

# ***EPA Protocol Gas Verification Program***

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# *Outline of Presentation*

- Background information
- Early audits of EPA Protocol Gases
- Genesis of the PGVP
- Results of the PGVP

# ***What are EPA Protocol Gases?***

- Compressed gas mixtures
- Assayed using EPA traceability protocol
- Traceable to NIST gaseous standards
- Sold by producers and their distributors
- Used for calibrations of air pollution monitors operated by regulated community (government and industry)

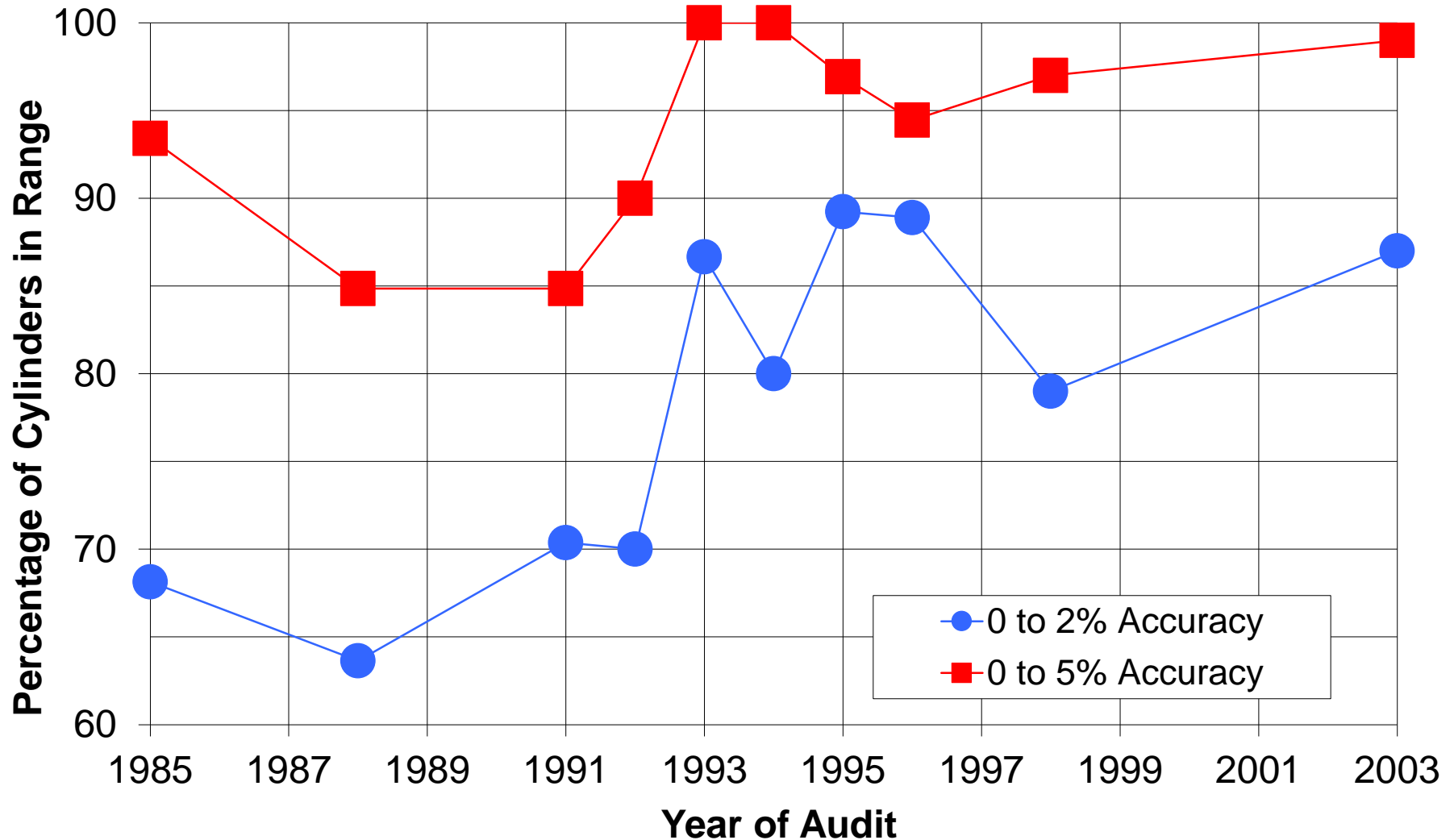
# *Calibration Gas Requirements in EPA Monitoring Regulations*

- Ambient air regulations require EPA Protocol Gases, no accuracy specification
- Stationary source methods require EPA Protocol Gases, no accuracy specification
- Acid rain regulations require NIST SRMs, NIST NTRMs or EPA Protocol Gases with +/- 2.0 percent uncertainty

# *EPA Traceability Protocol*

- Developed by EPA, NIST, and producers in 1978
- Balances EPA's need for accuracy with the producers' need for flexibility and low cost
- Specific analytical/statistical method (a recipe)
- Assays of individual cylinders, no batches
- No blanket accreditation of producers
- No external review of producer's results
- Minimal governmental oversight of producers
- Periodic audits of EPA Protocol Gases
- Dissemination of audit results to users

## *Percentage of Audited EPA Protocol Gases within a Given Accuracy Range*



# *2008 Audit by EPA Inspector General*

- EPA purchased 87 EPA Protocol Gases containing NO, SO<sub>2</sub> and CO<sub>2</sub> in nitrogen at three concentration levels
- Third-party buyer surreptitiously bought cylinders from 14 producers/vendors
- Cylinders were analyzed by NIST
- Acceptance criterion was EPA acid rain program's  $\pm 2.0$  percent uncertainty specification

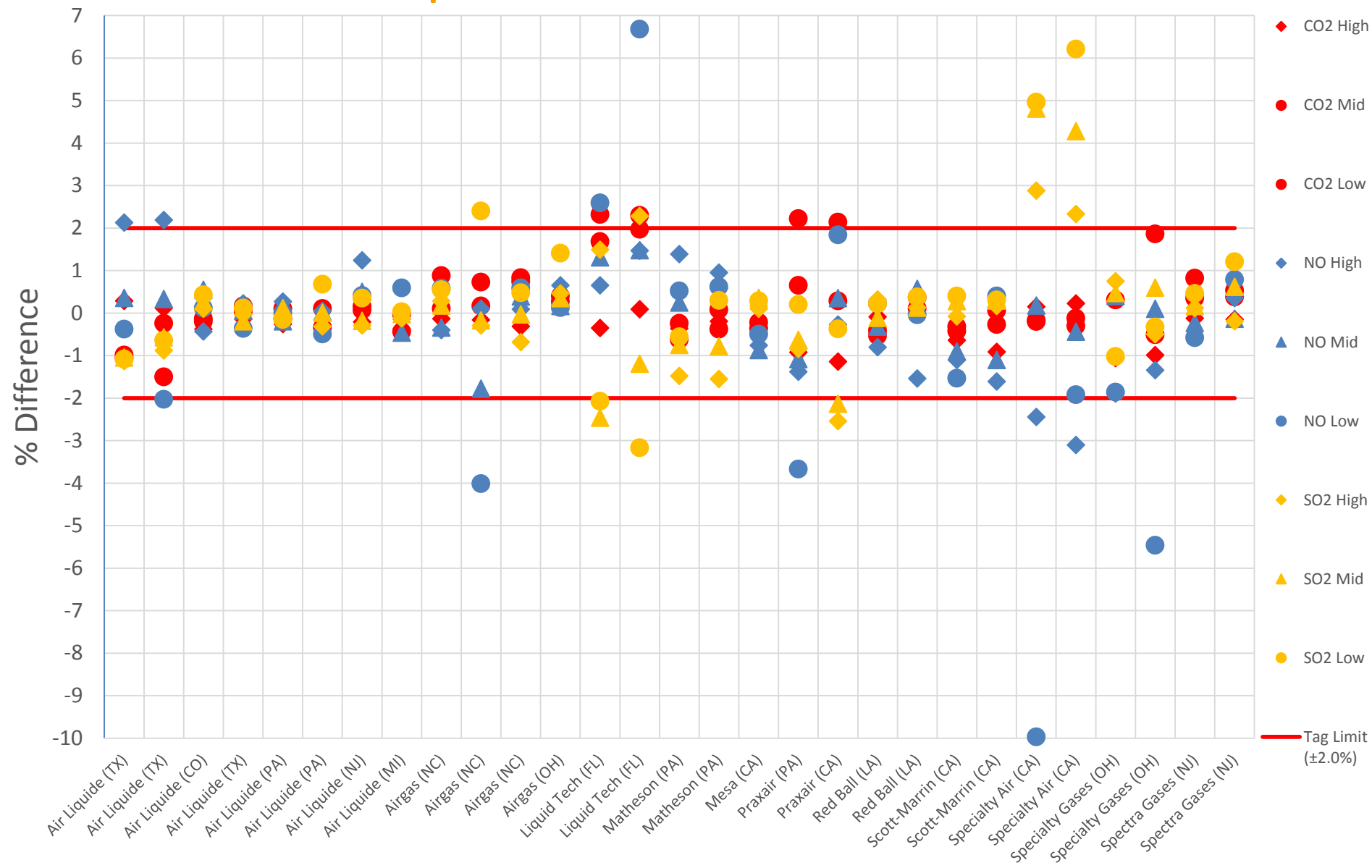


# ***Results of 2008 IG Audit***

## ***[Failures/Total Number (Percent Failures)]***

<b>Concentration</b>	<b>NO Component</b>	<b>SO<sub>2</sub> Component</b>	<b>CO<sub>2</sub> Component</b>	<b>All Components</b>
High Level	4/29 (14)	4/29 (14)	0/29 (0)	8/87 (9)
Mid Level	0/29 (0)	4/29 (14)	1/29 (3)	5/87 (6)
Low Level	7/29 (24)	5/29 (17)	3/29 (10)	15/87 (17)
All Levels	11/87 (13)	13/87 (15)	4/87 (5)	28/261 (11)

# 2008 Inspector General Audit Results



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# ***EPA Inspector General's Recommendations***

- Implement oversight program for EPA acid rain program
- Implement oversight program for EPA ambient air program
- Update and maintain EPA traceability protocol

# *EPA Acid Rain Program Regulations*

40 CFR Part 75, Appendix A, Section 5.1.4:

‘...a specialty gas producer advertising calibration gas certification with the EPA Traceability Protocol or distributing calibration gases as "EPA Protocol Gas" must participate in the EPA Protocol Gas Verification Program (PGVP)... or it cannot use “EPA” in any form of advertising...’

# *EPA Ambient Air Monitoring Regulations*

40 CFR Part 58, Appendix A, Section 2.6:

*‘... Vendors advertising certification with the procedures provided in reference 4 of this appendix and distributing gases as “EPA Protocol Gas” must participate in the EPA Protocol Gas Verification Program or not use “EPA” in any form of advertising...’*

# *Protocol Gas Verification Program*

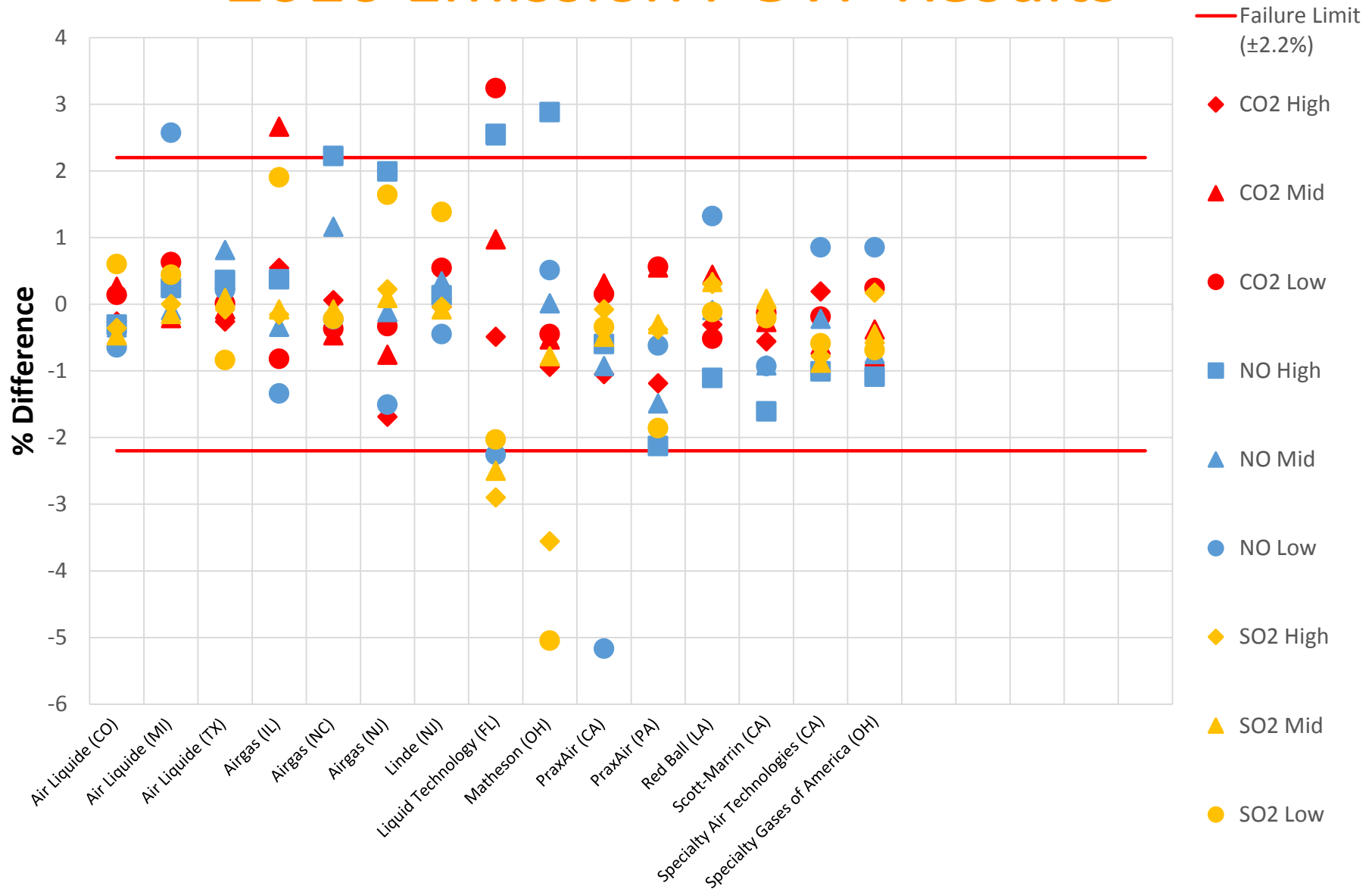
- Two separately administered PGVPs
- Emissions verifications performed by NIST
- Ambient air verification by Regions 2 and 7
- Any participant must notify EPA each year, but do not have to be audited each year
- PGVP results do not have to meet the +/- 2 percent accuracy criterion
- Dissemination of PGVP results to users

# ***Results of 2010 Emission PGVP***

***[Failures/Total Number (Percent Failures)]***

<b>Concentration</b>	<b>NO Component</b>	<b>SO<sub>2</sub> Component</b>	<b>CO<sub>2</sub> Component</b>	<b>All Components</b>
High Level	3/15 (20)	2/15 (13)	0/15 (0)	5/45 (11)
Mid Level	1/15 (7)	1/15 (7)	1/15 (7)	3/45 (7)
Low Level	3/15 (20)	1/15 (7)	1/15 (7)	5/45 (11)
All Levels	7/45 (16)	5/45 (11)	2/45 (4)	13/135 (10)

# 2010 Emission PGVP Results



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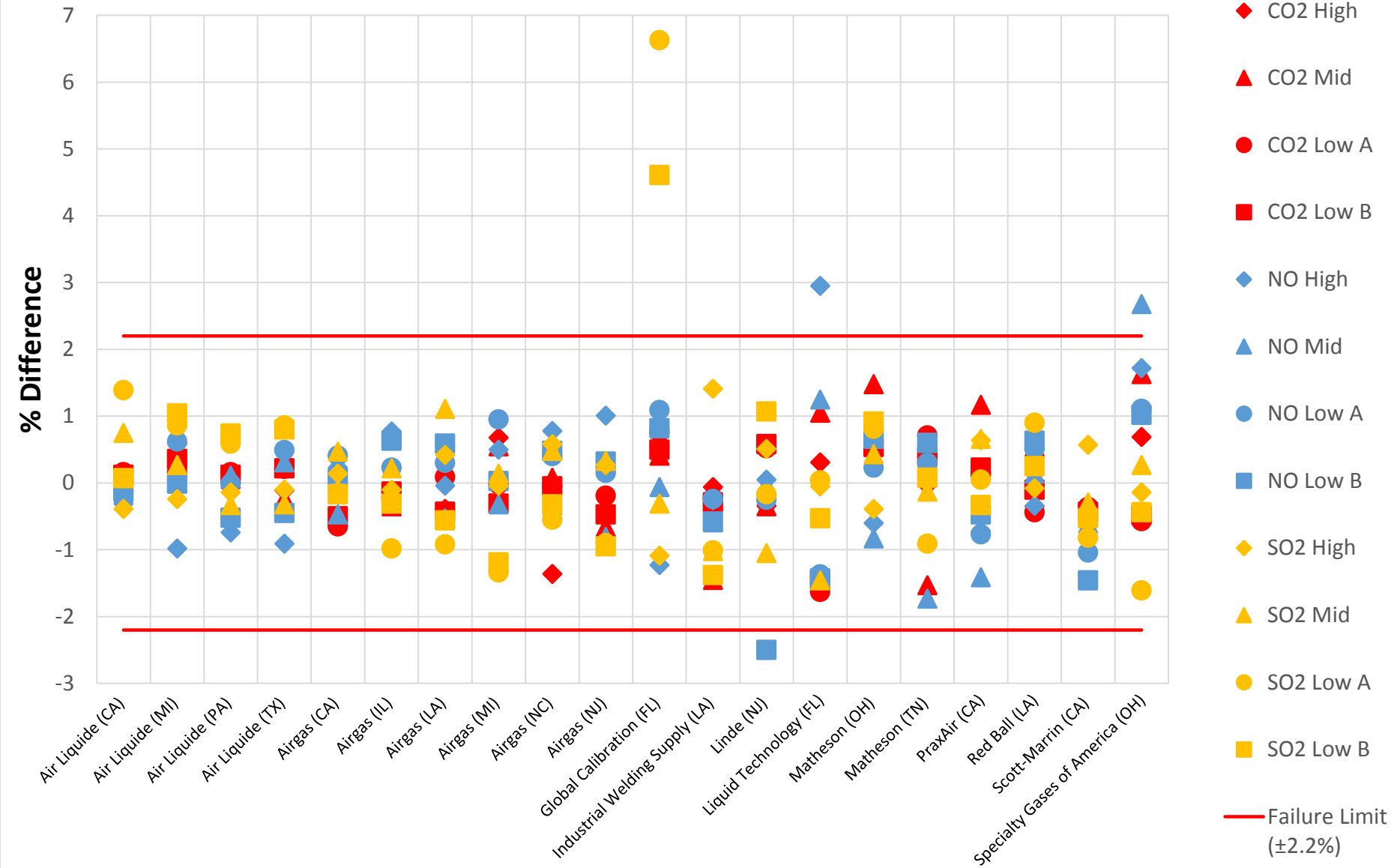


# ***Results of 2013 Emission PGVP***

***[Failures/Total Number (Percent Failures)]***

<b>Concentration</b>	<b>NO Component</b>	<b>SO<sub>2</sub> Component</b>	<b>CO<sub>2</sub> Component</b>	<b>All Components</b>
High Level	1/20 (5)	0/20 (0)	0/20 (0)	1/60 (2)
Mid Level	1/20 (5)	0/20 (0)	0/20 (0)	1/60 (2)
Low Level	1/40 (3)	2/40 (5)	0/40 (0)	3/120 (3)
All Levels	3/80 (4)	2/80 (3)	0/80 (0)	5/240 (2)

# 2013 Emission PGVP Results



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# Results of Ambient Air PGVP

*[Difference > 2 percent/Total Number (Percent)]*

Year (Direct Ships)	NO Standard	SO <sub>2</sub> Standard	CO Standard	All Standards
2010 (0/42)	0/17 (0)	2/14 (14)	1/17 (6)	3/48 (6)
2011 (20/48)	3/17 (18)	2/16 (11)	0/13 (0)	5/46 (10)
2012 (20/60)	3/25 (12)	4/20 (20)	0/15 (0)	7/60 (12)
2013 (44/59)	3/18 (17)	1/18 (6)	0/21 (0)	4/57 (7)
2014 (29/35)	1/12 (8)	1/11 (9)	1/12 (8)	3/35 (9)
All Years	10/89 (14)	8/79 (12)	1/78 (2)	22/244 (9)

# Results of Ambient Air PGVP

*[Difference > 5 percent/Total Number (Percent)]*

Year (Direct Ship)	NO Standard	SO <sub>2</sub> Standard	CO Standard	All Standards
Year (Direct Ship)	NO Standard	SO2 standard	CO Standard	All Standard
2010 (0/42)	0/17 (0)	1/14 (7)	0/17 (0)	1/48 (2)
2011 (20/48)	1/17 (6)	0/16 (0)	0/13 (0)	1/46 (2)
2012 (20/60)	0/25 (0)	0/20 (0)	0/15 (0)	0/60 (0)
2013 (44/59)	0/18 (0)	0/18 (0)	0/21 (0)	0/57 (0)
2014 (29/35)	0/12 (0)	0/11 (0)	0/12 (0)	0/35 (0)

# *Summary of Presentation*

- EPA Inspector General recommended that EPA implement PGVPs to provide reasonable assurance that EPA Protocol Gases are accurate
- Since 2010, the PGVP has regularly assessed the quality of these reference standards
- PGVP results provide assurance to end users and producers that EPA Protocol Gases are meeting the accuracy requirements of EPA's acid rain and ambient air programs.

# ***PGVP Administrative Contacts***

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