



Annual Data Quality Report Process Overview and 2022 Data Highlights

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Overview

Annual Data Quality Report

What is the Annual Data Quality Report?

What is the purpose?

What does it include?

What is the process?

How are the results summarized?



Drum roll!!!

Highlights from 2022 Data

What is the Annual Data Quality Report?

- Ambient air quality data results collected in a specific calendar year
- Centralized review and analysis of the data



What is the Purpose?

Provides data producers and users an assessment of data quality

Supports decision-making for regulations and attainment

Identifies areas for program improvements



What Does it Include? PQAOs

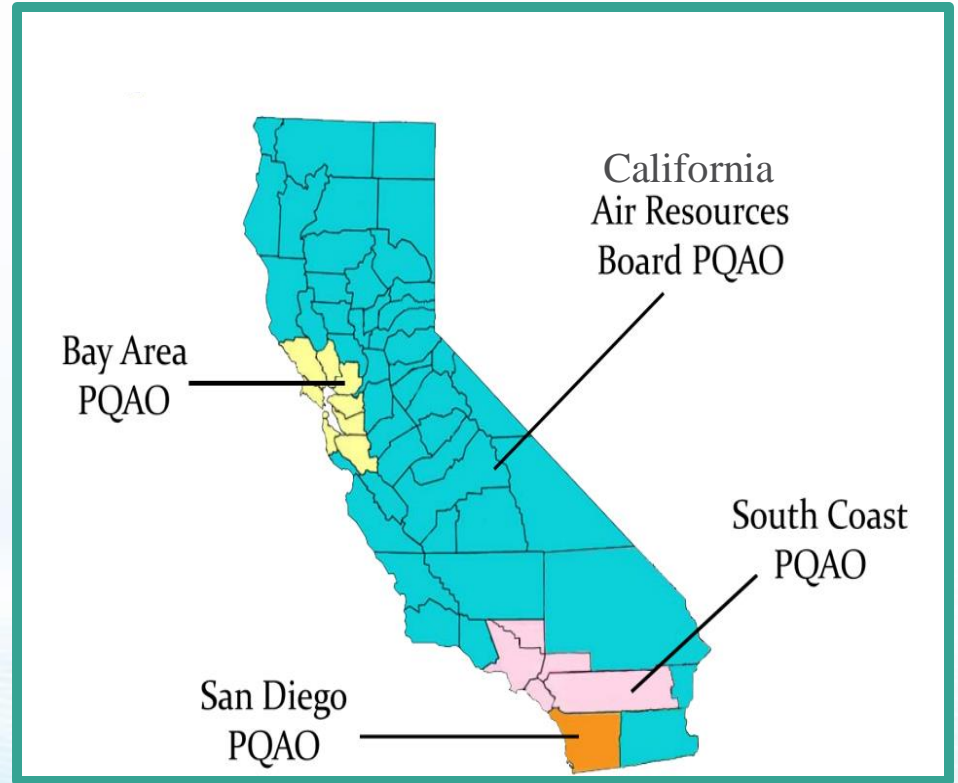
Data results collected:

CARB's Primary Quality Assurance Organization (PQAO)

Antelope Valley AQMD	Northern Sonoma County APCD
CARB	Placer County APCD
Eastern Kern APCD	Sacramento Metro AQMD
Great Basin Unified APCD	San Joaquin Valley APCD
Imperial County APCD	San Luis Obispo County APCD
Lake County AQMD	Santa Barbara County APCD
Mendocino County AQMD	Shasta County AQMD
Mojave Desert AQMD	Siskiyou County APCD
Monterey Bay ARD	Tehama County APCD
North Coast Unified AQMD	Ventura County APCD
Northern Sierra AQMD	Yolo-Solano AQMD

Data results comparisons:

4 CA PQAOs and Nationwide



What Does it Include? Pollutants

Ozone (O ₃)	Carbon Monoxide (CO)	Particulate Matter (PM ₁₀)
Nitrogen Dioxide (NO ₂)	Sulfur Dioxide (SO ₂)	Particulate Matter (PM _{2.5})

What Does it Include? MQO and Criteria

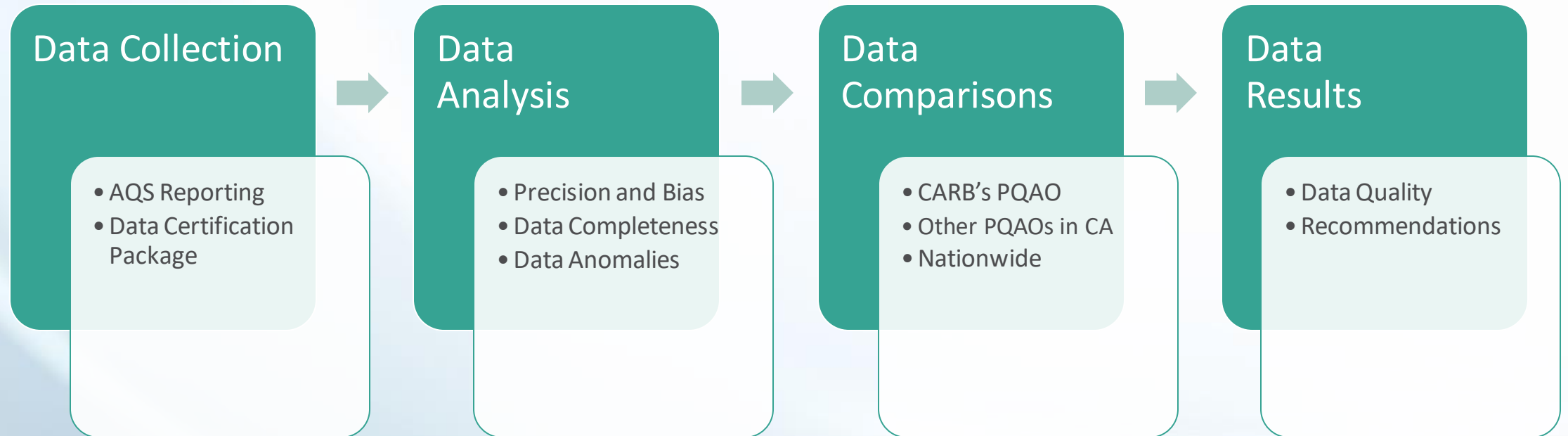
Measurement Quality Objectives (MQO)

- Precision
- Bias
- Data capture
- Amount of precision and bias data collected/reported

MQO criteria

- Mostly from 40 Code of Federal Regulation (CFR), Part 58, Appendix A

What is the Process? Process Overview



What is the Process? Data Collection

Monitoring Organization's Responsibilities:

Quarterly Data

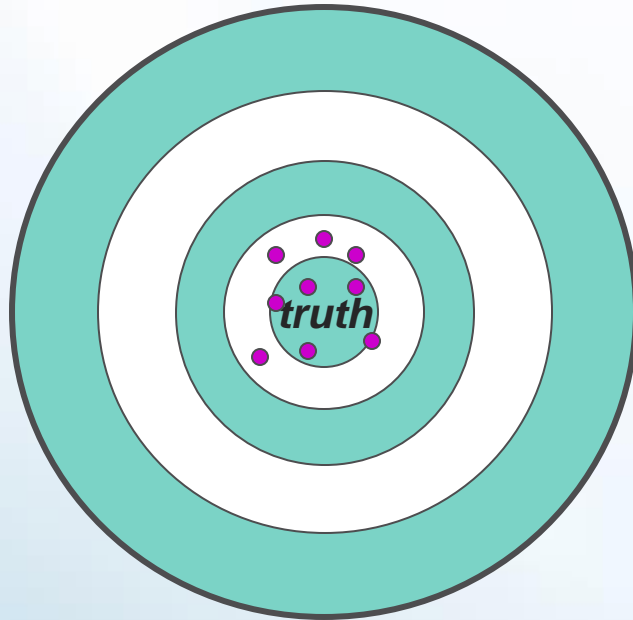
- Data collected is reported to Air Quality System (AQS) within **90 days** of the end of each quarter
- 40 CFR Part 58 Appendix A Section 5.1.1



Annual Data

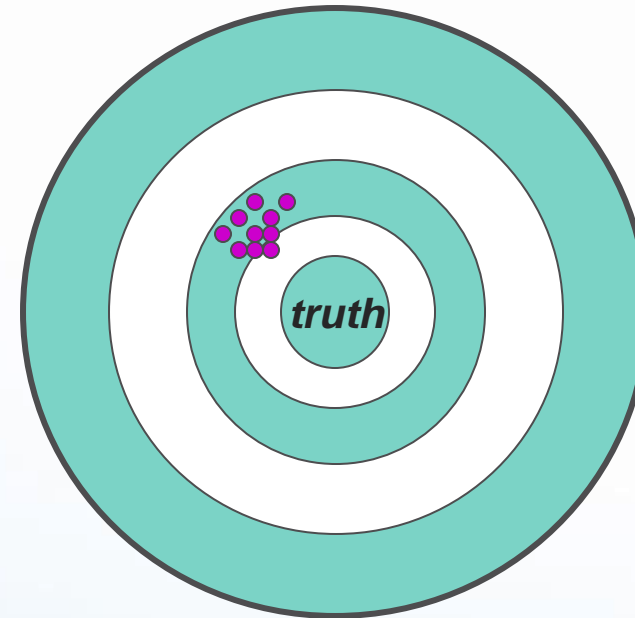
- Report ambient air quality data to AQS
- Prepare Data Certification Package for U.S. EPA
 - Data certification letter
 - Data certification AMP 600 report
- Submit data certification package by **May 1**

What is the Process? Data Analysis: Precision versus Bias



Precision

“A measure of **mutual agreement** among individual measurements of the same property, usually under prescribed similar conditions”



Bias

“A systematic or **persistent distortion** of a measurement process which causes errors in one direction”

What is the Process? Data Analysis: Precision and Bias

Pollutant	Precision only	Bias only		Precision and Bias
	Collocated Measurements	Performance Audits	Flow Rate Verifications	1-pt QC Checks
Gases				
CO, NO ₂ , O ₃ , SO ₂		✓		✓
Continuous				
PM ₁₀		✓	✓	
PM _{2.5}	✓	✓	✓	
Manual				
PM ₁₀	✓	✓	✓	
PM _{2.5}	✓	✓	✓	

What is the Process? Data Analysis: Data Completeness

MQO and Pollutant	Coverage (Annual)	Frequency	Data/Regulatory Completeness	MQO Reference
Ambient Data Capture - CO, NO ₂ , O ₃ , SO ₂ ; PM ₁₀ , PM _{2.5}	Each instrument and sampler	Collected data for the year	At least 75%	Refer to Appendix A in the Annual Data Quality Report for details
One-Point QC Check - CO, NO ₂ , O ₃ , SO ₂	Each instrument	Once every 14 days	at least 75%	
Collocated Sampling - PM ₁₀ , PM _{2.5}	15% of network	Every 12 days	At least 75%	
Flow Rate Verification - PM ₁₀ , PM _{2.5}	Each sampler	Once per month	100%	
Performance Audit: Performance Evaluation - CO, NO ₂ , O ₃ , SO ₂	Each instrument	Once per year	100%	Refer to Appendices A and C in the Annual Data Quality Report for details
Performance Audit: Semi-Annual Flow Rate – PM ₁₀ Continuous, PM _{2.5}	Each sampler	Twice per year	100%	

What is the Process? Data Analysis: Anomalies

Definition

- Instances where a MQO is not met is considered a data anomaly

Information used

- Annual data certification package
- Various AQS outputs

Comprehensive review process

- CARB review
- Monitoring Organization review

What is the Process? Data Comparisons

- At the PQAQ level and Nationwide

Example Ambient PM Data Capture Results Comparison

Pollutant	PQAQ	Year	Number of Samplers	Number of Samplers Reporting \geq 75% Data Capture	% of Samplers Reporting \geq 75% Data Capture
PM ₁₀	PQAQ 1	2022	97	94	97
		2021	98	95	97
		2020	100	99	99
	PQAQ 2	2022	7	7	100
		2021	8	8	100
		2020	8	8	100
	Nationwide	2022	33	32	97
		2021	34	9	26
		2020	34	33	97

How are the Results Summarized?

Data Results

- CARB's PQAO
 - Data quality
 - Recommendations for improvement

Example Ambient Data and Data Quality Results for Geographic Areas within CARB's PQAO

Geographic Area	PM Samplers					
	Data Capture Rate	Precision Data Collocated Sites	Collocated Sites Met Criteria	Flow Rate Verification	Samplers All Audited	Audited Samplers Met Criteria
Geographic Area 1	Y	Y	Y	Y	Y	Y
Geographic Area 2	Y	Y	Y	Y	Y	Y
Geographic Area 3	Y	N	N	Y	Y	N

2022 Annual Data Quality Report Highlights

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More than 90% data capture rate

The reporting of flow rate verifications for PM₁₀ and PM_{2.5} were near 100%

Number of data anomalies decreased by almost 50% (from 107 in 2021 to 51 in 2022)

2022 Annual Data Quality Report Highlights

- 2022 data assessed against U.S. EPA Measurement Quality Objectives

Gases

- Ambient Data Capture ✓
- Precision ✓
- Bias ✓

Particulates

- Ambient Data Capture ✓
- Precision ✗
- Bias ✓

Conclusion

- 2022 data – most criteria were met at the PQAQO level
- Future report development – steps for success
 - Inform PQAQO Liaison of network and equipment changes
 - Keep AQS up to date



Questions?

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Annual Data Quality Reports are available at
CARB's website:

[https://ww2.arb.ca.gov/resources/documents/
/data-quality-reports-primary-quality-
assurance-organizations](https://ww2.arb.ca.gov/resources/documents/data-quality-reports-primary-quality-assurance-organizations)



2022 Annual Data Quality Report

**California Air Resources Board's
Primary Quality Assurance Organization**

Monitoring and Laboratory Division
Quality Management Branch

Coming Soon!