



The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at ***WVPurchasing.gov*** with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.

Header 4

List View

General Information [Contact](#) [Default Values](#) [Discount](#) [Document Information](#) [Clarification Request](#)

Procurement Folder: 1828241

Procurement Type: Central Master Agreement

Vendor ID: 000000230863

Legal Name: MET ONE INSTRUMENTS INC

Alias/DBA:

Total Bid: \$0.00

Response Date: 11/19/2025

Response Time: 17:46

Responded By User ID: metone1

First Name: Joe

Last Name: Mattos

Email: joe.mattos@acoem.com

Phone: 541-471-7111

SO Doc Code: CRFQ

SO Dept: 0313

SO Doc ID: DEP2600000014

Published Date: 11/6/25

Close Date: 11/20/25

Close Time: 13:30

Status: Closed

Solicitation Description: Continuous Particulate Matter Beta Attenuation Mass Monitors

Total of Header Attachments: 4

Total of All Attachments: 4



Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Solicitation Response

Proc Folder: 1828241
Solicitation Description: Continuous Particulate Matter Beta Attenuation Mass Monitors
Proc Type: Central Master Agreement

Solicitation Closes	Solicitation Response	Version
2025-11-20 13:30	SR 0313 ESR11192500000003233	1

VENDOR
000000230863
MET ONE INSTRUMENTS INC

Solicitation Number: CRFQ 0313 DEP2600000014
Total Bid: 0
Response Date: 2025-11-19
Response Time: 17:46:16
Comments:

FOR INFORMATION CONTACT THE BUYER
Joseph (Josh) E Hager III
(304) 558-2306
joseph.e.hageriii@wv.gov

Vendor		
Signature X	FEIN#	DATE

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Continuous Particulate Matter Beta Attenuation Mass Monitors	0.00000	EA	539944.000000	0.00

Comm Code	Manufacturer	Specification	Model #
41110000			

Commodity Line Comments: There is a problem with Exhibit and the freight was not added into the total though it is shown in the unit price column. The pricing table got skewed starting at line 18, item 14 Multi-Function Flow Meter Total Price, including estimated freight is \$539,944.00

Extended Description:
Enter total bid amount from Exhibit A pricing page



Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Centralized Request for Quote
Equipment

Proc Folder: 1828241			Reason for Modification:
Doc Description: Continuous Particulate Matter Beta Attenuation Mass Monitors			
Proc Type: Central Master Agreement			
Date Issued	Solicitation Closes	Solicitation No	Version
2025-11-06	2025-11-20 13:30	CRFQ 0313 DEP2600000014	1

BID RECEIVING LOCATION

BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR

Vendor Customer Code:

Vendor Name :

Address :

Street :

City :

State : **Country :** **Zip :**

Principal Contact :

Vendor Contact Phone: **Extension:**

FOR INFORMATION CONTACT THE BUYER

Joseph (Josh) E Hager III
(304) 558-2306
joseph.e.hageriii@wv.gov

Vendor Signature X	FEIN#	DATE
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All offers subject to all terms and conditions contained in this solicitation

ADDITIONAL INFORMATION
West Virginia Purchasing Division is soliciting bids on behalf of the West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality, to establish an open-end contract for continuous particulate matter beta attenuation mass monitors and supplies per the attached specifications and terms and conditions.

INVOICE TO	SHIP TO
ENVIRONMENTAL PROTECTION DIVISION OF AIR QUALITY 601 57TH ST SE CHARLESTON WV US	ENVIRONMENTAL PROTECTION 601 57TH ST CHARLESTON WV US

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	Continuous Particulate Matter Beta Attenuation Mass Monitors	0.00000	EA		

Comm Code	Manufacturer	Specification	Model #
41110000			

Extended Description:
Enter total bid amount from Exhibit A pricing page

SCHEDULE OF EVENTS		
<u>Line</u>	<u>Event</u>	<u>Event Date</u>

INSTRUCTIONS TO VENDORS SUBMITTING BIDS

1. **REVIEW DOCUMENTS THOROUGHLY:** The attached documents contain a solicitation for bids. Please read these instructions and all documents attached in their entirety. These instructions provide critical information about requirements that if overlooked could lead to disqualification of a Vendor's bid. All bids must be submitted in accordance with the provisions contained in these instructions and the Solicitation. Failure to do so may result in disqualification of Vendor's bid.

2. **MANDATORY TERMS:** The Solicitation may contain **mandatory** provisions identified by the use of the words "**must**," "**will**," and "**shall**." Failure to comply with a mandatory term in the Solicitation will result in bid disqualification.

3. **PRE-BID MEETING:** The item identified below shall apply to this Solicitation.

☐ A pre-bid meeting will not be held prior to bid opening

☐ A **MANDATORY PRE-BID** meeting will be held at the following place and time:

All Vendors submitting a bid must attend the **mandatory** pre-bid meeting. Failure to attend the **mandatory** pre-bid meeting shall result in disqualification of the Vendor's bid. No one individual is permitted to represent more than one vendor at the pre-bid meeting. Any individual that does attempt to represent two or more vendors will be required to select one vendor to which the individual's attendance will be attributed. The vendors not selected will be deemed to have not attended the pre-bid meeting unless another individual attended on their behalf.

An attendance sheet provided at the pre-bid meeting shall serve as the official document verifying attendance. Any person attending the pre-bid meeting on behalf of a Vendor must list on the attendance sheet his or her name and the name of the Vendor he or she is representing. It is the Vendor's responsibility to locate the attendance sheet and provide the required information. Failure to complete the attendance sheet as required may result in disqualification of Vendor's bid.

Vendors who arrive after the starting time but prior to the end of the pre-bid will be permitted to sign in but are charged with knowing all matters discussed at the pre-bid.

Any discussions or answers to questions at the pre-bid meeting are preliminary in nature and are non-binding. Official and binding answers to questions will be published in a written addendum to the Solicitation prior to bid opening.

4. VENDOR QUESTION DEADLINE: Vendors may submit questions relating to this Solicitation to the Purchasing Division. Questions must be submitted in writing. All questions **must be submitted on or before the date listed below and to the address listed below to be considered.** A written response will be published in a Solicitation addendum if a response is possible and appropriate. Non-written discussions, conversations, or questions and answers regarding this Solicitation are preliminary in nature and are non-binding.

Submitted emails should have the solicitation number in the subject line. Question

Submission Deadline:

Submit Questions to:

2019 Washington Street, East Charleston, WV 25305

Fax: (304) 558-3970

Email:

5. VERBAL COMMUNICATION: Any verbal communication between the Vendor and any State personnel is not binding, including verbal communication at the mandatory pre-bid conference. Only information issued in writing and added to the Solicitation by an official written addendum by the Purchasing Division is binding.

6. BID SUBMISSION: All bids must be submitted on or before the date and time of the bid opening listed in section 7 below. Vendors can submit bids electronically through wvOASIS, in paper form delivered to the Purchasing Division at the address listed below either in person or by courier, or in facsimile form by faxing to the Purchasing Division at the number listed below. Notwithstanding the foregoing, the Purchasing Division may prohibit the submission of bids electronically through wvOASIS at its sole discretion. Such a prohibition will be contained and communicated in the wvOASIS system resulting in the Vendor's inability to submit bids through wvOASIS. The Purchasing Division will not accept bids or modification of bids via email.

Bids submitted in paper, facsimile, or via wvOASIS must contain a signature. Failure to submit a bid in any form without a signature will result in rejection of your bid.

A bid submitted in paper or facsimile form should contain the information listed below on the face of the submission envelope or fax cover sheet. Otherwise, the bid may be rejected by the Purchasing Division.

VENDOR NAME:

BUYER:

SOLICITATION NO.:

BID OPENING DATE:

BID OPENING TIME:

FAX NUMBER:

Any bid received by the Purchasing Division staff is considered to be in the possession of the Purchasing Division and will not be returned for any reason.

Bid Delivery Address and Fax Number:

Department of Administration, Purchasing Division 2019 Washington Street East

Charleston, WV 25305-0130

Fax: 304-558-3970

7. BID OPENING: Bids submitted in response to this Solicitation will be opened at the location identified below on the date and time listed below. Delivery of a bid after the bid opening date and time will result in bid disqualification. For purposes of this Solicitation, a bid is considered delivered when confirmation of delivery is provided by wvOASIS (in the case of electronic submission) or when the bid is time stamped by the official Purchasing Division time clock (in the case of hand delivery or via delivery by mail).

Bid Opening Date and Time:

Bid Opening Location:

Department of Administration, Purchasing Division

2019 Washington Street East

Charleston, WV 25305-0130

8. ADDENDUM ACKNOWLEDGEMENT: Changes or revisions to this Solicitation will be made by an official written addendum issued by the Purchasing Division. Vendor should acknowledge receipt of all addenda issued with this Solicitation by completing an Addendum Acknowledgement Form. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

9. **BID FORMATTING:** Vendor should type or electronically enter the information onto its bid to prevent errors in the evaluation. Failure to type or electronically enter the information may result in bid disqualification.

10. **ALTERNATE MODEL OR BRAND:** Unless the box below is checked, any model, brand, or specification listed in this Solicitation establishes the acceptable level of quality only and is not intended to reflect a preference for, or in any way favor, a particular brand or vendor. Vendors may bid alternates to a listed model or brand provided that the alternate is at least equal to the model or brand and complies with the required specifications. The equality of any alternate being bid shall be determined by the State at its sole discretion. Any Vendor bidding an alternate model or brand **shall** clearly identify the alternate items in its bid and should include manufacturer's specifications, industry literature, and/or any other relevant documentation demonstrating the equality of the alternate items. Failure to provide information for alternate items **may** be grounds for rejection of a Vendor's bid.

[] This Solicitation is based upon a standardized commodity established under W. Va. Code § 5A-3-61. Vendors are expected to bid the standardized commodity identified. Failure to bid the standardized commodity will result in your firm's bid being rejected.

11. **COMMUNICATION LIMITATIONS:** In accordance with West Virginia Code of State Rules §148-1-6.6.2, communication with the State of West Virginia or any of its employees regarding this Solicitation during the solicitation, bid, evaluation or award periods, except through the Purchasing Division, is strictly prohibited without prior Purchasing Division approval. Purchasing Division approval for such communication is implied for all agency delegated and exempt purchases.

12. **REGISTRATION:** Prior to Contract award, the apparent successful Vendor **must** be properly registered with the West Virginia Purchasing Division and must have paid the \$125 fee, if applicable.

13. **UNIT PRICE:** Unit prices **shall** prevail in cases of a discrepancy in the Vendor's bid.

14. **PREFERENCE:** Vendor Preference may be requested in purchases of motor vehicles or construction and maintenance equipment and machinery used in highway and other infrastructure projects. Any request for preference must be submitted in writing with the bid, must specifically identify the preference requested with reference to the applicable subsection of West Virginia Code § 5A-3-37, and must include with the bid any information necessary to evaluate and confirm the applicability of the requested preference. A request form to help facilitate the request can be found at: www.state.wv.us/admin/purchase/vrc/Venpref.pdf.

15A. RECIPROCAL PREFERENCE: The State of West Virginia applies a reciprocal preference to all solicitations for commodities and printing in accordance with W. Va. Code § 5A-3-37(b). In effect, non-resident vendors receiving a preference in their home states, will see that same preference granted to West Virginia resident vendors bidding against them in West Virginia. Any request for reciprocal preference must include with the bid any information necessary to evaluate and confirm the applicability of the preference. A request form to help facilitate the request can be found at: www.state.wv.us/admin/purchase/vrc/Venpref.pdf.

15. SMALL, WOMEN-OWNED, OR MINORITY-OWNED BUSINESSES:

For any solicitations publicly advertised for bid, in accordance with West Virginia Code §5A-3-37 and W. Va. CSR § 148-22-9, any non-resident vendor certified as a small, women-owned, or minority-owned business under W. Va. CSR § 148-22-9 shall be provided the same preference made available to any resident vendor. Any non-resident small, women-owned, or minority-owned business must identify itself as such in writing, must submit that writing to the Purchasing Division with its bid, and must be properly certified under W. Va. CSR § 148-22-9 prior to contract award to receive the preferences made available to resident vendors.

16. WAIVER OF MINOR IRREGULARITIES: The Director reserves the right to waive minor irregularities in bids or specifications in accordance with West Virginia Code of State Rules § 148-1-4.7.

17. ELECTRONIC FILE ACCESS RESTRICTIONS: Vendor must ensure that its submission in wvOASIS can be accessed and viewed by the Purchasing Division staff immediately upon bid opening. The Purchasing Division will consider any file that cannot be immediately accessed and viewed at the time of the bid opening (such as, encrypted files, password protected files, or incompatible files) to be blank or incomplete as context requires and are therefore unacceptable. A vendor will not be permitted to unencrypt files, remove password protections, or resubmit documents after bid opening to make a file viewable if those documents are required with the bid. A Vendor may be required to provide document passwords or remove access restrictions to allow the Purchasing Division to print or electronically save documents provided that those documents are viewable by the Purchasing Division prior to obtaining the password or removing the access restriction.

18. NON-RESPONSIBLE: The Purchasing Division Director reserves the right to reject the bid of any vendor as Non-Responsible in accordance with W. Va. Code of State Rules § 148-1-5.3, when the Director determines that the vendor submitting the bid does not have the capability to fully perform or lacks the integrity and reliability to assure good-faith performance.”

19. ACCEPTANCE/REJECTION: The State may accept or reject any bid in whole, or in part in accordance with W. Va. Code of State Rules § 148-1-4.6. and § 148-1-6.3.”

20. **WITH THE BID REQUIREMENTS:** In instances where these specifications require documentation or other information with the bid, and a vendor fails to provide it with the bid, the Director of the Purchasing Division reserves the right to request those items after bid opening and prior to contract award pursuant to the authority to waive minor irregularities in bids or specifications under W. Va. CSR § 148-1-4.7. This authority does not apply to instances where state law mandates receipt with the bid.

21. **EMAIL NOTIFICATION OF AWARD:** The Purchasing Division will attempt to provide bidders with e-mail notification of contract award when a solicitation that the bidder participated in has been awarded. For notification purposes, bidders must provide the Purchasing Division with a valid email address in the bid response. Bidders may also monitor wvOASIS or the Purchasing Division's website to determine when a contract has been awarded.

22. **EXCEPTIONS AND CLARIFICATIONS:** The Solicitation contains the specifications that **shall** form the basis of a contractual agreement. **Vendor shall clearly mark any exceptions, clarifications, or other proposed modifications in its bid.** Exceptions to, clarifications of, or modifications of a requirement or term and condition of the Solicitation may result in bid disqualification.

GENERAL TERMS AND CONDITIONS:

1. CONTRACTUAL AGREEMENT: Issuance of an Award Document signed by the Purchasing Division Director, or his designee, and approved as to form by the Attorney General's office constitutes acceptance by the State of this Contract made by and between the State of West Virginia and the Vendor. Vendor's signature on its bid, or on the Contract if the Contract is not the result of a bid solicitation, signifies Vendor's agreement to be bound by and accept the terms and conditions contained in this Contract.

2. DEFINITIONS: As used in this Solicitation/Contract, the following terms shall have the meanings attributed to them below. Additional definitions may be found in the specifications included with this Solicitation/Contract.

2.1. "Agency" or "Agencies" means the agency, board, commission, or other entity of the State of West Virginia that is identified on the first page of the Solicitation or any other public entity seeking to procure goods or services under this Contract.

2.2. "Bid" or "Proposal" means the vendors submitted response to this solicitation.

2.3. "Contract" means the binding agreement that is entered into between the State and the Vendor to provide the goods or services requested in the Solicitation.

2.4. "Director" means the Director of the West Virginia Department of Administration, Purchasing Division.

2.5. "Purchasing Division" means the West Virginia Department of Administration, Purchasing Division.

2.6. "Award Document" means the document signed by the Agency and the Purchasing Division, and approved as to form by the Attorney General, that identifies the Vendor as the contract holder.

2.7. "Solicitation" means the official notice of an opportunity to supply the State with goods or services that is published by the Purchasing Division.

2.8. "State" means the State of West Virginia and/or any of its agencies, commissions, boards, etc. as context requires.

2.9. "Vendor" or "Vendors" means any entity submitting a bid in response to the Solicitation, the entity that has been selected as the lowest responsible bidder, or the entity that has been awarded the Contract as context requires.

3. CONTRACT TERM; RENEWAL; EXTENSION: The term of this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below:

☐ **Term Contract**

Initial Contract Term: The Initial Contract Term will be for a period of _____. The Initial Contract Term becomes effective on the effective start date listed on the first page of this Contract, identified as the State of West Virginia contract cover page containing the signatures of the Purchasing Division, Attorney General, and Encumbrance clerk (or another page identified as _____), and the Initial Contract Term ends on the effective end date also shown on the first page of this Contract.

Renewal Term: This Contract may be renewed upon the mutual written consent of the Agency, and the Vendor, with approval of the Purchasing Division and the Attorney General's office (Attorney General approval is as to form only). Any request for renewal should be delivered to the Agency and then submitted to the Purchasing Division thirty (30) days prior to the expiration date of the initial contract term or appropriate renewal term. A Contract renewal shall be in accordance with the terms and conditions of the original contract. Unless otherwise specified below, renewal of this Contract is limited to _____ successive one (1) year periods or multiple renewal periods of less than one year, provided that the multiple renewal periods do not exceed the total number of months available in all renewal years combined. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's office (Attorney General approval is as to form only)

☐ **Alternate Renewal Term** – This contract may be renewed for _____ successive _____ year periods or shorter periods provided that they do not exceed the total number of months contained in all available renewals. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's office (Attorney General approval is as to form only)

Delivery Order Limitations: In the event that this contract permits delivery orders, a delivery order may only be issued during the time this Contract is in effect. Any delivery order issued within one year of the expiration of this Contract shall be effective for one year from the date the delivery order is issued. No delivery order may be extended beyond one year after this Contract has expired.

☐ **Fixed Period Contract:** This Contract becomes effective upon Vendor's receipt of the notice to proceed and must be completed within _____ days.

☐ **Fixed Period Contract with Renewals:** This Contract becomes effective upon Vendor's receipt of the notice to proceed and part of the Contract more fully described in the attached specifications must be completed within _____ days. Upon completion of the work covered by the preceding sentence, the vendor agrees that:

☐ the contract will continue for _____ years;

☐ the contract may be renewed for _____ successive _____ year periods or shorter periods provided that they do not exceed the total number of months contained in all available renewals. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's Office (Attorney General approval is as to form only).

☐ **One-Time Purchase:** The term of this Contract shall run from the issuance of the Award Document until all of the goods contracted for have been delivered, but in no event will this Contract extend for more than one fiscal year.

☐ **Construction/Project Oversight:** This Contract becomes effective on the effective start date listed on the first page of this Contract, identified as the State of West Virginia contract cover page containing the signatures of the Purchasing Division, Attorney General, and Encumbrance clerk (or another page identified as _____), and continues until the project for which the vendor is providing oversight is complete.

☐ **Other:** Contract Term specified in _____

4. AUTHORITY TO PROCEED: Vendor is authorized to begin performance of this contract on the date of encumbrance listed on the front page of the Award Document unless either the box for "Fixed Period Contract" or "Fixed Period Contract with Renewals" has been checked in Section 3 above. If either "Fixed Period Contract" or "Fixed Period Contract with Renewals" has been checked, Vendor must not begin work until it receives a separate notice to proceed from the State. The notice to proceed will then be incorporated into the Contract via change order to memorialize the official date that work commenced.

5. QUANTITIES: The quantities required under this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below.

☐ **Open End Contract:** Quantities listed in this Solicitation/Award Document are approximations only, based on estimates supplied by the Agency. It is understood and agreed that the Contract shall cover the quantities actually ordered for delivery during the term of the Contract, whether more or less than the quantities shown.

☐ **Service:** The scope of the service to be provided will be more clearly defined in the specifications included herewith.

☐ **Combined Service and Goods:** The scope of the service and deliverable goods to be provided will be more clearly defined in the specifications included herewith.

☐ **One-Time Purchase:** This Contract is for the purchase of a set quantity of goods that are identified in the specifications included herewith. Once those items have been delivered, no additional goods may be procured under this Contract without an appropriate change order approved by the Vendor, Agency, Purchasing Division, and Attorney General's office.

☐ **Construction:** This Contract is for construction activity more fully defined in the specifications.

6. EMERGENCY PURCHASES: The Purchasing Division Director may authorize the Agency to purchase goods or services in the open market that Vendor would otherwise provide under this Contract if those goods or services are for immediate or expedited delivery in an emergency. Emergencies shall include, but are not limited to, delays in transportation or an unanticipated increase in the volume of work. An emergency purchase in the open market, approved by the Purchasing Division Director, shall not constitute a breach of this Contract and shall not entitle the Vendor to any form of compensation or damages. This provision does not excuse the State from fulfilling its obligations under a One-Time Purchase contract.

7. REQUIRED DOCUMENTS: All of the items checked in this section must be provided to the Purchasing Division by the Vendor as specified:

☐ **LICENSE(S) / CERTIFICATIONS / PERMITS:** In addition to anything required under the Section of the General Terms and Conditions entitled Licensing, the apparent successful Vendor shall furnish proof of the following licenses, certifications, and/or permits upon request and in a form acceptable to the State. The request may be prior to or after contract award at the State's sole discretion.

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The apparent successful Vendor shall also furnish proof of any additional licenses or certifications contained in the specifications regardless of whether or not that requirement is listed above.

8. INSURANCE: The apparent successful Vendor shall furnish proof of the insurance identified by a checkmark below prior to Contract award. The insurance coverages identified below must be maintained throughout the life of this contract. Thirty (30) days prior to the expiration of the insurance policies, Vendor shall provide the Agency with proof that the insurance mandated herein has been continued. Vendor must also provide Agency with immediate notice of any changes in its insurance policies, including but not limited to, policy cancelation, policy reduction, or change in insurers. The apparent successful Vendor shall also furnish proof of any additional insurance requirements contained in the specifications prior to Contract award regardless of whether that insurance requirement is listed in this section.

Vendor must maintain:

☐ **Commercial General Liability Insurance** in at least an amount of: _____ per occurrence.

☐ **Automobile Liability Insurance** in at least an amount of: _____ per occurrence.

☐ **Professional/Malpractice/Errors and Omission Insurance** in at least an amount of: _____ per occurrence. Notwithstanding the forgoing, Vendor's are not required to list the State as an additional insured for this type of policy.

☐ **Commercial Crime and Third Party Fidelity Insurance** in an amount of: _____ per occurrence.

☐ **Cyber Liability Insurance** in an amount of: _____ per occurrence.

☐ **Builders Risk Insurance** in an amount equal to 100% of the amount of the Contract.

☐ **Pollution Insurance** in an amount of: _____ per occurrence.

☐ **Aircraft Liability** in an amount of: _____ per occurrence.

☐

☐

☐

☐

9. WORKERS' COMPENSATION INSURANCE: Vendor shall comply with laws relating to workers compensation, shall maintain workers' compensation insurance when required, and shall furnish proof of workers' compensation insurance upon request.

10. VENUE: All legal actions for damages brought by Vendor against the State shall be brought in the West Virginia Claims Commission. Other causes of action must be brought in the West Virginia court authorized by statute to exercise jurisdiction over it.

11. LIQUIDATED DAMAGES: This clause shall in no way be considered exclusive and shall not limit the State or Agency's right to pursue any other available remedy. Vendor shall pay liquidated damages in the amount specified below or as described in the specifications:

☐ _____ for _____.

☐ Liquidated Damages Contained in the Specifications.

☐ Liquidated Damages Are Not Included in this Contract.

12. ACCEPTANCE: Vendor's signature on its bid, or on the certification and signature page, constitutes an offer to the State that cannot be unilaterally withdrawn, signifies that the product or service proposed by vendor meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise indicated, and signifies acceptance of the terms and conditions contained in the Solicitation unless otherwise indicated.

13. PRICING: The pricing set forth herein is firm for the life of the Contract, unless specified elsewhere within this Solicitation/Contract by the State. A Vendor's inclusion of price adjustment provisions in its bid, without an express authorization from the State in the Solicitation to do so, may result in bid disqualification. Notwithstanding the foregoing, Vendor must extend any publicly advertised sale price to the State and invoice at the lower of the contract price or the publicly advertised sale price.

14. PAYMENT IN ARREARS: Payments for goods/services will be made in arrears only upon receipt of a proper invoice, detailing the goods/services provided or receipt of the goods/services, whichever is later. Notwithstanding the foregoing, payments for software maintenance, licenses, or subscriptions may be paid annually in advance.

15. PAYMENT METHODS: Vendor must accept payment by electronic funds transfer and P-Card. (The State of West Virginia's Purchasing Card program, administered under contract by a banking institution, processes payment for goods and services through state designated credit cards.)

16. TAXES: The Vendor shall pay any applicable sales, use, personal property or any other taxes arising out of this Contract and the transactions contemplated thereby. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.

17. ADDITIONAL FEES: Vendor is not permitted to charge additional fees or assess additional charges that were not either expressly provided for in the solicitation published by the State of West Virginia, included in the Contract, or included in the unit price or lump sum bid amount that Vendor is required by the solicitation to provide. Including such fees or charges as notes to the solicitation may result in rejection of vendor's bid. Requesting such fees or charges be paid after the contract has been awarded may result in cancellation of the contract.

18. FUNDING: This Contract shall continue for the term stated herein, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise made available, this Contract becomes void and of no effect beginning on July 1 of the fiscal year for which funding has not been appropriated or otherwise made available. If that occurs, the State may notify the Vendor that an alternative source of funding has been obtained and thereby avoid the automatic termination. Non-appropriation or non-funding shall not be considered an event of default.

19. CANCELLATION: The Purchasing Division Director reserves the right to cancel this Contract immediately upon written notice to the vendor if the materials or workmanship supplied do not conform to the specifications contained in the Contract. The Purchasing Division Director may also cancel any purchase or Contract upon 30 days written notice to the Vendor in accordance with West Virginia Code of State Rules § 148-1-5.2.b.

20. TIME: Time is of the essence regarding all matters of time and performance in this Contract.

21. APPLICABLE LAW: This Contract is governed by and interpreted under West Virginia law without giving effect to its choice of law principles. Any information provided in specification manuals, or any other source, verbal or written, which contradicts or violates the West Virginia Constitution, West Virginia Code, or West Virginia Code of State Rules is void and of no effect.

22. COMPLIANCE WITH LAWS: Vendor shall comply with all applicable federal, state, and local laws, regulations and ordinances. By submitting a bid, Vendor acknowledges that it has reviewed, understands, and will comply with all applicable laws, regulations, and ordinances.

SUBCONTRACTOR COMPLIANCE: Vendor shall notify all subcontractors providing commodities or services related to this Contract that as subcontractors, they too are required to comply with all applicable laws, regulations, and ordinances. Notification under this provision must occur prior to the performance of any work under the contract by the subcontractor.

23. ARBITRATION: Any references made to arbitration contained in this Contract, Vendor's bid, or in any American Institute of Architects documents pertaining to this Contract are hereby deleted, void, and of no effect.

24. MODIFICATIONS: This writing is the parties' final expression of intent. Notwithstanding anything contained in this Contract to the contrary no modification of this Contract shall be binding without mutual written consent of the Agency, and the Vendor, with approval of the Purchasing Division and the Attorney General's office (Attorney General approval is as to form only). Any change to existing contracts that adds work or changes contract cost, and were not included in the original contract, must be approved by the Purchasing Division and the Attorney General's Office (as to form) prior to the implementation of the change or commencement of work affected by the change.

25. WAIVER: The failure of either party to insist upon a strict performance of any of the terms or provision of this Contract, or to exercise any option, right, or remedy herein contained, shall not be construed as a waiver or a relinquishment for the future of such term, provision, option, right, or remedy, but the same shall continue in full force and effect. Any waiver must be expressly stated in writing and signed by the waiving party.

26. SUBSEQUENT FORMS: The terms and conditions contained in this Contract shall supersede any and all subsequent terms and conditions which may appear on any form documents submitted by Vendor to the Agency or Purchasing Division such as price lists, order forms, invoices, sales agreements, or maintenance agreements, and includes internet websites or other electronic documents. Acceptance or use of Vendor's forms does not constitute acceptance of the terms and conditions contained thereon.

27. ASSIGNMENT: Neither this Contract nor any monies due, or to become due hereunder, may be assigned by the Vendor without the express written consent of the Agency, the Purchasing Division, the Attorney General's office (as to form only), and any other government agency or office that may be required to approve such assignments.

28. WARRANTY: The Vendor expressly warrants that the goods and/or services covered by this Contract will: (a) conform to the specifications, drawings, samples, or other description furnished or specified by the Agency; (b) be merchantable and fit for the purpose intended; and (c) be free from defect in material and workmanship.

29. STATE EMPLOYEES: State employees are not permitted to utilize this Contract for personal use and the Vendor is prohibited from permitting or facilitating the same.

30. PRIVACY, SECURITY, AND CONFIDENTIALITY: The Vendor agrees that it will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the Agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the Agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in www.state.wv.us/admin/purchase/privacy.

31. YOUR SUBMISSION IS A PUBLIC DOCUMENT: Vendor's entire response to the Solicitation and the resulting Contract are public documents. As public documents, they will be disclosed to the public following the bid/proposal opening or award of the contract, as required by the competitive bidding laws of West Virginia Code §§ 5A-3-1 et seq., 5-22-1 et seq., and 5G-1-1 et seq. and the Freedom of Information Act West Virginia Code §§ 29B-1-1 et seq.

DO NOT SUBMIT MATERIAL YOU CONSIDER TO BE CONFIDENTIAL, A TRADE SECRET, OR OTHERWISE NOT SUBJECT TO PUBLIC DISCLOSURE.

Submission of any bid, proposal, or other document to the Purchasing Division constitutes your explicit consent to the subsequent public disclosure of the bid, proposal, or document. The Purchasing Division will disclose any document labeled "confidential," "proprietary," "trade secret," "private," or labeled with any other claim against public disclosure of the documents, to include any "trade secrets" as defined by West Virginia Code § 47-22-1 et seq. All submissions are subject to public disclosure without notice.

32. LICENSING: In accordance with West Virginia Code of State Rules § 148-1-6.1.e, Vendor must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agency or political subdivision. Obligations related to political subdivisions may include, but are not limited to, business licensing, business and occupation taxes, inspection compliance, permitting, etc. Upon request, the Vendor must provide all necessary releases to obtain information to enable the Purchasing Division Director or the Agency to verify that the Vendor is licensed and in good standing with the above entities.

SUBCONTRACTOR COMPLIANCE: Vendor shall notify all subcontractors providing commodities or services related to this Contract that as subcontractors, they too are required to be licensed, in good standing, and up-to-date on all state and local obligations as described in this section. Obligations related to political subdivisions may include, but are not limited to, business licensing, business and occupation taxes, inspection compliance, permitting, etc. Notification under this provision must occur prior to the performance of any work under the contract by the subcontractor.

33. ANTITRUST: In submitting a bid to, signing a contract with, or accepting a Award Document from any agency of the State of West Virginia, the Vendor agrees to convey, sell, assign, or transfer to the State of West Virginia all rights, title, and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to Vendor.

34. VENDOR NON-CONFLICT: Neither Vendor nor its representatives are permitted to have any interest, nor shall they acquire any interest, direct or indirect, which would compromise the performance of its services hereunder. Any such interests shall be promptly presented in detail to the Agency.

35. VENDOR RELATIONSHIP: The relationship of the Vendor to the State shall be that of an independent contractor and no principal-agent relationship or employer-employee relationship is contemplated or created by this Contract. The Vendor as an independent contractor is solely liable for the acts and omissions of its employees and agents. Vendor shall be responsible for selecting, supervising, and compensating any and all individuals employed pursuant to the terms of this Solicitation and resulting contract. Neither the Vendor, nor any employees or subcontractors of the Vendor, shall be deemed to be employees of the State for any purpose whatsoever. Vendor shall be exclusively responsible for payment of employees and contractors for all wages and salaries, taxes, withholding payments, penalties, fees, fringe benefits, professional liability insurance premiums, contributions to insurance and pension, or other deferred compensation plans, including but not limited to, Workers' Compensation and Social Security obligations, licensing fees, etc. and the filing of all necessary documents, forms, and returns pertinent to all of the foregoing.

Vendor shall hold harmless the State, and shall provide the State and Agency with a defense against any and all claims including, but not limited to, the foregoing payments, withholdings, contributions, taxes, Social Security taxes, and employer income tax returns.

36. INDEMNIFICATION: The Vendor agrees to indemnify, defend, and hold harmless the State and the Agency, their officers, and employees from and against: (1) Any claims or losses for services rendered by any subcontractor, person, or firm performing or supplying services, materials, or supplies in connection with the performance of the Contract; (2) Any claims or losses resulting to any person or entity injured or damaged by the Vendor, its officers, employees, or subcontractors by the publication, translation, reproduction, delivery, performance, use, or disposition of any data used under the Contract in a manner not authorized by the Contract, or by Federal or State statutes or regulations; and (3) Any failure of the Vendor, its officers, employees, or subcontractors to observe State and Federal laws including, but not limited to, labor and wage and hour laws.

37. NO DEBT CERTIFICATION: In accordance with West Virginia Code §§ 5A-3-10a and 5-22-1(i), the State is prohibited from awarding a contract to any bidder that owes a debt to the State or a political subdivision of the State. By submitting a bid, or entering into a contract with the State, Vendor is affirming that (1) for construction contracts, the Vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, neither the Vendor nor any related party owe a debt as defined above, and neither the Vendor nor any related party are in employer default as defined in the statute cited above unless the debt or employer default is permitted under the statute.

38. CONFLICT OF INTEREST: Vendor, its officers or members or employees, shall not presently have or acquire an interest, direct or indirect, which would conflict with or compromise the performance of its obligations hereunder. Vendor shall periodically inquire of its officers, members and employees to ensure that a conflict of interest does not arise. Any conflict of interest discovered shall be promptly presented in detail to the Agency.

39. REPORTS: Vendor shall provide the Agency and/or the Purchasing Division with the following reports identified by a checked box below:

[] Such reports as the Agency and/or the Purchasing Division may request. Requested reports may include, but are not limited to, quantities purchased, agencies utilizing the contract, total contract expenditures by agency, etc.

[] Quarterly reports detailing the total quantity of purchases in units and dollars, along with a listing of purchases by agency. Quarterly reports should be delivered to the Purchasing Division via email at purchasing.division@wv.gov.

40. BACKGROUND CHECK: In accordance with W. Va. Code § 15-2D-3, the State reserves the right to prohibit a service provider's employees from accessing sensitive or critical information or to be present at the Capitol complex based upon results addressed from a criminal background check. Service providers should contact the West Virginia Division of Protective Services by phone at (304) 558-9911 for more information.

41. PREFERENCE FOR USE OF DOMESTIC STEEL PRODUCTS: Except when authorized by the Director of the Purchasing Division pursuant to W. Va. Code § 5A-3-56, no contractor may use or supply steel products for a State Contract Project other than those steel products made in the United States. A contractor who uses steel products in violation of this section may be subject to civil penalties pursuant to W. Va. Code § 5A-3-56. As used in this section:

- a. "State Contract Project" means any erection or construction of, or any addition to, alteration of or other improvement to any building or structure, including, but not limited to, roads or highways, or the installation of any heating or cooling or ventilating plants or other equipment, or the supply of and materials for such projects, pursuant to a contract with the State of West Virginia for which bids were solicited on or after June 6, 2001.
- b. "Steel Products" means products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated or otherwise similarly processed, or processed by a combination of two or more or such operations, from steel made by the open hearth, basic oxygen, electric furnace, Bessemer or other steel making process.
- c. The Purchasing Division Director may, in writing, authorize the use of foreign steel products if:
 1. The cost for each contract item used does not exceed one tenth of one percent (.1%) of the total contract cost or two thousand five hundred dollars (\$2,500.00), whichever is greater. For the purposes of this section, the cost is the value of the steel product as delivered to the project; or
 2. The Director of the Purchasing Division determines that specified steel materials are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet contract requirements.

42. PREFERENCE FOR USE OF DOMESTIC ALUMINUM, GLASS, AND STEEL: In Accordance with W. Va. Code § 5-19-1 et seq., and W. Va. CSR § 148-10-1 et seq., for every contract or subcontract, subject to the limitations contained herein, for the construction, reconstruction, alteration, repair, improvement or maintenance of public works or for the purchase of any item of machinery or equipment to be used at sites of public works, only domestic aluminum, glass or steel products shall be supplied unless the spending officer determines, in writing, after the receipt of offers or bids, (1) that the cost of domestic aluminum, glass or steel products is unreasonable or inconsistent with the public interest of the State of West Virginia, (2) that domestic aluminum, glass or steel products are not produced in sufficient quantities to meet the contract requirements, or (3) the available domestic aluminum, glass, or steel do not meet the contract specifications. This provision only applies to public works contracts awarded in an amount more than fifty thousand dollars (\$50,000) or public works contracts that require more than ten thousand pounds of steel products.

The cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than twenty percent (20%) of the bid or offered price for foreign made aluminum, glass, or steel products. If the domestic aluminum, glass or steel products to be supplied or produced in a “substantial labor surplus area”, as defined by the United States Department of Labor, the cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than thirty percent (30%) of the bid or offered price for foreign made aluminum, glass, or steel products. This preference shall be applied to an item of machinery or equipment, as indicated above, when the item is a single unit of equipment or machinery manufactured primarily of aluminum, glass or steel, is part of a public works contract and has the sole purpose or of being a permanent part of a single public works project. This provision does not apply to equipment or machinery purchased by a spending unit for use by that spending unit and not as part of a single public works project.

All bids and offers including domestic aluminum, glass or steel products that exceed bid or offer prices including foreign aluminum, glass or steel products after application of the preferences provided in this provision may be reduced to a price equal to or lower than the lowest bid or offer price for foreign aluminum, glass or steel products plus the applicable preference. If the reduced bid or offer prices are made in writing and supersede the prior bid or offer prices, all bids or offers, including the reduced bid or offer prices, will be reevaluated in accordance with this rule.

43. INTERESTED PARTY SUPPLEMENTAL DISCLOSURE: W. Va. Code § 6D-1-2 requires that for contracts with an actual or estimated value of at least \$1 million, the Vendor must submit to the Agency a disclosure of interested parties prior to beginning work under this Contract. Additionally, the Vendor must submit a supplemental disclosure of interested parties reflecting any new or differing interested parties to the contract, which were not included in the original pre-work interested party disclosure, within 30 days following the completion or termination of the contract. A copy of that form is included with this solicitation or can be obtained from the WV Ethics Commission. This requirement does not apply to publicly traded companies listed on a national or international stock exchange. A more detailed definition of interested parties can be obtained from the form referenced above.

44. PROHIBITION AGAINST USED OR REFURBISHED: Unless expressly permitted in the solicitation published by the State, Vendor must provide new, unused commodities, and is prohibited from supplying used or refurbished commodities, in fulfilling its responsibilities under this Contract.

45. VOID CONTRACT CLAUSES: This Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law.

46. ISRAEL BOYCOTT: Bidder understands and agrees that, pursuant to W. Va. Code § 5A-3-63, it is prohibited from engaging in a boycott of Israel during the term of this contract.

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

(Printed Name and Title) _____

(Address) _____

(Phone Number) / (Fax Number) _____

(email address) _____

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that: I have reviewed this Solicitation/Contract in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation/Contract for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that this bid or offer was made without prior understanding, agreement, or connection with any entity submitting a bid or offer for the same material, supplies, equipment or services; that this bid or offer is in all respects fair and without collusion or fraud; that this Contract is accepted or entered into without any prior understanding, agreement, or connection to any other entity that could be considered a violation of law; that I am authorized by the Vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on Vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

By signing below, I further certify that I understand this Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law; and that pursuant to W. Va. Code 5A-3-63, the entity entering into this contract is prohibited from engaging in a boycott against Israel.

(Company)

(Signature of Authorized Representative)

(Printed Name and Title of Authorized Representative) (Date)

(Phone Number) (Fax Number)

(Email Address)

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.:

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

- | | |
|---|--|
| ☐ Addendum No. 1 | ☐ Addendum No. 6 |
| ☐ Addendum No. 2 | ☐ Addendum No. 7 |
| ☐ Addendum No. 3 | ☐ Addendum No. 8 |
| ☐ Addendum No. 4 | ☐ Addendum No. 9 |
| ☐ Addendum No. 5 | ☐ Addendum No. 10 |

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Company

Authorized Signature

Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.

REQUEST FOR QUOTATION
Continuous Particulate Matter Beta Attenuation Mass Monitors and Supplies

SPECIFICATIONS

- 1. PURPOSE AND SCOPE:** The West Virginia Purchasing Division is soliciting bids on behalf of the West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality, to establish an open-end contract for continuous particulate matter beta attenuation mass monitors and supplies.
- 2. DEFINITIONS:** The terms listed below shall have the meanings assigned to them below. Additional definitions can be found in section 2 of the General Terms and Conditions.
 - 2.1 “Contract Item” or “Contract Items”** means the list of items identified in Section 3.1 below and on the Pricing Pages.
 - 2.2 “Pricing Pages”** means the schedule of prices, estimated order quantity, and totals contained in wvOASIS or attached hereto as Exhibit A, and used to evaluate the Solicitation responses.
 - 2.3 “Solicitation”** means the official notice of an opportunity to supply the State with goods or services that is published by the Purchasing Division.
 - 2.4 “AC”** means alternating current, an electric current that reverses its direction many times a second at regular intervals.
 - 2.5 “BGI VSCC”** means a BGI VSCC™ Very Sharp Cut Cyclone as approved by the United States Environmental Protection Agency per Automated Equivalent Method EQPM-0308-170 in the “List of Designated Reference and Equivalent Methods.”
 - 2.6 “ ° C”** means degree Celsius or centigrade, a measurement of temperature.
 - 2.7 “Class III Equivalent Method”** per EPA’s definition at 40 CFR 53, means an equivalent method for PM_{2.5} or PM_{10-2.5} that is an analyzer capable of providing PM_{2.5} or PM_{10-2.5} ambient air measurements representative of one-hour or less integrated PM_{2.5} or PM_{10-2.5} concentrations as well as 24-hour measurements determined as, or equivalent to, the mean of 24 one-hour consecutive measurements.
 - 2.8 “EPA”** means the United States Environmental Protection Agency.
 - 2.9 “Federal Equivalent Method (FEM)”** per EPA’s definition means a method for measuring the concentration of an air pollutant in the ambient air that has been designated as an equivalent method in accordance with 40 CFR Part 53. it does not

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include a method for which an equivalent method designation has been canceled in accordance with § 53.11 or § 53.16.

2.10 “Federal Reference Method (FRM)” per EPA’s definition means a method of sampling and analyzing the ambient air for an air pollutant that is specified as a reference method in an appendix to part 50 of chapter 40, or a method that has been designated as a reference method in accordance with 40 CFR Part 53; it does not include a method for which a reference method designation has been canceled in accordance with § 53.11 or § 53.16.PM2.5.

2.11 “List of Designated Reference and Equivalent Methods” means the most recent list provided by United States Environmental Protection Agency list in accordance with 40 CFR 53 at https://www.epa.gov/system/files/documents/2025-06/amtic-list-june-2025_final-508-compliant.pdf, and attached as Exhibit B.

2.12 “PM10-2.5” per EPA’s definition, means particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers and greater than a nominal 2.5 micrometers as measured by a reference method based on appendix O to part 50 of chapter 40, and designated in accordance with 40 CFR 53 or by an equivalent method designated in accordance 40 CFR 53.

2.13 “PM2.5” per EPA’s definition means particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers as measured by a reference method based on appendix L of part 50 of chapter 40, and designated in accordance with part 53 of this chapter, by an equivalent method designated in accordance with part 53, chapter 40, or by an approved regional method designated in accordance with appendix C to 40 CFR 53.

2.14 “RH” means Relative Humidity, expressed as a percentage, indicates a present state of absolute humidity relative to a maximum humidity given at the same temperature.

2.15 “V” means volts, a unit of electric potential.

3. GENERAL REQUIREMENTS:

3.1 Contract Items and Mandatory Requirements: Vendor shall provide Agency with the Contract Items listed below on an open-end and continuing basis. Contract Items must meet or exceed the mandatory requirements as shown below.

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3.1.1 Portable, Self-Contained (BAM 1022 or Equal) for Continuous PM2.5 FEM

3.1.1.1 Must meet United States Environmental Protection Agency (EPA) Class III equivalent method EQPM-1013-209 for continuous monitoring of suspended particulate matter of 2.5 micrometers in diameter (PM2.5) in ambient air by beta attenuation meeting Federal Equivalent Method (FEM) status as defined in EPA List of Designated Reference and Equivalent Methods, June 15, 2025, https://www.epa.gov/system/files/documents/2025-06/amtic-list-june-2025_final-508-complaint.pdf (Exhibit B) Must meet MetOne Instruments Model BAM 1022 or equal.

3.1.1.2 Monitor must be capable of providing continuous PM2.5 data with sample reporting times of 1 minute, 15 minutes, 30 minutes and 1 hour.

3.1.1.3 Monitor must be capable of running in ambient conditions, specifically must be functional in high ambient temperatures and relative humidity.

3.1.1.3.1 Operating Temp Range: between a minimum - 30° C to an upper limit minimum of +50° C.

3.1.1.3.2 Operating Humidity Range: between a minimum 0% RH to an upper minimum of 90% RH or above, non-condensing.

3.1.1.3.3 Must not require collocation with air-conditioning unit in order to function.

3.1.1.3.4 Must be functional in humid environments without the risk of condensation forming in sample lines.

3.1.1.4 Monitor must be self-contained: must not require installation within a secondary shelter. Self-containment must protect the instrument from natural elements such as weather. Monitor containment must provide complete, sustained protection by preventing any water or moisture from entering, even in heavy downpours.

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Continuous Particulate Matter Beta Attenuation Mass Monitors and Supplies

- 3.1.1.5 Monitor must include internal temperature control to maintain the sensor at a constant operating temperature within a minimum of 5 degrees and a maximum of 10 degrees above ambient temperature.
- 3.1.1.6 Monitor must be portable enough to meet the following:
 - 3.1.1.6.1 Must be able to be located on a rooftop or ground-level.
 - 3.1.1.6.2 Must be able to be moved by 1-2 people (90 lb or less fully assembled) without requiring disassembly.
- 3.1.1.7 Monitor must use a glass fiber filter tape for sample measurements.
- 3.1.1.8 Monitor must be equipped with a BGI very sharp cut cyclone (VSCC) particle size separator or equal.
- 3.1.1.9 The volumetric flow rate, measured or averaged over intervals of not more than 5 minutes over a 24-hour period, shall not vary more than ± 5 percent from the specified 16.67 L/min flow rate over the entire sample period (per 40 CFR 50, Subpart L, 7.4.3.1).
 - 3.1.1.9.1. This equates to a minimum of 15.84 liters per minute, and a maximum of 17.50 liters per minute, over a 24-hour period.
- 3.1.1.10 Monitor must include an ambient temperature, barometric pressure and relative humidity sensor(s).
- 3.1.1.11 Monitor must use a touchscreen interface and be compatible with Agilair datalogger models 8864 or 8872.
- 3.1.1.12 Each monitor must come with a calibration certificate.
- 3.1.1.13 Each monitor must have a two-year extended warranty from date of acceptance which consists of complete coverage of system onsite, parts, and labor.

3.1.2 BAM 1020 or Equal for Continuous PM_{2.5} or PM₁₀ FEM

- 3.1.2.1 Must meet United States Environmental Protection Agency (EPA) Automated Equivalent Method EQPM-0308-170 for continuous monitoring of suspended particulate matter of 2.5 micrometers in diameter (PM_{2.5}) in ambient air by beta attenuation, using a very sharp cut cyclone (VSCC), as defined in EPA List of Designated Reference and Equivalent Methods, June 15, 2025, https://www.epa.gov/systems/files/documents/2025-06/amtic-list-june-2025_final-508-compliant.pdf (Exhibit

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B) Monitor must be able to operate in FEM status for both PM2.5 and PM10 (not simultaneously). Must meet MetOne Instruments Model BAM 1020 or equal.

3.1.2.2 Monitor must be capable of providing continuous PM2.5 data or PM10 data with sample reporting time of 1 hour.

3.1.2.3 Monitor must be capable of running in ambient conditions, specifically must be functional in high ambient temperatures and relative humidity.

3.1.2.3.1 Operating temp Range: between a minimum - 30° C to +50° C or above.

3.1.2.3.2 Operating Humidity Range: between a minimum 0% RH to an upper minimum of 90% RH or above, non-condensing.

3.1.2.4 Monitor must include internal temperature control to maintain the sensor at a constant operating temperature within a minimum of 5 degrees and a maximum of 10 degrees above ambient temperature.

3.1.2.5 Monitor must be portable enough to meet the following:

3.1.2.5.1 Must be able to be moved by 1-2 people (50 lb or less) without requiring disassembly.

3.1.2.5.2 Must be functional in humid environments without risk of condensation forming in sample lines.

3.1.2.6 Monitor must use a glass fiber filter tape for sample measurements.

3.1.2.7 Monitor must be equipped with a BGI very sharp cut cyclone (VSCC) particle size separator or equal.

3.1.2.8 The volumetric flow rate, measured or averaged over intervals of not more than 5 minutes over a 24-hour period, shall not vary more than ± 5 percent from the specified 16.67 L/min flow rate over the entire sample period (per 40 CFR 50, Subpart L, 7.4.3.1).

3.1.2.8.1. This equates to a minimum of 15.84 liters per minute, and a maximum of 17.50 liters per minute, over a 24-hour period.

3.1.2.9 Monitor must include an ambient temperature, barometric pressure and relative humidity sensor(s).

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3.1.2.10 Monitor must use a touchscreen interface and be compatible with Agilair datalogger models 8864 or 8872.

3.1.2.11 Each monitor must come with a calibration certificate.

3.1.2.12 Each monitor must have a two-year extended warranty from date of acceptance which consists of complete coverage of system onsite, parts, and labor.

3.1.3 Supplies

3.1.3.1 These supplies shall be provided according to the contract terms and conditions contained in the table below, and noted in the Exhibit A Pricing Page. Supplies must be compatible with the BAM1022 or equal, or with the BAM 1020 or equal, or both.

Continuous Particulate Matter Beta Attenuation Mass Monitors - Supplies	
Product Code or equal	Description
460180	Filter tape, glass fiber, 25M long, 30MM wide (may be used for BAM 1022 or BAM 1020)
82044	Replacement pump assembly, MEDO, 120V, BAM 1022 or equal (spare pumps)
680839	Pump Rebuild Kit (MEDO) for BAM 1022 or equal
680828	Gast Pump rebuild Kit for BAM 1020 or equal
460134	BX-302 zero filter calibration kit
BX-126 (order with BAM 1020)	Pump, Medo 115 VAC±10% 60 HZ (replacement for BAM 1020 pump)
SWIFT 25.0	Multi-Function Flow Meter
30030-1	Spare circuit boards for BAM 1022 or equal (Core Processor PCBA) for BAM 1022 or equal
82970-1	Spare I/O wiring panel, PCBA for BAM 1022 or equal
580345	Filter, vacuum line
7440	Rubber Leak Test Nozzle Seal Tool
9122	O-Ring Kit, Inlet tube receiver and nozzle
80324	Internal flow sensor
BX-344	BAM Inlet Cleaning Kit

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- 3.1.4 Two sets of manuals (styled: Instruction Manual, Operator's Manual, Operation and Service Manual, etc.) must accompany each monitor. The manuals will include complete operating instructions, circuit descriptions, theory of operation, location of controls and switches, software commands, maintenance and service instructions. The manual will also include schematic diagrams, pneumatic flow charts, lists of commonly replaced parts, warnings and safety precautions.
- 3.1.5 In-house training for WVDEP Division of Air Quality staff must be provided at no additional costs for maintenance and diagnostic repair.
- 3.1.6 Technical support must be available for WVDEP Division of Air Quality staff between the hours of 8 a.m. and 5 p.m. Eastern Standard Time (EST) during regular business days, Mondays through Fridays, via both telephone access and electronic mail (e-mail).

4. CONTRACT AWARD:

- 4.1 **Contract Award:** The Contract is intended to provide Agencies with a purchase price on all Contract Items. The Contract shall be awarded to the Vendor that provides the Contract Items meeting the required specifications for the lowest overall total cost as shown on the Pricing Pages.

- 4.2 **Pricing Pages:** Vendor must complete the Pricing Page (Exhibit A), and provide pricing for each item number (unit price), as well as a total for the estimate quantify of parts listed (total cost per item), and the total bid amount. Vendor must complete the Pricing Page in its entirety as failure to do so may result in Vendor's bids being disqualified.

The Pricing Page must contain a list of the Contract Items and estimated purchase volume. The estimated purchase volume for each item represents the approximate volume of anticipated purchases only. No future use of the Contract or any individual item is guaranteed or implied.

- 4.2.1 Bids must include estimated shipping and freight charges to 601 57th Street, SE, Charleston, WV 25304 on the Exhibit A Pricing Page. All shipping and freight charges will be paid based on actual expenses.

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Continuous Particulate Matter Beta Attenuation Mass Monitors and Supplies

5. ORDERING AND PAYMENT:

- 5.1 Ordering:** Vendor shall accept orders through wvOASIS, regular mail, facsimile, e-mail, or any other written form of communication. Vendor may, but is not required to, accept on-line orders through a secure internet ordering portal/website. If Vendor has the ability to accept on-line orders, it should include in its response a brief description of how Agencies may utilize the on-line ordering system. Vendor shall ensure that its on-line ordering system is properly secured prior to processing Agency orders on-line.
- 5.2 Payment:** Vendor shall accept payment in accordance with the payment procedures of the State of West Virginia.

6. DELIVERY AND RETURN:

- 6.1 Delivery Time:** Vendor shall deliver standard orders within 60 working days after orders are received. Vendor shall deliver emergency orders within 30 working day(s) after orders are received for monitors, and within 5 working days for supplies. Vendor shall ship all orders in accordance with the above schedule and shall not hold orders until a minimum delivery quantity is met.
- 6.2** Equipment shall be shipped Freight on Board/Free on Board (FOB) Destination. The seller shall be responsible for the cost of transporting merchandise to the WVDEP delivery address listed above and the WVDEP Division of Air Quality staff will take delivery of shipped goods once the goods arrive at the WVDEP location.
- 6.3 Late Delivery:** WVDEP Division of Air Quality must be notified in writing if orders will be delayed for any reason. Any delay in delivery that could cause harm to an Agency will be grounds for cancellation of the delayed order, and/or obtaining the items ordered from a third party.
- Any Agency seeking to obtain items from a third party under this provision must first obtain approval of the Purchasing Division.
- 6.4 Delivery Payment/Risk of Loss:** Standard order delivery shall be F.O.B. destination to the Agency's location. Vendor shall include the cost of standard order delivery charges in its bid pricing/discount and is not permitted to charge the Agency separately for such delivery. The Agency will pay delivery charges on all emergency orders provided that Vendor invoices those delivery costs as a separate charge with the original freight bill attached to the invoice.

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Continuous Particulate Matter Beta Attenuation Mass Monitors and Supplies

6.5 Return of Unacceptable Items: If the Agency deems the Contract Items to be unacceptable, the Contract Items shall be returned to Vendor at Vendor's expense and with no restocking charge. Vendor shall either make arrangements for the return within five (5) days of being notified that items are unacceptable, or permit the Agency to arrange for the return and reimburse Agency for delivery expenses. If the original packaging cannot be utilized for the return, Vendor will supply the Agency with appropriate return packaging upon request. All returns of unacceptable items shall be F.O.B. the Agency's location. The returned product shall either be replaced, or the Agency shall receive a full credit or refund for the purchase price, at the Agency's discretion.

6.6 Return Due to Agency Error: Items ordered in error by the Agency will be returned for credit within 60 days of receipt, F.O.B. Vendor's location. Vendor shall not charge a restocking fee if returned products are in a resalable condition. Items shall be deemed to be in a resalable condition if they are unused and in the original packaging. Any restocking fee for items not in a resalable condition shall be the lower of the Vendor's customary restocking fee or 5% of the total invoiced value of the returned items.

7. VENDOR DEFAULT:

7.1 The following shall be considered a vendor default under this Contract.

- 7.1.1 Failure to provide Contract Items in accordance with the requirements contained herein.
- 7.1.2 Failure to comply with other specifications and requirements contained herein.
- 7.1.3 Failure to comply with any laws, rules, and ordinances applicable to the Contract Services provided under this Contract.
- 7.1.4 Failure to remedy deficient performance upon request.

7.2 The following remedies shall be available to Agency upon default.

- 7.2.1 Immediate cancellation of the Contract.
- 7.2.2 Immediate cancellation of one or more release orders issued under this Contract.

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7.2.3 Any other remedies available in law or equity.

8. MISCELLANEOUS:

- 8.1 No Substitutions:** Vendor shall supply only Contract Items submitted in response to the Solicitation unless a contract modification is approved in accordance with the provisions contained in this Contract.
- 8.2 Vendor Supply:** Vendor must carry sufficient inventory of the Contract Items being offered to fulfill its obligations under this Contract. By signing its bid, Vendor certifies that it can supply the Contract Items contained in its bid response.
- 8.3 Reports:** Vendor shall provide quarterly reports and annual summaries to the Agency showing the Agency's items purchased, quantities of items purchased, and total dollar value of the items purchased. Vendor shall also provide reports, upon request, showing the items purchased during the term of this Contract, the quantity purchased for each of those items, and the total value of purchases for each of those items. Failure to supply such reports may be grounds for cancellation of this Contract.
- 8.4 Contract Manager:** During its performance of this Contract, Vendor must designate and maintain a primary contract manager responsible for overseeing Vendor's responsibilities under this Contract. The Contract manager must be available during normal business hours to address any customer service or other issues related to this Contract. Vendor should list its Contract manager and his or her contact information below.

Contract Manager: _____
Telephone Number: _____
Fax Number: _____
Email Address: _____

Exhibit A - Continuous Particulate Matter Beta Attenuation Mass Monitors and Supplies

The following shall be provided according to the contract terms and conditions contained herein. Price must be provided for all the following in whole. Please note these are estimated quantities and do not reflect any guarantee of purchase. WVDEP DAQ may purchase more or less as needed.

Item	Specification No.	Product Code or equal (1)	(1) Product Code if different	Description	Estimated Quantify	Unit Price	Total Cost Per Item
1	3.1.1	BAM 1022		Continuous PM2.5 OR PM10 BETA ATTENUATION MONITOR - OUTDOOR CONFIGURATION AUTOMATED MEETING EPA FEDERAL EQUIVALENT METHOD (FEM) EQUIVALENT METHOD EQPM-1013-209. With 110 VAC Pump Box. Includes Calibration to Standard. New Calibration Certificate traceable to NIST Standards	15		
2	3.1.1	BX-141 (order with BAM 1022)		110 VAC Pump Box (for BAM 1022 to be FEM complete)	15		
3	3.1.1.13, 3.1.2.12	EXT Warranty		2-Year Extended Warranty from date of acceptance for BAM 1022 or BAM1020. Must consist of complete coverage of system onsite, parts, and labor.	17		
4	3.1.2	BAM 1020		PM2.5 OR PM10 CONTINUOUS BETA ATTENUATION MONITOR - AUTOMATED MEETING EPA FEDERAL EQUIVALENT METHOD (FEM) EQUIVALENT METHOD EQPM-0308-170. Includes Calibration to Standard. New Calibration Certificate traceable to NIST Standards	2		
5	3.1.2	PM2.5A-FEM-KIT (order with BAM 1020)		Accessory Kit, FEM PM2.5 BGI Very Sharp Cut Cyclone for PM2.5 OR PM10 CONTINUOUS MONITOR - AUTOMATED MEETING EPA FEDERAL EQUIVALENT METHOD (FEM) EQUIVALENT METHOD EQPM-0308-170. Includes Zero Calibrator with Adaptors (BX-302); Digital Temperature, Relative Humidity, BP combination sensor with 25 foot cable (BX-597A); valve plus HEPA filter (BX-302); 120 Volt, 60 Hertz	2		
6	3.1.2	BX-827 (order with BAM 1020)		Moisture Controlled Inlet Heater, 115V (Smart Heater)	2		
7	3.1.2	BX-126 (order with BAM 1020)		Pump, Medo 115 VAC±10% 60 HZ. This is also the replacement pump for BAM-1020.	2		
				Supplies			
8	3.1.3	460180		Filter tape, glass fiber, 25M long, 30MM wide (may be used for BAM 1022 or BAM 1020)	270		
9	3.1.3	82044		Replacement pump assembly, MEDO, 120V, BAM 1022 or equal (spare pumps)	15		
10	3.1.3	680839		Pump Rebuild Kit (MEDO) for BAM 1022 or equal	15		
11	3.1.3	680828		Gast Pump rebuild Kit for BAM 1020 or equal	2		
12	3.1.3	460134		BX-302 zero filter calibration kit	6		
13	3.1.3	BX-126 (order with BAM 1020)		Pump, Medo 115 VAC±10% 60 HZ (replacement for BAM 1020 pump)	15		
14	3.1.3	SWIFT 25.0		Multi-Function Flow Meter	1		
15	3.1.3	30030-1		Spare circuit boards for BAM 1022 or equal (Core Processor PCBA) for BAM 1022 or equal	3		
16	3.1.3	82970-1		Spare I/O wiring panel, PCBA for BAM 1022 or equal	3		
17	3.1.3	580345		Filter, vacuum line	10		
18	3.1.3	7440		Rubber Leak Test Nozzle Seal Tool	10		
19	3.1.3	9122		O-Ring Kit, Inlet tube receiver and nozzle	15		
20	3.1.3	80324		Internal flow sensor	3		
21	3.1.3	BX-344		BAM Inlet Cleaning Kit	6		
22	3.1.10	----		In-house training at no additional cost.	1		
23	3.1.5	----		Freight Shipping Cost per BAM 1022, BAM 1020, or for supplies *	17 (monitors)		
				* Note: All shipping and freight charges will be paid based on actual expenses.	50 (supplies)		
				Total Bid Amount			



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CENTER FOR ENVIRONMENTAL MEASUREMENTS & MODELING
AIR METHODS & CHARACTERIZATION DIVISION (MD-D205-03)
Research Triangle Park, NC 27711

Office of
Research and Development

LIST OF DESIGNATED REFERENCE AND EQUIVALENT METHODS

Issue Date: June 15, 2025

(www.epa.gov/ttn/amtic/criteria.html)

These methods for measuring ambient concentrations of specified air pollutants have been designated as "reference methods" or "equivalent methods" in accordance with Title 40, Part 53 of the Code of Federal Regulations (40 CFR Part 53). Subject to any limitations (e.g., operating range or temperature range) specified in the applicable designation, each method is acceptable for use in state or local air quality surveillance systems under 40 CFR Part 58 unless the applicable designation is subsequently canceled. Automated methods for pollutants other than PM₁₀ are acceptable for use only at shelter temperatures between 20°C and 30°C and line voltages between 105 and 125 volts unless wider limits are specified in the method description.

Prospective users of the methods listed should note (1) that each method must be used in strict accordance with its associated operation or instruction manual and with applicable quality assurance procedures, and (2) that modification of a method by its vendor or user may cause the pertinent designation to be inapplicable to the method as modified. (See Section 2.8 of Appendix C, 40 CFR Part 58 for approval of modifications to any of these methods by users.)

Further information concerning particular designations may be found in the *Federal Register* notice cited for each method or by writing to the Center for Environmental Measurements and Modeling, Air Methods and Characterization Division (MD-D205-03), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. Technical information concerning the methods should be obtained by contacting the source listed for each method. Source addresses are listed at the end of the listing of methods, except for the addresses for lead method sources, which are given with the method. New analyzers or PM₁₀ samplers sold as reference or equivalent methods must carry a label or sticker identifying them as designated methods. For analyzers or PM₁₀ samplers sold prior to the designation of a method with the same or similar model number, the model number does not necessarily identify an analyzer or sampler as a designated method. Consult the manufacturer or seller to determine if a previously sold analyzer or sampler can be considered a designated method or if it can be upgraded to designation status. Analyzer users who experience operational or other difficulties with a designated analyzer or sampler and are unable to resolve the problem directly with the instrument manufacturer may contact EPA (preferably in writing) at the above address for assistance.

This list will be revised as necessary to reflect any new designations, modifications of existing designations, or any cancellation of a designation currently in effect. The most current revision of the list will be available for inspection at EPA's Regional Offices, and copies may be obtained at the Internet site identified above or by writing to the Center for Environmental Measurements and Modeling at the address specified above.

Most Recent Designations

Designation Number	Applicant	Instrument Series	Summary of Designation	Effective Date
EQPM-1224-264	DKK-TOA	Model FPM-377	New PM _{2.5} FEM	April 8, 2025
EQPM-1224-265	DKK-TOA	Model FPM-377	New PM _{10-2.5} FEM	April 8, 2025

Most Recent Modifications of Existing Designations

Designation Number	Applicant	Instrument Series	Summary of Modification	Effective Date
RFNA-1289-074	Thermo Environmental	Model 42 series NO ₂ analyzers	Updated to include NH ₃ measurements	January, 2025
EQPM-0308-170, EQPM-0715-266, EQPM-0709-185, EQPM-0798-122, EQPM-1013-209, EQPM-1215-226	Met One Instruments, Inc.	BAM-1020, BAM-1022 and E-BAMPLUS	Updated to improve zero background test results	February, 2025
RFNA-0506-157	Horiba Instruments, Ltd.	APNA-370 NO ₂ Monitor or APNA-380 NO ₂ Monitor	Add recommended flow rates for APNA-370, add APNA-380 with expanded temperature range to designation description.	March, 2025
EQOA-0506-160	Horiba Instruments, Ltd.	APOA-370 Ozone Analyzer or APOA-380 Ozone Analyzer	Added recommended flow rates for APOA-370. Add model APOA-380 with expanded temperature range.	March, 2025
RFCA-0506-158	Horiba Instruments, Ltd.	APMA-370 CO Monitor	Added APMA-380 CO Monitor to the designation description entry name	December, 2024
EQSA-0506-159	Horiba Instruments, Ltd.	APSA-370 SO ₂ Monitor	Added APSA-380 SO ₂ Monitor to the designation description entry name	December, 2024
RFNA-0819-254	FPI	AQMS-600	Addition of 110V to the designation description	June, 2025
RFSA-1219-255	FPI	AQMS-500	Addition of 110V to the designation description	June, 2025

Particulate Matter - TSP*Reference Method for TSP***Manual Reference Method: 40 CFR Part 50, Appendix B**

Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method)

Federal Register: Vol. 47, page 54912, 12/06/82 and Vol. 48, page 17355, 04/22/1983

Particulate Matter – PM₁₀***Andersen Model RAAS10-100 PM₁₀ Single Channel PM₁₀ Sampler*****Manual Reference Method: RFPS-0699-130**

“Andersen Instruments, Incorporated Model RAAS10-100 Single Channel Reference Method PM₁₀ Sampler,” with RAAS-10 PM₁₀ inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM₁₀ reference method, and operated for a continuous 24-hour sample period at a flow rate of 16.67 Lpm, and in accordance with the Model RAAS105-100 Operator’s Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix J.

Federal Register: Vol. 64, page 33481, 06/23/1999

Andersen Model RAAS10-200 PM₁₀ Single Channel PM₁₀ Audit Sampler**Manual Reference Method: RFPS-0699-131**

“Andersen Instruments, Incorporated Model RAAS10-200 Single Channel Reference Method PM₁₀ Audit Sampler,” with RAAS-10 PM₁₀ inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM₁₀ reference method, and operated for a continuous 24-hour sample period at a flow rate of 16.67 Lpm, and in accordance with the Model RAAS105-200 Operator’s Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix J.

Federal Register: Vol. 64, page 33481, 06/23/1999

Andersen Model RAAS10-300 PM₁₀ Multi Channel PM₁₀ Sampler**Manual Reference Method: RFPS-0699-132**

“Andersen Instruments, Incorporated Model RAAS10-300 Multi Channel Sequential Reference Method PM₁₀ Sampler,” with RAAS-10 PM₁₀ inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM₁₀ reference method, and operated for a continuous 24-hour sample period at a flow rate of 16.67 Lpm, and in accordance with the Model RAAS105-300 Operator’s Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix J.

Federal Register: Vol. 64, page 33481, 06/23/1999

BGI Incorporated Model PQ100 Air Sampler**Manual Reference Method: RFPS-1298-124**

“BGI Incorporated or Mesa Laboratories Incorporated Model PQ100 Air Sampler,” with BGI 16.7 Inlet Kit or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM₁₀ reference method, for a continuous 24-hour sample period at a flow rate of 16.7 Lpm, with original firmware version 6.X and lower or new firmware 2.0.0.0. or higher, operated in accordance with the original Model PQ100 Instruction Manual or manual revision Version 7.0, as appropriate, and with the requirements specified in 40 CFR Part 50, Appendix J, using either the original or the newer PQ200-type filter cassettes, and with or without the optional Solar Panel Power Supply.

Federal Register: Vol. 63, page 69625, 12/17/1998

Latest modification: 01/2009; 6/2015; 5/2016; 10/2020

BGI Incorporated Model PQ200 Air Sampler**Manual Reference Method: RFPS-1298-125**

“BGI Incorporated or Mesa Laboratories Incorporated Model PQ200 Air Sampler,” with “flat plate” PM₁₀ inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM₁₀ reference method, and operated with firmware version 6V001 or earlier, for a continuous 24-hour sample period in accordance with the Model PQ200 Instruction Manual and with the requirements specified in 40 CFR Part 50, Appendix J, and with or without the optional Solar Panel Power Supply.

Federal Register: Vol. 63, page 69625, 12/17/1998

Latest modification: 6/2015; 5/2018; 10/2020

DKK-TOA Models FPM-222/222C, FPM223/223C, DUB-222(S)/223(S), FPM-377C(S) and FPM-377C PM₁₀ Monitor
Automated Equivalent Method: EQPM-0905-156

“DKK-TOA Models FPM-222, FPM-222C, FPM-223, FPM-223C, FPM-377C(S), FPM-377C, DUB-222(S), and DUB-223(S) Particulate Monitor,” for monitoring PM₁₀ in Ambient Air (beta attenuation monitor), configured for PM₁₀, with Firmware Version DUB4-658355 or later, Corrected Slope Factor (FACT SLOPE) set to 1.232, Corrected Zero Value (FACT ZERO) set to 1.8, and with or without any of the following options: Auto Check and Serial Recorder.

Federal Register: Vol. 70, page 56684, 09/28/2005

Latest modification: 11/2022

Ecotech or Acoem Australasia Model 3000 or Met One Instruments HVS-100 PM₁₀ High Volume Air Sampler
Manual Reference Method: RFPS-0706-162

“Ecotech Pty. Ltd. or Acoem Australasia Model 3000 or Met One Instruments HVS-100 PM₁₀ High Volume Air Sampler,” configured with the Ecotech or Acoem Australasia or Met One PM₁₀ Size-Selective Inlet (SSI)(P-ECO-HVS3000-02), with the flow rate set to 1.13 m³/min (67.8 m³/hour).

Federal Register: Vol. 71, page 42089, 07/25/2006

Latest modification: 11/2021; 07/2022

Environnement S.A. or ENVEA Model MP101M PM₁₀ Monitor
Automated Equivalent Method: EQPM-0404-151

“Environnement S.A. or ENVEA Model MP101M PM₁₀ Beta Gauge Monitor,” configured with the louvered PM₁₀ inlet specified in 40 CFR 50 Appendix L or its flat-topped predecessor version and one of the three optional temperature-regulated sampling tubes (RST) and operated with the sample flow rate set to 1.00 m³/h and in accordance with the Ambient Air Continuous Particulate Monitor Model MP101M operation manual, and operating from a 115V/ 60Hz, 230V/50Hz or 24Vdc power source. With or without optional ESTEL analog inputs/outputs and touchscreen user interface, with or without solar panel option installed: serial link: 1 RS-232/422; USB port; Ethernet port (TCP/IP). This designation applies to PM₁₀ measurements only.²

Federal Register: Vol. 69, page 18569, 4/8/2004

Latest modification: 9/2017, 8/2020, 6/2022

Focused Photonics Inc. BPM-200 PM₁₀ Monitor
Automated Equivalent Method: EQPM-0121-258

“Focused Photonics Inc. BPM-200 PM₁₀ Monitor” operated in the following concentration ranges: 0-1 mg/m³, 0-2 mg/m³, 0-5 mg/m³, or 0-10 mg/m³, analyzing ambient conditions temperatures between -30°C to 50°C while the monitor can operate in a conditioned space between 0°C to 50°C. The unit is operated for 24-hour average measurements, with the FPI P/N 1010500687 EPA PM₁₀ inlet, glass fiber filter tape with axial inner diameter of 41mm (1360700223), the 220VAC 50Hz power supply, the FPI P/N 1010500688 Atmospheric Temperature Unit, the 1010500920 Air heating unit for maintaining moisture at about 35% and no ΔT control, the FPI P/N 1360600229 filter, the FPI P/N 1010500303 internal calibration device, 1041000215 Main Board, 1010503229 Interface board display. Instrument must be operated in accordance with the appropriate instrument manual and with software (firmware) version AQMSPlus.P005.V01A.US001.

Federal Register: Vol. 86, pages 12682-12683, 03/4/2021

Graseby Andersen/GMW Model 1200 High-Volume Air Sampler
Manual Reference Method: RFPS-1287-063

“Sierra-Andersen or General Metal Works Model 1200 PM₁₀ High-Volume Air Sampler System,” consisting of a Sierra-Andersen or General Metal Works Model 1200 PM₁₀ Size-Selective Inlet and any of the high-volume air samplers identified as SAUV-10H, SAUV-11H, GMW-IP-10, GMW-IP-10-70, GMW-IP-10-801, or GMW-IP-10-8000, which include the following components: Anodized aluminum high-volume shelter with either acrylonitrile butadiene styrene plastic filter holder and motor/blower housing or stainless steel filter holder and phenolic plastic motor/blower housing; 0.6 hp motor/blower; pressure transducer flow recorder; either an electronic mass flow controller or a volumetric flow controller; either a digital timer/programmer, seven-day mechanical timer, six-day timer/programmer, or solid-state timer/programmer; elapsed time indicator; and filter cartridge.

Federal Register: Vol. 52, page 45684, 12/01/1987 and Vol. 53, page 1062, 01/15/1988

Graseby Andersen/GMW Model 321-B High-Volume Air Sampler**Manual Reference Method: RFPS-1287-064**

"Sierra-Andersen or General Metal Works Model 321-B PM₁₀ High-Volume Air Sampler System," consisting of a Sierra-Andersen or General Metal Works Model 321-B PM₁₀ Size-Selective Inlet and any of the high-volume air samplers identified as SAUV-10H, SAUV-11H, GMW-IP-10, GMW-IP-10-70, GMW-IP-10-801, or GMW-IP-10-8000, which include the following components: Anodized aluminum high-volume shelter with either acrylonitrile butadiene styrene plastic filter holder and motor/blower housing or stainless steel filter holder and phenolic plastic motor/blower housing; 0.6 hp motor/blower; pressure transducer flow recorder; either an electronic mass flow controller or a volumetric flow controller; either a digital timer/programmer, seven-day mechanical timer, six-day timer/programmer, or solid-state timer/programmer; elapsed time indicator; and filter cartridge.

Federal Register: Vol. 52, page 45684, 12/01/1987 and Vol. 53, page 1062, 01/15/1988

Graseby Andersen/GMW Model 321-C High-Volume Air Sampler**Manual Reference Method: RFPS-1287-065**

"Sierra-Andersen or General Metal Works Model 321-C PM₁₀ High-Volume Air Sampler System," consisting of a Sierra-Andersen General Metal Works Model 321-C PM₁₀ or Size-Selective Inlet and any of the high-volume air samplers identified as SAUV-10H, SAUV-11H, GMW-IP-10, GMW-IP-10-70, GMW-IP-10-801, or GMW-IP-10-8000, which include the following components: Anodized aluminum high-volume shelter with either acrylonitrile butadiene styrene plastic filter holder and motor/blower housing or stainless steel filter holder and phenolic plastic motor/blower housing; 0.6 hp motor/blower; pressure transducer flow recorder; either an electronic mass flow controller or a volumetric flow controller; either a digital timer/programmer, seven-day mechanical timer, six-day timer/programmer, or solid-state timer/programmer; elapsed time indicator; and filter cartridge.

Federal Register: Vol. 52, page 45684, 12/01/1987 and Vol. 53, page 1062, 01/15/1988

Graseby Andersen/GMW Models SA241 and SA241M Dichotomous Sampler**Manual Reference Method: RFPS-0789-073**

"Sierra-Andersen Models SA241 and SA241M or General Metal Works Models G241 and G241M PM₁₀ Dichotomous Samplers," consisting of the following components: Sampling Module with SA246b or G246b 10 µm inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, 2.5 µm virtual impactor assembly, 37 mm coarse and fine particulate filter holders, and tripod mount; Control Module with diaphragm vacuum pump, pneumatic constant flow controller, total and coarse flow rotameters and vacuum gauges, pressure switch (optional), 24-hour flow/event recorder, digital timer/programmer or 7-day skip timer, and elapsed time indicator.

Federal Register: Vol. 54, page 31247, 07/27/1989

Graseby Andersen/GMW Model FH621-N Beta Monitor**Automated Equivalent Method: EQPM-0990-076**

"Andersen Instruments Model FH621-N PM₁₀ Beta Attenuation Monitor," consisting of the following components: FH101 Vacuum Pump Assembly; FH102 Accessory Kit; FH107 Roof Flange Kit; FH125 Zero and Span PM₁₀ Mass Foil Calibration Kit; FH621 Beta Attenuation 19-inch Control Module; SA246b PM₁₀ Inlet (16.7 Lpm) or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19; operated for 24-hour average measurements, with an observing time of 60 minutes, the calibration factor set to 2400, a glass fiber filter tape, an automatic filter advance after each 24-hour sample period, and with or without either of the following options: FH0P1 Indoor Cabinet; FH0P2 Outdoor Shelter Assembly.

Federal Register: Vol. 55, page 38387, 09/18/1990

Met One or Sibata Models BAM/GBAM 1020, BAM/GBAM 1020-1, Horiba APDA-371, or Ecotech or Acoem Australasia Spirant BAM1000**Automated Equivalent Method: EQPM-0798-122**

“Met One Instruments or Sibata Scientific Technology Models BAM 1020, GBAM 1020, BAM 1020-1, GBAM 1020-1, Horiba APDA-371 PM₁₀ Beta Attenuation Monitor, or Ecotech or Acoem Australasia Spirant BAM1000 Spirant BAM1000” including the BX-802 EPA PM₁₀ inlet (or alternative louvered PM₁₀ inlet meeting 40 CFR 50 Appendix L specifications), operated for 24-hour average measurements, with a filter change frequency of one hour, with glass fiber filter tape (460130 or 460180), and with or without any of the following options: BX-823, tube extension; BX-825, heater kit; BX-826, 230 VAC heater kit; BX-827 “Smart Heater” set for maintaining moisture between 35% and 45% and no ΔT control; BX-828, roof tripod; BX-902, exterior enclosure; BX-903, exterior enclosure with temperature control; BX-961, mass flow controller; BX-967, internal calibration device, BX-965 Report Processor Board, BX-970 touch-screen display with USB interface. For software (firmware) versions V3.0 or higher, a user-selectable measurement time (COUNT TIME) of 4, 6, 8 or 10 minutes selected, along with appropriate sample time (BAM SAMPLE) setting of 50, 46, 42 or 38 minutes, respectively, to maintain a 60-minute measurement cycle. For software (firmware) versions V3.5 or higher, user-selectable option to sample under actual conditions (Flow Type: ACTUAL) and report under standard conditions (Reporting: STD), which requires the use of P/N BX-592 external temperature sensor or P/N BX-596 external temperature/barometric pressure sensor, or BX-597 external temperature/barometric pressure/relative humidity sensor. The user may also sample under standard conditions (Flow Type: STD) and report under standard conditions (Reporting: STD) with any software/firmware 2.0 or higher. For instruments running firmware V9.0.0 or later, P/N BX-598 (digital temperature) or P/N BX-597A (digital temperature, pressure, humidity) must be used. Instrument must be operated in accordance with the appropriate instrument manual and may employ either the standard or advanced leak test procedure. Zero background tests must be conducted with BX-302 zero filter calibration kit with or without inlet cover (P/N 81418).

Federal Register: Vol. 63, page 41253, 08/03/1998

Latest modifications: 06/2009; 07/2010; 8/2010; 8/2012; 4/2017; 12/2018; 08/2020; 11/2021; 02/2025

Met One Instruments, Inc. E-BAM PLUS Beta Attenuation Mass Monitor- PM₁₀ FEM Configuration**Automated Equivalent Method: EQPM-1215-226**

“Met One Instruments, Inc. E-BAM PLUS Beta Attenuation Mass Monitor – PM₁₀ FEM Configuration,” configured for 24 1-hour average measurements of PM₁₀ by beta attenuation, using a glass fiber filter tape roll (460130 or 460180), a sample flow rate of 16.67 liters/min, with the standard (BX-802) EPA PM₁₀ inlet (meeting 40 CFR 50 Appendix L specifications) and equipped with 9250 ambient temperature sensor or BX-597 T/BP/RH combination sensor. Instrument must be operated in accordance with the E-BAM PLUS Particulate Monitor operation manual, revision 1 or later and may employ either the standard or advanced leak test procedure. Zero background tests must be conducted with BX-302 zero filter calibration kit with or without inlet cover (P/N 81418). This designation applies to PM₁₀ measurements only.

Federal Register: Vol. 81, page 4294, 01/26/2016

Latest modification: 04/2017; 12/2018; 02/2025

Met One Instruments, Inc. E-FRM- PM₁₀ or E-FRM-DC-PM₁₀**Manual Reference Method: RFPS-0216-231**

“Met One Instruments, Inc. E-FRM,” configured for filter sampling of ambient particulate matter using the US EPA PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, equipped with an external sampling pump (*E-FRM-PM_{2.5}*) or internal sampling pump (*E-FRM-DC-PM_{2.5}*), with a flow rate of 16.67 L/min, using 47 mm PTFE membrane filter media, and operating with firmware version R2.0.1 and later, and operated in accordance with the Met One E-FRM PM₁₀ operating manual. This designation applies to PM₁₀ measurements only.

Federal Register: Vol. 81, page 25397, 04/28/2016

Latest modification: 11/14/2017

Met One Instruments, Inc. E-SEQ-FRM PM₁₀ Sampler**Manual Reference Method: RFPS-0717-246**

“Met One Instruments, Inc. E-SEQ-FRM,” sequential sampler configured for multi-event filter sampling of ambient particulate matter using the US EPA PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, with a flow rate of 16.67 L/min, using 47 mm PTFE membrane filter media, and operating with firmware version R1.1.0 and later, and operated in accordance with the Met One E-SEQ-FRM PM₁₀ operating manual. This designation applies to PM₁₀ measurements only.

Federal Register: Vol. 82, page 44613, 09/25/2017

Latest modification: 08/2019

Opsis Model SM200 PM₁₀ Monitor**Automated Equivalent Method: EQPM-0810-193**

“Opsis Model SM200 Monitor,” beta gauge semi-continuous ambient particulate monitor operated for 24 hours at a flow rate of 16.67 Lpm between 5° and 40°C using 47 mm PTFE membrane filter media, in the mass measurement range of 0 to 60 mg, configured with a BGI Model SSI25 PM₁₀ inlet meeting criteria specified in 40 CFR 50 Appendix L, with a roof mounting kit, and with or without an inlet tube heater (as recommended based on site RH conditions), according to the SM200 User’s Guide.

Federal Register: Vol. 75, page 51039, 08/18/2010

Oregon DEQ Medium Volume PM₁₀ Sampler**Manual Reference Method: RFPS-0389-071**

“Oregon DEQ Medium Volume PM₁₀ Sampler.” NOTE: This method is no longer commercially available.

Federal Register: Vol. 54, page 12273, 03/24/1989

Teledyne Model 602 Beta^{PLUS} Particle Measurement System or SWAM 5a Dual Channel Monitor**Automated Equivalent Method: EQPM-0912-205**

“Teledyne Model 602 Beta^{PLUS} Particle Measurement System” or “SWAM 5a Dual Channel Monitor” configured for 1-hour measurements of PM₁₀ by beta attenuation on a single sampling line (Line A or B, but not both together), with the standard, louvered US EPA PM₁₀ size selective inlet specified in 40 CFR 50 Appendix L, using 47 mm glass fiber filters, at a sample flow set to 16.67 liters/min and software version 05-02.07.63 or later. Operated in accordance with the Teledyne Model 602 Beta^{PLUS} Particle Measurement System Operation Manual.

Federal Register: Vol. 77, page 60985, 10/5/2012

Teledyne Advanced Pollution Instrumentation Model T640 PM mass monitor with 640X option**Automated Equivalent Method: EQPM-0516-239**

“Teledyne Advanced Pollution Instrumentation Model T640 PM mass monitor with 640X option,” continuous ambient particulate monitor operated at a volumetric flow rate of 16.67 Lpm, equipped with the louvered PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L–2 thru L–19, TAPI aerosol sample conditioner (P/N: 081040000), configured for operation with or without Network Data Alignment enabled, in accordance with the Teledyne Model T640 Operations Manual. This designation applies to PM₁₀ measurements only.

Federal Register: Vol. 81, page 45285, 07/13/2016

Latest modification: 3/2020, 4/2023

Thermo Andersen Series FH 62 C14 Continuous PM₁₀ Monitor or Thermo Scientific Model 5014i Beta (5014i Beta), Continuous Ambient Particulate Monitor or Thermo Scientific Model 5028i Beta (5028i Beta), Dual Channel, Continuous Ambient Particulate Monitor, or the Thermo Scientific Model 5014iQ Continuous Particulate Monitor**Automated Equivalent Method: EQPM-1102-150**

“Thermo Andersen Series FH 62 C14 Continuous PM₁₀ Ambient Particulate Monitor, Thermo Scientific Model 5014i Beta (5014i Beta), and Thermo Scientific Model 5028i Beta (5028i Beta) Continuous Ambient Particulate Monitor,” operated for 24-hour average measurements, with the specified 10-micron EPA PM₁₀ inlet (or alternative louvered PM₁₀ inlet meeting 40 CFR 50 Appendix L specifications), inlet connector, sample tube with heater, roof flange kit, mass foil kit, pump kit, sample filter tape; with operational settings of 1000 L/h (16.67 L/min) sample flow rate, daily filter change, auto filter change at volumetric flow <950 L/h, auto filter change at mass >1500 micrograms, and factory default calculation mode settings operated with software version 1.07 or firmware version 03.00.03 (Model 5014i). Operated, calibrated and serviced according to the appropriate Operator Manual. Thermo Scientific Model 5014iQ Continuous Particulate Monitor, operated at a flow rate of 16.67 liters per minute for 24-hour average measurements configured for PM₁₀ with a louvered PM₁₀ size selective inlet as specified in 40 CFR 50 Appendix L, Figs. L-2 through L-19, inlet connector, and operational calibration and servicing as outlined in the Model 5014iQ Continuous Particulate Monitor operating manual.

Federal Register: Vol. 67, page 76174, 12/11/2002

Latest modifications: 07/2009; 12/2012; 6/2016; 08/2020; 09/2022

Thermo Scientific Model 5030iQ SHARP**Automated Equivalent Method: EQPM-0423-260**

“Thermo Scientific Model 5030iQ SHARP Monitor,” operated at a flow rate of 16.67 liters per minute for 24-hour average measurements configured for PM₁₀ measurements with a louvered PM₁₀ size selective inlet as specified in 40 CFR 50 Appendix L, Figs. L-2 through L-19, inlet connector, and operational calibration and servicing as outlined in the Model 5030iQ SHARP instructional manual. Model 5030iQ instrument firmware version 01.0.09 or later.

Federal Register: Vol. 88, page 42718, 07/3/2023

Thermo Scientific or Rupprecht & Patashnick Partisol® Model 2000 Air Sampler**Manual Reference Method: RFPS-0694-098**

“Thermo Scientific Partisol® 2000 Air Sampler” or “Rupprecht & Patashnick Partisol® Model 2000 Air Sampler,” consisting of a Hub Unit and 0, 1, 2, or 3 Satellite Units, with each sampling station used for PM₁₀ measurements equipped with a Rupprecht & Patashnick PM₁₀ inlet and operated for continuous 24-hour sampling period using the Basic, Manual, Time, Analog Input, or Serial Input programming modes, and with or without any of the following options: PM_{2.5}-style filter cassette holder; louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19 in lieu of standard inlet; 57-002320 Stand for Hub or Satellite; 59-002542 Advanced EPROM; 10-001403 Large Pump (1/4 hp); 120 VAC. Hardware for Indoor Installation consists of: 51-002638-xxxx Temperature Sensor (Extended Length); 55-001289 Roof Flange (1 1/4"); 57-000604 Support Tripod for Inlet; 57-002526-0001 Sample Tube Extension (1 m); 57-002526-0002 Sample Tube Extension (2 m). Hardware for Outdoor Installation in Extreme Cold Environments consists of: 10-002645 Insulating Jacket for Hub Unit.

Federal Register: Vol. 59, page 35338, 07/11/1994

Thermo Scientific Partisol® 2000-D Dichotomous Air Sampler or Thermo Fisher Scientific Partisol® 2000i-D Dichotomous Air Sampler**Manual Equivalent Method: EQPS-0311-197**

“Thermo Scientific Partisol® 2000-D Dichotomous Air Sampler” or “Thermo Fisher Scientific Partisol® 2000i-D Dichotomous Air Sampler,” configured for dual-filter, single-event sampling of fine (PM_{2.5}) and coarse (PM_{10-2.5}) particles, operated with a U.S. EPA PM₁₀ inlet and using a virtual impactor to separate fine and coarse PM into two samples for collection on two separate filter membranes, for a 24-hour sampling period and in accordance with the Partisol® 2000-D or Partisol® 2000i-D instruction manual, as appropriate. Partisol® 2000i-D operated with firmware version 2.0 or greater.

Federal Register: Vol. 76, page 15974, 03/22/2011

Latest modification: 06/2011

Thermo Scientific Partisol® 2000-FRM PM₁₀ Air Sampler or Thermo Fisher Scientific Partisol® 2000i PM₁₀ Air Sampler or Rupprecht and Patashnick Partisol®-FRM 2000 PM₁₀ Air Sampler**Manual Reference Method: RFPS-1298-126**

“Thermo Scientific Partisol® 2000-FRM PM₁₀ Air Sampler” or “Thermo Fisher Scientific Partisol® 2000i PM₁₀ Air Sampler” or “Rupprecht and Patashnick Partisol®-FRM 2000 PM₁₀ Air Sampler,” with PM₁₀ inlet or louvered inlet specified in 40 CFR 50, Appendix L, Figs. L-2 through L-19, configured as a PM₁₀ reference method with a U.S. EPA PM₁₀ inlet with straight downtube adapter and operated for continuous 24-hour sample periods in accordance with the Partisol® 2000-FRM or Partisol® 2000i instruction manual, as appropriate, and with the requirements specified in 40 CFR Part 50, Appendix J. Model 2000i operated with firmware version 2.0 or greater.

Federal Register: Vol. 63, page 69625, 12/17/1998

Latest modification: 06/2011

Thermo Scientific Partisol®-Plus 2025 PM₁₀ Sequential Air Sampler or Thermo Fisher Scientific Partisol® 2025i PM₁₀ Sequential Air Sampler or Rupprecht and Patashnick Partisol®-Plus 2025 PM₁₀ Sequential Air Sampler**Manual Reference Method: RFPS-1298-127**

“Thermo Scientific Partisol®-Plus 2025 Sequential Air Sampler” or “Thermo Fisher Scientific Partisol® 2025i Sequential Air Sampler” or “Rupprecht and Patashnick Partisol®-Plus 2025 PM₁₀ Sequential Air Sampler,” with PM₁₀ inlet or louvered inlet specified in 40 CFR 50, Appendix L, Figs. L-2 through L-19, configured as a PM₁₀ reference method and operated for continuous 24-hour sample periods. Partisol®-Plus 2025 to be operated with any software version 1.003 through 1.5 and the Partisol® 2025i with firmware version 2.0 or greater, with the modified filter shuttle mechanism, in accordance with the Partisol®-Plus 2025 or Partisol® 2025i instruction manual, as appropriate, and with the requirements specified in 40 CFR Part 50, Appendix J.

Federal Register: Vol. 63, page 69625, 12/17/1998

Latest modification: 06/2011

Thermo Scientific Dichotomous Partisol®-Plus 2025-D Sequential Air Sampler or Thermo Fisher Scientific Dichotomous Partisol® 2025i-D Sequential Air Sampler**Manual Equivalent Method: EQPS-0311-198**

“Thermo Scientific Dichotomous Partisol®-Plus 2025-D Sequential Air Sampler” or “Thermo Fisher Scientific Dichotomous Partisol® 2025i-D Sequential Air Sampler,” configured for dual-filter sampling of fine (PM_{2.5}) and coarse (PM_{10-2.5}) particles, with a U.S. EPA PM₁₀ inlet and using a virtual impactor to separate the fine and coarse PM into two samples for collection on two separate filter membranes, and operated with the modified filter shuttle mechanism implemented May 31, 2008, and firmware version 1.500 or greater for the Partisol®-Plus 2025-D and version 2.0 or greater for the Partisol® 2025i-D, for continuous 24-hour sample periods, in accordance with the Partisol®-Plus 2025-D or Partisol® 2025i-D instruction manual, as appropriate.

Federal Register: Vol. 76, page 15975, 03/22/2011

Latest modification: 06/2011

Thermo Scientific TEOM® 1400AB/TEOM® 1405 Ambient Particulate Monitor or Rupprecht & Patashnick TEOM® Series 1400/1400a PM₁₀ Monitors**Automated Equivalent Method: EQPM-1090-079**

“Thermo Scientific TEOM® 1400AB [PM₁₀] Ambient Particulate Monitor” or “Rupprecht & Patashnick TEOM® Series 1400 and Series 1400a PM-10 Monitors,” (including serial number prefixes 1400, 140A, 140AA, 140AB, 140AT, and 140UP, 1405A), consisting of the following components: TEOM® Sensor Unit; TEOM® Control Unit; Flow Splitter (3 Lpm sample flow); Teflon-Coated Glass Fiber Filter Cartridges; Rupprecht & Patashnick PM-10 Inlet (part number 57-00596), Sierra-Andersen Model 246b PM-10 Inlet (16.7 Lpm) or louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19; operated for 24-hour average measurements, with the total mass averaging time set at 300 seconds, the mass rate/mass concentration averaging time set at 300 seconds, the gate time set at 2 seconds, and with or without any of the following options: Tripod; Outdoor Enclosure; Automatic Cartridge Collection Unit (Series 1400a only); Flow Splitter Adapter (for 1 or 2 Lpm sample flow). Thermo Scientific TEOM® 1405 Ambient Particulate Monitor with combined sensor and control units and redesigned mass transducer and user interface, operated in accordance with the Thermo Scientific TEOM® 1405 instrument manual.

Federal Register: Vol. 55, page 43406, 10/29/1990

Latest modification: 12/2008

Thermo Scientific TEOM® 1405-DF Dichotomous Ambient Particulate Monitor with FDMS®**Automated Equivalent Method: EQPM-1013-208**

“Thermo Scientific TEOM® 1405-DF Dichotomous Ambient Particulate Monitor with FDMS®,” configured for dual filter sampling of fine (PM_{2.5}) and coarse particles using the US EPA PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19 and a virtual impactor, with a total flow rate of 16.67 L/min, fine sample flow of 3 L/min, and coarse sample flow rate of 1.67 L/min, and operating with firmware version 1.70 and later, operated with or without external enclosures, and operated in accordance with the Thermo Scientific TEOM® 1405-DF Dichotomous Ambient Particulate Monitor Instruction Manual. This designation applies to PM₁₀ measurements only.

Federal Register: Vol. 78, page 67360, 11/12/2013

Tisch Environmental Model TE-6070 PM₁₀ High-Volume Air Sampler or New Star Environmental Model NS-6070 PM₁₀ High-Volume Air Sampler**Manual Reference Method: RFPS-0202-141**

“Tisch Environmental Model TE-6070 or New Star Environmental Model NS-6070 PM₁₀ High-Volume Air Sampler,” consisting of a TE-6001 PM₁₀ size-selective inlet, 8" x 10" filter holder, aluminum outdoor shelter, mass flow controller or volumetric flow controller with brush or brushless motor, 7-day mechanical off/on-elapsed timer or 11-day digital off/on-elapsed timer, and any of the high volume sampler variants identified as TE-6070-BL or NS-6070-BL, TE-6070D or NS-6070D, TE-6070D-BL or NS-6070-BL, TE-6070V or NS-6070V, TE-6070V-BL or NS-6070V-BL, TE-6070-DV or NS-6070-DV, or TE-6070DV-BL or NS-6070DV-BL, with or without the optional stainless steel filter media holder/filter cartridge or continuous flow/pressure recorder.

Federal Register: Vol. 67, page 15566, 04/02/2002

Tisch Environmental Model TE-Wilbur10 Particulate Sampler – PM₁₀**Manual Reference Method: RFPS-0714-216**

“Tisch Environmental Model TE-Wilbur10 PM₁₀ Low-Volume Air Particulate Sampler,” configured as a PM₁₀ reference method, with software version 3.5 (or later) for the screen and version 3.51 (or later) for the PLC and a TE-PM10-D PM₁₀ size-selective inlet, as specified in 40 CFR 50 Appendix L Figs. L–2 thru L–19, and operated for a continuous 24-hr sampler period at a flow rate of 16.67 L/min, using 47 mm PTFE membrane filter media, operated without the use of the optional anemometer, and in accordance with the Tisch Environmental Model TE-Wilbur10 PM₁₀ Low-Volume Air Particulate Sampler instruction manual and with the requirements and sample collection filters as specified in 40 CFR Part 50, Appendix J

Federal Register: Vol. 79, page 49307, 08/20/2014

Latest modification: 6/2015; 1/2018; 2/2019; 3/2019; 5/2019; 5/2022

Vasthi Instruments Pvt.Ltd, PM Monitor**Automated Equivalent Method: EQPM-0923-262**

“Vasthi Instruments Pvt. Ltd Vair-9009 PM₁₀ Monitor,” beta-ray monitor operated in a range of 0-5mg/m³, with an operational temperature range of 0°C to 40°C. The unit is configured for 24 1-hour average measurements of PM₁₀ by beta attenuation, using a glass fiber paper tape roll (VPM-1006). The unit operates at a sample flow rate of 16.67 liters/min, with PM₁₀ inlet meeting 40 CFR Part 50 Appendix L specifications, and heated inlet to control sample relative humidity to 35%. Instrument must be operated in accordance with the Vair-9009 Operating Manual. This designation applies to PM₁₀ measurements only.

Federal Register: Vol.88, pages 76212-76213 11/6/2023

Wedding & Associates' or Thermo Environmental Instruments Inc. Model 600 PM₁₀ High-Volume Sampler**Manual Reference Method: RFPS-1087-062**

“Wedding & Associates' or Thermo Environmental Instruments, Inc. Model 600 PM₁₀ Critical Flow High-Volume Sampler,” consisting of the following W&A/TEII components: PM₁₀ Inlet; Critical Flow Device; Anodized Aluminum Shelter; Blower Motor Assembly for 115, 220 or 240 VAC and 50/60 Hz; Mechanical Timer; Elapsed Time Indicator; and Filter Cartridge/Cassette, and with or without the following options: Digital Timer, 6 or 7 Day Timer, and 1 or 7 Day Pressure Recorder.

Federal Register: Vol. 52, page 37366, 10/06/1987

Wedding & Associates' or Thermo Environmental Instruments Inc. Model 650 PM₁₀ Beta Gauge**Automated Equivalent Method: EQPM-0391-081**

“Wedding & Associates' or Thermo Environmental Instruments, Inc. Model 650 PM₁₀ Beta Gauge Automated Particle Sampler,” consisting of the following W&A/TEII components: Particle Sampling Module, PM₁₀ Inlet (18.9 Lpm), Inlet Tube and Support Ring, Vacuum Pump (115, 220 or 240 VAC and 50/60 Hz); and operated for 24-hour average measurements with glass fiber filter tape.

Federal Register: Vol. 56, page 9216, 03/05/1991

Particulate Matter – PM_{2.5}***Ambilabs Model 2WIN PM_{2.5} FEM Monitor*****Automated Equivalent Method: EQPM-0922-260**

“Ambilabs Model 2WIN PM_{2.5} FEM Monitor” Optically based continuous ambient particulate analyzer operated at a volumetric flow rate of 2 Lpm, equipped with Ambilabs omnidirectional sampling inlet (P/N: M9003011), an Ambilabs 2 Lpm sharp cut cyclone inlet (P/N: A001025), and an Ambilabs ambient temperature sensor (P/N: AL-2WIN-TEMP) configured for operation with firmware version 1.36 or later, and operated in accordance with the Ambilabs 2WIN operations manual. The 2WIN PM_{2.5} FEM Monitor is set for red and blue scattering coefficients and the internal sample conditioning must be set for an RH < 35%. The Monitor can be operated either outside in an Ambilabs environmental enclosure (P/N: Neph Shelter) or as tabletop or wall mount in an AC controlled shelter. This designation applies to PM_{2.5} Measurements only.

Federal Register: Vol. 87, pages 65203-65204, 10/28/2022

Andersen Model RAAS2.5-200 PM_{2.5} Ambient Audit Air Sampler**Manual Reference Method: RFPS-0299-128**

“Andersen Instruments, Incorporated Model RAAS2.5-200 PM_{2.5} Audit Sampler,” configured as a PM_{2.5} reference method and operated with software (firmware) version 4B, 5.0.1 - 6.09, 6.0A, or 6.0B, for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, and in accordance with the Model RAAS2.5-200 Operator’s Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 64, page 12167, 03/11/1999

BGI Inc. Models PQ200 or PQ200A PM_{2.5} Ambient Fine Particle Sampler**Manual Reference Method: RFPS-0498-116**

“BGI Incorporated or Mesa Laboratories Incorporated Models PQ200 and PQ200A PM_{2.5} Ambient Fine Particle Sampler,” operated with firmware version 3.88, 3.89R, 3.91, 3.91R, 5.62, and 6V001, for a continuous 24-hour sample period, in accordance with the Model PQ200/PQ200A Instruction Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L, and with or without the optional Solar Power Supply or the optional dual-filter cassette (P/N F-21/6) and associated lower impactor housing (P/N B2027), where the upper filter is used for PM_{2.5}. The Model PQ200A is described as a portable audit sampler and includes a set of three carrying cases.

Federal Register: Vol. 63, page 18911, 04/16/1998

Latest modification: 6/2015; 06/2016; 12/2016; 5/2018; 10/2020

BGI Inc. Models PQ200-VSCC™ or PQ200A-VSCC™ PM_{2.5} Sampler**Manual Reference Method: RFPS-0498-116 or Manual Equivalent Method: EQPM-0202-142**

“BGI Incorporated or Mesa Laboratories Incorporated Models PQ200-VSCC™ or PQ200A-VSCC™ PM_{2.5} Ambient Fine Particle Sampler,” configured with a BGI Very Sharp Cut Cyclone (VSCC™) particle size separator and operated with firmware version 3.88, 3.89R, 3.91, 3.91R, 5.62, and 6V001, for a continuous 24-hour sample period, in accordance with the Model PQ200/PQ200A Instruction Manual and VSCC™ supplemental manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L, and with or without the optional Solar Power Supply or the optional dual-filter cassette (P/N F-21/6) and associated lower impactor housing (P/N B2027), where the upper filter is used for PM_{2.5}. The Model PQ200A VSCC™ is described as a portable audit sampler and includes a set of three carrying cases.

Federal Register: Vol. 67, page 15567, 04/02/2002

Latest modification: 6/2015; 06/2016; 12/2016; 5/2018; 10/2020

DKK-TOA Models FPM-377C(S), FPM-377C, Particulate Monitor**Automated Equivalent Method: EQPM-1224-264**

“DKK-TOA Models FPM-377C(S), FPM-377C, Particulate Monitor,” for monitoring PM_{2.5} in Ambient Air (beta attenuation monitor), configured with a standard EPA PM₁₀ inlet (meeting 40 CFR 50 Appendix L specifications) and with either; a URG-2000-30EGN PM_{2.5} cyclone, or BGI VSCC™ Very Sharp Cut Cyclone particle size separator, or Tisch TE-PM2.5C cyclone for PM_{2.5}, or other PM_{2.5} separator that meets 40 CFR 50 Appendix L, and operated with Software Firmware Version FPM4-749840 or later, Corrected Slope Factor (FACT SLOPE) set to 1.242, Corrected Zero Value (FACT ZERO) set to 0, and with or without any of the following options: Auto Check and Serial Recorder. This designation applies to PM_{2.5} measurements only.

Federal Register: Vol. 90, page 15001, 04/07/2025

Environnement S.A. or ENVEA Model MP101M PM_{2.5} Monitor***Automated Equivalent Method: EQPM-1013-211***

“Environnement S.A. or ENVEA Model MP101M PM_{2.5} Beta Attenuation Monitor” using a glass fiber filter tape roll, operated at a sample flow rate of 16.67 liters/min for 24-hour average measurements of PM_{2.5}, configured with the standard EPA PM10 inlet (meeting 40 CFR 50 Appendix L specifications) associated with a BGI Very Sharp Cut Cyclone (VSCC™) particle size separator or Tisch TE-PM2.5C cyclone and using a temperature regulated sampling tube with ambient meteorological sensor. With or without optional ESTEL analog inputs/outputs and touchscreen interface, solar panel option installed, serial link: 1 RS-232/422; USB port; Ethernet port (TCP/IP). Instrument must be operated in accordance with the Ambient Air Continuous Particulate Monitor Model MP101M operation manual, and operating from a 115V/ 60Hz, 230V/50Hz or 24Vdc power source. This designation applies to PM_{2.5} measurements only.

Federal Register: Vol. 78, page 67360, 11/12/2013

Latest modification: 9/2017, 8/2020, 6/2022; 06/2024

Graseby Andersen Model RAAS2.5-100 PM_{2.5} Ambient Air Sampler***Manual Reference Method: RFPS-0598-119***

“Graseby Andersen Model RAAS2.5-100 PM_{2.5} Ambient Air Sampler,” operated with software version 4B, 5.0.1 - 6.09, 6.0A, or 6.0B, configured for “Single 2.5” operation, for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, and in accordance with the Model RAAS2.5-100 Operator’s Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 63, page 31991, 06/11/1998

Graseby Andersen Model RAAS2.5-300 PM_{2.5} Sequential Ambient Air Sampler***Manual Reference Method: RFPS-0598-120***

“Graseby Andersen Model RAAS2.5-300 PM_{2.5} Sequential Ambient Air Sampler,” operated with software version 4B, 5.0.1 - 6.09, 6.0A, or 6.0B, configured for “Multi 2.5” operation, for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, and in accordance with the Model RAAS2.5-300 Operator’s Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 63, page 31991, 06/11/1998

Grimm Model EDM 180 PM_{2.5} Monitor***Automated Equivalent Method: EQPM-0311-195***

“GRIMM Aerosol Technik Ainring GmbH & Co. Model EDM 180 PM_{2.5},” light scattering continuous ambient particulate monitor operated for 24 hours at a volumetric flow rate of 1.2 L/min, configured with a Nafion®-type air sample dryer, complete for operation with firmware version 7.80, in accordance with the Grimm Technologies, Inc. Model EDM 180 Operation and Instruction Manual. The optional graphic presentation can be made with the software model 1.177 version 3.30 or later.

Federal Register: Vol. 76, page 15974, 03/22/2011

Latest Modification: 01/2012; 3/2014; 12/2016; 10/2018

Met One Instruments, Inc. BAM-1020 Monitor – PM_{2.5} FEM Configuration, Horiba APDA-371– PM_{2.5} Configuration, or Ecotech or Acoem Australasia Spirant BAM1100**Automated Equivalent Method: EQPM-0308-170**

“Met One Instruments, Inc. BAM-1020 Beta Attenuation Mass Monitor – PM_{2.5} FEM Configuration, Horiba Instruments APDA-371 Beta Attenuation Mass Monitor – PM_{2.5} FEM Configuration, or Ecotech or Acoem Australasia Spirant BAM1100”, configured with the standard BX-802 EPA PM₁₀ inlet (or alternative louvered PM₁₀ inlet meeting 40 CFR 50 Appendix L specifications) and with a BGI VSCC™ Very Sharp Cut Cyclone or Tisch TE-PM2.5C particle size separator, operated for 24 1-hour average measurements with firmware revision 3.2.4 or later, with or without an inlet tube extension (BX-823), with or without external enclosures BX-902 or BX-903 and equipped with BX-596 ambient temperature and barometric pressure combination sensor, or BX-597 ambient temperature, barometric pressure, relative humidity combination sensor, internal BX-961 automatic flow controller operated in Actual (volumetric) flow control mode, the standard BX-802 EPA PM₁₀ inlet head and a BGI Very Sharp Cut Cyclone (VSCC™ -A) or Tisch TE-PM2.5C cyclone, BX-827 (110V) or BX-830 (230V) Smart Inlet Heater, with the heater RH set to 35% and the temperature control set to "off", the 8470-1 revision D or later tape control transport assembly with close geometry beta source configuration, used with standard glass fiber filter tape (460130 or 460180), COUNT TIME parameter set for 8 minutes, the SAMPLE TIME parameter set for 42 minutes, BX-302 zero filter calibration kit required with or without inlet cover (P/N 81418), and with or without BX-965 report processor board, or with or without BX-970 touch-screen display with USB interface. Instrument must be operated in accordance with the BAM 1020 Particulate Monitor operation manual, revision F or later, the Horiba APDA-371 Monitor operation manual or the Ecotech or Acoem Australasia Spirant BAM Manual (rev. A or later), as appropriate, and the VSCC™ or Tisch TE-PM2.5C supplemental manual and may employ either the standard or advanced leak test procedure. For instruments running firmware V9.0.0 or later, P/N BX-597A (digital temperature, pressure, humidity) must be used.

Federal Register: Vol. 73, page 13224, 03/12/2008

Latest modifications: 7/2010; 8/2010; 8/2012; 3/2015; 9/2015; 4/2017; 12/2018; 08/2020; 11/2021; 02/2025

Met One Instruments, Inc. BAM-1020 Beta Attenuation Mass Monitor- PM_{2.5} FEM Configuration, or Ecotech or Acoem Australasia Spirant BAM1100**Automated Equivalent Method: EQPM-0715-266**

“Met One Instruments, Inc. BAM-1020 Beta Attenuation Mass Monitor – PM_{2.5} FEM Configuration or Ecotech or Acoem Australasia Spirant BAM1100,” configured for 24 1-hour average measurements of PM_{2.5} by beta attenuation, using a glass fiber filter tape roll (460130 or 460180) and a sample flow rate of 16.67 liters/min and with the standard EPA PM₁₀ inlet (meeting 40 CFR 50 Appendix L specifications) and with a URG-2000-30EGN PM_{2.5} (BX-809) cyclonic separator, BX-596 combo T/BP sensor or BX-597 combo T/BP/RH sensor, BX-827 (110V) or BX-830 (230 V) and with or without BX-965 report processor board and with or without BX-970 touch screen display. Instrument must be operated in accordance with the BAM 1020 Particulate Monitor operation manual, revision L or later or with Ecotech or Acoem Australasia Spirant BAM1100 Operators Manual and may employ either the standard or advanced leak test procedure. Zero background tests must be conducted with BX-302 zero filter calibration kit with or without inlet cover (P/N 81418). Instrument must be operated with firmware revision 3.2.4 or later. This PM_{2.5} equivalent method designation only applies to the BAM-1020 or BAM1100 configured with the URG-2000-30EGN cyclone. For instruments running firmware V9.0.0 or later, P/N BX-597A (digital temperature, pressure, humidity) must be used.

Federal Register: Vol. 80, page 51802, 8/26/2015

Latest modification: 04/2017; 10/2018; 12/2018; 08/2020; 11/2021; 02/2025

Met One Instruments, Inc. BAM-1022 Real Time Beta Attenuation Mass Monitor-Outdoor PM_{2.5} FEM Configuration or BAM-1022-PLUS High-Performance Beta Attenuation Mass Monitor Outdoor PM_{2.5} FEM Configuration
Automated Equivalent Method: EQPM-1013-209

“Met One Instruments, Inc. BAM-1022 Beta Attenuation Mass Monitor – Outdoor PM_{2.5} FEM Configuration,” or “Met One Instruments, Inc. BAM-1022-PLUS High Performance Beta Attenuation Mass Monitor – Outdoor PM_{2.5} FEM Configuration” configured for 24 1-hour average measurements of PM_{2.5} by beta attenuation, using a glass fiber filter tape roll (460130 or 460180 for BAM-1022 only) or PTFE filter tape roll (460185 for BAM-1022-PLUS only) and a sample flow rate of 16.67 liters/min and with the standard (BX-802) EPA PM₁₀ inlet (meeting 40 CFR 50 Appendix L specifications) and with a BGI VSCC™ Very Sharp Cut Cyclone (BX-808) or Tisch TE-PM2.5C particle size separator, and equipped with external enclosure BX-922 and BX-596 ambient temperature/barometric combination sensor, BX-597 or BX-597A ambient temperature/barometric pressure/relative humidity combination sensors. Instrument must be operated in accordance with the BAM-1022 Particulate Monitor operation manual, revision B or later or the BAM-1022-PLUS Particulate Monitor operation manual, revision A or later. Zero background tests must be conducted with BX-302 zero filter calibration kit with or without inlet cover (P/N 81418). The BAM- 1022 can use either the standard or advanced leak test procedure. The BAM-1022-PLUS can use only the advanced leak test procedure. This designation applies to PM_{2.5} measurements only.

Federal Register: Vol. 78, page 67360, 11/12/2013

Latest modifications: 7/2014; 10/2015; 3/2016; 12/2018; 10/2019; 02/2024; 02/2025

Met One Instruments, Inc. E-FRM–PM_{2.5} or E-FRM-DC-PM_{2.5}

Manual Reference Method: RFPS-0315-221

“Met One Instruments, Inc. E-FRM,” configured for filter sampling of ambient particulate matter using the US EPA PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, equipped with an external sampling pump (E-FRM–PM_{2.5}) or an internal sampling pump (E-FRM-DC-PM_{2.5}), equipped with either a BGI VSCC™ cyclone, Tisch TE-PM2.5C cyclone, or WINS PM_{2.5} fractionator, with a flow rate of 16.67 L/min, using 47 mm PTFE membrane filter media, and operating with firmware version R1.1.0 and later, and operated in accordance with the Met One E-FRM PM_{2.5} operating manual.

Federal Register: Vol. 80, page 32114, 6/05/2015

Latest modifications: 11/14/2017; 06/2024

Met One Instruments, Inc. E-FRM– PM_{2.5}

Manual Equivalent Method: EQPS-0316-235

“Met One Instruments, Inc. E-FRM,” configured for filter sampling of ambient particulate matter using the US EPA PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, equipped with a URG-2000-30EGN Cyclone particle size separator, and operated for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, using 47 mm PTFE membrane filter media, and operating with firmware version R1.1.0 and later, and operated in accordance with the Met One E-FRM PM_{2.5} operating manual.

Federal Register: Vol. 81, page 25397, 4/28/2016

Met One Instruments, Inc. E-SEQ-FRM PM_{2.5} Sampler

Automated Reference Method: RFPS-0717-245

“Met One Instruments, Inc. E-SEQ-FRM,” sequential sampler configured for multi-event filter sampling of ambient particulate matter using the US EPA PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, equipped with either a Mesa Laboratories VSCC™ cyclone, Tisch TE-PM2.5C cyclone, or WINS PM_{2.5} fractionator, with a flow rate of 16.67 L/min, using 47 mm PTFE membrane filter media, and operating with firmware version R1.1.0 and later, and operated in accordance with the Met One E-SEQ-FRM PM_{2.5} operating manual. This designation applies to PM_{2.5} measurements only.

Federal Register: Vol. 82, page 44612, 09/25/2017

Latest modification: 06/2024

Opsis SM200- Dust Monitor

Automated Equivalent Method: EQPM-0812-203

“Opsis SM200- Dust Monitor” configured for PM_{2.5} with the US EPA PM₁₀ inlet specified in 40 CFR 50 Appendix L, followed by a BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator or Tisch TE-PM2.5C cyclone, operated for a continuous 24-hour sample period at a total actual flow rate of 16.67 L/min. using 47mm PTFE membrane filters, a TS200 temperature stabilizer and software version 1.04.16 or later, in accordance with the Opsis SM200 Dust Monitor Operation and Instruction Guide.

Federal Register: Vol. 77, page 55832, 09/11/2012

Latest modification: 06/2024

Rupprecht & Patashnick Partisol®-FRM Model 2000 PM_{2.5} Air Sampler**Manual Reference Method: RFPS-0498-117**

“Rupprecht & Patashnick Company, Incorporated Partisol®-FRM Model 2000 PM_{2.5} Air Sampler,” operated with software versions 1.102 – 1.202, with either R&P-specified machined or molded filter cassettes, with or without the optional insulating jacket for cold weather operation, for a continuous 24-hour sample period, in accordance with the Model 2000 Instruction Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 63, page 18911, 04/16/1998***Rupprecht & Patashnick Partisol® Model 2000 PM_{2.5} Audit Sampler*****Manual Reference Method: RFPS-0499-129**

“Rupprecht & Patashnick Company, Inc. Partisol® Model 2000 PM_{2.5} Audit Sampler,” configured as a PM_{2.5} reference method and operated with software (firmware) version 1.2 – 1.202, for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, in accordance with the Partisol® Model 2000 Operating Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 64, page 19153, 04/19/1999***Rupprecht & Patashnick Partisol® Model 2000 PM_{2.5} Audit Sampler*****Manual Reference Method: RFPS-0499-129 or Manual Equivalent Method: EQPM-0202-144**

“Rupprecht & Patashnick Co., Inc. Partisol® Model 2000 PM_{2.5} FEM Audit Sampler,” configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator or Tisch TE-PM2.5C cyclone, and operated with software (firmware) version 1.2 – 1.202, for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, in accordance with the Partisol® Model 2000 Operating Manual and VSCC™ supplemental manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 67, page 15567, 04/02/2002***Latest modification: 06/2024******Rupprecht & Patashnick Partisol®-Plus Model 2025 Sequential Air Sampler*****Manual Reference Method: RFPS-0498-118**

“Rupprecht & Patashnick Company, Incorporated Partisol®-Plus Model 2025 PM_{2.5} Sequential Air Sampler,” operated with any software version 1.003 through 1.4.16, with either R&P-specified machined or molded filter cassettes, for a continuous 24-hour sample period, in accordance with the Model 2025 Instruction Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 63, page 18911, 04/16/1998***Teledyne Model 602 Beta^{PLUS} Particle Measurement System or SWAM 5a Dual Channel Monitor*****Automated Equivalent Method: EQPM-0912-204**

“Teledyne Model 602 Beta^{PLUS} Particle Measurement System” or “SWAM 5a Dual Channel Monitor” configured for 1-hour measurements of PM_{2.5} by beta attenuation, on either a single (Line A or B) or both sampling lines (Line A and B) simultaneously, using 47 mm glass fiber filters, at a sample flow set to 16.67 liters/min and software version 05-02.07.63 or later and with an inlet system comprised of a PM₁₀ pre-impactor inlet (based on European PM₁₀ inlet design) combined with a BGI VSCC™ PM_{2.5} cyclone separator or Tisch TE-PM2.5C cyclone. Operated in accordance with the Teledyne Model 602 Beta^{PLUS} Particle Measurement System Operation Manual.

Federal Register: Vol. 77, page 60985, 10/5/2012***Latest modification: 06/2024******Teledyne Advanced Pollution Instrumentation Model T640 PM Mass Monitor*****Automated Equivalent Method: EQPM-0516-236**

“Teledyne Advanced Pollution Instrumentation Model T640 PM mass monitor,” continuous ambient particulate monitor operated at a volumetric flow rate of 5.0 Lpm, equipped with a TAPI 5-Lpm sample inlet (P/N: 081050000), TAPI aerosol sample conditioner (P/N: 081040000), configured for operation with or without Network Data Alignment enabled, and operated in accordance with the Teledyne Model T640 Operations Manual. This designation applies to PM_{2.5} measurements only.

Federal Register: Vol. 81, page 45285, 07/13/2016***Latest modification: 3/2020, 4/2023***

Teledyne Advanced Pollution Instrumentation Model T640 PM Mass Monitor with 640X Option**Automated Equivalent Method: EQPM-0516-238**

“Teledyne Advanced Pollution Instrumentation Model T640 PM mass monitor with 640X option,” continuous ambient particulate monitor operated at a volumetric flow rate of 16.67 Lpm equipped with the louvered PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L–2 thru L–19, TAPI aerosol sample conditioner (P/N: 081040000), configured for operation with or without Network Data Alignment enabled, in accordance with the Teledyne Model T640 Operations Manual. This designation applies to PM_{2.5} measurements only.

Federal Register: Vol. 81, page 45285, 07/13/2016

Latest modification: 3/2020, 4/2023

Thermo Electron Model RAAS2.5-100 PM_{2.5} Ambient Air Sampler**Manual Reference Method: RFPS-0598-119 or Manual Equivalent Method: EQPM-0804-153**

“Thermo Electron Corporation Model RAAS2.5-100 FEM PM_{2.5} Ambient Air Sampler,” configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator or Tisch TE-PM2.5C cyclone, and operated with software version 06.0B.00 configured for “Single 2.5” operation, for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, in accordance with the Model RAAS2.5-100 FEM Operator’s Manual and VSCC™ supplemental manual, and in accordance with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 69, page 47924, 08/06/2004

Latest modification: 06/2024

Thermo Electron Model RAAS2.5-200 PM_{2.5} Audit Air Sampler**Manual Reference Method: RFPS-0299-128 or Manual Equivalent Method: EQPM-0804-154**

“Thermo Electron Corporation Model RAAS2.5-200 FEM PM_{2.5} Audit Air Sampler,” configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator or Tisch TE-PM2.5C cyclone, and operated with software version 06.0B.00, for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, in accordance with the Model RAAS2.5-200 FEM Operator’s Manual and VSCC™ supplemental manual, and in accordance with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 69, page 47924, 08/06/2004

Latest modification: 06/2024

Thermo Electron Model RAAS2.5-300 PM_{2.5} Sequential Ambient Air Sampler**Manual Reference Method: RFPS-0598-120 or Manual Equivalent Method: EQPM-0804-155**

“Thermo Electron Corporation Model RAAS2.5-300 FEM PM_{2.5} Sequential Ambient Air Sampler,” configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator or Tisch TE-PM2.5C cyclone, and operated with software version 06.0B.00 configured for “Multi 2.5” operation, for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, in accordance with the Model RAAS2.5-300 FEM Operator’s Manual and VSCC™ supplemental manual, and in accordance with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 69, page 47924, 08/06/2004

Latest modification: 06/2024

Thermo Environmental Instruments, Incorporated Model 605 “CAPS” Sampler**Manual Reference Method: RFPS-1098-123**

“Thermo Environmental Instruments, Incorporated Model 605 “CAPS” Computer Assisted Particle Sampler,” configured as a PM_{2.5} reference method and operated with software version 1.02A, for a continuous 24-hour sample period, in accordance with the Model 605 Instruction Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 63, page 58036, 10/29/1998

Thermo Scientific Model 5014i or Thermo Scientific FH62C14-DHS Continuous Ambient Particle Monitor or Thermo Scientific Model 5028i Beta (5028i Beta) Dual Channel Continuous Ambient Particulate Monitor or Thermo Scientific Model 5014iQ Beta (5014iQ) Continuous Ambient Particle Monitor

Automated Equivalent Method: EQPM-0609-183

“Thermo Scientific Model 5014i, FH62C14-DHS, and Model 5028i Beta (5028i Beta) Continuous Ambient Particle Monitor(s),” operated at a flow rate of 16.67 liters per minute for 24-hour average measurements configured for PM_{2.5} with a louvered PM₁₀ size selective inlet as specified in 40 CFR 50 Appendix L, Figs. L-2 through L-19, a PM_{2.5} BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator or Tisch TE-PM2.5C cyclone, inlet connector, sample tube, DHS heater with 35% RH threshold, mass foil kit, GF10 filter tape, 8-hour filter change, and operational calibration and servicing as outlined in the 5014i Continuous Ambient Particulate Monitor, FH62C14-DHS, or 5028i Continuous Ambient Particulate Monitor operating manual. Model 5014i instrument firmware version 03.00.03 or later. Thermo Scientific Model 5014iQ Continuous Particulate Monitor, operated at a flow rate of 16.67 liters per minute for 24-hour average measurements configured for PM_{2.5} with a louvered PM₁₀ size selective inlet as specified in 40 CFR 50 Appendix L, Figs. L-2 through L-19, a PM_{2.5} BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator or Tisch TE-PM2.5C cyclone, inlet connector, and operational calibration and servicing as outlined in the Model 5014iQ Continuous Particulate Monitor operating manual.

Federal Register: Vol. 74, page 28696, 06/17/2009

Latest modification: 03/2010; 6/2016; 08/2020; 09/2022; 06/2024

Thermo Scientific Model 5030i SHARP Monitor or Model 5030 SHARP Monitor or Model 5030iQ SHARP Monitor

Automated Equivalent Method: EQPM-0609-184

“Thermo Scientific Model 5030 SHARP Monitor,” operated at a flow rate of 16.67 liters per minute for 24-hour average measurements configured for PM_{2.5} with a louvered PM₁₀ size selective inlet as specified in 40 CFR 50 Appendix L, Figs. L-2 through L-19, a PM_{2.5} BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator or Tisch TE-PM2.5C cyclone, inlet connector, sample tube, DHS heater with 58% RH threshold, mass foil kit, GF10 filter tape, nephelometer zeroing kit, 8-hour filter change, and operational calibration and servicing as outlined in the Model 5030i or Model 5030 SHARP instructional manual. Model 5030i instrument firmware version 03.00.03 or later. “Thermo Scientific Model 5030iQ SHARP Monitor,” operated at a flow rate of 16.67 liters per minute for 24-hour average measurements configured for PM_{2.5} with a louvered PM₁₀ size selective inlet as specified in 40 CFR 50 Appendix L, Figs. L-2 through L-19, a PM_{2.5} BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator or Tisch TE-PM2.5C cyclone, inlet connector, and operational calibration and servicing as outlined in the Model 5030iQ SHARP instructional manual.

Federal Register: Vol. 74, page 28696, 06/17/2009

Latest modification: 06/2013; 08/2020; 09/2022; 06/2024

Thermo Scientific TEOM® 1400a Ambient Particulate Monitor with Series 8500C FDMS®; Thermo Scientific TEOM® 1405-F Ambient Particulate Monitor with FDMS®

Automated Equivalent Method: EQPM-0609-181

“Thermo Scientific TEOM® 1400a Ambient Particulate Monitor with Series 8500C FDMS® (Filter Dynamics Measurement System) or Thermo Scientific TEOM® 1405-F Ambient Particulate Monitor with FDMS®,” configured for PM_{2.5} with the US EPA PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, followed by a BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator or Tisch TE-PM2.5C cyclone, operated with a total actual flow of 16.67 L/min., loaded with Series FDMS® 8500 module operating software and an FDMS® kit. TEOM® 1400a with Series 8500C FDMS® operated with firmware version 3.20 and later and TEOM® 1405-F with FDMS® operated with version 1.55 or later and according to the appropriate operating manual.

Federal Register: Vol. 74, page 28696, 06/17/2009

Latest Modification: 09/2010; 06/2024

Thermo Scientific TEOM® 1405-DF Dichotomous Ambient Particulate Monitor with FDMS®

Automated Equivalent Method: EQPM-0609-182

“Thermo Scientific TEOM® 1405-DF Dichotomous Ambient Particulate Monitor with FDMS®,” configured for dual filter sampling of fine (PM_{2.5}) and coarse particles using the US EPA PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19 and a virtual impactor, with a total flow rate of 16.67 L/min, fine sample flow of 3 L/min, and coarse sample flow rate of 1.67 L/min, and operating with firmware version 1.50 and later, operated with or without external enclosures, and operated in accordance with the Thermo Scientific TEOM® 1405-DF Dichotomous Ambient Particulate Monitor Instruction Manual. This designation applies to PM_{2.5} measurements only.

Federal Register: Vol. 74, page 28696, 06/17/2009

Thermo Scientific Partisol® 2000-D Dichotomous Air Sampler or Thermo Fisher Scientific Partisol® 2000i-D Dichotomous Air Sampler**Manual Equivalent Method: EQPS-0509-177**

“Thermo Scientific Partisol® 2000-D Dichotomous Air Sampler” or “Thermo Fisher Scientific Partisol® 2000i-D Dichotomous Air Sampler,” configured for dual-filter, single-event sampling of fine (PM_{2.5}) and coarse (PM_{10-2.5}) particles, operated with a U.S. EPA PM₁₀ inlet and using a virtual impactor to separate fine and coarse PM into two samples for collection on two separate filter membranes, for a 24-hour sampling period, in accordance with the Partisol® 2000-D or Partisol® 2000i-D instruction manual, as appropriate. Partisol® 2000i-D operated with firmware version 2.0 or greater.

Federal Register: Vol. 74, page 26395, 06/02/2009

Latest modification: 06/2011

Thermo Scientific Partisol®-Plus 2025-D Dichotomous Sequential Air Sampler or Thermo Fisher Scientific Partisol® 2025i-D Dichotomous Sequential Air Sampler**Manual Equivalent Method: EQPS-0509-179**

“Thermo Scientific Partisol®-Plus 2025-D Dichotomous Sequential Air Sampler” or “Thermo Fisher Scientific Partisol® 2025i-D Dichotomous Sequential Air Sampler,” configured for dual-filter sampling of fine (PM_{2.5}) and coarse (PM_{10-2.5}) particle components, with a U.S. EPA PM₁₀ inlet and using a virtual impactor to separate the fine and coarse PM into two samples for collection on two separate filter membranes, and operated with the modified filter shuttle mechanism implemented May 31, 2008, and firmware version 1.500 or greater for the Partisol®-Plus 2025-D and version 2.0 or greater for the Partisol® 2025i-D, for continuous 24-hour sample period, in accordance with the Partisol®-Plus 2025-D or Partisol® 2025i-D instruction manual, as appropriate.

Federal Register: Vol. 74, page 26395, 06/02/2009

Latest modification: 06/2011

Thermo Scientific Partisol® 2000-FRM PM_{2.5} Air Sampler or Thermo Fisher Scientific Partisol® 2000i PM_{2.5} Air Sampler or Rupprecht & Patashnick Partisol®-FRM 2000 PM_{2.5} Air Sampler**Manual Reference Method: RFPS-0498-117 or Manual Equivalent Method: EQPM-0202-143**

“Thermo Scientific Partisol® 2000-FRM PM_{2.5} Air Sampler” or “Thermo Fisher Scientific Partisol® 2000i PM_{2.5} Air Sampler” or “Rupprecht & Patashnick Partisol®-FRM 2000 PM_{2.5} [FEM] Air Sampler configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator or Tisch TE-PM2.5C cyclone, with either R&P-specified machined or molded filter cassettes, for 24-hour continuous sampling periods, in accordance with the Partisol® 2000-FRM or Partisol® 2000i Instruction Manual, as appropriate, and VSCC™ supplemental manual. Partisol® 2000-FRM operated with software versions 1.102 through 1.202 and Partisol® 2000i with firmware version 2.0 or greater. Method is operated with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L, and with or without the optional insulating jacket for cold weather operation.

Federal Register: Vol. 67, page 15567, 04/02/2002

Latest modification: 06/2011; 06/2024

Thermo Scientific Partisol®-Plus 2025 Sequential PM_{2.5} Air Sampler or Thermo Fisher Scientific Partisol® 2025i Sequential PM_{2.5} Air Sampler or Rupprecht & Patashnick Partisol®-Plus 2025 PM_{2.5} Sequential Sampler**Manual Reference Method: RFPS-0498-118 or Manual Equivalent Method: EQPM-0202-145**

“Thermo Scientific Partisol®-Plus 2025 PM_{2.5} Sequential Air Sampler” or “Thermo Fisher Scientific Partisol® 2025i PM_{2.5} Sequential Air Sampler” or “Rupprecht & Patashnick Partisol®-Plus 2025 PM_{2.5} (FEM) Sequential Air Sampler,” configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator or Tisch TE-PM2.5C cyclone, with either R&P-specified machined or molded filter cassettes, for 24-hour continuous sampling periods. Partisol®-Plus 2025 to be operated with any software version 1.003 through 1.5 and Partisol® 2025i with firmware version 2.0 or greater, and with the modified filter shuttle mechanism. Method to be operated in accordance with the Partisol®-Plus 2025 or Partisol® 2025i instruction manual, as appropriate, with the VSCC™ supplemental manual, and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 67, page 15567, 04/02/2002

Latest modification: 06/2011; 06/2024

Tisch Environmental Model TE-Wilbur2.5 Particulate Sampler – PM_{2.5}**Manual Reference Method: RFPS-1014-219**

“Tisch Environmental Model TE-Wilbur2.5 PM_{2.5} Low-Volume Air Particulate Sampler,” configured as a PM_{2.5} reference method, operated with software version 3.5 (or later) for the screen and version 3.51 (or later) for the PLC and a TE-PM10-D PM10 size-selective inlet and a TE-PM10-D PM10 size-selective inlet as specified in 40 CFR 50 Appendix L Figs. L-2 thru L-19, with either a BGI VSCC™ Very Sharp Cut Cyclone particle size separator or WINS impactor or Tisch Environmental TE-PM2.5C cyclone, and operated for a continuous 24-hr sampler period at a flow rate of 16.67 L/min, using 47 mm PTFE membrane filter media, operated with or without the optional TE-W-600 Solar Panel Power Supply kit, operated without the use of the optional anemometer, and in accordance with the Tisch Environmental Model TE-Wilbur2.5 PM_{2.5} Low-Volume Air Particulate Sampler instruction manual and with the requirements and sample collection filters as specified in 40 CFR Part 50, Appendix L

Federal Register: Vol. 79, page 65392, 11/04/2014

Latest modification: 6/2015; 11/2016; 1/2018; 2/2019; 3/2019; 5/2019; 5/2022

Tisch Environmental Model TE-Wilbur2.5 Particulate Sampler – PM_{2.5}**Manual Equivalent Method: EQPS-0415-223**

“Tisch Environmental Model TE-Wilbur2.5 PM_{2.5} Low-Volume Air Particulate Sampler,” configured as a PM_{2.5} equivalent method, operated with software version 3.5 or earlier and a TE-PM10-D PM₁₀ size-selective inlet as specified in 40 CFR 50 Appendix L Figs. L-2 thru L-19, configured with a Tisch TE-PM2.5C particle size separator and operated for a continuous 24-hour sample period at a flow rate of 16.67 L/min, using 47 mm PTFE membrane filter media, operated with or without the optional TE-W-600 Solar Panel Power Supply kit, and in accordance with the Tisch Environmental Model TE-Wilbur2.5 PM_{2.5} Low-Volume Air Particulate Sampler instruction manual and with the requirements and sample collection filters as specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 80, page 32114, 6/05/2015

URG-MASS100 Single PM_{2.5} Sampler**Manual Reference Method: RFPS-0400-135**

“URG-MASS100 Single PM_{2.5} FRM Sampler,” operated with software (firmware) version 4B or 5.0.1, configured for “Single 2.5” operation with either a BGI Very Sharp Cut Cyclone (VSCC™) particle size separator or Tisch TE-PM2.5C cyclone or WINS impactor, and operated for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute and in accordance with the URG-MASS100 Operator’s Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 65, page 26603, 05/08/2000

Latest modification: 06/2024

URG-MASS300 Sequential PM_{2.5} Sampler**Manual Reference Method: RFPS-0400-136**

“URG-MASS300 Sequential PM_{2.5} FRM Sampler,” operated with software (firmware) version 4B or 5.0.1, configured for “Multi 2.5” operation with either a BGI Very Sharp Cut Cyclone (VSCC™) particle size separator or Tisch TE-PM2.5C cyclone or WINS impactor, and operated for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, and in accordance with the URG-MASS300 Operator’s Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 65, page 26603, 05/08/2000

Latest modification: 06/2024

URG-MASS100 Single PM_{2.5} Sampler**Manual Equivalent Method: EQPS-0316-233**

“URG-MASS100 Single PM_{2.5} Sampler,” operated with software (firmware) version 4B or 5.0.1, configured for “Single 2.5” operation with a URG-2000-30EGN Cyclone particle size separator, and operated for a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, and in accordance with the URG-MASS100 Operator’s Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 81, page 25397, 04/28/2016

URG-MASS300 Sequential PM_{2.5} Sampler**Manual Equivalent Method: EQPS-0316-234**

“URG-MASS300 Sequential PM_{2.5} Sampler,” operated with software (firmware) version 4B or 5.0.1, configured for “Multi 2.5” operation with a URG-2000-30EGN Cyclone particle size separator, and operated a continuous 24-hour sample period at a flow rate of 16.67 liters/minute, and in accordance with the URG-MASS300 Operator’s Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

Federal Register: Vol. 81, page 25397, 04/28/2016

Particulate Matter – PM_{10-2.5}***BGI Incorporated Model PQ200 Sampler Pair*****Manual Reference Method: RFPS-1208-173**

“BGI Incorporated or Mesa Laboratories Incorporated Model PQ200 PM_{10-2.5} Sampler Pair,” for the determination of coarse particulate matter as PM_{10-2.5} consisting of a pair of BGI Model PQ200 samplers, with one configured for sampling PM_{2.5} (RFPS-0498-116) and the other configured for sampling PM_{10c} (RFPS-1298-125) with the PM_{2.5} separator replaced with a BGI WINS Eliminator and operated in accordance with the Model PQ200 Instruction manual supplement Appendix O.

Federal Register: Vol. 73, page 77024, 12/18/2008

Latest modification: 5/2018; 10/2020

DKK-TOA Models FPM-377C(S), FPM-377C, Particulate Monitor Pair**Automated Equivalent Method: EQPM-1224-265**

“DKK-TOA Models FPM-377C(S), FPM-377C, Particulate Monitor Pair,” for the determination of coarse particulate matter as PM_{10-2.5}, consisting of a pair of DKK-TOA monitors, with one being the approved PM₁₀ monitors (EQPM-0905-156) and the other being the approved PM_{2.5} monitors (designation EQPM-1224-264). The monitors are collocated with 1-4 meters of one another and are concurrently operated. Both monitors are operated in accordance with their associated Operating Manual. This designation applies to PM_{10-2.5} measurements only.

Federal Register: Vol. 90, page 15001, 04/07/2025

Met One Instruments BAM-1020 PM_{10-2.5} Measurement System**Automated Equivalent Method: EQPM-0709-185**

“Met One Instruments BAM-1020 PM_{10-2.5} Measurement System,” consisting of 2 BAM-1020 monitors, the first of which (PM_{2.5} measurement) is configured as a PM_{2.5} FEM (EQPM-0308-170). The second BAM-1020 monitor (PM₁₀ measurement) is configurable as a PM_{2.5} FEM (EQPM-0308-170), but set to monitor PM₁₀. The BAM-1020 monitors are collocated to within 1-4 meters of one another. The BAM-1020 performing the PM_{2.5} measurement is equipped with Met One Instruments, Inc. P/N BX-Coarse interface board and accessories; the units are interconnected to provide concurrent sampling and to report PM_{10-2.5} concentrations directly to the user. Both units are operated in accordance with BAM-1020 PM-Coarse Addendum Rev. 5-5 or later, the BAM-1020 Operations Manual Rev. D or later, or for units running firmware V9.0.0 or later, BAM-1020-9805 Operations Manual Rev. A or later and may employ either the standard or advanced leak test procedure. Both units must use glass fiber filter tape (460130 or 460180).

Federal Register: Vol. 74, page 28241, 06/15/2009

Latest modification: 04/2017; 12/2018; 08/2020

Met One Instruments, Inc. E-FRM– PM₁₀ and E-FRM– PM_{2.5} Sampler Pair or E-FRM–DC-PM₁₀ and E-FRM-DC-PM_{2.5} Sample Pair**Manual Reference Method: RFPS-0316-232**

“Met One Instruments, Inc. E-FRM– PM₁₀ and E-FRM– PM_{2.5} Sampler Pair” for the determination of coarse particulate matter as PM_{10-2.5}, consisting of a pair of Met One Instruments, Inc. E-FRM samplers, with one being the E-FRM PM_{2.5} sampler (RFPS-0315-221) and the other being the E-FRM PM₁₀ sampler (RFPS-0216-231). This designation also applies to “Met One Instruments, Inc. E-FRM-DC–PM₁₀ and E-FRM-DC–PM_{2.5} Sampler Pair” for the determination of coarse particulate matter as PM_{10-2.5}, consisting of a pair of Met One Instruments, Inc. E-FRM-DC samplers, with one being the E-FRM-DC-PM_{2.5} sampler (RFPS-0315-221) and the other being the E-FRM-DC-PM₁₀ sampler (RFPS-0216-231). The units are collocated to within 1-4 meters of one another. Both units are operated in accordance with the associated E-FRM instruction manual. This designation applies to PM_{10-2.5} measurements only.

Federal Register: Vol. 81, page 25397, 04/28/2016

Latest modification: 11/14/2017

Met One Instruments, Inc. E-SEQ-FRM PM₁₀ and E-SEQ-FRM PM_{2.5} Sampler Pair**Manual Reference Method: RFPS-0717-247**

“Met One Instruments, Inc. E-SEQ-FRM PM₁₀ and E-SEQ-FRM PM_{2.5} Sampler Pair” for the determination of coarse particulate matter as PM_{10-2.5}, consisting of a pair of Met One Instruments, Inc. E-SEQ-FRM samplers, with one being the E-SEQ-FRM PM_{2.5} sampler (RFPS-0717-245) and the other being the E-SEQ-FRM PM₁₀ sampler (RFPS-0717-246). The units are to be collocated to within 1-4 meters of one another and sample concurrently. Both units are operated in accordance with the associated E-SEQ-FRM instruction manual. This designation applies to PM_{10-2.5} measurements only.

Federal Register: Vol. 82, page 44613, 09/25/2017

Teledyne Model 602 Beta^{PLUS} Particle Measurement System or SWAM 5a Dual Channel Monitor**Automated Equivalent Method: EQPM-0912-206**

“Teledyne Model 602 Beta^{PLUS} Particle Measurement System” or “SWAM 5a Dual Channel Monitor” configured for 1-hour measurements of PM₁₀ and PM_{2.5} by beta attenuation, with the standard, louvered US EPA PM₁₀ size selective inlet specified in 40 CFR 50 Appendix L on one channel (Line A or B) and with an inlet system comprised of a PM₁₀ pre-impactor inlet (based on European PM₁₀ inlet design) combined with a BGI VSCCTM PM_{2.5} cyclone separator or Tisch TE-PM2.5C cyclone on the second channel (Line A or B, but always with PM₁₀ on the opposite Line). The PM_{10-2.5} mass measurement is performed using the resultant subtraction of PM₁₀ minus PM_{2.5}. Operated in accordance with the Teledyne Model 602 Beta^{PLUS} Particle Measurement System Operation Manual.

Federal Register: Vol. 77, page 60985, 10/5/2012

Latest modification: 06/2024

Teledyne Advanced Pollution Instrumentation Model T640 PM Mass Monitor with 640X Option**Automated Equivalent Method: EQPM-0516-240**

“Teledyne Advanced Pollution Instrumentation Model T640 PM mass monitor with 640X option,” continuous ambient particulate monitor operated at a volumetric flow rate of 16.67 Lpm, equipped with the louvered PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, TAPI aerosol sample conditioner (P/N: 081040000), configured for operation with or without Network Data Alignment enabled, in accordance with the Teledyne Model T640 Operations Manual. This designation applies to PM_{10-2.5} measurements only.

Federal Register: Vol. 81, page 45285, 07/13/2016

Latest modification: 3/2020, 4/2023

Thermo Scientific Partisol[®] 2000-D Dichotomous Air Sampler or Thermo Fisher Scientific Partisol[®] 2000i-D Dichotomous Air Sampler**Manual Equivalent Method: EQPS-0509-178**

“Thermo Scientific Partisol[®] 2000-D Dichotomous Air Sampler” or “Thermo Fisher Scientific Partisol[®] 2000i-D Dichotomous Air Sampler,” configured for dual-filter, single-event sampling of fine (PM_{2.5}) and coarse (PM_{10-2.5}) particles, operated with a U.S. EPA PM₁₀ inlet and using a virtual impactor to separate fine and coarse PM into two samples for collection on two separate filter membranes, for a 24-hour sampling period, in accordance with the Partisol[®] 2000-D or Partisol[®] 2000i-D instruction manual, as appropriate. Partisol[®] 2000i-D operated with firmware version 2.0 or greater.

Federal Register: Vol. 74, page 26395, 06/02/2009

Latest modification: 06/2011

Thermo Scientific Partisol[®]-Plus 2025-D Dichotomous Sequential Air Sampler or Thermo Fisher Scientific Partisol[®] 2025i-D Dichotomous Sequential Air Sampler**Manual Equivalent Method: EQPS-0509-180**

“Thermo Scientific Partisol[®]-Plus 2025-D Dichotomous Sequential Air Sampler” or “Thermo Scientific Partisol[®] 2025i-D Dichotomous Sequential Air Sampler,” configured for dual-filter sampling of fine (PM_{2.5}) and coarse (PM_{10-2.5}) particle components, with a U.S. EPA PM₁₀ inlet and using a virtual impactor to separate the fine and coarse PM into two samples for collection on two separate filter membranes, and operated with the modified filter shuttle mechanism implemented May 31, 2008, and firmware version 1.500 or greater for the Partisol[®]-Plus 2025-D and version 2.0 or greater for the Partisol[®] 2025i-D, for 24-hour continuous sampling periods, in accordance with the Partisol[®]-Plus 2025-D or Partisol[®] 2025i-D instruction manual, as appropriate.

Federal Register: Vol. 74, page 26395, 06/02/2009

Latest modification: 06/2011

Thermo Scientific Partisol[®] 2000-FRM PM_{10-2.5} Sampler Pair or Thermo Fisher Scientific Partisol[®] 2000i PM_{10-2.5} Air Sampler Pair**Manual Reference Method: RFPS-0509-175**

“Thermo Scientific Partisol[®] 2000-FRM PM_{10-2.5} Sampler Pair” or “Thermo Fisher Scientific Partisol[®] 2000i PM_{10-2.5} Air Sampler Pair,” for the determination of coarse particulate matter as PM_{10-2.5}, consisting of a pair of Thermo Scientific Partisol[®] 2000-FRM or 2000i samplers, with one configured as a PM_{2.5} sampler (RFPS-0498-117) and the other configured as a PM_{10c} sampler with the PM_{2.5} separator replaced with a Thermo Scientific WINS bypass downtube (RFPS-1298-126), with U.S. EPA PM₁₀ inlets on both samplers and operated in accordance with the Partisol[®] 2000-FRM or 2000i instruction manual supplement, as appropriate, and the 2000i operated with firmware version 2.0 or greater.

Federal Register: Vol. 74, page 26395, 06/02/2009

Latest modification: 06/2011

Thermo Scientific Partisol®-Plus 2025 Sequential PM_{10-2.5} Air Sampler Pair or Thermo Fisher Scientific Partisol® 2025i Sequential PM_{10-2.5} Air Sampler Pair**Manual Reference Method: RFPS-0509-176**

“Thermo Scientific Partisol®-Plus 2025 Sequential PM_{10-2.5} Air Sampler Pair” or “Thermo Fisher Scientific Partisol® 2025i Sequential PM_{10-2.5} Air Sampler Pair,” for the determination of coarse particulate matter as PM_{10-2.5}, consisting of a pair of Thermo Scientific Partisol®-Plus 2025 sequential samplers or a pair of Thermo Fisher Scientific Partisol® 2025i sequential samplers, with one configured as a PM_{2.5} sampler (RFPS-0498-118) and the other configured as a PM_{10c} sampler with the PM_{2.5} separator replaced with a Thermo Scientific Partisol® 2025 downtube (RFPS-1298-127). Partisol®-Plus 2025 to be operated with any software version 1.003 through 1.5 and Partisol® 2025i with firmware version 2.0 or greater, with the modified filter shuttle mechanism. Method to be operated in accordance with the Partisol®-Plus 2025 or Partisol® 2025i instruction manual supplement, as appropriate.

Federal Register: Vol. 74, page 26395, 06/02/2009

Latest modification: 06/2011

Thermo Scientific TEOM® 1405-DF Dichotomous Ambient Particulate Monitor with FDMS®**Automated Equivalent Method: EQPM-1013-207**

“Thermo Scientific TEOM® 1405-DF Dichotomous Ambient Particulate Monitor with FDMS®,” configured for dual filter sampling of fine (PM_{2.5}) and coarse particles using the US EPA PM₁₀ inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19 and a virtual impactor, with a total flow rate of 16.67 L/min, fine sample flow of 3 L/min, and coarse sample flow rate of 1.67 L/min, and operating with firmware version 1.70 and later, operated with or without external enclosures, and operated in accordance with the Thermo Scientific TEOM® 1405-DF Dichotomous Ambient Particulate Monitor Instruction Manual. This designation applies to PM_{10-2.5} measurements only.

Federal Register: Vol. 78, page 67360, 11/12/2013

Tisch Environmental Model TE-Wilbur Low-Volume Air Particulate Sampler Pair**Manual Reference Method: RFPS-1014-220**

“Tisch Environmental Model TE-Wilbur Low-Volume Air Particulate Sampler Pair” for the determination of coarse particulate matter as PM_{10-2.5}, consisting of a pair of Tisch Environmental Model TE-Wilbur samplers, with one being the TE-Wilbur2.5 PM_{2.5} sampler (RFPS-1014-219) and the other being a TE-Wilbur10 PM₁₀ sampler (RFPS-0714-216), and operated in accordance with the associated TE-Wilbur instruction manual. This designation applies to PM_{10-2.5} measurements only.

Federal Register: Vol. 79, page 65392, 11/04/2014

Latest modification: 11/2016

Tisch Environmental Model TE-Wilbur2.5 and TE-Wilbur10 Sampler Pair**Manual Equivalent Method: EQPS-0415-224**

“Tisch Environmental Model TE-Wilbur Low-Volume Air Particulate Sampler Pair” for the determination of coarse particulate matter as PM_{10-2.5}, consisting of a pair of Tisch Environmental Model TE-Wilbur samplers, with one being the TE-Wilbur2.5 PM_{2.5} sampler with TE-PM2.5C particle size separator (EQPS-0415-223) and the other being a TE-Wilbur10 PM₁₀ sampler (RFPS-0714-216), and operated in accordance with the associated TE-Wilbur instruction manual. This designation applies to PM_{10-2.5} measurements only.

Federal Register: Vol. 80, page 32114, 6/05/2015

Sulfur Dioxide***Reference Method for SO₂ (Pararosaniline Method)*****Manual Reference Method: 40 CFR Part 50, Appendix A**

Reference Method for the Determination of Sulfur Dioxide in the Atmosphere (Pararosaniline Method)

Federal Register: Vol. 47, page 54899, 12/06/1982 and Vol. 48, 17355, 04/22/1983***Pararosaniline Method for SO₂ - Technicon I*****Manual Equivalent Method: EQS-0775-001**

“Pararosaniline Method for the Determination of Sulfur Dioxide in the Atmosphere-Technicon I Automated Analysis System”

Federal Register: Vol. 40, page 34024, 08/13/1975***Pararosaniline Method for SO₂ - Technicon II*****Manual Equivalent Method: EQS-0775-002**

“Pararosaniline Method for the Determination of Sulfur Dioxide in the Atmosphere-Technicon II Automated Analysis System”

Federal Register: Vol. 40, page 34024, 08/13/1975***Advanced Pollution Instrumentation, Inc. Model 100 SO₂ Analyzer*****Automated Equivalent Method: EQSA-0990-077**

“Advanced Pollution Instrumentation, Inc. Model 100 Fluorescent SO₂ Analyzer,” operated on the 0-0.1 ppm¹, the 0-0.2 ppm¹, the 0-0.5 ppm, or the 0-1.0 ppm range with a 5-micron TFE filter element installed in the rear-panel filter assembly, either a user- or vendor-supplied vacuum pump capable of providing 20 inches of mercury vacuum at 2.5 L/min, with or without any of the following options: Internal Zero/Span; Pump Pack; Rack Mount With Slides; RS-232 Interface; Status Output; TFE Zero/Span Valves; Zero Air Scrubber; Dual Range.²

Federal Register: Vol. 55, page 38149, 09/17/1990***ASARCO Model 500 SO₂ Monitor*****Automated Equivalent Method: EQSA-0877-024**

“ASARCO Model 500 Sulfur Dioxide Monitor,” operated on a 0-0.5 ppm range; or “ASARCO Model 600 Sulfur Dioxide Monitor,” operated on a 0-1.0 ppm range. (Both models are identical except for the range.) NOTE: This method is no longer commercially available.

Federal Register: Vol. 42, page 44264, 09/02/77 and Vol. 44, page 67522, 11/26/1979***Beckman Model 953 Fluorescent Ambient SO₂ Analyzer*****Automated Equivalent Method: EQSA-0678-029**

“Beckman Model 953 Fluorescent Ambient SO₂ Analyzer,” operated on a range of either 0-0.5 or 0-1.0 ppm, with a time constant setting of 2, 2.5, or 3 minutes, a 5 to 10 micron membrane filter element installed in the rear-panel filter assembly, with or without any of the following options: Remote Operation Kit, Catalog No. 641984; Digital Panel Meter, Catalog No. 641710; Rack Mount Kit, Catalog No. 641709; Panel Mount Kit, Catalog No. 641708.

Federal Register: Vol. 43, page 35995, 08/14/1978***Bendix Model 8303 Sulfur Analyzer*****Automated Equivalent Method: EQSA-1078-030**

“Bendix Model 8303 Sulfur Analyzer,” operated on a range of either 0-0.5 or 0-1.0 ppm, with a Teflon filter installed on the sample inlet of the H₂S scrubber assembly.

Federal Register: Vol. 43, page 50733, 10/31/1978***Columbia Scientific Industries Model 5700 SO₂ Analyzer*****Automated Equivalent Method: EQSA-0494-095**

“Columbia Scientific Industries Model 5700 Sulfur Dioxide Analyzer,” operated with software version 1.0 on any full scale range between 0-250 ppb¹ and 0-1000 ppb, at any integration time setting from 20 to 99 seconds, at any temperature in the range of 15°C to 30°C, at any AC line voltage in the range of 105 to 130 volts, and with or without any of the following options:

964-0121 Alarm Relay Contacts	964-0125 Dual Current Outputs	964-0131 Rack Mount
964-0122 Input Solenoids	964-0126 Printer	964-0012 Single Headed Pump
964-0124 Dual Analog Voltage Outputs		

Federal Register: Vol. 59, page 18818, 04/20/1994

Dasibi Model 4108 U.V. Fluorescence SO₂ Analyzer**Automated Equivalent Method: EQSA-1086-061**

“Dasibi Model 4108 U.V. Fluorescence SO₂ Analyzer,” operated with a range of 0-100 ppb¹, 0-200 ppb¹, 0-500 ppb, or 0-1000 ppb, with a Teflon-coated particulate filter and continuous hydrocarbon removal system, with or without any of the following options: Rack Mounting Brackets and Slides; RS-232-C Interface; Temperature Correction.

Federal Register: Vol. 51, page 32244, 09/10/1986

DKK-TOA Corp. Model GFS-32 U.V. Fluorescent SO₂ Analyzer**Automated Equivalent Method: EQSA-0701-115**

“DKK-TOA Corporation Model GFS-32 Ambient Air SO₂ Ultraviolet Fluorescent Analyzer,” operated within the 0.000 to 0.500 ppm range in the temperature range of 20°C to 30°C.

Federal Register: Vol. 62, page 44007, 08/18/1997

DKK-TOA Corp. Model GFS-112E U. V. Fluorescent SO₂ Analyzer**Automated Equivalent Method: EQSA-0100-133**

“DKK-TOA Corporation Models GFS-112E and GFS-112E-1 U.V. Fluorescence SO₂ Analyzer,” operated at any temperature ranging from 15°C to 35°C, on any of the following measurement ranges: 0-0.05 ppm¹, 0-0.100 ppm¹, 0-0.200 ppm¹, 0-0.5 ppm, or 0-1.000 ppm, and with or without the optional Internal zero air supply and permeation tube oven.²

Federal Register: Vol. 65, page 2610, 01/18/2000

DKK-TOA Corp. Model GFS-312E, GFS-390 Ambient SO₂ Analyzer**Automated Equivalent Method: EQSA-1107-168**

“DKK-TOA Corporation Model GFS-312E or GFS-390 Ambient SO₂ Analyzer,” operated at any environmental temperature in the range of 20°C to 30°C on any of the following measurement ranges¹: 0-0.1 ppm, 0-0.2 ppm and 0-0.5 ppm.²

Federal Register: Vol. 72, page 63176, 11/08/2007

Latest Modification: 05/2022

Ecotech or Acoem Australasia Serinus 50 Sulfur Dioxide Analyzer or Opsis AB OPS50 Sulfur Dioxide Analyzer or Teledyne Analytical Instruments 6400E Sulfur Dioxide Analyzer or Tisch Environmental TE 2.0 Sulfur Dioxide Analyzer or Met One Instruments GAS-1050 Sulfur Dioxide Analyzer or Met One Instruments GAS-1050-TL Sulfur Dioxide Analyzer**Automated Equivalent Method: EQSA-0809-188**

“Ecotech or Acoem Australasia Serinus 50 Sulfur Dioxide Analyzer” or “Opsis AB OPS50 Sulfur Dioxide Analyzer” or “Teledyne Analytical Instruments 6400E Sulfur Dioxide Analyzer” or “***Tisch Environmental TE 2.0 Sulfur Dioxide Analyzer***,” operated in the range of 0–0.5 ppm, temperatures ranging from 0 to 40 °C, with a five-micron Teflon® filter element installed, with or without trace option and with the following selected: Background-Enabled, Control Loop-Enabled, Diagnostic Mode-Operate, Pres/Temp/Flow Compensation-Enabled, Span Compensation-Disabled, with concentration automatically corrected for temperature and pressure changes, and operated according to the Serinus 50 Sulfur Dioxide Analyzer User Manual or the Opsis OPS50 Sulfur Dioxide Analyzer User Manual or the Teledyne Analytical Instruments 6400E Sulfur Dioxide Analyzer Instruction Manual or the Tisch Environmental TE 2.0 Sulfur Dioxide Analyzer Instruction Manual or Met One Instruments GAS-1050 Sulfur Dioxide Analyzer Instruction Manual or Met One Instruments GAS-1050-TL Sulfur Dioxide Analyzer Instruction Manual, as appropriate.

Federal Register: Vol. 74, page 38184, 07/31/2009

Latest Modifications: 05/2010, 05/2011, 05/2012, 8/2014, 12/2019, 11/2021, 07/2022, 06/2024

Environnement S.A. or ENVEA Model AF21M SO₂ Analyzer**Automated Equivalent Method: EQSA-0292-084**

“Environnement S.A. or ENVEA Model AF21M Sulfur Dioxide Analyzer,” operated on a range of 0-0.5 ppm with a response time coefficient setting of 01, a Teflon filter installed in the rear-panel filter assembly, and with or without any of the following options: Rack Mount/Slides; RS-232-C Interface.

Federal Register: Vol. 57, page 5444, 02/14/1992

Latest Modifications: 08/2020

Environnement S.A. or ENVEA Model AF22M or AF22e SO₂ Analyzer**Automated Equivalent Method: EQSA-0802-149**

“Environnement S.A. or ENVEA Model AF22M or AF22eUV Fluorescence Sulfur Dioxide Analyzer,” operated with a full scale range of 0 - 500 ppb, at any temperature in the range of 10°C to 35°C, with a 5-micron PTFE sample particulate filter, with automatic response time, with the automatic “ZERO-REF” cycle ON and set for activation every 24 hours, and with or without either of the following options: Permeation oven, ESTEL analog input/output board and LCD color touch screen², solar panel option installed. Analyzer operated and maintained in accordance with the Model AF222M or AF22e Technical Manuals, and operating from a 115V/ 60Hz, 230V/50Hz or 24Vdc power source.

Federal Register: Vol. 67, page 57811, 09/12/2002

Latest Modifications: 11/2015, 8/2020, 6/2022

Environnement S.A. or ENVEA SANOVA Multigas Longpath Monitoring System**Automated Equivalent Method: EQSA-0400-138**

“Environnement S.A. or ENVEA Model SANOVA Multigas Longpath Air Quality Monitoring System,” consisting of a receiver, one or more projectors, interface unit, a user-provided control unit computer running the SANOVA VisionAIR software, and associated incidental equipment; configured for measuring SO₂, with the temperature control and internal calibration cell options installed, operated with a measurement range of 0 to 0.5 ppm, over an installed monitoring path length of between 27 and 500 meters, within an ambient air temperature range of -30 to +45°C, with a measurement (integrating) time of 180 seconds, and with or without external temperature and barometric pressure sensors or any of the following options: external (meteo) input connection, series 1M bus connection, OGR type projector, analog outputs.

Federal Register: Vol. 65, page 26603, 05/08/2000

Latest Modifications: 08/2020

Focused Photonics Inc. (FPI) Model AQMS-500 SO₂ Analyzer**Automated Reference Method: RFSA-1219-255**

“Focused Photonics Inc. AQMS-500 SO₂ Analyzer” Ultraviolet Fluorescence (UVF) analyzer operated in the range of 0–0.5 ppm, with 5 µm, 47 mm diameter Teflon® (PTFE) filter installed, operated at temperatures between 20°C and 30°C, at nominal input line voltage of 220±10% VAC and frequency of 50 Hz or 110±10% VAC and frequency of 60 Hz, at a nominal sampling flow rate of 800±80 cc/min, and operated according to the FPI AQMS-500 User Manual.

Federal Register: Vol. 85, page 5958, 2/3/2020

Latest Modifications: 06/2025

Horiba Models APSA-360, APSA-360-CE, or APSA-360A-CE SO₂ Monitors**Automated Equivalent Method: EQSA-0197-114**

“Horiba Instruments, Inc. Models APSA-360, APSA-360-CE or APSA-360A-CE Ambient Sulfur Dioxide Monitor,” operated with a full scale range of 0 - 0.50 ppm, at any temperature in the range of 5°C to 40°C, with a Line Setting of "MEASURE," an Analog Output Setting of "MOMENTARY VALUE", and with or without any of the following options:² 1) Rack Mounting Plate and Side Rails, 2) RS-232 Communications Port, and 3) Internal zero gas and span gas generator.

"Horiba Instruments, Inc. Model APSA-360A-CE Ambient Sulfur Dioxide Monitor," operated with one of the following measurement ranges: 0-0.05 ppm, 0-0.1 ppm, 0-0.2 ppm, 0-0.5 ppm or 0-1.0 ppm; with selectable time constants from 10 to 300 seconds; at any temperature in the range of 5°C to 40°C; and with or without the optional internal zero gas and span gas generator.

Federal Register: Vol. 62, page 6968, 02/14/97; Vol. 63, page 31992, 06/11/1998

Horiba Model APSA-370 Ambient SO₂ Monitor or Horiba APSA-380 SO₂ Monitor**Automated Equivalent Method: EQSA-0506-159**

“Horiba Instruments Incorporated Model APSA-370 or APSA-380 Ambient SO₂ Monitor,” operated with a full-scale fixed measurement range of 0 - 0.50 ppm, with the automatic range switching off, at any environmental temperature in the range of 20°C to 30°C,² at the design flow rate of 0.7 LPM and operational flow rate between 0.3 LPM and 1.0 LPM, or the Horiba Instruments Incorporated Model APSA-380 Ambient SO₂ Monitor, operated with full scale fixed measurement range of 0-0.50 ppm, with automatic range switching off, at any environmental temperature between 5°C and 40°C, with 100 s “Rolling Average” or with “Digital Filter” selected on the “Calculation Method” screen, at the design flow rate of 0.6 LPM and operational flow rate between 0.3 LPM and 1.0 LPM.”

Federal Register: Vol. 71, page 25587, 05/01/2006

Latest Modification: 12/2024

KENTEK Inc. Model MEZUS 110 SO₂ Analyzer**Automated Equivalent Method: RFSA-1120-257**

"KENTEK Inc. Model MEZUS 110 SO₂ Analyzer," UV fluorescence analyzer operated in a range of 0–0.5 ppm, with 0.5 µm, 47 mm diameter Teflon® filter installed, operated at temperatures between 20°C and 30°C, at a nominal sampling flow rate of 800 cc/min, using a 5 minute averaging time, with either 105VAC-125VAC or 200VAC-240VAC input power options installed, 280-watt power consumption, equipped with 7 inch LCD touch screen display, and operated according to the KENTEK Inc. Model Mezus 110 Sulfur Dioxide Analyzer User's Instruction Manual.

Federal Register: Vol. 86, pages 12682-12683, 03/4/2021

Lear Siegler Model AM2020 SO₂ Monitor**Automated Equivalent Method: EQSA-0486-049**

"Lear Siegler Model AM2020 Ambient SO₂ Monitor," operated on a range of either 0-0.5 or 0-1.0 ppm, at a wavelength of 299.5 nm, with a 5-minute integration period, over any 10°C temperature range between 20°C and 45°C, with or without the automatic zero and span correction feature.

Federal Register: Vol. 45, page 79574, 12/01/1980; Vol. 46, page 9997, 01/30/1981

Lear Siegler Model SM1000 SO₂ Monitor**Automated Equivalent Method: EQSA-1275-005**

"Lear Siegler Model SM1000 SO₂ Ambient Monitor," operated on the 0-0.5 ppm range, at a wavelength of 299.5 nm, with the "slow" (300 second) response time, with or without any of the following options: SM-1 Internal Zero/Span; SM-2 Span Timer Card; SM-3 0-0.1 Volt Output; SM-4 0-5 Volt Output; SM-5 Alternate Sample Pump; SM-6 Outdoor Enclosure.

Federal Register: Vol. 41, page 3893, 01/27/1976; Vol. 41, page 32946, 08/06/1976; Vol. 42, page 13044, 03/08/1977; Vol. 45, page 1147, 01/04/1980

Meloy Model SA185-2A SO₂ Analyzer**Automated Equivalent Method: EQSA-1275-006**

"Meloy Model SA185-2A Sulfur Dioxide Analyzer," operated on the 0-0.5 ppm range, with or without any of the following options:

S-1 Linearized Output	S-2 Modified Recorder Output	S-18 Rack Mount Conversion
S-24 Dual Range Linearized Output	S-5 Teflon-Coated Block	S-18A Rack Mount Conversion
S-33 Remote Range Control and Status	S-6A Reignite Timer Circuit	S-21 Front Panel Digital (Signals)
S-7 Press to Read Volt Meter	S-11A Manual Zero and Span	
S-34 Remote Control	S-35 Front Panel Digital Meter with BCD Output	
S-22 Remote Zero/Span Control and Status (Timer)	S-13 Status Lights	S-22A Remote Zero/Span Control
S-11B Automatic Zero and Span	S-14 Output Booster Amplifier	S-23 Automatic Zero Adjust
S-36 Dual Range Log-Linear Output	S-14B Line Transmitter Board	S-23A Automatic/Manual Zero Adjust
S-38 Sampling Mode Status		

or operated on the 0-1.0 ppm range with either option S-36 or options S-1 and S-24, with or without any of the other options.

Federal Register: Vol. 41, page 3893, 01/27/1976 and Vol. 43, page 38088, 08/25/1978

Meloy Model SA285E SO₂ Analyzer**Automated Equivalent Method: EQSA-1078-032**

"Meloy Model SA285E Sulfur Dioxide Analyzer," operated on the following ranges and time constant switch positions:

Range, ppb:	<u>0-50</u> ¹	<u>0-100</u> ¹	<u>0-500</u>	<u>0-1000</u>
Time Constant Setting:	1 or 10	1 or 10	off, 1 or 10	off, 1 or 10

The analyzer may be operated at temperatures between 10°C and 40°C and at line voltages between 105 and 130 volts, with or without any of the following options:

S-5 Teflon Coated Block	S-22B Remote Zero/Span Control and Status (Pulse)	S-30 Auto Reignite
S-14B Line Transmitter Board	S-23 Auto Zero Adjust	S-32 Remote Range Control and Status
S-18 Rack Mount Conversion	S-23A Auto/Manual Zero Adjust	S-35 Front Panel Digital Meter With BCD Output
S-18A Rack Mount Conversion	S-25 Press To Read	S-37 Temperature Status Lights
S-21 Front Panel Digital Meter	S-26 Manual Zero and Span	S-38 Sampling Mode Status
S-22 Remote Zero/Span Control and Status (Timer)	S-27 Auto Manual Zero/Span	
S-22A Remote Zero/Span Control	S-28 Auto Range and Status	

Federal Register: Vol. 43, page 50733, 10/31/1978

Meloy Model SA 700 Fluorescence Sulfur Dioxide Analyzer**Automated Equivalent Method: EQSA-0580-046**

“Meloy Model SA 700 Fluorescence Sulfur Dioxide Analyzer,” operated on the 0-250 ppb¹, the 0-500 ppb, or the 0-1000 ppb range with a time constant switch position of either 2 or 3. The analyzer may be operated at temperatures between 20°C and 30°C and at line voltages between 105 and 130 volts, with or without any of the following options: FS-1 Current Output; FS-2 Rack Mount Conversion; FS-2A Rack Mount Conversion; FS-2B Rack Mount Conversion; FS-3 Front Panel Mounted Digital Meter; FS-5 Auto/Manual Zero/Span With Status; FS-6 Remote/Manual Zero/Span With Status; FS-7 Auto Zero Adjust.

Federal Register: Vol. 45, page 31488, 05/13/1980

Monitor Labs Model 8450 Sulfur Monitor**Automated Equivalent Method: EQSA-0876-013**

“Monitor Labs Model 8450 Sulfur Monitor,” operated on a range of either 0-0.5 or 0-1.0 ppm, with a 5 second time constant, a model 8740 hydrogen sulfide scrubber in the sample line, with or without any of the following options: BP Bipolar Signal Processor; IZS Internal Zero/Span Module; V Zero/Span Valves; CLO Current Loop Output; TF TFE Sample Particulate Filter; VT Zero/Span Valves and Timer; DO Status Remote Interface.

Federal Register: Vol. 41, page 36245, 08/27/1976 and Vol. 44, page 33476, 06/11/1979

Monitor Labs/Lear Siegler Model 8850 SO₂ Analyzer**Automated Equivalent Method: EQSA-0779-039**

“Monitor Labs or Lear Siegler Model 8850 Fluorescent SO₂ Analyzer,” operated on a range of either 0-0.5 or 0-1.0 ppm, with an internal time constant setting of 55 seconds, a TFE sample filter installed on the sample inlet line, with or without any of the following options: 03A Rack; 03B Slides; 05A Valves Zero/Span; 06A IZS Internal Zero/Span Source; 06B,C,D NIST-Traceable Permeation Tubes; 08A Pump; 09A Rack Mount For Option 08A; 010 Status Output W/Connector; 013 Recorder Output Options; 014 DAS Output Options; 017 Low Flow Option; 018 Kicker.

Federal Register: Vol. 44, page 44616, 07/30/1979

Monitor Labs/Lear Siegler Model 8850S SO₂ Analyzer**Automated Equivalent Method: EQSA-0390-075**

“Monitor Labs or Lear Siegler Model 8850S SO₂ Analyzer,” operated on a range of either 0-0.5 or 0-1.0 ppm.

Federal Register: Vol. 55, page 5264, 02/14/1990

Opsis Model AR 500 and System 300 Open Path Ambient Air Monitoring Systems for SO₂**Automated Equivalent Method: EQSA-0495-101**

“Opsis Model AR 500 System” or “System 300 Open Path (long path) Ambient Air Monitoring Systems,” configured for measuring SO₂, with one detector and movable grating, operated with a measurement range of 0 to 0.5 ppm or 0 to 1.0 ppm, an installed monitoring path length between 20 and 500 meters (or 20 and 1000 meters with the ER 150 option, AR 500 System only), xenon lamp type B (150 watt), fiber optic cable length between 3 to 20 meters; operating within an ambient air temperature range of -50 to +50°C, an analyzer temperature range of 20 to 30°C, a measurement (integrating) time setting between 30 and 120 seconds (0 min:30 sec. to 2 min:00 sec.), and with a complete cycle time of not more than 200 seconds (3 min, 20 sec.). Under this method designation, the Model AR 500 System or System 300 consists of: AR 500 opto-analyser; emitter EM 110 and receiver RE 110 (together identified as ER 110); optic fibre cable OF60-S; power supply PS 150; Opsis operational software, version 7.0 or 7.1; and initial on-site installation, setup, and limited operator training.²

Optional components that can be used with the Model AR 500 only, in addition to or as alternative to corresponding components listed above: • AR 503 opto-analyzer configured as Model AR 500 (only the center detector active, sequential monitoring) • Emitter/receiver ER 150 (for monitoring path lengths up to 1 kilometer) • Transceiver ER 130 and Retroreflector RE 090 with 7 prisms (max. monitoring path length 150 meters) or 12 prisms (max. monitoring path length 250 meters) • Receiver RE 130 • Xenon lamp type A (higher short-wavelength UV output) • Optic fibre cable OF60-R (low-loss for short wavelengths) • Multiplexers MX 004 and MX 024 • Dataloggers DL 010 and DL 016 • Analogue and digital input/output cards AO 008, AI 016, and DI 032 • Analogue and digital isolation cards IA 008, ID 008, OA 008, and OD 008 • Window heaters HF 110 and HF 150 • Mirror heaters HM 110 and HM 150 • Auto calibration unit CU 007 • Software packages IO 80 (for the analogue and digital input/output adapters), DL10 and DL16 (for data loggers), COMVISION, and STAT 500;

Recommended calibration and accuracy audit components (or equivalent) for either Model AR 500 or System 300:

• Wavelength calibration lamp CA 004 • Calibration bench CB 100 • Receiver unit RE 060 (two required) • Calibration unit CA 150, with same type lamp as used in the monitoring path emitter • Power supply PS 150 for calibration unit CA 150 • Calibration cells CC 001-X, where X represents various cell lengths from 1 to 900 mm • Special calibration cells CC 110 or CC 150 (for mounting directly on receiver) • Light meter LM 010.

Federal Register: Vol. 60, page 21518, 05/02/1995

Philips PW9755 SO₂ Analyzer**Automated Equivalent Method: EQSA-0676-010**

“Philips PW9755 SO₂ Analyzer,” consisting of the following components: PW9755/02 SO₂ Monitor with PW9741/00 SO₂ Source, PW9721/00 Filter Set SO₂, PW9711/00 Electrolyte SO₂, PW9750/00 Supply Cabinet, PW9750/10 Supply Unit/Coulometric, either PW9731/00 Sampler or PW9731/20 Dust Filter (or vendor-approved alternate particulate filter); operated with a 0-0.5 ppm range and with a reference voltage setting of 760 millivolts; with or without any of the following options: PW9750/30 Frame For MTT; PW9752/00 Air Sampler Manifold; PW9753/00 Mounting Rack For Accessories; PW9750/41 Control Clock 60 Hz; PW9754/00 Air Distributor.

Federal Register: Vol. 41, page 26252, 6/25/1976; Vol. 41, page 46019, 10/19/1976; Vol. 42, page 28571, 06/03/1977

Philips PW9700 SO₂ Analyzer**Automated Equivalent Method: EQSA-0876-011**

“Philips PW9700 SO₂ Analyzer,” consisting of the following components: PW9710/00 Chemical Unit with PW9711/00, Electrolyte SO₂, PW9721/00 Filter Set SO₂, PW9740/00 SO₂ Source; PW9720/00 Electrical Unit; PW9730/00 Sampler Unit (or vendor-approved alternate particulate filter); operated with a 0-0.5 ppm range and with a reference voltage of 760 millivolts.

Federal Register: Vol. 41, page 34105, 08/12/1976

SERES Model SF 2000 G Sulfur Dioxide Analyzer**Automated Equivalent Method: EQSA-0810-194**

“SERES model SF 2000 G Sulfur Dioxide Analyzer,” UV fluorescence method using a wavelength source approaching 215 nm and a selective membrane for aromatic hydrocarbon removal, operated with a full scale measurement range of 0 - 0.5 ppm at any ambient temperature in the range of 20°C to 30°C, with tabletop or rack mounts, microprocessor controlled menu-driven user interface, onboard diagnostics and system test functions, analog output signals of 4-20 mA or user selectable voltage ranges up to 10 V, printer port, modem port and 32 pin data/control/alarm port, user selectable manual and automatic zero/span and calibrate modes; with or without a permeation tube system (optional equipment) for internal calibration; operated in accordance with the SF 2000 G User and Maintenance Manual.

Federal Register: Vol. 75, page 51039, 08/18/2010

SIR S.A. Model S-5001 U.V. Fluorescence SO₂ Analyzer**Automated Equivalent Method: EQSA-0507-166**

“SIR S.A. Model S-5001 U.V. Fluorescence SO₂ Analyzer,” operated with a full-scale measurement range of 0 - 0.5 ppm, with an integration time setting of 1 minute, and with or without an optional PCMCIA card or the optional internal permeation oven.²

Federal Register: Vol. 72, page 26627, 05/10/2007

Sutron or Sabio Model 6020 Sulfur Dioxide SO₂ Analyzer**Automated Reference Method: RFSA-0616-237**

“Sutron or Sabio Model 6020 Sulfur Dioxide SO₂ Analyzer,” operated at any of the following measurement ranges: 0–0.5 ppm, at any ambient temperature in the range of 5–40 °C, at any line voltage in the range of 90–260 VAC, at any sample flow rate in the range of 0.4–0.8 L/min, and in accordance with the Model 6020 SO₂ Analyzer Operation Manual, with or without the following options: Zero/span ports for external calibration; an optional inlet filter; or an optional second gas measurement module collocated inside of the enclosure.

Federal Register: Vol. 81 page 45284, 07/13/2016

Latest Modification: 05/2018

Teledyne Advanced Pollution Instrumentation, Models 100A, 100AS, 100E, 100EU, T100, T100U, N100; Teledyne Analytical Instruments Model 6400A; or Teledyne Monitor Labs sensor-e™ Model TML-50 SO₂ Analyzers; or recordum airpointer® system module 801-001000

Automated Equivalent Method: EQSA-0495-100

“Teledyne Advanced Pollution Instrumentation Models 100A, 100AS, 100E, 100EU, T100, T100U or N100; Teledyne Analytical Instruments Model 6400A; or Teledyne Monitor Labs, Inc. sensor-e™ Model TML-50 UV Fluorescent Sulfur Dioxide Analyzer; operated on any full scale range between 0-50 ppb¹ and 0-1000 ppb, at any temperature in the range of 5 - 40°C (0 – 45°C for the N100), with a TFE filter element or a Kynar® DFU installed in the filter assembly, with either the vendor-supplied internal pump or a user- or vender-supplied external vacuum pump capable of maintaining an absolute pressure of 35 cm (14 inches) of mercury (or less) at 1.0 standard liter per minute flow rate, with the following software settings: Dynamic zero: OFF or ON; Dynamic span: OFF; AutoCal: ON or OFF; Dual range: ON or OFF; Autorange: ON or OFF; Temp/pressure compensation: ON; dilution factor: OFF or 1.0; and with or without any of the following options (if available for the various models):² Rack mount with or without chassis slides; Fluorocarbon zero/span valves; Internal zero/span (IZS); Three-point internal zero/span (IZS, option 51C); 4-20 mA, isolated analog outputs; analog input option; External pump; Status outputs; Control inputs; Rack mount for external pump with tray; RS-232 output; Ethernet output; Zero air scrubber; Combustion Filter; SO₂ Permeation tube, certified or uncertified, 0.4 ppm @ 0.7 L/min; SO₂ Permeation tube, certified or uncertified, 0.8 ppm @ 0.7 L/min; the NumaView™ software. **Airpointer® module 801-001000 only:** operated on any full scale range between 0-0.05 ppm and 0-1.0 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any temperature in the range of 10°C to 45°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches of mercury or less at 2.5 sLpm; installed in the compact, thermally controlled (-40°C to + 45°C) and weather proof airpointer® base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without internal span option as module supplement consisting of permeation oven and permeation tube; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with the appropriate instrument manual. Note 2 applies to the following Teledyne Advanced Pollution Instrumentation Models 100E, 100EU, T100, T100U, and Teledyne Monitor Labs, Inc. Sensor-e™ Model TML-50.

Federal Register: Vol. 60, page 17061, 04/04/1995

Latest Modification: 08/2010; 05/2013; 07/2014; 9/2015; 5/2021

Teledyne Monitor Labs/Casella/Ecotech/ Acoem Australasia /Aeris Model***ML9850/CM2050/EC9850/EC9850T/AE9850/AE2050; Teledyne Monitor Labs/Casella/ Ecotech/Model******ML9850B/CM2050B/EC9850B; or Wedding & Associates Model 1040 SO₂ Analyzers*****Automated Equivalent Method: EQSA-0193-092**

“Teledyne Monitor Labs, Casella Monitor, or Ecotech or Acoem Australasia or Aeris Models ML9850/CM2050/EC9850/AE9850/AE2050, or ML9850B/CM2050B/EC9850B, Ecotech or Acoem Australasia Model EC9850T, or Wedding & Associates, Inc. Model 1040 Sulfur Dioxide Analyzers,” operated on any full scale range between 0-0.050 ppm¹ and 0-1.0 ppm, at any temperature in the range of 15°C to 35°C, with the service switch on the secondary panel set to the *In* position; with the following menu choices selected: Range: *0.05 ppm to 1.0 ppm*; Over-ranging: *Enabled or Disabled*; Background: *Not Disabled*; Calibration: *Manual or Timed*; Diagnostic Mode: *Operate*; Filter Type: *Kalman*; Pres/Temp/Flow Comp: *On*; Span Comp: *Disabled*; and as follows: **Model ML9850/CM2050/AE9850/AE2050/ EC9850/EC9850T** - with a five-micron Teflon® filter element installed internally, with the 50-pin I/O board installed on the rear panel configured at any of the following output range settings: Voltage, 0.1 V, 1 V, 5 V, 10 V; Current, 0-20 mA, 2-20 mA, 4-20 mA; and with or without any of the following options: Valve Assembly for External Zero/Span (EVS); Rack Mount Assembly; Internal Floppy Disk Drive. **Models ML9850B/CM2050B/EC9850B and 1040** - with either a vendor-supplied or equivalent user supplied five-micron Teflon® filter, zero air scrubber, and exhaust pump, and with or without any of the following options: Valve Assembly for External Zero/Span (EVS); Rack Mount Assembly; 50-pin I/O board; Exhaust Scrubber; Internal Zero/Span Assembly (IZS); hinged, fold-down front panel. Operated with the appropriate instrument manual.

Federal Register: Vol. 58, page 6964, 02/03/1993***Latest Modification: 03/2011; 11/2020; 11/2021******Thermo Electron Model 43 SO₂ Analyzer*****Automated Equivalent Method: EQSA-0276-009**

“Thermo Electron Model 43 Pulsed Fluorescent SO₂ Analyzer,” equipped with an aromatic hydrocarbon cutter and operated on a range of either 0-0.5 or 0-1.0 ppm, with or without any of the following options: 001 Rack Mounting For Standard 19 Inch Relay Rack; 002 Automatic Actuation Of Zero and Span Solenoid Valves; 003 Type S Flash Lamp Power Supply; 004 Low Flow.

Federal Register: Vol. 41, page 8531, 02/27/1976; Vol. 41, page 15363, 04/12/1976; Vol. 42, page 20490, 04/20/1977 Vol. 44, page 21861, 04/12/1979; Vol. 45, page 2700, 01/14/1980; Vol. 45, page 32419, 05/16/1980

Thermo Environmental Instruments, Inc./Thermo Electron, Thermo Scientific Models 43A, 43B, 43C, 43C-TLE, 43i, 43i-TLE, 43iQ, 43iQTL SO₂ Analyzer

Automated Equivalent Method: EQSA-0486-060

“Thermo Electron or Thermo Environmental Instruments, Inc. **Model 43A or 43B** Pulsed Fluorescence SO₂ Analyzer,” operated on the 0-0.1 ppm¹, the 0-0.2 ppm¹, the 0-0.5 ppm, or the 0-1.0 ppm range, Standard model’s design flow rate (0.5 Lpm) and operational flow rate (0.35 -0.65 Lpm), with either a high or a low time constant setting (Model 43A) and with or without any of the following options:²

001 Teflon Particulate Filter	004 High Flow Rate (1.0 Lpm)	007 Remote Activation of Zero/Span Valves
002 19" Rack Mounting Configuration	005 Current Output	008 RS-232 Interface (Model 43B)
003 Internal Zero/Span Valves	006 Internal Permeation	009 Pressure/Temperature Compensation
	Span Source	(Model 43B)

“Thermo Environmental Instruments, Inc. **Models 43C, 43C-TLE, 43i, 43i-TLE**, Pulsed Fluorescence SO₂ Analyzer,” operated on any measurement range between 0-50 ppb¹ (0-10¹ ppb for Model TLE) and 0-1000 ppb, Standard model’s design flow rate (0.5 Lpm) and operational flow rate (0.35-0.65 Lpm), with any time average setting from 10 to 300 seconds, Remote activation of zero/span and sample valves, RS-232/485 interface, with temperature and/or pressure compensation on or off, operated at temperatures between 20°C and 30°C, and with or without any of the following options:² Teflon particulate filter, 4-20 mA current output or I/O expansion board, Rack mounts, Internal permeation span source/Permeation oven, Internal zero/span and sample solenoid valves, High flow rate model’s design flow rate (1.0 Lpm) and operational flow rate (0.85-1.15 Lpm) ; **Models 43C, 43C-TLE: airpointer® Model 801-001000-T**, operated on any full scale range between 0-0.05 ppm and 0-1.0 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any internal temperature in the range of 15°C to 39°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; Standard model’s design flow rate (0.5 Lpm) and operational flow rate (0.35-0.65 Lpm), installed in the compact, thermally controlled (-40°C to + 45°C) and weather proof airpointer® base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without internal span option as module supplement consisting of permeation oven and permeation tube; with or without modules for other criteria pollutants; with optional High flow rate model’s design flow rate (1.0 Lpm) and operational flow rate (0.85-1.15 Lpm), with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with the appropriate instrument manual. **Model 43iQ** SO₂ Analyzer operated between 0-50 ppb and 0-1000 ppb with averaging times from 10 to 300 seconds or with adaptive filtering, Standard model’s design flow rate (0.5 Lpm) and operational flow rate (0.35-0.65 Lpm), operated at temperatures between 0 °C and 45 °C, at line voltages of 100 to 240 VAC @ 50/60 Hz, with or without the following options: Teflon particulate filter, 19 inch rack mount, internal zero/span and sample valves with remote activation, pressure and/or temperature compensation on or off, analog I/O expansion board, digital I/O expansion board, communication board, permeation oven, dynamic filtering, and High flow rate model’s design flow rate (1.0 Lpm) and operational flow rate (0.85-1.15 Lpm). **Model 43iQTL**, Trace Level SO₂ Analyzer operated between 0-10 ppb and 0-1000 ppb with averaging times from 10 to 300 seconds or with dynamic filtering, Standard model’s design flow rate (0.5 Lpm) and operational flow rate (0.35-0.65 Lpm), operated at temperatures between 0 °C and 45 °C, at line voltages of 100 to 240 VAC @ 50/60 Hz, with or without the following options: Teflon particulate filter, 19 inch rack mount, internal zero/span and sample valves with remote activation, pressure and/or temperature compensation on or off, analog I/O expansion board, digital I/O expansion board, communication board, permeation oven, dynamic filtering, and High flow rate model’s design flow rate (1.0 Lpm) and operational flow rate (0.85-1.15 Lpm). Operated with the appropriate instrument manual.

Federal Register: Vol. 51, page 12390, 04/10/1986

Latest Modification: 10/2015; 7/2017; 9/2018; 10/2018, 6/2024

Ozone**2B Technologies Models 106-L, OEM-106-L, or OEM-108-L Ozone Monitor****Automated Equivalent Method: EQOA-0914-218**

“2B Technologies Model 106-L or OEM-106-L Ozone Monitor,” operated in a range of 0-0.5 ppm in an environment of 0-40 °C, temperature and pressure compensation, internal dewLine for humidity control, using a 1 minute average, with a 12V DC source supplied by a 100-240V AC power adapter, operated according to the Model 106-L Ozone Monitor Operation Manual and with or without the following: cigarette lighter adapter or a 12V DC battery for portable operation, external PTFE or PVDF inlet filter and holder, nylon or stainless steel bulkhead fittings, USB data port with computer cable. **Model OEM-108-L:** operated with external sample pump capable of maintaining 0.6-1.5 Lpm, Teflon® or PVDF inlet filter, 1/4” O.D. Teflon® (or other inert material approved by 40 CFR Part 58) tubing, and RS-232 interface with user provided terminal emulation software. Operated with the 2B Technologies Model 108-L Operation Manual (rev. D-4 or later) and Model 108-L Quick Start Manual (rev A-3 or later).

Federal Register: Vol. 79, page 65392, 11/04/2014

Latest Modification: 10/2019; 05/2020; 05/2023

2B Technologies Model 202 and 205 Ozone Monitors**Automated Equivalent Method: EQOA-0410-190**

“2B Technologies Models 202 (single beam) and 205 (dual beam) Ozone Monitors,” operated in a range of 0 - 0.5 ppm in an environment of 10 - 40°C, -20 - 40°C with Cold-Weather package, with temperature and pressure compensation, internal DewLine for humidity control, using a 10 second average, with a 110-220V AC power adapter or a 12V DC source 4.0 to 6.0 watt power consumption, operated according to the Model 202 or 205 Ozone Monitor Operation Manual with or without the following: cigarette lighter adapter or a 12V DC battery for portable operation, external TFE inlet filter and holder, nylon or stainless steel bulkhead fittings, serial data port with computer cable, BNC connector for 0-2.5V scalable analog output, internal data logger, 3-analog inputs for external signals (such as temperature, relative humidity or pressure), rack mount hardware, on-board backup sample pump, cold-weather package low temperature pump and lamp heater.

Federal Register: Vol. 75, pages 22126-22127, 04/27/2010

Latest Modification: 12/2010; 03/2020; 05/2020

2B Technologies Model 211 and 211-G Ozone Monitors**Automated Equivalent Method: EQOA-0514-215**

“2B Technologies Models 211 and 211-G Ozone Monitors,” operated in a range of 0 - 0.5 ppm in an environment of 20 - 30°C, with temperature and pressure compensation, internal DewLine for humidity control, using a 1-minute average, with a 110-220V AC power adapter or a 12V DC source, 8.0 to 18.0 watt power consumption, operated according to the Model 211 Scrubberless or Model 211-G Ozone Monitor Operation Manual. The Model 211 uses the gas phase titration of ozone for interference-free measurements with either an external nitric oxide source or internal photolytic generator for production of NO scrubber gas from nitrous oxide. The Model 211-G uses a heated graphite scrubber in place of the Model 211’s NO gas-phase titration scrubber. Both supplied with or without the following: cigarette lighter adapter or a 12V DC battery for portable operation, external PTFE inlet filter and holder, nylon or stainless-steel bulkhead fittings, serial data port with computer cable, BNC connector for 0-2.5V or 4-20 mA scalable analog output, internal data logger, microFlash card for data recording and backup, rack mount hardware, and long-life sample pump.

Federal Register: Vol. 79, pages 34734-34735 06/18/2014

Latest Modification: 2/2018; 05/2020

2B Technologies Model Personal Ozone Monitor (POM)**Automated Equivalent Method: EQOA-0815-227**

“2B Technologies Model Personal Ozone Monitor (POM),” operated in a range of 0 - 0.5 ppm in an environment of 20-30 °C, temperature and pressure compensation, using a 10 second averaging time, with a 12V DC source supplied by a 100-240V AC power adapter, operated according to the POM Operation Manual and with or without the following: cigarette lighter adapter or a 12V DC battery or a 7-24 V battery for portable operation, USB data port with computer cable.

Federal Register: Vol. 80, page 51802, 8/26/2015

Beckman Model 950A Ozone Analyzer**Automated Reference Method: RFOA-0577-020**

“Beckman Model 950A Ozone Analyzer,” operated on a range of 0-0.5 ppm and with the "SLOW" (60 second) response time, with or without any of the following options: Internal Ozone Generator; Computer Adaptor Kit; Pure Ethylene Accessory.

Federal Register: Vol. 42, page 28571, 06/03/1977

Bendix or Combustion Engineering Model 8002 Ozone Analyzer**Automated Reference Method: RFOA-0176-007**

“Bendix or Combustion Engineering Model 8002 Ozone Analyzer,” operated on the 0-0.5 ppm range, with a 40 second time constant, with or without any of the following options: Rack Mounting with Chassis Slides; Rack Mounting without Chassis Slides; Zero and Span Timer; Ethylene/CO₂ Blend Reactant Gas.

Federal Register: Vol. 41, page 5145, 02/04/1976 and Vol. 45, page 18474, 03/21/1980

Columbia Scientific Industries Model 2000 Ozone Meter**Automated Reference Method: RFOA-0279-036**

“Columbia Scientific Industries Model 2000 Ozone Meter,” when operated on the 0-0.5 ppm range with either AC or battery power: The BCA 952 battery charger/AC adapter M952-0002 (115V) or M952-0003 (230V) is required for AC operation; an internal battery M952-0006 or 12-volt external battery is required for portable non-AC powered operation.

Federal Register: Vol. 44, page 10429, 02/20/1979

Dasibi Models 1003-AH, 1003-PC, or 1003-RS Ozone Analyzers**Automated Equivalent Method: EQOA-0577-019**

“Dasibi Model 1003-AH, 1003-PC, or 1003-RS Ozone Analyzer,” operated on a range of either 0-0.5 or 0-1.0 ppm, with or without any of the following options: Adjustable Alarm; Aluminum Coated Absorption Tubes, Integrated Output; Vycor-Jacketed U.V. Source Lamp; BCD Digital Output; Rack Mounting Ears and Slides; 0-10 mV, 0-100 mV, 0-1 V, Or 0-10 V; Glass (Pyrex) Absorption Tubes; Teflon-based Solenoid Valve; Analog Output.

Federal Register: Vol. 42, page 28571, 06/03/1977

Dasibi Models 1008-AH, 1008-PC, or 1008-RS Ozone Analyzers**Automated Equivalent Method: EQOA-0383-056**

“Dasibi Model 1008-AH, 1008-PC, or 1008-RS Ozone Analyzer,” operated on a range of either 0-0.5 or 0-1.0 ppm, with or without any of the following options: Aluminum Coated Absorption Tubes; BCD Digital Output; RS232 Interface; Glass (Pyrex) Absorption Tubes; Vycor-Jacketed U.V. Source Lamp; Ozone Generator; Teflon-based Solenoid Valve; Photometer Flow Restrictor (2 Lpm); 4-20 mA, Isolated, or Dual Analog Outputs; Rack Mounting Brackets or Slides; 20 Second Update Software.

Federal Register: Vol. 48, page 10126, 03/10/1983

DKK-TOA Corp. Model GUX-113E Ozone Analyzer**Automated Equivalent Method: EQOA-0200-134**

“DKK-TOA Corporation Models GUX-113E and GUX-113E-1 Ozone Analyzer,” operated at any temperature in the range of 15°C to 35°C, on any of the following measurement ranges: 0-0.100 ppm¹, 0-0.200 ppm¹, 0-0.5 ppm, or 0-1.000 ppm, and with or without the optional Internal Ozone Generator.²

Federal Register: Vol. 65, page 11308, 03/02/2000

DKK-TOA Corp. Model GUX-313E or GUX-390 Ambient O₃ Analyzer**Automated Equivalent Method: EQOA-1107-169**

“DKK-TOA Corporation Model GUX-313E Ambient O₃ Analyzer” or “DKK-TOA Corporation Model GUX-390 Ambient O₃ Analyzer” operated at any environmental temperature in the range of 20°C to 30°C on any of the following measurement ranges¹: 0-0.1 ppm, 0-0.2 ppm and 0-0.5 ppm.² **Model GUX-390:** with optional ethernet connection and MODBUS protocol. Operated with the appropriate instrument user manual.

Federal Register: Vol. 72, page 63176, 11/08/2007

Latest Modification: 05/2023

Ecotech or Acoem Australasia Serinus 10 Ozone Analyzer or Opsis AB OPS10 Ozone Analyzer or Tisch Environmental TE 1.0 or Met One Instruments Gas 1010 Ozone Analyzer**Automated Equivalent Method: EQOA-0809-187**

“Ecotech or Acoem Australasia Serinus 10 Ozone Analyzer” or “Opsis AB OPS10 Ozone Analyzer” or “Tisch Environmental TE 1.0 Ozone Analyzer,” operated in the range of 0–0.5 ppm, temperature range within 0–40 °C, with a five-micron Teflon® filter element installed, the photodiode sensor from Acoem with either of the following part numbers: H013111 or S030029, and with the following selected: Control Loop-Enabled, Diagnostic Mode-Operate, Pres/Temp/Flow Compensation-Enabled, Span Compensation-Disabled, with concentration automatically corrected for temperature and pressure changes, and operated according to the Serinus 10 Ozone Analyzer User Manual, or the Opsis AB OPS10 Ozone Analyzer User Manual, or the Tisch Environmental TE 1.0 Ozone Analyzer Instruction Manual or the Met One Instruments GAS-1010 User Manual, as appropriate.

Federal Register: Vol. 74, page 38184, 07/31/2009

Latest Modifications: 05/2010; 05/2012; 8/2014; 11/2021, 07/2022, 02/2024, 09/2024

Envionics Series 300 Ozone Analyzer**Automated Equivalent Method: EQOA-0990-078**

“Envionics Series 300 Computerized Ozone Analyzer,” operated on the 0–0.5 ppm range, with the following parameters entered into the analyzer's computer system: Absorption Coefficient = 308 $\checkmark$ 4; Flush Time = 3; Integration Factor = 1; Offset Adjustment = 0.025 ppm; Ozone Average Time = 4; Signal Average = 0; Temp/Press Correction = On; and with or without the RS-232 Serial Data Interface.

Federal Register: Vol. 55, page 38386, 09/18/1990

Environnement S.A. or ENVEA Model O₃41M UV Ozone Analyzer**Automated Equivalent Method: EQOA-0895-105**

“Environnement S.A. or ENVEA Model O₃41M UV Photometric Ozone Analyzer,” operated on a full scale range of 0 - 500 ppb, at any temperature in the range of 15°C to 35°C, with the response time set to 50 seconds, and with or without any of the following options:² Internal Ozone Generator; Span External Control; RS232-422 Serial Interface; Internal Printer.

Federal Register: Vol.60, page 39382, 08/02/1995

Latest Modifications: 08/2020

Environnement S.A. or ENVEA Model O₃42M UV Ozone Analyzer**Automated Equivalent Method: EQOA-0206-148**

“Environnement S.A. or ENVEA Model O₃42M UV Photometric Ozone Analyzer,” operated with a full scale range of 0 - 500 ppb, at any temperature in the range of 10°C to 35°C, with a 5-micron PTFE sample particulate filter, with response time setting of 11 (Automatic response time), and with or without any of the following options:² a) Internal ozone generator, b) Span external control (zero/span solenoid valve).

Federal Register: Vol.67, page 42557, 06/24/2002

Latest Modifications: 08/2020

Environnement S.A. or ENVEA SANOVA Multigas Longpath Monitoring System**Automated Equivalent Method: EQOA-0400-137**

“Environnement S.A. or EVNEA Model SANOVA Multigas Longpath Air Quality Monitoring System, consisting of a receiver, one or more projectors, interface unit, a user-provided control unit computer running the SANOVA VisionAIR software, and associated incidental equipment; configured for measuring O₃, with the temperature control and internal calibration cell options installed, operated with a measurement range of 0 to 0.5 ppm, over an installed monitoring path length of between 27 and 500 meters, within an ambient air temperature range of -30 to +45°C, with a measurement (integrating) time of 180 seconds, and with or without external temperature and barometric pressure sensors or any of the following options: external (meteo) input connection, series 1M bus connection, OGR type projector, analog outputs. A high-concentration ozone generator, part # 80-231-03, or the SONIMIX 7121B calibration system is recommended for calibration or accuracy auditing.

Federal Register: Vol.65, page 26603, 05/08/2000

Latest Modifications: 08/2020

Environnement S.A. or ENVEA Model O₃ 42e UV Ozone Analyzer**Automated Equivalent Method: EQOA-0515-225**

“Environnement S.A. or ENVEA Model O₃ 42e UV Photometric Ozone Analyzer,” operated in a range of 0–0.5 ppm in an environment of 0–35 °C, with a Teflon sample inlet filter, with automatic temperature and pressure compensation, with a flowrate of 1 Lpm and with zero/span external solenoid valve, with or without the solar panel option installed. Analyzer operated and maintained in accordance with the Model O342e Technical Manuals, and operating from a 115V/ 60Hz, 230V/50Hz or 24Vdc power source.

Federal Register: Vol. 80, page 32114, 6/05/2015

Latest Modifications: 08/2020,06/2022

Focused Photonics Inc. (FPI) Model AQMS-300 and AQMS-300M O₃ Analyzer**Automated Equivalent Method: EQOA-0719-253**

“Focused Photonics Inc. AQMS-300 and AQMS-300M O₃ Analyzer” UV photometric analyzer operated the range of 0–0.5 ppm, with 5 µm, 47 mm diameter Teflon®(PTFE) filter installed, operated at temperatures between 20°C and 30°C, at nominal input line voltage of 110 VAC and frequency of 60 Hz or 220±10% VAC and frequency of 50 Hz, at a nominal sampling flow rate of 800±80 cc/min, and operated according to the FPI AQMS-300 or AQMS-300M User Manual.

Federal Register: Vol. 84, page 44299, 8/23/2019

Latest Modifications: 5/2024

Horiba Instruments Models APOA-360 or APOA-360-CE Ozone Monitor**Automated Equivalent Method: EQOA-0196-112**

“Horiba Instruments, Inc. Model APOA-360 or APOA-360-CE Ambient Ozone Monitor,” operated with a full scale range of 0 - 0.50 ppm, at any temperature in the range of 10°C to 40°C, with a Line Setting of "MEASURE," and an Analog Output of "MOMENTARY VALUE," and with or without any of the following options:² 1) Rack Mounting Plate and Side Rails 2) RS-232 Communications Port, and 3) Optional Internal Zero/Span Check

Federal Register: Vol. 61, page 11404, 03/20/1996

Horiba Instruments Model APOA-370 Ozone Monitor or Horiba APOA-380 Ozone Monitor**Automated Equivalent Method: EQOA-0506-160**

“Horiba Instruments Incorporated APOA-370 or APOA-380 Ambient O₃ Monitor,” standard specification, operated with a full-scale fixed measurement range of 0 - 0.5 ppm, with the automatic range switching off, at any temperature in the range of 20 to 30°C, at the design flow rate of 0.7 LPM and operational flow rate between 0.5 LPM and 0.9 LPM, or the “Horiba Instruments Incorporated Model APOA-380 Ambient O₃ Monitor”, operated with full scale fixed measurement range of 0-0.5 ppm with automatic range switching off, at any environmental temperature between 5°C and 40°C, with 70 s “Rolling Average” or with “Digital Filter” selected on the “Calculation Method” screen, at the design flow rate of 0.6 LPM and operational flow rate between 0.3 LPM and 1.0 LPM.”

Federal Register: Vol. 71, page 25587, 05/01/2006

Latest Modifications: 03/2025

KENTEK Inc. MEZUS 410 O₃ Analyzer**Automated Equivalent Method: EQOA-0219-251**

“KENTEK Inc. Model MEZUS 410 O₃ Analyzer,” UV photometric analyzer operated in a range of 0–0.5 ppm, with 0.5 µm, 47 mm diameter Teflon® filter installed, operated at temperatures between 20°C and 30°C, with temperature and pressure compensation, at a nominal sampling flow rate of 800 cc/min, using a 5 minute averaging time, with either 105VAC-125VAC or 200VAC-240VAC input power options installed, 230-watt power consumption, equipped with 7 inch LCD touch screen display, and operated according to the KENTEK Inc. Model Mezus 410 Ozone Analyzer User’s Instruction Manual.

Federal Register: Vol. 84, page 11973, 03/29/2019

McMillan (MEC) Models 1100-1, 1100-2, and 1100-3 Ozone Meters**“MEC Model 1100-1 Ozone Meter,” Automated Reference Method: RFOA-1076-014****“MEC Model 1100-2 Ozone Meter,” Automated Reference Method: RFOA-1076-015****“MEC Model 1100-3 Ozone Meter,” Automated Reference Method: RFOA-1076-016**

Operated on a 0-0.5 ppm range, with or without any of the following options: 0011 Rack Mounting Ears; 0026 Alarm Set Feature; 0012 Instrument Bail; 0033 Local-Remote Sample; Zero, Span Kit Blend Feature; 0016 Chassis Slide Kit; 0040 Ethylene/CO₂.

Federal Register: Vol. 41, page 46647, 10/22/1976; Vol. 42, page 30235, 06/13/1977***Meloy Model OA325-2R Ozone Analyzer*****Automated Reference Method: RFOA-1075-003**

“Meloy Model OA325-2R Ozone Analyzer,” operated with a scale range of 0-0.5 ppm, with or without any of the following options: 0-4 Output Booster Amplifier; 0-18 Rack Mount Conversion; 0-18A Rack Mount Conversion.

Federal Register: Vol. 40, page 54856, 11/26/1975***Meloy Model OA350-2R Ozone Analyzer*****Automated Reference Method: RFOA-1075-004**

“Meloy Model OA350-2R Ozone Analyzer,” operated with a scale range of 0-0.5 ppm, with or without any of the following options: 0-2 Automatic Zero and Span; 0-3 Remote Control Zero and Span; 0-4 Output Booster Amplifier; 0-18 Rack Mount Conversion; 0-18A Rack Mount Conversion.

Federal Register: Vol. 40, page 54856, 11/26/1975***Monitor Labs Model 8410E Ozone Analyzer*****Automated Reference Method: RFOA-1176-017**

“Monitor Labs Model 8410E Ozone Analyzer,” operated on a range of 0-0.5 ppm with a time constant setting of 5 seconds, with or without any of the following options: DO Status Outputs; ER Ethylene Regulator Assembly; V TFE Zero/Span Valves; TF TFE Sample Particulate Filter; VT TFE Zero/Span Valves and Timer.

Federal Register: Vol. 41, page 53684, 12/08/1976***Monitor Labs/Lear Siegler Model 8810 Ozone Analyzer*****Automated Equivalent Method: EQOA-0881-053**

“Monitor Labs or Lear Siegler Model 8810 Photometric Ozone Analyzer,” operated on a range of either 0-0.5 or 0-1.0 ppm, with selectable electronic time constant settings from 20 through 150 seconds, with or without any of the following options: 05 Pressure Compensation; 06 Averaging Option; 07 Zero/Span Valves; 08 Internal Zero/Span (Valve and Ozone Source); 09 Status; 10 Particulate Filter; 15 through 20 DAS/REC Output.

Federal Register: Vol. 46, page 52224, 10/26/1981

Opsis Model AR 500 and System 300 Open Path Ambient Air Monitoring Systems for Ozone**Automated Equivalent Method: EQOA-0495-103**

“Opsis Model AR 500 System” or “System 300 Open Path (long path) Ambient Air Monitoring Systems,” configured for measuring O₃, with one detector and moveable grating, operated with a measurement range of 0 to 0.5 ppm, an installed monitoring path length between 20 and 500 meters (or 20 and 1000 meters with the ER 150 option, AR 500 System only), xenon lamp type B (150 watt), fiber optic cable length between 3 to 20 meters; operating within an ambient air temperature range of -50 to +50°C, an analyzer temperature range of 20 to 30°C, a measurement (integrating) time setting between 30 and 120 seconds (0 min:30 sec. to 2 min:00 sec.), and with a complete cycle time of not more than 200 seconds (3 min, 20 sec.). Under this method designation, the Model AR 500 System or System 300 consists of: AR 500 opto-analyser; emitter EM 110 and receiver RE 110 (together identified as ER 110); optic fibre cable OF60-S; power supply PS 150, Opsis operational software, version 7.0 or 7.1; and initial on-site installation, setup, and limited operator training.²

Optional components that can be used with the Model AR 500 only, in addition to or as alternative to corresponding components listed above: • AR 503 opto-analyzer configured as Model AR 500 (only the center detector active, sequential monitoring) • Emitter/receiver ER 150 (for monitoring path lengths up to 1 kilometer) • Transceiver ER 130 and Retroreflector RE 090 with 7 prisms (max. monitoring path length 150 meters) or 12 prisms (max. monitoring path length 250 meters) • Receiver RE 130 • Optic fibre cable OF60-R (low-loss for short wavelengths) • Multiplexers MX 004 and MX 024 • Dataloggers DL 010 and DL 016 • Analogue and digital input/output cards AO 008, AI 016, and DI 032 • Analogue and digital isolation cards IA 008, ID 008, OA 008, and OD 008 • Window heaters HF 110 and HF 150 • Mirror heaters HM 110 and HM 150 • Auto calibration unit CU 007 • Software packages IO 80 (for the analogue and digital input/output adapters), DL10 and DL16 (for data loggers), ComVision, and STAT 500;

Recommended calibration and accuracy audit components (or equivalent) for either Model AR 500 or System 300:

• Wavelength calibration lamp CA 004 • Calibration bench CB 100 • Receiver unit RE 060 (two required) • Calibration unit CA 150, with same type lamp as used in the monitoring path emitter • Power supply PS 150 for calibration unit CA 150 • Calibration cells CC 001-X, where X represents various cell lengths from 1 to 900 mm • Special calibration cells CC 110 or CC 150 (for mounting directly on receiver) • Ozone generator OC 500 • Light meter LM 010.

Federal Register: Vol. 60, page 21518, 05/02/1995

PCI Ozone Corporation Model LC-12 Ozone Analyzer**Automated Equivalent Method: EQOA-0382-055**

“PCI Ozone Corporation Model LC-12 Ozone Analyzer,” operated on a range of 0-0.5 ppm.

Federal Register: Vol. 47, page 13572, 03/31/1982

Philips PW9771 O₃ Analyzer**Automated Equivalent Method: EQOA-0777-023**

“Philips PW9771 O₃ Analyzer,” consisting of the following components: PW9771/00 O₃ Monitor with PW9724/00 Disc.-Set; PW9750/00 Supply Cabinet; PW9750/20 Supply Unit operated on a range of 0-0.5 ppm, with or without any of the following accessories: PW9732/00 Sampler Line Heater; PW9750/30 Frame For MTT; PW9750/41 Control Clock 60 Hz; PW9733/00 Sampler; PW9752/00 Air Sampler Manifold.

Federal Register: Vol. 42, page 38931, 08/01/1977; Vol. 42, page 57156, 11/01/1977

Seres Model OZ 2000 G Ozone Analyzer**Automated Equivalent Method: EQOA-0506-161**

“Seres OZ 2000 G Ozone Ambient Air Analyzer,” operated with a full scale range of 0 - 0.5 ppm, at any temperature in the range of 20°C to 30°C, and with or without either of the following options: internal ozone generator, teletransmission interface.²

Federal Register: Vol. 71, page 25587, 05/01/2006

SIR S.A. Model S-5014 O₃ Analyzer**Automated Equivalent Method: EQOA-0207-164**

“SIR S.A. Model S-5014 Photometric O₃ Analyzer,” operated on the 0 - 500 ppb measurement range, within an ambient temperature range of 20°C to 30°C, with a sample inlet particulate filter, and with or without an optional PCMCIA card.

Federal Register: Vol. 72, page 8985, 02/28/2007

Sutron Corporation or Sabio Model 6030 Ozone (O₃) Analyzer**Automated Equivalent Method: EQOA-0415-222**

“Sutron or Sabio Model 6030 Ozone (O₃) Analyzer,” operated at any of the following measurement ranges: 0-0.05 ppm, 0-0.5 ppm and 0-1.0 ppm, at any ambient temperature in the range of 5°C -45 °C, with an averaging time of 1 to 99 analyzer cycles (0 to 396 seconds), with sample flow rate of 0.5 to 1 Lpm and in accordance with the Model 6030 Ozone Analyzer Operation Manual and with or without the following options: internal ozone generator, zero/span ports for external calibration.

Federal Register: Vol. 80, page 32114, 6/05/2015

Latest Modification: 05/2018

Tanabyte Models 722, 723, 724, 725, or 726 Ambient Ozone Analyzer**Automated Equivalent Method: EQOA-0407-165**

“Tanabyte Models 722, 723, 724, 725, or 726 Ambient Ozone Analyzer,” enclosed in either a Dual-Bay Chassis or a Single-Bay Chassis and operated on either the 0 - 0.5 ppm or 0 - 1.0 ppm measurement range, within an ambient temperature range of 20 to 30 degrees C, and with a sample inlet particulate filter installed in the sample filter holder.

Federal Register: Vol. 72, page 20846, 04/26/2007

Teledyne Advanced Pollution Instrumentation, Model 400E or T400 or N400; Advanced Pollution Instrumentation, Model 400/400A; Teledyne Monitor Labs sensor-e™ Model TML-10 Ozone Analyzers; or recordum airpointer® system module 801-004000;**Automated Equivalent Method: EQOA-0992-087**

“Teledyne Advanced Pollution Instrumentation. Model 400E or T400 or N400; Advanced Pollution Instrumentation, Model 400 or 400A; or Teledyne Monitor Labs sensor-e™ Model TML-10 Ozone Analyzer” operated on any full scale range between 0-100 ppb¹ and 0-1000 ppb, with any range mode (Single, Dual, or AutoRange), at any ambient temperature in the range of 5°C to 40°C (0°C -45°C for the N400), and with a TFE filter or a Kynar® DFU. **Models 400E, T400, N400 and TML-10:** operated with a sample flow rate of 800 ± 80 cm³/min (measured volumetrically at actual T & P conditions), with the dilution factor set to 1, with Dynamic Zero ON or OFF, with Dynamic Span OFF, with Temp/Press compensation ON, and with or without any of the following options: Internal or external sample pump, Sample/Cal valve option, Internal Zero/Span (IZS), Rack mount with or without slides, analog input option, 4-20 mA isolated current loop output; the NumaView™ software.² **Models 400E, T400 and N400:** operated with or without the optional Teledyne Nafion™ drier kit. **Models 400/400A:** operated with the dynamic zero and span adjustment feature (some Model 400 units only) set to OFF, and with or without any of the following options: Zero/Span Valve option, Internal Zero/Span (IZS) option, IZS ozone generator reference feedback option, standard serial port or Multi-drop RS-232, digital status outputs, analog outputs: 100 mV, 1V, 5V, 10V, 4-20 mA current loop, optional metal wool ozone scrubber, optional external sample pump, optional 47 mm diameter filter, optical bench heater, rack mount with slides; the NumaView™ software. **airpointer® system module 801-004000 only:** operated on any full scale range between 0-0.100 ppm and 0-1.0 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any temperature in the range of 10°C to 45°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; installed in the compact. thermally controlled (-40°C to + 45°C) and weather proof airpointer® base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without the internal span option as module supplement consisting of ozone generator; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with the appropriate instrument manual. Note 2 applies to the following Teledyne Advanced Pollution Instrumentation, Models 400E, T400, N400, and Teledyne Monitor Labs, Inc. Sensor-e™ Model TML-10.

Federal Register: Vol. 57, page 44565, 09/28/1992; Vol. 63, page 31992, 06/11/1998 Vol. 67, page 57811, 09/12/2002

Latest Modification: 08/2010; 05/2013; 07/2014; 9/2015; 12/2021; 07/2022

Teledyne Advanced Pollution Instrumentation Model 265E or T265 Chemiluminescence Ozone Analyzers**Automated Equivalent Method: EQOA-0611-199 or Automated Reference Method: RFOA-0216-230**

“Teledyne Advanced Pollution Instrumentation, Model 265E or T265 Chemiluminescence Ozone Analyzer,” operated on any full scale range between 0-100 ppb and 0-1000 ppb, with any range mode (Single, Dual, or AutoRange), at any operating temperature in the range of 5°C to 40°C, and with a TFE filter or a Kynar® DFU in the sample air inlet, operated with a sample flow rate of 500 ± 50 cm³/min (sea level), with the dilution factor set to 1, with Temp/Press compensation ON, and in accordance with the appropriate associated instrument manual, and with or without any of the following options: Internal or external sample pump, Sample/Cal valve option, Rack mount with or without slides, analog input option, 4-20 mA isolated current loop output. Note 2 applies to the following Teledyne Advanced Pollution Instrumentation Models 265E and T265.

Federal Register: Vol. 76, page 62402, 10/07/2011; Vol. 81, page 25397, 04/28/2016

Latest Modification: 10/2012; 07/2014

Teledyne Advanced Pollution Instrumentation, Model T204 Analyzer**Automated Equivalent Method: EQOA-0514-214**

“Teledyne Advanced Pollution Instrumentation, Model T204 NOX + O₃ Analyzer”, operated on any full scale range between 0-100 ppb and 0-500 ppb, at any operating temperature from 5°C to 40°C, with either a user-or vendor-supplied vacuum pump capable of providing an absolute pressure of 10 inches mercury or less at 3 sLpm, with either the standard or higher gain photomultiplier tube, in accordance with the associated instrument manual, and with or without any of the following options: Zero/Span valves, external communication and data monitoring interfaces. Note 2 applies to the Teledyne Advanced Pollution Instrumentation, Model T204.

Federal Register: Vol.79, pages 34734-34735, 06/18/2014

Latest Modification: 07/2014; 04/2018

Teledyne Advanced Pollution Instrumentation, Model 430 Ozone Analyzer**Automated Equivalent Method: EQOA-1015-229**

“Teledyne Advanced Pollution Instrumentation, Model 430 Ozone Analyzer”, operated with a full scale range between 0-500 ppb, at any operating temperature from 5°C to 40°C, with a sample particulate filter, with a 100-240V AC to DC power adapter or a 12V DC source capable of providing 9 watts of power, in accordance with the associated instrument manual, and with or without any of the following options: internal long-life pump, external long-life pump, external portable battery pack, external communication and data monitoring interfaces.

Federal Register: Vol.80, pages 72432, 11/19/2015

Teledyne Monitor Labs/Casella/Ecotech/Acoem Australasia /Aeris Models ML9810/CM2010/EC9810/AE2010/AE9810, -11, or -12, Teledyne Monitor Labs/Casella/Ecotech Model ML9810B/CM2010B/EC9810B, or Wedding & Associates Model 1010 Ozone Analyzers**Automated Equivalent Method: EQOA-0193-091**

“Teledyne Monitor Labs, Casella Monitor, or Ecotech, or Aeris Models ML9810/CM2010/EC9810/AE2010/AE9810, ML9811/CM2011/EC9811, ML9812/CM2012/EC9812, or ML9810B/CM2010B/EC9810B or Wedding & Associates, Inc. Model 1010 Ozone Analyzers,” operated on any full scale range between 0-0.05 ppm¹ and 0-1.0 ppm, at any temperature in the range of 15°C to 35°C, with the service switch on the secondary panel set to the *In* position; with the following menu choices selected: Range: *0.05 ppm to 1.0 ppm*; Over-ranging: *Enabled or Disabled*; Calibration: *Manual or Timed*; Diagnostic Mode: *Operate*; Filter Type: *Kalman*; Pres/Temp/Flow Comp: *On*; Span Comp: *Disabled*; and as follows: **Models ML9810/CM2010/EC9810/AE2010/AE9810, -11, and -12** - with a five-micron Teflon® filter element installed internally, with the 50-pin I/O board installed on the rear panel configured at any of the following output range settings: Voltage, 0.1V, 1V, 5V, 10V; Current, 0-20 mA, 2-20 mA, 4-20 mA; and with or without any of the following options: Valve Assembly for External Zero/Span (EVS); Rack Mount Assembly; Internal Floppy Disk Drive. **Models ML9810B/CM2010B/EC9810B and 1010** - with either a vendor-supplied or equivalent user-supplied five-micron Teflon® filter and exhaust pump, and with or without any of the following options: Valve Assembly for External Zero/Span (EVS); Rack Mount Assembly; 50-pin I/O board; Internal Zero/Span Assembly (IZS); hinged, fold-down front panel. Operated with appropriate instrument manual.

Federal Register: Vol. 58, page 6964, 02/03/1993

Latest Modification: 03/2011, 10/2020, 11/2021

Thermo Electron/Thermo Environmental Instruments Models 49, 49C, 49i, 49iQ**Automated Equivalent Method: EQOA-0880-047**

“Thermo Electron or Thermo Environmental Instruments, Inc. **Model 49** U.V. Photometric Ambient O₃ Analyzer,” operated with a sample flow rate of 1 to 3 Lpm on a measurement range of either 0-0.5 or 0-1.0 ppm with or without any of the following options: 49-001 Teflon Particulate Filter; 49-002 19 Inch Rack Mount; 49-100 Internal Ozone Generator for Zero, Precision, and Level 1 Span Check; 49-103 Internal Ozone Generator for Zero, Precision, and Level 1 Span Checks With Remote Activation; 49-488 GPIB (General Purpose Interface Bus) IEEE-488. **Model 49C or 49i** U.V. Photometric Ambient O₃ Analyzer,” operated with a sample flow rate of 1 to 3 Lpm on any measurement range between 0-0.05¹ to 1.0 ppm, with any time average setting between 10 and 300 seconds, operated at temperatures between 5°C to 40°C with the temperature and/or pressure compensation on or off, at frequencies of 50/60Hz and voltages of 90 to 110 VAC, 105 to 125VAC, and 210 to 250 VAC, with or without any of the following options: ² Teflon particulate filter, Internal Zero Air Scrubber, Internal Ozonator with remote activation, Rack mounts; Operated with or without the optional internal Thermo Nafion™ dryer kit and the appropriate instrument manual. **Model 49i**: Assembled with solenoid valves containing either Polytetrafluoroethylene (PTFE) and Viton wetted materials or chlorinated polyvinyl chloride resin (CPVC), Viton and Polyether ether ketone (PEEK) materials. **Model 49C**: Internal Ozonator, Carrying Handle, 4-20 mA current output, RS-232 Interface, RS-485 Interface; **Model 49i**: I/O expansion board. **airpointer® Model 801-004000-T**, operated with a sample flow rate of 1 to 3 Lpm on any full scale range between 0-0.100 ppm and 0-1.0 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any internal temperature in the range of 0°C to 45°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; installed in the compact, thermally controlled (-40°C to +45°C) and weather proof airpointer® base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without the internal span option as module supplement consisting of ozone generator; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with or without the optional internal Thermo Nafion™ dryer kit and the appropriate instrument manual. **Model 49iQ** O₃ Analyzer operated between 0 and 1000 ppb with averaging times from 10 to 300 seconds or with dynamic filtering, operated with a sample flow rate of 1 to 3 Lpm at temperatures between 0°C to 45°C with temperature and pressure compensation, at line voltages of 100 to 240 VAC @ 50/60 Hz, with or without the following options: Teflon particulate filter, 19 inch rack mount, internal zero air scrubber, internal ozonator with remote activation, internal zero/span valves with remote activation, internal zero air package, analog I/O expansion board, digital I/O expansion board, communications board, dynamic filtering. Operated with or without the optional internal Thermo Nafion™ dryer kit and the appropriate instrument manual.

Federal Register: Vol. 45, page 57168, 08/27/1980

Latest Modification: 12/2011; 10/2015; 07/2017; 04/2018; 5/2019; 03/2023;06/2023

Vasthi Instruments Vair-9004 O₃ Analyzer**Automated Equivalent Method: EQOA-0424-263**

“Vasthi Instruments Model Vair-9004 O₃ Analyzer,” UV photometric analyzer operated in a range of 0–0.5 ppm, with 0.5 µm, 47 mm diameter Teflon® filter installed, operated at temperatures between 20°C and 30°C, with temperature and pressure compensation, at a nominal sampling flow rate of 800 cc/min, using a 5 minute averaging time, with either 105VAC-125VAC or 200VAC-240VAC input power options, 270-watt power consumption, equipped with 7 inch LCD touch screen display, and operated according to the Vasthi Instruments Model Vair-9004 Ozone Analyzer User’s Instruction Manual.

Federal Register: Vol. 89, page 49874, 06/12/2024

Carbon Monoxide***Beckman Model 866 CO Monitoring System*****Automated Reference Method: RFCA-0876-012**

“Beckman Model 866 Ambient CO Monitoring System,” consisting of the following components: Pump/Sample-Handling Module; Gas Control Panel; Model 865-17 Analyzer Unit; Automatic Zero/Span Standardizer; operated with a 0-50 ppm range, a 13 second electronic response time, with or without any of the following options: Current Output Feature; Bench Mounting Kit; Linearizer Circuit.

Federal Register: Vol. 41, page 36245, 08/27/1976

Bendix/Combustion Engineering Model 8501-5CA CO Analyzer**Automated Reference Method: RFCA-0276-008**

“Bendix or Combustion Engineering Model 8501-5CA Infrared CO Analyzer,” operated on the 0-50 ppm range and with a time constant setting between 5 and 16 seconds, with or without any of the following options: Rack Mounting with Chassis Slides; Rack Mounting without Chassis Slides; External Sample Pump.

Federal Register: Vol. 41, page 7450, 02/18/1976

Dasibi Model 3003 CO Analyzer**Automated Reference Method: RFCA-0381-051**

“Dasibi Model 3003 Gas Filter Correlation Dasibi Environmental CO Analyzer,” operated on the 0-50 ppm range, with a sample particulate filter installed on the sample inlet line, with or without any of the following options:

3-001 Rack Mount	3-003 BCD Digital Output	3-007 Zero/Span Module Panel
3-002 Remote Zero and Span	3-004 4-20 Milliamp Output	

Federal Register: Vol. 46, page 20773, 04/07/1981

Dasibi Model 3008 CO Analyzer**Automated Reference Method: RFCA-0488-067**

“Dasibi Model 3008 Gas Filter Correlation CO Analyzer,” operated on the 0-50 ppm range, with a time constant setting of 60 seconds, a particulate filter installed in the analyzer sample inlet line, with or without use of the auto zero or auto zero/span feature, and with or without any of the following options: N-0056-A RS-232-C Interface; S-0132-A Rack Mounting Slides; Z-0176-S Rack Mounting Brackets.

Federal Register: Vol. 53, page 12073, 04/12/1988

DKK-TOA Corporation Model GFC-311E, GFC-390 Ambient CO Analyzer**Automated Reference Method: RFCA-0907-167**

“DKK-TOA Corporation Model GFC-311E or GFC-390 Ambient CO Analyzer,” operated with full scale fixed measurement ranges of 0-5, 0-10 (GFC-390 only), 0-20, and 0-50 ppm at any environmental temperature in the range of 20°C to 30°C, GFC-390 operated with Main CPU firmware: GFC4-749240-C and Sub CPU firmware: GFC4-690992-C and Dryer Unit 5999360U. GFC-311E and GFC-390 operate at 220V.

Federal Register: Vol. 72, page 56339, 10/03/2007

Latest Modification:09/2022

Ecotech or Acoem Australasia Serinus 30 Carbon Monoxide Analyzer or Opsis AB OPS 30 Carbon Monoxide Analyzer or Teledyne Analytical Instruments GFC7001E Carbon Monoxide Analyzer or Tisch Environmental TE 3.0 or Met One Instruments GAS-1030 or Met One Instruments GAS-1030-TL Carbon Monoxide Analyzer

Automated Reference Method: RFCA-0509-174

“Ecotech or Acoem Australasia Serinus 30 Carbon Monoxide Analyzer” or “Opsis AB OPS30 Carbon Monoxide Analyzer” or “Teledyne Analytical Instruments GFC7001E Carbon Monoxide Analyzer” or “*Tisch Environmental TE 3.0 Carbon Monoxide Analyzer*,” operated in the range of 0-50 ppm with or without the trace option, at a temperature range of 0 to 40 °C, with a five-micron Teflon® filter element installed, and with the following selected: Background–Enabled, Control Loop–Enabled, Diagnostic Mode–Operate, Pres/Temp/Flow Compensation–Enabled, Span Compensation–Disabled, with concentration automatically corrected for temperature and pressure changes, and operated according to the Serinus 30 Carbon Monoxide Analyzer User Manual or the OPS 30 Carbon Monoxide Analyzer User Manual or the Teledyne Analytical Instruments GFC7001E Carbon Monoxide Analyzer Instruction Manual, or the Tisch Environmental TE 3.0, or the Met One Instruments GAS-1030 or Met One Instruments GAS-1030-TL Carbon Monoxide Analyzer Instruction Manual as appropriate.

Federal Register: Vol. 74, page 26395, 06/02/2009

Latest Modifications: 05/2010; 05/2011; 05/2012; 08/2014; 11/2021, 07/2022, 08/2022, 06/2024

Environnement S.A. or ENVEA Model CO11M CO Analyzer

Automated Reference Method: RFCA-0995-108

“Environnement S.A. or ENVEA Model CO11M Ambient Carbon Monoxide Analyzer,” operated on a full scale range of 0 - 50 ppm, at any temperature in the range of 15°C to 35°C, with a 5-micron PTFE sample particulate filter, with the following software settings: Automatic response time ON; Minimum response time set to 40 seconds (RT 13); Automatic ZERO-REF cycle programmed every 24 hours; and with or without any of the following options: ² RS232-422 Serial Interface; Internal Printer.

Federal Register: Vol. 60, page 54684, 10/25/1995

Latest Modifications: 08/2020

Environnement S.A. or ENVEA Model CO12M CO Analyzer

Automated Reference Method: RFCA-0206-147

“Environnement S.A. or ENVEA Model CO12M Gas Filter Correlation Carbon Monoxide Analyzer,” operated with a full-scale range of 0 - 50 ppm, at any temperature in the range of 10°C to 35°C, with a 5-micron PTFE sample particulate filter, with response time ON, and with the automatic “ZERO-REF” cycle either ON or OFF.²

Federal Register: Vol. 67, page 42557, 06/24/2002

Latest Modifications: 08/2020

Environnement S.A. or ENVEA Model CO12e CO Analyzer

Automated Reference Method: RFCA-0915-228

“Environnement S.A. or ENVEA Model CO12e Carbon Monoxide Analyzer”, an infrared absorption spectroscopy technique operated on a full scale range of 0 - 50 ppm, at any temperature in the range of 10°C to 35°C, with a teflon sample particulate filter with the following software settings: Automatic response time ON; Automatic “ZERO-REF” cycle either ON or OFF, with or without the solar panel option installed and with or without the following options: ESTEL Analog Input/Output Board, LCD color touch screen and Carbon Dioxide CO₂ sensor. Analyzer operated and maintained in accordance with the Model CO12e Technical Manual, and operating from a 115V/ 60Hz, 230V/50Hz or 24Vdc power source.

Federal Register: Vol. 80, page 72432, 11/19/2015

Latest Modifications: 08/2020, 06/2022

Focused Photonics Inc. (FPI) Model AQMS-400, AQMS-400M CO Analyzer

Automated Reference Method: RFCA-0419-252

“Focused Photonics Inc. AQMS-400 or AQMS-400M CO Analyzer” non-dispersive infrared (NDIR) analyzer operated in the range of 0–50 ppm, with 5 µm, 47 mm diameter Teflon® (PTFE) filter installed, operated at temperatures between 20°C and 30°C, at nominal input line voltage of 220±10% VAC and frequency of 50 Hz or 110±10% and a frequency of 60 Hz, at a nominal sampling flow rate of 800±80 cc/min, and operated according to the FPI AQMS-400 User Manual.

Federal Register: Vol. 84, page 24508, 5/28/2019

Latest Modifications: 10/2024

Horiba Models AQM-10, AQM-11, or AQM12 CO Monitoring Systems**Automated Reference Method: RFCA-1278-033**

“Horiba Models AQM-10, AQM-11, or AQM12 Ambient CO Monitoring Systems,” operated on the 0-50 ppm range, with a response time setting of 15.5 seconds, with or without any of the following options: AIC-101 Automatic Indication Corrector; VIT-3 Non-Isolated Current Output; ISO-2 and DCS-3 Isolated Current Output.

Federal Register: Vol. 43, page 58429, 12/14/1978

Horiba Model APMA-300E CO Monitoring System**Automated Reference Method: RFCA-1180-048**

“Horiba Model APMA-300E Ambient Carbon Monoxide Monitoring System,” operated on the 0-20 ppm¹, the 0-50 ppm, or the 0-100 ppm range with a time constant switch setting of No. 5. The monitoring system may be operated at temperatures between 10°C and 40°C. (This method was originally designated as “Horiba Model APMA 300E/300SE Ambient Carbon Monoxide Monitoring System.”)

Federal Register: Vol. 45, page 72774, 11/03/1980

Horiba Models APMA-360 or APMA-360-CE CO Monitor**Automated Reference Method: RFCA-0895-106**

“Horiba Instruments Incorporated, Models APMA-360 or APMA-360-CE Ambient Carbon Monoxide Monitor,” operated on the 0-50 ppm range, with the Line Setting set to "MEASURE," with the Analog Output set to "MOMENTARY VALUE," and with or without the following options:² 1) Rack Mounting Plate and Side Rails 2) RS-232 Com Port.

Federal Register: Vol. 60, page 39382, 08/02/1995

Horiba Model APMA-370 CO Monitor or Horiba APMA-380 CO Monitor**Automated Reference Method: RFCA-0506-158**

“Horiba Instruments Incorporated Model APMA-370 or APMA-380 Ambient CO Monitor,” operated with a full scale fixed measurement range of 0 - 50 ppm, with the automatic range switching off, at any environmental temperature in the range of 20°C to 30°C,² at the design flow rate of 1.5 LPM and operational flow rate between 1.0 LPM and 2.0 LPM, or the Horiba Instruments Incorporated Model APMA-380 Ambient CO Monitor, operated with full scale fixed measurement range of 0-50 ppm, with automatic range switching off, at any environmental temperature between 5°C and 40°C, with 45 s “Rolling Average” or with “Digital Filter” selected on the “Calculation Method” screen, at the design flow rate of 1.5 LPM and operational flow rate between 1.0 – 2.0 LPM.

Federal Register: Vol. 71, page 25587, 05/01/2006

Latest Modification: 12/2024

KENTEK Inc. MEZUS 310 CO Analyzer**Automated Reference Method: RFCA-0317-244**

“KENTEK Inc. Model MEZUS 310 Carbon Monoxide Analyzer” non-dispersive infrared (NDIR) analyzer operated in the range of 0–50 ppm, with 0.5 µm, 47 mm diameter Teflon® filter installed, operated at temperatures between 20°C and 30°C, at nominal input line voltages of 110 VAC or 220 VAC and frequencies of 50 to 60 Hz, with temperature and pressure compensation, at a nominal sampling flow rate of 800 cc/min, and operated according to the Kentek Mezus 310 CO User’s Instruction Manual.

Federal Register: Vol. 82, page 27816, 6/19/2017

Latest Modification: 2/2019

MASS-CO, Model 1 CO Analyzer**Automated Reference Method: RFCA-1280-050**

“MASS-CO, Model 1 Carbon Monoxide Analyzer,” operated on a range of 0-50 ppm, with automatic zero and span adjustments at time intervals not to exceed 4 hours, with or without the 100 millivolt and 5 volt output options. The method consists of the following components: (1) Infra-2 (Uras 2) Infrared Analyzer Model 5611-200-35, (2) Automatic Calibrator Model 5869-111, (3) Electric Gas Cooler Model 7865-222 or equivalent with prehumidifier, (4) Diaphragm Pump Model 5861-214 or equivalent, (5) Membrane Filter Model 5862-111 or equivalent, (6) Flow Meter Model SK 1171-U or equivalent, (7) Recorder Model Mini Comp DN 1/192 or equivalent. NOTE: This method is not now commercially available.

Federal Register: Vol. 45, page 81650, 12/11/1980

Monitor Labs Model 8310 CO Analyzer**Automated Reference Method: RFCA-0979-041**

“Monitor Labs Model 8310 CO Analyzer,” operated on the 0-50 ppm range, with a sample inlet filter, with or without any of the following options:

02A Zero/Span Valves	04B Pump (50 Hz)	07A Zero/Span Valve Power Supply
03A Floor Stand	05A CO Regulator	08A Calibration Valves
04A Pump (60 Hz)	06A CO Cylinder	09A, B, C, D Input Power Transformer

Federal Register: Vol. 44, page 54545, 09/20/1979 and Vol. 45, page 2700, 01/14/1980

Monitor Labs/Lear Siegler Model 8830 CO Analyzer**Automated Reference Method: RFCA-0388-066**

“Monitor Labs or Lear Siegler Model 8830 CO Analyzer,” operated on the 0-50 ppm range, with a five-micron Teflon filter element installed in the rear-panel filter assembly, with or without any of the following options: 2 - Zero/Span Valve Assembly; 3 - Rack Assembly; 4 - Slide Assembly; 7 - 230 VAC, 50/60 Hz.

Federal Register: Vol. 53, page 7233, 03/07/1988

MSA/LIRA Model 202S CO Analyzer System**Automated Reference Method: RFCA-0177-018**

“LIRA Model 202S Air Quality Carbon Monoxide Analyzer System,” consisting of a LIRA Model 202S optical bench (P/N 459839), a regenerative dryer (P/N 464084), and rack-mounted sampling system; operated on a 0-50 ppm range, with the slow response amplifier, with or without any of the following options: Remote Meter; Remote Zero and Span Controls; 0-1, 5, 20, Or 50 mA Output; 1-5, 4-20, Or 10-50 mA Output; 0-10 Or 100 mV Output; 0-1, 5, Or 10 Volt Output.

Federal Register: Vol. 42, page 5748, 01/31/1977

Peak Laboratories, Model 910-170 Carbon Monoxide Analyzer**Automated Equivalent Method: EQCA-0814-217**

“Peak Laboratories, Model 910-170 Carbon Monoxide Analyzer”, (Mercury replacement- UV photometric method) operated on the standard range of 0-50 ppm and the lower range of 0-1 ppm, at any operating temperature from 20°C to 30°C, using a back-flushing GC scrubber, 99.9999% nitrogen carrier gas at a gas pressure of 60-80 psig, with a column temperature of 105°C, and a detector temperature of 265°C; inlet flow of 20-100 mL/min; in accordance with the associated instrument manual, and with or without any of the following options: rack mount kit, internal sample pump, 4-20 mA output module, particle filter, and data collection software.

Federal Register: Vol. 79, page 65392, 11/04/2014

Latest modification: 6/2015

Sabio Model 6050 Ambient Carbon Monoxide (CO) Analyzer**Automated Reference Method: RFCA-0817-248**

“Sabio Model 6050 Ambient CO Analyzer”, operated in the measurement range of 0-50 ppm, at any ambient temperature in the range of 5-40°C, at any line voltage in the range of 90-260 VAC, at any sample flow rate in the range of 0.50-0.75 L/min, in accordance with the Sabio Model 6050 Ambient CO Analyzer Instruction Manual, with or without optional zero/span ports for external calibration, and with or without an optional inlet filter.

Federal Register: Vol. 82, page 45843, 10/2/2017

SIR S.A. Model S-5006 CO Analyzer**Automated Reference Method: RFCA-0708-172**

“SIR S.A. Model S-5006 CO Analyzer,” operated with full scale fixed measurement ranges 0-50 ppm at any environment temperature in the range of 20°C to 30°C.

Federal Register: Vol. 73, page 40866, 07/16/2008

Teledyne Advanced Pollution Instrumentation Models 300, 300E, 300EU, T300, T300U, N300 or Teledyne Monitor Labs sensor-e™ Model TML-30 CO Analyzer; or recordum airpointer® system module 801-003000;

Automated Reference Method: RFCA-1093-093

“Teledyne Advanced Pollution Instrumentation Models 300, 300E, 300EU, T300, T300U, N300 or Teledyne Monitor Labs, Inc. sensor-e™ Model TML-30, Gas Filter Correlation Carbon Monoxide Analyzer,” operated on any full scale range between 0-10 ppm and 0-50 ppm (0 - 0.1 ppm for **Models 300EU and T300U**, 0-5 ppm and 0-50 ppm for **Model N300**), at any temperature in the range of 15°C to 35°C for **Model 300** or 10°C to 40°C for **Models 300E, 300 EU, T300, T300U and TML-30**, or 0°C to 40°C for **Model N300**, with a 5-micron TFE filter element or a Kynar® DFU installed in the sample filter assembly, with the dynamic zero and span adjustment set to *Off* for **Model 300**, and with or without any of the following options:² Option 50, Zero/Span Valves with pressurized span gas and shutoff valve; Option 51, Zero/Span Valves with pressurized span gas and shutoff valve and Internal Zero Air Generator; Option 52, Zero/Span Valves; Option 53, Zero/Span Valves with Internal Zero Air Generator; Rack Mount with slides; RS-232 serial port with status outputs; analog input option; ; the NumaView™ software and (for **Models 300E, 300EU, T300, T300U and TML-30**) 4-20 mA isolated outputs. **airpointer® model 801-003000 only:** operated on any full scale range between 0-10 ppm and 0-50 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any temperature in the range of 10°C to 45°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; installed in the compact. thermally controlled (-40°C to + 45°C) and weatherproof airpointer® base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without internal dilution system with internal span gas bottle; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with the appropriate instrument manual. Note 2 applies to the following Teledyne Advanced Pollution Instrumentation Models 300E, 300EU, T300, T300U, and Teledyne Monitor Labs, Inc. Sensor-e™ Model TML-30.

Federal Register: Vol. 58, page 58166, 10/29/1993

Latest Modification: 08/2010; 05/2013; 07/2014; 09/2015; 08/2021

Teledyne Monitor Labs/Casella/Ecotech/Acoem Australasia/Aeris Model ML9830/CM2030/EC9830/EC9830T/AE9830/AE2030, Teledyne Monitor Labs/Casella/Ecotech/Acoem Australasia/Aeris Model ML9830B/CM2030B/EC9830B, or Wedding & Associates Model 1020 CO Analyzers

Automated Reference Method: RFCA-0992-088

“Teledyne Monitor Labs, Casella Monitor, or Ecotech or Acoem Australasia or Aeris Models ML9830/CM2030/EC9830/AE9830/AE2030 or ML9830B/CM2030B/ EC9830B, Ecotech or Acoem Australasia Model EC9830T, or Wedding & Associates, Inc. Model 1020 Carbon Monoxide Analyzer,” operated on any full scale range between 0-5.0 ppm¹ and 0-100 ppm, at any temperature in the range of 15°C to 35°C, with the service switch on the secondary panel set to the *In* position, with the following menu choices selected: Range: *5.0 ppm to 100.0 ppm*; Over-ranging: *Enabled or Disabled*; Background: *Not Disabled*; Calibration: *Manual or Timed*; Diagnostic Mode: *Operate*; Filter Type: *Kalman*; Pres/Temp/Flow Comp: *On*; Span Comp: *Disabled*; and as follows: **Model ML9830/CM2030/ EC9830/EC9830T/AE9830/AE2030:** with a five-micron Teflon® filter element installed internally, with the 50-pin I/O board installed on the rear panel configured at any of the following output range settings: Voltage, 0.1V, 1V, 5V, 10V; Current, 0-20 mA, 2-20 mA and 4-20 mA; and with or without any of the following options: Valve Assembly for External Zero/Span (EVS); Valve Assembly for Internal Zero/Span (IZS); Rack Mount Assembly; Internal Floppy Disk Drive. **Models ML9830B/CM2030B/ EC9830B and 1020:** with either a vendor-supplied or equivalent user-supplied five-micron Teflon® filter and exhaust pump, and with or without any of the following options: Valve Assembly for External Zero/Span (EVS); 50-pin I/O board; Rack Mount Assembly; High Pressure Span Valve; hinged, fold-down front panel. Operated with appropriate instrument manual.

Federal Register: Vol. 57, page 44565, 09/28/1992

Latest Modification: 03/2011; 10/2020; 11/2021

Thermo Electron/Thermo Environmental Instruments Models 48, 48C, 48CTLE, 48i, 48iTLE, 48iQ, 48iQTL CO Analyzer
Automated Reference Method: RFCA-0981-054

“Thermo Electron or Thermo Environmental Instruments, Inc. **Model 48** Gas Filter Correlation Ambient CO Analyzer,” operated on the 0-50 ppm range, with a time constant setting of 30 seconds, with or without any of the following options:

- | | |
|---|--|
| 48-001 Teflon Particulate Filter | 48-010 Internal Zero Air Package |
| 48-002 19 Inch Rack Mount | 48-488 GPIB (General Purpose Interface Bus) EEEE-488 |
| 48-003 Internal Zero/Span Valves with Remote Activation | |

“Thermo Electron or Thermo Environmental Instruments, Inc. **Models 48C or 48i** Gas Filter Correlation Ambient CO Analyzer,” operated on any measurement range between 0-1 ppm¹ and 0-100 ppm, with any averaging time setting from 10 to 300 seconds, with temperature and/or pressure compensation on or off, operated at temperatures between 20°C and 30°C, with or without any of the following options:² Teflon particulate filter, Internal zero air scrubber, I/O Expansion board; **Model 48C**: Carrying handle, 4-20 mA current output, Rack mounts, RS-232 interface, Internal zero/span and sample/calibration solenoid valves, RS-485 interface, Internal zero/span and sample/calibration solenoid valves with remote I/O activation; **Models 48C or 48i Trace Level-Enhanced (TLE) Gas Filter Correlation Ambient CO Analyzers** operated between 0-1 ppm and 0-100 ppm with averaging time from 10 to 300 seconds, operated at temperatures between 20° and 30°C at line voltages of 90-110, 105-125, and 210-250 VAC @ 50/60 Hz, with or without any of the following options: rack mounts, Teflon[®] particulate filter, I/O Expansion board. **airpointer[®] Model 801-003000-T**: operated on any full scale range between 0-10 ppm and 0-50 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any internal temperature in the range of 15°C to 45°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; installed in the compact, thermally controlled (-40°C to +45°C) and weather proof airpointer[®] base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without the internal span option as module supplement consisting of an internal dilution system with internal span gas bottle; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with the appropriate instrument manual. **Model 48iQ** CO Analyzer operated between 0-1 ppm and 0-100 ppm with averaging times from 10 to 300 seconds or with dynamic filtering, with temperature and/or pressure compensation on or off, operated at temperatures between 5 °C and 45 °C, at line voltages of 100 to 240 VAC @ 50/60 Hz, With or without the following options: Teflon particulate filter, 19 inch rack mount, internal zero/span valves with remote activation, internal zero air package, analog I/O expansion board, digital I/O expansion board, communication board, oxygen sensor, dynamic filtering. Operated with the appropriate instrument manual. **Model 48iQTL** Trace Level CO Analyzer operated between 0-1 ppm and 0-100 ppm with averaging times from 10 to 300 seconds or with dynamic filtering, with intelligent zero referencing on, with temperature and/or pressure compensation on or off, operated at temperatures between 5 °C and 40 °C, at line voltages of 100 to 240 VAC @ 50/60 Hz, with or without the following options: Teflon particulate filter, 19 inch rack mount, internal zero/span valves with remote activation, analog I/O expansion board, digital I/O expansion board, communication board, dynamic filtering, intelligent zero referencing. Operated with the appropriate instrument manual.

Federal Register: Vol. 46, page 47002, 09/23/1981

Latest modifications: 04/2009; 10/2010; 10/2015; 7/2017; 9/2018; 10/2018

Nitrogen Dioxide

Sodium Arsenite Method for NO₂

Manual Equivalent Method: EQN-1277-026

“Sodium Arsenite Method for the Determination of Nitrogen Dioxide in the Atmosphere.”

Federal Register: Vol. 42, page 62971, 12/14/1977

Sodium Arsenite Method for NO₂ - Technicon II

Manual Equivalent Method: EQN-1277-027

“Sodium Arsenite Method for the Determination of Nitrogen Dioxide in the Atmosphere-Technicon II Automated Analysis System.”

Federal Register: Vol. 42, page 62971, 12/14/1977

TGS-ANSA Method for NO₂

Manual Equivalent Method: EQN-1277-028

“TGS-ANSA Method for the Determination of Nitrogen Dioxide in the Atmosphere.”

Federal Register: Vol. 42, page 62971, 12/14/1977

2B Technologies Model 405 nm NO₂/NO/NO_x Monitor

Automated Equivalent Method: EQNA-0217-243

“2B Technologies, Model 405 nm NO₂/NO/NO_x Monitor,” operated in a range of 0 – 500 ppb, operated at temperatures between 0°C and 40°C, with temperature and pressure compensation, with internal DewLine for humidity control, with averaging times from 5 seconds to 1 hour, with a 110-220V AC power adapter or a 12V DC source, with a fixed current power driver or pulse-width modulating power driver to the LED Light source, operated in accordance with the instrument manual, and with or without the following: auto zeroing, external PTFE inlet filter and holder, nylon or stainless steel bulkhead fittings, cigarette lighter adapter or a 12V DC battery for portable operation, serial data communication, 0-2.5V or scalable analog output, external communication and monitoring interfaces, internal data logger, removable memory device for data recording and backup, touchscreen interface enabling the following features: USB, Ethernet (TCP/IP), Wi-Fi, and onboard web server.

Federal Register: Vol. 82, page 21995, 5/11/2017

Latest Modification: 6/2020; 11/2020; 12/2020; 05/2023

Advanced Pollution Instrumentation, Inc. Model 200 NO₂ Analyzer

Automated Reference Method: RFNA-0691-082

“Advanced Pollution Instrumentation, Inc. Model 200 Nitrogen Oxides Analyzer,” operated on a range of either 0-0.5 or 0-1.0 ppm, with a 5-micron TFE filter element installed in the rear-panel filter assembly, with either a user- or vendor-supplied vacuum pump capable of providing 5 inches mercury absolute pressure at 5 sLpm, with either a user- or vendor-supplied dry air source capable of providing air at a dew point of 0°C or lower, with the following settings of the adjustable setup variables:

Adaptive Filter = On	PMT Temperature Set Point = 15°C	Normal Filter Size = 12 samples
Dwell Time = 7 seconds	Rate of Change (ROC) Threshold = 10%	Dynamic Span = Off
Sample Time = 8 seconds	Reaction Cell Temperature = 50°C	Dynamic Zero = Off

and with or without any of the following options:

180 Stainless Steel Valves	283 Internal Zero/Span With Valves (IZS)	356 Level One Spares Kit
184 Pump Pack	325 RS-232/Status Output	357 Level Two Spares Kit
280 Rack Mount With Slides	355 Expendables	PE5 Permeation Tube for IZS

Federal Register: Vol. 56, page 27014, 06/12/1991

Beckman Model 952-A NO/NO₂/NO_x Analyzer

Automated Reference Method: RFNA-0179-034

“Beckman Model 952-A NO/NO₂/NO_x Analyzer,” operated on the 0-0.5 ppm range with the 5-micron Teflon sample filter (Beckman P/N 861072 supplied with the analyzer) installed on the sample inlet line, with or without the Remote Operation Option (Beckman No. 635539).

Federal Register: Vol. 44, page 7806, 02/07/1979

Bendix Model 8101-B Oxides of Nitrogen Analyzer**Automated Reference Method: RFNA-0479-038**

"Bendix Model 8101-B Oxides of Nitrogen Analyzer," operated on a 0-0.5 ppm range with a Teflon sample filter installed on the sample inlet line and with the following post-manufacture modifications: 1) Ozone generator and reaction chamber input-output tubing modification per Bendix Service Bulletin 8101B-2; 2) The approved converter material; 3) The revised and EPA-approved operation and service manual. These items are mandatory and must be obtained from ABB Process Analytics. The analyzer may be operated with or without any of the following optional modifications: a. Perma Pure dryer/ambient air modification; b. Valve cycle time modification; c. Zero potentiometer centering modification per Bendix Service Bulletin 8101B-1; d. Reaction chamber vacuum gauge modification.

Federal Register: Vol. 44, page 26792, 05/07/1979

Bendix/Combustion Engineering Model 8101-C Oxides of Nitrogen Analyzer**Automated Reference Method: RFNA-0777-022**

"Bendix or Combustion Engineering Model 8101-C Oxides of Nitrogen Analyzer," operated on a 0-0.5 ppm range with a Teflon sample filter (Bendix P/N 007163) installed on the sample inlet line.

Federal Register: Vol. 42, page 37435, 07/21/1977

Columbia Scientific Industries Models 1600 and 5600 Analyzers**Automated Reference Method: RFNA-0977-025**

"CSI Model 1600 Oxides of Nitrogen Analyzer," operated on a 0-0.5 ppm range with a Teflon sample filter (CSI P/N M951-8023) installed on the sample inlet line, with or without any of the following options:

951-0103 Rack Ears	951-0114 Recorder Output, 5 V
951-0104 Rack Mounting Kit (Ears & Slides)	951-0115 External Pump (115 V, 60 Hz)
951-0106 Current Output, 4-20 mA (Non-Insulated)	951-8072 Molybdenum Converter Assembly (Horizontal)
951-0108 Diagnostic Output Option	951-8074 Copper Converter Assembly (Horizontal)
951-0111 Recorder Output, 10 V	951-8079 Copper Converter Assembly (Vertical)
951-0112 Remote Zero/Span Sample Control	951-8085 Molybdenum Converter Assembly (Vertical)

NOTE: The vertical molybdenum converter assembly is standard on all new analyzers as of 1-1-87; however, use of any of the other converter assemblies is optional. Also, the above options reflect new CSI part numbers.

"CSI Model 5600 Oxides of Nitrogen Analyzer," operated on a 0-0.5 ppm range, with any signal integration time in the range of 20 to 99 seconds, with a Teflon sample filter (CSI P/N M951-8023) installed on the sample inlet line, and with or without any of the following options: 954-0121 - Status Contacts; 964-0126 - Printer; 954-0131 - Rack Mounting Kit (ears and slides); 954-0122 - Input Solenoids; 954-8024 - Cartridge Dryer; 964-0012 - Single Headed Pump - Gast; 954-0125 - Current Output, 4-20 mA; 951-0115 - Single Headed Pump - KNF.

Federal Register: Vol. 42, page 46574, 09/16/1977

Dasibi Model 2108 Oxides of Nitrogen Analyzer**Automated Reference Method: RFNA-1192-089**

"Dasibi Model 2108 Oxides of Nitrogen Analyzer," operated on the 0-500 ppb range, with software revision 3.6 installed in the analyzer, with the auto thumbwheel switch and the diag thumbwheel switch settings at 0, with the following internal CPU dipswitch settings:

<u>switch</u>	<u>position</u>	<u>function</u>
1	open (down)	Recorder outputs are NO & NO ₂
5	open (down)	3-minute time constant
6	closed (up)	3-minute time constant;

with a 5-micron Teflon filter element installed in the filter holder, and with or without any of the following options:

Built-in Permeation Oven Rack Mounting Three-Channel Recorder Output RS-232 Interface 4-20 mA Output

Federal Register: Vol. 57, page 55530, 11/25/1992

DKK-TOA Corporation Model GLN-114E Nitrogen Oxides Analyzer**Automated Reference Method: RFNA-0798-121**

"DKK-TOA Corporation Models GLN-114E and GLN-114E-1 Nitrogen Oxides Analyzer," operated within a temperature range of 20 to 30 degrees C, on any of the following measurement ranges: 0-0.050¹, 0-0.100¹, 0-0.200¹, 0-0.500, and 0-1.000 ppm, and with or without the optional Internal zero air supply and permeation tube oven.²

Federal Register: Vol. 63, page 41253, 08/03/1998

DKK-TOA Corporation Model GLN-314E or GLN-390 Nitrogen Oxides Analyzer**Automated Reference Method: RFNA-0508-171**

“DKK-TOA Corporation Model GLN-314E or GLN-390 Nitrogen Oxides Analyzer,” operated at any temperature in the range of 20°C to 30°C, on any of the following measurement ranges:¹ 0-0.100 ppm, 0-0.200 ppm, 0-0.500 ppm.²

Federal Register: Vol. 73, page 28819, 05/19/2008***Latest modification: 12/2022***

Ecotech or Acoem Australasia Serinus 40 Oxides of Nitrogen Analyzer or Ecotech or Acoem Australasia Serinus 44 NO/NO₂/NO_x/NH₃ Analyzer or Opsis AB OPS40 Oxides of Nitrogen Analyzer or Teledyne Analytical Instruments 9110E Oxides of Nitrogen Analyzer or Tisch Environmental TE 4.0 Oxides of Nitrogen Analyzer or Met One Instruments GAS-1040 Oxides of Nitrogen Analyzer or Met One Instruments GAS-1044 Oxides of Nitrogen Analyzer or Met One Instruments GAS-1040-TL Oxides of Nitrogen Analyzer

Automated Reference Method: RFNA-0809-186

“Ecotech or Acoem Australasia Serinus 40 Oxides of Nitrogen Analyzer” or “Ecotech or Acoem Australasia Serinus 44 NO/NO₂/NO_x/NH₃ Analyzer” “Opsis AB OPS40 Oxides of Nitrogen Analyzer” or “Teledyne Analytical Instruments 9110E Oxides of Nitrogen Analyzer” or “***Tisch Environmental TE 4.0 Oxides of Nitrogen Analyzer***,” operated in the range of 0–0.5 ppm, with a five-micron Teflon® filter element installed, with or without trace option, with either a molybdenum or a vitreous carbon NO₂ to NO catalyst, and with the following selected: Control Loop-Enabled, Diagnostic Mode-Operate, Pres/Temp/Flow Compensation-Enabled, Span Compensation-Disabled, with concentration automatically corrected for temperature and pressure changes, and operated according to the Serinus 40 Oxides of Nitrogen Analyzer User Manual or the Serinus 44 NO/NO₂/NO_x/NH₃ Analyzer User Manual or the OPS40 Oxides of Nitrogen Analyzer User Manual or the Teledyne Analytical Instruments 9110E Oxides of Nitrogen Analyzer Instruction Manual or Tisch Environmental TE 4.0 Oxides of Nitrogen Analyzer Instruction Manual or Met One Instruments GAS-1040 Oxides of Nitrogen Analyzer Instruction Manual or Met One Instruments GAS-1044 Oxides of Nitrogen Analyzer Instruction Manual or Met One Instruments GAS-1040-TL Oxides of Nitrogen Analyzer Instruction Manual as appropriate.

Federal Register: Vol. 74, page 38184, 07/31/2009***Latest Modifications: 05/2010; 05/2011; 05/2012; 03/2013; 08/2014; 7/2017; 12/2019; 11/2021; 07/2022***

Ecotech or Acoem Australasia Serinus 60 or Met One Instruments GAS-1060 NO₂ CAPS (Cavity Attenuated Phase Shift) Analyzer

Automated Reference Method: EQNA-0217-242

“Ecotech or Acoem Australasia Serinus 60 NO₂ CAPS (Cavity Attenuated Phase Shift) Analyzer” operated at temperatures between 20°C and 45°C, a line voltage between 80V and 260V, and with or without any of the following options: rack mounts, internal pump, internal permeation device, high pressure calibration ports, Ethernet output. The following menu choices must be selected: Control Loop - Enabled; Diagnostic Mode - Operate; Pres/Temp/Flow Compensation - Enabled; Span Compensation – Disabled; and operated according to the Serinus 60 or Met One Instruments GAS-1060 User Manual.

Federal Register: Vol. 82, page 27816, 6/19/2017***Latest Modifications: 11/2021; 07/2022***

Environnement S. A. or ENVEA Model AC31M NO₂ Analyzer

Automated Reference Method: RFNA-0795-104

“Environnement S. A. or ENVEA Model AC31M Chemiluminescent Nitrogen Oxide Analyzer,” operated with a full scale range of 0 - 500 ppb, at any temperature in the range of 15°C to 35°C, with a 5-micron PTFE sample particulate filter, with the following software settings: Automatic response time ON; Minimum response time set to 60 seconds (RT) 2); and with or without any of the following options:² Internal Permeation Oven; Connection for Silica Gel Dryer; RS232-422 interface; EV3 valve; Internal Printer.

Federal Register: Vol. 60, page 38326, 07/26/1995***Latest Modifications: 08/2020***

Environnement S. A. or ENVEA Model AC32e and AC32e* NO₂ Analyzer**Automated Reference Method: RFNA-0118-249**

“Environnement S. A. or ENVEA Model AC32e Chemiluminescent NO, NO_x, NO₂ Analyzer,” operated with user selectable range of 0-1 ppm or 0-10 ppm, at any temperature in the range of 0°C to 40°C, equipped with a 5-micron PTFE sample inlet filter, molybdenum NO_x converter operating at 340°C, heated catalytic ozone scrubber, external pump, operating with a sample flow rate of 0.66 Lpm (1.00 Lpm with optional sample dryer), with or without the solar panel option installed, with an ozone flow rate of 0.06 Lpm, and operating from a 115V/ 60Hz, 230V/50Hz or 24Vdc power source. Includes 7” touch screen and USB and Ethernet outputs. Model AC32e* does not contain touch screen and communicates via user-provided computer, smartphone, or tablet. Analyzer operated and maintained in accordance with the Model AC32e Technical Manual.

Federal Register: Vol. 83, page 6174, 02/13/2018

Latest Modifications: 08/2020, 06/2022

Environnement S. A. or ENVEA Model AC32M NO₂ Analyzer**Automated Reference Method: RFNA-0202-146**

“Environnement S. A. Model AC32M Chemiluminescent Nitrogen Oxides Analyzer,” operated with a full scale range of 0 - 500 ppb, at any temperature in the range of 10°C to 35°C, with a 5-micron PTFE sample particulate filter, with response time setting 11 (automatic response time), and with or without the following option: Internal permeation oven.

Federal Register: Vol. 67, page 15567, 04/02/2002

Latest Modifications: 08/2020

Environnement S.A. or ENVEA SANOVA Multigas Longpath Monitoring System**Automated Reference Method: EQNA-0400-139**

“Environnement S.A. or ENVEA Model SANOVA Multigas Longpath Air Quality Monitoring System,” consisting of a receiver, one or more projectors, interface unit, a user-provided control unit computer running the SANOVA VisionAIR software, and associated incidental equipment; configured for measuring NO₂, with the temperature control and internal calibration cell options installed, operated with a measurement range of 0 to 0.5 ppm, over an installed monitoring path length of between 27 and 500 meters, within an ambient air temperature range of -30 to +45°C, with a measurement (integrating) time of 180 seconds, and with or without external temperature and barometric pressure sensors or any of the following options: external (meteo) input connection, series 1M bus connection, OGR type projector, analog outputs.

Federal Register: Vol. 65, page 26603, 05/08/2000

Latest Modifications: 08/2020

Environnement S.A. or ENVEA Model AS32M Nitrogen Dioxide Analyzer**Automated Equivalent Method: EQNA-1013-210**

“Environnement S.A. or ENVEA Model AS32M cavity attenuated phase shift spectroscopy Nitrogen Dioxide Analyzer”, operated on any full-scale range between 0-500 ppb and 0-1000 ppb, at any ambient temperature in the range of 20°C to 30°C, with automatic response time ON, set to 11, in accordance with the associated instrument manual; with sample particulate filter; zero gas inlet and zero check enabled; sample permeation dryer. Serial link: 2 RS-232; USB port; Ethernet port (TCP/IP); onboard html web server and, with or without any of the following options: internal permeation bench; ESTEL analog inputs/outputs.

Federal Register: Vol. 78, page 67360, 11/12/2013

Latest Modifications: 08/2020

Focused Photonics Inc. Model AQMS-600 Nitric Oxides Analyzer**Automated Reference Method: RFNA-0819-254**

“Focused Photonics Inc. Model AQMS-600 Chemiluminescent Nitric Oxides Analyzer,” operated with a measurement range of 0-0.5 ppm, equipped with a 1-micron, 47mm diameter Teflon®(PTFE) sample inlet filter, at any temperature in the range of 20°C to 30°C, with Molybdenum NO_x converter operating at 315°C, at a nominal sample flow rate of 500±50 cc/min, with an ozone flow rate of 80±10% cc/min, at nominal input line voltage of 220±10% VAC or 110±10% VAC and frequency of 50 Hz or 60 Hz. Analyzer operated and maintained in accordance with the Model AQMS-600 Nitric Oxides Analyzer User Manual.

Federal Register: Vol. 84, page 50833, 9/26/2019

Latest Modifications: 06/2025

Horiba Instruments Models APNA-360 or APNA-360-CE NO-NO₂-NO_x Monitor**Automated Reference Method: RFNA-0196-111**

“Horiba Instruments, Inc. Models APNA-360 or APNA-360-CE Ambient NO-NO₂-NO_x Monitor,” operated with a full scale range of 0 - 0.50 or 0 - 1.0 ppm, at any temperature in the range of 10°C to 40°C, with a Line Setting of "MEASURE", and an Analog Output of "MOMENTARY VALUE", and with or without the following options:² 1) Rack Mounting Plate and Side Rails 2) RS-232 Communications Port.

Federal Register: Vol. 61, page 11404, 03/20/1996

Horiba Instruments Model APNA-370 NO₂ Monitor or Horiba APNA-380 NO₂ Monitor**Automated Reference Method: RFNA-0506-157**

“Horiba Instruments Incorporated Model APNA-370 or APNA-380 Ambient NO_x Monitor,” standard specification, operated with a full scale fixed measurement range of 0 - 0.50 ppm with the automatic range switching off, at any ambient temperature in the range of 20°C to 30°C, at the design flow rate of 0.8 LPM and operational flow rate between 0.3 LPM and 1.0 LPM, or the Horiba Instruments Incorporated Model APNA-380 Ambient NO₂ Monitor, operated with full scale fixed measurement range of 0-0.5 ppm with automatic range switching off, at any environmental temperature between 5°C and 40°C, with 90 s “Rolling Average” or with “Digital Filter” selected on the “Calculation Method” screen, at the design flow rate of 0.7 LPM and operational flow rate between 0.3 LPM and 1.0 LPM.”

Federal Register: Vol. 71, page 25587, 05/01/2006

Latest Modification: 03/2025

KENTEK Inc. MEZUS 210 NO₂ Analyzer**Automated Reference Method: RFNA-1221-259**

“KENTEK Inc. Model MEZUS 210 NO₂ Analyzer,” Chemiluminescence analyzer operated in a range of 0–0.5 ppm, with 0.45 µm, 47 mm diameter Teflon® filter installed, operated at temperatures between 20°C and 30°C, with nominal sampling flow rate of 800 cc/min, using a 5 minute averaging time, with either 105VAC-125VAC or 200VAC-240VAC input power options installed, 360-watt power consumption, equipped with 7 inch LCD touch screen display, and operated according to the KENTEK Inc. Model MEZUS 210 Nitrogen Oxide Analyzer Instruction Manual.

Federal Register: Vol. 87, pages 7172-7173, 02/08/22

Meloy Model NA530R Nitrogen Oxides Analyzer**Automated Reference Method: RFNA-1078-031**

“Meloy Model NA530R Nitrogen Oxides Analyzer,” operated on the following ranges and time constant switch positions:

Range, ppm:	<u>0-0.1</u> ¹	<u>0-0.25</u> ¹	<u>0-0.5</u>	<u>0-1.0</u>
Time Constant Setting:	4	3 or 4	2,3, or 4	2,3, or 4

Operation of the analyzer requires an external vacuum pump, either Meloy Option N-10 or an equivalent pump capable of maintaining a vacuum of 200 torr (22 inches of mercury vacuum) or better at the pump connection at the specified sample and ozone-air flow rates of 1200 and 200 cm³/min, respectively. The analyzer may be operated at temperatures between 10°C and 40°C and at line voltages between 105 and 130 volts, with or without any of the following options: N-1A Automatic Zero and Span; N-2 Vacuum Gauge; N-4 Digital Panel Meter; N-6 Remote Control For Zero and Span; N-6B Remote Zero/Span Control and Status (Pulse); N-6C Remote Zero/Span Control and Status (Timer); N-9 Manual Zero/Span; N-10 Vacuum Pump Assembly (See Alternate Requirement Above); N-11 Auto Ranging; N-14B Line Transmitter; N-18 Rack Mount Conversion; N-18A Rack Mount Conversion.

Federal Register: Vol. 43, page 50733, 10/31/1978 and Vol. 44, page 8327, 02/09/1979

Monitor Labs Model 8440E Nitrogen Oxides Analyzer**Automated Reference Method: RFNA-0677-021**

“Monitor Labs Model 8440E Nitrogen Oxides Analyzer,” operated on a 0-0.5 ppm range (position 2 of range switch) with a time constant setting of 20 seconds, with or without any of the following options:

TF- Sample Particulate Filter	DO- Status Outputs	O18A- Ozone Dry Air	O18B- Ozone Dry Air - No Drierite
With TFE Filter Element	R- Rack Mount	V- Zero/Span Valves	FM- Flow meters

Federal Register: Vol. 42, page 37434, 07/21/1977; Vol. 42, page 46575, 09/16/1977; Vol. 46, page 29986, 06/04/1981

Monitor Labs/Lear Siegler Model 8840 Nitrogen Oxides Analyzer**Automated Reference Method: RFNA-0280-042**

“Monitor Labs or Lear Siegler Model 8840 Nitrogen Oxides Analyzer,” operated on a range of either 0-0.5 or 0-1.0 ppm, with an internal time constant setting of 60 seconds, a TFE sample filter installed on the sample inlet line, with or without any of the following options:

02 Flowmeter	08A Pump Pac Assembly with 09A (115 VAC)	011A Recorder Output 1 Volt
03A Rack Ears	08B Pump Pac Assembly with 09B (100 VAC)	011B Recorder Output 100 mV
03B Slides	08C Pump Pac Assembly with 09C (220/240 VAC)	011C Recorder Output 10 mV
05A Zero/Span Valves	08D Rack Mount Panel Assembly	012A DAS Output 1 Volt
05B Valve/Relay	09A Pump 115 VAC 50/60 Hz	012B DAS Output 100 mV
06 Status	09B Pump 100 VAC 50/60 Hz	012C DAS Output 10 mV
07A Input Power Transformer 100 VAC, 50/60 Hz	09C Pump 220/240 VAC 50 Hz	013A Ozone Dry Air
07B Input Power Transformer 220/240 VAC 50 Hz		013B Ozone Dry Air - No Drierite

Federal Register: Vol. 45, page 9100, 02/11/1980 and Vol. 46, page 29986, 06/04/1981

Monitor Labs/Lear Siegler Model 8841 Nitrogen Oxides Analyzer**Automated Reference Method: RFNA-0991-083**

“Monitor Labs or Lear Siegler Model 8841 Nitrogen Oxides Analyzer,” operated on the 0-0.05 ppm,¹ 0-0.1 ppm,¹ 0-0.2 ppm,¹ 0 - 0.5 ppm, or 0-1.0 ppm range, with manufacturer-supplied vacuum pump or alternative user-supplied vacuum pump capable of providing 200 torr or better absolute vacuum while operating with the analyzer.

Federal Register: Vol. 56, page 47473, 09/19/1991

Opsis Model AR 500 and System 300 Open Path Ambient Air Monitoring Systems for NO₂**Automated Equivalent Method: EQNA-0495-102**

“Opsis Model AR 500 System” or “System 300 Open Path (long path) Ambient Air Monitoring Systems,” configured for measuring NO₂, with one detector and movable grating, operated with a measurement range of 0 to 0.5 ppm, an installed monitoring path length between 50 and 500 meters (or 50 and 1000 meters with the ER 150 option, AR 500 System only), xenon lamp type B (150 watt), fiber optic cable length between 3 and 20 meters; operating within an ambient air temperature range of -50 to +50°C, an analyzer temperature range of 20 to 30°C, a measurement (integrating) time setting between 30 and 120 seconds (0 min:30 sec. to 2 min:00 sec.), and with a complete cycle time of not more than 200 seconds (3 min, 20 sec.). Under this method designation, the Model AR 500 System or System 300 consists of: AR 500 opto-analyser; emitter EM 110 and receiver RE 110 (together identified as ER 110); optic fibre cable OF60-S; power supply PS 150; Opsis operational software, version 7.0 or 7.1; and initial on-site installation, setup, and limited operator training.²

Optional components that can be used with the Model AR 500 only, in addition to or as alternative to corresponding components listed above: • AR 503 opto-analyzer configured as Model AR 500 (only the center detector active, sequential monitoring) • Emitter/receiver ER 150 (for monitoring path lengths up to 1 kilometer) • Transceiver ER 130 and Retroreflector RE 090 with 7 prisms (max. monitoring path length 150 meters) or 12 prisms (max. monitoring path length 250 meters) • Receiver RE 130 • Xenon lamp type A (higher short-wavelength UV output) • Optic fibre cable OF60-R (low-loss for short wavelengths) • Multiplexers MX 004 and MX 024 • Dataloggers DL 010 and DL 016 • Analogue and digital input/output cards AO 008, AI 016, and DI 032 • Analogue and digital isolation cards IA 008, ID 008, OA 008, and OD 008 • Window heaters HF 110 and HF 150 • Mirror heaters HM 110 and HM 150 • Auto calibration unit CU 007 • Software packages IO 80 (for the analogue and digital input/output adapters), DL10 and DL16 (for data loggers), ComVision, and STAT 500.

Recommended calibration and accuracy audit components (or equivalent) for either Model AR 500 or System 300: • Wavelength calibration lamp CA 004 • Calibration bench CB 100 • Receiver unit RE 060 (two required) • Calibration unit CA 150, with same type lamp as used in the monitoring path emitter • Power supply PS 150 for calibration unit CA 150 • Calibration cells CC 001-X, where X represents various cell lengths from 1 to 900 mm • Filter GG 400 • Special calibration cells CC 110 or CC 150 (for mounting directly on receiver) • Light meter LM 010

Federal Register: Vol. 60, page 21518, 05/02/1995

Philips Model PW9762/02 NO/NO₂/NO_x Analyzer**Automated Reference Method: RFNA-0879-040**

“Philips Model PW9762/02 NO/NO₂/NO_x Analyzer,” consisting of the following components: PW9762/02 Basic Analyzer; PW9729/00 Converter Cartridge; PW9731/00 Sampler or PW9731/20 Dust Filter; operated on a range of 0-0.5 ppm, with or without any of the following accessories: PW9752/00 Air Sampler Manifold; PW9732/00 Sample Line Heater; PW9011/00 Remote Control Set.

Federal Register: Vol. 44, page 51683, 09/04/1979

Sabio Model 6040 Oxides of Nitrogen (NO/NO₂/NO_x) Analyzer**Automated Reference Method: RFNA-0418-250**

“Sabio Model 6040 Oxides of Nitrogen (NO/NO₂/NO_x) Analyzer”, operated in the measurement range of 0-0.5 PPM, at any ambient temperature in the range of 5-40°C, within a line voltage range determined by the selected optional pump [115 VAC external pump: 105-125 VAC (60 Hz); 230 VAC external pump: 210-250 VAC (50-60 Hz); 24 VDC internal pump: 90-260 VAC (50-60 Hz)], at any sample flow rate in the range of 0.50-0.75 L/min, in accordance with the “Sabio Model 6040 Ambient NO/NO₂/NO_x Analyzer Instruction Manual”, with or without optional zero/span ports for external calibration, and with or without an optional inlet filter.

Federal Register: Vol. 83, page 25451, 06/01/2018

Seres Model NO_x 2000 G Nitrogen Dioxide Analyzer**Automated Reference Method: RFNA-0706-163**

“Seres Model NO_x 2000 G Nitrogen Dioxide Ambient Air Analyzer,” operated with a full scale measurement range of 1 - 0.50 ppm, at any ambient temperature in the range of 20°C to 30°C.

Federal Register: Vol. 71, page 42089, 07/25/2006

SIR S.A. Model S-5012 Nitrogen Oxides Analyzer**Automated Reference Method: RFNA-0804-152**

“SIR S.A. Model S-5012 Chemiluminescent Nitrogen Oxides Analyzer,” operated with a full scale range of 0 - 500 ppb, at any temperature in the range of 20°C to 30°C, with the integration time set to 1 minute, with the “initial zero” disabled, and with a specified Teflon particulate filter installed in the sample inlet filter holder.²

Federal Register: Vol. 69, page 47924, 08/06/2004

Teledyne Advanced Pollution Instrumentation Models 200A, 200AU, 200E, 200EU, T200, N200, T200U, T204; Teledyne Analytical Instruments Model 9110A, 9110E, 9110T; or Teledyne Monitor Labs sensor-e™ Model TML-41 NO₂ Analyzers; or recordum airpointer® System, Module 801-002000;**Automated Reference Method: RFNA-1194-099**

“Teledyne Advanced Pollution Instrumentation Models 200A, 200AU, , 200E, 200EU, T200, N200, T200U, T204; Teledyne Analytical Instruments Model 9110A, 9110E, 9110T; or Teledyne Monitor Labs, Inc. sensor-e™ Model TML-41 Chemiluminescence Nitrogen Oxides Analyzer,” operated on any full scale range between 0-0.05 ppm and 0-1.0 ppm, with a PTFE filter element or a Kynar® DFU installed in the internal filter assembly, with the following software settings: dynamic zero: OFF or ON; dynamic span: OFF; cal-on-NO₂: OFF; dilution factor: OFF or set to 1.0; autocal: ON or OFF; independent range: ON or OFF; autorange: ON or OFF; temperature/pressure compensation: ON; and with or without any of the following options (if available): rack mounts with or without slides, rack mount for external pump, zero/span valves, 4-20 mA analog outputs, status outputs, Digital I/O, RS-232 output ; the NumaView™ software. **Models 200A, 200E, T200, N200 and 9110A, 9110E, 9110T, and TML-41 only:** operated at any temperature in the range of 5°C to 40°C (0 - 45°C for the N200), with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 10 inches mercury or less at 2 sLpm, with either the standard or higher gain photomultiplier tube, with or without optional internal zero/span (IZS) and permeation tubes for IZS, gold-plated reaction chamber, or Nafion-type sample gas conditioner, ethernet output, control input, analog input option, RS-485 output. **Model 200AU, 200EU, and T200U only:** operated at any temperature in the range of 20°C to 30°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 4 inches mercury or less at 1 sLpm. **Model T204 NO_x + O₃ Analyzer only:** operated on any full scale range between 0-100 ppb and 0-500 ppb, at any operating temperature from 5°C to 40°C, with either the standard or higher gain photomultiplier tube, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 10 inches mercury or less at 3 sLpm, in accordance with the associated instrument manual, and with or without any of the following options: Zero/Span valves, external communication and data monitoring interfaces. **Airpointer® system module 801-002000 only:** operated on any full scale range between 0-0.05 ppm and 0-1.0 ppm, with either the standard or higher gain photomultiplier tube, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any temperature in the range of 10°C to 45°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; installed in the compact, thermally controlled (-40°C to + 45°C) and weather proof airpointer® base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without internal span option as module supplement consisting of permeation oven and permeation tube; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with the appropriate instrument manual. Note 2 applies to the following Teledyne Advanced Pollution Instrumentation Models 200E, 200EU, T200, N200, T200U, T204 and Teledyne Monitor Labs, Inc. Sensor-e™ Model TML-41.

Federal Register: Vol. 59, page 61892, 12/02/1994

Latest modifications: 03/2009; 08/2010; 10/2012; 5/2013; 06/2014; 07/2014; 9/2015; 4/2018; 8/2021

Teledyne Advanced Pollution Instrumentation Model 200EUP or T200UP Chemiluminescence Nitrogen Oxides Analyzer
Automated Equivalent Method: EQNA-0512-200

“Teledyne Advanced Pollution Instrumentation Model 200EUP or T200UP Chemiluminescence Nitrogen Oxides Analyzer,” operated on any full scale range between 0-50 ppb and 0-1000 ppb, with any range mode (Single, Independent, or AutoRange), at any ambient temperature in the range of 20°C to 30°C, equipped with either the nominal or high efficiency photolytic converter, with software Temperature and Pressure compensation ON, in accordance with the associated instrument manual; and with or without any of the following options: Zero/Span Valves, standard serial port (RS232/RS485) or Multi-drop RS-232, Ethernet port, USB COM port, analog inputs, digital status outputs, analog outputs: 100 mV, 1V, 5V, 10V, 4-20 mA current loop outputs; with the NumaView™ software,. Note 2 applies to the following Teledyne Advanced Pollution Instrumentation, Models 200EUP and T200UP.

Federal Register: Vol 77, page 32632, 06/01/2012

Latest Modification: 10/2012; 07/2014; 5/2016; 11/2016

Teledyne Advanced Pollution Instrumentation Model T500U Nitrogen Dioxide Analyzer
Automated Equivalent Method: EQNA-0514-212

“Teledyne Advanced Pollution Instrumentation, Model T500U cavity attenuated phase shift spectroscopy Nitrogen Dioxide Analyzer”, operated on any full scale range between 0-50 ppb and 0-1000 ppb, with any range mode (Single, Dual, or AutoRange), at any operating temperature from 5°C to 40°C, with a sample particulate filter, with the following software setting: Temperature and Pressure compensation ON; in accordance with the associated instrument manual, and with or without any of the following options: Zero/Span valves, internal Zero/Span permeation oven (IZS), external communication and data monitoring interfaces; and the NumaView™ software. Note 2 applies to the Teledyne Advanced Pollution Instrumentation, Model T500U.

Federal Register: Vol.79, pages 34734-34735, 06/18/2014

Latest modification: 11/2015

Teledyne Advanced Pollution Instrumentation Model N500 Cavity-Attenuated Phase-Shift (CAPS) spectroscopy Nitrogen Oxides Analyzer

Automated Equivalent Method: EQNA-0320-256

“Teledyne Advanced Pollution Instrumentation, Model N500 Cavity-Attenuated Phase-Shift (CAPS) spectroscopy Nitrogen Oxides Analyzer”, operated on any full scale range between 0-0.5 ppm, at any operating temperature from 0°C to 40°C, with a sample particulate filter and in accordance with the Model N500 CAPS NO_x Analyzer User Manual, and with or without any of the following options: Zero/Span valves, internal Zero/Span permeation oven (IZS), Analog Output expansion board, Digital I/O expansion board, external communication and data monitoring interfaces; and the NumaView™ software.

Federal Register: Vol. 85, page 27221, 5/7/2020

Teledyne Advanced Pollution Instrumentation Model T200P Chemiluminescence Nitrogen Oxides Analyzer
Automated Equivalent Method: EQNA-1016-241

“Teledyne Advanced Pollution Instrumentation Model T200P Chemiluminescence Nitrogen Oxides Analyzer,” operated on any full scale range between 0-50 ppb and 0-1000 ppb, with a PTFE filter element or a Kynar® DFU installed in the filter assembly, with any range mode (Single or Dual), at any operating temperature in the range of 15°C to 35°C, with the high efficiency photolytic converter, with software Temperature and Pressure compensation ON, with either the standard or higher gain photomultiplier tube, in accordance with the associated instrument manual; and with or without any of the following options: Zero/Span valves, internal Zero/Span permeation oven (IZS), Nafion-type sample gas conditioner, external communication and data monitoring interfaces; and the NumaView™ software. Note 2 applies to the Teledyne Advanced Pollution Instrumentation, Model T200P.

Federal Register: Vol.81, pages 85561-85562, 11/28/2016

Latest modification: 04/2018

Teledyne Monitor Labs/Casella/Ecotech/ Acoem Australasia /Aeris Models ML9841/CM2041/AE9841/AE2041, ML9841A/CM2041A/EC9841A/EC9841T, Teledyne Monitor Labs/Casella/Ecotech/ Acoem Australasia Model ML9841B/CM2041B/EC9841B, or Wedding & Associates Model 1030 NO₂ Analyzers

Automated Reference Method: RFNA-1292-090

“Teledyne Monitor Labs, Casella Monitor, or Ecotech or Acoem Australasia or Aeris Models ML9841/CM2041, ML9841A/CM2041A/EC9841A/AE9841, or ML9841B/CM2041B/EC9841B, Ecotech or Acoem Australasia Model 9841T, or Wedding & Associates, Inc. Model 1030 Nitrogen Oxides Analyzers,” with either a molybdenum or a vitreous carbon NO₂ to NO catalyst, operated on any full scale range between 0-0.05 ppm¹ and 0-1.0 ppm, at any temperature in the range of 15°C to 35°C, with the service switch on the secondary panel set to the *In* position; with the following menu choices selected: Range: *0.05 ppm to 1.0 ppm*; Over-ranging: *Enabled* or *Disabled*; Calibration: *Manual* or *Timed*; Diagnostic Mode: *Operate*; Filter Type: *Kalman*; Pres/Temp/Flow Comp: *On*; Span Comp: *Disabled*; and as follows: **Models ML9841/CM2041, ML9841A/CM2041A/EC9841A, AE9841/AE2041 and EC9841T** - with a five-micron Teflon® filter element installed internally, with the 50-pin I/O board installed on the rear panel configured at any of the following output range setting: Voltage, 0.1V, 1V, 5V, 10V; Current, 0-20 mA, 2-20 mA, 4-20 mA; and with or without any of the following options: Valve Assembly for External Zero/Span (EVS); Internal Zero/Span (IZS) Assembly for; Rack Mount Assembly; Internal Floppy Disk Drive. **Models ML9841B/CM2041B/EC9841B and 1030** - with a vendor-supplied or equivalent user-supplied five-micron Teflon® filter and exhaust pump, and with or without any of the following options: Valve Assembly for External Zero/Span (EVS); 50-pin I/O board; Internal Zero/Span (IZS) Assembly; Rack Mount Assembly; Charcoal exhaust scrubber; hinged, fold-down front panel. Operated with appropriate instrument manual.

Federal Register: Vol. 57, page 60198, 12/18/1992

Latest Modification: 03/2011; 03/2013; 11/2020; 11/2021

Thermo Electron/Thermo Environmental Instruments Model 14 B/E

Automated Reference Method: RFNA-0179-035

“Thermo Electron or Thermo Environmental Instruments, Inc. Model 14 B/E Chemiluminescent NO/NO₂/NO_x Analyzer,” operated on the 0-0.5 ppm range, with or without any of the following options:

14-001 Teflon Particulate Filter	14-003 Long-Time Signal Integrator	14-005 Sample Flowmeter
14-002 Voltage Divider Card	14-004 Indicating Temperature Controller	14-006 Air Filter

Federal Register: Vol. 44, page 7805, 02/07/1979 and Vol.44, page 54545, 09/20/1979

Thermo Electron/Thermo Environmental Instruments Model 14 D/E

Automated Reference Method: RFNA-0279-037

“Thermo Electron or Thermo Environmental Instruments, Inc. Model 14 D/E Chemiluminescent NO/NO₂/NO_x Analyzer,” operated on the 0-0.5 ppm range, with or without any of the following options: 14-001 Teflon Particulate Filter; 14-002 Voltage Divider Card.

Federal Register: Vol. 44, page 10429, 02/20/1979

Thermo Environmental Instruments Models 42, 42C, 17i, 42i, 42i-TL, 42i-NH3, 42iQ, 42iQTL NO/NO₂/NO_x Analyzer
Automated Reference Method: RFNA-1289-074

“Thermo Environmental Instruments Inc. Model 42, Model 42C, Model 17i, Model 42i-NH₃ or Model 42i Chemiluminescence NO-NO₂-NO_x Analyzer,” operated on any measurement range between 0-50 ppb and 0-1000 ppb, with any time average setting from 10 to 300 seconds, with temperature and/or pressure compensation on or off, operated at temperatures between 15°C and 35°C, and with or without an external NH₃ converter, an exhaust ozone scrubber or any of the following options: 2 Rack mounts; Internal Zero/span and sample valves with remote activation; Ozone particulate filter; Teflon particulate filter; Ozone permeation dryer; Permeation Oven; RS-232/485 interface, 4-20 mA current output, or I/O expansion board; **Model 42** only: Pressure transducer, Sample/ozone flow meters. **Model 42i-TL** operated between 0-10 ppb and 0-1000 ppb with averaging times from 10 to 300 seconds, operated at temperatures between 15°C and 35°C at line voltages of:

- a) 90-110 VAC @ 50/60/Hz
- b) 105-125 VAC @ 50/60/Hz
- c) 210-250 VAC @ 50/60/Hz

and with or without the following options: rack mounts, Teflon® Particle Filter, I/O Expansion Board. **airpointer® Model 801-002000-T**, operated on any full scale range between 0-0.05 ppm and 0-1.0 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any internal temperature in the range of 15°C to 39°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; installed in the compact, thermally controlled (-40°C to +45°C) and weather proof airpointer® base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without internal span option as module supplement consisting of permeation oven and permeation tube; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. **Model 42iQ** NO/NO₂/NO_x Analyzer operated between 0-50 ppb and 0-1000 ppb with averaging times from 10 to 300 seconds or with dynamic filtering, operated at temperatures between 0°C and 40°C with temperature and pressure compensation, at line voltages of 100 to 240 VAC @ 50/60 Hz, with or without the following options: Teflon particulate filter, ozone particulate filter, ozone permeation dryer, permeation oven, 19 inch rack mount, internal zero/span valves with remote activation, internal zero air package, analog I/O expansion board, digital I/O expansion board, communication board, and dynamic filtering. Operated with the appropriate instrument manual. **Model 42iQTL** Trace Level NO/NO₂/NO_x Analyzer operated between 0-10 ppb and 0-1000 ppb with averaging times from 10 to 300 seconds or with dynamic filtering, operated at temperatures between 0°C and 35°C with temperature and pressure compensation, at line voltages of 100 to 240 VAC @ 50/60 Hz, with or without the following options: Teflon particulate filter, ozone particulate filter, ozone permeation dryer, 19 inch rack mount, internal zero/span valves with remote activation, internal zero air package, analog I/O expansion board, digital I/O expansion board, communication board, and dynamic filtering. Operated with the appropriate instrument manual.

Federal Register: Vol. 54, page 50820, 12/11/1989

Latest modification: 01/2010, 10/2015, 7/2017, 9/2018, 10/2018, 01/2025

Lead***Inductively Coupled Plasma Mass Spectroscopy (ICP-MS)*****Manual Reference Method: 40 CFR Part 50, Appendix G: RFLA-0813-813**

Reference Method for the Determination of Lead in Suspended Particulate Matter Collected from Ambient Air.

Federal Register: Vol. 78, page 40000, 7/03/2013***Energy-Dispersive X-Ray Fluorescence Spectrometry (TNRCC)*****Manual Equivalent Method: EQL-0783-058**

“Determination of Lead Concentration in Ambient Particulate Matter by Energy-Dispersive X-Ray Fluorescence Spectrometry (Texas Natural Resource Conservation Commission),” Texas Natural Resource Conservation Commission, P.O. Box 13087, Austin, TX 78711-3087.

Federal Register: Vol. 48, page 29742, 06/28/1983***Energy-Dispersive X-Ray Fluorescence Spectrometry (NEA, Inc.)*****Manual Equivalent Method: EQL-0589-072**

“Determination of Lead Concentration in Ambient Particulate Matter by Energy-Dispersive X-Ray Fluorescence Spectrometry (NEA, Inc.),” Nuclear Environmental Analysis, Inc., Suite 260, 10950 SW 5th Street, Beaverton, OR 97005.

Federal Register: Vol. 54, page 20193, 05/10/1989***Flame Atomic Absorption Spectroscopy (FAAS)*****Manual Equivalent Method: EQLA-0813-803**

Equivalent Method for the Determination of Lead in Suspended Particulate Matter Collected from Ambient Air.

Federal Register: Vol. 78, page 40000, 7/03/2013***Flame Atomic Absorption Spectrometry*****Manual Equivalent Method: EQL-0380-043**“Determination of Lead Concentration in Ambient Particulate Matter by Flame Atomic Absorption Spectrometry Following Ultrasonic Extraction with Heated HNO₃-HCl”***Federal Register: Vol. 45, page 14648, 03/06/1980******Flameless Atomic Absorption Spectrometry (EPA/RTP, N.C.)*****Manual Equivalent Method: EQL-0380-044**

“Determination of Lead Concentration in Ambient Particulate Matter by Flameless Atomic Absorption Spectrometry (EPA/RTP, NC)”

Federal Register: Vol. 45, page 14648, 03/06/1980***Flameless (Graphite Furnace) Atomic Absorption (Houston, Texas)*****Manual Equivalent Method: EQL-0895-107**

“Determination of Lead Concentration in Ambient Particulate Matter by Flameless (Graphite Furnace) Atomic Absorption (City of Houston, Texas),” Health and Human Services Department, Environmental Chemistry Service, 1115 S. Braeswood, Houston, TX 77030.

Federal Register: Vol. 60, page 39383, 08/02/1995***Flameless Atomic Absorption Spectrometry (Omaha)*****Manual Equivalent Method: EQL-0785-059**

“Determination of Lead Concentration in Ambient Particulate Matter by Flameless Atomic Absorption Spectrometry (Omaha-Douglas County Health Department),” Omaha-Douglas County Health Department, 1819 Farnam Street, Omaha, NE 68183.

Federal Register: Vol. 50, page 37909, 09/18/1985***Inductively Coupled Argon Plasma-Optical Emission Spectrometry (Doe Run)*****Manual Equivalent Method: EQL-0196-113**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (Doe Run Co.),” Doe Run Company, Smelting Division, 881 Main Street Herculaneum, MO 63048.

Federal Register: Vol. 61, page 11404, 03/20/1996

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (EPA/RTP)**Manual Equivalent Method: EQL-0380-045**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (EPA/RTP, NC)”

Federal Register: Vol. 45, page 14648, 03/06/1980

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (IL)**Manual Equivalent Method: EQL-1193-094**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (State of Illinois),” State of Illinois, Environmental Protection Agency, Champaign Inorganic Laboratory, 2120 South First Street, Champaign, IL 61820

Federal Register: Vol. 58, page 61902, 11/23/1993

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (Kansas)**Manual Equivalent Method: EQL-0592-085**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (State of Kansas),” State of Kansas, Department of Health and Environment, Forbes Field, Building 740, Topeka, KS 66620-0001.

Federal Register: Vol. 57, page 20823, 05/15/1992

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (Montana)**Manual Equivalent Method: EQL-0483-057**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (State of Montana),” State of Montana, Department of Health and Environmental Sciences, Cogswell Building, Helena, MT 59620.

Federal Register: Vol. 48, page 14748, 04/05/1983

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (NETI)**Manual Equivalent Method: EQL-1188-069**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (Northern Engineering and Testing, Inc.),” Northern Engineering and Testing, Inc., P.O. Box 30615, Billings, MT 59107.

Federal Register: Vol. 53, page 44947, 11/07/1988

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (NH)**Manual Equivalent Method: EQL-1290-080**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (State of New Hampshire),” State of New Hampshire, Department of Environmental Services, Laboratory Service Unit, 6 Hazen Drive (P.O. Box 95), Concord, NH 03302-0095.

Federal Register: Vol. 55, page 49119, 11/26/1990

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (PA)**Manual Equivalent Method: EQL-0592-086**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (Commonwealth of Pennsylvania),” Commonwealth of Pennsylvania, Department of Environmental Resources, P.O. Box 2357, Harrisburg, PA 17105-2357.

Federal Register: Vol. 57, page 20823, 05/15/1992

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (Pima, AZ)**Manual Equivalent Method: EQL-0995-109**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (Pima County, Arizona),” Pima County, Wastewater Management Department, 201 North Stone Avenue, Tucson, Arizona 85701-1207.

Federal Register: Vol. 60, page 54684, 10/25/1995

Inductively Coupled Argon Plasma-Mass Spectrometry (Pima Co., AZ)**Manual Equivalent Method: EQL-0995-110**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Plasma-Mass Spectrometry (Pima County, Arizona),” Pima County, Wastewater Management Department, 201 North Stone Avenue, Tucson, Arizona 85701-1207.

Federal Register: Vol. 60, page 54684, 10/25/1995

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (RI)**Manual Equivalent Method: EQL-0888-068**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (State of Rhode Island),” State of Rhode Island Department of Health, Air Pollution Laboratory, 50 Orms Street, Providence, RI 02904

Federal Register: Vol. 53, page 30866, 08/16/1988

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (Silver Valley)**Manual Equivalent Method: EQL-1288-070**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (Silver Valley Laboratories),” Silver Valley Laboratories, Inc., P.O. Box 929, Kellogg, ID 83837.

Federal Register: Vol. 53, page 48974, 12/05/1988

Inductively Coupled Argon Plasma-Atomic Emission Spectrometry (TNRCC)**Manual Equivalent Method: EQL-0400-140**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Atomic Emission Spectrometry (TNRCC),” Texas Natural Resource Conservation Commission Laboratory, 5144 E. Sam Houston Parkway N., Houston, TX 77030.

Federal Register: Vol. 65, page 26603, 05/8/2000

Inductively Coupled Argon Plasma-Optical Emission Spectrometry (WV)**Manual Equivalent Method: EQL-0694-096**

“Determination of Lead Concentration in Ambient Particulate Matter by Inductively Coupled Argon Plasma-Optical Emission Spectrometry (State of West Virginia),” State of West Virginia, Department of Commerce, Labor and Environmental Resources, Division of Environmental Protection, 1558 Washington Street East, Charleston, WV 25311-2599

Federal Register: Vol. 59, page 29429, 06/07/1994

Wavelength Dispersive X-Ray Fluorescence Spectrometry (CA)**Manual Equivalent Method: EQL-0581-052**

“Determination of Lead Concentration in Ambient Particulate Matter by Wavelength Dispersive X-Ray Fluorescence Spectrometry,” California Department of Health Services, Air & Industrial Hygiene Laboratory, 2151 Berkeley Way, Berkeley, CA 94704.

Federal Register: Vol. 46, page 29986, 06/04/1981

Inductively Coupled Plasma - Mass Spectrometry (Inter-Mountain Labs, Inc.)**Manual Equivalent Method: EQL-0310-189**

“Procedure for Determination of Lead in Ambient TSP by Hot Plate Acid Extraction and ICP-MS Analysis,” where total suspended particulate matter (TSP) is collected according to 40 CFR Appendix B to part 50, *EPA Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method)*, extracted on a hot plate with 3M HNO₃ according to 40 CFR Appendix G to part 50, *EPA Reference Method for the Determination of Lead in Suspended Particulate Matter Collected from Ambient Air*, and analyzed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) based on EPA SW-846 Method 6020A.

Federal Register: Vol. 75, page 9894, 03/04/2010

Inductively Coupled Plasma - Mass Spectrometry (US EPA/OAQPS)**Manual Equivalent Method: EQL-0510-191**

“Determination of Lead Concentration in TSP by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) with Heated Ultrasonic Nitric and Hydrochloric Acid Filter Extraction,” where total suspended particulate matter (TSP) is collected according to 40 CFR Appendix B to part 50, *EPA Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method)*, extracted with a solution of nitric and hydrochloric acids, heated to 80° C and sonicated for one hour, brought to a final volume of 40mL, and analyzed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) based on EPA SW-846 Method 6020A.

Federal Register: Vol. 75, page 30022, 05/28/2010

Inductively Coupled Plasma - Mass Spectrometry (US EPA/Region 9)**Manual Equivalent Method: EQL-0710-192**

“Heated Nitric Acid Hot Block Digestion and ICP/MS Analysis for Lead (Pb) on TSP High-Volume Filters.” In this method, total suspended particulate matter (TSP) is collected on glass fiber filters according to 40 CFR Appendix B to part 50, EPA Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method), extracted with a solution of nitric acid, heated on a hot block to 95°C for one hour, and brought to a final volume of 50 mL. The lead content of the sample extract is analyzed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) based on EPA Method 200.8 and SW-846 Method 6020A.

Federal Register: Vol. 75, page 45627, 08/03/2010

Inductively Coupled Plasma-Atomic Emission Spectroscopy (US EPA/OAQPS)**Manual Equivalent Method: EQL-0311-196**

“Heated Ultrasonic Nitric and Hydrochloric Acid Digestion and ICP/AES Analysis for Lead (Pb) on TSP High-Volume Filters.” A sample of total suspended particulate matter (TSP) is collected on a glass fiber filter, using the sampler and procedure of the EPA Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method) (40 CFR 50, Appendix B). The TSP sample is extracted with a solution of nitric and hydrochloric acid, heated in an ultrasonic bath to 80°C for one hour, and brought to a final volume of 40 mL. The lead content of the sample extract is analyzed by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES), based on EPA SW-846 Method 6010C.

Federal Register: Vol. 76, page 15974, 03/22/2011

Inductively Coupled Plasma- Mass Spectrometry (Eastern Research Group, Inc.)**Manual Equivalent Method: EQL-0512-201**

“Determination of Lead in TSP by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) with Hot Block Dilute Acid and Hydrogen Peroxide Filter Extraction.” In this method, total suspended particulate matter (TSP) is collected on glass fiber filters according to 40 CFR Appendix G to part 50, EPA Reference Method for the Determination of Lead in Suspended Particulate Matter Collected from Ambient Air. The filter samples are extracted in a hot block at 95°C with a solution of dilute hydrochloric acid and nitric acid and two aliquots of hydrogen peroxide, for a total of two and a half hours extraction time. The samples are brought to a final volume of 50 mL and the lead content of the sample extract is analyzed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) based on EPA Compendium Method IO-3.5 and SW-846 Method 6020A.

Federal Register: Vol. 77, page 32632, 06/01/2012

Inductively Coupled Plasma- Mass Spectrometry (Eastern Research Group, Inc.)**Manual Equivalent Method: EQL-0512-202**

“Determination of Lead in PM₁₀ by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) with Hot Block Dilute Acid and Hydrogen Peroxide Filter Extraction.” In this method, PM₁₀ particulate matter is collected on Teflon® membrane filters according to 40 CFR Appendix Q to part 50, EPA Reference Method for the Determination of Lead in Particulate Matter as PM₁₀ Collected from Ambient Air. The filter samples are extracted in a hot block at 95°C with a solution of hydrochloric acid, nitric acid, and hydrofluoric acid and an aliquot of hydrogen peroxide for a total of two and a half hours extraction time. Samples are brought to a final volume of 50 mL and analyzed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) based on EPA Compendium Method IO-3.5 and SW-846 Method 6020A.

Federal Register: Vol. 77, page 32632, 06/01/2012

Inductively Coupled Plasma- Mass Spectrometry (South Coast Air Quality Management District Laboratory)**Manual Equivalent Method: EQL-0514-213**

“Determination of Lead (Pb) on TSP Hi-Volume Filters by Microwave Assisted Digestion and Time of Flight Inductively Coupled Plasma Mass Spectrometry (TOF ICP-MS).” A sample of total suspended particulate matter (TSP) is collected on a glass fiber filter, using the sampler and procedure of the EPA Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method) (40 CFR 50, Appendix B). The TSP sample is extracted with a solution of nitric and digested in a microwave digestion system at 175° C for 15 minutes, centrifuged for 30 minutes at 2000 rpm, and brought to a final acid concentration of 2-3%. The lead content of the sample extract is analyzed by Time of Flight Inductively Coupled Plasma Mass Spectrometry (TOF ICP-MS), based on EPA SW-846 Method 6010C.

Federal Register: Vol.79, pages 34734-34735 06/18/2014

Microwave Assisted Digestion and Quadrupole Inductively Coupled Plasma- Mass Spectrometry (South Coast Air Quality Management District Laboratory)**Manual Equivalent Method: EQL-0723-261**

“Determination of Lead (Pb) on TSP Hi-Volume Filters by Microwave Assisted Digestion and Quadrupole Inductively Coupled Plasma Mass Spectrometry (Quadrupole ICP-MS).” A sample of total suspended particulate matter (TSP) is collected on a glass or quartz fiber filter, using the sampler and procedure of the EPA Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method) (40 CFR 50, Appendix B). The TSP sample is extracted with a nitric acid solution and digested in a microwave system, centrifuged and brought to a final acid concentration of 2-3%. The lead content of the sample extract is analyzed by Quadrupole Inductively Coupled Plasma Mass Spectrometry (Quadrupole ICP-MS), based on EPA Method IO-3.5

Federal Register: Vol.88, pages 76212-76213 11/6/2023

Notes

¹ Users should be aware that designation of this analyzer for operation on ranges less than the range specified in the performance specifications for this analyzer (40 CFR 53, Subpart B) is based on meeting the same absolute performance specifications required for the specified range. Thus, designation of these lower ranges does not imply commensurably better performance than that obtained on the specified range.

² This analyzer is approved for use, with proper factory configuration (if applicable), on either 50 or 60 Hertz line frequency and nominal power line voltages of 115 VAC and 230 VAC, or similar voltages as specified in the operation or instruction manual associated with the method.

^a For cases with two designation numbers, these methods are dual designated as FRM and FEM. However, where a method is dual designated, EPA considers the method an FRM for purposes of ensuring QA requirements are met.

^b Method code as available in the AQS data system

U.S. EPA Reference and Equivalent Methods for Ambient Air**Particulate Matter - TSP**

TSP Manual Method		
Method	Designation No.	Method Code ^b
Reference method (high-volume)	—	802

Particulate Matter – PM₁₀

PM ₁₀ Samplers		
Method	Designation No.	Method Code ^b
Andersen Instruments RAAS10-100	RFPS-0699-130	130
Andersen Instruments RAAS10-200	RFPS-0699-131	131
Andersen Instruments RAAS10-300	RFPS-0699-132	132
BGI or Mesa Laboratories Incorporated Model PQ100	RFPS-1298-124	124
BGI or Mesa Laboratories Incorporated Model PQ200	RFPS-1298-125	125
Ecotech or Acoem Australasia Model 3000 or Met One Instruments HVS-100 PM10 High Volume Sampler	RFPS-0706-162	162
Met One Instruments, Inc. E-FRM– PM ₁₀	RFPS-0216-231	231
Met One Instruments, Inc. E-SEQ-FRM	RFPS-0717-246	246
New Star Environmental Model NS-6070	RFPS-0202-141	141
Oregon DEQ Medium volume sampler	RFPS-0389-071	071
Rupprecht & Patashnick Partisol® 2000	RFPS-0694-098	098
R & P Partisol®-FRM 2000	RFPS-1298-126	126
R & P Partisol®-Plus 2025 Seq.	RFPS-1298-127	127
Sierra-Andersen/GMW 1200	RFPS-1287-063	063
Sierra-Andersen/GMW 321-B	RFPS-1287-064	064
Sierra-Andersen/GMW 321-C	RFPS-1287-065	065
Sierra-Andersen/GMW SA241, SA241M Dichot.	RFPS-0789-073	073
Thermo Scientific Partisol® 2000	RFPS-0694-098	098
Thermo Scientific Partisol® 2000-D, Partisol® 2000 <i>i</i> -D	EQPS-311-197	197
Thermo Scientific Partisol® 2000-FRM, Partisol® 2000 <i>i</i>	RFPS-1298-126	126
Thermo Scientific Partisol®-Plus 2025 Seq., Partisol® 2025 <i>i</i> Seq	RFPS-1298-127	127
Thermo Scientific Partisol®-Plus 2025-D Seq., Partisol® 2025 <i>i</i> -D Seq	EQPS-0311-198	198
Tisch Environmental Model TE-6070	RFPS-0202-141	141
Tisch Environmental Model TE-Wilbur 10	RFPS-0714-216	216
W&A/Thermo Electron Model 600 HVL	RFPS-1087-062	062

PM ₁₀ Monitors		
Method	Designation No.	Method Code ^b
Andersen Instruments FH62I-N Beta	EQPM-0990-076	076
DKK-TOA FPM-222/222C/223/223C	EQPM-0905-156	156
DKK-TOA DUB-222(S)/223(S)	EQPM-0905-156	156
DKK-TOA FPM-377C(S), FPM-377C	EQPM-0905-156	156
ENVEA MP101M Beta	EQPM-0404-151	151
Environnement S.A. MP101M Beta	EQPM-0404-151	151
Focused Photonics Inc. BPM-200	EQPM-0121-258	258
Horiba APDA-371	EQPM-0798-122	122
Met One BAM1020, GBAM1020, BAM1020-1, GBAM1020-1 Beta	EQPM-0798-122	122
Ecotech or Acoem Australasia Spirant BAM1000	EQPM-0798-122	122
Met One Instruments, Inc. E-BAM PLUS	EQPM-1215-226	226
Opsis SM200	EQPM-0810-193	193
R & P TEOM® 1400, 1400a	EQPM-1090-079	079
SWAM 5a Dual Channel Monitor	EQPM-0912-205	205
Teledyne Model 602 Beta ^{PLUS} Particle Measurement System	EQPM-0912-205	205

PM ₁₀ Monitors		
Method	Designation No.	Method Code ^b
Teledyne Model T640 PM ₁₀ Mass Monitor with 640X option	EQPM-0516-239	239
Teledyne T640x PM ₁₀ Mass Monitor with Network Data Alignment enabled	EQPM-0516-239	639
Thermo Andersen Series FH 62 C14 Beta Monitor, 5014i Beta, 5028i, 5014iQ	EQPM-1102-150	150
Thermo Scientific 5030iQ SHARP	EQPM-0423-260	184
Thermo Scientific TEOM [®] 1400AB, 1405	EQPM-1090-079	079
Thermo Scientific TEOM [®] 1405-DF with FDMS [®]	EQPM-1013-208	208
Vasthi Instruments Vair-9009	EQPM-0923-262	262
W&A/Thermo Electron 650 Beta Gauge	EQPM-0391-081	081

Particulate Matter – PM_{2.5}

PM _{2.5} Samplers		
Method	Designation No. ^a	Method Code ^b
Ambilabs Model 2WIN PM2.5 FEM Monitor	EQPM-0922-260	260
Andersen Model RAAS2.5-200 Audit with WINS	RFPS-0299-128	128
BGI or Mesa Laboratories Inc. PQ200/200A with WINS	RFPS-0498-116	116
BGI or Mesa Laboratories Inc. PQ200-VSCC™ or PQ200A-VSCC™	RFPS-0498-116 or EQPM-0202-142	142
DKK–TOA Models FPM–377C(S), FPM–377C	EQPM-1224-264	264
Graseby Andersen RAAS2.5-100 with WINS	RFPS-0598-119	119
Graseby Andersen RAAS2.5-300 with WINS	RFPS-0598-120	120
Met One Instruments, Inc. E-FRM with WINS	RFPS-0315-221	221
Met One Instruments, Inc. E-FRM with VSCC™ or TE-PM2.5C	RFPS-0315-221	521
Met One Instruments, Inc. E-FRM with URG	EQPS-0316-235	235
Met One Instruments, Inc. E-SEQ-FRM with WINS	RFPS-0717-245	245
Met One Instruments, Inc. E-SEQ-FRM with VSCC™ or TE-PM2.5C	RFPS-0717-245	545
R & P Partisol®-FRM 2000 PM2.5 with WINS	RFPS-0498-117	117
R & P Partisol®-FRM 2000 PM-2.5 Thermo Scientific with VSCC™ or TE-PM2.5C	RFPS-0498-117 or EQPM-0202-143	143
R & P Partisol® 2000 PM-2.5 Audit with WINS	RFPS-0499-129	129
R & P Partisol® 2000 PM-2.5 Audit with VSCC™ or TE-PM2.5C	RFPS-0499-129 or EQPM-0202-144	144
R & P Partisol®-Plus 2025 PM-2.5 Seq. with WINS	RFPS-0498-118	118
R & P Partisol®-Plus 2025 PM-2.5 Seq. with VSCC™ or TE-PM2.5C	RFPS-0498-118 or EQPM-0202-145	145
Thermo Electron RAAS2.5-100 with VSCC™ or TE-PM2.5C	RFPS-0598-119 or EQPM-0804-153	153
Thermo Electron RAAS2.5-100 with WINS	RFPS-0598-119	119
Thermo Electron RAAS2.5-200 with VSCC™ or TE-PM2.5C	RFPS-0299-128 or EQPM-0804-154	154
Thermo Electron RAAS2.5-200 with WINS	RFPS-0299-128	128
Thermo Electron RAAS2.5-300 with VSCC™ or TE-PM2.5C	RFPS-0598-120 or EQPM-0804-155	155
Thermo Electron RAAS2.5-300 with WINS	RFPS-0598-120	120
Thermo Environmental Model 605 CAPS	RFPS-1098-123	123
Thermo Scientific Partisol® 2000-D Dichot., Partisol® 2000i-D Dichot.	EQPS-0509-177	177
Thermo Scientific Dichot. Partisol®-Plus Model 2025-D Seq., Partisol® 2025i-D Dichot. Seq.	EQPS-0509-179	179
Thermo Scientific Partisol® 2000-FRM, Partisol® 2000i with WINS	RFPS-0498-117	117
Thermo Scientific Partisol® 2000-FRM, Partisol® 2000i with VSCC™ or TE-PM2.5C	RFPS-0498-117 or EQPM-0202-143	143
Thermo Scientific Partisol®-Plus 2025 Seq., Partisol® 2025i Seq with WINS	RFPS-0498-118	118
Thermo Scientific Partisol®-Plus 2025 Seq., Partisol® 2025i Seq with VSCC™ or TE-PM2.5C	RFPS-0498-118 or EQPM-0202-145	145
Tisch Environmental Model TE-Wilbur 2.5 with WINS	RFPS-1014-219	219
Tisch Environmental Model TE-Wilbur 2.5 with VSCC™ or TE-PM2.5C	RFPS-1014-219	519
Tisch Environmental Model TE-Wilbur 2.5 with Tisch TE-PM2.5C	RFPS-1014-219 or EQPS-0415-223	223

PM _{2.5} Samplers		
Method	Designation No. ^a	Method Code ^b
URG-MASS100 with WINS	RFPS-0400-135	135
URG-MASS100 with VSCC™ or TE-PM2.5C	RFPS-0400-135	535
URG-MASS100 with URG-2000-30EGN cyclone	EQPS-0316-233	233
URG-MASS300	RFPS-0400-136	136
URG-MASS300 with VSCC™ or TE-PM2.5C	RFPS-0400-136	536
URG-MASS300 with URG-2000-30EGN cyclone	EQPS-0316-234	234
^a For cases with two designation numbers, these methods are dual designated as FRM and FEM. However, where a method is dual designated, EPA considers the method an FRM for purposes of ensuring QA requirements are met.		
^b Method code as available in the AQS data system		

PM _{2.5} Monitors		
Method	Designation No.	Method Code ^b
ENVEA Model MP101M PM2.5 Beta Attenuation Monitor	EQPM-1013-211	211
Environnement S.A. Model MP101M PM2.5 Beta Attenuation Monitor	EQPM-1013-211	211
Grimm Model EDM 180 PM _{2.5} Monitor	EQPM-0311-195	195
Horiba APDA-371	EQPM-0308-170	170
Met One BAM-1020 PM-2.5 with VSCC™ or TE-PM2.5C	EQPM-0308-170	170
Met One BAM-1020 PM-2.5 with TE-PM2.5C	EQPM-0308-170	570
Ecotech or Acoem Australasia Spirant BAM1100	EQPM-0308-170	170
Met One BAM-1022 Real Time Beta Attenuation Mass Monitor	EQPM-1013-209	209
Met One BAM-1022 with TE-PM2.5C	EQPM-1013-209	509
BAM-1022-PLUS with VSCC	EQPM-1013-209	210
BAM-1022-PLUS with TE-PM2.5C	EQPM-1013-209	510
Met One BAM-1020 with URG-2000-30EGN Cyclone	EQPM-0715-266	266
Ecotech or Acoem Australasia Spirant BAM1100	EQPM-0715-266	266
Opsis SM200	EQPM-0812-203	203
SWAM 5a Dual Channel Monitor	EQPM-0912-204	204
Teledyne Model 602 Beta ^{PLUS} Particle Measurement System	EQPM-0912-204	204
Teledyne Model T640 PM Mass Monitor	EQPM-0516-236	236
Teledyne T640 PM _{2.5} Mass Monitor with Network Data Alignment enabled	EQPM-0516-236	636
Teledyne Model T640 PM Mass Monitor with 640X option	EQPM-0516-238	238
Teledyne T640x PM _{2.5} Mass Monitor with Network Data Alignment enabled	EQPM-0516-238	638
Thermo Scientific FH62C14-DHS Continuous, 5014i, 5028i, 5014iQ	EQPM-0609-183	183
Thermo Scientific Model 5030i Sharp, 5030 SHARP, 5030iQ SHARP	EQPM-0609-184	184
Thermo Scientific TEOM® 1400a with Series 8500C FDMS®	EQPM-0609-181	181
Thermo Scientific TEOM® 1405-F with FDMS®	EQPM-0609-181	581
Thermo Scientific TEOM® 1405-DF Dichot. with FDMS®	EQPM-0609-182	182

Particulate Matter – PM_{10-2.5}

PM _{10-2.5} Samplers		
Method	Designation No.	Method Code ^b
BGI or Mesa Laboratories, Inc. Model PQ200 PM _{10-2.5} sampler pair	RFPS-1208-173	173
DKK–TOA Models FPM–377C(S), FPM–377C, Particulate Monitor Pair	EQPM-1224-265	265
Met One Instruments, Inc. E-FRM PM _{10-2.5}	RFPS-0316-232	232
Met One Instruments, Inc. E-SEQ-FRM PM _{10-2.5} sampler pair	RFPS-0717-247	247
Thermo Scientific Partisol® 2000-FRM sampler pair, Partisol® 2000 <i>i</i> sampler pair	RFPS-0509-175	175
Thermo Scientific Partisol®-Plus 2025 Seq. sampler pair, Partisol® 2025 <i>i</i> Seq sampler pair	RFPS-0509-176	176
Thermo Scientific Partisol® 2000-D Dichot., Partisol® 2000 <i>i</i> -D Dichot.	EQPS-0509-178	178
Thermo Scientific Dichot. Partisol®-Plus Model 2025-D Seq., Partisol® 2025 <i>i</i> -D Dichot. Seq.	EQPS-0509-180	180
Tisch Environmental Model TE-Wilbur Low-Volume Air Particulate Sampler Pair with WINS	RFPS-1014-220	220
Tisch Environmental Model TE-Wilbur Low-Volume Air Particulate Sampler Pair with VSCC™	RFPS-1014-220	520
Tisch Environmental Model TE-Wilbur Low-Volume Air Particulate Sampler Pair with Tisch TE-PM2.5C cyclone	RFPS-1014-220 or EQPS-0415-224	224

PM _{10-2.5} Monitors		
Method	Designation No.	Method Code ^b
Met One Instruments BAM-1020 System	EQPM-0709-185	185
SWAM 5a Dual Channel Monitor	EQPM-0912-206	206
Teledyne Model 602 Beta ^{PLUS} Particle Measurement System	EQPM-0912-206	206
Teledyne Model T640 PM Mass Monitor with 640X option	EQPM-0516-240	240
Teledyne T640x PM _{10-2.5} Mass Monitor with Network Data Alignment enabled	EQPM-0516-240	640
Thermo Scientific TEOM® 1405-DF with FDMS®	EQPM-1013-207	207

Sulfur Dioxide

SO ₂ Manual Methods		
Method	Designation No.	Method Code ^b
Reference method (pararosaniline)	—	097
Technicon I (pararosaniline)	EQS-0775-001	097
Technicon II (pararosaniline)	EQS-0775-002	097

SO ₂ Analyzers		
Method	Designation No.	Method Code ^b
Advanced Pollution Instr. 100	EQSA-0990-077	077
Advanced Pollution Instr. 100A/100AS	EQSA-0495-100	100
Aeris AE9850, AE2050	EQSA-0193-092	092
Asarco 500	EQSA-0877-024	024
Beckman 953	EQSA-0678-029	029
Bendix 8303	EQSA-1078-030	030
Casella ML9850, ML9850B, CM2050, CM2050B	EQSA-0193-092	092
Columbia Scientific Industries 5700	EQSA-0494-095	095
Dasibi 4108	EQSA-1086-061	061
DKK-TOA Corp. GFS-32	EQSA-0701-115	115
DKK-TOA Corp. GFS-112E, GFS-112E-1	EQSA-0100-133	133
DKK-TOA Corp. GFS-312E, GFS-390	EQSA-1107-168	168
Ecotech or Acoem Australasia ML9850/EC9850, ML9850B/EC9850B	EQSA-0193-092	092
Ecotech or Acoem Australasia EC9850T	EQSA-0193-092	092
Ecotech or Acoem Australasia Serinus 50	EQSA-0809-188	188
ENVEA AF21M	EQSA-0292-084	084
ENVEA AF22M	EQSA-0802-149	149
ENVEA SANO A	EQSA-0400-138	138
Environnement S.A. AF21M	EQSA-0292-084	084
Environnement S.A. AF22M	EQSA-0802-149	149
Environnement S.A. SANO A	EQSA-0400-138	138
Focused Photonics Inc. AQMS-500	RFSA-1219-255	255
Horiba Model APSA-360/APSA-360ACE	EQSA-0197-114	114
Horiba Model APSA-370	EQSA-0506-159	159
Kentek Inc. Mezus 110	RFSA-1120-257	257
Lear Siegler AM2020	EQSA-1280-049	049
Lear Siegler SM1000	EQSA-1275-005	005
Meloy SA185-2A	EQSA-1275-006	006
Meloy SA285E	EQSA-1078-032	032
Meloy SA700	EQSA-0580-046	046
Met One Instruments GAS-1050, Met One Instruments GAS-1050-TL	EQSA-0809-188	188
Monitor Labs 8450	EQSA-0876-013	513
Monitor Labs or Lear Siegler 8850	EQSA-0779-039	039
Monitor Labs or Lear Siegler 8850S	EQSA-0390-075	075
Opsis AB OPS50	EQSA-0809-188	188
Opsis AR 500, System 300 (open path)	EQSA-0495-101	101
Philips PW9700	EQSA-0876-011	511

SO ₂ Analyzers		
Method	Designation No.	Method Code ^b
Philips PW9755	EQSA-0676-010	010
recordum airpointer® system	EQSA-0495-100	100
recordum airpointer® system	EQSA-0486-060	060
SERES SF 2000 G	EQSA-0810-194	194
SIR S.A. S-5001	EQSA-0507-166	166
Sutron Model 6020	RFSA-0616-237	237
Teledyne Advanced Pollution Inst. 100A, 100 AS, 100E, 100EU, T100, T100U, N100	EQSA-0495-100	100
Teledyne Analytical Instruments 6400A	EQSA-0495-100	100
Teledyne Analytical Instruments 6400E	EQSA-0809-188	188
Teledyne Monitor Labs ML9850, ML9850B	EQSA-0193-092	092
Teledyne Monitor Labs TML-50	EQSA-0495-100	100
Thermo Electron 43	EQSA-0276-009	009
Thermo Electron 43A, 43C-TLE, 43i, 43i-TLE, 43iQ, 43iQTL	EQSA-0486-060	060
Thermo Environmental Instruments 43B, 43C	EQSA-0486-060	060
Tisch Environmental Model TE 2.0	EQSA-0809-188	188
Wedding 1040	EQSA-0193-092	092

Ozone

O ₃ Analyzers		
Method	Designation No.	Method Code ^b
2B Technologies Models 202, 205	EQOA-0410-190	190
2B Technologies Models 211, 211-G	EQOA-0514-215	215
2B Technologies Model 106-L, OEM-106-L, OEM-108-L	EQOA-0914-218	218
2B Technologies Model POM	EQOA-0815-227	227
Advanced Pollution Instr. 400/400A/400E	EQOA-0992-087	087
Aeris AE2010/AE9810	EQOA-0193-091	091
Beckman 950A	RFOA-0577-020	020
Bendix 8002	RFOA-0176-007	007
Casella ML9810, ML9810B, ML9811, ML9812, CM2010, CM2010B, CM2011, CM2012	EQOA-0193-091	091
Columbia Scientific Industries 2000	RFOA-0279-036	036
Dasibi 1003-AH, -PC, -RS	EQOA-0577-019	019
Dasibi 1008-AH, -PC, -RS	EQOA-0383-056	056
DKK-TOA Corp. GUX-113E, GUX-113E-1	EQOA-0200-134	134
DKK-TOA Corp. GUX-313E, GUX-390	EQOA-1107-169	169
Ecotech or Acoem Australasia ML9810/EC9810, -9810B, -9811, -9812	EQOA-0193-091	091
Ecotech or Acoem Australasia Serinus 10	EQOA-0809-187	187
EnviroNics 300	EQOA-0990-078	078
ENVEA O ₃ 41M	EQOA-0895-105	105
ENVEA O ₃ 42M	EQOA-0206-148	148
ENVEA SANO A	EQOA-0400-137	137
ENVEA O ₃ 42e	EQOA-0515-225	225
Environnement S.A O ₃ 41M	EQOA-0895-105	105
Environnement S.A O ₃ 42M	EQOA-0206-148	148
Environnement S.A SANO A	EQOA-0400-137	137
Environnement S.A O ₃ 42e	EQOA-0515-225	225
Focused Photonics Inc. AQMS-300, AQMS-300M	EQOA-0719-253	253
Horiba APOA-360	EQOA-0196-112	112
Horiba APOA-370 or APOA-380	EQOA-0506-160	160
KENTEK Inc. Model MEZUS 410	EQOA-0219-251	251
McMillan 1100-1	RFOA-1076-014	014
McMillan 1100-2	RFOA-1076-015	015
McMillan 1100-3	RFOA-1076-016	016
Meloy OA325-2R	RFOA-1075-003	003
Meloy OA350-2R	RFOA-1075-004	004
Met One Instruments GAS-1010	EQOA-0809-187	187
Monitor Labs 8410E	RFOA-1176-017	017
Monitor Labs or Lear Siegler 8810	EQOA-0881-053	053
Opsis AB OPS10	EQOA-0809-187	187
Opsis AR 500, System 300 (open path)	EQOA-0495-103	103
PCI Ozone Corp. LC-12	EQOA-0382-055	055
Philips PW9771	EQOA-0777-023	023
recordum airpointer® system	EQOA-0992-087	087
recordum airpointer® system	EQOA-0880-047	047
Seres Model OZ 2000 G	EQOA-0506-161	161
SIR S.A. S-5014	EQOA-0207-164	164
Sutron Model 6030	EQOA-0415-222	222

O ₃ Analyzers		
Method	Designation No.	Method Code ^b
Tanabyte 722, 723, 724, 725, 726	EQOA-0407-165	165
Teledyne Advanced Pollution Instr. 265E, T265	EQOA-0611-199 or RFOA-0216-230	199
Teledyne Advanced Pollution Instr. 400, 400A, 400E, T400, N400	EQOA-0992-087	087
Teledyne Advanced Pollution Instr. T204	EQOA-0514-214	214
Teledyne Advanced Pollution Instr. Model 430	EQOA-1015-229	229
Teledyne Monitor Labs ML9810/9810B, ML9811, ML9812	EQOA-0193-091	091
Teledyne Monitor Labs TML-10	EQOA-0992-087	087
Thermo Electron or Thermo Environmental Instruments 49, 49C, 49i, 49iQ	EQOA-0880-047	047
Tisch Environmental TE 1.0	EQOA-0809-187	187
Vasthi Instruments Model Vair-9004 O ₃ Analyzer	EQOA-0424-263	263
Wedding 1010	EQOA-0193-091	091

Carbon Monoxide

CO Analyzers		
Method	Designation No.	Method Code ^b
Aeris AE9830, AE2030	RFCA-0992-088	088
Beckman 866	RFCA-0876-012	012
Bendix 8501-5CA	RFCA-0276-008	008
Casella ML9830, ML9830B, CM2030, CM2030B	RFCA-0992-088	088
Dasibi 3003	RFCA-0381-051	051
Dasibi 3008	RFCA-0488-067	067
DKK-TOA Corp. GFC-311E, GFC-390	RFCA-0907-167	167
Ecotech or Acoem Australasia Serinus 30	RFCA-0509-174	174
Ecotech or Acoem Australasia ML9830/EC9830, ML9830B/EC9830B	RFCA-0992-088	088
Ecotech or Acoem Australasia EC9830T	RFCA-0992-088	088
ENVEA CO11M	RFCA-0995-108	108
ENVEA CO12M	RFCA-0206-147	147
ENVEA CO12e	RFCA-0915-228	228
Environnement S.A CO11M	RFCA-0995-108	108
Environnement S.A CO12M	RFCA-0206-147	147
Environnement S.A CO12e	RFCA-0915-228	228
Focused Photonics Inc. AQMS-400	RFCA-0419-252	252
Horiba AQM-10, -11, -12	RFCA-1278-033	033
Horiba 300E/300SE	RFCA-1180-048	048
Horiba APMA-360	RFCA-0895-106	106
Horiba APMA-370	RFCA-0506-158	158
KENTEK Inc. Model MEZUS 310	RFCA-0317-244	244
MASS – CO 1 (Massachusetts)	RFCA-1280-050	050
Met One Instruments GAS-1030 or Met One Instruments GAS-1030-TL	RFCA-0509-174	174
Monitor Labs 8310	RFCA-0979-041	041
Monitor Labs or Lear Siegler 8830	RFCA-0388-066	066
MSA 202S	RFCA-0177-018	018
Opsis AB OPS 30	RFCA-0509-174	174
Peak Laboratories Model 910-170	EQCA-0814-217	217
recordum airpointer® system	RFCA-1093-093	093
recordum airpointer® system	RFCA-0981-054	054
SIR S.A. Model S-5006	RFCA-0708-172	172
Sutron Corp. Model 6050	RFCA-0817-248	248
Teledyne Adv. Pollution Instr. 300, 300E, 300EU, T300, T300U, N300	RFCA-1093-093	093
Teledyne Analytical Instruments GFC7001E	RFCA-0509-174	174
Teledyne Monitor Labs ML9830/9830B	RFCA-0992-088	088
Teledyne Monitor Labs TML-30	RFCA-1093-093	093
Thermo Electron or Thermo Environmental Instruments 48, 48C, 48CTLE, 48i, 48/TLE, 48iQ, 48iQTL	RFCA-0981-054	054
Tisch Environmental Model TE 3.0	RFCA-0509-174	174
Wedding 1020	RFCA-0992-088	088

Nitrogen Dioxide

NO ₂ Manual Methods		
Method	Designation No.	Method Code ^b
Sodium arsenite (orifice)	EQN-1277-026	084
Sodium arsenite/Technicon II	EQN-1277-027	084
TGS-ANSA (orifice)	EQN-1277-028	098

NO ₂ Analyzers		
Method	Designation No.	Method Code ^b
2B Technologies Model 405 nm	EQNA-0217-243	243
Advanced Pollution Instr. 200	RFNA-0691-082	082
Advanced Pollution Instr. 200A/200AU	RFNA-1194-099	099
Aeris AE9841, AE2041	RFNA-1292-090	090
Beckman 952A	RFNA-0179-034	034
Bendix 8101-B	RFNA-0479-038	038
Bendix 8101-C	RFNA-0777-022	022
Casella ML9841, ML9841A, ML9841B, CM2041, CM2041A, CM2041B	RFNA-1292-090	090
Columbia Scientific Indust. 1600, 5600	RFNA-0977-025	025
Dasibi 2108	RFNA-1192-089	089
DKK-TOA Corp GLN-114E, GLN-114E-1	RFNA-0798-121	121
DKK-TOA Corp GLN-314E, GLN-390	RFNA-0508-171	171
Ecotech or Acoem Australasia ML9841A/EC9841A, ML9841B/EC9841B	RFNA-1292-090	090
Ecotech or Acoem Australasia EC9841T	RFNA-1292-090	090
Ecotech or Acoem Australasia Serinus 40	RFNA-0809-186	186
Ecotech or Acoem Australasia Serinus 44	RFNA-0809-186	186
Ecotech or Acoem Australasia Serinus 60	EQNA-0217-242	242
ENVEA AC31M	RFNA-0795-104	104
ENVEA AC32M	RFNA-0202-146	146
ENVEA AC32e, AC32e*	RFNA-0118-249	249
ENVEA SANO A	EQNA-0400-139	139
ENVEA AS32M	EQNA-1013-210	210
Environnement S.A. AC31M	RFNA-0795-104	104
Environnement S.A. AC32M	RFNA-0202-146	146
Environnement S.A. AC32e, AC32e*	RFNA-0118-249	249
Environnement S.A. SANO A	EQNA-0400-139	139
Environnement S.A. AS32M	EQNA-1013-210	210
Focused Photonics Inc. AQMS-600	RFNA-0819-254	254
Horiba APNA-360	RFNA-0196-111	111
Horiba APNA-370 or Horiba APNA-380	RFNA-0506-157	157
KENTEK Inc. MEZUS 210	RFNA-1221-259	259
Meloy NA530R	RFNA-1078-031	031
Met One Instruments GAS-1040, Met One Instruments GAS-1044, Met One Instruments GAS-1040-TL	RFNA-0809-186	186
Met One Instruments GAS-1060	EQNA-0217-242	242
Monitor Labs 8440E	RFNA-0677-021	021
Monitor Labs or Lear Siegler 8840	RFNA-0280-042	042
Monitor Labs or Lear Siegler 8841	RFNA-0991-083	083

NO ₂ Analyzers		
Method	Designation No.	Method Code ^b
Monitor Labs ML9841	RFNA-1292-090	090
Opsis AB OPS40	RFNA-0809-186	186
Opsis AR 500, System 300 (open path)	EQNA-0495-102	102
Philips PW9762/02	RFNA-0879-040	040
recordum airpointer system	RFNA-1194-099	099
recordum airpointer system	RFNA-1289-074	074
Sabio Model 6040 NO/NO ₂ /NO _x	RFNA-0418-250	250
Seres Model NO _x 2000 G	RFNA-0706-163	163
SIR S.A. S-5012	RFNA-0804-152	152
Teledyne Advanced Pollution Inst. 200A, 200AU, 200E, 200EU, T200, T200U, T204, N200	RFNA-1194-099	099
Teledyne Advanced Pollution Inst. N500 CAPS	EQNA-0320-256	256
Teledyne Advanced Pollution Inst. T500U	EQNA-0514-212	212
Teledyne Advanced Pollution Inst. 200EUP, T200UP	EQNA-0512-200	200
Teledyne Advanced Pollution Inst. T200P	EQNA-1016-241	241
Teledyne Analytical Instruments 9110A, 9110E, 9110T	RFNA-1194-099	099
Teledyne Analytical Instruments 9110E	RFNA-0809-186	186
Teledyne Monitor Labs ML9841, ML9841A, ML9841B	RFNA-1292-090	090
Teledyne Monitor Labs TML-41	RFNA-1194-099	099
Thermo Electron or Thermo Environmental Instruments 14B/E	RFNA-0179-035	035
Thermo Electron or Thermo Environmental Instruments 14D/E	RFNA-0279-037	037
Thermo Environmental Instr. 42, 42C, 42i, 42i-TL 42iQ	RFNA-1289-074	074
Tisch Environmental Model TE 4.0	RFNA-0809-186	186
Wedding 1030	RFNA-1292-090	090

Lead

Pb Manual Methods		
Method	Designation No.	Method Code ^b
Hi-vol/AAS (alt. extr.)	EQL-0380-043	043
Hi-vol/Energy-disp XRF (TX ACB)	EQL-0783-058	058
Hi-vol/Energy-disp XRF (NEA)	EQL-0589-072	072
Hi-vol/FAAS	EQLA-0813-803	803
Hi-vol/Flameless AA (EMSL/EPA)	EQL-0380-044	044
Hi-vol/Flameless AA (Houston)	EQL-0895-107	107
Hi-vol/Flameless AA (Omaha)	EQL-0785-059	059
Hi-vol/ICAP-OES (Doe Run Co.)	EQL-0196-113	113
Hi-vol/ICAP-OES (EMSL/EPA)	EQL-0380-045	045
Hi-vol/ICAP-OES (Illinois)	EQL-1193-094	094
Hi-vol/ICAP-OES (Kansas)	EQL-0592-085	085
Hi-vol/ICAP-OES (Montana)	EQL-0483-057	057
Hi-vol/ICAP-OES (NE&T)	EQL-1188-069	069
Hi-vol/ICAP-OES (New Hampshire)	EQL-1290-080	080
Hi-vol/ICAP-OES (Pennsylvania)	EQL-0592-086	086
Hi-vol/ICAP-OES (Pima Co.,AZ)	EQL-0995-109	109
Hi-vol/ICAP-MS (Pima Co.,AZ)	EQL-0995-110	110
Hi-vol/ICAP-OES (Rhode Island)	EQL-0888-068	068
Hi-vol/ICAP-OES (Silver Val. Labs)	EQL-1288-070	070
Hi-vol/ICAP-AES (TNRCC)	EQL-0400-140	140
Hi-vol/ICAP-OES (West Virginia)	EQL-0694-096	096
Hi-vol/WL-disp. XRF (CA A&IHL)	EQL-0581-052	052
Hi-vol/ICP-MS (IML, Inc)	EQL-0310-189	189
Hi-Vol/ICP-MS (US EPA/OAQPS)	EQL-0510-191	191
Hi-Vol/ICP-MS (US EPA/Region 9)	EQL-0710-192	192
Hi-Vol/ICP-AES (US EPA/OAQPS)	EQL-0311-196	196
Hi-Vol/ICP-MS (ERG)	EQL-0512-201	201
PM ₁₀ /ICP-MS (ERG)	EQL-0512-202	202
Hi-Vol/TOF ICP-MS (SCAQMD)	EQL-0514-213	213
Hi-Vol/Quadrupole ICP-MS (SCAQMD)	EQL-0723-261	261

Sources or Contacts for Designated Reference and Equivalent Methods**2B Technologies, Inc.**

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Advanced Pollution Instrumentation, Inc.

[Refer to Teledyne Advanced Pollution Instrumentation]

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Andersen Instruments

[Refer to Thermo Fisher Scientific, Inc.]

ASARCO Incorporated

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Beckman Instruments, Inc.

Process Instruments Division
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Bendix

[Refer to ABB Process Analytics]

BGI Incorporated

(Refer to Mesa Labs, Inc.)

Casella Monitor

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www.casellameasurement.com

Columbia Scientific Industries

11950 Jollyville Road
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Combustion Engineering

[Refer to ABB Process Analytics]

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[Refer to Acoem Australasia]

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Environnement S.A.)**

111 Bd Robespierre – CS 80004
78300 Poissy Cedex 4 – FRANCE
Phone: + 33 1 3922 3800
www.envea.global
Email: info@envea.global

Instruments also available from:

ENVEA Inc. (former Altech Environment USA)
2623 Kaneville Court,
Geneva, IL 60134 – USA
Phone : (63) 262 4400
Email: sales.usa@envea.global

Environics, Inc.

69 Industrial Park Rd. E.
Tolland, CT 06084-2805
(203) 429-0077
www.environics.com

FAI Instruments S.R.L

Via Aurora, 15 -00013 Fonte Nuova
Rome, Italy
(+39) 06.9050248
www.fai-instruments.it

Focused Photonics Inc. (FPI)

760 Bin'an Rd, Binjiang District
Hangzhou, Zhejiang, China 310052
(+86) 400-7007-555
tech_support@fpi-inc.com
www.fpi-inc.com/en

Graseby GMW

[Refer to Thermo Fisher Scientific, Inc.]

GRIMM Aerosol Technik

Ainring GmbH & Co. KG
(Headquarters)
Dorfstrasse 9
83404 Ainring, Germany
49 8654 578-0
www.grimm-aerosol.com

GRIMM Aerosol

(U.S. Office).
P.O. Box 6358
Douglasville, GA 30153
(770) 577-0853
www.grimm-aerosol.com

Horiba Instruments Incorporated

17671 Armstrong Avenue
Irvine, CA 92714
(800) 446-7422
www.horiba.com

Inter-Mountain Labs, Inc.

1673 Terra Avenue
Sheridan, WY 82801
(307) 672-8945
www.intermountainlabs.com

KENTEK Inc.

Hanshin S Meca room #526
65 Techno 3-ro, Yuseong-gu
Daejeon, Republic of Korea, 34016
www.kentek.co.kr

Lear Siegler

[Refer to Teledyne Monitor Labs, Inc.]

Commonwealth of Massachusetts

Department of Environmental
Quality Engineering
Tewksbury, MA 01876

Mesa Laboratories Inc.

10 Park Place
Butler, NC 07405
(973) 492-8400
www.mesalabs.com

Met One Instruments, Inc.

1600 Washington Blvd.
Grants Pass, OR 97526
(541) 471-7111
www.metone.com (metone@metone.com)

McMillan

[Refer to Columbia Scientific Industries]

Mine Safety Appliances

600 Penn Center Blvd.
Pittsburgh, PA 15235-5810
(412) 273-5101

Monitor Labs, Inc.

[Refer to Teledyne Monitor Labs, Inc.]

New Star Environmental, LLC

3293 Ashburton Chase NE
Roswell, GA 30075
(770) 998-2590

Opsis AB

Box 244
SE-244 02 Furulund
Sweden
+46 46 72 25 00
www.opsis.se

Instruments also available from

Opsis, Inc.

150 N. Michigan Ave., Suite 1950
Chicago, IL 60601
(312) 447-7733

State of Oregon

Department of Environmental Quality
Air Quality Division
811 S.W. Sixth Avenue
Portland, OR 97204

PCI Ozone Corp.

One Fairfield Crescent
West Caldwell, NJ 07006
(201) 575-7052
www.pci-wedeco.com

Peak Laboratories, LLC

2330 Old Middlefield Way Suite 10
Mountain View, CA 94043
650-691-1267
www.peaklaboratories.com

Phillips Electronic Instruments, Inc.

85 McKee Drive
Mahwah, NJ 07430

Recordum Messtechnik GmbH

Haus 1/Top 403
Triester Str. 14
A-2351 Wiener Neudorf
Austria
www.recordum.com

Rupprecht & Patashnick Co., Inc.

[Refer to Thermo Fisher Scientific, Inc.]

Sibata Scientific Technology, Ltd.

1-25, 3-chome
Ikenohata, Taito-ku
Tokyo 110, Japan
81-3(3822)2272
TTani@email.msn.com

Seres

360 Rue Louis de Broglie
La Duranne - BP 87000
13793 Aix en Provence - Cedex 3
France
+33 (0)4 42 97 37 37
www.seres-france.com

SIR S.A. (Sistemas Instalaciones y Redes, S.A.)

Avenida de la Industria, 3
Tres Cantos 28760 Madrid, SPAIN
(+34) 91 803 66 02
www.sirsa.es

SIR USA

826 West Braddock Road
Alexandria, VA 22302-3605
(703) 837-1883

South Coast Air Quality Management District

21865 Copley Drive
Diamond Bar, CA 91765-4182
(909) 396-2269
jlow@aqmd.gov

Sutron Air Quality Division

[Refer to Sabio Environmental, LLC]

Sabio Environmental, LLC

21 Cypress Blvd., Suite 1130
Round Rock, TX 78665
512-869-0544
www.sabio.com
sales@sabio.com

Tanabyte Engineering, Inc.

1210 West Burbank Blvd., Suite B,
Burbank, CA 91506
(818) 842-4022
www.tanabyte.com

Teledyne Advanced Pollution Instrumentation

9970 Carroll Canyon Rd, Suite A
San Diego, CA 92131
(858) 657-9800
www.teledyne-api.com

Teledyne Analytical Instruments

16830 Chestnut Street
City of Industry, CA 91748
(626) 934-1622

Teledyne Monitor Labs, Inc.

74 Inverness Drive East
Englewood, CO 80112-5189
(303) 792-3300
www.teledyne-ml.com

Thermo Electron Corporation

[Refer to Thermo Fisher Scientific, Inc.]

Thermo Environmental Instruments, Inc.

[Refer to Thermo Fisher Scientific, Inc.]

Thermo Fisher Scientific, Inc.**Air Quality Instruments**

27 Forge Parkway
Franklin, MA 02038
1-508-520-0430
www.thermo.com/aqi

Tisch Environmental, Inc.

145 S. Miami Avenue
Village of Cleves, OH 45002
(513) 467-9000
www.tisch-env.com

URG Corporation

116 Merritt Mill Road
Chapel Hill, NC 27516
(919) 942-2753

U.S. EPA

Center for Environmental Measurements & Modeling
Air Methods & Characterization Division
Ambient Air Branch
(MD D205-03)
Research Triangle Park, NC 27711
(919) 541- 7877
vanderpool.robert@epa.gov

U.S. EPA

Office of Air and Radiation
Air Quality Assessment Division
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

U.S. EPA

Region 9 Laboratory
1337 South 46th Street, Bldg 201
Richmond, CA 94804

Vasthi Instruments Pvt.Ltd

Phase IV, Auto Nagar
Guntur, Andhra Pradesh, India, -522002
+91 863-2253 667

We Care 4 Air Ltd

Units 4, 5, 6 Parklands Business Centre
Leaden Roding
Essex, England, CM6 1GF
+44 (0)203-751-4939
www.wecare4air.com

Wedding and Associates, Inc.

[Refer to Thermo Fisher Scientific, Inc.]

Exhibit A - Continuous Particulate Matter Beta Attenuation Mass Monitors and Supplies

The following shall be provided according to the contract terms and conditions contained herein. Price must be provided for all the following in whole. Please note these are estimates and reflect any guarantee of purchase. WVDEP DAQ may purchase more or less as needed.

Item	Specification No.	Product Code or equal (1)	(1) Product Code if different	Description	Estimated Quantity	Unit Price
1	3.1.1	BAM 1022		Continuous PM2.5 OR PM10 BETA ATTENUATION MONITOR - OUTDOOR CONFIGURATION AUTOMATED MEETING EPA FEDERAL EQUIVALENT METHOD (FEM) EQUIVALENT METHOD EQPM-1013-209. With 110 VAC Pump Box. Includes Calibration to Standard. New Calibration Certificate traceable to NIST Standards	15	\$ 24,700.00
2	3.1.1	BX-141 (order with BAM)		110 VAC Pump Box (for BAM 1022 to be FEM complete)	15	
3	3.1.1.13, 3.1.2.12	EXT Warranty		2-Year Extended Warranty from date of acceptance for BAM 1022 or BAM1020. Must consist of complete coverage of system onsite, parts, and labor.	17	\$ 437.00
4	3.1.2	BAM 1020		PM2.5 OR PM10 CONTINUOUS BETA ATTENUATION MONITOR - AUTOMATED MEETING EPA FEDERAL EQUIVALENT METHOD (FEM) EQUIVALENT METHOD EQPM-0308-170. Includes Calibration to Standard. New Calibration Certificate traceable to NIST Standards	2	\$ 20,100.00
5	3.1.2	PM2.5A-FEM-KIT (order with BAM 1020)		Accessory Kit, FEM PM2.5 BGI Very Sharp Cut Cyclone for PM2.5 OR PM10 CONTINUOUS MONITOR - AUTOMATED MEETING EPA FEDERAL EQUIVALENT METHOD (FEM) EQUIVALENT METHOD EQPM-0308-170. Includes Zero Calibrator with Adaptors (BX-302); Digital Temperature, Relative Humidity, BP combination sensor with 25 foot cable (BX-597A); valve plus HEPA filter (BX-302); 120 Volt, 60 Hertz	2	\$ 5,900.00
6	3.1.2	BX-827 (order with BAM 1020)		Moisture Controlled Inlet Heater, 115V (Smart Heater)	2	\$ 1,075.00
7	3.1.2	BX-126 (order with BAM 1020)		Pump, Medo 115 VAC±10% 60 HZ. This is also the replacement pump for BAM-1020.	2	\$ 2,100.00
Supplies						
8	3.1.3	460180		Filter tape, glass fiber, 25M long, 30MM wide (may be used for BAM 1022 or BAM 1020)	270	\$ 90.00
9	3.1.3	82044		Replacement pump assembly, MEDO, 120V, BAM 1022 or equal (spare pumps)	15	\$ 1,400.00
10	3.1.3	680839		Pump Rebuild Kit (MEDO) for BAM 1022 or equal	15	\$ 225.00
11	3.1.3	680828		Gast Pump rebuild Kit for BAM 1020 or equal	2	\$ 252.00
12	3.1.3	460134		BX-302 zero filter calibration kit	6	\$ 360.00
13	3.1.3	BX-126 (order with BAM 1020)		Pump, Medo 115 VAC±10% 60 HZ (replacement for BAM 1020 pump)	15	\$ 2,100.00
14	3.1.3	SWIFT 25.0		Multi-Function Flow Meter	1	\$ 3,300.00
15	3.1.3	30030-1		Spare circuit boards for BAM 1022 or equal (Core Processor PCBA) for BAM 1022 or equal	3	\$ 1,015.00
16	3.1.3	82970-1		Spare I/O wiring panel, PCBA for BAM 1022 or equal	3	\$ 600.00
17	3.1.3	580345		Filter, vacuum line	10	\$ 20.00
18	3.1.3	7440		Rubber Leak Test Nozzle Seal Tool	10	\$ 20.00
19	3.1.3	9122		O-Ring Kit, Inlet tube receiver and nozzle	15	\$ 35.00
20	3.1.3	80324		Internal flow sensor	3	\$ 410.00
21	3.1.3	BX-344		BAM Inlet Cleaning Kit	6	\$ 125.00
22	3/1/10	----		In-house training at no additional cost.	1	
23	3.1.5			Freight Shipping Cost per BAM 1022, BAM 1020, or for supplies *	17 (monitors) 50 (supplies)	\$ 8,775.00

23	3.1.3	----		* Note: All shipping and freight charges will be paid based on actual expenses.		\$ 5,770.00
					Total Bid Amount	

led quantities and do not
Total Cost Per Item
\$ 370,500.00
\$ -
\$ 7,429.00
\$ 40,200.00
\$ 11,800.00
\$ 2,150.00
\$ 4,200.00
\$ 24,300.00
\$ 21,000.00
\$ 3,375.00
\$ 504.00
\$ 2,160.00
\$ 31,500.00
\$ 3,300.00
\$ 3,045.00
\$ 1,800.00
\$ 200.00
\$ 200.00
\$ 525.00
\$ 1,230.00
\$ 750.00
¢

₹	-
\$	530,168.00



Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Centralized Request for Quote
Equipment

Proc Folder: 1828241			Reason for Modification:
Doc Description: Continuous Particulate Matter Beta Attenuation Mass Monitors			
Proc Type: Central Master Agreement			
Date Issued	Solicitation Closes	Solicitation No	Version
2025-11-06	2025-11-20 13:30	CRFQ 0313 DEP2600000014	1

BID RECEIVING LOCATION

BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR

Vendor Customer Code: 230863
Vendor Name: MET ONE INSTRUMENTS, INC
Address: 200 NE GREENFIELD ROAD
Street:
City: GRANTS PASS
State: OREGON Country: USA Zip: 97526
Principal Contact: DAVID GILMORE
Vendor Contact Phone: 541.471.7111 Extension: 421

FOR INFORMATION CONTACT THE BUYER

Joseph (Josh) E Hager III
(304) 558-2306
joseph.e.hageriii@wv.gov

Vendor
Signature X

FEIN#

93-1007023

DATE

11/19/2025

All offers subject to all terms and conditions contained in this solicitation

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.: DEP2600000014

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

- ☒ Addendum No. 1
- ☐ Addendum No. 2
- ☐ Addendum No. 3
- ☐ Addendum No. 4
- ☐ Addendum No. 5

- ☐ Addendum No. 6
- ☐ Addendum No. 7
- ☐ Addendum No. 8
- ☐ Addendum No. 9
- ☐ Addendum No. 10

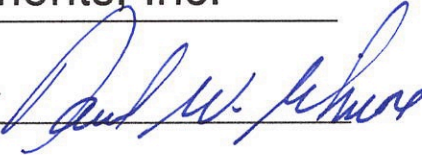
I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Met One Instruments, Inc.

Company

David W. Gilmore

Authorized Signature



11/19/2025

Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

(Printed Name and Title) David Gilmore

(Address) 200 NE Greenfield Rd, Grants Pass, OR 97526

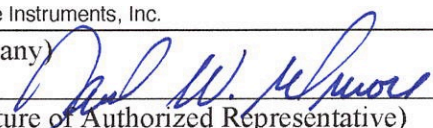
(Phone Number) / (Fax Number) 541.471.7111 X 421 / 541.471.7115

(email address) david.gilmore@acoem.com

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that: I have reviewed this Solicitation/Contract in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation/Contract for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that this bid or offer was made without prior understanding, agreement, or connection with any entity submitting a bid or offer for the same material, supplies, equipment or services; that this bid or offer is in all respects fair and without collusion or fraud; that this Contract is accepted or entered into without any prior understanding, agreement, or connection to any other entity that could be considered a violation of law; that I am authorized by the Vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on Vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

By signing below, I further certify that I understand this Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law; and that pursuant to W. Va. Code 5A-3-63, the entity entering into this contract is prohibited from engaging in a boycott against Israel.

Met One Instruments, Inc.

(Company) 

(Signature of Authorized Representative)

David Gilmore - Business Development Manager - N.A. /Eastern region Sales Manager 11/19/2025

(Printed Name and Title of Authorized Representative) (Date)

541.471.7111 X 421 / 541.471.7115

(Phone Number) (Fax Number)

david.gilmore@metone.com

(Email Address)

REQUEST FOR QUOTATION
Continuous Particulate Matter Beta Attenuation Mass Monitors and Supplies

7.2.3 Any other remedies available in law or equity.

8. MISCELLANEOUS:

- 8.1 No Substitutions:** Vendor shall supply only Contract Items submitted in response to the Solicitation unless a contract modification is approved in accordance with the provisions contained in this Contract.
- 8.2 Vendor Supply:** Vendor must carry sufficient inventory of the Contract Items being offered to fulfill its obligations under this Contract. By signing its bid, Vendor certifies that it can supply the Contract Items contained in its bid response.
- 8.3 Reports:** Vendor shall provide quarterly reports and annual summaries to the Agency showing the Agency's items purchased, quantities of items purchased, and total dollar value of the items purchased. Vendor shall also provide reports, upon request, showing the items purchased during the term of this Contract, the quantity purchased for each of those items, and the total value of purchases for each of those items. Failure to supply such reports may be grounds for cancellation of this Contract.
- 8.4 Contract Manager:** During its performance of this Contract, Vendor must designate and maintain a primary contract manager responsible for overseeing Vendor's responsibilities under this Contract. The Contract manager must be available during normal business hours to address any customer service or other issues related to this Contract. Vendor should list its Contract manager and his or her contact information below.

Contract Manager: DAVID GILMORE
Telephone Number: 541.471.7111 X 421
Fax Number: 541.471.7115
Email Address: DAVID.GILMORE@ALCOEM.COM

Exhibit A - Continuous Particulate Matter Beta Attenuation Mass Monitors and Supplies

The following shall be provided according to the contract terms and conditions contained herein. Price must be provided for all the following in whole. Please note these are estimated quantities and do not reflect any guarantee of purchase. WVDEP DAQ may purchase more or less as needed.

Item	Specification No.	Product Code or equal (1)	(1) Product Code if different	Description	Estimated Quantify	Unit Price	Total Cost Per Item
1	3.1.1	BAM 1022		Continuous PM2.5 OR PM10 BETA ATTENUATION MONITOR - OUTDOOR CONFIGURATION AUTOMATED MEETING EPA FEDERAL EQUIVALENT METHOD (FEM) EQUIVALENT METHOD EQPM-1013-209. With 110 VAC Pump Box. Includes Calibration to Standard. New Calibration Certificate traceable to NIST Standards	15		
2	3.1.1	BX-141 (order with BAM 1022)		110 VAC Pump Box (for BAM 1022 to be FEM complete)	15		
3	3.1.1.13, 3.1.2.12	EXT Warranty		2-Year Extended Warranty from date of acceptance for BAM 1022 or BAM1020. Must consist of complete coverage of system onsite, parts, and labor.	17		
4	3.1.2	BAM 1020		PM2.5 OR PM10 CONTINUOUS BETA ATTENUATION MONITOR - AUTOMATED MEETING EPA FEDERAL EQUIVALENT METHOD (FEM) EQUIVALENT METHOD EQPM-0308-170. Includes Calibration to Standard. New Calibration Certificate traceable to NIST Standards	2		
5	3.1.2	PM2.5A-FEM-KIT (order with BAM 1020)		Accessory Kit, FEM PM2.5 BGI Very Sharp Cut Cyclone for PM2.5 OR PM10 CONTINUOUS MONITOR - AUTOMATED MEETING EPA FEDERAL EQUIVALENT METHOD (FEM) EQUIVALENT METHOD EQPM-0308-170. Includes Zero Calibrator with Adaptors (BX-302); Digital Temperature, Relative Humidity, BP combination sensor with 25 foot cable (BX-597A); valve plus HEPA filter (BX-302); 120 Volt, 60 Hertz	2		
6	3.1.2	BX-827 (order with BAM 1020)		Moisture Controlled Inlet Heater, 115V (Smart Heater)	2		
7	3.1.2	BX-126 (order with BAM 1020)		Pump, Medo 115 VAC±10% 60 HZ. This is also the replacement pump for BAM-1020.	2		
				Supplies			
8	3.1.3	460180		Filter tape, glass fiber, 25M long, 30MM wide (may be used for BAM 1022 or BAM 1020)	270		
9	3.1.3	82044		Replacement pump assembly, MEDO, 120V, BAM 1022 or equal (spare pumps)	15		
10	3.1.3	680839		Pump Rebuild Kit (MEDO) for BAM 1022 or equal	15		
11	3.1.3	680828		Gast Pump rebuild Kit for BAM 1020 or equal	2		
12	3.1.3	460134		BX-302 zero filter calibration kit	6		
13	3.1.3	BX-126 (order with BAM 1020)		Pump, Medo 115 VAC±10% 60 HZ (replacement for BAM 1020 pump)	15		
14	3.1.3	SWIFT 25.0		Multi-Function Flow Meter	1		
15	3.1.3	30030-1		Spare circuit boards for BAM 1022 or equal (Core Processor PCBA) for BAM 1022 or equal	3		
16	3.1.3	82970-1		Spare I/O wiring panel, PCBA for BAM 1022 or equal	3		
17	3.1.3	580345		Filter, vacuum line	10		
18	3.1.3	7440		Rubber Leak Test Nozzle Seal Tool	10		
19	3.1.3	9122		O-Ring Kit, Inlet tube receiver and nozzle	15		
20	3.1.3	80324		Internal flow sensor	3		
21	3.1.3	BX-344		BAM Inlet Cleaning Kit	6		
22	3.1.10	----		In-house training at no additional cost.	1		
23	3.1.5	----		Freight Shipping Cost per BAM 1022, BAM 1020, or for supplies *	17 (monitors)		
				* Note: All shipping and freight charges will be paid based on actual expenses.	50 (supplies)		
					Total Bid Amount		

SEE EXHIBIT A

David W. McNamee
11/19/25



POWERED BY ACOEM

200 NE Greenfield Rd.
Grants Pass OR 97526
Voice: (541) 471-7111
Fax: (541)-471-7116
www.metone.com

WEST VIRGINIA DEPT OF ENVIRONMENTAL PROTECTION Renu Chakrabarty 601 57TH STREET SE DIVISION OF AIR QUALITY CHARLESTON WV USA 25304	Quotation # 53195 Rev: B Date: 11/19/2025 Quotation Firm: 60 Days Payment Terms: N30 OAC or Prepay Ship Date: 7 - 10 Weeks ARO Delivery Terms : Ex works Documentation & Handling Please Reference Quote Number 53195 On Document When Ordering
--	--

Please Send Purchase Order by email to the Met One Instruments Order Desk, orderdesk.moi@acoem.com

Line Qty	Item#	Description	Price	Extension
1		Quote for BAM 1022s (15), BAM 1020s (2) & Spares		
2				
3	15	BAM 1022	BETA ATTENUATION PARTICULATE MONITOR, PM2.5	24,700.00
4		INCLUDED STANDARD ACCESSORIES: BX-802 PM 10 INLET BX-808 VSCC 80559 TUBE HEATER 9123-2 INLET TUBE HEATER INSULATION SLEEVE 8112-2.25 INLET TUBE 27 INCHES BX-597A AMBIENT COMBO AT, BP, RH SENSOR 460185 FILTER TAPE (1 ROLL) 83035 ACCESSORY KIT		370,500.00
5	15	BX-141	BAM 1022 110 VAC MEDO PUMP BOX	0.00
6				0.00
7	17	EXT. WARRANTY	2-YEAR EXTENDED WARRANTY FROM DATE OF ACCEPTANCE - ONSITE PARTS & LABOR	1,000.00
8				17,000.00
9	N	BAM W/ TOUCH SCREEN, FEM PM2.5A, 120V, 50HZ		
10	2	BAM 1020	BAM 1020 W/ TOUCH SCREEN, PM__, _V, _HZ	20,100.00
11	2	PM2.5A-FEM-KIT	ACCESSORIES FOR FEM PM 2.5 - BGI VSCC	5,900.00
12		INCLUDES THE FOLLOWING: BX-302 ZERO CALIBRATOR WITH ADAPTERS BX-597A AT/RH/BP COMBO SENSOR (25' DIGITAL CABLE P/N 82929-25 INCL. IN 83437 ASSY. KIT) BX-801 INLET SYSTEM W/SUPPORT BRACES BX-802 PM-10 SAMPLING INLET BX-808 PM 2.5 VSCC		11,800.00
13	2	BX-827	MOISTURE CONTROLLED INLET HEATER, 115V (SMART HEATER)	1,075.00
14	2	BX-126	PUMP, MEDO 115VAC $\pm 10\%$, 60Hz, BAM 1020	2,100.00
15				4,200.00
16		Supplies		
17	270	460180	FILTER TAPE, GLASS FIBER, 25M LONG, 30MM WIDE	90.00
18	15	82044	REPLACEMENT PUMP ASSY., MEDO, 120V, BAM 1022	1,400.00
19	15	680839	PUMP REBUILD KIT (MEDO)	225.00
20	2	680828	PUMP SERVICE KIT (GAST)	252.00
21	6	460134	REPLACEMENT 0.2 μ m FILTER ELEMENT FOR BX-302	360.00
22	15	BX-126	PUMP, MEDO 115VAC $\pm 10\%$, 60Hz, BAM 1020	2,100.00
23	1	SWIFT 25.0	MULTI-FUNCTION FLOW CALIBRATOR	3,300.00
24	3	30030-1	REPLACEMENT CPU BOARD ASSY MUST PROVIDE SERIAL NUMBER WHEN ORDERING THIS PART	1,015.00
25	3	82970-1	I/O WIRING PANEL, PCBA	600.00
26	10	580345	FILTER ELEMENT, VACUUM, 5 MICRON, IN-LINE	20.00
27	10	7440	RUBBER NOZZLE SEAL TOOL - BAM	20.00

Quote By: David W. Gilmore

Total:(US\$) 549,515.00

28	15	9122	INLET O-RING REPLACEMENT KIT - BAM 1020	35.00	525.00
29	3	80324	FLOW SENSOR, 20SLPM - BAM 1020	410.00	1,230.00
30	6	BX-344	BAM INLET CLEANING KIT	125.00	750.00
31					
32	1	TRAIN.CHARGE	IN-HOUSE TRAINING - INCLUDED	0.00	0.00
33					
34	1	FRT.CHARGE	FREIGHT & SHIPPING COST BAM 1022S, BAM 1020S & SUPPLIES - BILLED AT ACTUL COST - ESTIMATED	9,776.00	9,776.00
35					

Terms & Conditions

1. VALIDITY: Quotation will be valid for a period of 60 days from the quote date.
2. Please note the \$200 minimum value for all orders. Thank you for your support.
3. A credit card convenience fee of 3% will be applied to all credit card transactions.

THIS QUOTATION IS SUBJECT TO MET ONE STANDARD TERMS & CONDITIONS OF SALE.

Warranty Terms & Conditions

1. The warranty period for Met One supplied products and systems is 2 years (unless otherwise noted) from date of shipment or that as agreed to by Met One and the customer.
2. Met One warrants that its products will be free from defects in materials and workmanship under normal use and service for the duration of the warranty period.
3. Products which have been repaired or replaced during the warranty period are warranted for the remainder of the unexpired portion of the original warranty period.
4. RA (Return Authorization): Authorization and shipping instructions for the return of any product must be obtained by the purchaser from the Met One service department before returning the product.

Limitation of Warranty

The warranty set forth above does not extend to and shall not apply to:

Consumable or expandable items which require replacement during the normal course of operation.

Products which have been subject to abuse, misuse, neglect, accident, power reversal or improper installation.

Products damaged by improper operation, lightning or excessive power surges.

Products which have been repaired or altered by other than Met One authorized personnel, unless purchaser has properly altered or repaired the products in accordance with procedures previously approved in writing by Met One.

Met One offers no other warranties expressed or implied other than the Limited warranty contained herein which gives the purchaser specific legal rights. Met One has no liability for consequential damages. In any case, Met One's entire liability under any provision of this Agreement shall be limited to the amount actually paid by the purchaser for the product.

This Agreement is governed by the laws of the State of Oregon