

Session III

APMMN Mercury Wet Deposition Roundtable Discussion

- Standard Operating Procedures
- Acid cleaning
- Case study
- Blank sample preparation

Current SOP

Asia – Pacific Mercury Monitoring Network (APMMN)

Mercury Wet Deposition Network Field Standard Operating Procedures

Version 1.3-, February, 2015

- Based on MDN/NADP SOP.
- Revised Ver. 1.3 by EPAT, USEPA, NADP, NCU, Vietnam and Thailand in 2015



Asia Pacific Mercury
Monitoring Network

<http://apmmn.org>

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Publications

APMMN Field Sample SOP

Sampling and analysis method

UNEP documents

APMMN Field Sample SOP

- APMMN Field Sample SOP [\[PDF\]](#)

Asia – Pacific Mercury Monitoring Network (APMMN)
Mercury Wet Deposition Network Field Standard Operating
Procedures
Version 1.3-, February, 2015



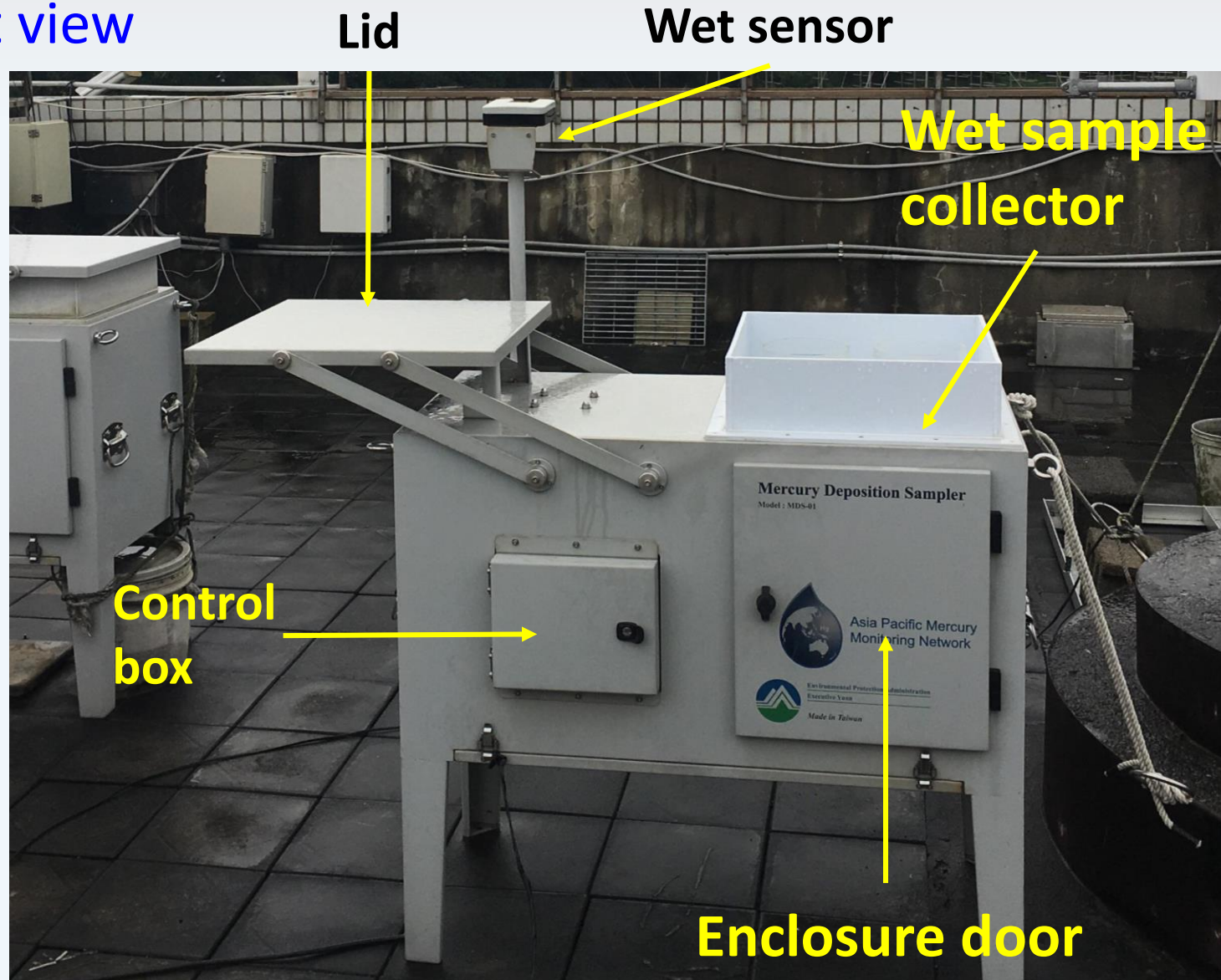
RECENT NEWS

- [2018 NADP Annual Meeting](#)
Nov 5 - 9, 2018
Albany, NY, US
- [ICMGP 2019](#)
Sep 8-13, 2019
Karkow, Poland

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Wet-only precipitation collector – MIC-B type

Front view

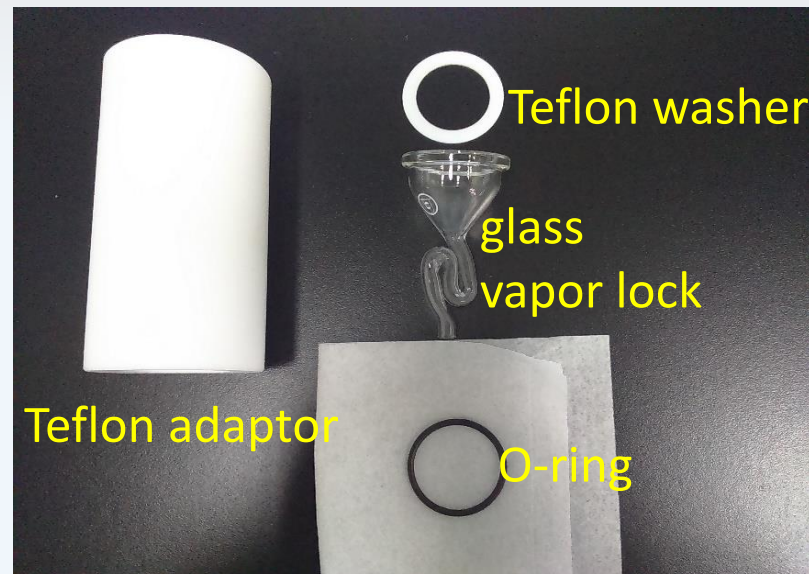


Wet-only precipitation collector-MIC type

Top view



Mercury collection device



Sample changeout

Items needed:

- Network Observation Form (NOF), for previous week
- NOF, for current week
- Mercury collection device (precharged hydrochloric acid), covered with double plastic bags
- Fresh deionized water in a squeeze bottle (~300 ml)
- Paper towels or lab wipes
- 3 Pairs of glove
- 2 zipped bags

Network Observer Form (NOF)



Asia Pacific Mercury
Monitoring Network

OBSERVER FORM

Rev. 10/18

Courier/Tracking # _____

LAB ID		Central Laboratory Use Only																																												
		Sample Receipt																																												
1. STATION Name _____ ID <table border="1" style="display: inline-table; text-align: center; width: 100px;"> <tr><td>A</td><td>P</td><td></td><td></td><td></td><td></td></tr> </table>		A	P					2. OBSERVER ON OFF Name _____ Name _____																																						
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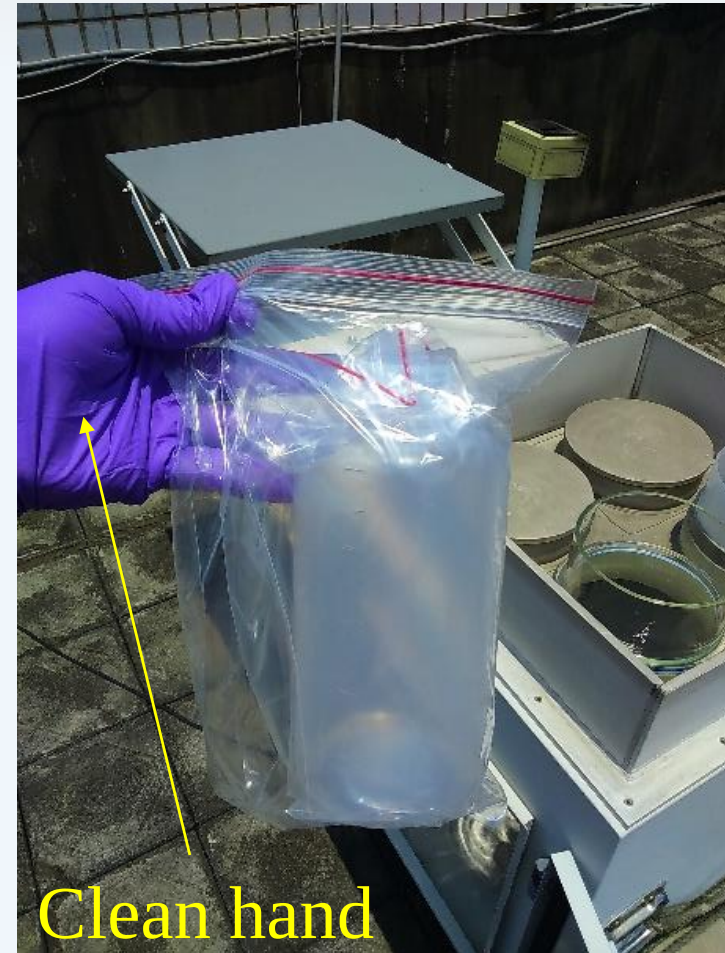
Retrieve your sample

- Changes on Tuesday morning 9 am (local time)
- Approach collector **facing into the wind**
- Open the enclosure door
- **Put on the gloves**
- Take off PFA sample bottle



Retrieve your sample

- Cap the bottle
- Take 2 zipped bags to cover bottle



Retrieve your sample

- Fill in the **Network Observer Form**
- Open the lid
- Take out the used sample collection device (funnel)



Retrieve your sample

- Fill in the **Network Observer Form (previous week)**

1. STATION				2. OBSERVER																													
Name <u>Lulin</u>				ON _____ OFF _____																													
ID <table border="1" style="display: inline-table; text-align: center; width: 100px;"><tr><td>A</td><td>P</td><td>T</td><td>W</td><td>0</td><td>1</td></tr></table>				A	P	T	W	0	1	Name <u>DW</u> Name <u>DW</u>																							
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☒	☐																																
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Retrieve your sample

- Fill in the **Network Observer Form (previous week)**

8. OVERFLOW							
Yes	No						
☐	☒						
_____ g							
9. ENCLOSURE TEMPERATURE							
MAXIMUM	<table border="1"><tr><td>3</td><td>6</td><td>5</td></tr><tr><td>2</td><td>8</td><td>1</td></tr></table> °C	3	6	5	2	8	1
3	6	5					
2	8	1					
MINIMUM	<table border="1"><tr><td>3</td><td>6</td><td>5</td></tr><tr><td>2</td><td>8</td><td>1</td></tr></table> °C	3	6	5	2	8	1
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2	8	1					

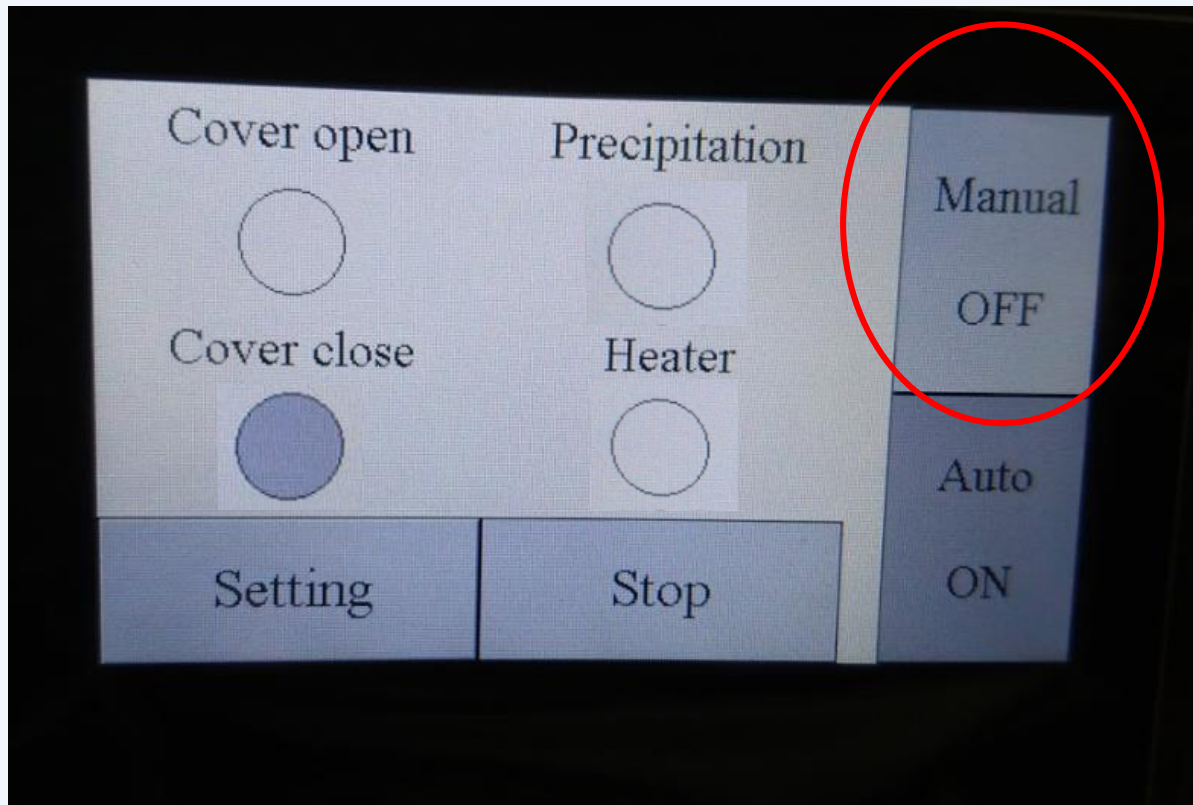
10. REMARKS

For example: equipment malfunction, extreme weather conditions, contamination, burning, leakage, etc.

1. xxxx
2. @@@@

Retrieve your sample

- Open the lid (switch to Manual OFF)
- Take out the used sample collection device (funnel)



Cleaning the collector

- Clean the sampler surfaces by Deionized water and paper towels
- Clean any debris off precipitation sensor

Dirty hand



Deployment of new sample collector

- Change your gloves !
- Deploy new sample collection device
- Avoid to touch the inner surface of glass funnel
- Close the lid and enclosure door
- Note the date/time on the new NOF



Weigh, transfer and storage

- Weigh the sample bottle and subtract the weight of empty bottle (recode it on the NOF)

Central Laboratory Use Only									
Sample Receipt									
Name: _____									
Date	Month		Day		Year		Hour		Minute
Bag Open?	Yes		No		Leak?		Yes		No
Full Wt.				2	6	5			
Empty Wt.				1	7	9			
Net Wt.					8	6			
Leak Wt.									
Total Wt.									



Weigh, transfer and storage

- Carefully pour the sample from 1L PFA bottle to 125mL **PETG** shipping bottle
- Label the sample with sampling site ID, start/end date
- Place the sample into **double** sealable plastic bag
- Store the sample in a **Hg-free** and secure place (or refrigerator) if not shipping immediately.

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Thermo Scientific™

Nalgene™ Square PETG Media Bottles with Closure

Catalog number: 2019-0125

Related applications: [Bioprocessing Containers](#)

Eliminate costly washing, depyrogenation and autoclaving steps with certified sterile and non-pyrogenic Thermo Scientific™ Nalgene™ Square PETG Storage



Weigh, transfer and storage

- Capture rain gauge data

7. PRECIPITATION RECORD													
	R – Rain only						S – Snow Only		M – Mixture		U – Unknown		
	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED			
Precipitation Type	R S M U	R S M U	R S M U	R S M U	R S M U	R S M U	R S M U	R S M U	R S M U	R S M U			
Precipitation depth			0.5	2.0				3.5					
Total Precipitation												6.0	mm

- Complete the NOF

Sample label

- The one of important part of taking sample

Site ID

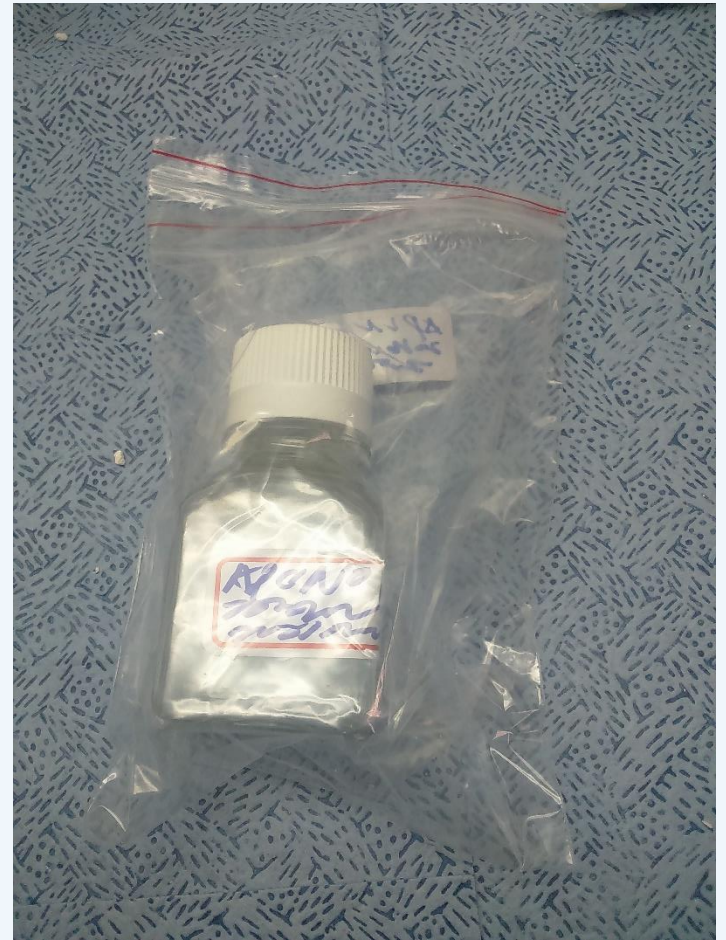
Start Date (MM/dd/yyyy)

End Date

APTW01

08/06/2019

08/13/2019



Shipping Info.

Ship samples at least **monthly** by int'l logistics service

Ex:



- Pack samples and NOFs singly or in bulk
- Cold shipping is unnecessary
- **Description of goods : Rainwater**

Dr. Guey-Rong Sheu

APMMN

Department of Atmospheric Sciences National Central University

300 Jhong-Da Road Jhong-Li 320, Taiwan

Acid Clean of Collection Devices

Material/Equipment

- Cleanroom w/ fume hood ($1.5\text{-}15.4\text{ ng m}^{-3}$, indoor air concentration in NCU ATEL)
- Personal protective equipment
- Deionized water – $\rho \geq 18.2\text{ M}\Omega\cdot\text{cm}$, $\sigma \leq 0.055\text{ }\mu\text{S/cm}$
- **Hydrochloric acid** – J.T Baker Hydrochloric Acid, 36.5-38.0%, BAKER INSTRA-ANALYZED[®] Reagent or equivalent
- Container (polyethylene)

Certificate of Analysis

Hydrochloric Acid, 36.5–38.0%
BAKER INSTRA-ANALYZED® Reagent
For Trace Metal Analysis



Material No.: 9530-00
Batch No.: 0000083492
Manufactured Date: 2014/04/22
Retest Date: 2019/04/21

Certificate of Analysis

Test	Specification	Result
ACS – Assay (as HCl) (by acid-base titrn)	36.5 – 38.0 %	37.7
ACS – Color (APHA)	<= 10	5
ACS – Residue after Ignition	<= 3 ppm	1
ACS – Specific Gravity at 60°/60°F	1.185 – 1.192	1.190
ACS – Bromide (Br)		
ACS – Extractable Organic Substances		
ACS – Free Chlorine (as Cl ₂)		
Phosphate (PO ₄)		
Sulfate (SO ₄)		
Sulfite (SO ₃)		
Ammonium (NH ₄)		
Trace Impurities – Arsenic (As)		
Trace Impurities – Aluminum (Al)		
Arsenic and Antimony (as As)		
Trace Impurities – Barium (Ba)		
Trace Impurities – Beryllium (Be)		
Trace Impurities – Bismuth (Bi)		
Trace Impurities – Boron (B)		
Trace Impurities – Cadmium (Cd)	<= 20.0 ppb	< 5.0
	<= 1.0 ppb	< 1.0

Hydrochloric Acid, 36.5–38.0%
BAKER INSTRA-ANALYZED® Reagent
For Trace Metal Analysis

Material No.: 9530-00
Batch No.: 0000083492

Test	Specification	Result
Trace Impurities – Germanium (Ge)	<= 3.0 ppb	< 2.0
Trace Impurities – Gold (Au)	<= 4.0 ppb	< 0.2
Heavy Metals (as Pb)	<= 100 ppb	< 50
Trace Impurities – Iron (Fe)	<= 15.0 ppb	1.9
Trace Impurities – Lead (Pb)	<= 1.0 ppb	< 0.5
Trace Impurities – Lithium (Li)	<= 1.0 ppb	< 1.0
Trace Impurities – Magnesium (Mg)	<= 10.0 ppb	< 1.0
Trace Impurities – Manganese (Mn)	<= 1.0 ppb	< 1.0
Trace Impurities – Mercury (Hg)	<= 0.5 ppb	0.3
Trace Impurities – Molybdenum (Mo)	<= 10.0 ppb	< 5.0
Trace Impurities – Nickel (Ni)	<= 4.0 ppb	< 0.3
Trace Impurities – Niobium (Nb)	<= 1.0 ppb	< 1.0
Trace Impurities – Potassium (K)	<= 9.0 ppb	< 2.0
Trace Impurities – Selenium (Se), For Information Only	ppb	1.0
Trace Impurities – Silicon (Si)	<= 100.0 ppb	< 10.0
Trace Impurities – Silver (Ag)	<= 1.0 ppb	< 1.0
	ppb	< 5.0
	ppb	< 1.0
	ppb	< 0.9
	ppb	< 5.0
	ppb	< 0.8
	ppb	< 1.0
	ppb	< 1.0
	ppb	< 1.0
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Country of Origin: US

ACS – Assay (as HCl) (by acid–base titrn) 36.5 – 38.0 % 37.7

Trace Impurities – Mercury (Hg) <= 0.5 ppb 0.3

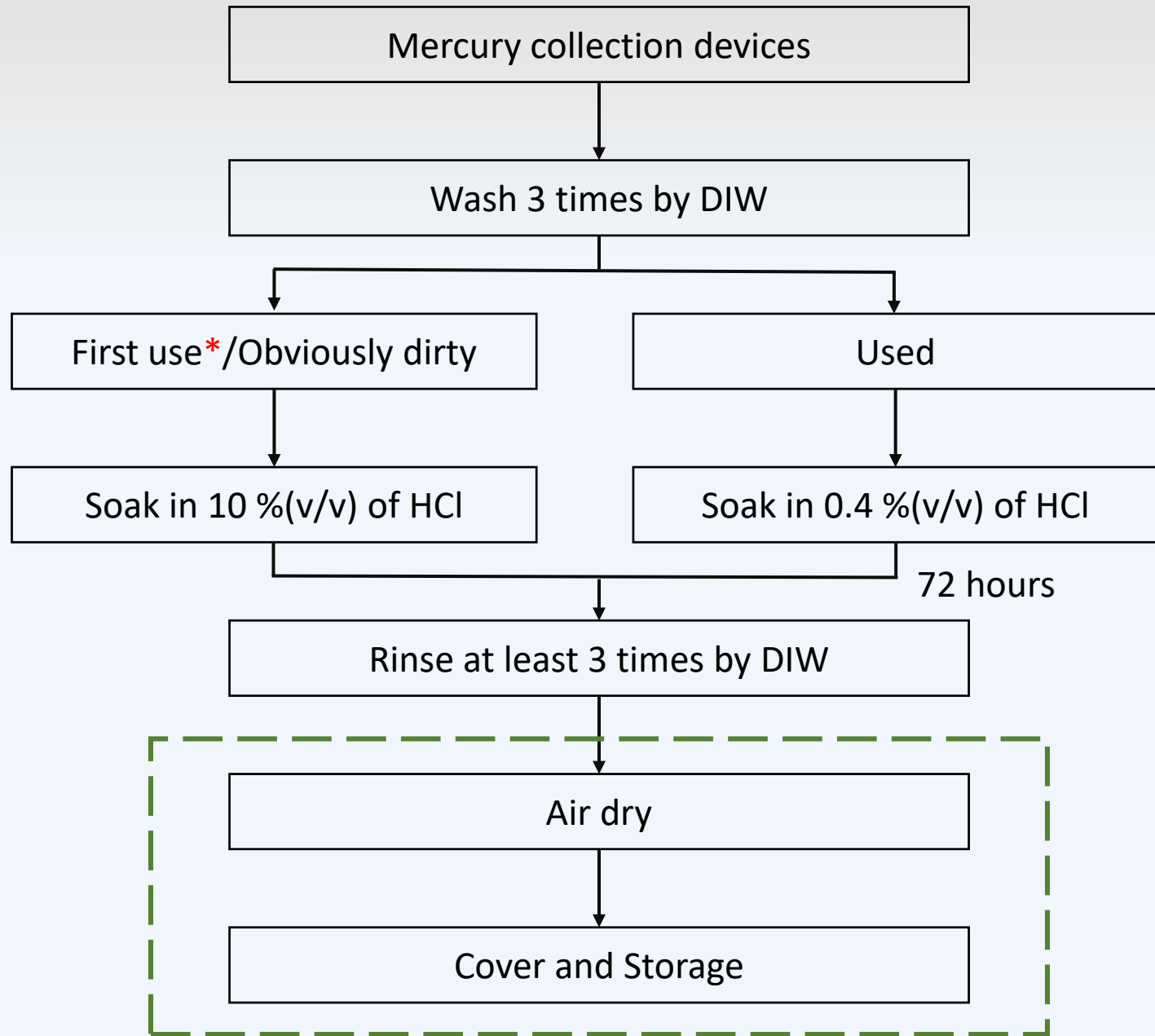
For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.573.2600
Avantor™ Performance Materials Inc.
3477 Corporate Parkway, Suite #200, Center Valley, PA 18034, U.S.A. Phone: 610.573.2600 . Fax: 610.573.2610



Phillipsburg, NJ 9001:2008, 14001:2004
Paris, KY 9001:2008
Mexico City, Mexico 9001:2008
Deventer, The Netherlands 9001:2008, 14001:2004, 13485:2003
Gliwice, Poland 9001:2008, 17025:2005
Selangor, Malaysia 9001:2008
Dehradun, India, 9001:2008, 14001:2004, 13485:2003
Mumbai, India, 9001:2008, 17025:2005
Panaji, India 9001:2008

Richard M. Siberski
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Vice President Global Quality

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3477 Corporate Parkway, Suite #200, Center Valley, PA 18034, U.S.A. Phone: 610.573.2600 . Fax: 610.573.2610



* : independent tank, fresh solution

Under the clean room/clean bench

Acid Clean of Collection Devices

- Separate the collection device and wash by DIW



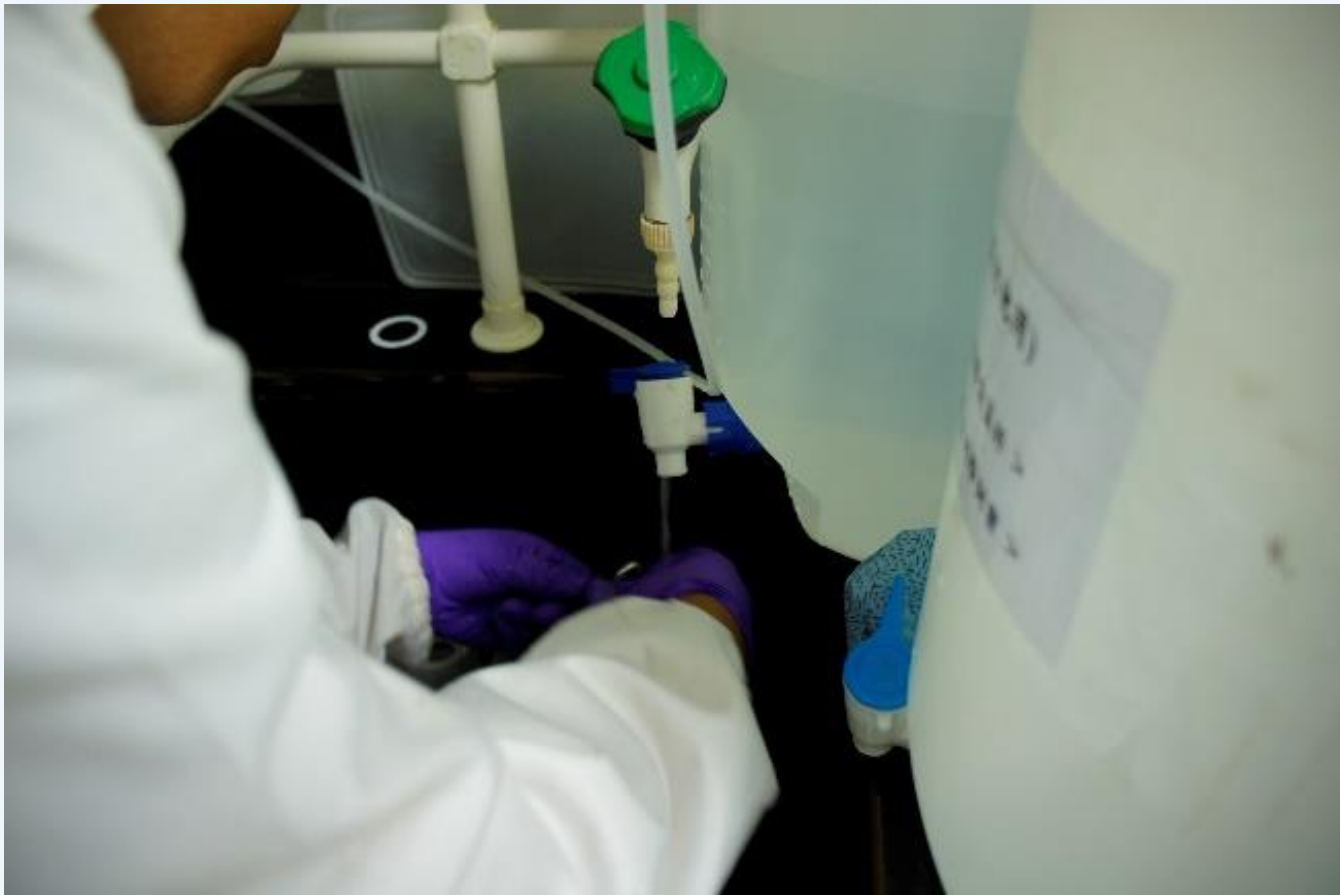
Acid Clean of Collection Devices

- Soak within hydrochloric acid for 72 hours (**except O-ring**)



Acid Clean of Collection Devices

- Rinse thoroughly each component with deionized water ($\rho \geq 18.2 \text{ M}\Omega$) at least **3 times**



Acid Clean of Collection Devices

- Air dry each component in the clean bench



Acid Clean of Collection Devices

- Cover each component with clean plastic bag and store
- Assemble each component before use



Cases in the past years

Case 1:

No sealable plastic bag (double bags)

No lable on sample bottle



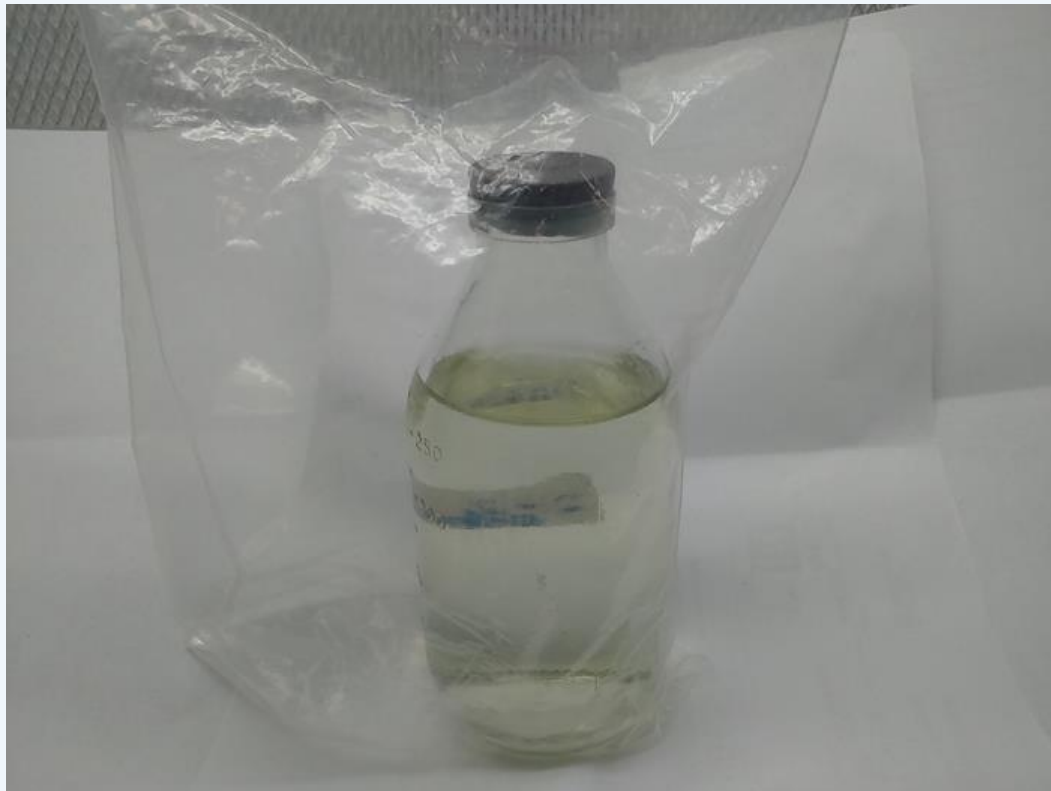
Cases in the past years

Case 2:

Single sealable plastic bag only

Number of Sample bottle and NOF were unequal

Not use the suggest PETG bottle



Cases in the past years

Case 3:

No label on the bottle

No NOF



Field blank

Items needed:

- NOF, note the **field blank** on **block 4**
- Mercury collection device, covered with double plastic bags
- 100ml fresh deionized water in a squeeze bottle
- 1 PETG shipping bottle
- 2 zipped bags

Reagent blank

Items needed:

- NOF, note the **other** on **block 4** and describe it on **block 10**
 - PETG shipping bottles
 - Test reagent – hydrochloric, deionized water
 - 2 zipped bags pre shipping bottle
1. 100 ml, 0.5% (v/v) of diluted acid solution.
 - **99.5 ml** of deionized water and **0.5 ml** trace-metal grade 12-Normal hydrochloric acid prepared into PETG shipping bottle.
 2. 100 ml deionized water prepared

Bottle blank

Items needed:

- NOF, note the **other** on **block 4** and describe it on **block 10**
- Cleaned, dried 1L PFA bottle
- 100ml fresh deionized water
- PETG shipping bottles
- 2 zipped bags pre shipping bottle

Blank results

In the past three months at NCU ATEL

Type	Range (ng L ⁻¹)	Criterion
Field blank	0.38 – 1.29	-
Reagent blank – DIW	N.D – 0.04	-
Reagent blank – HCl	N.D – 1.12	-
Bottle blank	0.01 – 0.58	<0.5

THANK YOU