

Developing FACDQ Recommendations around Data Quality Objectives

November 20, 2006

Introduction

At its November 1, 2006 meeting, the Policy Work Group agreed to step back from efforts to reach consensus on Measurement Quality Objectives (MQOs) and to focus first on reaching consensus on broader data quality objectives (DQOs) for various detection and quantitation uses.

The Policy Work Group tasked a subgroup (Jim Pletl, Mary Smith, Brian Englert, Tom Mugan, Nan Thomey, Michael Murray, and John Phillips) with developing a product to stimulate discussion at the committee's December meeting. The subgroup developed two sets of questions related to these issues: fundamental questions related to data quality objectives and specific questions related to the FACDQ's recommendations.

On November 17, the Policy Work Group agreed that the questions posed in this document are significant and need to be addressed. The Policy Work Group agreed to ask all members of the FACDQ to prepare and send their responses to the questions to the facilitation team by **Thursday, November 30**. The facilitators will compile the responses so they can be arrayed for discussion at the December 6-8 FACDQ meeting. Where members have already submitted responses, they are included in *italics*.

Definitions

Data Quality Objectives

DQOs are qualitative and quantitative statements that clarify the purpose of a study, define the most appropriate type of information to collect, determine the most appropriate conditions from which to collect that information, and specify tolerable levels of potential decision errors. The DQO Process is a series of steps applied to decision-making (e.g., compliance/non-compliance with a standard) and estimation (e.g., ascertaining the mean concentration level of a contaminant). This definition is taken from "Guidance on Systematic Planning Using the Data Quality Objectives Process," EPA QA/G-4, Office of Environmental Information EPA/2401/B-06/001 Feb. 2006 (**available at <http://www.epa.gov/QUALITY/qs-docs/g4-final.pdf>**).

Measurement Quality Objectives

Measurement Quality Objectives are defined as qualitative and quantitative statements of the overall level of uncertainty that a decision maker is willing to accept in results or decisions derived from measurements.

Together, MQOs and DQOs provide the statistical framework for planning and managing measurement plans consistent with the data user's needs. (Glossary of Terms, FACDQ 07/05/06)

Fundamental Questions

A. Should FACDQ make recommendations regarding how to take Data Quality Objectives into consideration for decision-making?

Yes/No and Why ?

1. *Yes, the FACDQ "Uses in the Clean Water Act program" portion of our charter specifically ties to setting DQOs.*
2. *Maybe, because it relates to the Uses process.*

B. What Data Quality Objectives should be considered by the FACDQ for recommendations?

What are they? (e.g., specific MQO values or ranges, uncertainty, representativeness, matrix effects, etc.)

1. *Several of the DQO Process steps as defined in the EPA QA/G4 guidance document.*
2. *Introduction, section 0.9 page 11, "Categories of intended uses for environmental data"*
3. *Step One, section 1.2 page 17, "How do you identify the type of intended use for the study data?"*
4. *Step Two, section 2.2 page 22, "Decision and Estimation Problems"*
5. *Step Three, section 3.2 pages 27-28, "Availability of appropriate sampling and analysis methods."*
6. *Step Five, pages 39-43, specifically page 41, "How are measurement detection limits important to selecting an action level?"*
7. *Step Six, pages 45-70, specifically page 46, "False Positives, False Negatives, Uncertainty" also Figs. 7, 8 & 9 and "Types of Intervals"*

C. What are the decisions around which FACDQ should provide advice or recommendations on goals for DQOs?

List decisions.

1. *Generally speaking EPA guidance document QA/G4 does a fine job discussing the DQO process, but the FACDQ could provide advice and/or recommendations specifically regarding Step Six i.e. knowing or determining False Negative error rate, False Positive error rate, and Uncertainty (Precision, Bias and Data Comparability)*

D. Should there be goals for analytical methods?

Yes/No

1. *Yes, but it may be Use dependent.*
2. *I think of methods as having data quality characteristics associated with them, including an implied assumption that they are used competently with properly*

functioning equipment. Data quality objectives are established based on the use of the data in decision-making. The characteristics of the method are then evaluated to select a method that has the appropriate characteristics.

E. If so, what are those goals?

List goals.

1. *False Positive error rate*
2. *False Negative error rate*
3. *Method Precision at QL*
4. *Method Bias at QL*
5. *Data Comparability between labs*

Policy Work Group Specific Questions

1. What DQOs are applicable to the different identified uses?

- *I would restate this question, "What MQOs are needed to allow for the DQOs for different identified uses to be met?" (MQOs - False Positive error rate, False Negative error rate, Method Precision at QL, Method Bias at QL, and Data Comparability between labs).*
- *I think there may be different DQOs within a single use depending on the relationship between the WQBEL and the concentration of the analyte in the sample.*

2. What are the goals for method performance?

- *Must answer the prior question first.*

3. How do we account for uncertainty in methods (e.g. sampling, testing)?

- *We don't need to "account for uncertainty" that should be part of the DQO process. We just need to know how to measure uncertainty.*
- *I don't think there is agreement on how uncertainty is to be measured and reported.*

4. Does bias have to be taken into consideration in the decision process?

- *Yes, it is a component of Uncertainty*

5. Can representative data be defined? What about a robust reasonable potential process?

- *This is part of the DQO process.*

6. Should error rates be considered for different uses?

- *Do you mean FP and FN error rates? See response to item 1.*
- *Change question to: Should different error rates be considered for different uses? Comment: Probably.*

7. What is an acceptable level of decision error, taking into account MQOs and uncertainty?

- *Part of the DQO process.*
- *Is it the same in all instances?*

8. If data do not meet specified accuracy, how should they be used (should data be ignored or should the uncertainty be factored in)?

- *Must meet specified accuracy or must factor it in as part of the DQO process.*
- *This should be stated in DQOs and depends on the relationship between the WQBEL and the concentration of the analyte in the sample.*

9. How do we account for MQOs in reference matrices and in real world matrices?

- *Some comparison is needed between the reference matrix performance used for daily method QC and the real world matrix to determine the variability or uncertainty added to the method due to sample matrix effects.*

10. If matrix effects create a huge percent range in testing results, then do we recommend matrix specific spikes?

- *Sample matrix must be evaluated at some frequency, as determined by DQOs.*

11. If MQOs are set, how do you verify that those MQOs are achieved?

- *On-going QC including: Blanks, FNQS, LCS/LCSD, MS/MSD, also other method QC performance controls such as calibrations, internal standards and surrogates.*

12. If MQOs are set, what should be done with those numbers?

- *Compare them to the methods and various DQO needs.*

13. If we agree to set MQOs, should they be goals or specific requirements?

- *MQOs are "Objectives." This means they are the targets which need to be achieved for a successful outcome of the project. If you miss the target you will*

not bag the trophy. MQOs may not be specific requirements, but if they are not achieved the data may need to be qualified and it may impact both data usability and completeness.

14. What MQOs, if any, at this time, do you want the FACDQ to recommend to EPA?

List responses to the following.

1. False Positives
 - a. Recommended Value(s)
 - b. Ramifications
 - c. Discussions
2. False Negatives
 - a. Recommended Value(s)
 - b. Ramifications
 - c. Discussions
3. Accuracy
 - a. Recommended Value(s)
 - b. Ramifications
 - c. Discussions
4. Precision
 - a. Recommended Value(s)
 - b. Ramifications
 - c. Discussions