



# Native or Contamination? All A Matter of Perspective!

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August 2012

National Environmental Monitoring Conference



A banner image at the top of the slide shows a sunset over a field. The sun is low on the horizon, casting a warm glow across the sky with scattered clouds. The foreground shows a dark silhouette of a field or trees.

# Summary

- Why evaluate contamination?
- Sources of Contamination
- Validation Guidelines
- Examples of Contamination Assessments
- Comparability Issues
- Path Forward

# Why Evaluate Contamination?

- Method sensitivity/selectivity
  - False positives
  - Interferences
- Contamination/qualification impacts:
  - Notice of Violation
  - Additional discharge sampling
  - Additional remediation
  - Not enough remediation
  - Improper risk assessment

A banner image showing a sunset over a body of water with silhouettes of trees and buildings in the distance. The sky is filled with orange and yellow clouds, and the sun is low on the horizon.

# Sources of Contamination

- Collection equipment
- Bottleneck
- Preservatives
- Preparation equipment
- Storage
- Instrument carryover
- Reagents (solvents/spikes)

# October 1999 National Organic Validation Guidelines

Blank Result	Sample Result	Action for Samples
Detect	>CRQL but <5×blank result*	Qualify results as “U”
Detect	<CRQL and <5×blank result*	Report CRQL value with a “U”
Detect	>5×blank result*	No qualification
Gross contamination	Detects	Qualify results as unusable “R”

\*10×the CRQL for common laboratory contaminants

# June 2008 National Organic Validation Guidelines

Blank Result	Sample Result	Action for Samples
<CRQL	<CRQL*	Report CRQL value with a “U”
<CRQL	≥CRQL*	Use professional judgment
>CRQL	<CRQL*	Report CRQL value with a “U”
>CRQL	≥CRQL* and <blank concentration	Report the blank concentration for the sample with a “U” or qualify data as unusable “R”

\*2×CRQL for methylene chloride, 2-butanone, and acetone or  
5×CRQL for bis(2-ethylhexyl)phthalate

# June 2008 National Organic Validation Guidelines

Blank Result	Sample Result	Action for Samples
>CRQL	$\geq$ CRQL* and $\geq$ blank result	Use professional judgment
=CRQL	<CRQL*	Report CRQL with a "U"
=CRQL	$\geq$ CRQL*	Use professional judgment
Gross contamination	Detect	Qualify results as unusable "R"

\*2×CRQL for methylene chloride, 2-butanone, and acetone or  
5×CRQL for bis(2-ethylhexyl)phthalate

# February 1994 National Inorganic Validation Guidelines

Blank Result	Sample Result	Action for Samples
Detect	<5×blank result	Qualify results as “U”
Detect	>5×blank result	No qualification
Gross contamination	Detects	Qualify results as unusable “R”



# October 2004 National Inorganic Validation Guidelines

## Calibration Blanks

Blank Result	Sample Result	Action for Samples
≤CRQL	≤CRQL	Report CRQL with a “U”
≤CRQL	>CRQL	Use professional judgment
>CRQL	≤CRQL	Report CRQL with a “U”
>CRQL	>CRQL but <blank result	Report at level of blank result with a “U” or qualify data as unusable “R”
>CRQL	>blank result	Use professional judgment

# October 2004 National Inorganic Validation Guidelines

## Preparation Blanks

Blank Result	Sample Result	Action for Samples
$\leq$ CRQL	$\leq$ CRQL	Report CRQL with a "U"
$\leq$ CRQL	$>$ CRQL	Use professional judgment
$>$ CRQL	$\leq$ CRQL	Report CRQL with a "U"
$>$ CRQL	$>$ CRQL but $<10 \times$ blank result	Qualify results as unusable "R" or estimated "J"
$>$ CRQL	$>10 \times$ blank result	No qualification

# Region 1 Organic Validation Guidelines

Blank Result	Sample Result	Action for Samples
Detect	Not detected	No qualification
<CRQL	<QL and <5×blank result*	Report CRQL value with a “U”
<CRQL	>QL but <5×blank result*	Qualify results as “U”
<CRQL	<QL and >5×blank result*	No further action
<CRQL	>QL and >5×blank result*	No qualification

\* Common contaminants would be 10×blank result.

# Region 1 Organic Validation Guidelines

Blank Result	Sample Result	Action for Samples
$\geq$ CRQL	$>$ QL but $\leq 5 \times$ blank result*	Report value with a "U"
$\geq$ CRQL	$<$ QL and $\leq 5 \times$ blank result*	Qualify results as "U"
$\geq$ CRQL	$\geq$ QL and $> 5 \times$ blank result*	No further action
$\geq$ CRQL	$<$ QL but $> 5 \times$ blank result*	No qualification
Gross contamination ( $> 10 \times$ CRQL)	Detects	Qualify results as unusable "R"

# Region 1 Inorganic Validation Guidelines

Blank Result	Sample Result	Action for Samples
≥MDL	≥QL and >5×blank result	No qualification
≥MDL	<QL and >5×blank result	No further action (report estimated sample result)
≥MDL	≥QL but ≤5×blank result	Qualify results as “U”
≥MDL	< QL and ≤ 5 × blank contaminate	Report CRQL value with a “U”
≥MDL	Non-detect (U)	No qualification

# Region 2 Organic Validation Guidelines

Blank Result	Sample Result	Action for Samples
Detects	Not detected	No qualification
<CRQL	<CRQL	Report CRQL value with a "U"
<CRQL	≥CRQL	Use professional judgment
>CRQL	≥CRQL and <blank result	Report CRQL value with a "U"
>CRQL	≥CRQL and ≥blank result	Use professional judgment
=CRQL	<CRQL	Report CRQL value with a "U"
=CRQL	≥CRQL	Use professional judgment
Gross contamination	Detects	Qualify results as unusable "R"

# Region 2 Inorganic Validation Guidelines

## Instrument Blanks

Blank Result	Sample Result	Action for Samples
$\leq$ CRQL	$\leq$ CRQL	Report CRQL value with a “U”
$>$ CRQL	$>$ CRQL but $<$ blank result	Qualify results as unusable “R”
$>$ CRQL	$>$ CRQL and $\leq 10 \times$ blank result	Qualify results as estimated “J”
$>$ CRQL	$\leq$ CRQL	Report CRQL value with a “U”
$<(-$ CRQL)	$\geq$ CRQL but $< 10 \times$ CRQL	Qualify results as estimated “J”

# Region 2 Inorganic Validation Guidelines

## Preparation Blanks

Blank Result	Sample Result	Action for Samples
$\leq$ CRQL	$\leq$ CRQL	Report CRQL value with a “U”
$>$ CRQL	$>$ Blank result but $<10\times$ blank result	Flag results as estimated “J”
$>$ CRQL	$>$ CRQL but $<$ blank result	Reject “R” all sample results
$>$ CRQL	Prep blank $<$ field blank	No qualification
$>$ CRQL	$\leq$ CRQL	Report CRQL value with a “U”



# Region 3 Organic Validation Guidelines

Blank Result	Sample Result	Action for Samples
Detected	<5×blank result*	Qualify results as “B”
Detected	Not-detected or >5×blank result*	No qualification
Gross contamination	Detects	Qualify results as unusable “R”

\* Common contaminants would be 10×blank result.

# Region 3 Inorganic Validation Guidelines

Blank Result	Sample Result	Action for Samples
Detected	<5×blank result	Qualify results as “B”
Detected	Not-detected or >5×blank result	No qualification

The blank result is the highest concentration of all associated blanks.

# TPH Contamination Assessment

- Method blank has 8.2  $\mu\text{g/L}$  reported
- Quantitation limit is 200  $\mu\text{g/L}$
- Sample has 85  $\mu\text{g/L}$  reported
- NFG 1999 – qualification: None
- NFG 2008 – qualification: 200 U
- Region 1 – qualification: None
- Region 2 – qualification: 200 U
- Region 3 – qualification: None

# Acetone Contamination Assessment

- Method blank has 27.0  $\mu\text{g/L}$  reported
- Quantitation limit is 25.0  $\mu\text{g/L}$
- Sample has 190  $\mu\text{g/L}$  reported
- NFG 1999 – qualification: 190 U
- NFG 2008 – qualification: Use prof. judgment
- Region 1 – qualification: 190 U
- Region 2 – qualification: Use prof. judgment
- Region 3 – qualification: 190 B

# Biphenyl Contamination Assessment

- Method blank has 0.013  $\mu\text{g/L}$  reported
- Quantitation limit is 0.020  $\mu\text{g/L}$
- Sample has 0.023  $\mu\text{g/L}$  reported
- NFG 1999 – qualification: 0.023 U
- NFG 2008 – qualification: None
- Region 1 – qualification: 0.023 U
- Region 2 – qualification: Use prof. judgment
- Region 3 – qualification: 0.023 B

# Barium Contamination Assessment

- Method blank has 1.5  $\mu\text{g/L}$  reported
- Quantitation limit is 0.30  $\mu\text{g/L}$
- Sample has 6.0  $\mu\text{g/L}$  reported
- NFG 1994 – qualification: 6.0 U
- NFG 2004 – qualification: 6.0 J or 6.0 R
- Region 1 – qualification: 6.0 U
- Region 2 – qualification: 6.0 J
- Region 3 – qualification: 6.0 B

# Zinc Contamination Assessment

- Method blank has 8.5  $\mu\text{g/L}$  reported
- Quantitation limit is 5.0  $\mu\text{g/L}$
- Sample has 7.0  $\mu\text{g/L}$  reported
- NFG 1994 – qualification: 7.0 U
- NFG 2004 – qualification: 7.0 U or 7.0 R
- Region 1 – qualification: 7.0 U
- Region 2 – qualification: 7.0 R
- Region 3 – qualification: 7.0 B



# Comparability Issues

- Use of different criteria for contamination evaluation is a kin to changing data quality objectives in the middle of a project.
- Differences in approaches to contamination evaluation can result in problems with:
  - Continuity of data over time
  - Comparison of data across regions/states
  - Comparison of validation between firms
  - Data use for risk assessment





# Path Forward

- Need to address:
  - Difference in Guidelines
  - Professional Judgment
  
- Ways to address:
  - Quality Assurance Project Plan
  - Standard Operating Procedures
  - Reports



# References

- Region I, EPA-New England Data Validation Functional Guidelines for Evaluating Environmental Analyses, July 1996, Revision December 1996
- USEPA Hazardous Waste Support Branch Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 method 8260B, SOP #HW-24, Revision #2, August 2008
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- Region III Modifications to National Functional Guidelines for Organic Data Review Multi-Media, Multi-Concentration (OLMO1.0-OLMO1.9), September 1994
- Region III Modifications to the National Functional Guidelines for Evaluating Inorganics Analyses, April 1993
- USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, October 1999 and June 2008
- USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, February 1994 and October 2004

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