



Looking Into The Future: Alternative Technologies and Regulatory Approval

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\$960 million per day* is the cost to comply with federal environmental regulations

*Competitive Enterprise Institute estimate for 2014

New Tech Opportunities and Challenges

Opportunities:

- Rapid innovation in emissions monitoring, detection, and control
- Improved environmental outcomes
- Cost savings for operators

Challenges:

- Demonstrating equivalency and data validation
- Lengthy approval process
- Fragmented Jurisdiction

Regulatory Perspective:

How is alternative technology defined?



Federal Frameworks – U.S. EPA

- Clean Air Act Pathways
 - Alternative Means of Emission Limitation (AMEL)
 - Alternative Test Method (ATM) submissions
 - Other Test Method (OTM) Approvals
 - Alternative Monitoring Plan (AMP) requests
 - Methane Alternative Test Method (MATM) – NSPS Subpart OOOOb

Alternative Means of Emissions Limitation (AMEL)

Approval of alternative regulatory control technologies



Strengths

- Applies to emission control tech
- Site-specific flexibility
- Pathway for control technology

Weaknesses

- Lengthy approval process
- High technical burden
- Complex Process
- Narrow Applicability

Examples of Approved AMELs

- AMEL Flares:

- Six approvals since 2015
- Refineries / Chemical plants
- Multi Point Ground Flares

<https://www.epa.gov/stationary-sources-air-pollution/alternative-means-emission-limitation-flares>

AMEL Leak Detection and Repair:

- One approval
- Refinery
- Leak Detection Sensor Network

<https://www.epa.gov/stationary-sources-air-pollution/alternative-means-emission-limitation-leak-detection-and-repair>

Alternative Test Method (ATM)

Approval of alternative regulatory compliance methods



Strengths

- Faster Approval (6+ months)
- Lower Technical Burden
- Widely applicable
- Cost effective

Weaknesses

- Lengthy Approval Process
- High Upfront Costs
- Uncertainty of Outcome
- Narrow Applicability

Types of Approved ATMs

162 broadly applicable ATMs since 1988

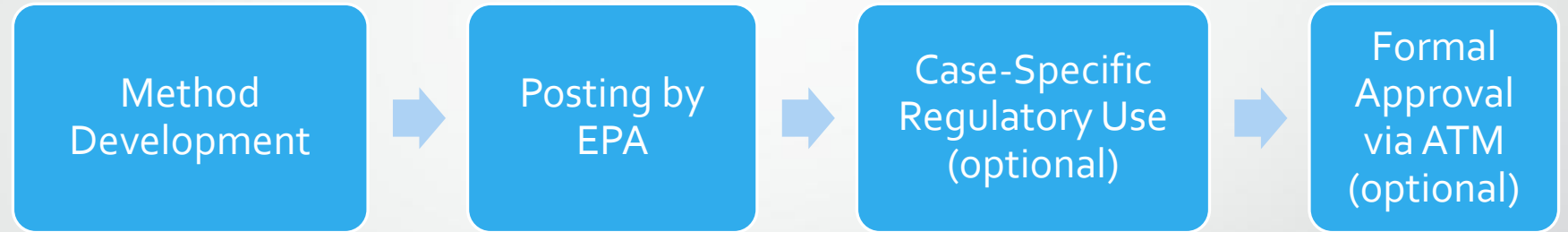
Types of ATMs:

- Variations on existing methods
- Technology alternatives (ALT-157)
- Other Test Method adoption (ALT-156)

<https://www.epa.gov/emc/broadly-applicable-approved-alternative-test-methods>

Other Test Method (OTM)

Approval of alternative monitoring/screening methods



Strengths

- Rapid development
- Flexible use
- Supports innovation
- EPA endorsed for Research

Weaknesses

- Not compliance-approved
- Additional steps for regulatory adoption

Examples of Approved OTMs

- 38 currently listed OTMs
- Several have been adopted as reference methods
- Recent Methods:
 - OTM-51 UAS Application of Method 21 for Surface Emission Monitoring of Landfills
 - OTM-52 - Method for Determination of Combustion Efficiency from Enclosed Combustion Devices Located at Oil and Natural Gas Facilities
 - OTM-56 - Determination of Flare Combustion Zone Net Heating Value via Combustion Index Using Video Imaging Spectral Radiometer

<https://www.epa.gov/emc/emc-other-test-methods>

Alternative Monitoring Plan (AMP)

Approval of alternative regulatory monitoring (non-test) methods



Strengths

- Regulatory flexibility
- Encourages innovation
- Compliance Pathway
- Integration with other alternative tech programs

Weaknesses

- Lengthy Approval Process
- Uncertainty of outcome
- Narrow Applicability

OOOOOb Methane Alternative Test Methods (MATMs)

Fugitive emissions monitoring and inspections requirements



Provides Framework for Accelerated Alt Tech Adoption

- Established timeline
- Streamlined approval process
 - Submission portal
 - Required documents outlined in rule
 - Guidance documents
- Encourages industry-vendor-regulator collaboration



How did MATM Advanced the Approval Process

- EPA acknowledgement of emerging technologies
- Performance based approval framework
- Adding flexibility to regulations
- Streamlining Approval Process
 - Required Documents: Guidance and rubrics
 - Submission portal
 - Timeframe: 270 days

Report a Violation

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Oil and Natural Gas

Advanced Methane Technology
Alternative Test Method



Test Method(s) Request Portal
Performance Standards and Emission
Gas Operations



Key Components to Success

- Method development prior to field testing
- Siting protocols
- Field Validations
 - Test plan complexity
 - Development 90% POD
 - Detection and Alerting
 - Quantification

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Test Method(s) Request Po
formance Standards and Em
Gas Operations



MATM Approved Tech

- Point sensors
- Path integrated fence line
- Imagers
 - Arial
 - Fix mounted
- Handheld devices

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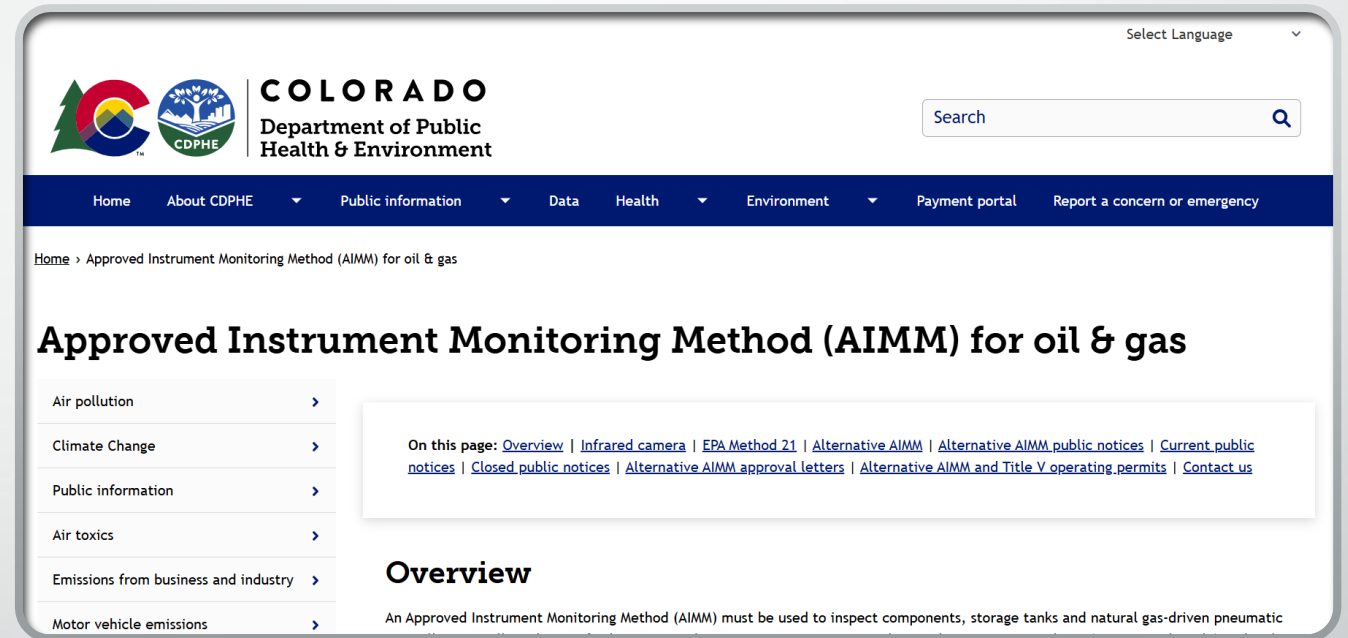


Test Method(s) Request Po
formance Standards and Em
Gas Operations

Colorado Framework: Regulation 7 Alternative Approved Instrument Monitoring Methods (Alt AIMM)



- Oil and Gas focused
- One of the most advanced technology review and approval programs in the country
- Existed for over 10 years



Alternative Approved Instrument Monitoring Method Framework

- Reg 7 requires component level inspections of well production facilities, compressor stations, and natural gas processing plants.
- Reg 7 defines AIMM as an infrared (IR) camera or EPA Method 21
- Alternative AIMM is an instrument-based monitoring method or program approved in accordance with the requirements of Regulation 7, Part B, Section I.L.8.
- Equivalency based approval process



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**Department of Public
Health & Environment**

Alternative Approved Instrument Monitoring Methods Application Components

- Technology details
- Quantitative or qualitative detection method
- Evidence of detection limits, reliability, performance:
 - Field validation data;
 - Blind testing;
 - Leak size vs. detection;
 - Distance;
 - influencing factors etc.
- Quality control / quality assurance plans.
- A monitoring plan
- Work practice
- Equivalency demonstration to OGI or Method 21
 - Equivalency modeling
 - LDAR-sim
 - MEET and FEAST
 - Factors to consider
 - Direct side-by-side field validation

Approved Alt-AIMMs

Imaging Solutions



Handheld Solution



Drone Mounted Solution



Fenceline Solution





Proposed Regulation 31 - Alternative Surface Emission Monitoring (Alt SEM)

- Landfills
- Similar to Alt AIMM
- Equivalency demonstration
- Submittal and approval process



Industry Roles, Expectations and Tips

Industry's Role in the Process

- Participation in pilots & demonstrations
- Providing real world facilities for tech evaluation
- Proactive engagement with regulators
- Shaping future approval programs

Industry's Expectations

- Ensure deployment matches the proposed method
- A commercially viable system
- Identify gaps and provide feedback to vendors
- Provide feedback to regulators

Practical Tips

- Start early
- Build defensible data package across wide range of operating conditions
- Value of piloting in real operations
- Expect iteration
- Document everything
- Avoid promoting unproven tech prematurely

Final Thoughts on Alternative Technology

- Innovation outpaces regulatory adoption
- Federal and state frameworks offer pathways for alternative technologies
- NSPS OOOOb plays a key role in enabling innovation
- Success depends on collaboration among developers, operators, and regulators

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Comments or Questions