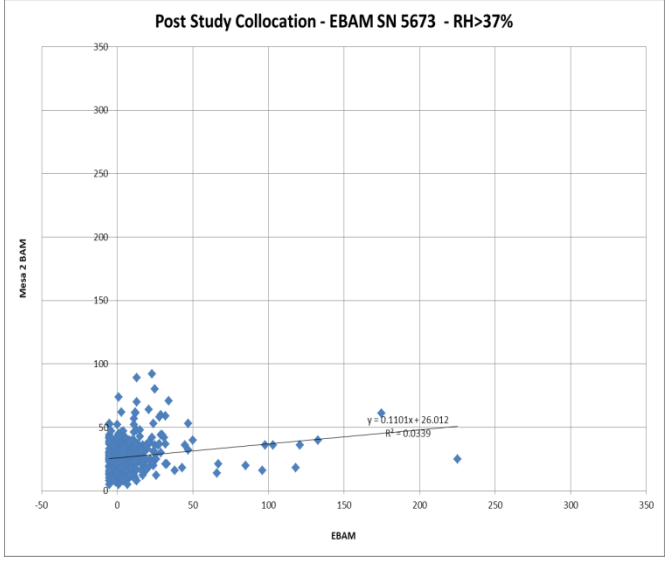


Figure 5. High Humidity Regression – Post Study

Assuming the change in response is time-related, the data adjustment methodology was again to interpolate adjustment factors as a function of time between the pre- and post-deployment collocations. However, to keep this interpolation successful, it was first necessary to match the sample RH transition values for a given sampler for both the pre- and post-deployment collocation studies. Again, this was done by trial, concentrating on assuring in particular that the low RH (high concentration) data were representative. Basically, given the weaker correlation of the post-deployment study, this was accomplished by using the transition values obtained for the post-deployment study, since the pre-deployment study data set was less sensitive to the transition RH value. However, a general decrease in the reported correlation for the pre-deployment regression equations was noted – a necessary compromise to obtaining the matching sample RH transition values.

The figures attached at the end of this memo present scatter plot comparisons of raw E-BAM versus BAM readings for each sampler for each of the E-BAM samplers. Each figure includes plots showing the complete collocated data set and the regressions for the low and high sample humidity scenarios, divided into pre- and post-deployment collocation efforts. The regression data are summarized in **Tables 3 and 4**, for the pre- and post-deployment collocations, respectively.

Figures 6 and 7 are time series plots of all adjusted collocated data, expressed as 24-hour averages, during the pre- and post-deployment studies, respectively. Figure 6 demonstrates the generally good agreement between samplers during the pre-deployment study, with no consistent under-reporting or over-reporting trends based on concentrations. This is less true for the post-deployment results presented in Figure 7. Both the factors and figures again show the noted differences between the pre- and post-deployment collocation studies – lower response (higher slopes) for the low sample RH data, and generally poorer correlated data, as well as notably higher intercepts. The derived post-deployment regression factors are in particular problematic, due to the low correlation. For example, using the derived slope for sampler 14567 of 0.02, it was quickly noted that raw data collected at the end of the study showing significant high peaks along with lower background concentrations was reduced across the board to about 25 $\mu g/m^3$ (the post-deployment intercept). It was thus decided that the pre-deployment regression equations for high sample RH, obtained using better correlated data, would be used for the entire deployment. Furthermore, review of the plots (attached at the end of this memo) show that the slopes calculated using the post-deployment collocation data are likely under-representing much of the high concentration data, again a product of poorer correlating data. Thus, the post-deployment slopes were manually adjusted to better fit the higher concentration data. This was accomplished by first visually estimating a line that best fit the high concentration data, and then testing the slopes to best match the 24-hour data with the BAM data. **Table 5** thus presents the finalized post-deployment regression factors used for adjusting the data. While the data remains noisier than the pre-deployment collocation data, the obvious under- and over-reporting of data relative to the BAM data has improved.

It is interesting to note the across-the-board increases in the low RH slopes and poorer correlations between the pre- and post-deployment collocation studies. While this may be due to a degradation in response due to fulltime use in a challenging environment, as suggested in the 2017 memo, the fact that all five samplers were similarly affected leads to the possibility that the BAM response changed, or more specifically there is something inherently different in the particulate matter being measured between the spring and fall. Further investigation is recommended.

Table 3. Summary of Correction Factors – Pre-deployment Collocation

EBAM SN	Low Sample RH			High Sample RH			Transition
	Slope	Int ($\mu g/m^3$)	R^2	Slope	Int ($\mu g/m^3$)	R^2	Sample RH(%)
14567	1.665	-10.7	0.8873	0.425	10.1	0.3526	42
12490	1.389	-6.4	0.8525	0.455	7.4	0.4727	41
5670	1.752	0.3	0.8644	0.554	11.8	0.4491	41
5673	1.722	-11.8	0.9093	0.459	7.8	0.4446	37
5674	1.587	-9.1	0.8092	0.429	11.0	0.2809	42

- Low RH factors are used for all EBAM readings where the sample RH is less than the transition value
- High RH factors are used for all EBAM readings where the sample RH is greater than or equal to the transition value

Table 4. Summary of Correction Factors – Post-deployment Collocation (Initial)

EBAM SN	Low Sample RH			High Sample RH			Transition
	Slope	Int ($\mu g/m^3$)	R^2	Slope	Int ($\mu g/m^3$)	R^2	Sample RH(%)
14567	2.131	7.2	0.6809	0.020	24.3	0.0019	42
12490	3.423	0.5	0.7317	0.682	21.0	0.1358	41
5670	2.123	23.2	0.4638	0.814	24.3	0.1597	41
5673	2.304	13.6	0.5827	0.110	26.0	0.0340	37
5674	1.730	4.8	0.6289	0.773	17.3	0.3113	42

- Low RH factors are used for all EBAM readings where the sample RH is less than the transition value
- High RH factors are used for all EBAM readings where the sample RH is greater than or equal to the transition value

Table 5. Summary of Correction Factors – Post-deployment Collocation (Final)

EBAM SN	Low Sample RH		High Sample RH		Transition
	Slope	Int ($\mu g/m^3$)	Slope	Int ($\mu g/m^3$)	Sample RH(%)
14567	3.0	7.2	0.425	10.1	42
12490	4.0	0.5	0.455	7.4	41
5670	3.0	23.2	0.554	11.8	41
5673	3.0	13.6	0.459	7.8	37
5674	2.5	4.8	0.429	11.0	42

- Low RH factors are used for all EBAM readings where the sample RH is less than the transition value
- High RH factors are used for all EBAM readings where the sample RH is greater than or equal to the transition value

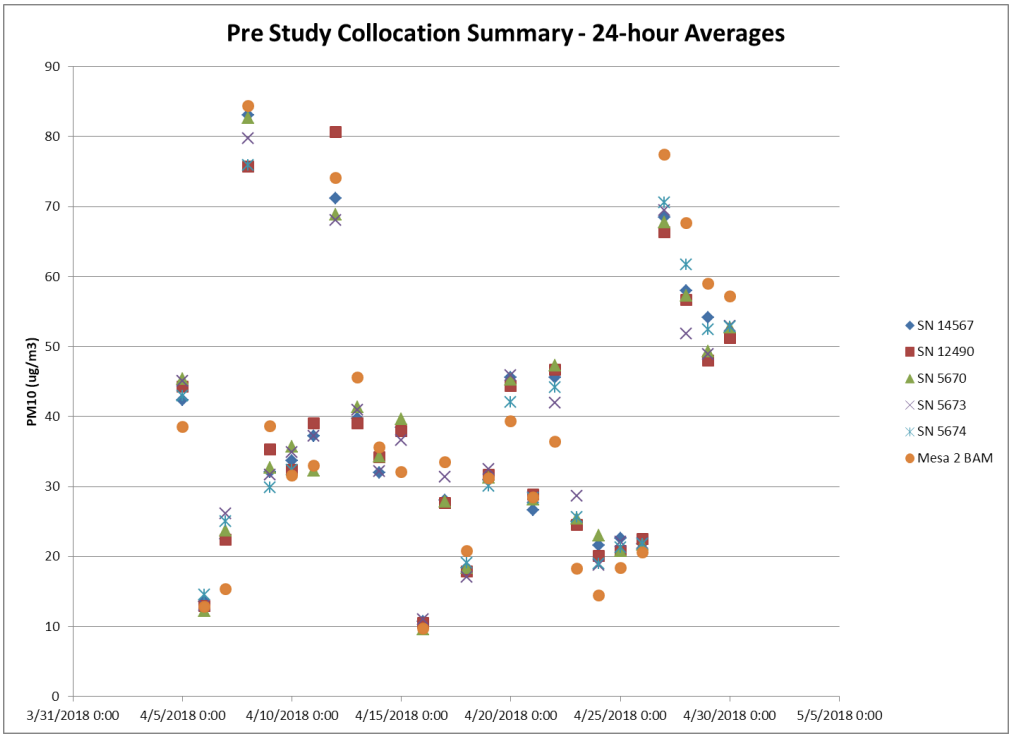


Figure 6. Corrected E-BAM 24-hr Averages during Pre-deployment Collocation Effort

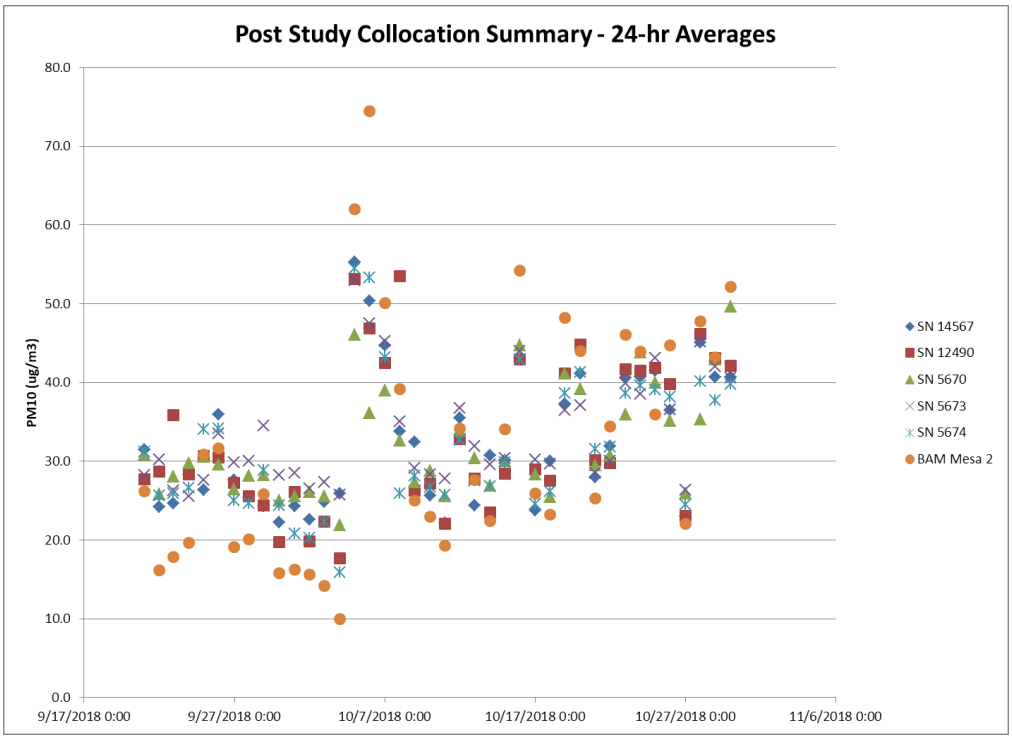


Figure 7. Corrected E-BAM 24-hr Averages during Post-deployment Collocation Effort

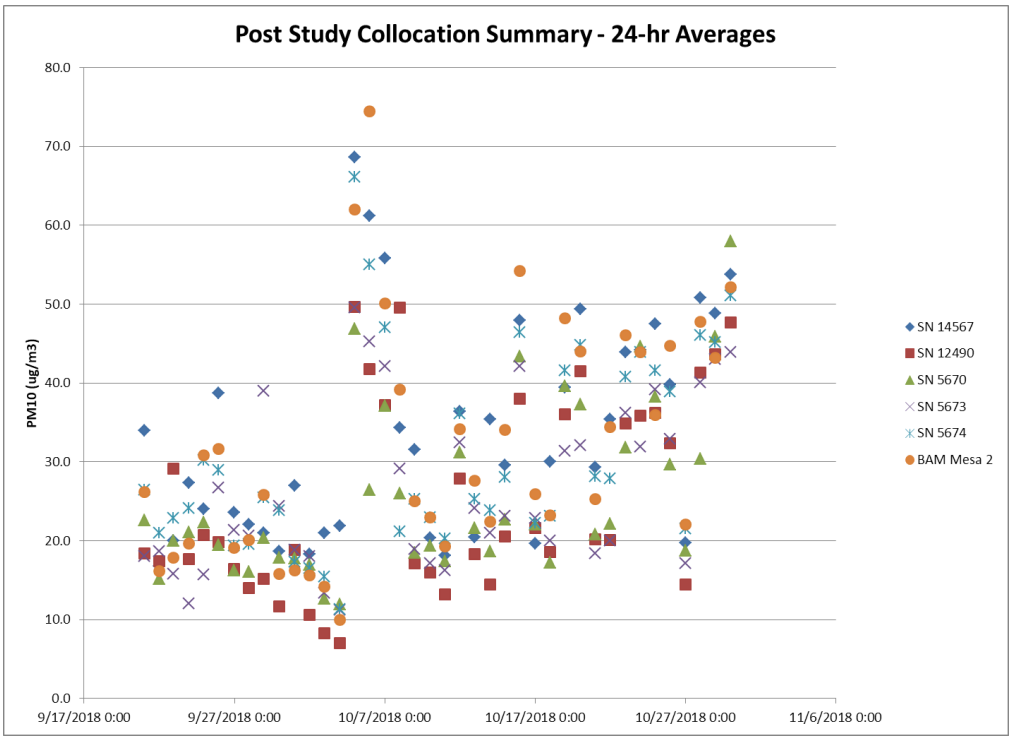


Figure 8. Corrected E-BAM 24-hr Averages during Post-deployment Collocation Effort using Finalized Post-deployment Factors

To evaluate the effectiveness of the derived correction factors, 24-hr averages were calculated for each collocation day, and the deviation versus the BAM FEM measurements calculated. **Table 6** provides the average 24-hr deviation of each E-BAM relative to the collocated BAM FEM at the Mesa 2 Site using all available collocated data. By adjusting the data using the above methodology, all samplers go from an underreporting of concentrations by about -30% to only a slight over-reporting by about 3%. Similarly, the average absolute difference of the adjusted data is very close to 0 $\mu g/m^3$ for all samplers. Note that this is not an unexpected result given the least-squares regression methodology used to derive the correction factors, though it verifies the effectiveness of using the sample RH for defining the regression equation to be used.

Table 6. Deviations versus FEM – All Collocated Data (24-hr averages)

	Unadjusted		Adjusted	
EBAM SN	Diff (%)	Diff ($\mu g/m^3$)	Diff (%)	Diff ($\mu g/m^3$)
14567	-21.9%	-10.4	8.7%	1.0
12490	-42.7%	-15.3	-10.3%	-4.1
5670	-67.2%	-22.4	-6.9%	-3.7
5673	-33.7%	-13.8	-5.2%	-3.4
5674	-38.7%	-14.1	2.5%	-0.8

* SN 5674 was not operational for the 7 days of pre-deployment comparison

To summarize, using sample RH as criteria for adjusting the E-BAM data works well for describing the 2018 collocation data set. However, there remains a major issue when using this adjustment methodology, as pointed out in the 2017 memo. While the collocation data set has a similar number of "low" and "high" humidity sampling periods, a significant majority of measurements made during the monitoring campaign were collected under "high" humidity conditions. For example, at Site 20, where SN 5670 was used with a sample humidity criterion value of 41%, only 11% of the study samples were obtained when the sample humidity was less than 41%, compared to the collocated measurements at Mesa 2 where 39% of the samples were obtained when the sample humidity was less than 41%. Furthermore, in contrast to the collocation data set, a significant majority of the high concentration measurements at Site 20 were obtained during "high" sample humidity conditions. The RH-based methodology also has a notable disadvantage in that it has a definite "continuity" issue. During periods when the sample RH is oscillating around the defined RH criterion, the adjusted concentration can deviate significantly from hour to hour, especially during periods of elevated readings, given the large difference between the "high" and "low" humidity adjustment factors. **Figure 9** shows both raw and adjusted data from Site 20 for a five-day period during which higher peaks of PM_{10} were recorded. Also included in the graph are data from the Mesa 2 BAM located approximately 4 miles from Site 20. Based on the Mesa 2 data, three of the days have PM_{10} peaks of similar concentrations. However, only the peak on May 7 occurred under drier conditions, with sample RHs below the 41% criteria established for this E-BAM. The difference in the adjusted value is obvious, with much higher concentrations reported on the 7th than for the other two peak days.

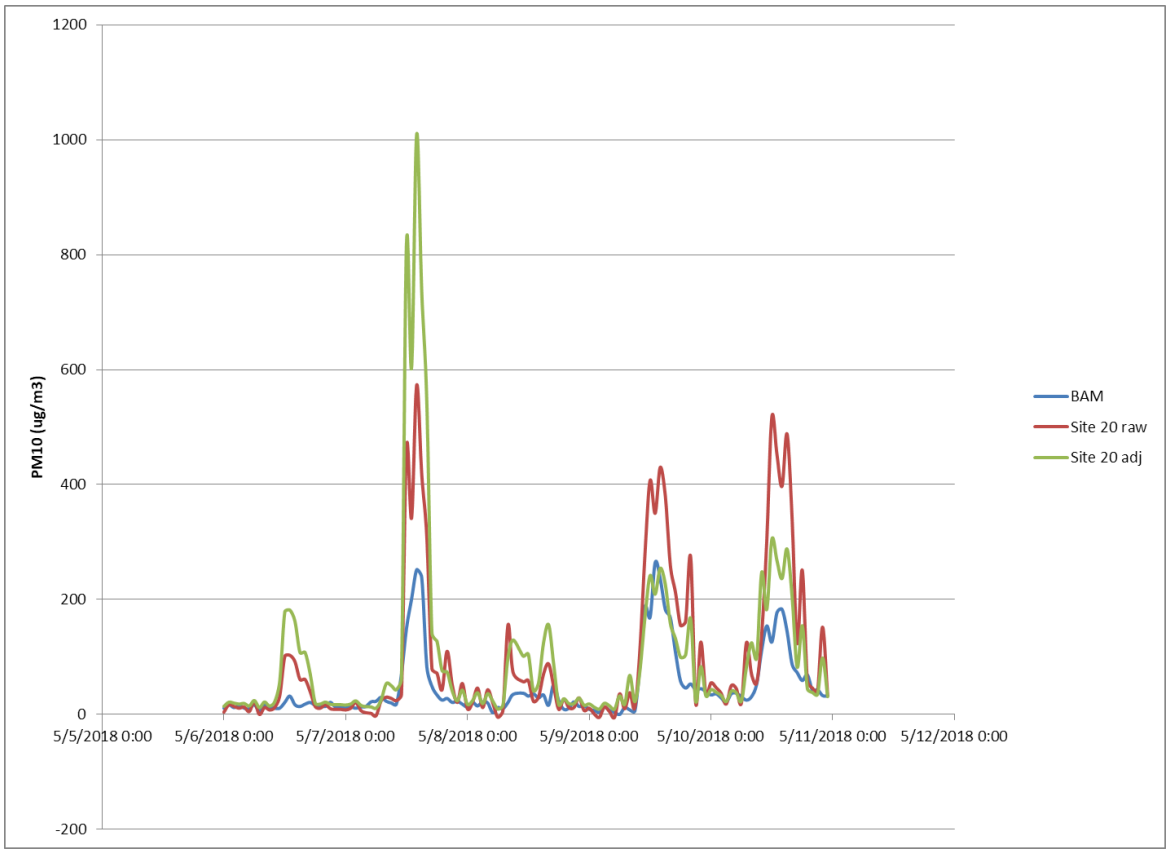
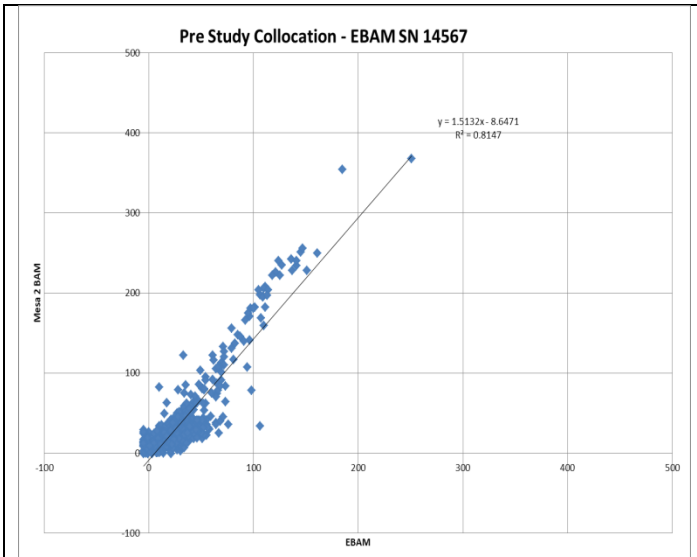


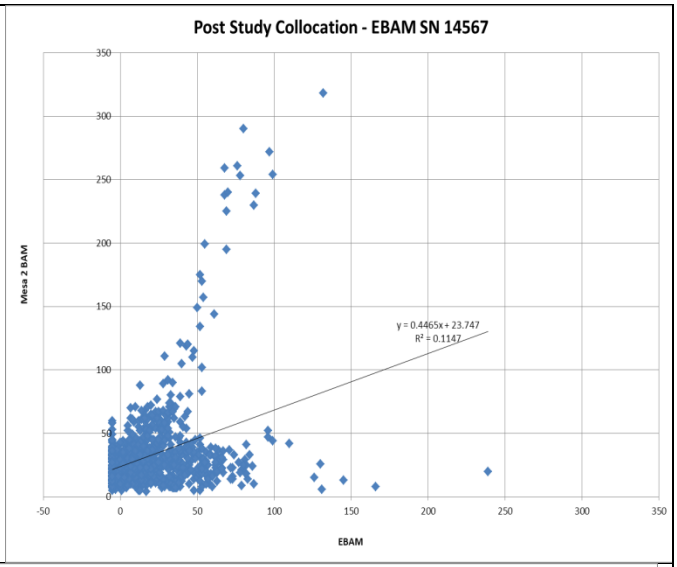
Figure 9. Comparison of Data from Site 20 with Mesa 2.

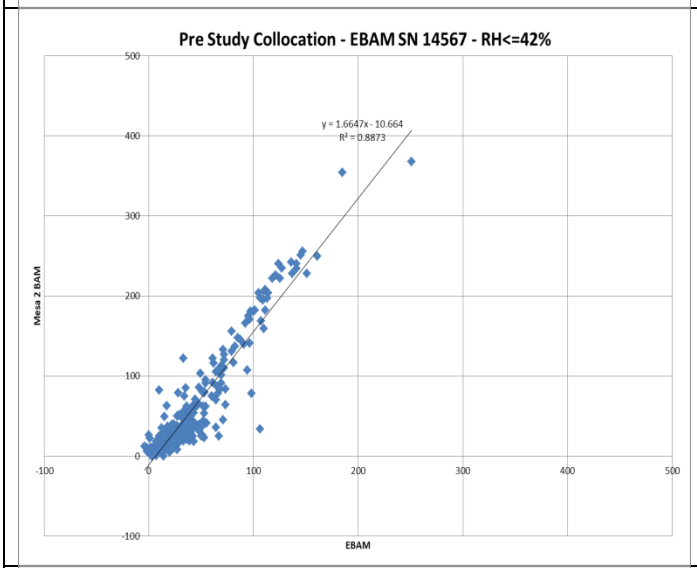
The above again points out the limitations of conducting the collocation studies at Mesa 2 rather than on the Dunes under more representative sampling conditions. While the RH-based methodology best fits the collocation data set, its success may be a by-product of a limited collocation data set where all high concentrations are coincidentally occurring during "low" humidity conditions. This review again brings up the possibility that relative humidity may be an important factor, and that the Mesa 2 site may not be sufficiently representative of conditions on the Dunes. A collocation study of a BAM 1020 with at least one E-BAM on the Dunes during high RH would be beneficial in order to better capture the dynamic range of PM10 concentrations and RH conditions on the Dunes. While we understand that the logistical difficulties of such a study would be significant, it seems clear that the investment would be worthwhile in more definitively characterizing the E-BAM measurements under the high humidity, high concentration conditions experienced on the Dunes and resolving this potentially very significant discrepancy in reported concentrations on the Dunes. One possibility is to set up one of the sites collocated with the BAM at Oso Flaco to better evaluate the performance of an E-BAM relative to the BAM under this unique coastal environment.

REFERENCES

STI Technical Memorandum to Ronnie Glick, June 18, 2013
SCS Tracer Technical Memorandum to Ronnie Glick, June 19, 2014
SCS Tracer Technical Memorandum to Ronnie Glick, January 21, 2015
T&B Systems Memorandum to Ronnie Glick, December 23, 2016
T&B Systems Memorandum to Ronnie Glick, January 3, 2018 (referred to as the "2017 memo")


Pre Study Collocation - EBAM SN 14567
y = 1.5132x - 8.6471
R² = 0.8147
Mesa 2 BAM
EBAM


Post Study Collocation - EBAM SN 14567
y = 0.4465x + 23.747
R² = 0.1147
Mesa 2 BAM
EBAM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y = 1.6647x - 10.664
R² = 0.8873
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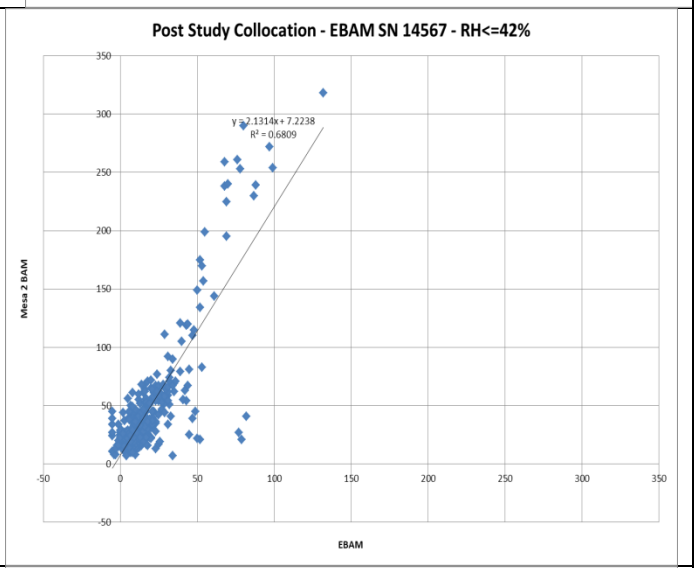
EBAM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R² = 0.6809
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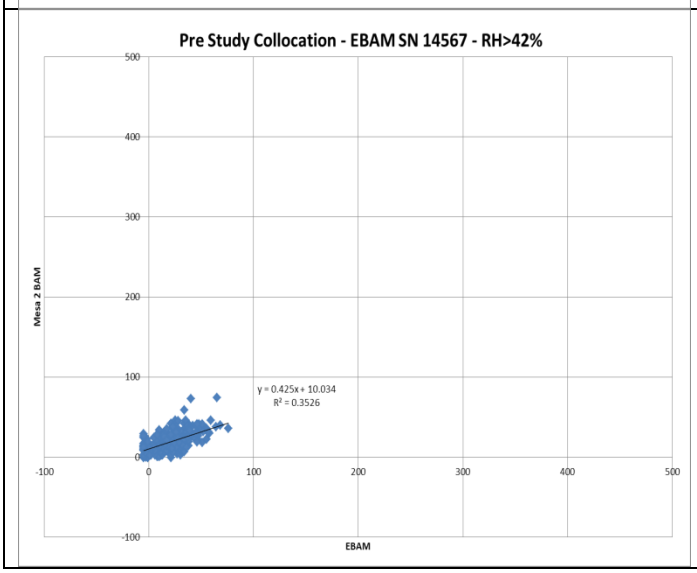
EBAM


Pre Study Collocation - EBAM SN 14567 - RH>42%
y = 0.425x + 10.034
R² = 0.3526
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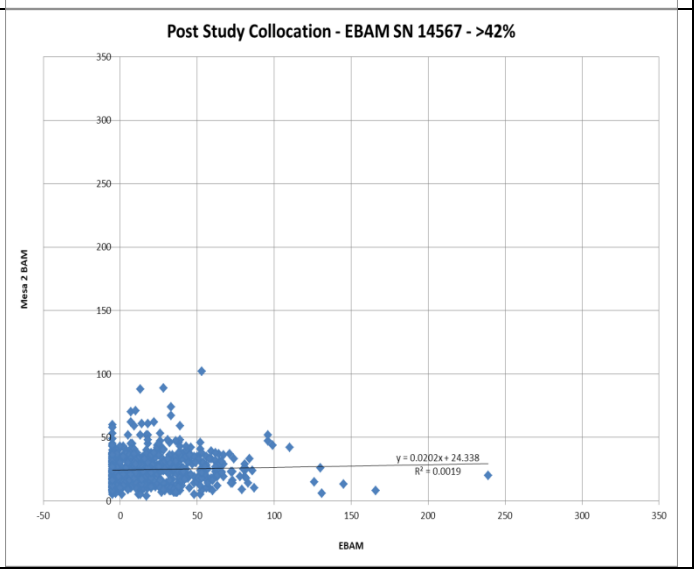
EBAM


Post Study Collocation - EBAM SN 14567 - >42%
y = 0.0202x + 24.338
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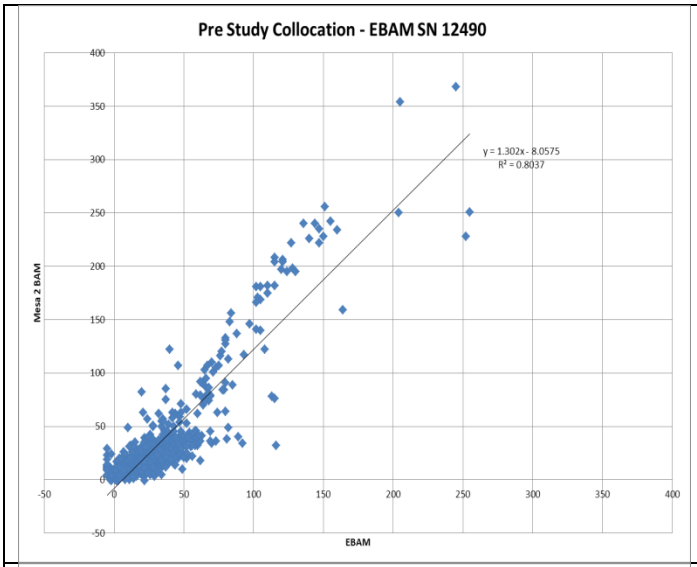
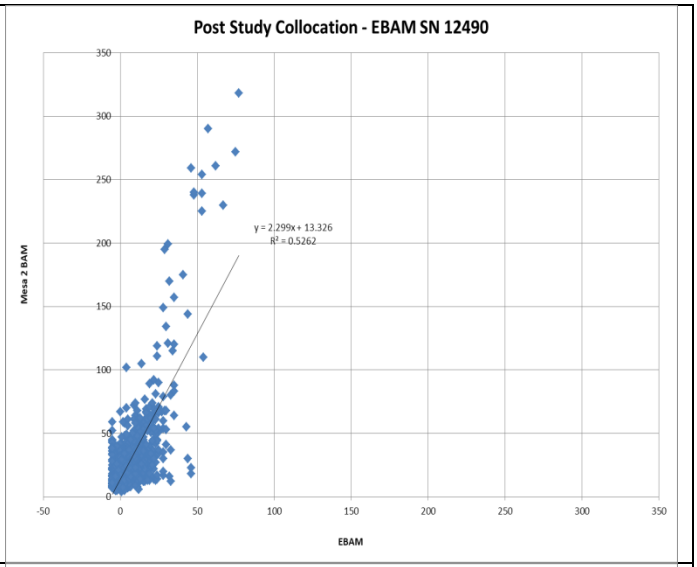
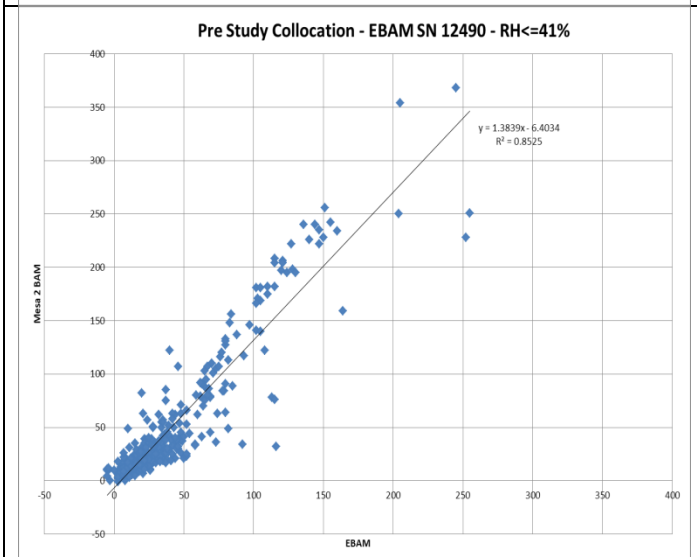
EBAM


Pre Study Collocation - EBAM SN 12490
y = 1.302x - 8.0575
R² = 0.8037
Mesa 2 BAM
EBAM


Post Study Collocation - EBAM SN 12490
y = 2.299x + 13.326
R² = 0.5262
Mesa 2 BAM
EBAM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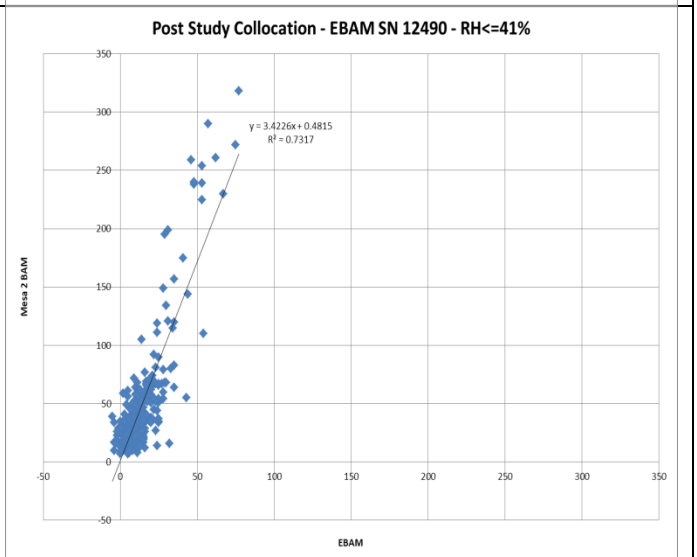
R² = 0.8525
Mesa 2 BAM
EBAM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y = 3.4226x + 0.4815
R² = 0.7317
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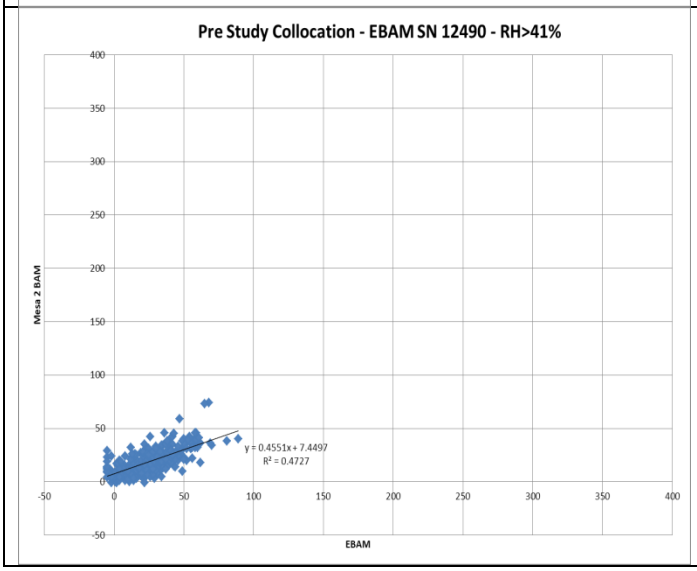
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y = 0.4551x + 7.4497
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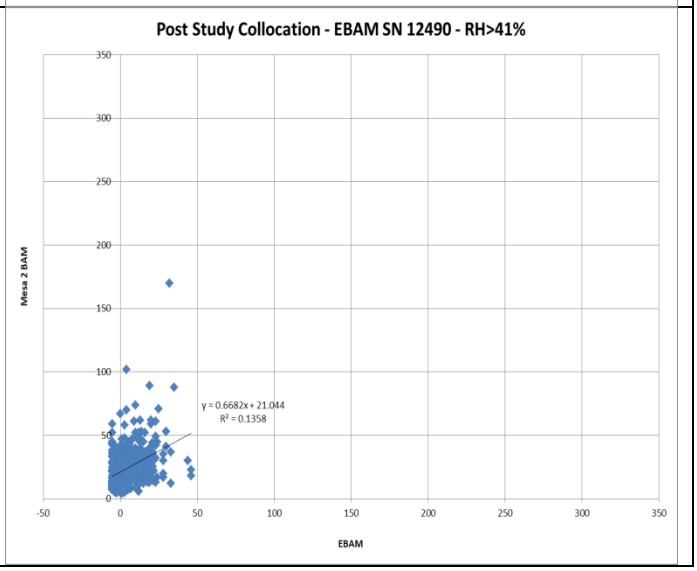
Mesa 2 BAM
EBAM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y = 0.6682x + 21.044
R² = 0.1358
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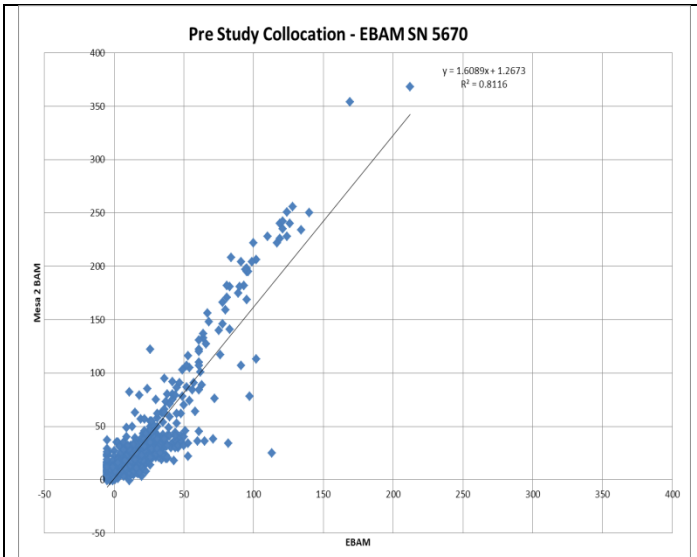
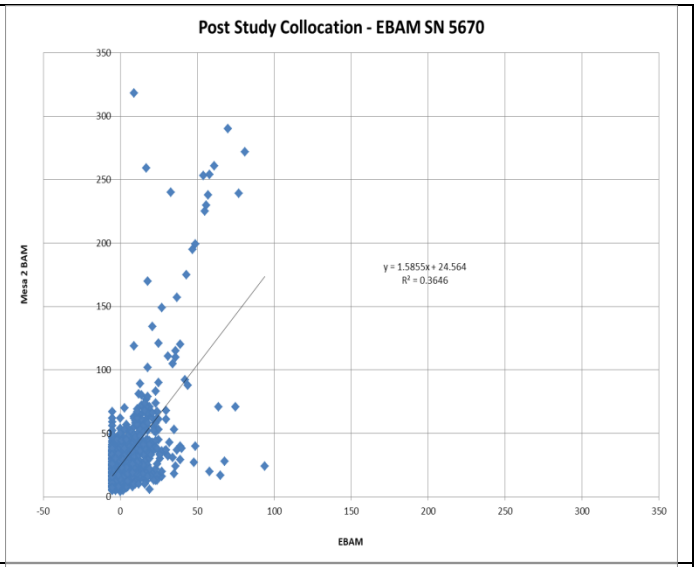
EBAM


Pre Study Collocation - EBAM SN 5670
y = 1.6089x + 1.2673
R² = 0.8116
Mesa 2 BAM
EBAM


Post Study Collocation - EBAM SN 5670
y = 1.5855x + 24.564
R² = 0.3646
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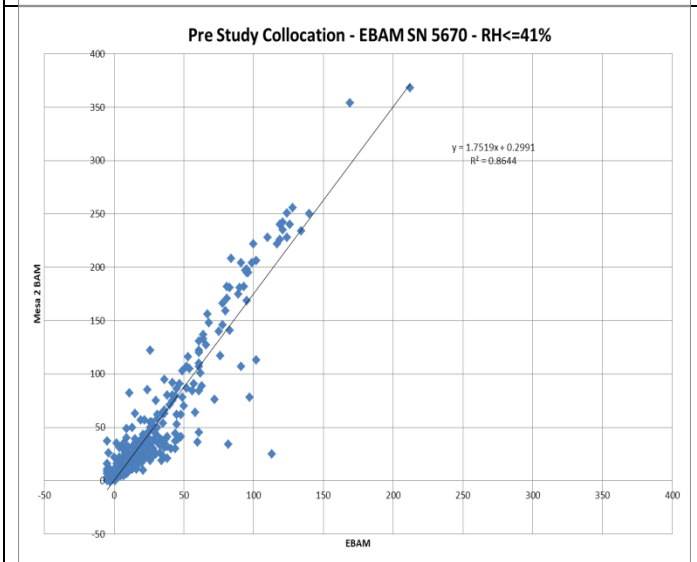
EBAM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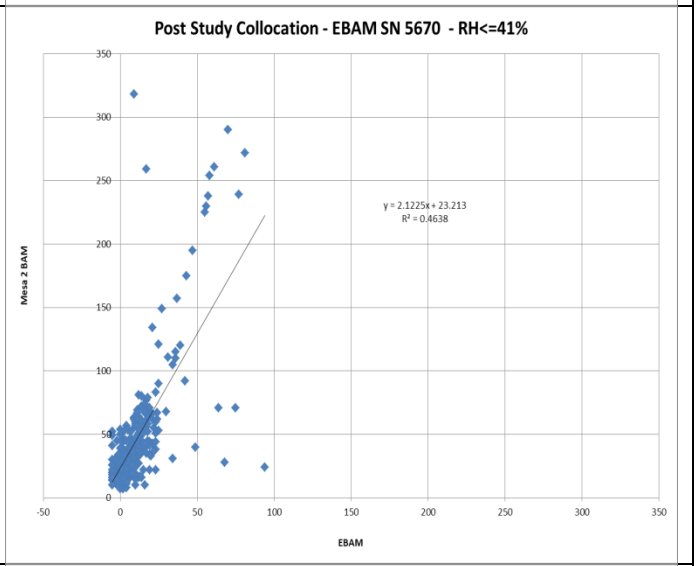
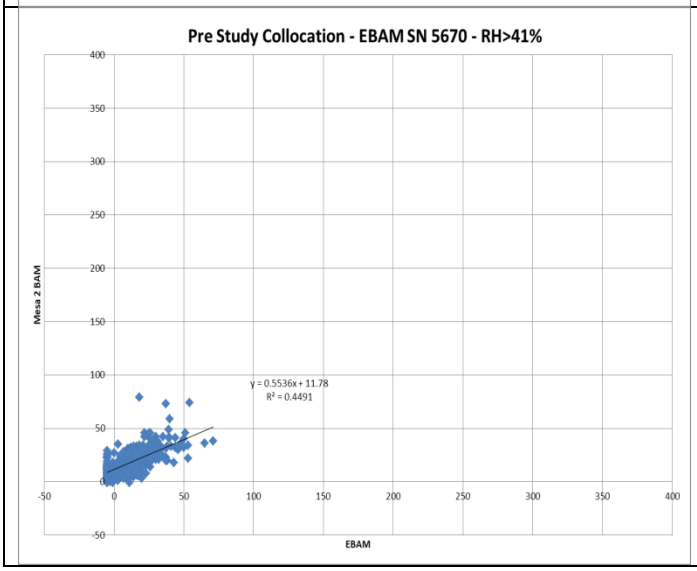
R² = 0.8644
Mesa 2 BAM
EBAM


Post Study Collocation - EBAM SN 5670 - RH<=41%
y = 2.1225x + 23.213
R² = 0.4638
Mesa 2 BAM
EBAM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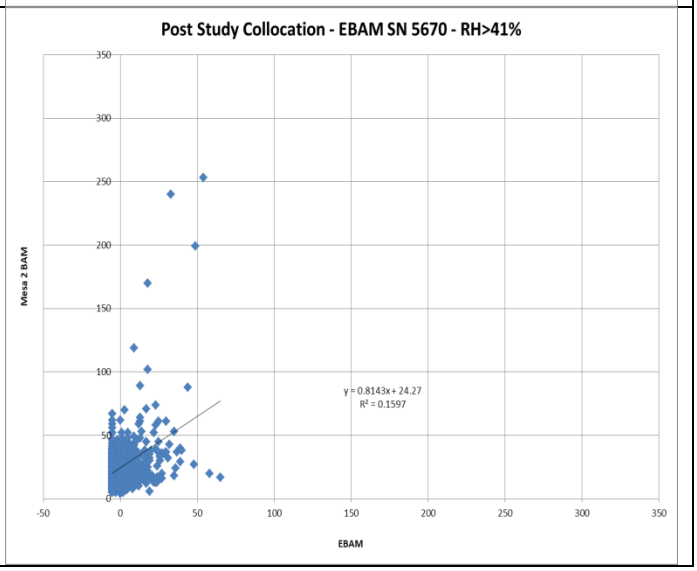
y = 0.5536x + 11.78
R² = 0.4491
Mesa 2 BAM
EBAM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y = 0.8143x + 24.27
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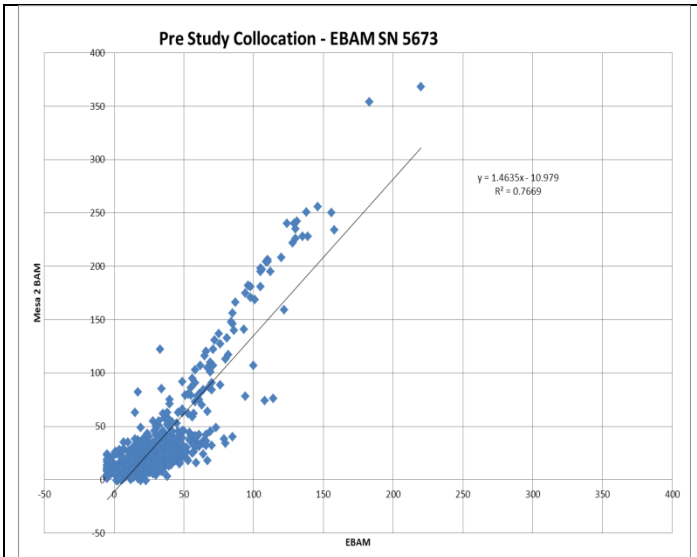
Mesa 2 BAM
EBAM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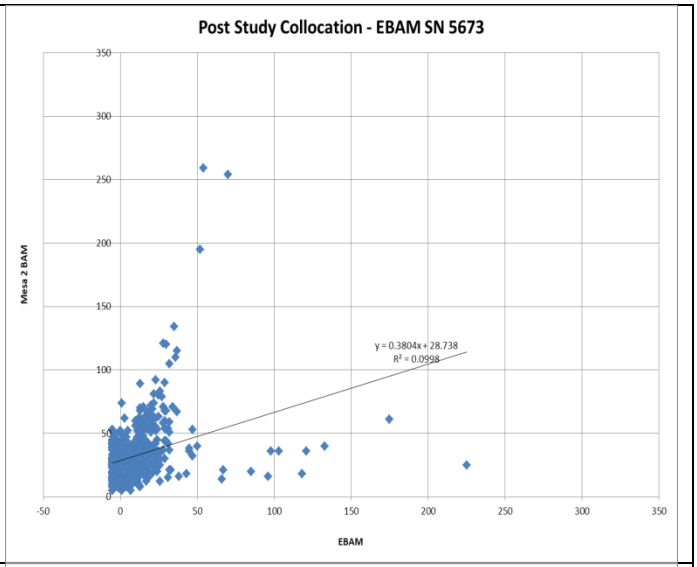
y = 1.4635x - 10.979
R² = 0.7669
Mesa 2 BAM
EBAM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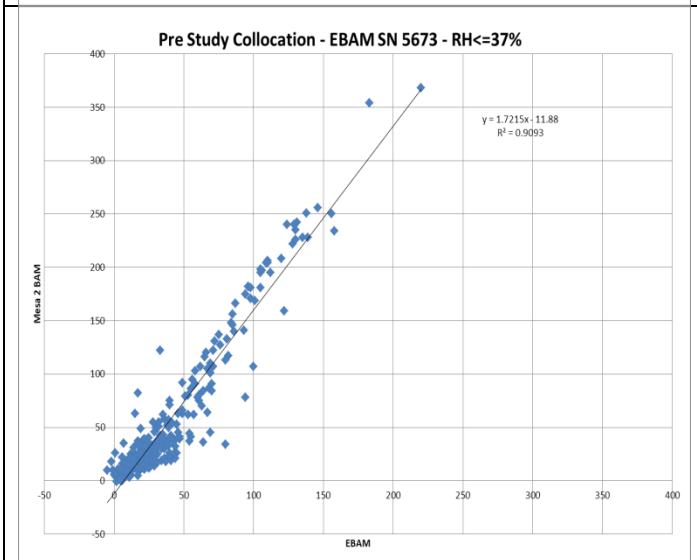
y = 0.3804x + 28.738
R² = 0.0998
Mesa 2 BAM
EBAM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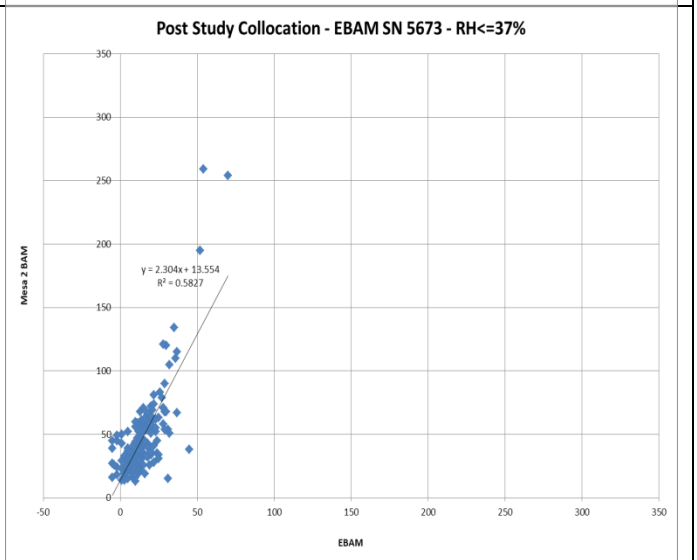
y = 1.7215x - 11.88
R² = 0.9093
Mesa 2 BAM
EBAM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y = 2.304x + 13.554
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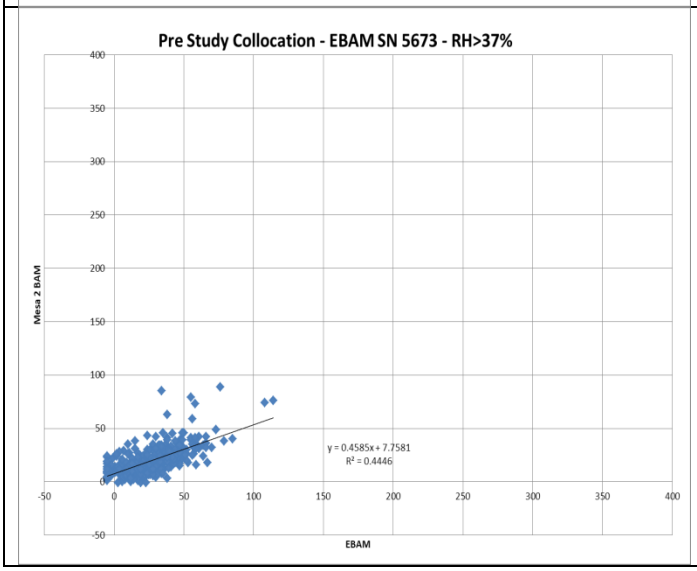
Mesa 2 BAM
EBAM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y = 0.4585x + 7.7581
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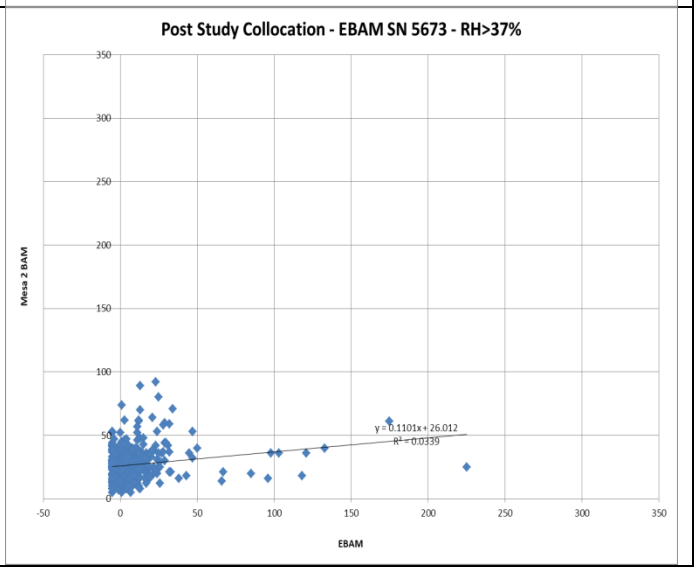
Mesa 2 BAM
EBAM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y = 0.1101x + 26.012
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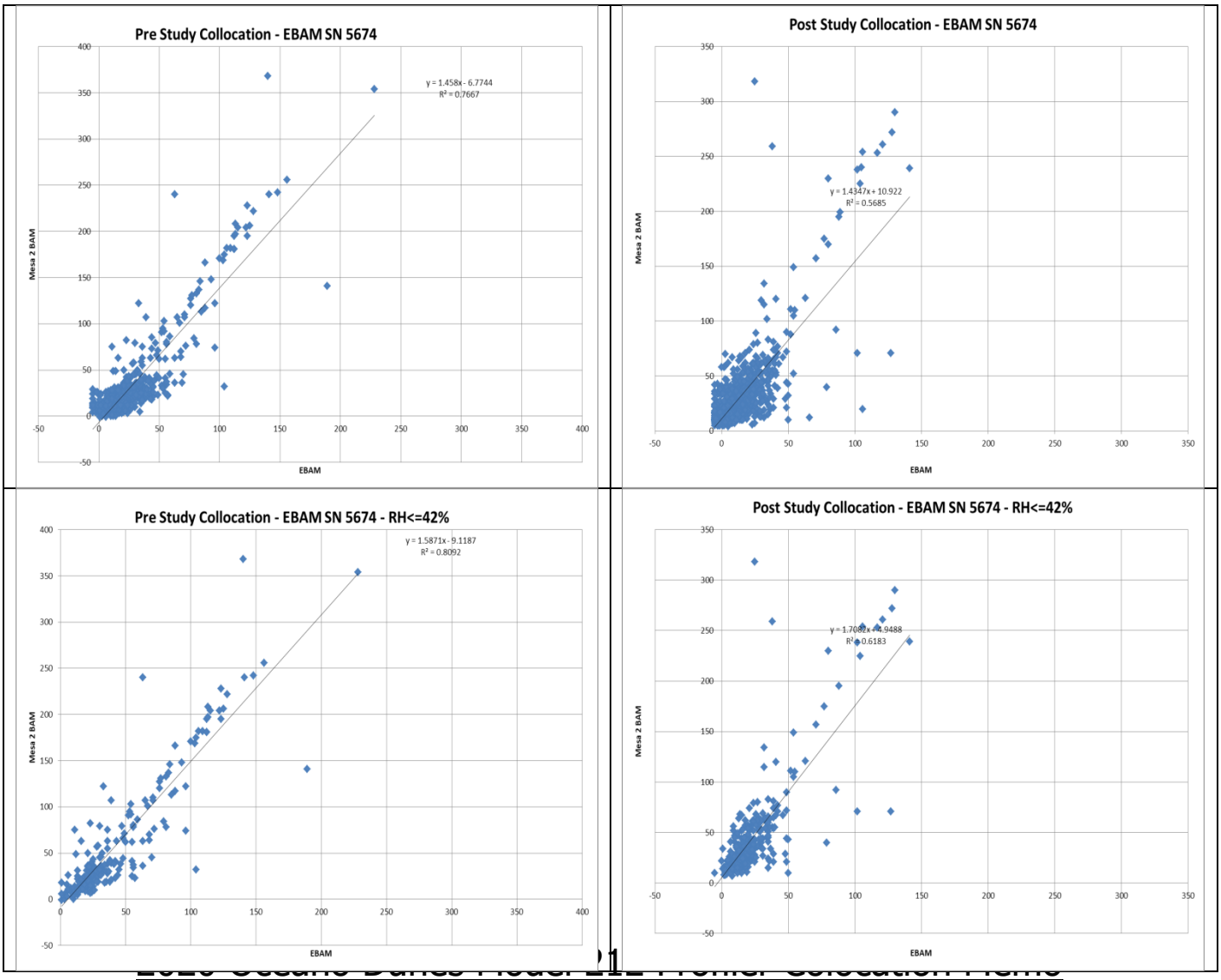
Mesa 2 BAM
EBAM


Pre Study Collocation - EBAM SN 5674
y = 1.458x - 6.7744
R² = 0.7667
Mesa 2 BAM
EBAM
Post Study Collocation - EBAM SN 5674
y = 1.4347x + 10.922
R² = 0.5685
Mesa 2 BAM
EBAM
Pre Study Collocation - EBAM SN 5674 - RH<=42%
y = 1.5871x - 9.1187
R² = 0.8092
Mesa 2 BAM
EBAM
Post Study Collocation - EBAM SN 5674 - RH<=42%
y = 1.7082x - 44.9488
R² = 0.6183
Mesa 2 BAM
EBAM

2020 Oceano Dunes Model 212 Profiler Colocation Memo

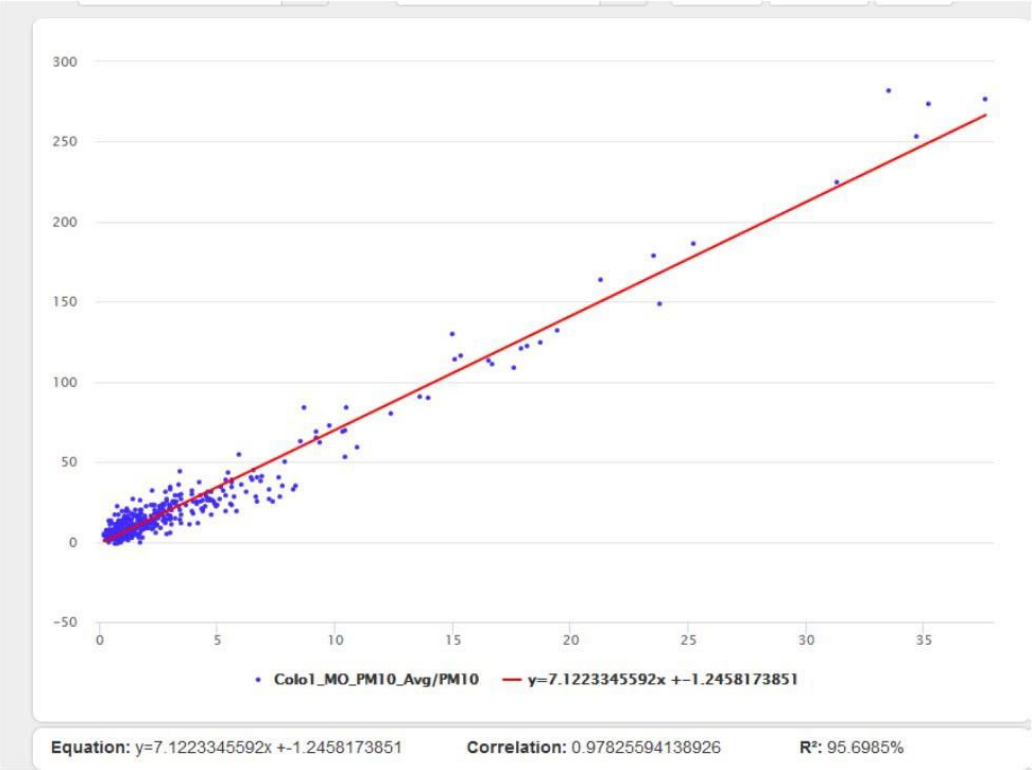
The following summarizes the results of the collocation testing that was conducted by T&B Systems for the Oceano Dunes PM_{10} Network Met One Profilers. Collocation data were obtained by collocating the profilers at the CDF monitoring station for comparison against the Met One Beta Attenuation Monitor (BAM 1020) operated at the site. The picture below shows the collocation setup.

Sixteen Profilers (Profilers 01 – 16) were included in the primary testing period (shown above) from March 12 to April 2, 2020. These were then deployed to the study area, and four additional Profilers (Profilers 17 – 20) were tested from April 2 to April 15, 2020. Hourly average, concentrations approaching 300$\mu g/m^3$, as measured by the BAM, were achieved during both periods. Hourly-average concentrations measured by each Profiler were compared against BAM hourly-average concentrations using standard linear regression analysis. Review of the plots shows consistent linear agreement between all Profilers and the BAM with little scatter. All linear regression results showed good correlation (R^2 > 0. 95, with the exception of Profiler 13 where one outlier affected the calculation), and intercepts very close to zero. However, all Profilers where reporting concentrations of only about one quarter that reported by the BAM. Plots of the collocated comparison data are attached and summarized in the table below. In addition to presenting slope and intercept adjustment factors needed to normalize the Profiler data relative to the BAM data, the table also indicates the site where each Profiler has been deployed (as of May 11, 2020).

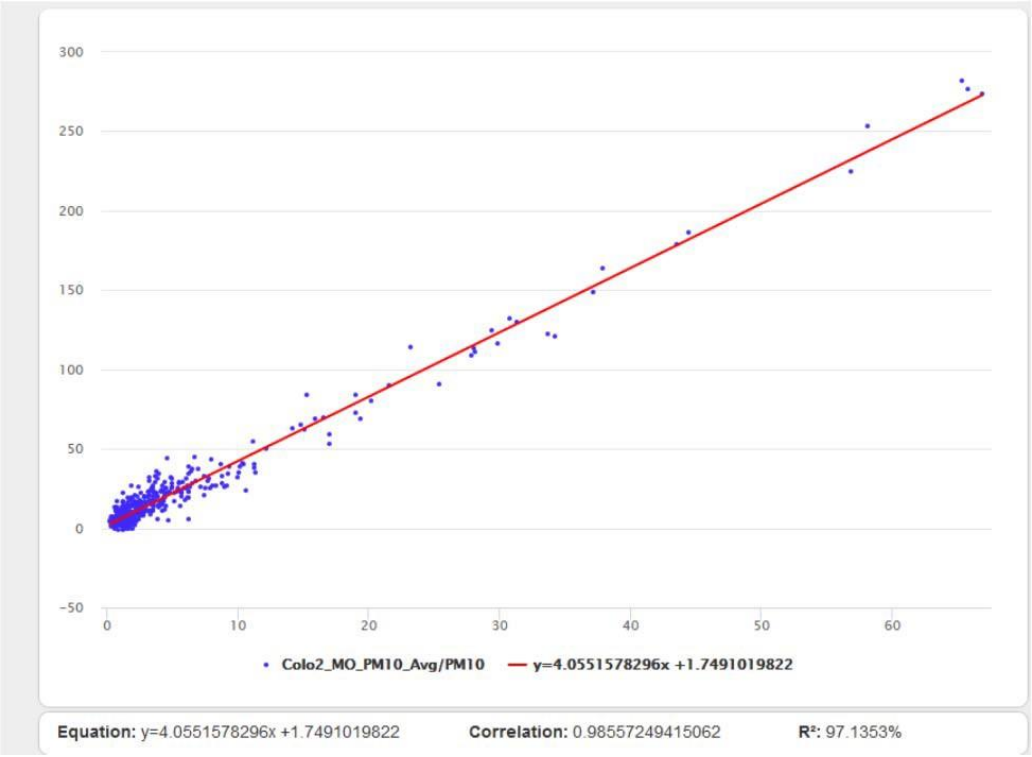
Profiler Deployment Oceano Dunes 2020

Last Updated May 11, 2020

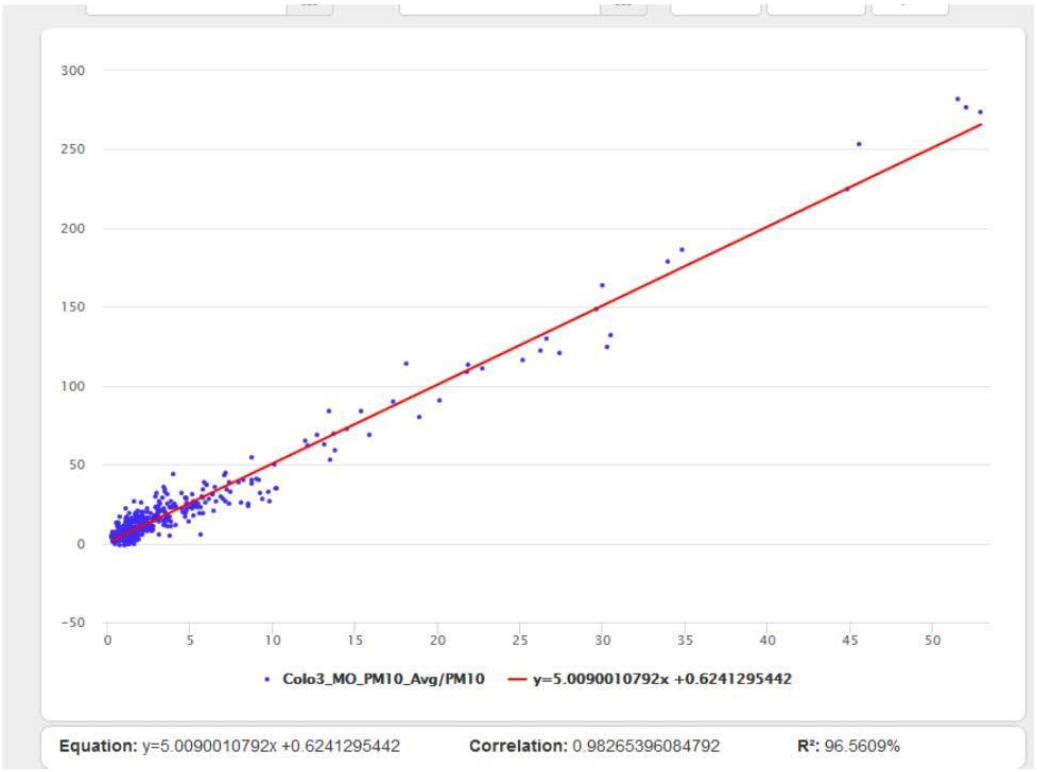
Site	Profiler #	SN	Slope	Intercept (ug/m3)	R^2
101 Moymell	01	10961	7.122	-1.25	0.9570
102 BBQ Flats	02	9290	4.055	1.75	0.9714
103 Camping	03	9286	5.009	0.62	0.9656
104 La Grande	04	9288	3.118	2.58	0.9692
105 Shoreline	05	9285	4.027	1.72	0.9673
106 Windfence	07	9281	3.829	1.73	0.9704
107 Acacia	08	9282	5.066	1.03	0.9674
108 Cottonwood	14	9284	4.792	1.04	0.9691
109 Haybail	16	20016	4.085	0.74	0.9671
110 Tabletop	10	9282	4.866	2.12	0.9631
111 Phillips 66	11	9287	3.491	2.05	0.9702
112 Scout	13	9283	3.679	2.51	0.8393
113 CDF	17	20017	3.787	0.17	0.9649
114 Pipeline	12	9278	4.883	1.09	0.9659
115 Sodar	15	20015	3.824	0.89	0.9619
Spare	20	20306	3.683	1.28	0.9668
	19	20019	4.091	-0.44	0.9622
	18	20018	3.716	0.05	0.9634
	06	9279	4.943	1.08	0.9639
Broken (post testing)	09	9280	3.696	3.28	0.9517



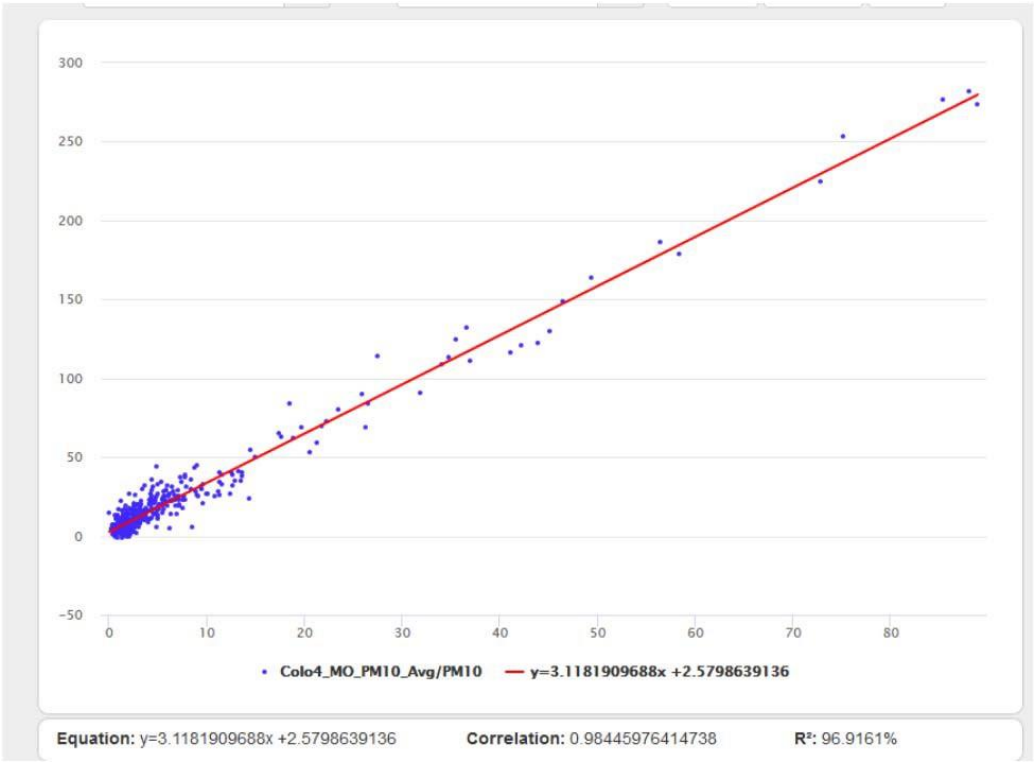
Profiler 01, SN 10961



Profiler 02, SN 9290



Profiler 03, SN 9286



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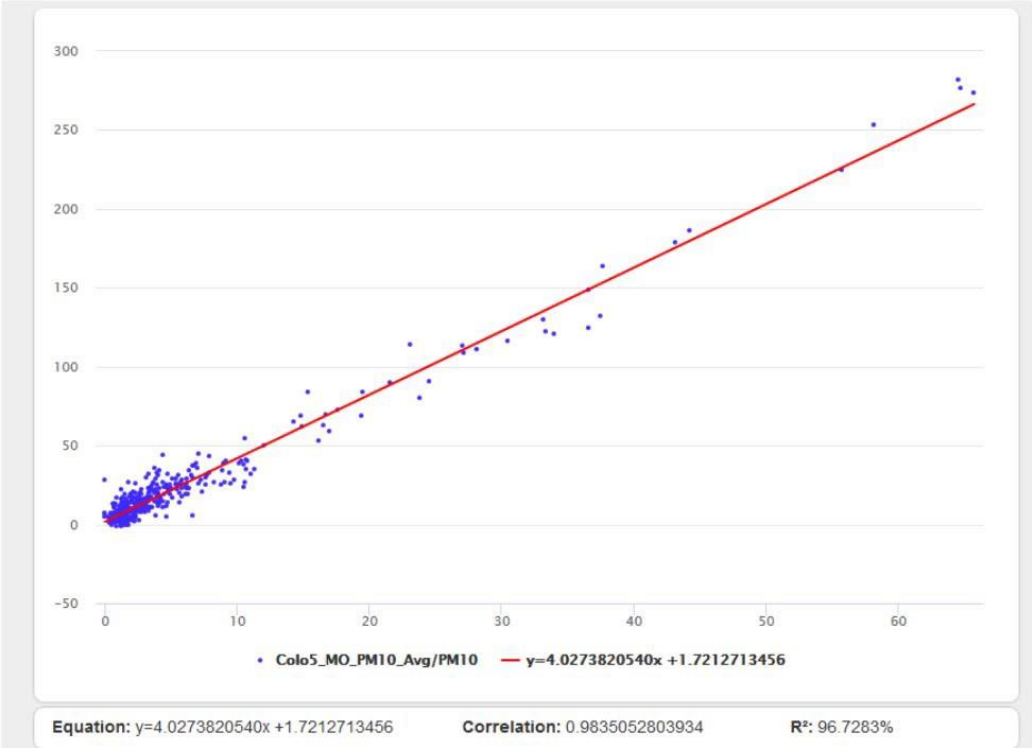
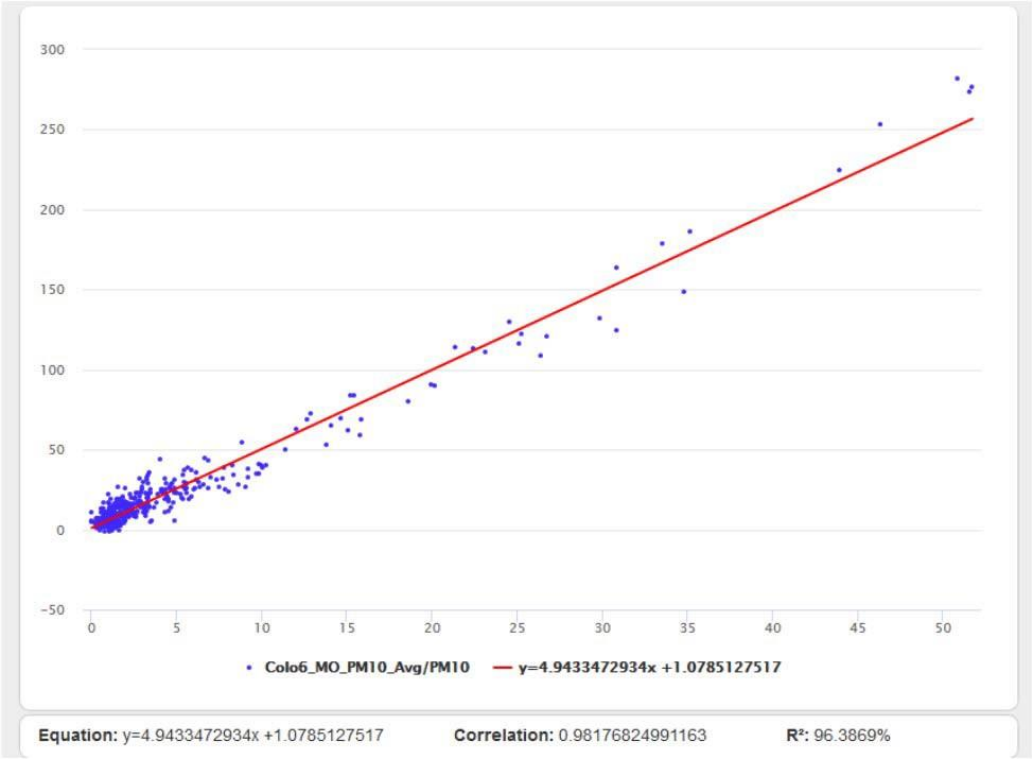
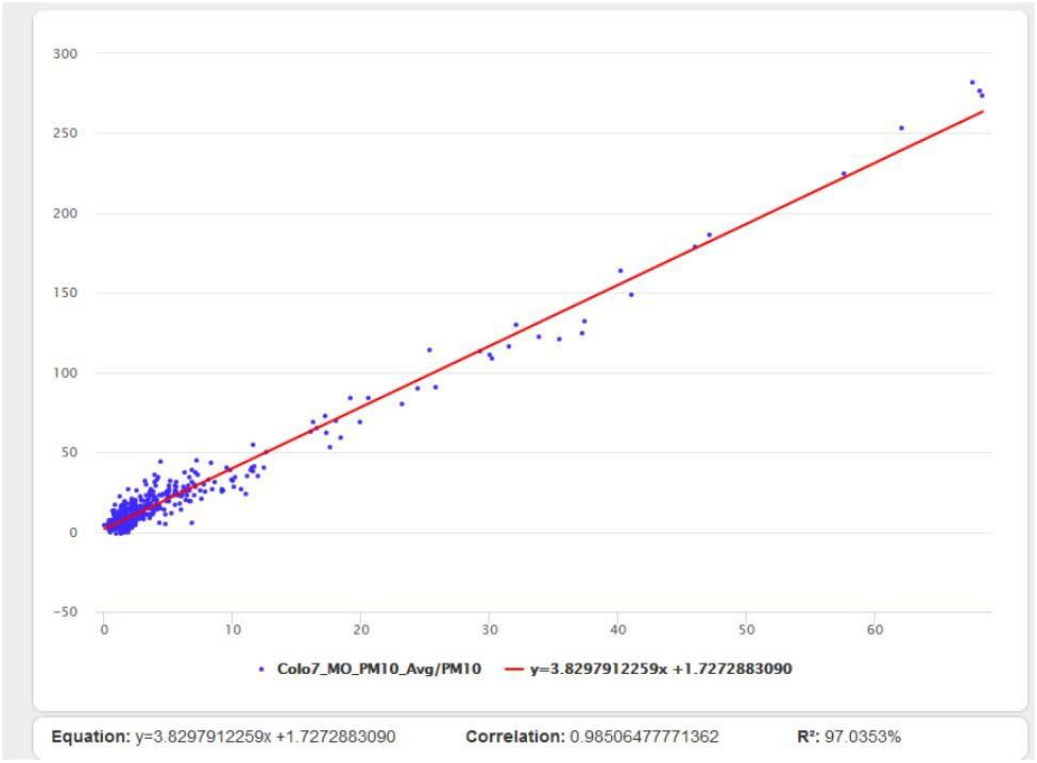


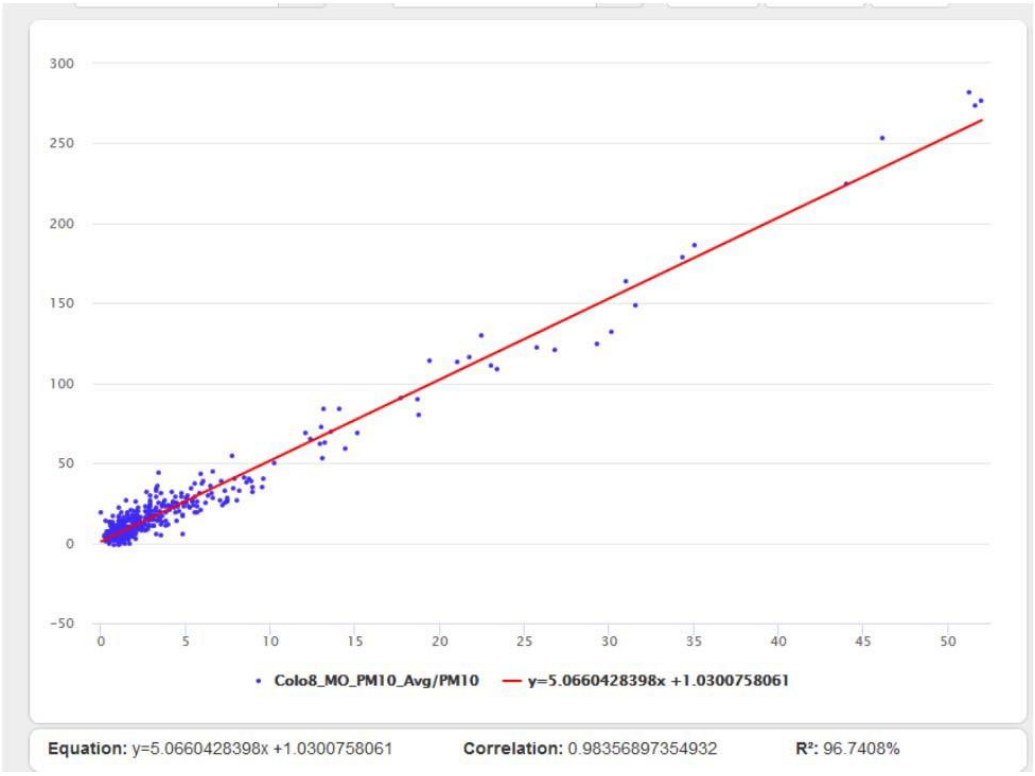
Profiler 05, SN 9285



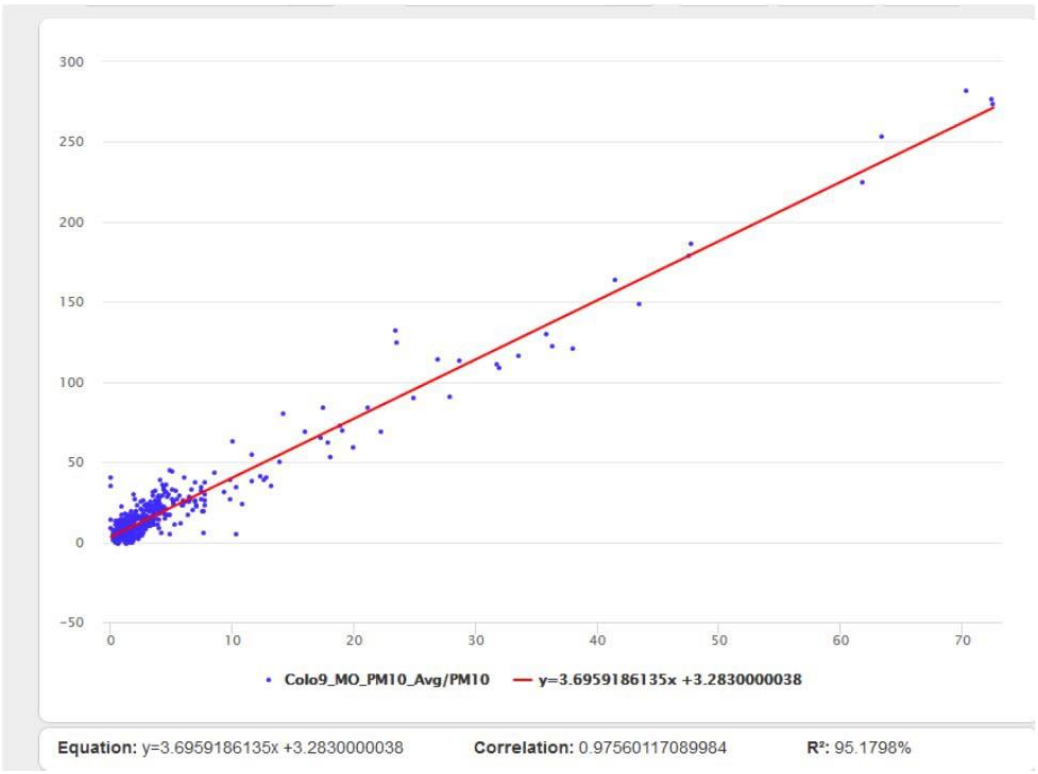
Profiler 06, SN 9279



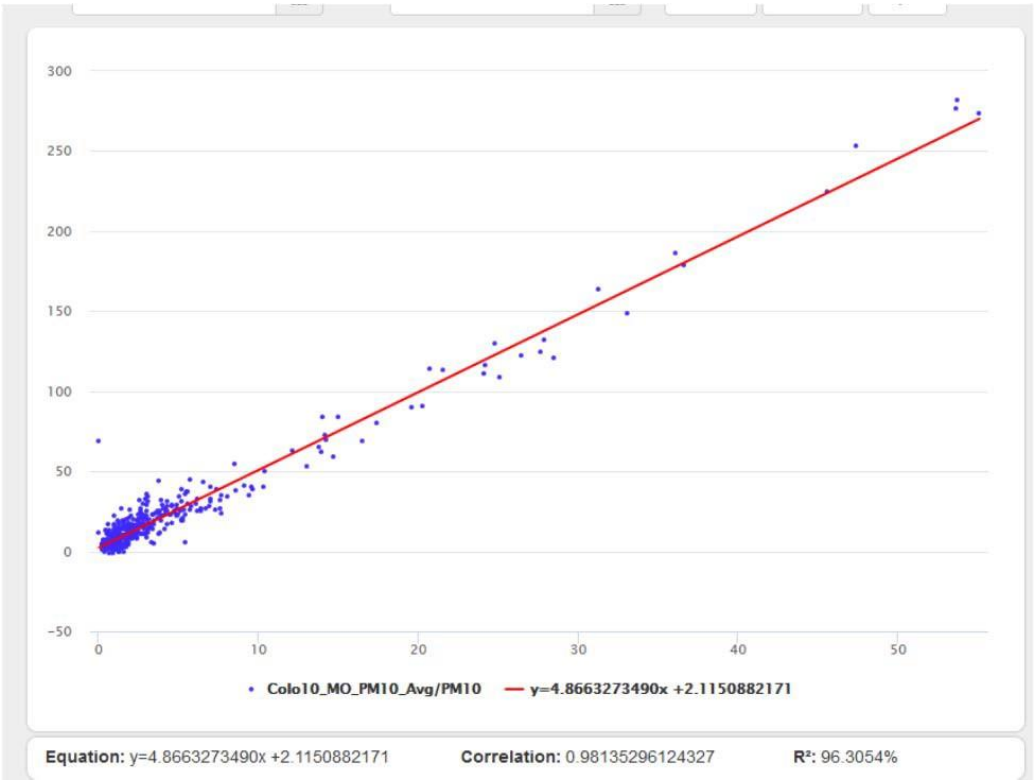
Profiler 07, SN 9281



Profiler 08, SN 9282



Profiler 09, SN 9280



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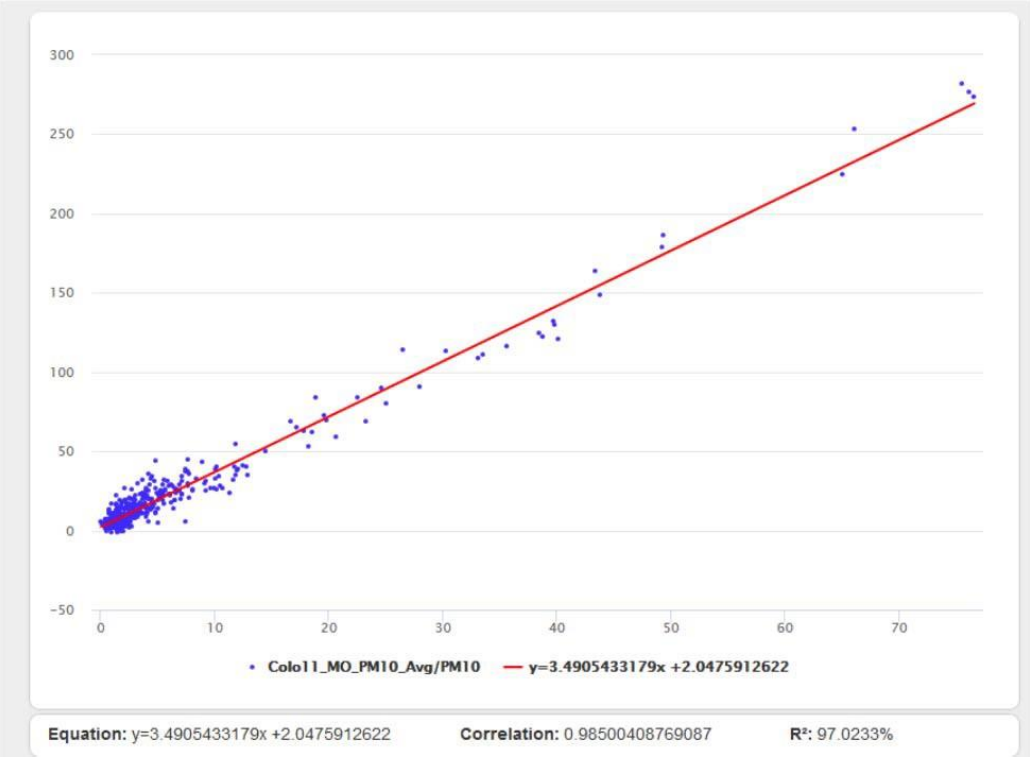

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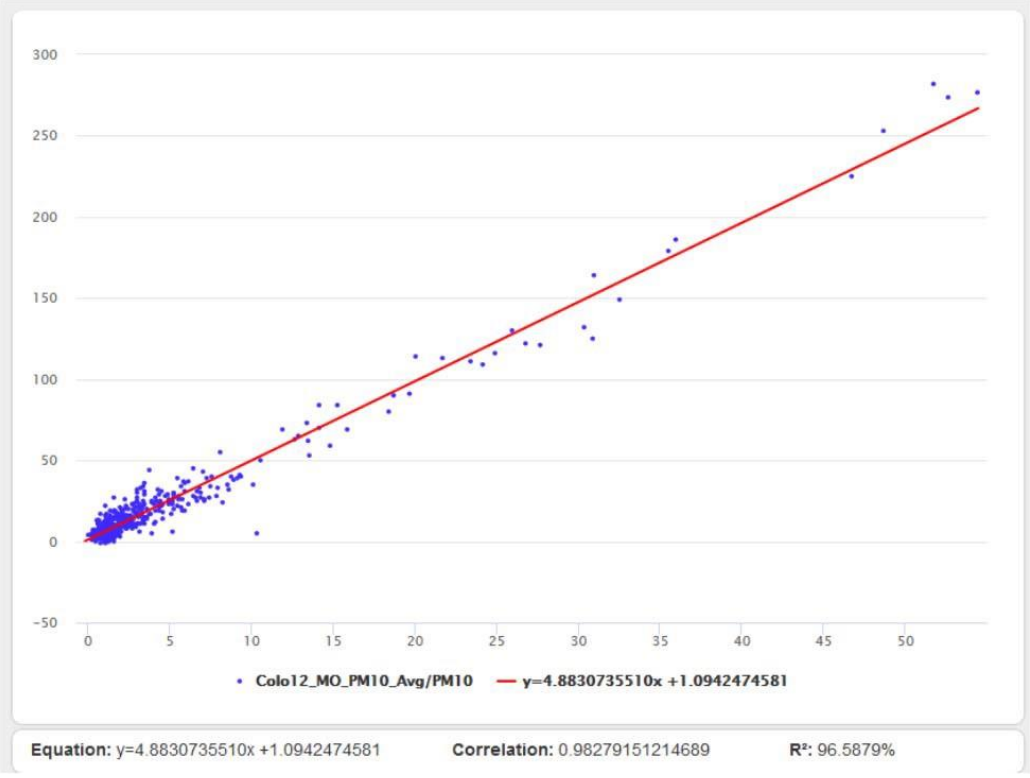

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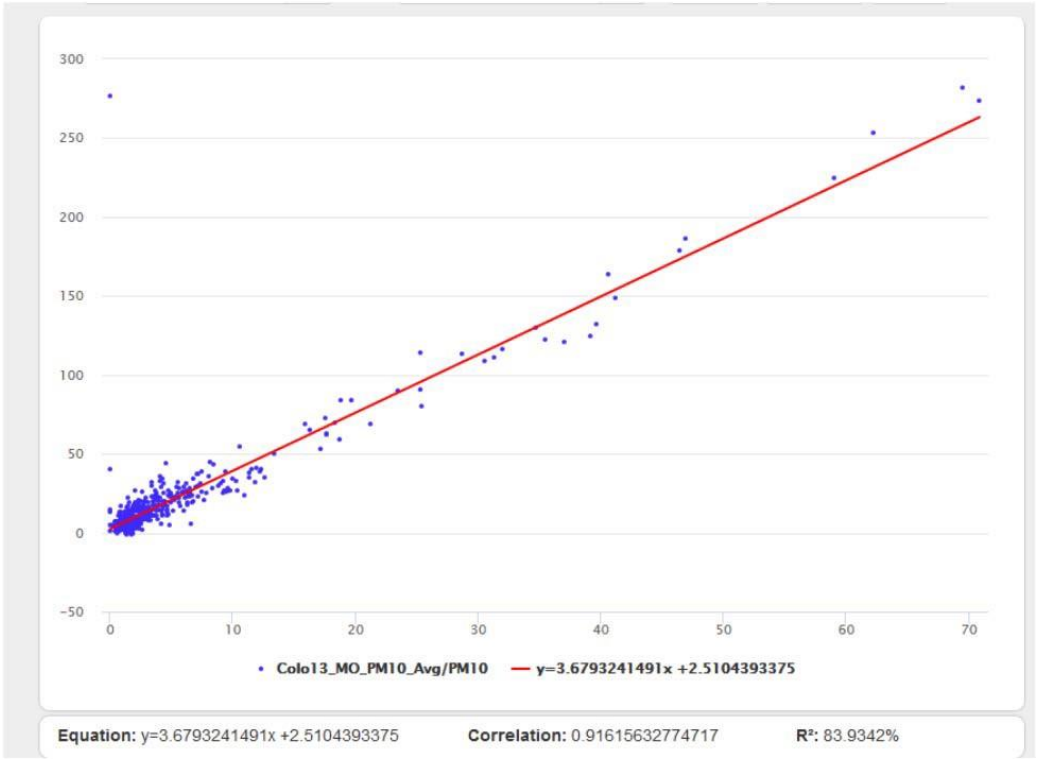

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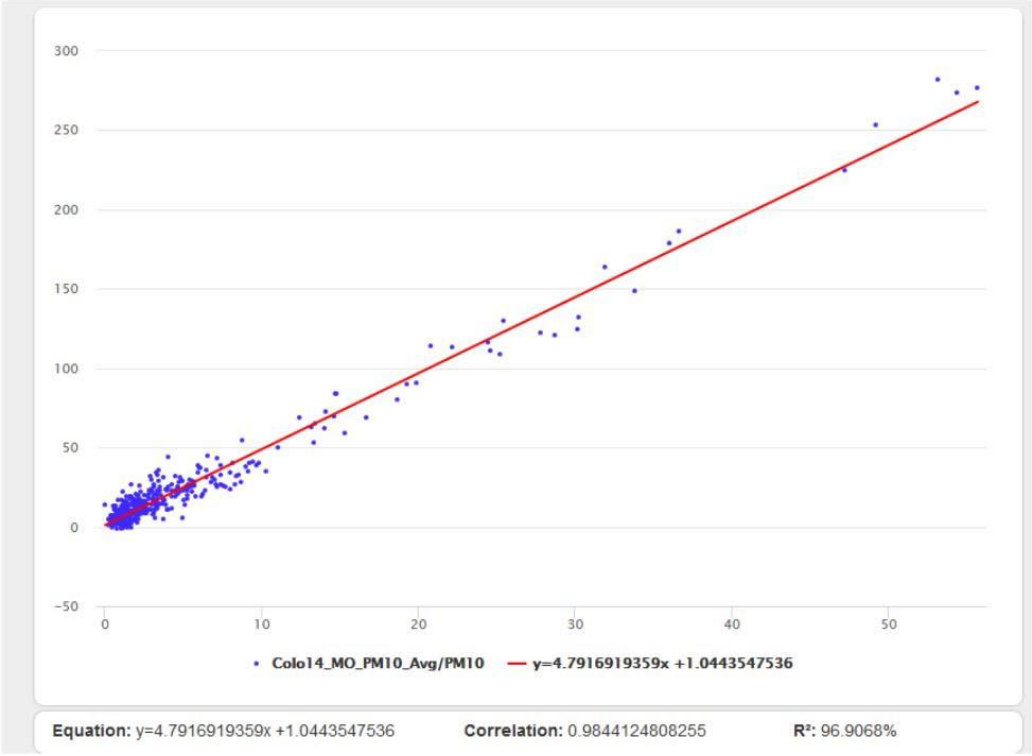

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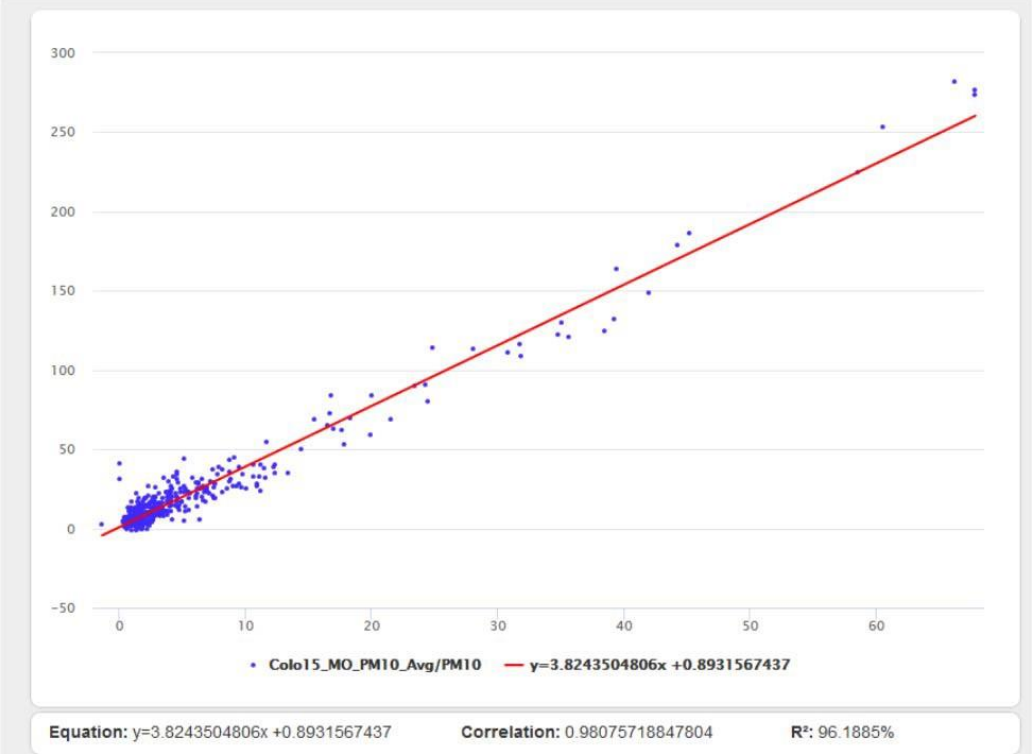

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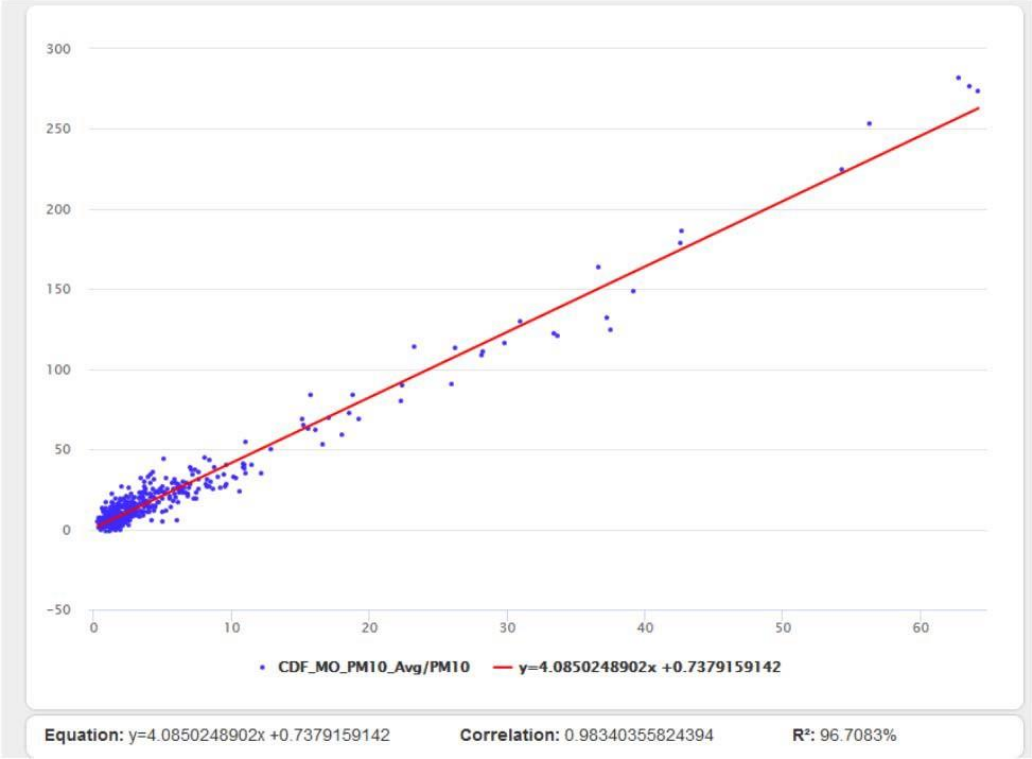

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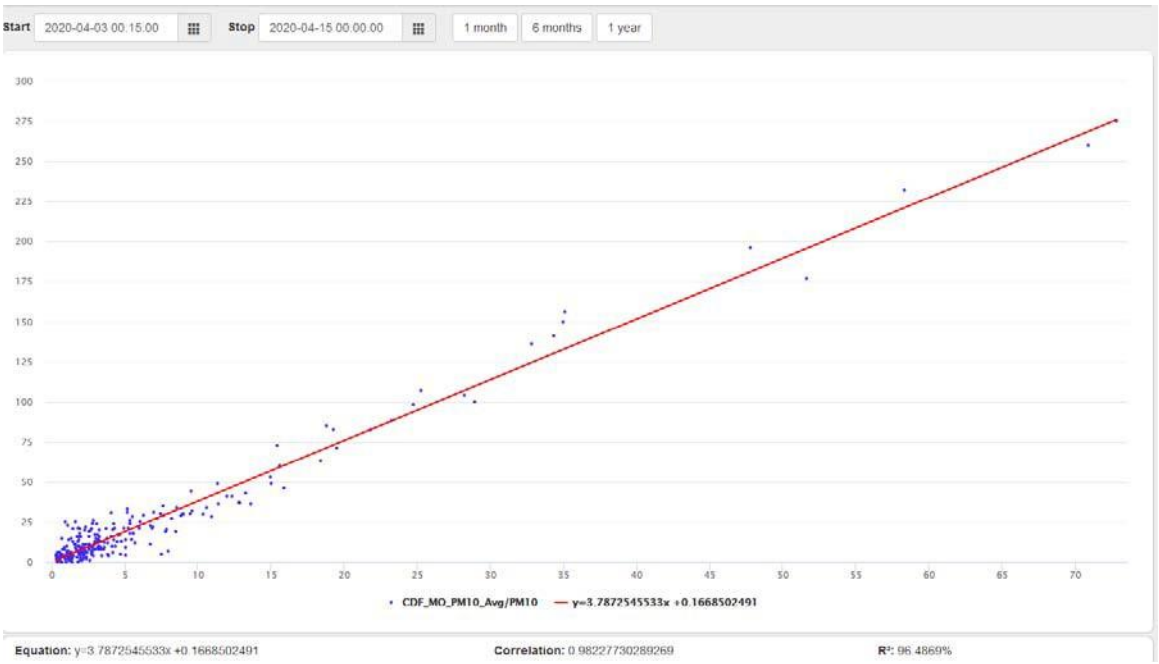

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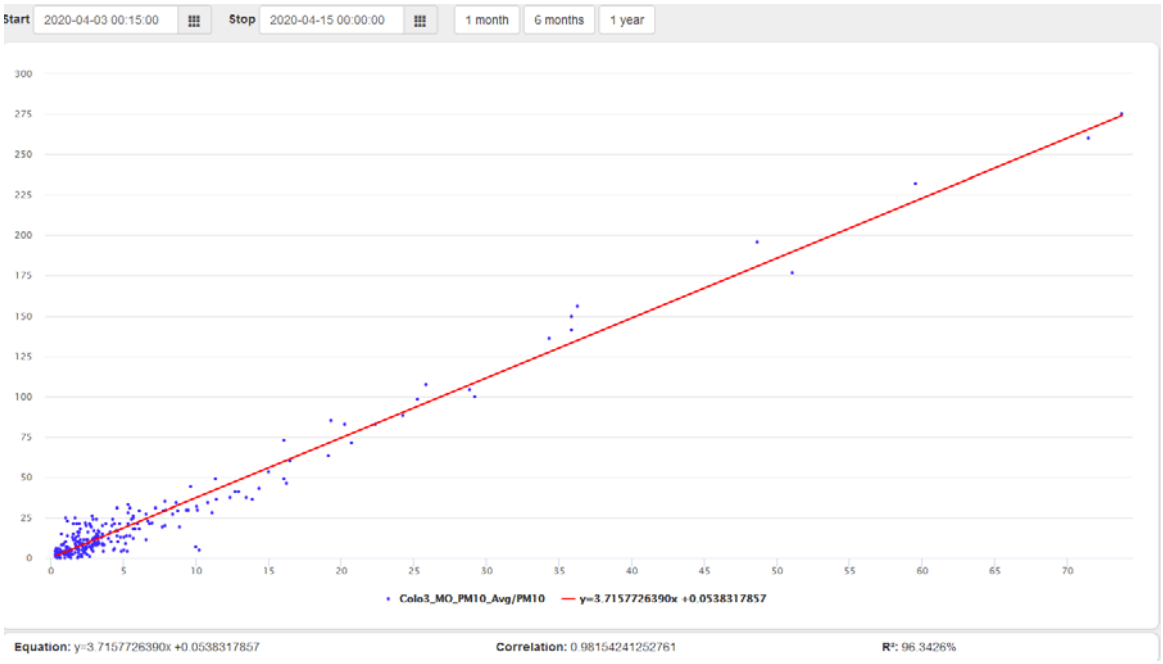

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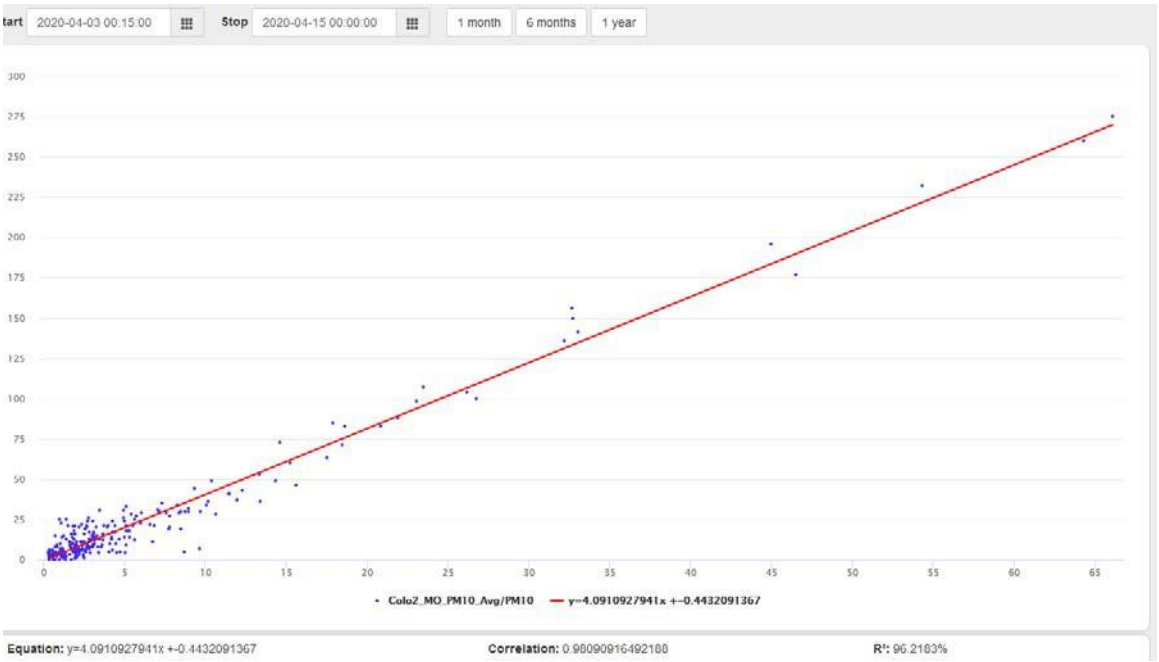

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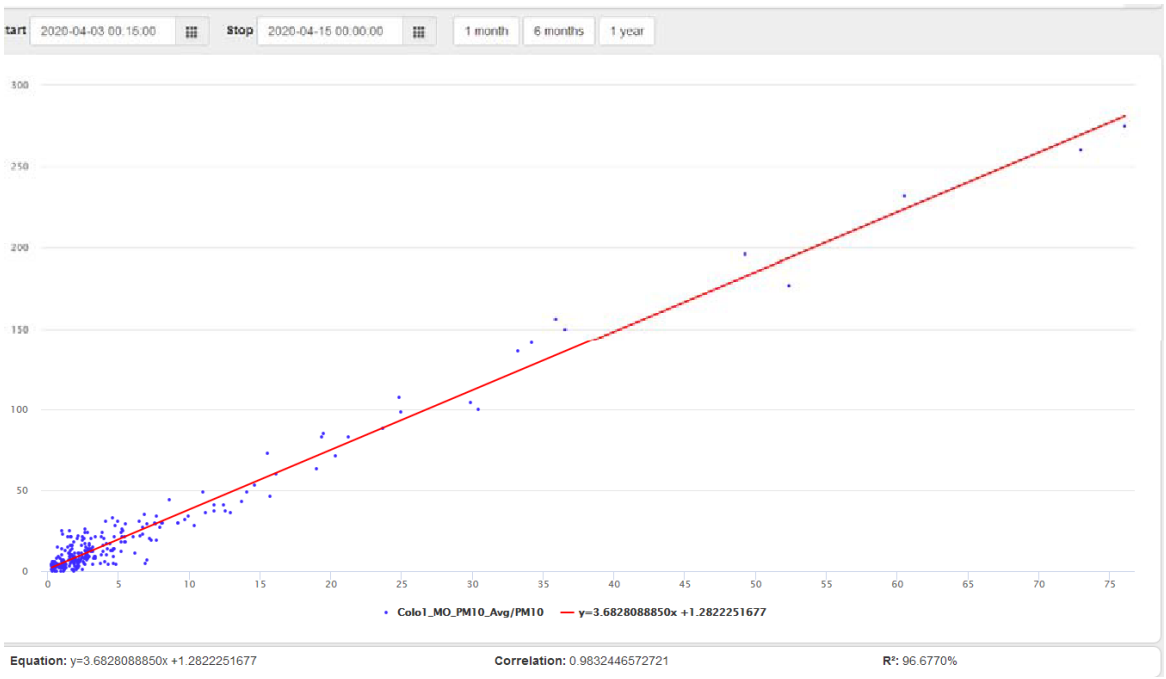

Profiler 20, SN 20306

APPENDIX B: RESUMES

David Yoho

***Monitoring Service Manager* — Santa Clarita, CA**

AREAS OF SPECIALIZATION

a. Air Quality and Meteorological Monitoring Systems
b. Performance and Systems Audits
c. Quality Assurance Project Plans
d. Data Quality Assurance and Validation
e. Special Studies/Research
f. Boundary Layer Measurements
g. Small Sensors Integration and Testing
h. USEPA $PM_{2.5}$ FEM Certification Experience

EDUCATION

B.A., Environmental Geography, California State University, Northridge

AFFILIATIONS

Air and Waste Management Association (A&WMA)
American Meteorological Society (AMS)

SUMMARY OF EXPERIENCE

Based in the Santa Clarita, California area and serving as a Monitoring Service Manager within Trinity Consultants' Monitoring Services and Integration Department. Primary role over the past 24 years of experience has been to assist clients in a wide range of industries including utilities, aerospace, papermill, refineries, oil & gas, mineral products, and government agencies with the need to collect and analyze ambient meteorological and air quality data. Air monitoring experience includes network/station planning and design, agency negotiations, equipment procurement, station installations, equipment maintenance, performance and systems auditing, and operator training.

TECHNICAL EXPERTISE

Air Monitoring Performance and Systems Audits - Currently managing and performing performance and systems evaluations for several ambient air quality monitoring projects in California and Hawaii. Audits include SLAMS, PSD, Special Purpose (AB617 and Rule 1180) and Tribal networks and range from meteorological sensors, gaseous and PM measurements. Mr. Yoho also has experience performing audits of boundary layer remote sensing equipment including radar wind profilers, temperature profilers and SODAR systems using rawinsondes.

Air Quality and Meteorological Instrumentation - Mr. Yoho is familiar with wind direction, wind speed, vertical wind speed, evaporation, temperature, relative humidity, precipitation, barometric pressure, snow depth, and solar and net radiation sensors as well as all types of ambient air quality analyzers including $NO/NO_2/NO_x/NO_y$, O_3, $PM_{2.5}/PM_{10}$, SO_2, CO, and CH_4/NMHC/THC, H_2S/TRS and Black Carbon. Mr. Yoho also has experience using and integrating small sensors and mobile platform monitoring including aircraft and vehicles.

Ambient Air Monitoring Network Management – Mr. Yoho is **c**urrently managing several ambient air quality monitoring projects in California including networks used for upwind/downwind PM_{10} compliance and a network of Hexavalent samplers to provide measurements used for impacts and surveillance of industry on Environmental Justice communities. Mr. Yoho is currently operating a mini-SODAR used for the detection of mixing height in Wyoming.

Refinery and Facility Fenceline Monitoring – Mr. Yoho is **c**urrently performing required fenceline monitoring for facilities including refineries in California. Instrumentation currently being operated includes Open Path monitors, H_2S and Black Carbon point monitors and meteorological instrumentation. Mr. Yoho also performed PM fenceline monitoring in Detroit, MI and Seattle, WA

Data Management, Validation and Air Monitoring Training –Currently performing data management and QA/QC of data for several clients. Mr. Yoho also assists Tribes with AQS data validation and uploads to

the USEPA. Additionally, Mr. Yoho provided training of air monitoring networks for several tribes in California and Nevada.

EMPLOYMENT HISTORY

2000 – 2001	Parsons Corporation
2002 – March 2023	T&B Systems
March 2023 – present	Trinity Consultants

Casey Lenhart

***Director, Monitoring Services* — Salt Lake City**

AREAS OF SPECIALIZATION

a. Ambient Air Quality Monitoring Systems
b. Meteorological Monitoring Systems
c. Project Management
d. Quality Assurance Performance and System Audits
e. Extensive Experience with all types of Air Quality and Meteorological Instrumentation
f. Equipment/System Design, Configuration, and Integration
g. Digital Peripheral Communications
h. IP Communications
i. Cellular Communications
j. RF Telemetry
k. Satellite Communications
l. Data logger Programming
m. Continuous Emissions Monitoring Systems (CEMS) Audits
n. Renewable Energy Assessment Monitoring Systems

EDUCATION

Advanced Technical Center, Salt Lake City, Utah Microsoft Certified Systems Engineer
ITT Technical Institute, Salt Lake City, Utah Associate of Applied Science Electronics Engineering Technology

SUMMARY OF EXPERIENCE

Mr. Casey Lenhart is a director of monitoring services for MSI Trinity and resides in the Salt Lake City, Utah office. Mr. Lenhart has 30 years of professional experience including 21 years of experience in the field of meteorological and air quality measurements. Mr. Lenhart is responsible for the technical direction and management of meteorological monitoring and air quality sampling programs domestically and internationally. He is an expert in air quality and meteorological monitoring, has extensive and proven experience with instrumentation, system integration, quality assurance, calibration, auditing, and operating all types of meteorological and air quality equipment. In addition, Mr. Lenhart is an expert with near real-time data retrieval and data hosting systems.

Mr. Lenhart has comprehensively managed numerous ambient air quality and meteorological monitoring projects all over the western US including Quality Assurance and Project Plan writing through final data acceptance.

AFFILIATIONS

Air and Waste Management Association

CERTIFICATION

TECHNICAL EXPERTISE

Instrumentation Measurement - Mr. Lenhart has extensive experience with many types of instrumentation including measurements of TSP, PM_{10}, $PM_{2.5}$, O_3, CO, SO_2, NO-NO_x-NO_2-NO_y, VOC, and Methane/HC, scene and visibility, as well as all meteorological parameters on 10- to 100-meter towers including horizontal and vertical wind speed, wind direction, temperature, delta-temperature, relative humidity, dew point, sigma theta, solar radiation, net radiation, precipitation, evaporation, and barometric pressure. Mr. Lenhart has served as site technician and managed several PSD, NRC, SPM, and SLAMS meteorological and air quality monitoring programs. As project manager, his responsibilities include the oversight of tall tower installations, routine site visits by MSI's technicians, monthly flow checks, zero/span/one-point QC checks, quarterly sampler and analyzer calibrations, sensor repair, maintenance, and/or replacement.

Communication Platforms - Mr. Lenhart has extensive experience with all types of communication platforms including satellite, RF telemetry, and IP cellular and data acquisition equipment. He has extensive experience in data logger programming using CR Basic and Edlog applications for Campbell Scientific data loggers (CR 10X, 21X, 23X, 850, 1000, and 3000) as well as peripheral device-conditional control via analog signals and digital MODBUS protocol.

Systems Design - Mr. Lenhart has designed and fabricated an exhaustive list of monitoring equipment systems for use in air quality monitoring, weather modification, sample collection, and atmospheric tracer gas measurement programs. The types of equipment include: automated samplers; automatic calibration systems; remote controlled data acquisition systems; as well as other remote controlled and manually controlled equipment.

EMPLOYMENT HISTORY

2006 – Present	Trinity Consultants
1996 – 2006	TouchFON International
1988 – 1996	TRC/North American Weather Consultants

Scott Adamson, CCM

***Managing Consultant* — Salt Lake City**

AREAS OF SPECIALIZATION

a. Meteorological Monitoring Systems
b. SLAMS, SPM, and PSD Monitoring Regulations
c. Exceptional Event Rule Analysis
d. Emergent Pollutant Monitoring and Analysis
e. Quality Assurance Project Plans
f. Air Quality and Meteorological Monitoring Systems
g. Data Quality Assurance and Validation
h. Exceptional Event Technical Analyses
i. Ambient Monitoring Network Assessments
j. Software Solutions Development
k. Database Development with Microsoft Access
l. Toxics Regulation and Human Health Risk Analyses
m. Atmospheric Dispersion Modeling Using the AERMOD, CALPUFF, and AESCREEN Dispersion Modeling Systems

SUMMARY OF EXPERIENCE

A Board-Certified Consulting Meteorologist (CCM) based in the Greater Salt Lake City, Utah area serving as a Managing Consultant within Trinity Consultants' Monitoring Services and Integration Department. Primary role over the past 17 years of experience has been to assist clients in a wide range of industries including utilities, aerospace, papermill, refineries, oil & gas, mineral products, and government agencies with the need to collect and analyze ambient meteorological and air quality data. Air monitoring experience includes network/station planning and design, agency negotiations, equipment procurement, station installations, equipment maintenance, performance auditing, and operator training.

EDUCATION

B.S., Meteorology, University of Utah

AFFILIATIONS

Air and Waste Management Association (A&WMA)
American Meteorological Society (AMS)

CERTIFICATION

AMS Board Certified Consulting Meteorologist (CCM) - #714

TECHNICAL EXPERTISE

Ambient Air Monitoring Network Management - Currently managing over 20 ambient air quality monitoring projects throughout the United States from Wyoming, Utah, New Mexico, Idaho, South Carolina, Illinois, and California. Mr. Adamson has extensive experience with SLAMS, PSD, and special purpose monitoring programs/studies. He acted as primary investigator for the annual Upper Green River Wyoming Ozone Study from 2010 through 2020. This studies focus is on the spatial and temporal distribution of ozone and precursor pollutants and how they relate to atmospheric conditions and snowfall within the Upper Green River Basin. Successfully negotiated regulatory agencies the use of lower-cost sensors for air quality analyses and compliance notifications for better understanding of impacts of industry on the Environmental Justics communities.

Permitting/Dispersion Modeling – Mr. Adamson has experience in the development, evaluation, application, and execution of dispersion models in support of PSD and NSR permit applications using the AERMOD and CALPUFF modeling systems. He has experience preparing minor source air quality permit applications incorporating process descriptions, emission inventories, regulatory review, regulatory applicability, and air quality impact analyses. In support of PSD permit applications, Mr. Adamson has recently completed Class II, Class I, and NAAQS dispersion modeling analyses for several refineries, a proposed 580MW combined-cycle electric generation facility, and a silicon manufacturing plant in Mississippi. Mr. Adamson is actively involved in several other AERMOD dispersion modeling projects associated with NSR permits to demonstrate compliance with the state or national ambient air quality standards (NAAQS) for proposed water pipeline pump stations, hydrotreating facilities, produced water evaporation pond facilities, a mineral

company's solar evaporation facility, several sand and aggregate facilities, and a large chemical industrial complex in the Caribbean.

Computer Programming - Mr. Adamson has written software to graphically display and predict plume dispersion and particulate fallout during solid rocket booster tests. With respect to air dispersion modeling, he has written software to manipulate meteorological data into formats suitable for input into dispersion models. In addition, Mr. Adamson developed and implemented Trinity's Data Scanning and Alert System (DSAS), a software application which conducts live inspection of meteorological and air quality monitoring site data. The program is used as a tool to assist Trinity staff identify data outliers, problems with site equipment, and site communication issues.

Air Quality and Meteorological Instrumentation - Mr. Adamson is familiar with wind direction, wind speed, vertical wind speed, evaporation, temperature, relative humidity, precipitation, barometric pressure, snow depth, and solar and net radiation sensors as well as all types of ambient air quality analyzers including $NO/NO_2/NO_x/NO_y$, O_3, $PM_{2.5}/PM_{10}$, SO_2, CO, and CH_4/NMHC/THC.

Mr. Adamson provides technical expertise in the quality assurance and analysis of meteorological and air quality data. This includes successful justification for data exclusion of PM_{10} concentrations measured near a coal-fired power plant as part of an exceptional event demonstration. He has developed and maintained databases as part of large research projects including a regional ozone study.

EMPLOYMENT HISTORY

2007 – January 2022	Trinity Consultants
January 2022 – August 2022	Ramboll
August 2022 – present	Trinity Consultants

Greg Dunn

***Instrumentation Technician* — Santa Clarita**

AREAS OF SPECIALIZATION

a. Meteorological and Air Quality Equipment Calibration
b. Routine Monitoring Operations
c. Quality Control
d. Instrument Preventive Maintenance and Repair
e. PM Filter Handling and CoC
f. Metal Fabrication

SUMMARY OF EXPERIENCE

Mr. Dunn has 2 years of meteorological and air quality experience including equipment installation, operation, calibration, maintenance, troubleshooting, and repair.

EDUCATION

Tool and Manufacturing Academy, Los Angeles Valley College, 2018

TECHNICAL EXPERTISE

Air Quality Technician - Since joining Trinity, Mr. Dunn has obtained experience with various instrumentation including measurements of continuous PM_{10} and as well as meteorological parameters including wind speed, wind direction, temperature, relative humidity, precipitation, and barometric pressure. His experience includes calibrations, performing one-point QC checks, preventative maintenance, monthly particulate sampler flow and leak checks, and filter-exchanges.

Certification - Global Wind Organization – To further enhance his capabilities in installing and servicing meteorological systems, Mr. Dunn has been certified to climb tall towers. The aim of this certification is to enable the participants, through theoretical and practical training, to use basic personal protective equipment, work safely at heights and perform comprehensive basic rescue from heights in a wind turbine / meteorological tower environment. The certification also aims to encourage positive manual handling and ergonomic behavior and enable participants to perform manual handling tasks in a safe manner.

SCV Homeworks Owner – For SCV Homeworks, Mr. Dunn provided handyman services, repair, construction and consultations for various home improvement projects. Mr. Dunn also designed and constructed furniture, cabinetry and various other wood/steel structures for clients across southern California.

Lathe Production Manager/ CNC Lathe Machinist – For Advanced Technology Machining Mr. Dunn oversaw and managed a team of CNC Lathe operators, for daily manufacturing operations. Mr. Dunn assisted with employee scheduling and workload planning. Mr. Dunn operated multiple models of mills and lathes in the daily production of parts for the aerospace industry and DOD.

PROJECT EXPERIENCE

City of Paramount Hexavalent Chromium Monitoring: Since June 2023, Mr. Dunn has assisted Trinity in the operation of the network. This includes sampler calibrations, sampler maintenance, filter exchanges, and correspondence with the analysis lab.

Sempra Socal Gas Company Meteorological Stations : Since October 2023, Mr. Dunn has performed the audits and maintenance of Sempra Socal Gas Companie's Meteorological Stations. This includes sonic wind sensors, temperature, relative humidity, barometric pressure.

Terra Gen Upwind Downwind PM10 Monitoring: Since June 2023, Mr. Dunn has performed the monthly calibration and maintenance of PM10 monitors used for upwind and downwind PM10 monitoring at Terra Gen's Edwards Sanborn facility in Mojave California. He also maintains and calibrates the meteorological sensors in the network. These measurements include wind speed, wind direction, temperature, relative humidity, barometric pressure and present weather sensors.

South Coast Air Quality Management District Coachella Network: Since June 2023, Mr. Dunn has performed calibrations of SCAQMD's Coachella meteorological instrumentation including wind speed, wind direction, temperature, relative humidity, and barometric pressure. Mr. Dunn also refurbished the White Water Wash site by updating sensors, upgrading wiring, repairing enclosures and mounting hardware.

EMPLOYMENT HISTORY

6/2023 – Present	Trinity Consultants
3/2020 – 6/2023	SCV Homeworks
8/2018 – 3/2020	Advanced Technology Machining

Michael Santimauro

***Instrumentation Technician* — Santa Clarita**

AREAS OF SPECIALIZATION

a. Meteorological and Air Quality Equipment Calibration
b. Routine Monitoring Operations
c. Quality Control
d. Instrument Preventive Maintenance and Repair
e. PM Filter Handling and CoC

SUMMARY OF EXPERIENCE

Mr. Santimauro has 2 years of meteorological and air quality experience including equipment installation, operation, calibration, maintenance, troubleshooting, and repair.

EDUCATION

Associates of Science Cyber Security, Los Angeles Mission College, August 2023

TECHNICAL EXPERTISE

Air Quality Technician - Since joining Trinity, Mr. Santimauro has experience with various instrumentation including measurements of continuous PM_{10} and as well as meteorological parameters including wind speed, wind direction, temperature, relative humidity, solar radiation, net radiation, precipitation, and barometric pressure. His experience includes calibrations, performing one-point QC checks, preventative maintenance, monthly particulate sampler flow and leak checks, and filter-exchanges.

Certification - Global Wind Organization – To further enhance his capabilities in installing and servicing meteorological systems, Mr. Santimauro has been certified to climb tall towers. The aim of this certification is to enable the participants, through theoretical and practical training, to use basic personal protective equipment, work safely at heights and perform comprehensive basic rescue from heights in a wind turbine / meteorological tower environment. The certification also aims to encourage positive manual handling and ergonomic behavior and enable participants to perform manual handling tasks in a safe manner.

IT Technician – For A2Z-IT, Mr Santimauro assisted in onsite IT assistance with deploying, maintaining and decommissioning workstations for clients across Southern California.

Project Manager – For the Barrington Metal Works. Mr. Santimauro prepared weekly budgets and progress reports. Mr. Santimauro also prepared daily job site documentation and planning along with leading the field team of welders and fabricators.

PROJECT EXPERIENCE

City of Paramount Hexavalent Chromium Monitoring: Since September 2023, Mr. Santimauro has assisted Trinity in the operation of the network. This includes sampler calibrations, sampler maintenance, filter exchanges, and correspondence with the analysis lab.

Cal Trans Road Weather Information Systems: Since September 2023, Mr. Santimauro has performed the calibration and maintenance of Cal Trans District 10's Road Weather Systems. This includes sonic wind sensors, temperature, relative humidity, barometric pressure and present weather sensors.

Terra Gen Upwind Downwind PM10 Monitoring: Since September 2023, Mr. Santimauro has assisted in the calibration and maintenance of PM10 monitors used for upwind and downwind PM10 monitoring at Terra Gen's Edwards Sanborn facility in Mojave California.

South Coast Air Quality Management District AB-617 Network and Coachella Network: Since September 2023, Mr. Santimauro has performed calibrations of SCAQMD's AB-617 and Coachella meteorological instrumentation including wind speed, wind direction, temperature, relative humidity, and barometric pressure.

EMPLOYMENT HISTORY

9/2023 – Present	Trinity Consultants
1/2023 – 9/2023	A2Z-IT
4/2014 – 9/2022	Barrington Metal Works

Clint Dominguez

***Senior Technician* — Bakersfield, CA**

AREAS OF SPECIALIZATION

a. LDAR Inspection and Report Preparation
b. WDR Monitoring
c. Water and Soil Sampling
d. Ambient Monitoring
e. Flue Gas Monitoring
f. LDAR Comparative Monitoring

CERTIFICATIONS

Medical Clearance for Respiratory Protection
Respiratory Fit Test
First Aid Training
Method 21 Trained
Aerial Lift Operator Training
Transportation Worker Identification Credential (TWIC)
Passport Training

SUMMARY OF EXPERIENCE

Mr. Dominguez serves as a lead field technician. He has a range of experience in drinking water and wastewater monitoring and sampling at California permitted drinking water and WDR permitting facilities. Tasks included collection and submittal of samples under chain of custody to certified laboratories.

LDAR experience includes inspections for routine permit requirements as well as comparative monitoring as required in agency issued violations. Inspection equipment experience includes maintenance, calibration, and troubleshooting.

He maintains a tracking schedule for technicians and equipment required for all field tasks. Responsibilities include forecasting for all LDAR supplies and calibration schedules.

TECHNICAL EXPERTISE

LDAR Inspection and Report Preparation – Performed LDAR inspections on oil and gas production and chemical facility components per Method 21. Prepared inspection reports demonstrating inspection rule compliance and inspection equipment calibration.
WDR Monitoring – Monitoring includes pH, EC, and Dissolved Oxygen.
Water and Soil Sampling – Wastewater sampling includes Biological Oxygen Demand, Nitrogen, Dissolved Solids, and various metals as required by permit specific requirements. Land Area Application soil monitoring includes advancing boring tool and sampling spoon to permit designated depths for collection and testing of Nitrogen, various metals, carbon content, and % moisture.
Ambient Monitoring – Fenceline air monitoring tasks performed at a SCAQMD permitted refinery.
Flue Gas Monitoring – Flue Gas Emissions Monitoring for combustion equipment.
LDAR Comparative Monitoring – Performed Method 21 comparative monitoring for fugitive emissions components.

PUBLICATIONS AND PRESENTATIONS

Heat Illness Prevention - Safety Presentation

EMPLOYMENT HISTORY

2016	Frito Lay – Merchandiser
2016 – Present	Trinity Consultants – Senior Technician

EXHIBIT A

SCOPE OF WORK
Part 2: Draft Quote for Equipment Lease

DRAFT QUOTE FOR EQUIPMENT LEASE

Quantity	Product	Trinity Lease to SBCAPCD
MET ONE INSTRUMENTS		
2	MET ONE ES-405 PARTICULATE PROFILER (ES-405)	$9,912
2	RS-232 COMM CABLE (83245)	$154
2	TRIPOD (EX-905)	$720
	TOTAL:	**$10,786**
ARA INSTRUMENTS		
4	N-FRM PM10 SAMPLER (102-000)	$12,288
4	UNIVERSAL MOUNT BRACKET (140-400)	$448
4	HEAVY DUTY TRIPOD (141-000)	$560
4	Spare Dewalt 18v, 5Ah Lithium Battery	$800
	TOTAL:	**$14,096**
CAMPBELL SCIENTIFIC		
2	CR310 DATA LOGGER	$2,160
2	ENC 10/12 ENCLOSURE/TRIPOD MOUNTING	$703
2	10 FT TRIPOD (CM106B)	$1,624
0	HYGROVUE10 TEMP/RH SENSOR	$0
0	VUECBL-L10 (cable for HygroVUE)	$0
0	RAD10E RADIATION SHIELD	$0
2	RV50(X) MOUNTING KIT	$93
2	PS150 12V POWER SUPPLY	$635
2	POWER SUPPLY 24Vdc	$68
2	CM204 SENSOR CROSSARM w/ CM210 MOUNTING KIT	$242
2	CM204SS STAINLESS STEEL SENSOR CROSSARM w/ CM210	$338
4	HARDWARE FITTING 1x1 NURAIL	$137
	TOTAL:	**$5,999**
R. M. YOUNG		
2	WIND MONITOR - AQ (05305)	$1,818
2	5 COND CABLE (60FT)	$26
	TOTAL:	**$1,843**
	SUBTOTAL:	**$32,724**
	TAX:	***TBD***
	SHIPPING:	**TBD**
	TARIFF CHARGES:	**TBD**
	TOTAL TRINITY LEASE AMOUNT TO SBCAPCD NOT TO EXCEED:	**$50,000**

Equipment costs do not include costs for Shipping, Tax or Tariff charges. The total equipment lease has been estimated to not exceed $50,000, including taxes, shipping, and tariff charges.

EXHIBIT B

PAYMENT ARRANGEMENTS
Compensation Upon Completion

A. For CONTRACTOR services to be rendered under this Agreement, CONTRACTOR shall be paid a total contract amount, including cost reimbursements, not to exceed $296,258.

B. Payment for services and /or reimbursement of costs shall be made upon CONTRACTOR's satisfactory performance, based upon the scope and methodology contained in **EXHIBIT A** as determined by DISTRICT.

C. Upon completion of the work detailed in **EXHIBIT A** and/or delivery to DISTRICT of item(s) specified therein, CONTRACTOR shall submit to the DISTRICT DESIGNATED REPRESENTATIVE an invoice or certified claim on the DISTRICT Treasury for the service performed. This invoice or claim must cite the assigned Board Contract Number. DISTRICT DESIGNATED REPRESENTATIVE shall evaluate the quality of the service performed and/or the item(s) delivered and if found to be satisfactory shall initiate payment processing. DISTRICT shall pay invoices or claims for satisfactory work within 30 days of receipt of correct and complete invoices or claims from CONTRACTOR.

D. DISTRICT's failure to discover or object to any unsatisfactory work or billings prior to payment will not constitute a waiver of DISTRICT's right to require CONTRACTOR to correct such work or billings or seek any other legal remedy.

Exhibit C

INDEMNIFICATION AND INSURANCE REQUIREMENTS
(For Environmental Contractors and/or Consultant Contracts)

INDEMNIFICATION

CONTRACTOR agrees to indemnify, defend (with counsel reasonably approved by DISTRICT) and hold harmless DISTRICT and its officers, officials, employees, agents and volunteers from and against any and all claims, actions, losses, damages, judgments and/or liabilities arising out of this Agreement from any cause whatsoever, including the acts, errors or omissions of any person or entity and for any costs or expenses (including but not limited to attorneys' fees) incurred by DISTRICT on account of any claim except where such indemnification is prohibited by law. CONTRACTOR'S indemnification obligation applies to DISTRICT'S active as well as passive negligence but does not apply to DISTRICT'S sole negligence or willful misconduct.

NOTIFICATION OF ACCIDENTS AND SURVIVAL OF INDEMNIFICATION PROVISIONS

CONTRACTOR shall notify DISTRICT immediately in the event of any accident or injury arising out of or in connection with this Agreement. The indemnification provisions in this Agreement shall survive any expiration or termination of this Agreement.

INSURANCE

CONTRACTOR shall procure and maintain for the duration of this Agreement insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder and the results of that work by the CONTRACTOR, its agents, representatives, employees or subcontractors.

A. Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. **Commercial General Liability (CGL):** Insurance Services Office (ISO) Form CG 00 01 covering CGL on an "occurrence" basis, including products-completed operations, personal & advertising injury, with limits no less than $2,000,000 per occurrence and $4,000,000 in the aggregate.
2. **Automobile Liability**: Insurance Services Office Form Number CA 0001 covering, Code 1 (any auto), or if CONTRACTOR has no owned autos, Code 8 (hired) and 9 (non-owned), with limit no less than $1,000,000 per accident for bodily injury and property damage.
3. **Workers' Compensation**: Insurance as required by the State of California, with Statutory Limits, and Employer's Liability Insurance with limit of no less than $1,000,000 per accident for bodily injury or disease. ***(Not required if CONTRACTOR provides written verification that it has no employees)***
4. **Contractor's Pollution Liability and/or Asbestos Pollution Liability and/or Errors & Omissions:** applicable to the work being performed, with a limit no less than $2,000,000 per claim or occurrence and $2,000,000 aggregate per policy period of one year.

If the CONTRACTOR maintains broader coverage and/or higher limits than the minimums shown above, the DISTRICT requires and shall be entitled to the broader coverage and/or the higher limits maintained by the CONTRACTOR. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the DISTRICT.

B. Other Insurance Provisions

The insurance policies are to contain, or be endorsed to contain, the following provisions:

1. **Additional Insured** – DISTRICT, its officers, officials, employees, agents and volunteers are to be covered as additional insureds on the CGL policy with respect to liability arising out of work or operations performed by or on behalf of the CONTRACTOR including materials, parts, or equipment furnished in connection with such work or operations. General liability coverage can be provided in the form of an endorsement to the CONTRACTOR'S insurance at least as broad as ISO Form ISO Form CG 20 10 11 85 or both CG 20 10, CG 20 26, CG 20 33, or CG 20 38; **and** CG 20 37 forms if later revisions used).
2. **Primary Coverage** – For any claims related to this contract, the CONTRACTOR'S insurance coverage shall be primary insurance primary coverage at least as broad as ISO CG 20 01 04 13 as respects the DISTRICT, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the DISTRICT, its officers, officials, employees, or volunteers shall be excess of the CONTRACTOR'S insurance and shall not contribute with it.
3. **Notice of Cancellation** – Each insurance policy required above shall provide that coverage shall not be canceled, except with notice to the DISTRICT.
4. **Waiver of Subrogation Rights** – CONTRACTOR hereby grants to DISTRICT a waiver of any right to subrogation which any insurer of said CONTRACTOR may acquire against the DISTRICT by virtue of the payment of any loss under such insurance. CONTRACTOR agrees to obtain any endorsement that may be necessary to effect this waiver of subrogation, but this provision applies regardless of whether or not the DISTRICT has received a waiver of subrogation endorsement from the insurer.
5. **Deductibles and Self-Insured Retention** – Any deductibles or self-insured retentions must be declared to and approved by the DISTRICT. The DISTRICT may require the CONTRACTOR to purchase coverage with a lower deductible or retention or provide proof of ability to pay losses and related investigations, claim administration, and defense expenses within the retention.
6. **Acceptability of Insurers** – Unless otherwise approved by Risk Management, insurance shall be written by insurers authorized to do business in the State of California and with a minimum A.M. Best's Insurance Guide rating of "A- VII".
7. **Verification of Coverage** – CONTRACTOR shall furnish the DISTRICT with proof of insurance, original certificates and amendatory endorsements as required by this Agreement. The proof of insurance, certificates and endorsements are to be received and approved by the DISTRICT before work commences. However, failure to obtain the required documents prior to the work beginning shall not waive the CONTRACTOR'S obligation to provide them. The CONTRACTOR shall furnish evidence of renewal of coverage throughout the term of the Agreement. The DISTRICT reserves the right to require complete, certified copies of all required insurance policies, including endorsements required by these specifications, at any time.
8. **Failure to Procure Coverage** – In the event that any policy of insurance required under this Agreement does not comply with the requirements, is not procured, or is canceled and not replaced, DISTRICT has the right but not the obligation or duty to terminate the Agreement. Maintenance of required insurance coverage is a material element of the Agreement and failure to maintain or renew such coverage or to provide evidence of renewal may be treated by DISTRICT as a material breach of contract.
9. **Subcontractors** – CONTRACTOR shall require and verify that all subcontractors maintain insurance meeting all the requirements stated herein, and CONTRACTOR shall ensure that DISTRICT is an additional insured on insurance required from subcontractors.

10. **Claims Made Policies** – If any of the required policies provide coverage on a claims-made basis:
    i. The Retroactive Date must be shown and must be before the date of the contract or the beginning of contract work.
    ii. Insurance must be maintained and evidence of insurance must be provided for at least five (5) years after completion of contract work.
    iii. If coverage is canceled or non-renewed, and not replaced with another claims-made policy form with a Retroactive Date prior to the contract effective date, the CONTRACTOR must purchase “extended reporting” coverage for a minimum of five (5) years after completion of contract work.

11. **Special Risks or Circumstances** – DISTRICT reserves the right to modify these requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other special circumstances.

Any change requiring additional types of insurance coverage or higher coverage limits must be made by amendment to this Agreement. CONTRACTOR agrees to execute any such amendment within thirty (30) days of receipt.

Any failure, actual or alleged, on the part of DISTRICT to monitor or enforce compliance with any of the insurance and indemnification requirements will not be deemed as a waiver of any rights on the part of DISTRICT.

EXHIBIT D

HIPAA BUSINESS ASSOCIATE AGREEMENT (BAA)

This Business Associate Agreement ("BAA") supplements and is made a part of the Agreement between DISTRICT (referred to herein as "Covered Entity") and CONTRACTOR (referred to herein as "Business Associate").

RECITALS

Covered Entity wishes to disclose certain information to Business Associate pursuant to the terms of the Agreement, some of which may constitute Protected Health Information ("PHI") (defined below).

Covered Entity and Business Associate intend to protect the privacy and provide for the security of PHI disclosed to Business Associate pursuant to the Agreement in compliance with the Health Insurance Portability and Accountability Act of 1996, Public Law 104-191 ("HIPAA"), the Health Information Technology for Economic and Clinical Health Act, Public Law 111-005 ("HITECH Act"), and 45 CFR Parts 160 and 164, Subpart C (the "Security Rule"), Subpart D (the "Data Breach Notification Rule") and Subpart E (the "Privacy Rule") (collectively, the "HIPAA Regulations").

As part of the HIPAA Regulations, the Privacy Rule and the Security Rule (defined below) require Covered Entity to enter into a contract containing specific requirements with Business Associate prior to the disclosure of PHI, as set forth in, but not limited to, Title 45, Sections 164.314(a), 164.502(e) and 164.504(e) of the Code of Federal Regulations (C.F.R.) and contained in this BAA.

In consideration of the mutual promises below and the exchange of information pursuant to this BAA, the parties agree as follows:

A. Definitions

1. **Breach** shall have the meaning given to such term under the HITECH Act [42 U.S.C. Section 17921].
2. **Business Associate** shall have the meaning given to such term under the Privacy Rule, the Security Rule, and the HITECH Act, including but not limited to, 42 U.S.C. Section 17938 and 45 C.F.R. Section 160.103.
3. **Covered Entity** shall have the meaning given to such term under the Privacy Rule and the Security Rule, including, but not limited to, 45 C.F.R. Section 160.103.
4. **Data Aggregation** shall have the meaning given to such term under the Privacy Rule, including, but not limited to, 45 C.F.R. Section 164.501.
5. **Designated Record Set** shall have the meaning given to such term under the Privacy Rule, including, but not limited to, 45 C.F.R. Section 164.501.
6. **Electronic Protected Health Information** means Protected Health Information that is maintained in or transmitted by electronic media.
7. **Electronic Health Record** shall have the meaning given to such term in the HITECH Act, including, but not limited to, 42 U.S.C. Section 17921.
8. **Health Care Operations** shall have the meaning given to such term under the Privacy Rule, including, but not limited to, 45 C.F.R. Section 164.501.
9. **Privacy Rule** shall mean the HIPAA Regulation that is codified at 45 C.F.R. Parts 160 and 164, Subparts A and E.

10. **Protected Health Information or PHI** means any information, whether oral or recorded in any form or medium: (i) that relates to the past, present or future physical or mental condition of an individual; the provision of health care to an individual; or the past, present or future payment for the provision of health care to an individual; and (ii) that identifies the individual or with respect to which there is a reasonable basis to believe the information can be used to identify the individual, and shall have the meaning given to such term under the Privacy Rule, including, but not limited to, 45 C.F.R. Section 164.501. Protected Health Information includes Electronic Protected Health Information [45 C.F.R. Sections 160.103, 164.501].
11. **Protected Information** shall mean PHI provided by Covered Entity to Business Associate or created or received by Business Associate on Covered Entity's behalf.
12. **Security Rule** shall mean the HIPAA Regulation that is codified at 45 C.F.R. Parts 160 and 164, Subparts A and C.
13. **Unsecured PHI** shall have the meaning given to such term under the HITECH Act and any guidance issued pursuant to such Act including, but not limited to, 42 U.S.C. Section 17932(h).

B. Obligations of Business Associate

1. **Permitted Uses.** Business Associate shall not use Protected Information except for the purpose of performing Business Associate's obligations under the Agreement and as permitted under the Agreement and this BAA. Further, Business Associate shall not use Protected Information in any manner that would constitute a violation of the Privacy Rule or the HITECH Act if so used by Covered Entity. However, Business Associate may use Protected Information (i) for the proper management and administration of Business Associate, (ii) to carry out the legal responsibilities of Business Associate, or (iii) for Data Aggregation purposes for the Health Care Operations of Covered Entity [45 C.F.R. Sections 164.504(e)(2)(ii)(A) and 164.504(e)(4)(i)].
2. **Permitted Disclosures.** Business Associate shall not disclose Protected Information except for the purpose of performing Business Associate's obligations under the Agreement and as permitted under the Agreement and this BAA. Business Associate shall not disclose Protected Information in any manner that would constitute a violation of the Privacy Rule or the HITECH Act if so disclosed by Covered Entity. However, Business Associate may disclose Protected Information (i) for the proper management and administration of Business Associate; (ii) to carry out the legal responsibilities of Business Associate; (iii) as required by law; or (iv) for Data Aggregation purposes for the Health Care Operations of Covered Entity. If Business Associate discloses Protected Information to a third party, Business Associate must obtain, prior to making any such disclosure, (i) reasonable written assurances from such third party that such Protected Information will be held confidential as provided pursuant to this BAA and only disclosed as required by law or for the purposes for which it was disclosed to such third party, and (ii) a written agreement from such third party to immediately notify Business Associate of any breaches of confidentiality of the Protected Information, to the extent the third party has obtained knowledge of such breach [42 U.S.C. Section 17932; 45 C.F.R. Sections 164.504(e)(2)(i), 164.504(e)(2)(i)(B), 164.504(e)(2)(ii)(A) and 164.504(e)(4)(ii)].
3. **Prohibited Uses and Disclosures.** Business Associate shall not use or disclose Protected Information for fundraising or marketing purposes. Business Associate shall not disclose Protected Information to a health plan for payment or health care operations purposes if the patient has requested this special restriction, and has paid out of pocket in full for the health care item or service to which the PHI solely relates [42 U.S.C. Section 17935(a)]. Business Associate shall not directly or indirectly receive remuneration in exchange for Protected Information, except with the prior written consent of Covered Entity and as permitted by the HITECH Act, 42 U.S.C. section 17935(d)(2); however, this prohibition shall

not affect payment by Covered Entity to Business Associate for services provided pursuant to the Agreement. Business Associate shall mitigate, to the extent practicable, any harmful effect that is known to Business Associate of a use or disclosure of PHI by Business Associate in violation of this Agreement, the BAA, or the HIPAA Regulations.

4. **Appropriate Safeguards.** Business Associate shall implement appropriate safeguards as are necessary to prevent the use or disclosure of Protected Information otherwise than as permitted by the Agreement or this BAA, including, but not limited to, administrative, physical and technical safeguards that reasonably and appropriately protect the confidentiality, integrity and availability of the Protected Information, in accordance with 45 C.F.R. Sections 164.308, 164.310, and 164.312. [45 C.F.R. Section 164.504(e)(2)(ii)(B); 45 C.F.R. Section 164.308(b)]. Business Associate shall comply with the policies and procedures and documentation requirements of the HIPAA Security Rule, including, but not limited to, 45 C.F.R. Section 164.316 [42 U.S.C. Section 17931].

5. **Reporting of Improper Access, Use or Disclosure.** Business Associate shall report to Covered Entity in writing of any access, use or disclosure of Protected Information not permitted by the Agreement and this BAA, and any Breach of Unsecured PHI, as required by the Data Breach Notification Rule, of which it becomes aware without unreasonable delay and in no case later than 60 calendar days after discovery [42 U.S.C. Section 17921; 45 C.F.R. Section 164.504(e)(2)(ii)(C); 45 C.F.R. Section 164.308(b)].

6. **Business Associate's Subcontractors and Agents.** Business Associate shall ensure that any agents and subcontractors to whom it provides Protected Information, agree in writing to the same restrictions and conditions that apply to Business Associate with respect to such PHI and implement the safeguards required by paragraph (c) above with respect to Electronic PHI [45 C.F.R. Section 164.504(e)(2)(ii)(D); 45 C.F.R. Section 164.308(b)]. Business Associate shall implement and maintain sanctions against agents and subcontractors that violate such restrictions and conditions and shall mitigate the effects of any such violation (see 45 C.F.R. Sections 164.530(f) and 164.530(e)(1)).

7. **Access to Protected Information.** To the extent that the Covered Entity keeps a designated record set then Business Associate shall make Protected Information maintained by Business Associate or its agents or subcontractors in Designated Record Sets available to Covered Entity for inspection and copying within five (5) days of a request by Covered Entity to enable Covered Entity to fulfill its obligations under state law [Health and Safety Code Section 123110] and the Privacy Rule, including, but not limited to, 45 C.F.R. Section 164.524 [45 CF.R. Section 164.504(e)(2)(ii)(E)]. If Business Associate maintains an Electronic Health Record, Business Associate shall provide such information in electronic format to enable Covered Entity to fulfill its obligations under the HITECH Act, including, but not limited to, 42 U.S.C. Section 17935(e).

8. **Amendment of PHI for Business Associate who is Required to Maintain a Record Set.** If Business Associate is required to maintain a designated record set on behalf of the Covered Entity the Business Associate shall within ten (10) days of receipt of a request from Covered Entity for an amendment of Protected Information or a record about an individual contained in a Designated Record Set, Business Associate or its agents or subcontractors shall make such Protected Information available to Covered Entity for amendment and incorporate any such amendment to enable Covered Entity to fulfill its obligations under the Privacy Rule, including, but not limited to, 45 C.F.R. Section 164.526. If any individual requests an amendment of Protected Information directly from Business Associate or its agents or subcontractors, Business Associate must notify Covered Entity in writing within five (5) days of the request. Any approval or denial of amendment of Protected Information maintained by Business Associate or its agents or subcontractors shall be the responsibility of Covered Entity [45 C.F.R. Section 164.504(e)(2)(ii)(F)].

9. **Accounting Rights.** Within ten (10) days of notice by Covered Entity of a request for an accounting of disclosures of Protected Information, Business Associate and its agents or subcontractors shall make available to Covered Entity the information required to provide an accounting of disclosures to enable Covered Entity to fulfill its obligations under the Privacy Rule, including, but not limited to, 45 C.F.R. Section 164.528, and the HITECH Act, including but not limited to 42 U.S.C. Section 17935(c), as determined by Covered Entity. Business Associate agrees to implement a process that allows for an accounting to be collected and maintained by Business Associate and its agents or subcontractors for at least six (6) years prior to the request. However, accounting of disclosures from an Electronic Health Record for treatment, payment or health care operations purposes are required to be collected and maintained for only three (3) years prior to the request, and only to the extent that Business Associate maintains an electronic health record and is subject to this requirement. At a minimum, the information collected and maintained shall include: (i) the date of disclosure; (ii) the name of the entity or person who received Protected Information and, if known, the address of the entity or person; (iii) a brief description of Protected Information disclosed and (iv) a brief statement of purpose of the disclosure that reasonably informs the individual of the basis for the disclosure, or a copy of the individual's authorization, or a copy of the written request for disclosure. In the event that the request for an accounting is delivered directly to Business Associate or its agents or subcontractors, Business Associate shall within five (5) days of a request forward it to Covered Entity in writing. It shall be Covered Entity's responsibility to prepare and deliver any such accounting requested. Business Associate shall not disclose any Protected Information except as set forth in Sections 2.b. of this BAA [45 C.F.R. Sections 164.504(e)(2)(ii)(G) and 165.528]. The provisions of this subparagraph shall survive the termination of this Agreement.

10. **Governmental Access to Records.** Business Associate shall make its internal practices, books and records relating to the use and disclosure of Protected Information available to Covered Entity and to the Secretary of the U.S. Department of Health and Human Services (Secretary) for purposes of determining Business Associate's compliance with the Privacy Rule [45 C.F.R. Section 164.504(e)(2)(ii)(H)]. Business Associate shall provide to Covered Entity a copy of any Protected Information that Business Associate provides to the Secretary concurrently with providing such Protected Information to the Secretary.

11. **Minimum Necessary.** Business Associate (and its agents or subcontractors) shall request, use and disclose only the minimum amount of Protected Information necessary to accomplish the purpose of the request, use, or disclosure [42 U.S.C. Section 17935(b); 45 C.F.R. Section 164.514(d)(3)]. Business Associate understands and agrees that the definition of "minimum necessary" is in flux and shall keep itself informed of guidance issued by the Secretary with respect to what constitutes "minimum necessary."

12. **Data Ownership**. Business Associate acknowledges that Business Associate has no ownership rights with respect to the Protected Information.

13. **Business Associate's Insurance.** Business Associate represents and warrants that it purchases commercial insurance to cover its exposure for any claims, damages or losses arising as a result of a breach of the terms of this BAA.

14. **Notification of Possible Breach.** During the term of the Agreement, Business Associate shall notify Covered Entity within twenty-four (24) hours of any suspected or actual breach of security, or any access, use or disclosure of Protected Information not permitted by the Agreement or this BAA or unauthorized use or disclosure of PHI of which Business Associate becomes aware and/or any actual or suspected use or disclosure of data in violation of any applicable federal or state laws or regulations. Business Associate shall take (i) prompt corrective action to cure any such deficiencies and (ii) any action pertaining to such unauthorized disclosure required by applicable federal and state laws and

regulations. [42 U.S.C. Section 17921; 45 C.F.R. Section 164.504(e)(2)(ii)(C); 45 C.F.R. Section 164.308(b)]

15. **Breach Pattern or Practice by Covered Entity.** Pursuant to 42 U.S.C. Section 17934(b), if the Business Associate knows of a pattern of activity or practice of the Covered Entity that constitutes a material breach or violation of the Covered Entity's obligations under the Agreement or this BAA or other arrangement, the Business Associate must take reasonable steps to cure the breach or end the violation. If the steps are unsuccessful, the Business Associate must terminate the Agreement or other arrangement if feasible, or if termination is not feasible, report the problem to the Secretary. Business Associate shall provide written notice to Covered Entity of any pattern of activity or practice of the Covered Entity that Business Associate believes constitutes a material breach or violation of the Covered Entity's obligations under the Agreement or this BAA or other arrangement within five (5) days of discovery and shall meet with Covered Entity to discuss and attempt to resolve the problem as one of the reasonable steps to cure the breach or end the violation.

16. **Audits, Inspection and Enforcement.** Within ten (10) days of a written request by Covered Entity, Business Associate and its agents or subcontractors shall allow Covered Entity to conduct a reasonable inspection of the facilities, systems, books, records, agreements, policies and procedures relating to the use or disclosure of Protected Information pursuant to this BAA for the purpose of determining whether Business Associate has complied with this BAA; provided, however, that (i) Business Associate and Covered Entity shall mutually agree in advance upon the scope, timing and location of such an inspection, (ii) Covered Entity shall protect the confidentiality of all confidential and proprietary information of Business Associate to which Covered Entity has access during the course of such inspection; and (iii) Covered Entity shall execute a nondisclosure agreement, upon terms mutually agreed upon by the parties, if requested by Business Associate. The fact that Covered Entity inspects, or fails to inspect, or has the right to inspect, Business Associate's facilities, systems, books, records, agreements, policies and procedures does not relieve Business Associate of its responsibility to comply with this BAA, nor does Covered Entity's (i) failure to detect or (ii) detection, but failure to notify Business Associate or require Business Associate's remediation of any unsatisfactory practices, constitute acceptance of such practice or a waiver of Covered Entity's enforcement rights under the Agreement or this BAA, Business Associate shall notify Covered Entity within ten (10) days of learning that Business Associate has become the subject of an audit, compliance review, or complaint investigation by the Office for Civil Rights.

C. Termination

1. **Material Breach.** A breach by Business Associate of any provision of this BAA, as determined by Covered Entity, shall constitute a material breach of the Agreement and shall provide grounds for immediate termination of the Agreement, any provision in the Agreement to the contrary notwithstanding [45 C.F.R. Section 164.504(e)(2)(iii)].

2. **Judicial or Administrative Proceedings.** Covered Entity may terminate the Agreement, effective immediately, if (i) Business Associate is named as a defendant in a criminal proceeding for a violation of HIPAA, the HITECH Act, the HIPAA Regulations or other security or privacy laws or (ii) a finding or stipulation that the Business Associate has violated any standard or requirement of HIPAA, the HITECH Act, the HIPAA Regulations or other security or privacy laws is made in any administrative or civil proceeding in which the party has been joined.

3. **Effect of Termination.** Upon termination of the Agreement for any reason, Business Associate shall, at the option of Covered Entity, return or destroy all Protected Information that Business Associate or its agents or subcontractors still maintain in any form, and shall retain no copies of such Protected Information. If return or destruction is not feasible, as determined by Covered Entity, Business Associate shall continue to extend the protections of Section 2 of this BAA to such information, and limit further

use of such PHI to those purposes that make the return or destruction of such PHI infeasible. [45 C.F.R. Section 164.504(e)(ii)(2(I)]. If Covered Entity elects destruction of the PHI, Business Associate shall certify in writing to Covered Entity that such PHI has been destroyed.

D. Indemnification

If Business Associate fails to adhere to any of the privacy, confidentiality, and/or data security provisions set forth in this BAA or if there is a Breach of PHI in Business Associate's possession and, as a result, PHI or any other confidential information is unlawfully accessed, used or disclosed, Business Associate agrees to reimburse Covered Entity for any and all costs, direct or indirect, incurred by Covered Entity associated with any Breach notification obligations. Business Associate also agrees to pay for any and all fines and/or administrative penalties imposed for such unauthorized access, use or disclosure of confidential information or for delayed reporting if it fails to notify the Covered Entity of the Breach as required by this BAA.

E. Disclaimer

Covered Entity makes no warranty or representation that compliance by Business Associate with this BAA, HIPAA, the HITECH Act, or the HIPAA Regulations will be adequate or satisfactory for Business Associate's own purposes. Business Associate is solely responsible for all decisions made by Business Associate regarding the safeguarding of PHI.

F. Certification

To the extent that Covered Entity determines that such examination is necessary to comply with Covered Entity's legal obligations pursuant to HIPAA relating to certification of its security practices, Covered Entity or its authorized agents or contractors, may, at Covered Entity's expense, examine Business Associate's facilities, systems, procedures and records as may be necessary for such agents or contractors to certify to Covered Entity the extent to which Business Associate's security safeguards comply with HIPAA, the HITECH Act, the HIPAA Regulations or this BAA.

G. Amendment to Comply with Law

The parties acknowledge that state and federal laws relating to data security and privacy are rapidly evolving and that amendment of the Agreement or this BAA may be required to provide for procedures to ensure compliance with such developments. The parties specifically agree to take such action as is necessary to implement the standards and requirements of HIPAA, the HITECH Act, the Privacy Rule, the Security Rule and other applicable laws relating to the security or confidentiality of PHI. The parties understand and agree that Covered Entity must receive satisfactory written assurance from Business Associate that Business Associate will adequately safeguard all Protected Information. Upon the request of either party, the other party agrees to promptly enter into negotiations concerning the terms of an amendment to this BAA embodying written assurances consistent with the standards and requirements of HIPAA, the HITECH Act, the Privacy Rule, the Security Rule or other applicable laws. Covered Entity may terminate the Agreement upon thirty (30) days written notice in the event (i) Business Associate does not promptly enter into negotiations to amend the Agreement or this BAA when requested by Covered Entity pursuant to this Section or (ii) Business Associate does not enter into an amendment to the Agreement or this BAA providing assurances regarding the safeguarding of PHI that Covered Entity, in its sole discretion, deems sufficient to satisfy the standards and requirements of applicable laws.

H. Assistance in Litigation of Administrative Proceedings

Business Associate shall make itself, and any subcontractors, employees or agents assisting Business Associate in the performance of its obligations under the Agreement or this BAA, available to Covered Entity, at no cost to Covered Entity, to testify as witnesses, or otherwise, in the event of litigation or administrative proceedings being commenced against Covered Entity, its directors, officers or employees based upon a claimed violation of HIPAA, the HITECH Act, the Privacy Rule, the Security Rule, or other laws relating to security and privacy, except where Business Associate or its subcontractor, employee or agent is named adverse party.

I. No Third-Party Beneficiaries

Nothing express or implied in the Agreement or this BAA is intended to confer, nor shall anything herein confer, upon any person other than Covered Entity, Business Associate and their respective successors or assigns, any rights, remedies, obligations or liabilities whatsoever.

J. Effect on Agreement

Except as specifically required to implement the purposes of this BAA, or to the extent inconsistent with this BAA, all other terms of the Agreement shall remain in force and effect.

K. Entire Agreement of the Parties

This BAA supersedes any and all prior and contemporaneous business associate agreements between the parties and constitutes the final and entire agreement between the parties hereto with respect to the subject matter hereof. Covered Entity and Business Associate acknowledge that no representations, inducements, promises, or agreements, oral or otherwise, with respect to the subject matter hereof, have been made by either party, or by anyone acting on behalf of either party, which are not embodied herein. No other agreement, statement or promise, with respect to the subject matter hereof, not contained in this BAA shall be valid or binding.

L. Interpretation

The provisions of this BAA shall prevail over any provisions in the Agreement that may conflict or appear inconsistent with any provision in this BAA. This BAA and the Agreement shall be interpreted as broadly as necessary to implement and comply with HIPAA, the HITECH Act, the Privacy Rule and the Security Rule. The parties agree that any ambiguity in this BAA shall be resolved in favor of a meaning that complies and is consistent with HIPAA, the HITECH Act, the Privacy Rule and the Security Rule.