United States Environmental Protection Agency

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, 2020

(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 PM_{10} 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 PM_{10} samplers sold as reference or equivalent methods must carry a label or sticker identifying them as designated methods. For analyzers or PM_{10} 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
RFSA-1219-255	Focused Photonics Inc.	Model AQMS-500 SO_2 FRM Analyzer	New designation of UV fluorescent SO_2 FRM.	February,2020
EQNA-0320-256	Teledyne API	Model N500 CAPS NO_x Analyzer	New designation.	May, 2020

Most Recent Modifications of Existing Designations

Designation Number	Applicant	Instrument Series	Summary of Modification	Effective Date
EQOA-0410-190	2B Technologies	Model 202 FEM O_3 Monitor	Addition of Cold-Weather package to designation.	March, 2020
EQPM-0516-236	Teledyne API	Model T640 $PM_{2.5}$ FEM Mass Monitor	Software update to version 1.4.24.512.	March, 2020
EQPM-0516-238	Teledyne API	Model T640X $PM_{2.5}$ FEM Mass Monitor	Software update to version 1.4.24.512.	March, 2020
EQPM-0516-240	Teledyne API	Model T640X $PM_{10-2.5}$ FEM Mass Monitor	Software update to version 1.4.24.512.	March, 2020
EQPM-0516-239	Teledyne API	Model T640X PM_{10} FEM Mass Monitor	Software update to version 1.4.24.512.	March, 2020
EQOA-0914-218	2B Technologies	Models 106-L and 108-L FEM O_3 Monitors	Approval of stainless-steel bulkhead fittings	May, 2020
EQOA-0410-190	2B Technologies	Models 202 and 205 FEM O_3 Monitors	Approval of stainless-steel bulkhead fittings	May, 2020
EQOA-0514-215	2B Technologies	Models 211 and 211-G FEM O_3 Monitors	Approval of stainless-steel bulkhead fittings	May, 2020
EQNA-0217-243	2B Technologies	Model 405 nm FEM NO_2/NO/NO_x Analyzer	Approval of stainless-steel bulkhead fittings	June, 2020

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 – PM_{10}

Andersen Model RAAS10-100 PM_{10} Single Channel PM_{10} Sampler
Manual Reference Method: RFPS-0699-130
"Andersen Instruments, Incorporated Model RAAS10-100 Single Channel Reference Method PM_{10} Sampler," with RAAS-10 PM_{10} inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} 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 PM_{10} Single Channel PM_{10} Audit Sampler
Manual Reference Method: RFPS-0699-131
"Andersen Instruments, Incorporated Model RAAS10-200 Single Channel Reference Method PM_{10} Audit Sampler," with RAAS-10 PM_{10} inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} 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 PM_{10} Multi Channel PM_{10} Sampler
Manual Reference Method: RFPS-0699-132
"Andersen Instruments, Incorporated Model RAAS10-300 Multi Channel Sequential Reference Method PM_{10} Sampler," with RAAS-10 PM_{10} inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} 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 PM_{10} 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

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" PM_{10} inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} 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

DKK-TOA Models FPM-222/222C, FPM223/223C, and DUB-222(S)/223(S) PM_{10} Monitor
Automated Equivalent Method: EQPM-0905-156
"DKK-TOA Models FPM-222, FPM-222C, FPM-223, FPM-223C, DUB-222(S), and DUB-223(S) Particulate Monitor," for monitoring PM_{10} in Ambient Air (beta attenuation monitor), configured for PM_{10}, with Firmware Version DUB4-658355, 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

Ecotech Model 3000 PM_{10} High Volume Air Sampler
Manual Reference Method: RFPS-0706-162
"Ecotech Pty. Ltd. Model 3000 PM_{10} High Volume Air Sampler," configured with the Ecotech PM_{10} Size-Selective Inlet (SSI)(P-ECO-HVS3000-02), with the flow rate set to 1.13 m^3/min (67.8 m^3/hour).
Federal Register: Vol. 71, page 42089, 07/25/2006

Environnement S.A. Model MP101M PM_{10} Monitor
Automated Equivalent Method: EQPM-0404-151
"Environnement S. A. Model MP101M PM_{10} Beta Gauge Monitor," configured with the louvered PM_{10} 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 m^3/h and in accordance with the Ambient Air Continuous Particulate Monitor Model MP101M operation manual. With or without optional ESTEL analog inputs/outputs and touchscreen user interface, serial link: 1 RS-232/422; USB port; Ethernet port (TCP/IP). This designation applies to PM_{10} measurements only. [2]
Federal Register: Vol. 69, page 18569, 4/8/2004
Latest modification: 9/2017

Graseby Andersen/GMW Model 1200 High-Volume Air Sampler
Manual Reference Method: RFPS-1287-063
"Sierra-Andersen or General Metal Works Model 1200 PM_{10} High-Volume Air Sampler System," consisting of a Sierra-Andersen or General Metal Works Model 1200 PM_{10} 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 PM_{10} High-Volume Air Sampler System," consisting of a Sierra-Andersen or General Metal Works Model 321-B PM_{10} 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 PM_{10} High-Volume Air Sampler System," consisting of a Sierra-Andersen General Metal Works Model 321-C PM_{10} 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 PM_{10} 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 FH62I-N PM_{10} Beta Attenuation Monitor," consisting of the following components: FH101 Vacuum Pump Assembly; FH102 Accessory Kit; FH107 Roof Flange Kit; FH125 Zero and Span PM_{10} Mass Foil Calibration Kit; FH62I Beta Attenuation 19-inch Control Module; SA246b PM_{10} 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 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 PM_{10} Beta Attenuation Monitor, or Ecotech Spirant BAM1000" including the BX-802 EPA PM_{10} inlet (or alternative louvered PM_{10} 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. Instrument must be operated in accordance with the appropriate instrument manual and may employ either the standard or advanced leak test procedure.
Federal Register: Vol. 63, page 41253, 08/03/1998
Latest modifications: 06/2009; 07/2010; 8/2010; 8/2012; 4/2017; 12/2018

Met One Instruments, Inc. E-BAM PLUS Beta Attenuation Mass Monitor- PM_{10} FEM Configuration
Automated Equivalent Method: EQPM-1215-226
"Met One Instruments, Inc. E-BAM PLUS Beta Attenuation Mass Monitor – PM_{10} FEM Configuration," configured for 24 1-hour average measurements of PM_{10} 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 PM_{10} 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. This designation applies to PM_{10} measurements only.
Federal Register: Vol. 81, page 4294, 01/26/2016
Latest modification: 04/2017; 12/2018

Met One Instruments, Inc. E-FRM– PM_{10} or E-FRM-DC-PM_{10}
Manual Reference Method: RFPS-0216-231
"Met One Instruments, Inc. E-FRM," configured for filter sampling of ambient particulate matter using the US EPA PM_{10} 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 PM_{10} operating manual. This designation applies to PM_{10} measurements only.
Federal Register: Vol. 81, page 25397, 04/28/2016
Latest modification: 11/14/2017

Met One Instruments, Inc. E-SEQ-FRM PM_{10} 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 PM_{10} 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 PM_{10} operating manual. This designation applies to PM_{10} measurements only.
Federal Register: Vol. 82, page 44613, 09/25/2017
Latest modification: 08/2019

Opsis Model SM200 PM_{10} 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 PM_{10} 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 PM_{10} Sampler
Manual Reference Method: RFPS-0389-071
"Oregon DEQ Medium Volume PM_{10} 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 PM_{10} by beta attenuation on a single sampling line (Line A or B, but not both together), with the standard, louvered US EPA PM_{10} 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
Automatic 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 PM_{10} 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 firmware version 1.0.2.126 or later, in accordance with the Teledyne Model T640 Operations Manual. This designation applies to PM_{10} measurements only.
Federal Register: Vol. 81, page 45285, 07/13/2016
Latest modification: 3/2020

Thermo Andersen Series FH 62 C14 Continuous PM_{10} 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 **Automated Equivalent Method: EQPM-1102-150**
"Thermo Andersen Series FH 62 C14 Continuous PM_{10} 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 PM_{10} inlet (or alternative louvered PM_{10} 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. Operated, calibrated and serviced according to the appropriate Operator Manual.
Federal Register: Vol. 67, page 76174, 12/11/2002
Latest modifications: 07/2009; 12/2012; 6/2016

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 PM_{10} measurements equipped with a Rupprecht & Patashnick PM_{10} 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® 2000*i*-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 PM_{10} 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® 2000*i*-D instruction manual, as appropriate. Partisol® 2000*i*-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 PM_{10} Air Sampler or Thermo Fisher Scientific Partisol® 2000i PM_{10} Air Sampler or Rupprecht and Patashnick Partisol®-FRM 2000 PM_{10} Air Sampler
Manual Reference Method: RFPS-1298-126
"Thermo Scientific Partisol® 2000-FRM PM_{10} Air Sampler" or "Thermo Fisher Scientific Partisol® 2000*i* PM_{10} Air Sampler" or "Rupprecht and Patashnick Partisol®-FRM 2000 PM_{10} Air Sampler," with PM_{10} inlet or louvered inlet specified in 40 CFR 50, Appendix L, Figs. L-2 through L-19, configured as a PM_{10} reference method with a U.S. EPA PM_{10} inlet with straight downtube adapter and operated for continuous 24-hour sample periods in accordance with the Partisol® 2000-FRM or Partisol® 2000*i* instruction manual, as appropriate, and with the requirements specified in 40 CFR Part 50, Appendix J. Model 2000*i* 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 PM_{10} Sequential Air Sampler or Thermo Fisher Scientific Partisol® 2025i PM_{10} Sequential Air Sampler or Rupprecht and Patashnick Partisol®-Plus 2025 PM_{10} Sequential Air Sampler
Manual Reference Method: RFPS-1298-127
"Thermo Scientific Partisol®-Plus 2025 Sequential Air Sampler" or "Thermo Fisher Scientific Partisol® 2025*i* Sequential Air Sampler" or "Rupprecht and Patashnick Partisol®-Plus 2025 PM_{10} Sequential Air Sampler," with PM_{10} inlet or louvered inlet specified in 40 CFR 50, Appendix L, Figs. L-2 through L-19, configured as a PM_{10} 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® 2025*i* with firmware version 2.0 or greater, with the modified filter shuttle mechanism, in accordance with the Partisol®-Plus 2025 or Partisol® 2025*i* 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® 2025*i*-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 PM_{10} 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® 2025*i*-D, for continuous 24-hour sample periods , in accordance with the Partisol®-Plus 2025-D or Partisol® 2025*i*-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 PM_{10} Monitors
Automated Equivalent Method: EQPM-1090-079
"Thermo Scientific TEOM® 1400AB [PM_{10}] 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 PM_{10} 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} measurements only.
Federal Register: Vol. 78, page 67360, 11/12/2013

Tisch Environmental Model TE-6070 PM_{10} High-Volume Air Sampler or New Star Environmental Model NS-6070 PM_{10} High-Volume Air Sampler

Manual Reference Method: RFPS-0202-141

"Tisch Environmental Model TE-6070 or New Star Environmental Model NS-6070 PM_{10} High-Volume Air Sampler," consisting of a TE-6001 PM_{10} 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 – PM_{10}

Manual Reference Method: RFPS-0714-216

''Tisch Environmental Model TE-Wilbur10 PM_{10} Low-Volume Air Particulate Sampler,'' configured as a PM_{10} 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 PM_{10} 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, and in accordance with the Tisch Environmental Model TE-Wilbur10 PM_{10} Low-Volume Air Particulate Sampler instruction manual and with the requirements and sample collection filters as specified in 40 CFR Part 50, Appendix

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

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

Wedding & Associates' or Thermo Environmental Instruments Inc. Model 600 PM_{10} High-Volume Sampler

Manual Reference Method: RFPS-1087-062

"Wedding & Associates' or Thermo Environmental Instruments, Inc. Model 600 PM_{10} Critical Flow High-Volume Sampler," consisting of the following W&A/TEII components: PM_{10} 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 PM_{10} Beta Gauge

Automated Equivalent Method: EQPM-0391-081

"Wedding & Associates' or Thermo Environmental Instruments, Inc. Model 650 PM_{10} Beta Gauge Automated Particle Sampler," consisting of the following W&A/TEII components: Particle Sampling Module, PM_{10} 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 – $PM_{2.5}$

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

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

Environnement S.A. Model MP101M $PM_{2.5}$ Monitor
Automated Equivalent Method: EQPM-1013-211
"Environnement S.A. Model MP101M PM2.5 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 and using a temperature regulated sampling tube with ambient meteorological sensor. With or without optional ESTEL analog inputs/outputs and touchscreen interface, 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. This designation applies to $PM_{2.5}$ measurements only.
Federal Register: Vol. 78, page 67360, 11/12/2013
Latest modification: 9/2017

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 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 Spirant BAM1100", configured with the standard BX-802 EPA PM_{10} inlet (or alternative louvered PM_{10} 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 PM_{10} 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 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 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. Alternatively, BX-851 (110V) or BX-852 (230V) Dew Point Heating System (DPHS) with BX-597 T/BP/RH sensor may be substituted for the BX-827 (110V) or BX-830 (230V) Smart Inlet Heater with BX-596 T/BP sensor. DPHS must be operated in accordance with BAM 1020 Particulate Monitor with DPHS operational manual and may employ either the standard or advanced leak test procedure. DPHS requires firmware V3.10.0 or greater for the standard BAM-1020 and firmware V4.4.0 with the Touch Screen Display Option (BX-970).
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

Met One Instruments, Inc. BAM-1020 Beta Attenuation Mass Monitor- $PM_{2.5}$ FEM Configuration, or Ecotech 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 Spriant 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 PM_{10} 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 Spirant BAM1100 Operators Manual and may employ either the standard or advanced leak test procedure. 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.

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

Latest modification: 04/2017; 10/2018; 12/2018

Met One Instruments, Inc. BAM-1022 Real Time 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," 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 (BX-802) EPA PM_{10} 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-592 ambient temperature sensor or BX-596 ambient temperature/barometric combination sensor or BX-597 ambient temperature/barometric pressure/relative humidity combination sensor. Instrument must be operated in accordance with the BAM 1022 Particulate Monitor operation manual, revision B or later and may employ either the standard or 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

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 PM_{10} 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 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

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 PM_{10} 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 PM_{10} inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, equipped with either a Mesa Laboratories VSCC™ 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

Opsis SM200- Dust Monitor
Automated Equivalent Method: EQPM-0812-203
"Opsis SM200- Dust Monitor" configured for $PM_{2.5}$ with the US EPA PM_{10} inlet specified in 40 CFR 50 Appendix L, followed by a BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator, 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

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, 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

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
Automatic 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 PM_{10} pre-impactor inlet (based on European PM_{10} inlet design) combined with a BGI VSCC™ $PM_{2.5}$ cyclone separator. 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
Automatic 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 firmware version 1.0.2.126 or later, 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

Teledyne Advanced Pollution Instrumentation Model T640 PM Mass Monitor with 640X Option
Automatic 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 PM_{10} 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 firmware version 1.0.2.126 or later, 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

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 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

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 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

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 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

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 PM2.5 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
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 PM_{10} size selective inlet as specified in 40 CFR 50 Appendix L, Figs. L-2 through L-19, a PM2.5 BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator, 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.
Federal Register: Vol. 74, page 28696, 06/17/2009
Latest modification: 03/2010; 6/2016

Thermo Scientific Model 5030i SHARP Monitor or Model 5030 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 PM_{10} 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, 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.
Federal Register: Vol. 74, page 28696, 06/17/2009
Latest modification: 06/2013

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 PM_{10} 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, 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

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 PM_{10} 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® 2000*i*-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 PM_{10} 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® 2000*i*-D instruction manual, as appropriate. Partisol® 2000*i*-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® 2025*i*-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 PM_{10} 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®* 2025*i*-D, for continuous 24-hour sample period , in accordance with the Partisol®-Plus 2025-D or *Partisol®* 2025*i*-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 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®2000*i* 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

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® 2025*i* *$PM_{2.5}$* 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 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® 2025*i* 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® 2025*i* 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

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, 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

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 PM_{10} 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, page32114, 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 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

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 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

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

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 (PM_{10} measurement) is configurable as a $PM_{2.5}$ FEM (EQPM-0308-170), but set to monitor PM_{10}. 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 and the BAM-1020 Operations Manual Rev. D 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

Met One Instruments, Inc. E-FRM– PM_{10} and E-FRM– $PM_{2.5}$ Sampler Pair or E-FRM–DC-PM_{10} and E-FRM-DC-$PM_{2.5}$ Sample Pair
Manual Reference Method: RFPS-0316-232
"Met One Instruments, Inc. E-FRM– PM_{10} 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 PM_{10} sampler (RFPS-0216-231). This designation also applies to "Met One Instruments, Inc. E-FRM-DC–PM_{10} 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-PM_{10} 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 PM_{10} and E-SEQ-FRM $PM_{2.5}$ Sampler Pair
Manual Reference Method: RFPS-0717-247
"Met One Instruments, Inc. E-SEQ-FRM PM_{10} 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 PM_{10} 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 PM_{10} and $PM_{2.5}$ by beta attenuation, with the standard, louvered US EPA PM_{10} 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 PM_{10} pre-impactor inlet (based on European PM_{10} inlet design) combined with a BGI VSCC™ $PM_{2.5}$ cyclone separator on the second channel (Line A or B, but always with PM_{10} on the opposite Line). The $PM_{10-2.5}$ mass measurement is performed using the resultant subtraction of PM_{10} 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

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 PM_{10} 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 firmware version 1.0.2.126 or later, 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

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® 2000*i*-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 PM_{10} 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® 2000*i*-D instruction manual, as appropriate. Partisol® 2000*i*-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® 2025*i*-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 PM_{10} 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® 2025*i*-D, for 24-hour continuous sampling periods, in accordance with the Partisol®-Plus 2025-D or Partisol® 2025*i*-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® 2000*i* $PM_{10-2.5}$ 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 2000*i* 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 PM_{10} inlets on both samplers and operated in accordance with the Partisol® 2000-FRM or 2000*i* instruction manual supplement, as appropriate, and the 2000*i* 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® 2025*i* 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® 2025*i* 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® 2025*i* 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® 2025*i* 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 PM_{10} 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 PM_{10} 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 PM_{10} 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 SO_2 (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 SO_2 - 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 SO_2 - 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 SO_2 Analyzer
Automated Equivalent Method: EQSA-0990-077
"Advanced Pollution Instrumentation, Inc. Model 100 Fluorescent SO_2 Analyzer," operated on the 0-0.1 ppm[1], the 0-0.2 ppm[1], 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 SO_2 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 SO_2 Analyzer
Automated Equivalent Method: EQSA-0678-029
"Beckman Model 953 Fluorescent Ambient SO_2 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 H_2S scrubber assembly.
Federal Register: Vol. 43, page 50733, 10/31/1978

Columbia Scientific Industries Model 5700 SO_2 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 ppb[1] 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 SO_2 Analyzer
Automated Equivalent Method: EQSA-1086-061
"Dasibi Model 4108 U.V. Fluorescence SO_2 Analyzer," operated with a range of 0-100 ppb[1], 0-200 ppb[1], 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 SO_2 Analyzer
Automated Equivalent Method: EQSA-0701-115
"DKK-TOA Corporation Model GFS-32 Ambient Air SO_2 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 SO_2 Analyzer
Automated Equivalent Method: EQSA-0100-133
"DKK-TOA Corporation Models GFS-112E and GFS-112E-1 U.V. Fluorescence SO_2 Analyzer," operated at any temperature ranging from 15ºC to 35ºC, on any of the following measurement ranges: 0-0.05 ppm[1], 0-0.100 ppm[1], 0-0.200 ppm[1], 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 Ambient SO_2 Analyzer
Automated Equivalent Method: EQSA-1107-168
"DKK-TOA Corporation Model GFS-312E Ambient SO_2 Analyzer," operated at any environmental temperature in the range of 20ºC to 30ºC on any of the following measurement ranges[1]: 0-0.1 ppm, 0-0.2 ppm and 0-0.5 ppm.[2]
Federal Register: Vol. 72, page 63176, 11/08/2007

Ecotech 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
Automated Equivalent Method: EQSA-0809-188
"Ecotech 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, 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, as appropriate.
Federal Register: Vol. 74, page 38184, 07/31/2009
Latest Modifications: 05/2010, 05/2011, 05/2012, 8/2014, 12/2019

Environnement S.A. Model AF21M SO_2 Analyzer
Automated Equivalent Method: EQSA-0292-084
"Environnement S.A 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

Environnement S.A. Model AF22M or AF22e SO_2 Analyzer
Automated Equivalent Method: EQSA-0802-149
"Environnement S.A 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 screen.[2]
Federal Register: Vol. 67, page 57811, 09/12/2002
Latest Modifications: 11/2015

Environnement S.A. SANOA Multigas Longpath Monitoring System
Automated Equivalent Method: EQSA-0400-138
"Environnement S.A. Model SANOA Multigas Longpath Air Quality Monitoring System," consisting of a receiver, one or more projectors, interface unit, a user-provided control unit computer running the SANOA VisionAIR software, and associated incidental equipment; configured for measuring SO_2, 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

Focused Photonics Inc. (FPI) Model AQMS-500 SO_2 Analyzer
Automated Reference Method: RFSA-1219-255
"Focused Photonics Inc. AQMS-500 SO_2 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, 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

Horiba Models APSA-360, APSA-360-CE, or APSA-360A-CE SO_2 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 SO_2 Monitor
Automated Equivalent Method: EQSA-0506-159
"Horiba Instruments Incorporated Model APSA-370 Ambient SO_2 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]
Federal Register: Vol. 71, page 25587, 05/01/2006

Lear Siegler Model AM2020 SO_2 Monitor
Automated Equivalent Method: EQSA-0486-049
"Lear Siegler Model AM2020 Ambient SO_2 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 SO_2 Monitor
Automated Equivalent Method: EQSA-1275-005
"Lear Siegler Model SM1000 SO_2 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 SO_2 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-21Front Panel Digital (Signals)
S-7 Press to Read Volt MeterS-34 Remote Control	S-11A Manual Zero and Span	
S-22 Remote Zero/Span Control and Status (Timer)	S-35 Front Panel Digital Meter with BCD Output	
S-11B Automatic Zero and Span	S-13 Status Lights	S-22A Remote Zero/Span Control
S-36 Dual Range Log-Linear Output	S-14 Output Booster Amplifier	S-23 Automatic Zero Adjust
S-38 Sampling Mode Status	S-14B Line Transmitter Board	S-23A Automatic/Manual Zero Adjust

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 SO_2 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:	0-50[1]	0-100[1]	0-500	0-1000
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 ppb[1], 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 SO_2 Analyzer
Automated Equivalent Method: EQSA-0779-039
"Monitor Labs or Lear Siegler Model 8850 Fluorescent SO_2 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 SO_2 Analyzer
Automated Equivalent Method: EQSA-0390-075
"Monitor Labs or Lear Siegler Model 8850S SO_2 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 SO_2
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 SO_2, 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 SO_2 Analyzer
Automated Equivalent Method: EQSA-0676-010
"Philips PW9755 SO_2 Analyzer," consisting of the following components: PW9755/02 SO_2 Monitor with PW9741/00 SO_2 Source, PW9721/00 Filter Set SO_2, PW9711/00 Electrolyte SO_2, 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 SO_2 Analyzer
Automated Equivalent Method: EQSA-0876-011
'Philips PW9700 SO_2 Analyzer,' consisting of the following components: PW9710/00 Chemical Unit with PW9711/00, Electrolyte SO_2, PW9721/00 Filter Set SO_2, PW9740/00 SO_2 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 SO_2 Analyzer
Automated Equivalent Method: EQSA-0507-166
"SIR S.A. Model S-5001 U.V. Fluorescence SO_2 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 SO_2 Analyzer
Automated Reference Method: RFSA-0616-237
"Sutron or Sabio Model 6020 Sulfur Dioxide SO_2 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 SO_2 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; Teledyne Analytical Instruments Model 6400A; or Teledyne Monitor Labs sensor-e™ Model TML-50 SO_2 Analyzers; or recordum airpointer® system **module 801-001000**
Automated Equivalent Method: EQSA-0495-100
"Teledyne Advanced Pollution Instrumentation Models 100A, 100AS, 100E, 100EU, T100 or T100U; 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 ppb[1] and 0-1000 ppb, at any temperature in the range of 5 to 40 degrees C, 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; SO_2 Permeation tube, certified or uncertified, 0.4 ppm @ 0.7 L/min; SO_2 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

Teledyne Monitor Labs/Casella/Ecotech Model ML9850/CM2050/EC9850/EC9850T; Teledyne Monitor Labs/Casella/ Ecotech/Model ML9850B/CM2050B/EC9850B; or Wedding & Associates Model 1040 SO_2 Analyzers

Automated Equivalent Method: EQSA-0193-092

"Teledyne Monitor Labs, Casella Monitor, or Ecotech Models ML9850/CM2050/EC9850, or ML9850B/CM2050B/ EC9850B, Ecotech Model EC9850T, or Wedding & Associates, Inc. Model 1040 Sulfur Dioxide Analyzers," operated on any full scale range between 0-0.050 ppm[1] 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/ 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 (EZS); 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 (EZS); 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

Thermo Electron Model 43 SO_2 Analyzer

Automated Equivalent Method: EQSA-0276-009

"Thermo Electron Model 43 Pulsed Fluorescent SO_2 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 Models 43A, 43B, 43C, 43C-TLE, 43i, 43i-TLE, 43iQ, 43iQTL SO_2 Analyzers

Automated Equivalent Method: EQSA-0486-060

"Thermo Electron or Thermo Environmental Instruments, Inc. **Model 43A or 43B** Pulsed Fluorescence SO_2 Analyzer," operated on the 0-0.1 ppm[1], the 0-0.2 ppm[1], the 0-0.5 ppm, or the 0-1.0 ppm range, 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 Lpm)	007Remote 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 Span Source	009 Pressure/Temperature Compensation (Model 43B)

"Thermo Environmental Instruments, Inc. **Models 43C, 43C-TLE, 43*i*, 43*i-TLE***, Pulsed Fluorescence SO_2 Analyzer," operated on any measurement range between 0-50 ppb[1] (0-10[1] ppb for Model TLE) 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 20ºC and 30ºC, 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 (0.5-1.0 Lpm); **Models 43C, 43C-TLE:** Remote activation of zero/span and sample valves, RS-232/485 interface**. 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; 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. **Model 43iQ** SO_2 Analyzer operated between 0-50 ppb and 0-1000 ppb with averaging times from 10 to 300 seconds or with adaptive filtering, 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 43iQTL**, Trace Level SO_2 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 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. 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

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 20-30 °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) 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

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/CO_2 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 ppm[1], 0-0.200 ppm[1], 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 Ambient O_3 Analyzer
Automated Equivalent Method: EQOA-1107-169
"DKK-TOA Corporation Model GUX-313E Ambient O_3 Analyzer," operated at any environmental temperature in the range of 20°C to 30°C on any of the following measurement ranges[1]: 0-0.1 ppm, 0-0.2 ppm and 0-0.5 ppm.[2]
Federal Register: Vol. 72, page 63176, 11/08/2007

Ecotech Serinus 10 Ozone Analyzer or Opsis AB OPS10 Ozone Analyzer or Tisch Environmental TE 1.0 Ozone Analyzer
Automated Equivalent Method: EQOA-0809-187
"Ecotech 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, with a five-micron Teflon® filter element installed, 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, as appropriate.
Federal Register: Vol. 74, page 38184, 07/31/2009
Latest Modifications: 05/2010, 05/2012, 8/2014

Environics Series 300 Ozone Analyzer
Automated Equivalent Method: EQOA-0990-078
"Environics 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 ∀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. Model O_3 41M UV Ozone Analyzer
Automated Equivalent Method: EQOA-0895-105
"Environnement S.A. Model $O_3$41M 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

Environnement S.A. Model O_3 42M UV Ozone Analyzer
Automated Equivalent Method: EQOA-0206-148
"Environnement S.A Model $O_3$42M 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

Environnement S.A. SANOA Multigas Longpath Monitoring System
Automated Equivalent Method: EQOA-0400-137
"Environnement S.A. Model SANOA Multigas Longpath Air Quality Monitoring System, consisting of a receiver, one or more projectors, interface unit, a user-provided control unit computer running the SANOA VisionAIR software, and associated incidental equipment; configured for measuring O_3, 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

Environnement S.A. Model O_3 42e UV Ozone Analyzer
Automated Equivalent Method: EQOA-0515-225
"Environnement S.A. 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 flow-rate of 1 Lpm and with zero/span external solenoid valve.
Federal Register: Vol. 80, page 32114, 6/05/2015

Focused Photonics Inc. (FPI) Model AQMS-300 O_3 Analyzer
Automated Equivalent Method: EQOA-0719-253
"Focused Photonics Inc. AQMS-300 O_3 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 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 User Manual.
Federal Register: Vol. 84, page 44299, 8/23/2019

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
Automated Equivalent Method: EQOA-0506-160
"Horiba Instruments Incorporated APOA-370 Ambient O_3 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.[2]
Federal Register: Vol. 71, page 25587, 05/01/2006

KENTEK Inc. MEZUS 410 O_3 Analyzer
Automated Equivalent Method: EQOA-0219-251
"KENTEK Inc. Model MEZUS 410 O_3 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/CO_2.
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 O_3, 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 to1 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 O_3 Analyzer
Automated Equivalent Method: EQOA-0777-023
"Philips PW9771 03 Analyzer," consisting of the following components: PW9771/00 03 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 O_3 Analyzer
Automated Equivalent Method: EQOA-0207-164
"SIR S.A. Model S-5014 Photometric O_3 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 (O_3) Analyzer
Automated Equivalent Method: EQOA-0415-222
"Sutron or Sabio Model 6030 Ozone (O_3) 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; 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; 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 ppb[1] 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, and with a TFE filter or a Kynar® DFU. **Models 400E, T400 and TML-10:** operated with a sample flow rate of 800 ± 80 cm^3/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 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, 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
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 cm^3/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 Models ML9810/CM2010/EC9810, -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 Models ML9810/CM2010/EC9810, 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 ppm[1] 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, -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 (EZS); 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 (EZS); 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

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 O_3 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 49*i*** U.V. Photometric Ambient O_3 Analyzer," operated with a sample flow rate of 1 to 3 Lpm on any measurement range between 0-0.05[1] 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; **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 the appropriate instrument manual. **Model 49iQ** O_3 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 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

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 Ambient CO Analyzer
Automated Reference Method: RFCA-0907-167
"DKK-TOA Corporation Model GFC-311E Ambient CO Analyzer," operated with full scale fixed measurement ranges of 0-5, 0-20, and 0-50 ppm at any environmental temperature in the range of 20ºC to 30ºC.
Federal Register: Vol. 72, page 56339, 10/03/2007

Ecotech 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 Carbon Monoxide Analyzer
Automated Reference Method: RFCA-0509-174
"Ecotech 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 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 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

Environnement S.A. Model CO11M CO Analyzer
Automated Reference Method: RFCA-0995-108
"Environnement S.A. 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

Environnement S.A. Model CO12M CO Analyzer
Automated Reference Method: RFCA-0206-147
"Environnement S.A 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

Environnement S.A. Model CO12e CO Analyzer
Automated Reference Method: ***RFCA-0915-228***
"Environnement S.A. 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 and with or without the following options: ESTEL Analog Input/Output Board, LCD color touch screen and Carbon Dioxide CO_2 sensor.
Federal Register: Vol. 80, page 72432, 11/19/2015

Focused Photonics Inc. (FPI) Model AQMS-400 CO Analyzer
Automated Reference Method: RFCA-0419-252
"Focused Photonics Inc. AQMS-400 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, 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

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 ppm[1], 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
Automated Reference Method: RFCA-0506-158
"Horiba Instruments Incorporated Model APMA-370 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]
Federal Register: Vol. 71, page 25587, 05/01/2006

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 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 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**), 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**, 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 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 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; 9/2015

Teledyne Monitor Labs/Casella/Ecotech Model ML9830/CM2030/EC9830/EC9830T, Teledyne Monitor Labs/Casella/ Ecotech Model ML9830B/CM2030B/EC9830B, or Wedding & Associates Model 1020 CO Analyzers

Automated Reference Method: RFCA-0992-088

"Teledyne Monitor Labs, Casella Monitor, or Ecotech Models ML9830/CM2030/EC9830 or ML9830B/CM2030B/ EC9830B, Ecotech Model EC9830T, or Wedding & Associates, Inc. Model 1020 Carbon Monoxide Analyzer," operated on any full scale range between 0-5.0 ppm[1] 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:** 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 (EZS); 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 (EZS); 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

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
48-002 19 Inch Rack Mount
48-003 Internal Zero/Span Valves with Remote Activation
48-010 Internal Zero Air Package
48-488 GPIB (General Purpose Interface Bus) EEEE-488

"Thermo Electron or Thermo Environmental Instruments, Inc. **Models 48C or 48*i*** Gas Filter Correlation Ambient CO Analyzer," operated on any measurement range between 0-1 ppm[1] 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 20ºC and 30ºC, 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 NO_2
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 NO_2 - 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 NO_2
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 NO_2/NO/NO_x Monitor
Automated Equivalent Method: EQNA-0217-243
"2B Technologies, Model 405 nm NO2/NO/NOx Monitor," operated in a range of 0 – 500 ppb, operated at temperatures between 20°C and 30°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, 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.
Federal Register: Vol. 82, page 21995, 5/11/2017
Latest modification: 6/2020

Advanced Pollution Instrumentation, Inc. Model 200 NO_2 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/NO_2/NOx Analyzer
Automated Reference Method: RFNA-0179-034
"Beckman Model 952-A NO/NO_2/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:

switch	position	function
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: 0-0.050[1], 0-0.100[1], 0-0.200[1], 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 Nitrogen Oxides Analyzer
Automated Reference Method: RFNA-0508-171
"DKK-TOA Corporation Model GLN-314E Nitrogen Oxides Analyzer," operated at any temperature in the range of 20ºC to 30ºC, 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

Ecotech Serinus 40 Oxides of Nitrogen Analyzer or Ecotech Serinus 44 $NO/NO_2/NO_x/NH_3$ 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***
Automated Reference Method: RFNA-0809-186
"Ecotech Serinus 40 Oxides of Nitrogen Analyzer" or "Ecotech Serinus 44 $NO/NO_2/NO_x/NH_3$ 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 NO_2 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 $NO/NO_2/NO_X/NH_3$ 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 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

Ecotech Serinus 60 NO_2 CAPS (Cavity Attenuated Phase Shift) Analyzer
Automated Reference Method: EQNA-0217-242
"Ecotech Serinus 60 NO_2 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 User Manual.
Federal Register: Vol. 82, page 27816, 6/19/2017

Environnement S. A. Model AC31M NO_2 Analyzer
Automated Reference Method: RFNA-0795-104
"Environnement S. A. 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

Environnement S. A. Model AC32e and AC32e* NO_2 Analyzer
Automated Reference Method: RFNA-0118-249
"Environnement S. A. Model AC32e Chemiluminescent NO, NO_x, NO_2 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 an ozone flow rate of 0.06 Lpm, and operating from a 115V/ 60Hz, 230V/50Hz 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

Environnement S. A. Model AC32M NO_2 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

Environnement S.A. SANOA Multigas Longpath Monitoring System
Automated Reference Method: EQNA-0400-139
"Environnement S.A. Model SANOA Multigas Longpath Air Quality Monitoring System," consisting of a receiver, one or more projectors, interface unit, a user-provided control unit computer running the SANOA VisionAIR software, and associated incidental equipment; configured for measuring NO_2, 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

Environnement S.A. Model AS32M Nitrogen Dioxide Analyzer
Automated Equivalent Method: EQNA-1013-210
"Environnement S.A. 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

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 and frequency of 50 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

Horiba Instruments Models APNA-360 or APNA-360-CE NO-NO_2-NO_X Monitor
Automated Reference Method: RFNA-0196-111
"Horiba Instruments, Inc. Models APNA-360 or APNA-360-CE Ambient NO-NO_2-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 NO_2 Monitor
Automated Reference Method: RFNA-0506-157
"Horiba Instruments Incorporated Model APNA-370 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, and with a 0.3 micrometer sample particulate filter installed.[2]
Federal Register: Vol. 71, page 25587, 05/01/2006

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:	0-0.1[1]	0-0.25[1]	0-0.5	0-1.0
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 cm^3/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	018A- 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 NO_2
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 NO_2, 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 $NO/NO_2/NO_x$ Analyzer
Automated Reference Method: RFNA-0879-040
"Philips Model PW9762/02 $NO/NO_2/NO_x$ 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 ($NO/NO_2/NO_x$) Analyzer
Automated Reference Method: RFNA-0418-250
"Sabio Model 6040 Oxides of Nitrogen ($NO/NO_2/NO_x$) Analyzer", operated in the measurement range of 0-0.5 PPM, an 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 $NO/NO_2/NO_X$ 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 NOx 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, T200U, T204; Teledyne Analytical Instruments Model 9110A, 9110E, 9110T; or Teledyne Monitor Labs sensor-e™ Model TML-41 NO_2 Analyzers; or recordum airpointer® System, Module 801-002000;
Automated Reference Method: RFNA-1194-099
"Teledyne Advanced Pollution Instrumentation Models 200A, 200AU, , 200E, 200EU, T200, 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-NO_2: 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, RS-232 output ; the NumaView™ software. **Models 200A, 200E, T200 and 9110A, 9110E, 9110T, and TML-41 only:** operated at any temperature in the range of 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 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 NOX + 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, 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

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 Models ML9841/CM2041, ML9841A/CM2041A/EC9841A/EC9841T, Teledyne Monitor Labs/Casella/Ecotech Model ML9841B/CM2041B/EC9841B, or Wedding & Associates Model 1030 NO_2 Analyzers
Automated Reference Method: RFNA-1292-090
"Teledyne Monitor Labs, Casella Monitor, or Ecotech Models ML9841/CM2041, ML9841A/CM2041A/EC9841A, or ML9841B/CM2041B/EC9841B, Ecotech 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 ppm[1] 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, 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 (EZS); Internal Zero/Span (IZS) Assembly for; Rack Mount Assembly; Internal Floppy Disk Drive. M**odels 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 (EZS); 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

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 $NO/NO_2/NO_x$ 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 $NO/NO_2/NO_x$ 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, 42i, 42i-TL, 42iQ, 42iQTL NO/NO2/NOx Analyzer
Automated Reference Method: RFNA-1289-074
"Thermo Environmental Instruments Inc. Model 42, Model 42C, or Model 42i Chemiluminescence NO-NO2-NOx 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 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 42*i*-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** $NO/NO_2/NOx$ 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 $NO/NO_2/NOx$ 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

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 HNO_3-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 HNO_3 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 80ºC 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 PM_{10} by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) with Hot Block Dilute Acid and Hydrogen Peroxide Filter Extraction." In this method, PM_{10} 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 PM_{10} 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 175º 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

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 – PM_{10}

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 Model 3000 PM_{10} 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*-D	EQPS-311-197	197
Thermo Scientific Partisol® 2000-FRM, Partisol® 2000*i*	RFPS-1298-126	126
Thermo Scientific Partisol®-Plus 2025 Seq., Partisol® 2025*i* Seq	RFPS-1298-127	127
Thermo Scientific Partisol®-Plus 2025-D Seq., Partisol® 2025*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} Analyzers		
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
Environnement S.A. MP101M Beta	EQPM-0404-151	151
Horiba APDA-371	EQPM-0798-122	122
Met One BAM1020, GBAM1020, BAM1020-1, GBAM1020-1 Beta	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
Teledyne Model T640 PM Mass Monitor with 640X option	EQPM-0516-239	239
Thermo Andersen Series FH 62 C14 Beta Monitor, 5014i Beta	EQPM-1102-150	150
Thermo Scientific TEOM® 1400AB, 1405	EQPM-1090-079	079
Thermo Scientific TEOM® 1405-DF with FDMS®	EQPM-1013-208	208

PM_{10} Analyzers		
Method	**Designation No.**	**Method Code[b]**
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]**
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
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™	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™	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™	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™	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™	RFPS-0498-118 or EQPM-0202-145	145
Thermo Electron RAAS2.5-100 with VSCC™	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™	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™	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® 2000*i*-D Dichot.	EQPS-0509-177	177
Thermo Scientific Dichot. Partisol®-Plus Model 2025-D Seq., Partisol® 2025*i*-D Dichot. Seq.	EQPS-0509-179	179
Thermo Scientific Partisol® 2000-FRM, Partisol® 2000*i* with WINS	RFPS-0498-117	117
Thermo Scientific Partisol® 2000-FRM, Partisol® 2000*i* with VSCC™	RFPS-0498-117 or EQPM-0202-143	143
Thermo Scientific Partisol®-Plus 2025 Seq., Partisol® 2025*i* Seq with WINS	RFPS-0498-118	118
Thermo Scientific Partisol®-Plus 2025 Seq., Partisol® 2025*i* Seq with VSCC™	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™	RFPS-1014-219	519
Tisch Environmental Model TE-Wilbur 2.5 with Tisch TE-PM2.5C cyclone	RFPS-1014-219 or EQPS-0415-223	223
URG-MASS100 with WINS	RFPS-0400-135	135

$PM_{2.5}$ Samplers		
Method	**Designation No.[a]**	**Method Code[b]**
URG-MASS100 with VSCC™	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™	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

$PM_{2.5}$ Analyzers		
Method	**Designation No.**	**Method Code[b]**
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™	EQPM-0308-170	170
Met One BAM-1020 PM-2.5 with TE-PM2.5C	EQPM-0308-170	570
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
Met One BAM-1020 with URG-2000-30EGN Cyclone	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 Model T640 PM Mass Monitor with 640X option	EQPM-0516-238	238
Thermo Scientific FH62C14-DHS Continuous, 5014i	EQPM-0609-183	183
Thermo Scientific Model 5030i Sharp, 5030 SHARP	EQPM-0609-184	184
Thermo Scientific TEOM® 1400a with Series 8500C FDMS®	EQPM-0609-181	181
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
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* sampler pair	RFPS-0509-175	175
Thermo Scientific Partisol®-Plus 2025 Seq. sampler pair, Partisol® 2025*i* Seq sampler pair	RFPS-0509-176	176
Thermo Scientific Partisol® 2000-D Dichot., Partisol® 2000*i*-D Dichot.	EQPS-0509-178	178
Thermo Scientific Dichot. Partisol®-Plus Model 2025-D Seq., Partisol® 2025*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

$PM_{10-2.5}$ Analyzers		
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
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
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	EQSA-1107-168	168
Ecotech ML9850/EC9850, ML9850B/EC9850B	EQSA-0193-092	092
Ecotech EC9850T	EQSA-0193-092	092
Ecotech Serinus 50	EQSA-0809-188	188
Environnement S.A AF21M	EQSA-0292-084	084
Environnement S.A AF22M	EQSA-0802-149	149
Environnement S.A. SANOA	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
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
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
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

SO_2 Analyzers		
Method	**Designation No.**	**Method Code[b]**
Teledyne Advanced Pollution Inst. 100A, 100 AS, 100E, 100EU, T100, T100U	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, 43*i*, 43*i-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, 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
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	EQOA-1107-169	169
Ecotech ML9810/EC9810, -9810B, -9811, -9812	EQOA-0193-091	091
Ecotech Serinus 10	EQOA-0809-187	187
Environics 300	EQOA-0990-078	078
Environnement S.A $O_3$41M	EQOA-0895-105	105
Environnement S.A $O_3$42M	EQOA-0206-148	148
Environnement S.A SANOA	EQOA-0400-137	137
Environnement S.A O_3 42e	EQOA-0515-225	225
Focused Photonics Inc. AQMS-300	EQOA-0719-253	253
Horiba APOA-360	EQOA-0196-112	112
Horiba APOA-370	EQOA-0506-160	160
KENTEK Inc. Model MEZUS 410	EQOA-0219-251	251
McMillan 1100-1	RFOA-1076-014	514
McMillan 1100-2	RFOA-1076-015	515
McMillan 1100-3	RFOA-1076-016	016
Meloy OA325-2R	RFOA-1075-003	003
Meloy OA350-2R	RFOA-1075-004	004
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
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	EQOA-0992-087	087
Teledyne Advanced Pollution Instr. T204	EQOA-0514-214	214

O_3 Analyzers		
Method	**Designation No.**	**Method Code[b]**
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, 49*i*, 49*iQ*	EQOA-0880-047	047
Tisch Environmental TE 1.0	EQOA-0809-187	187
Wedding 1010	EQOA-0193-091	091

Carbon Monoxide

CO Analyzers		
Method	**Designation No.**	**Method Code[b]**
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	RFCA-0907-167	167
Ecotech Serinus 30	RFCA-0509-174	174
Ecotech ML9830/EC9830, ML9830B/EC9830B	RFCA-0992-088	088
Ecotech EC9830T	RFCA-0992-088	088
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
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	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, 48*i*, 48*i*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	EQNA-0217-243	243
Advanced Pollution Instr. 200	RFNA-0691-082	082
Advanced Pollution Instr. 200A/200AU	RFNA-1194-099	099
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	RFNA-0508-171	171
Ecotech ML9841A/EC9841A, ML9841B/EC9841B	RFNA-1292-090	090
Ecotech EC9841T	RFNA-1292-090	090
Ecotech Serinus 40	RFNA-0809-186	186
Ecotech Serinus 44	RFNA-0809-186	186
Ecotech Serinus 60	EQNA-0217-242	242
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. SANOA	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	RFNA-0506-157	157
Meloy NA530R	RFNA-1078-031	031
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
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

NO_2 Analyzers		
Method	**Designation No.**	**Method Code[b]**
Teledyne Advanced Pollution Inst. 200A, 200AU, 200E, 200EU, T200, T200U, T204	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, 42*i*, 42*i-TL* 42*iQ*	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

Sources or Contacts for Designated Reference and Equivalent Methods

2B Technologies, Inc.
2100 Central Ave., Suite 105
Boulder, CO 80301
(303) 273-0559
http://www.twobtech.com

ABB Process Analytics
P.O. Box 831
Lewisburg, WV 24901
(304) 647-4358

Advanced Pollution Instrumentation, Inc.
[Refer to Teledyne Advanced Pollution Instrumentation]

Andersen Instruments
[Refer to Thermo Fisher Scientific, Inc.]

ASARCO Incorporated
3422 South 700 West
Salt Lake City, UT 84119
(801) 262-2459

Beckman Instruments, Inc.
Process Instruments Division
2500 Harbor Blvd.
Fullerton, CA 92634
(714) 871-4848

Bendix
[Refer to ABB Process Analytics]

BGI Incorporated
(Refer to Mesa Labs, Inc.)

Casella Monitor
Regent House, Wolseley Road, Kempston
Bedford, United Kingdom MK42 7JY
www.casellameasurement.com

Columbia Scientific Industries
11950 Jollyville Road
Austin, TX 78759
(800) 531-5003

Combustion Engineering
[Refer to ABB Process Analytics]

Dasibi Environmental Corp.
[Formerly, 506 Paula Avenue
Glendale, CA 91201
(818) 247-7601
www.dasibi.com

DKK-TOA Corporation
29-10, 1-Chome, Takadanobaba,
Shinjuku-ku
Tokyo 169-8648, Japan
+81-3-3202-0211
www.toadkk.co.jp

Eastern Research Group, Inc.
601 Keystone Park Drive, Suite 700,
Morrisville, NC 27560
919- 468-7800
www.erg.com

Ecotech Pty. Ltd.
1492 Ferntree Gully Rd.
Knoxfield, Victoria, 3180, Australia
+61 1300 364 946
www.ecotech.com.au

Environnement S.A.
111, bd Robespierre
78300 Poissy, France
www.environnement-sa.com
Instruments also available from:

Altech/Environnement U.S.A.
2623 Kaneville Court
Geneva, IL 60134
(630) 262- 4400

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
National Exposure Research Laboratory
Exposure Methods and Measurement Division
Air Quality 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

Wedding and Associates, Inc.
[Refer to Thermo Fisher Scientific, Inc.]