



# Low Level Metals Sampling Protocol EPA Method Sampling 1669

CLEAN HANDS/DIRTY HANDS

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SM 245 = 11110101

## Standard Methods 245

- ▶ Mercury by Atomic Fluorescence
  - ▶ Shorter Cycle Time Analysis
  - ▶ Less Stringent Contamination Control Requirements
  - ▶ Wider Dynamic Range
  - ▶ NOT Ultra Low Level Detection
  - ▶ Water Quality Reporting Limit = 200 ng/L

# SM 245 vs EPA Method 1631 Hg

- ▶ EPA Method 1631
  - ▶ Hg by Oxidation, Purge + Trap, Cold Vapor Fluorescence Spectrometry
    - ▶ Hg Detection at **0.5 ng/L** (0.0005 ug/L)
    - ▶ PWSD Permit Limit = 0.8 ng/L (0.008 ug/L)
    - ▶ Improves Accuracy and Precision at Low Levels
    - ▶ Measures at Ambient Water Levels
    - ▶ Clean Gloves and Metal-Free Apparatus
    - ▶ Performance Based

# EPA Methods 1631 AND 1669

## Performance Based?

- ▶ Means = You may modify the Method provided you demonstrate that your modification achieves performance equivalent or superior to the performance of Method 1631.
- ▶ EPA defines as, “Alternative procedures may be used, so long as those procedures are demonstrated to yield reliable results.”

# 1631 As We Know and Love Today

**2002- EPA Method 1631 E** Includes Revisions that Address Stakeholder Concerns (?)

- Clarifies Quality Control

- Clarifies Sample Handling Requirements

- Allows Flexibility to incorporate Additional Technologies

- Amends Requirements Regarding to – Preservation, Storage, and Holding Time

# 1631 E As We Didn't Know It

- ▶ Settlement Agreement
  - ▶ EPA
  - ▶ Alliance of Automobile Manufacturers, Inc.
  - ▶ Chemical Manufacturers Association
  - ▶ Utility Water Act Group
  - ▶ American Forest and Paper Association

# EPA Method 11001011111

- ▶ Changes in Method 1631 E
  - ▶ Method Clauses 2, 3, 4, and 5
  - ▶ Clarify Field Blank Subtraction
  - ▶ Clarify Use of Multiple Field Blanks
  - ▶ **Two-Member Sample Team Required**
- ▶ **Suggested EPA Sample Collection Method 1669**

# EPA 1669: Sampling Ambient Water for Trace Metals

- ▶ ANY 1600-Series Methods (Low Levels)
  - ▶ 1630—Methylmercury
  - ▶ 1631—Mercury
  - ▶ 1632—Arsenic
  - ▶ 1638—Trace Metals by ICP-MS
  - ▶ 1640—Trace Metals in Seawater by ICP-MS
- ▶ Performance-Based = Alternate Methods May Be Use





# Outside Laboratory Services

- ▶ ALL Contract Laboratories
  - ▶ All Bottles Double-Bagged
  - ▶ Trip Blank for Each Sample Site
- ▶ Upon Request May Provide
  - ▶ Delivery in Sealed Coolers to Sample Site
  - ▶ Ultra-Clean Sampling Equipment (Tubing and Filters) Bagged
  - ▶ Gloves/Masks Bagged
  - ▶ Preservatives Separated and Bagged

# Pre-Planned 11010000101 Sampling

- ▶ Contract Lab Selection
  - ▶ Reference Your State WQ Department
- ▶ Order Sample Kits
- ▶ Schedule Sample Date with Contract Laboratory
- ▶ Fill Out Labels (Exception of Date and Time)
  - ▶ Label Bottles vs Label Bags

# 1669 Low Level Metal Sampling Protocol

## Sample Preparation Plan:

- ▶ **Borosilicate Glass** or Fluoropolymer/Teflon Bottles
- ▶ Designated Clean Cooler:
  - ▶ Cleaned and Double Bagged Sample Bottles
  - ▶ Clean Powder-Free Gloves Double Bagged
  - ▶ Zip Bags W/ Dust Masks (Optional)
  - ▶ Plastic Sheet for Ground Cover (Optional)
  - ▶ Double Bagged Sample Filters (If Needed)
  - ▶ One Field Blank per site (or one every 10 samples)

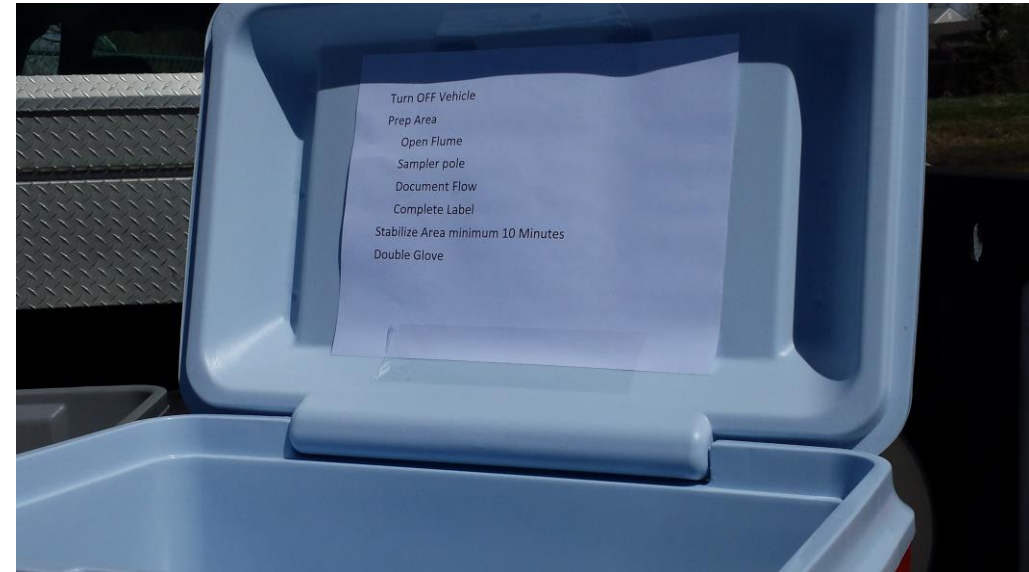
## Sample Location



- ▶ Selecting Sample Location
  - ▶ Easily Accessible
  - ▶ Adequate Size for Sampling
  - ▶ Potential Sources of Contamination Identified
  - ▶ Eliminate Any Sources for Contamination
  - ▶ Allow Site to Stabilize
  - ▶ Safety, Safety, Safety

- ▶ Sample Site

- ▶ Turn OFF Vehicle
- ▶ Unload Equipment (May Use Tailgate)
- ▶ Remove Any Appurtenance (Grate or WW Secure Accessory, Any Interferences)
- ▶ Cover Sample Area W/ Plastic (Coolers to Secure)
- ▶ Wait Minimum of 10 Minutes
- ▶ All Sampling Personnel are Required to Wear Clean, Powder Free Gloves At All times



# Who is Clean?

## CLEAN HANDS

- ▶ **DOES NOT** Touch:
  - ▶ 'Non-Clean' Materials
  - ▶ Secondary Container Bags
  - ▶ Shipping Containers

## CLEAN HANDS

- ▶ **Does** Touch:
  - ▶ All Tubing and Filters
  - ▶ Direct Contact w/Sample Source
  - ▶ Open/Close Primary Bags
  - ▶ Holds Sample Container



# Let's Get Dirty

## DIRTY HANDS

- ▶ **DOES** Touch
  - ▶ ALL 'Non-Clean' Materials
  - ▶ Open/Close Shipping Containers
  - ▶ Open/Close Secondary Bags
  - ▶ Operates Pump/Equipment

## DIRTY HANDS

- ▶ **DOES NOT** Touch
  - ▶ Sample Source
  - ▶ Primary Sample Bags
  - ▶ Sample Containers
  - ▶ Clean Equipment



# Double GLOVES ;)

- ▶ New, Unused, Clean Powder-Free Gloves
- ▶ Multiple Gloves Advised
  - ▶ **If** 'Clean Hands' Touches (or Fears) Unclean Materials
    - ▶ **ALL SAMPLING MUST BE HALTED**
      - ▶ Remove One Layer of Gloves
      - ▶ OR
      - ▶ Remove Gloves and Replace w/ New Clean Gloves

# Sampling

- ▶ Surface Samples = Grab Samples
- ▶ Subsurface Samples = Immersing Sample OR Pump Sample to Surface
- ▶ Preservation Either In Field or In Laboratory for Most Metals
  - ▶ Field for Trivalent Chromium, Recommended for Hexavalent Chromium
- ▶ Dissolved Metals? Filtered through a 0.45 um Filter (Contact Lab)
  - ▶ Double Bagged and Iced Immediately
  - ▶ Acidified Either In Field OR In Laboratory
  - ▶ Utilize Laboratory to minimize potential sample contamination

# Here is How It Works!

## ▶ Clean Hands

- ▶ Grab Sample Pole and Glove Box
- ▶ Rubber bands and Completed Label
- ▶ Put 2 Pair Gloves On
- ▶ Works Inner Bag Zip to Top
- ▶ Opens Outer Bag-Then Inner Bag
- ▶ When Bottle Gets to Top Pull and Twist
- ▶ Affix to Sample Pole w/Rubbers
- ▶ Remove Lid

## ▶ Dirty Hands

- ▶ Fills out Label
- ▶ Field Sample Book
- ▶ Grabs Sample Bottle Kit
- ▶ Dons 2 Pair Gloves
- ▶ Unrolls Sample Bottle Out Bubble Wrap
- ▶ Works Bottle Up From Bottom
- ▶ Holds Bottom of Sample Bags Firmly
- ▶ Removes Outer Gloves

# After Sample Drawn

- ▶ Also Advised
  - ▶ Carefully Lower (Drop) Sample Bottle Into Interior Bag
  - ▶ C/H Remove Outer Gloves
  - ▶ D/H Roll Sample Bottle and Bags
  - ▶ Clean Hands Zips Interior Bag (Through Outer Bag)
  - ▶ Continue Rolling Until Outer Bag Can Be Zipped



# Remember

- ▶ Demonstrate Compliance With Method
  - ▶ Collect Extensive Field Quality Control Samples
    - ▶ Trip Blanks
    - ▶ Field Blanks
      - ▶ One for Every 10 Samples
    - ▶ Field Duplicates
    - ▶ Equipment Blanks

# Additional Suggestions

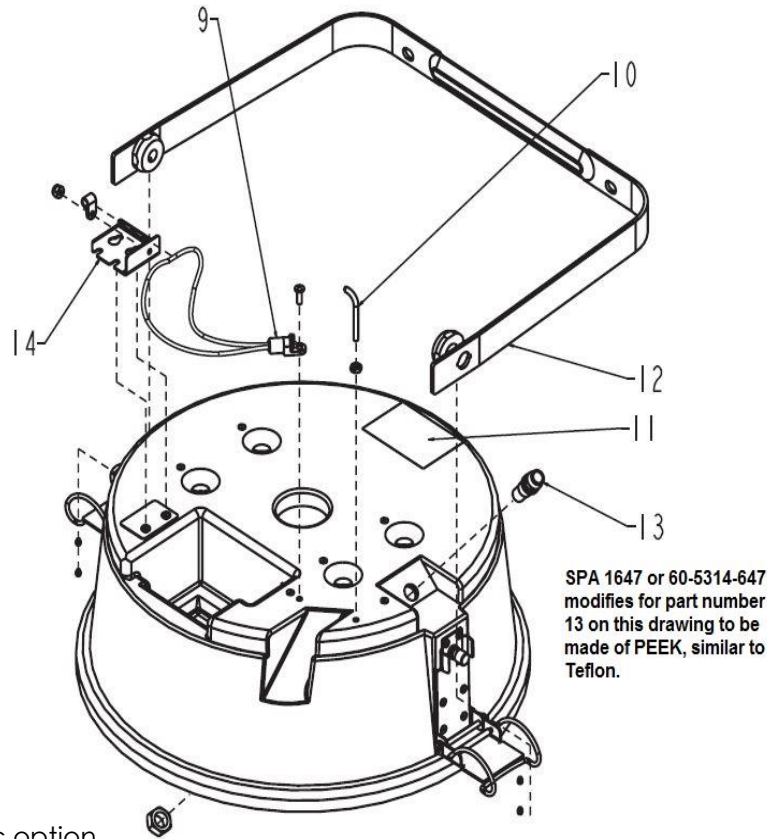
- ▶ Preserve or Not to Preserve
  - ▶ Preservation NOT Necessary IF
    - ▶ Samples to Contract Lab Next Day Air-Delivered before 10 AM
    - ▶ Samples are Composited by Lab
  - ▶ Preserve IF
    - ▶ Samples are NOT Composited in Lab
    - ▶ Samples MAY NOT Arrive at Contract Lab before 10 AM Next Day
- ▶ Zero Headspace ;(
  - ▶ No Transfer Vessel—This is a problem
- ▶ Rinse 3-5 times and fill at any interval after rinse #3
  - ▶ If received packaged from clean room may omit this step

# Noteworthy Cautions

- ▶ 1669 Check List Taped to Top of Cooler
- ▶ No Talking
- ▶ No Smoking
- ▶ Vehicles Turned Off
- ▶ If Vehicle Traffic—One Sampler should place their body between traffic and sample point
- ▶ NEW PPE at Each Sample Location
- ▶ Trip Blank at Each Location



# Sample Device



- ▶ ISCO GLS Can Create
  - ▶ Low Level Sampling Sampler
  - ▶ Change bulkhead to “PEEK”
    - ▶ Plastic/Nylon Material similar to Teflon
  - ▶ Coupler
  - ▶ Teflon Tubing
  - ▶ Non-Metallic Strainer

# Food Grade Rubbers

Rubber Articles CFR Title 21

Asparagus, Broccoli,  
Celery Any Vegetable  
Rubber bands Intended  
For Reuse Regulations.



# Conclusion

NO Right Way

Performance Based

BE Consistent

BE Thorough

BE Diligent

IF Wrong...OR Get A Hit...

Make Some Changes

...TRY AGAIN



# EPA 1669 References

BROOKS RAND LABS; BRL-1669-SAMPLING-CLASS.PDF

CITY OF GASTONIA; DEMONSTRATION OF METAL SAMPLE COLLECTION USING  
CLEAN HANDS/DIRTY HANDS TECHNIQUE

ENVIRONMENTAL-SAMPLING-FOR-LOW-LEVEL-TRACE-METALS0PER-EPA-  
METHOD-1669.PDF

EPA FEDERAL REGISTER VOLUME 66, NUMBER 195. 40 CFR PART 136

CFR TITLE 21 SUBCHAPTER B PART 177 SUBPART C –FOOD SAFE RUBBER BANDS

EPA METHOD 1669 SAMPLING AMBIENT WATER FOR TRACE METALS