

STANDARD OPERATING PROCEDURE

UV Photometric Ambient Ozone Analyzer (TEI 49C / API 400E)

DOCUMENT TITLE:	UV Photometric Ozone Analyzer Servicing & Calibration SOP	DOC NUMBER:	SOP-MET-O3-001
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1. Purpose & Safety Protocol

This Standard Operating Procedure (SOP) defines field verification, multi-point calibration, and maintenance procedures for ambient ozone (O₃) UV photometric analyzers (Thermo Environmental Instruments TEI 49C / Teledyne API 400E) operated within air quality networks (CASTNet/EPA). Technicians must ensure that shelter temperature is maintained within 5°C to 40°C (ideally 20°C–30°C) before conducting photometric zero or span checks.

2. Required Field Equipment & Transfer Standards

- Certified Level 2 Traveling Ozone Transfer Standard (photometric calibrator).
- Zero air generator equipped with activated charcoal and desiccant scrubbers.
- PTFE/Teflon sample lines and Balston particulate filter assemblies.
- Field calibration forms, multimeter, and datalogger serial communication cables.

3. Step-by-Step Field Servicing & Calibration Routine

3.1 As-Found Verification & Channel Flagging: Log into the ESC 88xx datalogger and flag the O₃ channel offline to prevent logging invalid calibration spikes. Verify current shelter temperature (must be between 15°C and 35°C).

3.2 Zero Air & Baseline Check: Supply clean zero air from the zero air generator to the analyzer inlet. Allow flow to stabilize for 15 minutes. Verify that the zero baseline reads 0.0 ± 2.0 ppb. Adjust analyzer zero offset if needed.

3.3 Multi-Point Calibration (Level 2 Transfer Standard): Connect the Level 2 Ozone Transfer Standard to generate known O₃ concentrations. Introduce at least 4 upscale points (e.g., 400 ppb, 250 ppb, 100 ppb, 50 ppb) plus zero. Verify linearity across all levels; slope must be 1.00 ± 0.03 with a correlation coefficient $r \geq 0.999$.

3.4 Optical Window & Pump Maintenance: Inspect and clean the absorption cell UV optical windows using lint-free Kimwipes. Inspect sample pump diaphragm; rebuild or replace pump if flow rate drops below 1.0 L/min. Replace Balston particulate filter elements weekly/monthly.

3.5 As-Left Verification & System Return: Re-run zero and span checks to confirm Post-Maintenance response. Unflag the O₃ channel on the datalogger, record serial numbers, and complete the field calibration form.

4. Technical Performance Acceptance Criteria

Parameter	Target Requirement	Acceptance Limits	Action / Corrective Measure
Shelter Temperature	20°C to 30°C nominal	5°C to 40°C max range	Adjust HVAC; invalidate if <5°C or >40°C

Zero Air Drift	0.0 ppb baseline	< ± 3.0 ppb drift	Replace charcoal/desiccant; re-zero
Multi-point Calibration	4 upscale points + zero	Slope = 1.00 ± 0.03 , $r \geq 0.999$	Clean optical cells; recalibrate PMT
Precision Check Drift	Nightly precision point	< $\pm 5.0\%$ difference	Recalibrate analyzer with Level 2 std
Sample Flow Rate	0.8 to 1.2 L/min	1.0 L/min $\pm 10\%$	Rebuild pump diaphragm; replace filter

PREPARED & APPROVED BY:	Kadeem Manning Lead Field Specialist & QA Lead	SIGNATURE:	DATE:
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