Water Quality Data Reliability

EPA 2nd 6-Year Review Data

Background

- 30,000 Small systems
- 4 quarterly Measurements
- Non-compliance - treatment

AWWA Article

Four NRWA White Papers

Data

- **~ 1000 Data Sets**
- **10 Contaminants**
  - Dichloromethane
  - Mercury (inorganic)
  - Thallium
  - Benzene
  - Tetrachloroethylene
  - Alpha particles
  - Radium-226 and -228
  - Trichloroethylene
  - Arsenic
  - Fluoride

Results of Statistical Analysis

Use Confidence Interval Around Mean

95% Confidence Interval (CI) = 2E
Where E = 1.59 x Std Dev

Results of Statistical Analysis

Avg CI for all sets = 105% of mean

Avg when mean near MCL = 193%

Would additional sampling improve data reliability?

Mixed – See Table

Number of Samples per Quarter Required for Estimation Errors of 10% or 25%

	Estimation Error for Annual Mean	
Analyte	**25%**	**10%**
Dichloromethane (Methylene chloride)	40	–
Mercury (inorganic)	18	–
Thallium	16	–
Benzene	8	40
Arsenic	4	24
Tetrachloroethylene (PCE)	3	16
Trichloroethylene (TCE)	2	10
Alpha particles	2	9
Radium-226 and -228	2	9
Fluoride	1	1.25

Does variability change with geography ?

No discernable influence

Summary & Conclusions

- Width of 95% CI greater than mean in over 1/3 of cases
- When mean is near MCL, uncertainty is twice as large
- Increasing number of samples may help with some contaminants
- No geographical influence

What's Next ?

- Increase System Awareness
  - Presentations
  - Peer reviewed publication – AWWA
- Evaluate Variability and Correct ?