



Fighter Aircraft COCAT Testing

Andrew Klein

F-35 Program Life Support Systems Engineer



Tulsa Fire Department: Carbon monoxide found in Delta plane diverted to Tulsa

Corley Peel, KJRH , WXIA

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TULSA - Several passengers voiced their frustrations after a flight from Atlanta to Denver was diverted to Tulsa.

Dylan Doyle was on his way from Atlanta to Denver to see his girlfriend, however, the trip was cut short when Delta flight 1817 was forced to land because 9 people were feeling nauseous.

"As people started seeing other people freaking out everybody just kind of went into a panic," Doyle told [KJRH in Tulsa](#).

"We arrived, assisted with evaluating 12 patients who had complained of or were showing symptoms of carbon monoxide poisoning," said Tulsa Fire Captain Stan May.

One passenger was transported to the hospital for unrelated medical issues, while around 150 other passengers were moved off the plane without their baggage, spending most of the day waiting in the terminal.

"So everyone is just sitting here quarantined and they're not telling us anything and it's getting to the point where people, tensions are running high," said Doyle.

Firefighters said the source of the carbon monoxide is still unknown.



Background

- **Carbon Monoxide (CO) identified as a potential contaminant in pilot breathing gas**
- **Several CO catalysts in development for fighter aircraft**
 - Navy COCAT program
 - F-35 COCAT plenum
- **Typical requirements:**
 - Low temperature operation
 - Wide range of flow rates and pressures
 - Durable for long-term installation
 - Low maintenance burden
 - Integrates with existing systems
 - No discernible impact to the pilot



Test Goals and Challenges

- 1. Characterize absolute performance of the catalyst**
- 2. Establish flow rate and pressure dependence**
- 3. Identify hysteresis effects**
- 4. Evaluate the long-term catalyst stability**



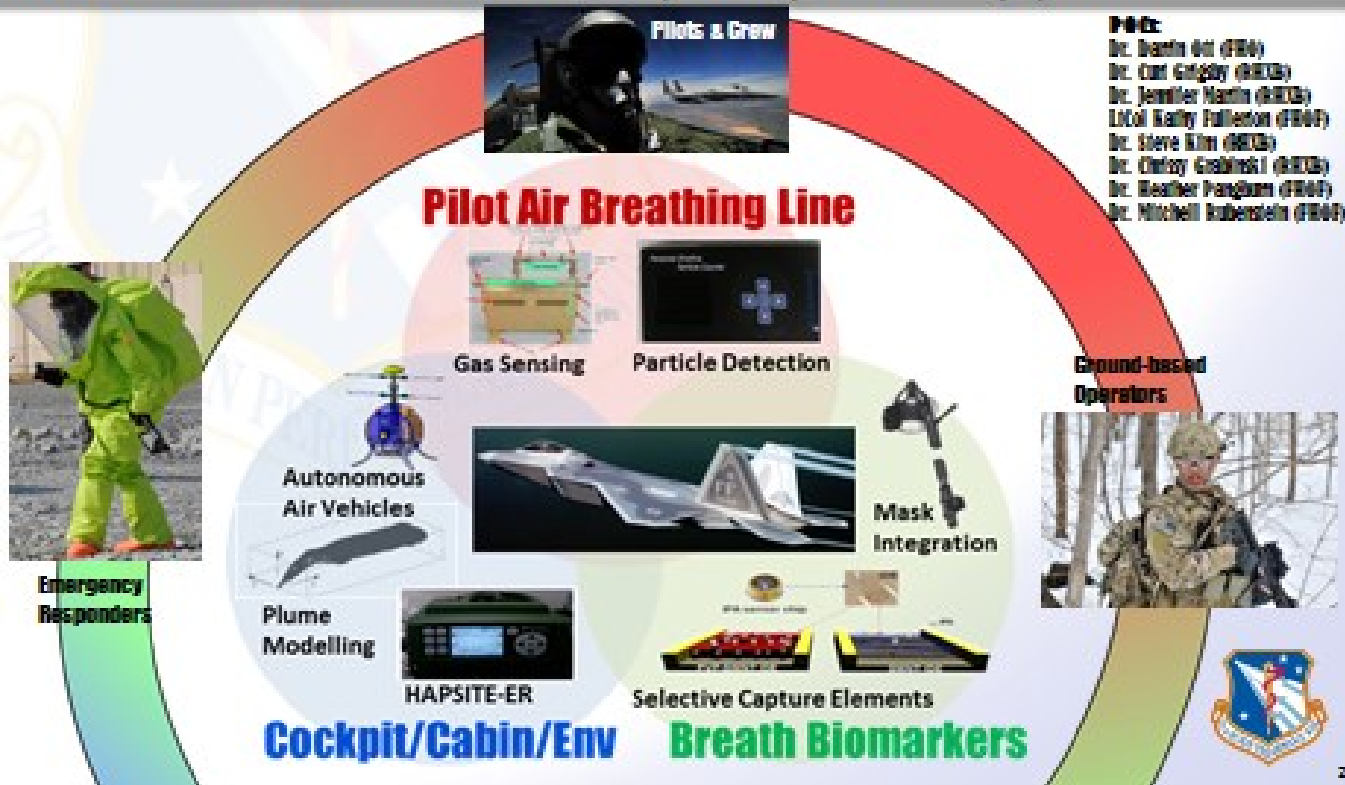
AFRL Air Quality Group



Air Quality Group Mission



VISION: Provide commanders with the tools necessary to make data driven, risk based decisions to execute mission and protect personnel/equipment





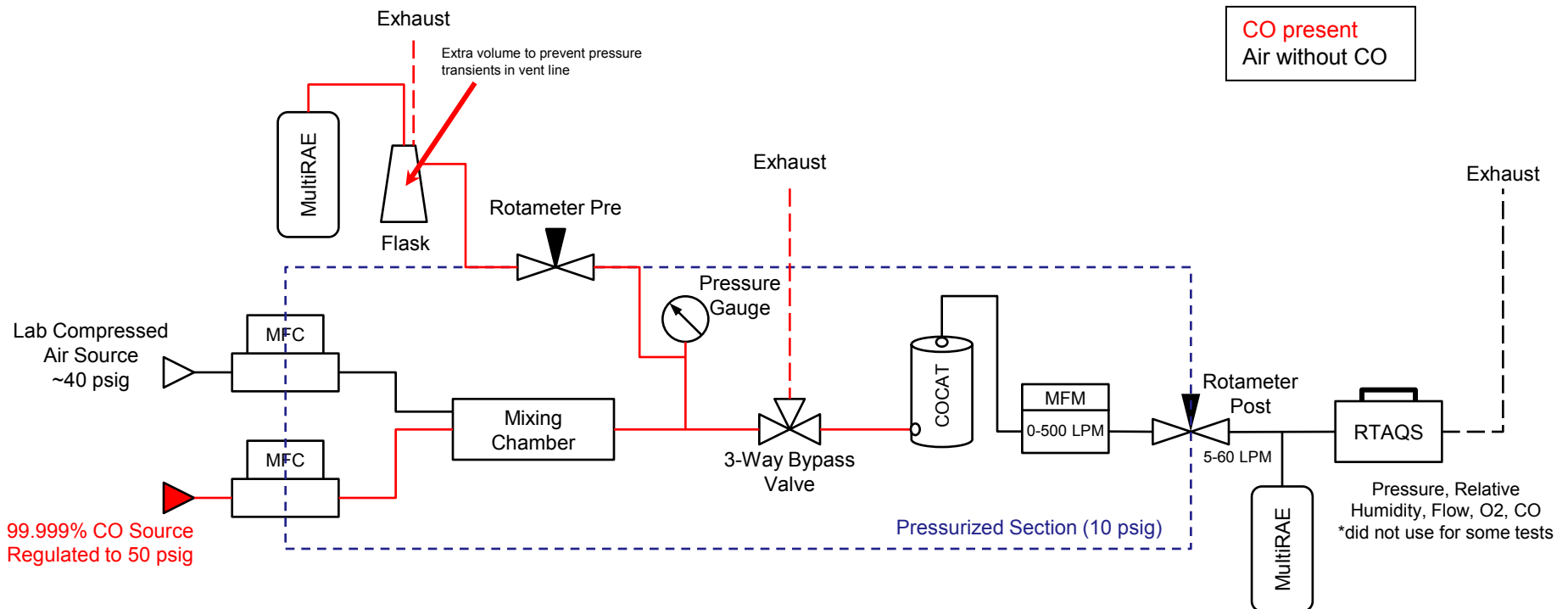
Test Cycle

- 1. Purge**
- 2. Apply CO challenge in air**
- 3. Constant flow rate throughout test**
- 4. Measure CO and CO2 at inlet and outlet**
- 5. Purge**
- 6. Increase challenge**

Goal was to find a CO challenge that resulted in quick break-through, so we could evaluate the absolute performance change

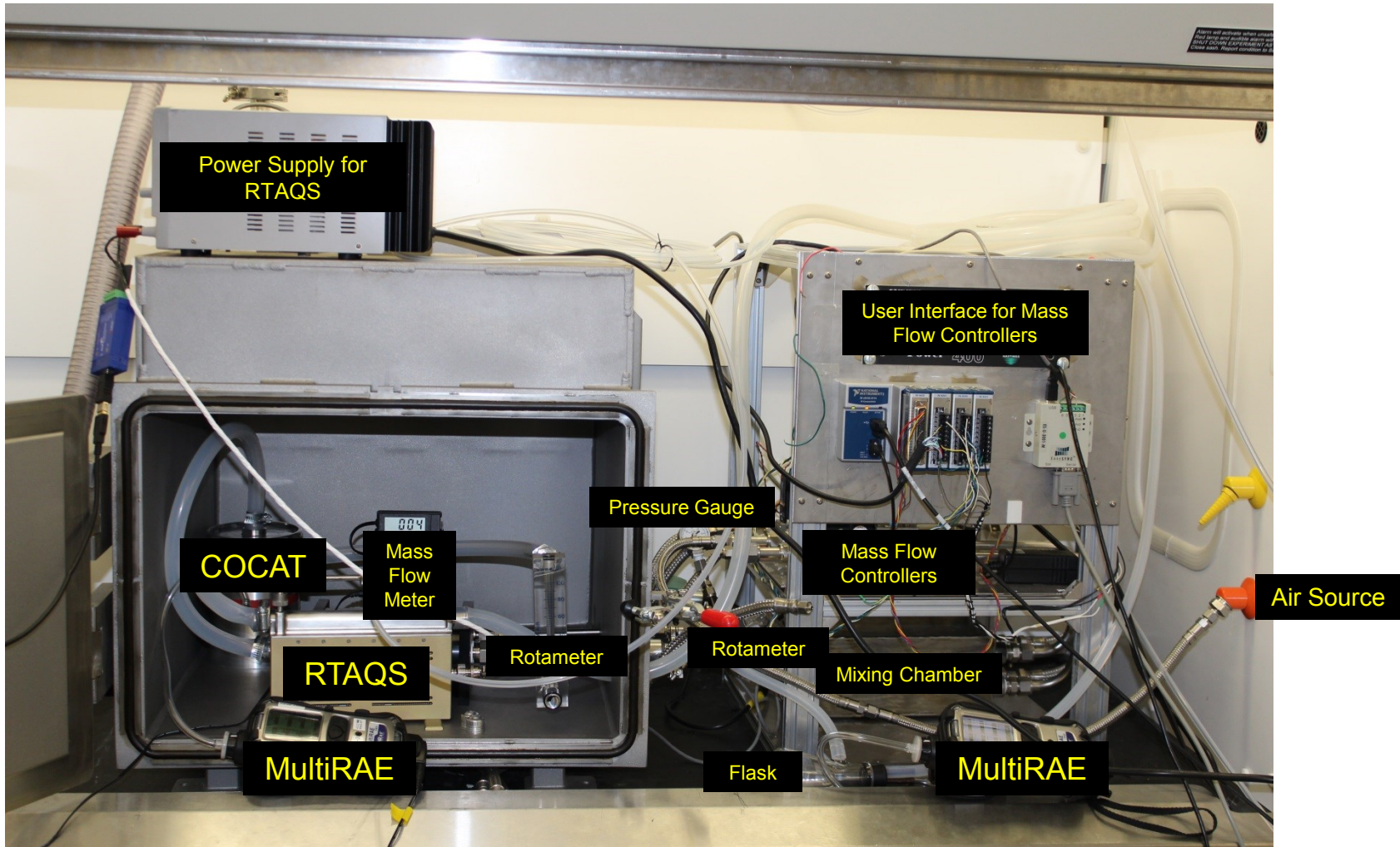


Test Setup Schematic



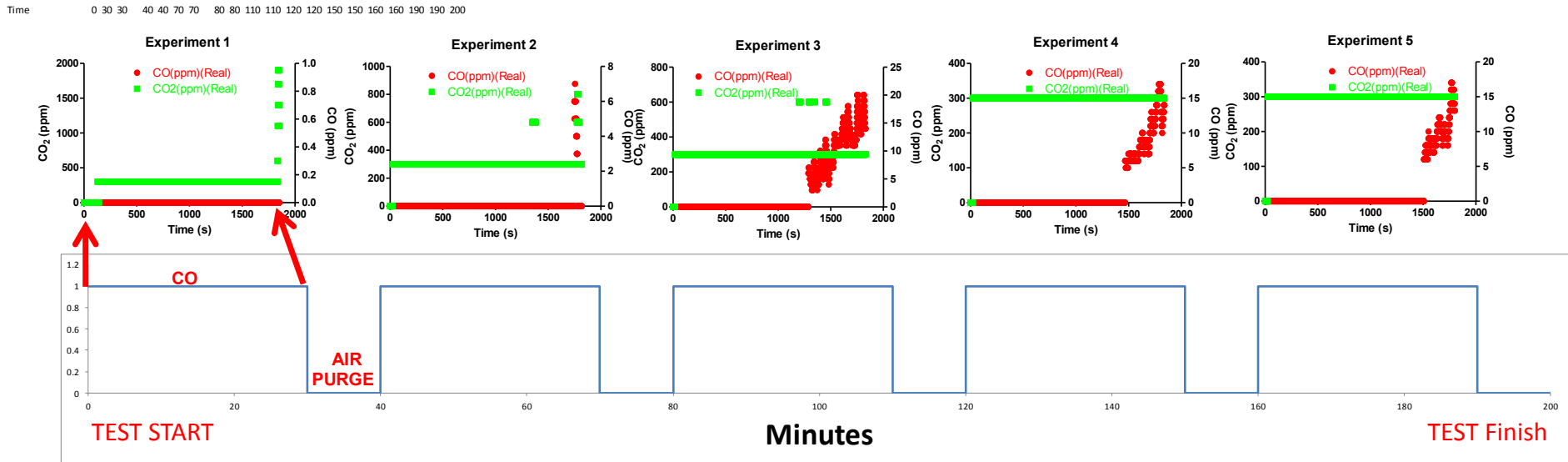


Test chamber





Results



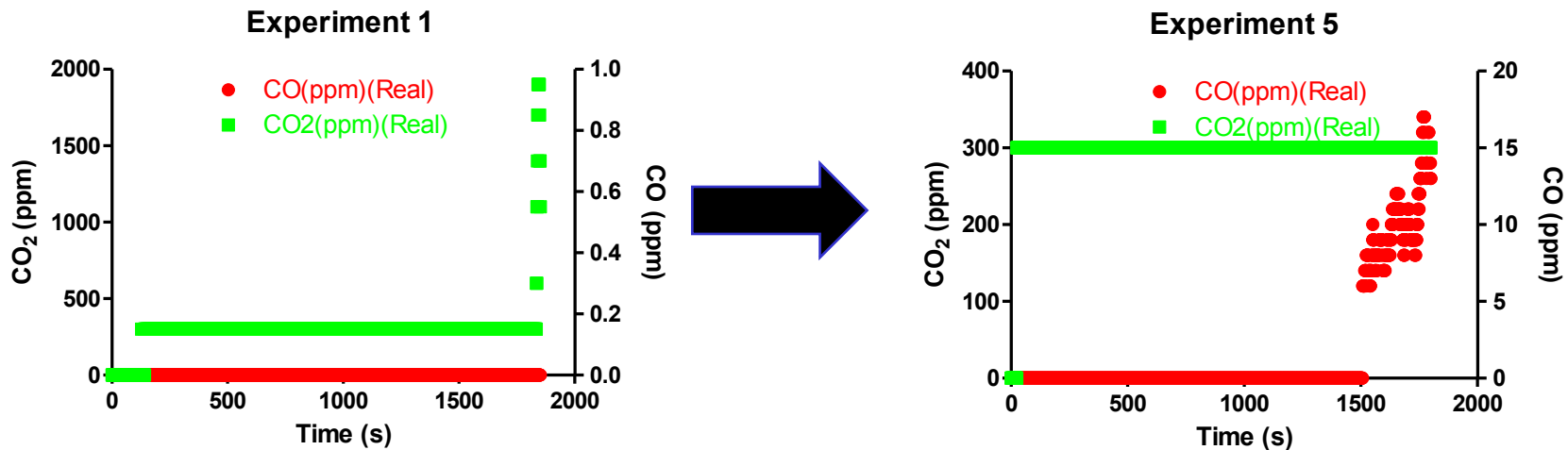
- 1) 60 LPM for all stages of the test
- 2) All testing at ambient pressure
- 3) Cycle repeated 5 times
- 4) CO steady state for all tests

- CO breakthrough observed after repeated exposures
- Purge was only 5 minutes
- 2 hour purge appeared to clear all CO, but exact time needed was not identified



Results

Findings:



1. Hysteresis / CO buildup can occur
2. Confounds tests and can lead to false “fail” result



Summary

- 1. Testing was much more challenging than initially anticipated**
- 2. We had to reduce our expectations, single flow rate, single ppm challenge**
- 3. Lots of testing required before consistent results were achieved**
- 4. Experience in the field will be the true litmus test**
- 5. Catalyst testing requires consistency and attention to detail**



Future efforts

- 1. Evaluate long-term catalyst durability**
- 2. Effect of different contaminants on catalyst life**
- 3. Modeling and characterizing useful life**
- 4. Characterizing sensors and other methods to monitor for contaminants**



Questions?
