

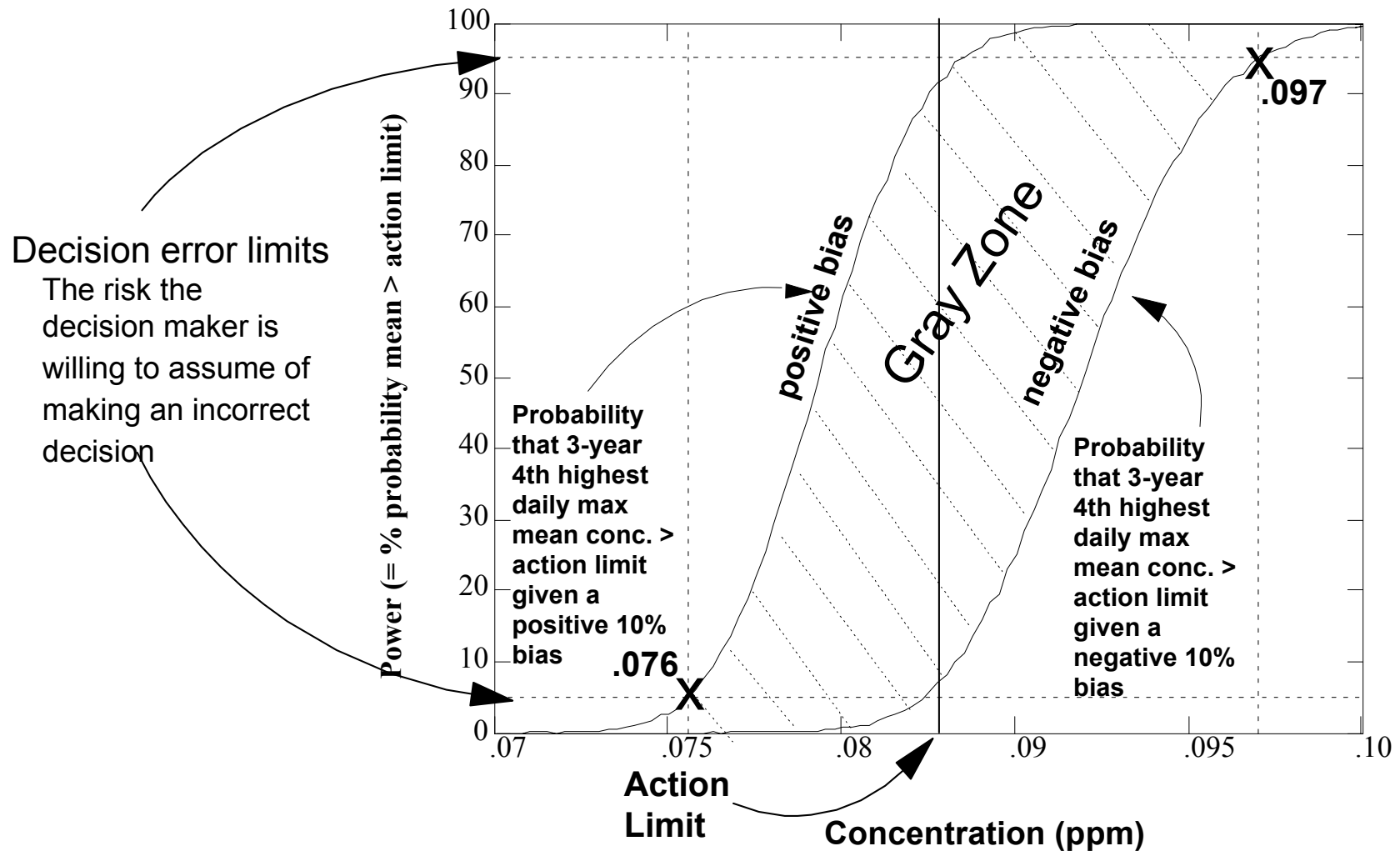
8-Hour Ozone Data Quality Objectives



What are we here for & why now?

- What
 - Basic understanding of the DQO process
 - Agreement on proposed **measurement quality objectives** for precision and bias
- Why Now
 - Monitoring Strategy
 - Opportunity for review and revision of CFR (Nov. 03 draft for potential late 04 early 05 promulgation)
 - Did not rethink the QA requirements back in 97
 - DQO Endorsement –provides a rationale for the quality system requirements “Now we see why your asking us to do this”
 - Improved data quality
 - It’s been awhile- the monitoring technology is better and the data quality is showing this. (*“The +/- 20% calibration tolerance encourages sloppy practices by instrumentation technicians”* -Mims)

What is a performance curve?



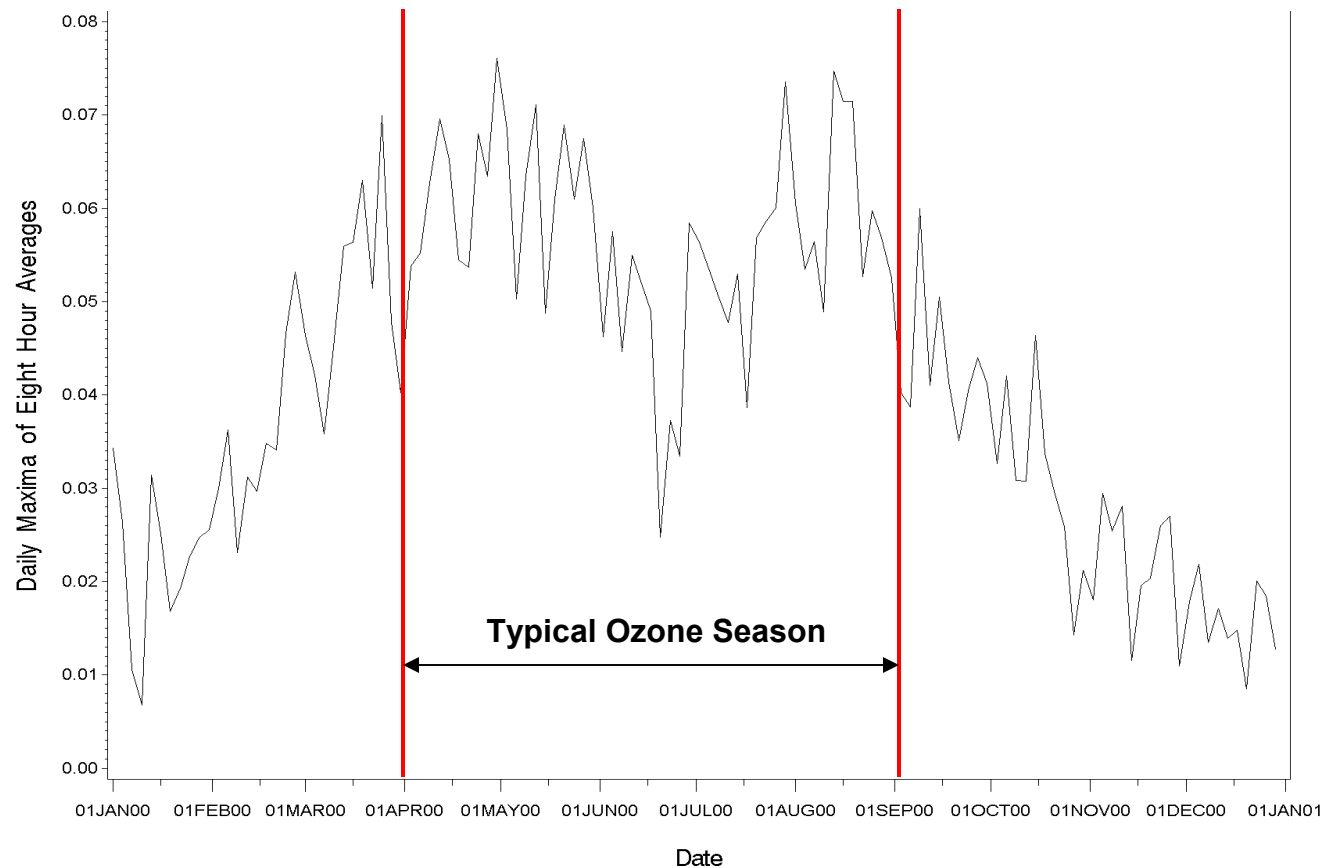
Development of the 8-hour Ozone DQO

1. Aggregated 3 years (99-2001) of ozone data from ~1,125 sites
2. Reviewed data to identify the appropriate population distribution and population input parameters--Developed the ozone main simulation model
3. Reviewed measurement data quality indicators (precision, bias, completeness) and developed within-day module that adjusts the main simulation model
4. Calculate various decision performance curves depending on changes to input parameters

Population Input Parameters

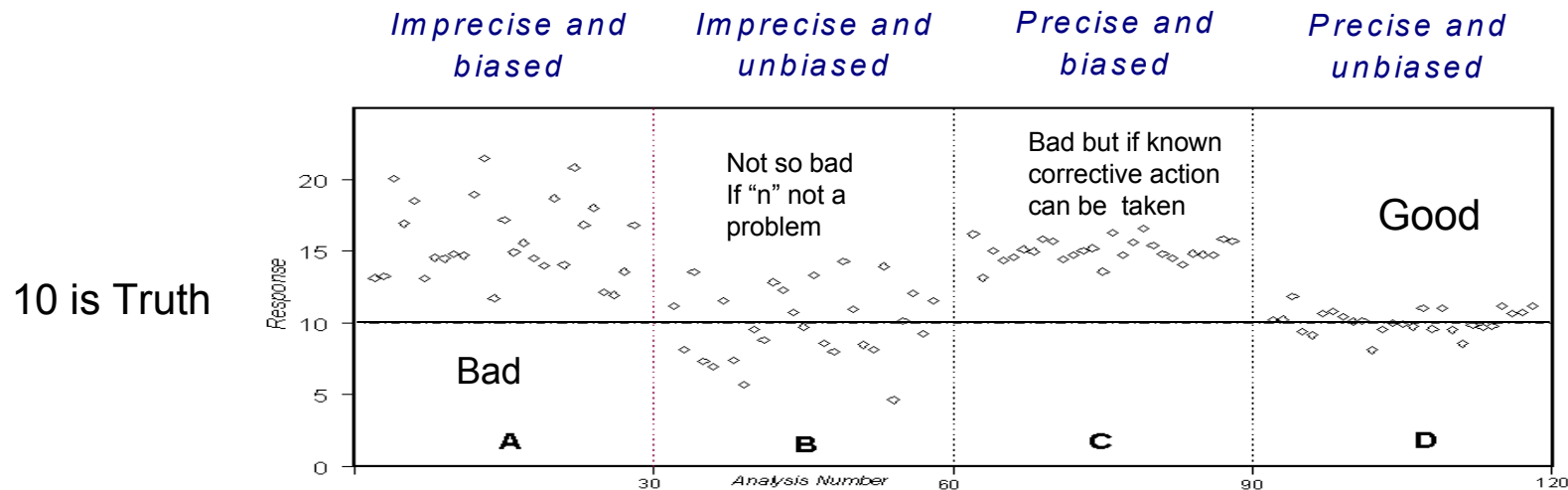
- Seasonality Ratio - Ratio of high to low point on sine curve
- Population CV - Variability of the population distribution
- Autocorrelation – Similarity in concentration between successive days
- Shift – The time at which ozone concentrations peak during the year

Typical time series of
daily maximum
8-hour average
ozone concentrations



Measurement Input Parameters

- **Precision** – Repeatability of the measurement system
- **Bias** – Systematic deviation from the true value
- **Completeness**- acceptable data loss on a sampling day (6 hours) and annual basis (75%)
 - completeness values (75% and 95%) were used



Selecting Input Parameters- Using the Conservative Approach

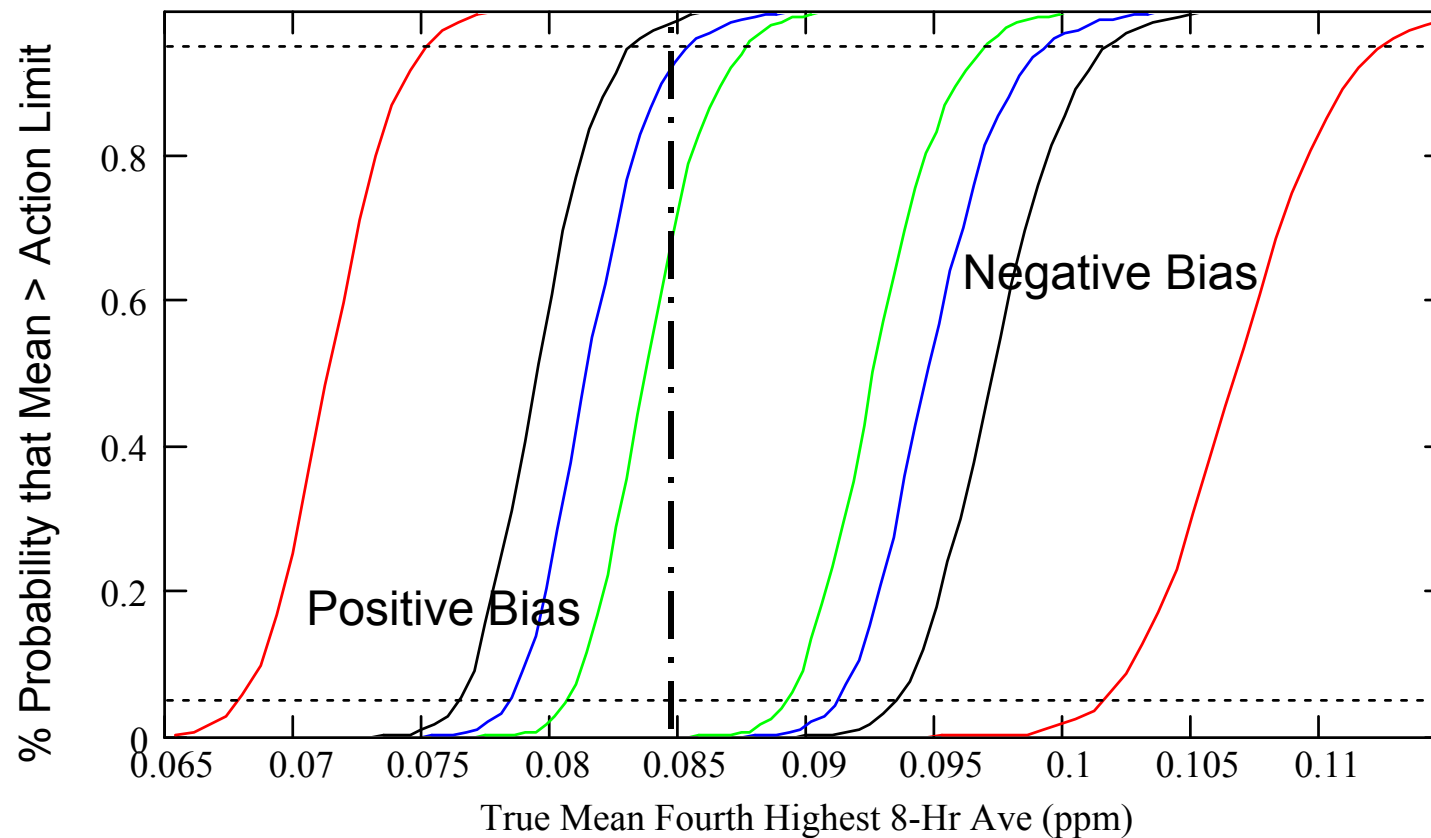
We selected input parameters that create the more extreme but realistic performance curves.

Percentiles of the Estimated Population and Measurement Parameters from the 3-Year Ozone Data Set

	Population Input Parameters				Measurement Parameters	
Percentile	Ratio of High to Low Season	Population CV	Auto-Correlation	Expected date of peak ozone	Sampler Bias	Hourly Precision CV
10	1.33	36% (43%)	0.17 (0.15)	7/27	1.23%	1.32%
20	1.49	34%	0.27	7/12	1.64%	1.69%
30	1.62	32%	0.34	7/6	1.98%	2.04%
40	1.76	30%	0.39	7/1	2.38%	2.38%
50	1.94	29%	0.44	6/27	2.72%	2.74%
60	2.14	27%	0.51	6/24	3.06%	3.10%
70	2.39	26%	0.55	6/20	3.51%	3.52%
80	2.79	25%	0.60	6/14	4.04%	4.00%
90	3.46 (3.5)	22%	0.67	6/3	5.00%	4.76%

For the performance curves the population input parameters were held constant, the measurement parameters are varied.

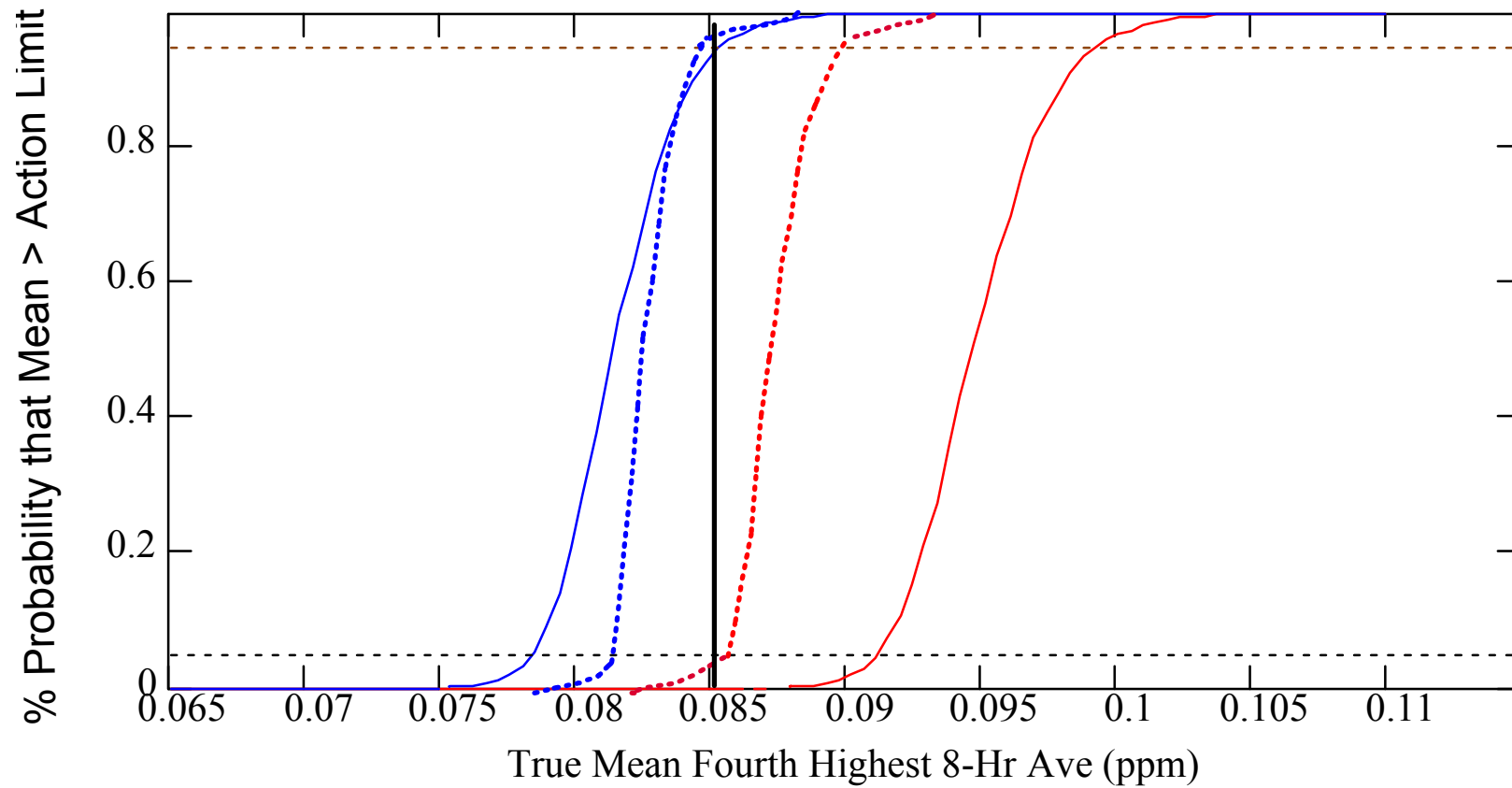
Decision Performance Curves for 75% Completeness



- 20% CV & Bias
- 10% CV & Bias
- 7.5% CV & Bias
- 5.0% CV & Bias
- 5% Limit
- 95% Limit

— · — Action Limit

Decision Performance Curve for Ozone



Conservative Proposal
(.078-.099 ppm)

More Typical Curve
(.080 - .090 ppm)

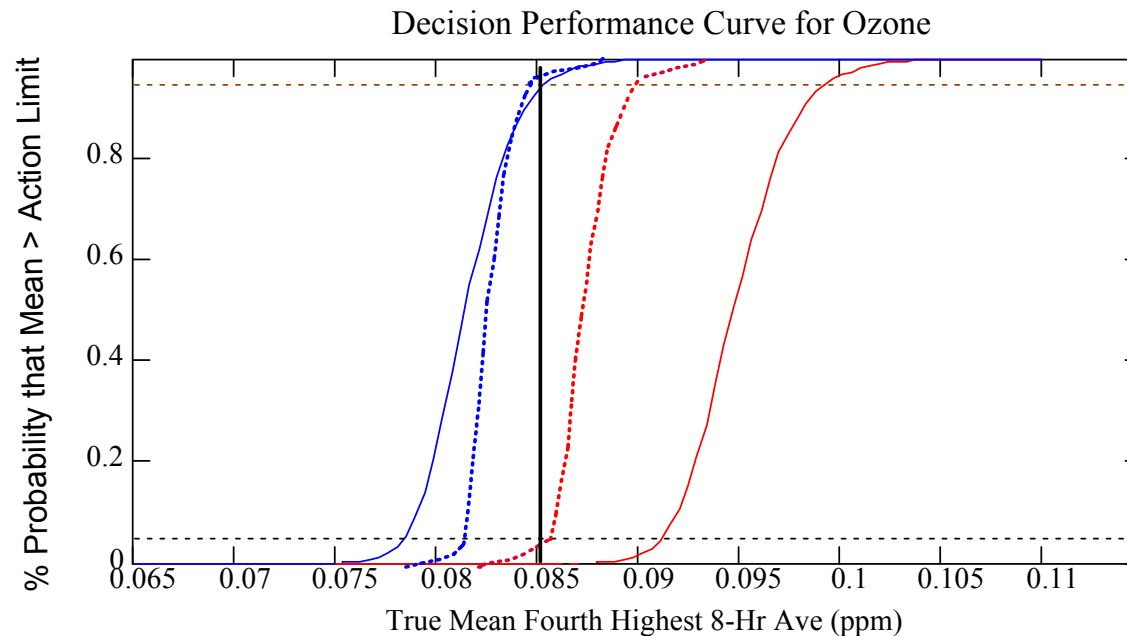
Bias 7.5
CV 7.5
Comp 75%
10/90 -Pop param.

Bias 3.5
CV 3.5
Comp 95%
70/30- Pop. Param

DQOs

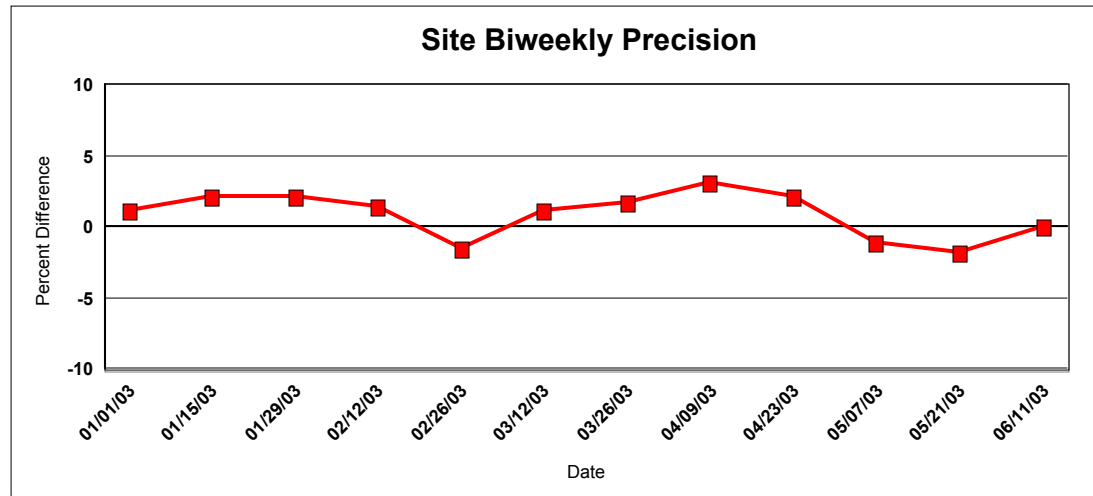
Summary

- Initial planning- can be used to help understand data quality impacts on:
 - The level of the standard
 - The form of the standard
 - Optimize network designs (number of sites, sampling frequency etc.)
- Ongoing monitoring implementation
 - Provides an excellent assessment tool for achievement of data quality
 - Provides a way to focus on quality system improvements as well as site specific improvements

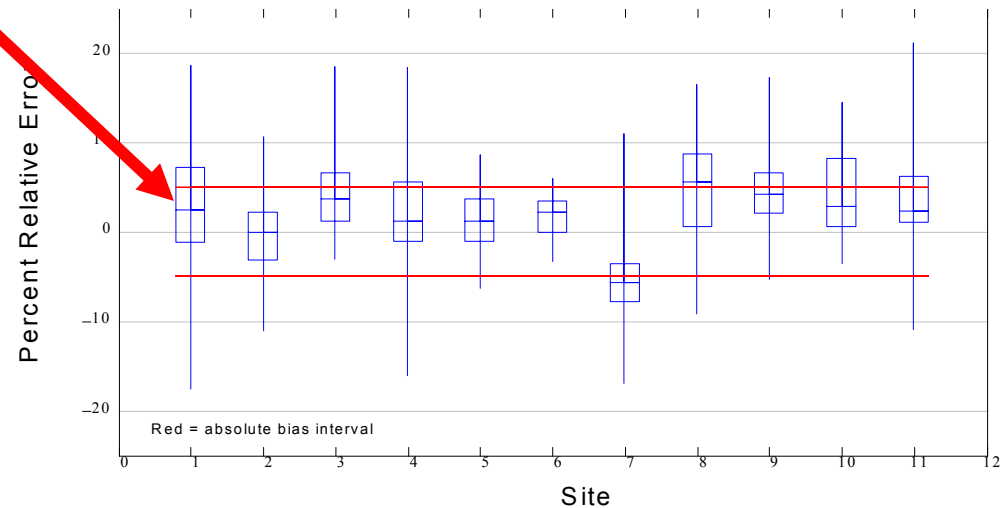


Steps to Data Assessment

- 1) Site level
 - a) Individual value
 - b) Trend



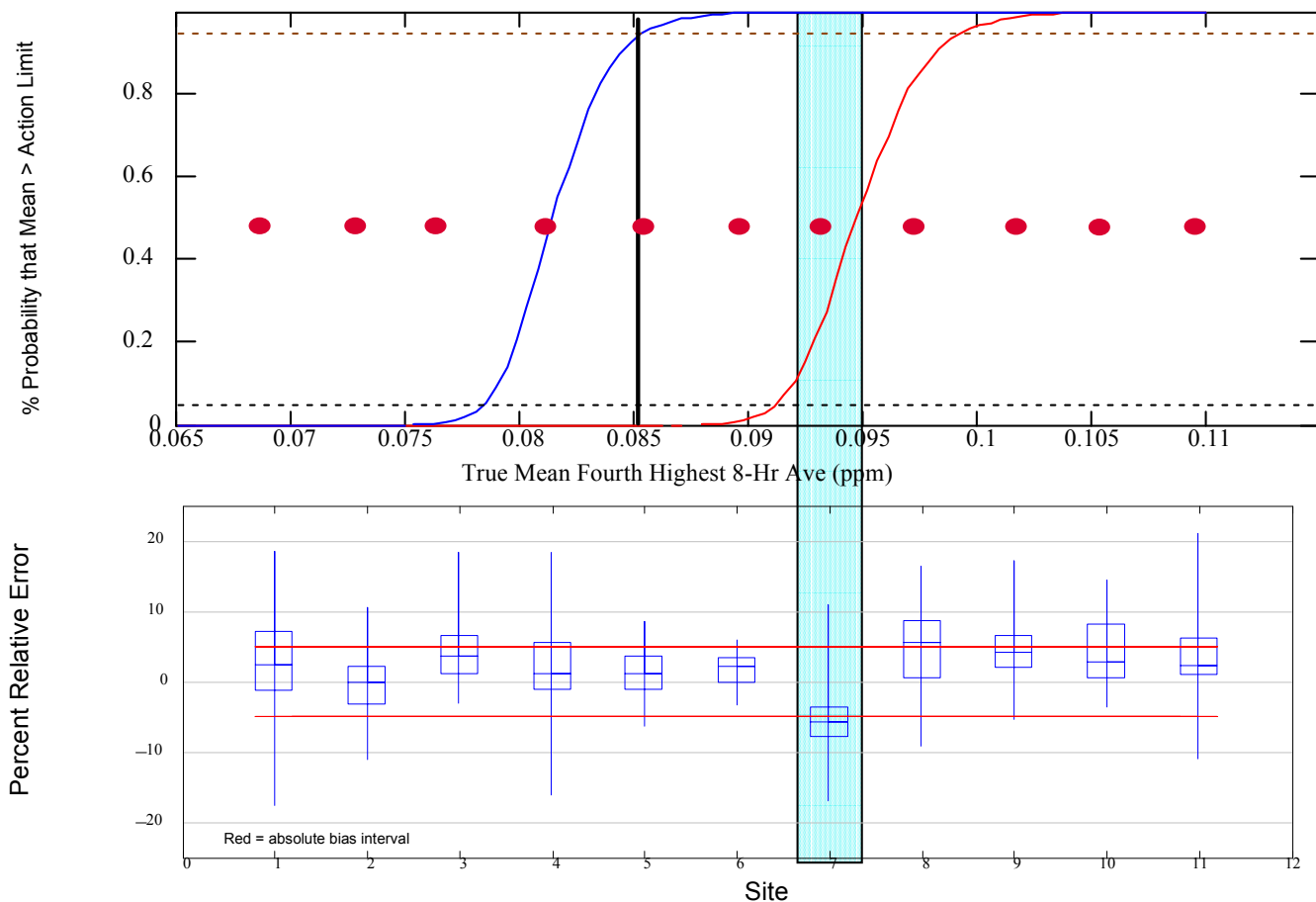
- 2) Site/Reporting Organization
 - a) Yearly
 - b) 3 year



Ozone CY 99-01 Data Quality Objective Parameters

State	Rep. Org	Siteid	Ave Conc. ppm	Season Ratio	Pop CV (%)	Autocor.	Complete.	Bias CL	Precision CL	99-01 Gray Zones	Gray Zone Within DQO
AK	15	20200018	0.066	1.33	25	0.27	0.90	2.7	7	(.078 - .093)	Yes
AK	15	20200044	0.074	1.37	23	0.34	0.94	-0.4	4.5	(.0789- .090)	Yes
AK	15	20900010	0.076	1.62	33	0.60	0.83	4.2	3.7	(.081 - .089)	Yes
AK	15	21100004	0.080	1.76	23	0.25	0.89	2.6	6.2	(.078 - .093)	Yes
AK	15	21700014	0.084	2.14	21	0.34	0.85	1.4	3.2	(.0789- .090)	Yes
AK	15	21700008	0.089	1.67	34	0.52	0.88	1.7	2.5	(.081 - .089)	Yes
AK	15	22900003	0.092	2.39	36	0.34	0.76	-5.6	4.7	(.078 - .093)	No
AK	15	21100005	0.096	2.19	22	0.25	0.89	4.6	6.3	(.0789- .090)	Yes
AK	15	21700007	0.101	1.24	32	0.34	0.85	4.8	5.2	(.081 - .089)	Yes
AK	15	21700022	0.104	2.22	12	0.52	0.88	4	4.4	(.078 - .093)	Yes
AK	15	22900004	0.108	3.46	33	0.34	0.76	3.7	5.8	(.0789- .090)	Yes

3) Assessments related to the DQOs



DQOs

Summary

- Are not used to invalidate data
 - Precision and bias QC checks can fail the MQOs without invalidation
- Identifies the probability of decision errors not the fact that these errors have occurred.
- Proposed
 - 5% decision error rate
 - 7% precision and bias MQO
 - 75% Completeness