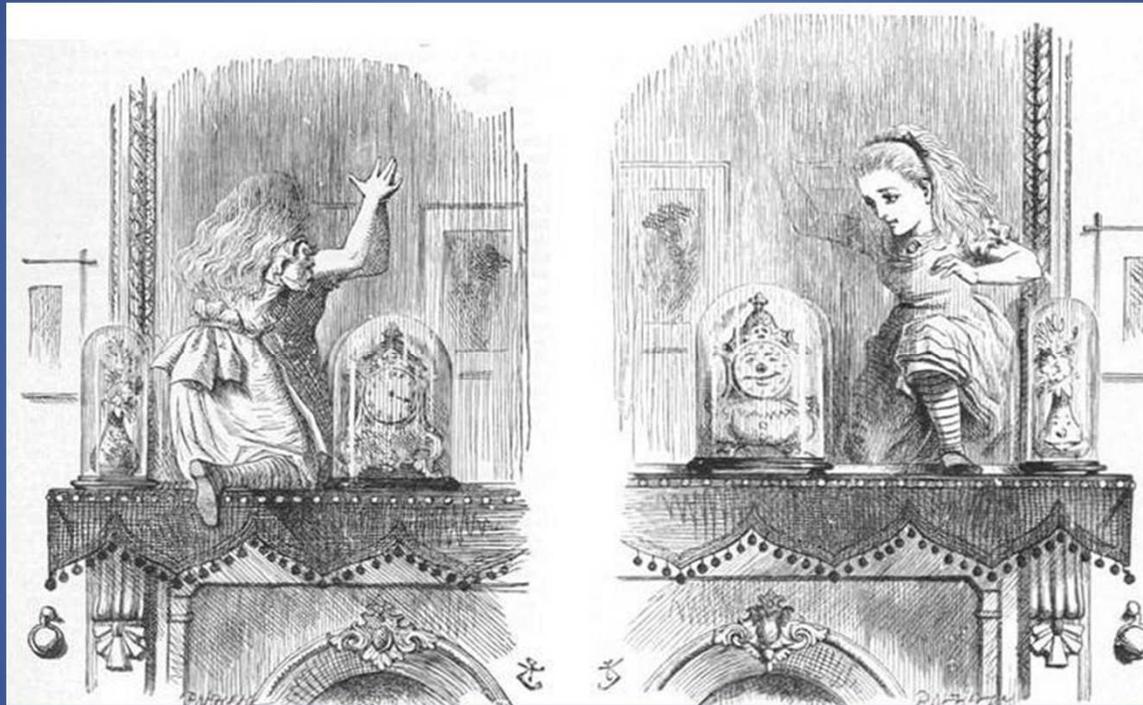


# Low-Level Mercury Sampling, Analysis, and Reporting for NPDES Permits



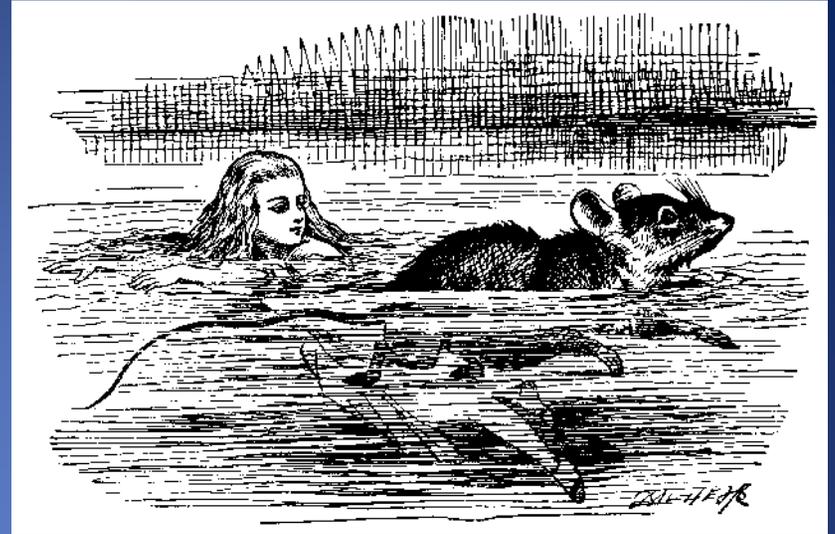
Field samples required, method blanks, adjusting final results, and reporting for EPA Methods 1631E and 1669

# Mercury Samples

EPA Methods 1631E & 1669 require that at least 1 field blank and at least 1 field duplicate be collected for each 10 samples per sampling event at a given site.



# Field Blank



- A field blank is reagent water that has been transported to the field and **treated as a sample in all respects**, including contact with the sampling devices & exposure to sampling site conditions, filtration, storage, preservation & analytical procedures.



# Method Blank

- Method Blanks are used in a laboratory to demonstrate that the analytical system is free from contamination.

# Trip Blanks

- “Trip blanks” are not equivalent to a field blank and are not required under EPA Method 1631E. A trip blank appears to be a bottle blank that goes on a trip.
- Bottle blanks are required at the lab to determine that bottles are free from contamination prior to use, but cannot be used to correct results like a field blank.
- EPA methods do not prohibit the use of other types of blanks and some labs require trip blanks for their own Quality Control program



## Field Duplicate

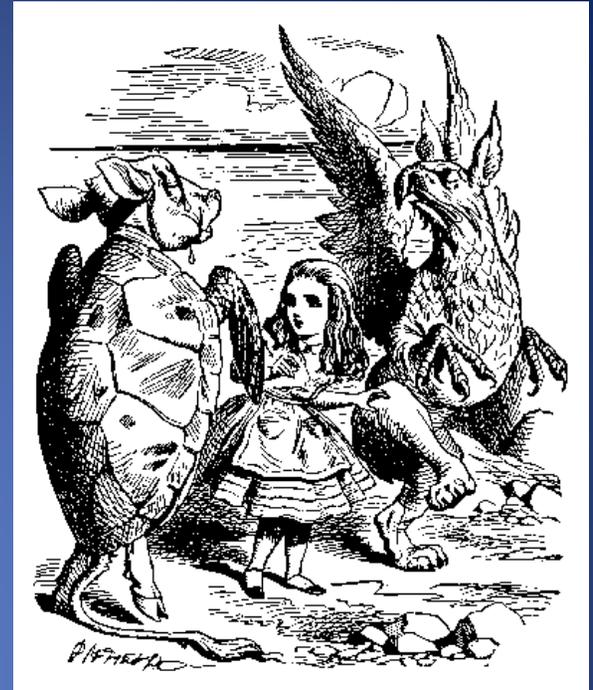
A field duplicate is a 2nd sample collected at the same time & place as the sample for quality control purposes. It is not used in calculations but is reported on the daily sheet of the eDMR.

# Required Blanks/Duplicates: Permittees



A permittee collecting its own sample(s) needs to collect at least one field blank and one field duplicate each time they sample a site (assuming they collect ten or fewer samples) and one blank and one duplicate for every ten samples if they collect more than ten samples

# Required Blanks/Duplicates: Contract Lab Collection



A contract lab collecting mercury samples for multiple facilities/sites would need to collect 1 field blank & 1 field duplicate **at each facility/site** (assuming they collect 10 or less samples at a single facility/site location.)

# Mercury Result Correction



- Mercury Results may be corrected with either (one or the other)
  - Field Blank results or
  - Method Blank resultsif they meet EPA Method 1631E acceptance criteria
- Duplicates are required to be taken for QA/QC purposes but are not used to adjust final results or calculate a daily average



# Field Blank Acceptance Criteria

The Method 1631E acceptance criteria for field blanks is less than 0.5 ng/L or no greater than one-fifth ( $1/5$ ) of the Hg in the associated sample(s), whichever is greater

# Field Blank Results Not Meeting Acceptance Criteria

- If the field blank results do not meet acceptance criteria, results of the sampling event are considered invalid
- Resampling should occur within the same reporting period
- We recommend sampling early in the month to allow time for resampling if needed



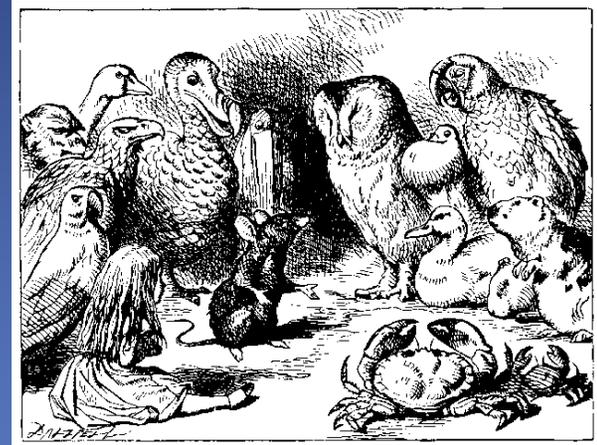
# Terminology, EPA Method 1631E

- The **Method Detection Limit** or **MDL** is the minimum level that can be reported with 99% confidence as  $> 0$
- The MDL for 1631E is 0.2 ng/l when no interferences are present
- The **Minimum Level** or **ML** is the minimum level of quantification
- The ML for 1631E is 0.5 ng/l

# Laboratory Reports: EPA Method 1631E Requirements

- Report **sample results** less than the ML as “<0.5 ng/l”
- Report **method blanks** or **field blanks** between 0.50 and <0.2 ng/l as “0.4, 0.3, or 0.2 ng/l”
- Report non-detectable (below the MDL) **method blanks** or **field blanks** as “<0.2 ng/l”

# Method Blank (MB) Acceptance Criteria



- Per Method 1631E, there are 3 MBs for each batch of mercury samples run at a lab.
- All MBs must be less than 0.5 ng/l for the results of analysis to be valid.
- If any of the MB results are 0.5 ng/l or greater, then the laboratory must eliminate the contamination and reanalyze all samples in that batch.

## Reporting Method Blank (MB) Results



- If all MBs are  $<0.2$  ng/l, the lab should report “ $<0.2$  ng/l” to their customer.
- Per Method 1631E and recommendation of EPA, detectable MBs less than 0.5 ng/l may be averaged.

## Method Blank (MB) Reporting

- If all MBs are valid and at least one is above the MDL of  $<0.2$  ng/l, labs may report one number, averaging detections less than 0.5 ng/l (per EPA, using 0.2 ng/l if one or two of the results is  $<0.2$  ng/l or below the MDL) . . .
- Unless more reagent was used for the sample in question and one of the MBs. In this case, the lab should report only the corresponding MB result.

# Correcting Results with Method Blanks (MB)

- Final results may be corrected with method blank if the MB is less than 0.5 ng/l (and greater than  $<0.2$  ng/l)
- MB results must be reported separately with associated samples on the eDMR daily form

# Example, Averaging Method Blank (MB) Results

- If MB results were <0.2 ng/L, 0.3 ng/L and 0.4 ng/L, per EPA, use the MDL of 0.2 ng/l as the numerical value in place of <0.2 ng/L.

$$0.2 \text{ ng/L} + 0.3 \text{ ng/L} + 0.4 \text{ ng/L} = 0.9 \text{ ng/L}$$

$$0.9 \text{ ng/L} \text{ divided by } 3 = 0.3 \text{ ng/L}$$

- The lab/permittee would report MB of 0.3 ng/l

## Example, Correcting a Result with a Method Blank (MB)

- With a MB result of 0.3 ng/l and uncorrected sample result of 1.5 ng/l, 1.2 ng/l may be reported as the final total mercury result:

$$1.5 \text{ ng/l} - 0.3 \text{ ng/l} = 1.2 \text{ ng/l}$$

# Acceptance Criteria for Field Blanks



- The Method 1631E acceptance criteria for field blanks is less than 0.5 ng/L or no greater than one-fifth (1/5) of the Hg in the associated sample(s), whichever is greater.

## Correcting a Result

### IF a Field Blank Is Less Than 0.5 ng/l

When a field blank result is less than the minimum level (ML or 0.5 ng/l) it may always be used to correct results:

Example: A permittee has 1.5 ng/L in the sample and 0.4 ng/L in the field blank.

$$1.5 \text{ ng/l} - 0.4 \text{ ng/l} = 1.1 \text{ ng/L}$$

## Correcting a Result

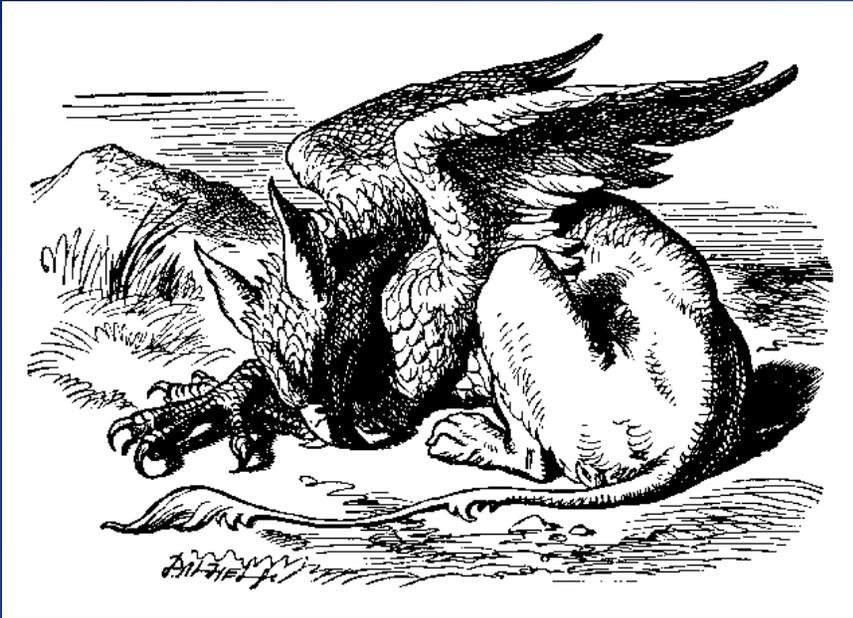
### IF a Field Blank $\geq 0.5$ ng/l

When a field blank is  $\geq$  the ML of 0.5 ng/l it may be used if it is 1/5 or less of the sample result:

Example: A permittee has a 5.4 ng/l sample and a 0.8 ng/l field blank. First, determine 1/5 of the sample:  $5.4 \text{ ng/l} \times 1/5 = 1.08 \text{ ng/l}$

Since  $0.8 \text{ ng/l} < 1.08 \text{ ng/l}$  (the Field Blank is less than 1/5 sample), the final result may be corrected by subtracting the field blank:

$$5.4 \text{ ng/l} - 0.8 \text{ ng/l} = 4.6 \text{ ng/l}$$



## Example 3, Field Blank < 0.2 ng/l

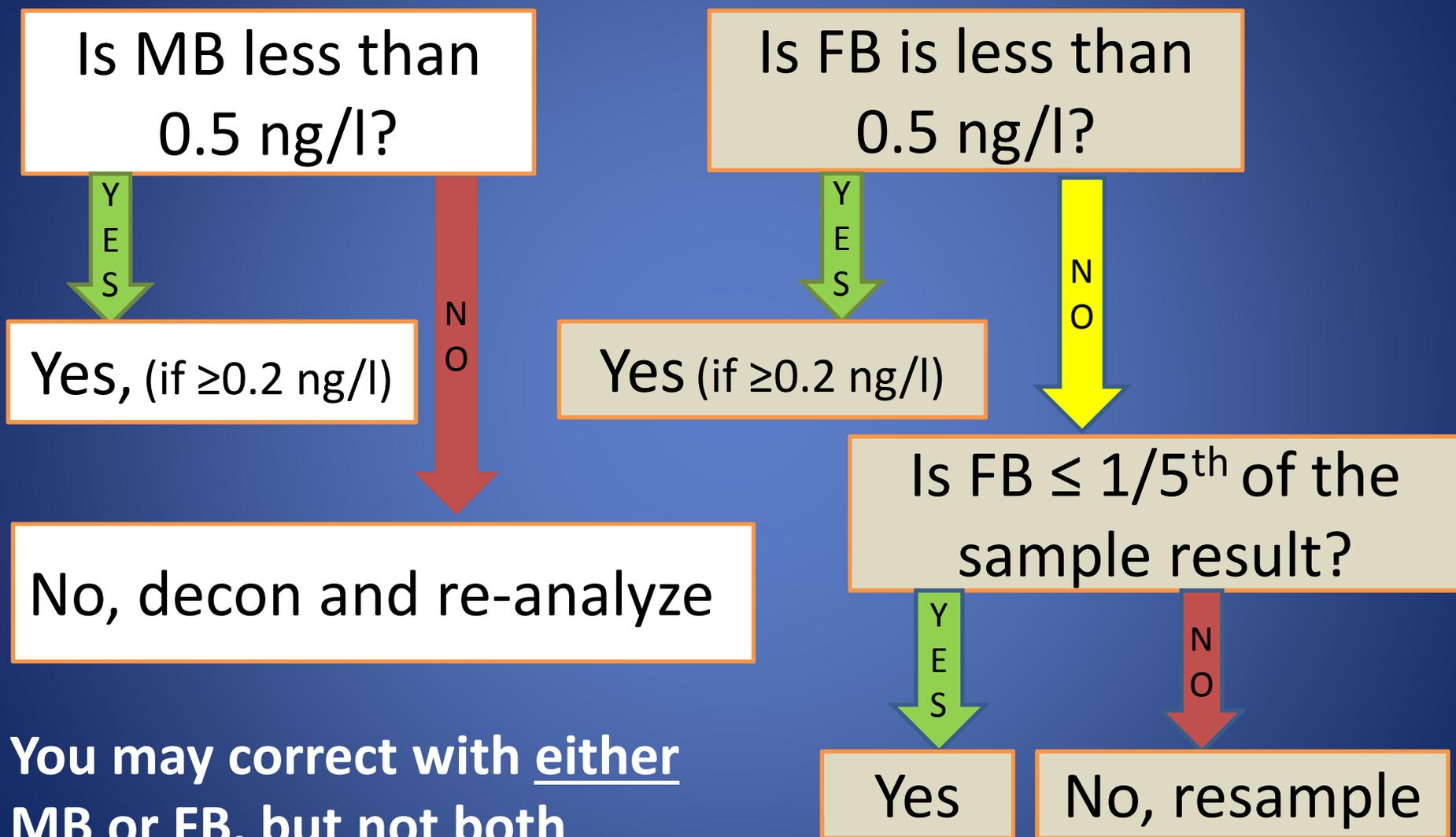
- If the field blank is reported by the lab as <math><0.2 \text{ ng/l}</math>, the permittee does not correct results with the field blank since no field contamination was detected.

# Can I Correct Final Mercury Results?

- IF MB or FB is less than 0.5 ng/l: Yes (if  $\geq 0.2$  ng/l)
- IF any MB  $\geq 0.5$  ng/l: No, lab must re-analyze
- IF FB is  $\geq 0.5$  ng/l, determine if FB is  $\leq 1/5^{\text{th}}$  of the sample result:
  - If yes, correct
  - If no, sampling event is invalid—resample

You may correct with either MB or FB, but not both.

# Can I Correct Final Mercury Results?



You may correct with either MB or FB, but not both

# NPDES Mercury Reporting for Permittees



- Report the final sample result (corrected if appropriate), uncorrected sample, duplicate, field blank, and method blank results on the daily sheet.
- Use the final sample result for calculations for the daily and monthly eDMRs.



# Ongoing Assistance



- This presentation will be maintained on our compliance assistance website at the following link:  
[www.michigan.gov/deqworkshops](http://www.michigan.gov/deqworkshops)
- Contact your District NPDES compliance staff with specific questions.

# Questions?

