

Open-Path FTIR Atmospheric Gas Analyzer

Standard Operating Procedure & Calibration Protocol

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Target Equipment: Open-Path FTIR Atmospheric Gas Analyzer	Status: Approved for Field Use

1.0 PURPOSE & SCOPE

This Standard Operating Procedure outlines optical alignment, background spectrum collection, and span calibration for Open-Path Fourier Transform Infrared (OP-FTIR) spectrometers measuring field atmospheric moisture and greenhouse gases across 500 to 4000 cm-1.

2.0 OPERATIONAL & CALIBRATION STEPS

- 1. Retroreflector Retro-Alignment:** Position corner-cube retroreflector array at 100m to 500m path length. Align IR beam for maximum Modulated Infra-Red Signal (MIRS) throughput.
- 2. Liquid Nitrogen Detector Cooling:** Cool MCT detector with LN2 or verify stirling cooler temperature at 77 K.
- 3. Zero Path / Short Path Background:** Collect short-path background spectrum (1m cell) to isolate instrument line shape (ILS).
- 4. Spectral Inversion & Calibration:** Apply HITRAN molecular absorption cross-section fitting algorithms for H2O, CH4, and CO2 column density calculations.
- 5. Purge Cell Verification:** Verify internal spectrometer nitrogen purge flow at 1.0 L/min.

3.0 ACCEPTANCE TOLERANCES

Check Item	Specification Range	Tolerance
MCT Cooler Temp	77 K (-196 °C)	+/- 2 K
IR Beam Throughput	Signal Strength > 85%	Maximized
Wavenumber Precision	Laser reference 632.8 nm	+/- 0.01 cm-1

APPROVAL & AUTHORIZATION	FIELD EXECUTION SIGN-OFF
Prepared By: Kadeem Manning Title: Lead Field Calibration Specialist Signature: <i>Kadeem Manning</i> Date: 2026-09-16	Field Technician: _____ Station / Location: _____ Signature: _____ Date: _____