# 1. PROJECT OVERVIEW

## Test Program Summary

Marathon Petroleum Company LP contracted CleanAir Engineering (CleanAir) to complete testing on the Coker Heater (EU70-COKERHTR-S1) at the Detroit Refinery. The test program included particulate matter (PM) testing intended to demonstrate compliance with the MDEQ Permit No. MI-ROP-A9831-2012c.

For the testing described in this report, CleanAir mistakenly provided the crew with filters prepared for Method 5B instead of Method 5. The methods differ in how the filters are prepared prior to testing and how the filters are analyzed after testing. As further discussed in a memorandum from CleanAir to MPC dated September 24, 2020 presented in Appendix I of this report, this difference imparted a significant positive bias to the measured particulate emissions. Due to this error and the resulting bias, these tests results are not representative of true unit emissions and should be discarded. Consequently, particulate emissions are presented in this report but not evaluated against the applicable limits.

Section 2 Results provides a more detailed account of the test conditions and data analysis. Test program information, including the test parameters, on-site schedule and a project discussion, begin below.

## Test Program Details

### Parameters

The test program included the following emissions measurements:

- particulate matter (PM) as filterable particulate matter (FPM)
- total particulate matter less than 10 microns in diameter ($PM_{10}$), assumed equivalent to the sum of the following constituents:
    - FPM
    - condensable particulate matter (CPM)
- flue gas composition (e.g., $O_2$, $CO_2$, $H_2O$)
- flue gas temperature
- flue gas flow rate

# Schedule

Testing was performed on August 11 and 12, 2020. The on-site schedule followed during the test program is outlined in Table 1-1.

**Table 1-1:**
**Test Schedule**

| Run Number | Location | Method | Analyte | Date | Start Time | End Time |
|---|---|---|---|---|---|---|
| 1 | Coker Heater | USEPA Method 5 / 202 | FPM / CPM | 08/11/20 | 13:10 | 14:16 |
| 2 | Coker Heater | USEPA Method 5 / 202 | FPM / CPM | 08/11/20 | 14:53 | 15:59 |
| 3 | Coker Heater | USEPA Method 5 / 202 | FPM / CPM | 08/11/20 | 16:25 | 17:30 |
| 4 | Coker Heater | USEPA Method 5 / 202 | FPM / CPM | 08/12/20 | 07:43 | 08:49 |

# Discussion

## *PM & $PM_{10}$ Testing*

A total of four (4) 60-minute EPA Method 5/202 test runs were performed. PM and $PM_{10}$ emission results were calculated in units of pounds per million Btu (lb/MMBtu). The final result was expressed as the average of the three (3) highest runs.

$PM_{10}$ is assumed equivalent to the sum of FPM and CPM. The Method 5/202 sample train yields a front-half, FPM result and a back-half, CPM result. The total PM result (FPM plus CPM) from Method 5/202 can be used as a worst-case estimation of total $PM_{10}$ since Method 5 collects all FPM present in the flue gas (regardless of particle size). The final result was expressed as the average of the three (3) highest runs.

## *Calculations*

Emission results in units of dry volume-based concentration (lb/dscf, ppmdv) were converted into units of pound per million BTU (lb/MMBtu) using an oxygen-based fuel factor ($F_d$) for refinery gas provided by MPC.

## *Test Conditions*

The unit was operated at the maximum normal operating capacity during each of the emissions compliance test runs. MPC was responsible for logging any relevant process-related data and providing it to CleanAir for inclusion in the test reports.

*End of Section*

# 2. RESULTS

This section summarizes the test program results. Additional results are available in the report appendices, specifically Appendix C Parameters.

**Table 2-1:**
**Coker Heater – FPM & $PM_{10}$ Emissions**

| Run No. | | 1 | 2 | 3* | 4 | Average |
|---|---|---|---|---|---|---|
| Date (2020) | | Aug 11 | Aug 11 | Aug 11 | Aug 12 | |
| Start Time (approx.) | | 13:10 | 14:53 | 16:25 | 07:43 | |
| Stop Time (approx.) | | 14:16 | 15:59 | 17:30 | 08:49 | |
| **Process Conditions** | | | | | | |
| $R_P$ | Production Rate (BPD) | 38,500 | 38,500 | 38,500 | 38,500 | **38,500** |
| $P_1$ | Fuel Consumption (mscf/day) | 4,191 | 4,219 | 4,179 | 4,180 | **4,192** |
| $F_d$ | Oxygen-based F-factor (dscf/MMBtu) | 8,605 | 8,605 | 8,605 | 8,608 | **8,606** |
| $H_i$ | Actual heat input (MMBtu/hr) | 208 | 209 | 207 | 209 | **208** |
| **Gas Conditions** | | | | | | |
| $O_2$ | Oxygen (dry volume %) | 6.6 | 6.7 | 6.7 | 6.6 | **6.6** |
| $CO_2$ | Carbon dioxide (dry volume %) | 8.2 | 8.0 | 8.1 | 8.3 | **8.2** |
| $T_s$ | Stack temperature (°F) | 401 | 402 | 404 | 392 | **398** |
| $B_w$ | Actual water vapor in gas (% by volume) | 14.4 | 14.6 | 14.0 | 14.0 | **14.3** |
| **Gas Flow Rate** | | | | | | |
| $Q_a$ | Volumetric flow rate, actual (acfm) | 98,700 | 97,300 | 96,900 | 98,900 | **98,300** |
| $Q_s$ | Volumetric flow rate, standard (scfm) | 58,700 | 57,800 | 57,400 | 60,000 | **58,900** |
| $Q_{std}$ | Volumetric flow rate, dry standard (dscfm) | 50,300 | 49,400 | 49,400 | 51,600 | **50,400** |
| **Sampling Data** | | | | | | |
| $V_{mstd}$ | Volume metered, standard (dscf) | 31.61 | 32.10 | 32.52 | 34.30 | **32.67** |
| %I | Isokinetic sampling (%) | 96.1 | 99.4 | 100.7 | 101.6 | **99.1** |
| **Laboratory Data**[1] | | | | | | |
| $m_n$ | Total FPM (g) | 0.00337 | 0.00329 | 0.00339 | 0.00373 | |
| $m_{CPM}$ | Total CPM (g) | 0.00288 | 0.00267 | 0.00061 | 0.00192 | |
| $m_{Part}$ | Total particulate matter (g) | 0.00625 | 0.00596 | 0.00400 | 0.00565 | |
| **FPM Results**[2] | | | | | | |
| $C_{sd}$ | Particulate Concentration (lb/dscf) | 2.35E-07 | 2.26E-07 | 2.30E-07 | 2.40E-07 | **2.35E-07** |
| $E_{lb/hr}$ | Particulate Rate (lb/hr) | 0.710 | 0.669 | 0.681 | 0.742 | **0.711** |
| $E_{Fd}$ | Particulate Rate - $F_d$-based (lb/MMBtu) | 0.00296 | 0.00286 | 0.00291 | 0.00302 | **0.00296** |
| **CPM Results** | | | | | | |
| $C_{sd}$ | Particulate Concentration (lb/dscf) | 2.01E-07 | 1.84E-07 | 4.14E-08 | 1.23E-07 | **1.37E-07** |
| $E_{lb/hr}$ | Particulate Rate (lb/hr) | 0.606 | 0.544 | 0.123 | 0.381 | **0.413** |
| $E_{Fd}$ | Particulate Rate - $F_d$-based (lb/MMBtu) | 0.00252 | 0.00233 | 0.00052 | 0.00155 | **0.00173** |
| **$PM_{10}$ Results**[3] | | | | | | |
| $C_{sd}$ | Particulate Concentration (lb/dscf) | 4.36E-07 | 4.10E-07 | 2.71E-07 | 3.63E-07 | **4.03E-07** |
| $E_{lb/hr}$ | Particulate Rate (lb/hr) | 1.32 | 1.21 | 0.804 | 1.12 | **1.217** |
| $E_{Fd}$ | Particulate Rate - $F_d$-based (lb/MMBtu) | 0.00548 | 0.00519 | 0.00343 | 0.00457 | **0.00508** |

The particulate results in this table are not believed to be representative of true emissions.

[1] Front half filter tare weights were determined subsequent to baking at 160°C, final weights were determined subsequent to baking at 105°C.

[2] FPM final average is the average of the three (3) highest FPM runs.

[3] $PM_{10}$ final average is the average of the three (3) highest $PM_{10}$ runs.

*End of Section*

# 3. DESCRIPTION OF INSTALLATION

## Process Description

MPC's facility in Detroit, Michigan, produces refined petroleum products from crude oil. MPC must continue to demonstrate that select process units are in compliance with permitted emission limits.

The Coker unit (EU70-COKER) converts Vacuum Resid (Crude Vacuum Tower Bottoms), a product normally sold as asphalt or blended into residual fuel oil, into lighter, more valuable products. The Vacuum Resid feedstock is heated before it enters the main fractionator, where lighter material vaporizes. The fractionator bottoms are routed through a fired heater and then into a coke drum. This emission unit consists of process vessels (fractionators), coke drums, heater (EU70-COKERHTR-S1), cooling tower, compressors, pumps, piping, drains and various components (pumps and compressor seals, process valves, pressure relief valves, flanges, connectors, etc.). This emission group includes the Coke Handling System, which collects, sizes and transports the petroleum coke created during the coking process. The system consists of a coke pit, storage pad, enclosed crusher, enclosed conveyors and surge bins.

The Coker Heater is fired by refinery fuel gas. Emissions are vented to the atmosphere via the Coker Heater Stack (SV70-H1) where testing was performed.

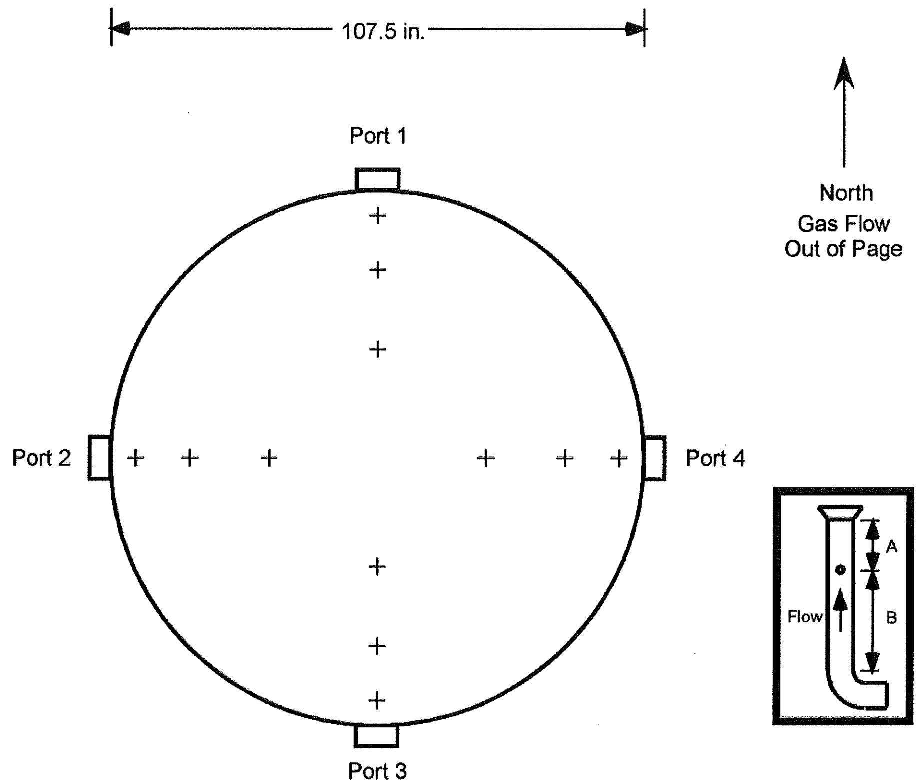
## Test Location

The sample point locations were determined by EPA Method 1. Table 3-1 presents the sampling information for the test location described in this report. The figure shown on page 5 represents the layout of the test location.

**Table 3-1:**
**Sampling Point Information**

| Source<br>Constituent | Method (USEPA) | Run No. | Ports | Points per Port | Minutes per Point | Total Minutes | Figure |
|---|---|---|---|---|---|---|---|
| Coker Heater Stack | | | | | | | |
| FPM / CPM | 5 / 202 | 1-4 | 4 | 3 | 5 | 60 | 3-1 |

**Figure 3-1:**
**FPM & $PM_{10}$ Sample Point Layout**




| Sampling Point | % of Stack Diameter | Port to Point Distance (inches) |
|---|---|---|
| 1 | 29.6 | 31.8 |
| 2 | 14.6 | 15.5 |
| 3 | 4.4 | 4.7 |

Duct diameters upstream from flow disturbance (A): 5.2 Limit: 0.5
Duct diameters downstream from flow disturbance (B): 8.3 Limit: 2.0

*End of Section*

# 4. METHODOLOGY

## Procedures and Regulations

The test program sampling measurements followed procedures and regulations outlined by the USEPA and Michigan Department of Environment, Great Lakes, and Energy (EGLE). These methods appear in detail in Title 40 of the CFR and at https://www.epa.gov/emc.

CleanAir follows specific QA/QC procedures outlined in the individual methods and in USEPA "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III Stationary Source-Specific Methods," EPA/600/R-94/038C. Appendix D contains additional QA/QC measures, as outlined in CleanAir's internal Quality Manual.

### Title 40 CFR Part 60, Appendix A

Method 1 "Sample and Velocity Traverses for Stationary Sources"

Method 2 "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"

Method 3 "Gas Analysis for the Determination of Dry Molecular Weight"

Method 3A "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)"

Method 3B "Gas Analysis for the Determination of Emission Rate Correction Factor or Excess Air"

Method 4 "Determination of Moisture Content in Stack Gases"

Method 5 "Determination of Particulate Matter Emissions from Stationary Sources"

### Title 40 CFR Part 51, Appendix M

Method 202 "Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources"

# Methodology Discussion

## *PM & $PM_{10}$ Testing – USEPA Method 5/202*

PM and $PM_{10}$ emissions were determined using EPA Method 5/202. Filters for this test were mistakenly prepared for Method 5B rather than for Method 5 resulting in a high bias for particulate matter emissions. See Appendix I for more details.

The front-half of the sampling train consisted of a glass nozzle, glass liner and filter holder heated to 248°F ± 25°F and a quartz fiber filter. Flue gas samples were extracted isokinetically per Method 5 requirements.

The back-half (Method 202 portion) of the sampling train is designed to mimic ambient conditions and collect only the particles that would truly form CPM in the atmosphere by minimizing the sulfur dioxide ($SO_2$) and nitrogen oxide ($NO_X$) interferences observed with earlier versions of the method, in which flue gas was bubbled through cold water, and $SO_2$ and $NO_X$ were absorbed and partially oxidized before they could be purged out with nitrogen ($N_2$).

Flue gas exiting the front-half heated filter passes through a coiled condenser and dry impinger system jacketed by water continually circulated at ambient temperature. Moisture is removed from the flue gas without bubbling through the condensed water. Flue gas then passes through a tetrafluoromethane (TFE) membrane filter at ambient temperature. The temperature of the flue gas at the exit of the filter was directly measured with an in-line thermocouple and maintained in the temperature range of 65°F to 85°F.

After exiting the ambient filter, the flue gas passes through two (2) additional impingers surrounded by ice in a "cold" section of the impinger bucket. The moisture collected in these impingers will not be analyzed for CPM and is only collected to determine the flue gas moisture and to thoroughly dry the gas. The sample gas then flows into a calibrated dry gas meter where the collected sample gas volume is determined.

The front-half portion of the sample train (nozzle, probe and heated filter) was recovered per Method 5 requirements, using acetone as the recovery solvent. The back-half of the sample train (heated filter outlet, condenser, dry impingers and TFE membrane filter) was recovered per Method 202 requirements. The impinger train was purged with $N_2$ at a rate of 14 liters per minute (lpm) for one (1) hour following each test run and prior to recovery.

A field train blank was assembled, purged and recovered as if it were an actual test sample; analysis of the field train blank was used to blank-correct the test run results. Reagent blanks were collected to quantify background contamination. All samples and blanks were returned to CleanAir Analytical Services in Palatine, Illinois, for gravimetric analysis. Method 202 samples were maintained at a temperature < 85°F during transport to the laboratory.

All samples and blanks were returned to CleanAir Analytical Services in Palatine, Illinois, for gravimetric analysis. Upon receipt, the filters dessicated for 24 hours at ambient temperature followed by an oven dry at 220°F. The front-half rinses were evaporated at ambient temperature and pressure. The masses from each fraction were then summed for a total FPM mass.

*End of Section*

# 5. APPENDIX

Appendix A: Test Method Specifications

Appendix B: Sample Calculations

Appendix C: Parameters

Appendix D: QA/QC Data

Appendix E: Field Data

Appendix F: Field Data Printouts

Appendix G: Facility Process & Fuel Analysis Data

Appendix H: Laboratory data

Appendix I: Filter Memo

Appendix J: CleanAir Resumes and Certifications

# APPENDIX A: TEST METHOD SPECIFICATIONS

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## Specification Sheet for EPA Method 5/202

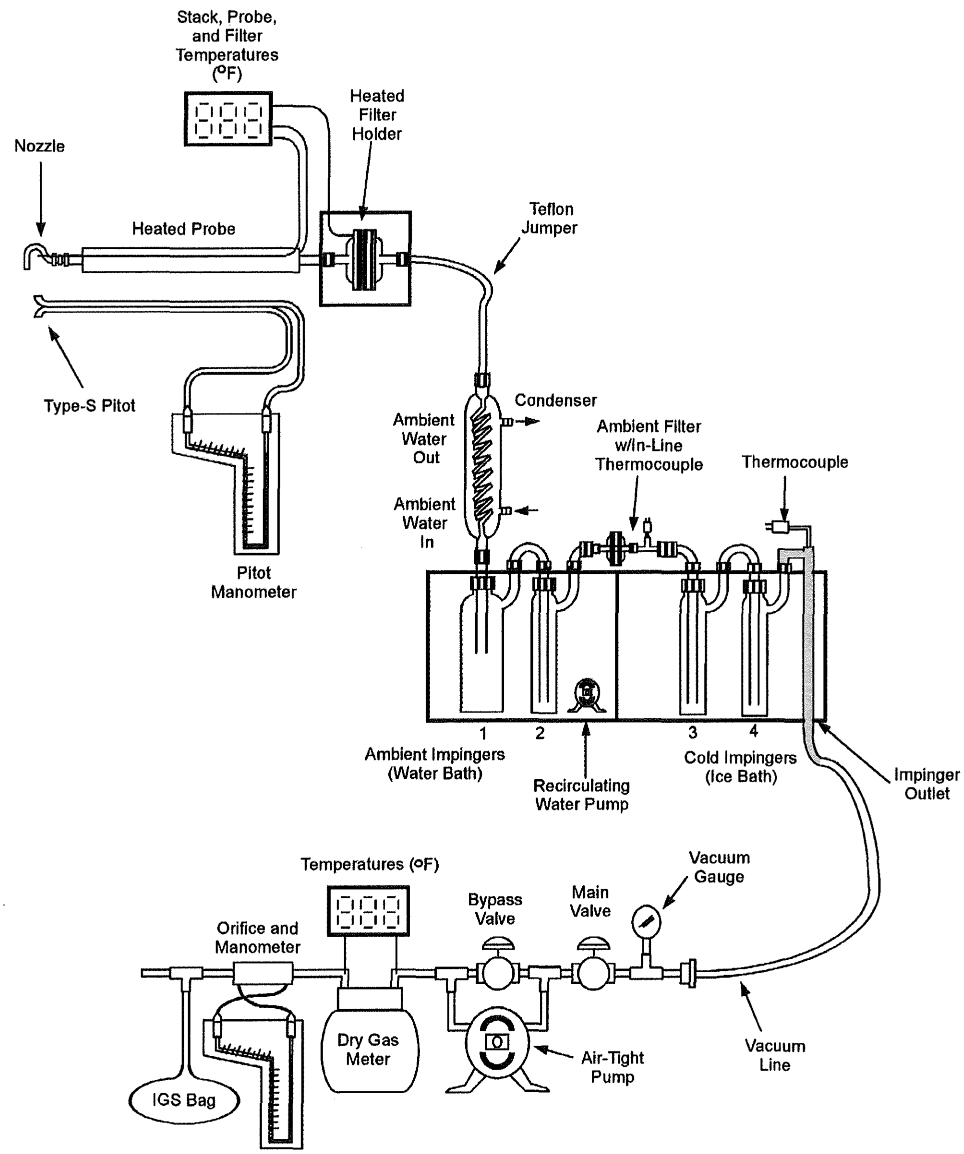
| | |
|---|---|
| Source Location Name(s) | Coker Heater Stack |
| Pollutant(s) to be Determined | Filterable Particulate Matter (FPM) and Condensable Particulate Matter (CPM) |
| Other Parameters to be Determined from Train | Gas Density, Moisture, Flow Rate |

| | Standard Method Specification | Actual Specification Used |
|---|---|---|
| **Pollutant Sampling Information** | | |
| Duration of Run | N/A | 60 minutes |
| No. of Sample Traverse Points | N/A | 12 |
| Sample Time per Point | N/A | 5 minutes |
| Sampling Rate | Isokinetic (90-110%) | Isokinetic (90-110%) |
| **Sampling Probe** | | |
| Nozzle Material | Stainless Steel or Glass | Borosilicate Glass |
| Nozzle Design | Button-Hook or Elbow | Button-Hook |
| Probe Liner Material | Glass or Teflon | Borosilicate Glass |
| Effective Probe Length | N/A | 6 feet |
| Probe Temperature Set-Point | 248°F±25°F | 248°F±25°F |
| **Velocity Measuring Equipment** | | |
| Pitot Tube Design | Type S | Type S |
| Pitot Tube Coefficient | N/A | 0.830 |
| Pitot Tube Calibration by | Geometric or Wind Tunnel | Wind-Tunnel |
| Pitot Tube Attachment | Attached to Probe | Attached to Probe |
| **Metering System Console** | | |
| Meter Type | Dry Gas Meter | Dry Gas Meter |
| Meter Accuracy | ±2% | ±1% |
| Meter Resolution | N/A | 0.01 cubic feet |
| Meter Size | N/A | 0.1 dcf/revolution |
| Meter Calibrated Against | Wet Test Meter or Standard DGM | Wet Test Meter |
| Pump Type | N/A | Rotary Vane |
| Temperature Measurements | N/A | Type K Thermocouple/Pyrometer |
| Temperature Resolution | 5.4°F | 1.0°F |
| ΔP Differential Pressure Gauge | Inclined Manometer or Equivalent | Inclined Manometer |
| ΔH Differential Pressure Gauge | Inclined Manometer or Equivalent | Inclined Manometer |
| Barometer | Mercury or Aneroid | Digital Barometer calibrated w/Mercury Aneroid |
| **FPM Filter Description** | | |
| Filter Location | After Probe | Exit of Probe |
| Filter Holder Material | Quartz | Borosilicate Glass |
| Filter Support Material | Glass Frit | Teflon |
| Cyclone Material | N/A | None |
| Filter Heater Set-Point | 248°F±25°F | 248°F±25°F |
| Filter Material | Glass Fiber | Quartz Fiber |
| **Other Components** | | |
| Description | Condenser | Condenser |
| Location | Before Impinger 1 | Before 1st Impinger |
| Operating Temperature | ≤85°F | ≤85°F |

# Specification Sheet for EPA Method 5/202

| | Standard Method Specification | Actual Specification Used |
|---|---|---|
| **Impinger Train Description** | | |
| Type of Glassware Connections | Leak-Free Glass Connectors | Ground Glass with Silicone O-Ring |
| Connection to Probe or Filter by | Direct or Flexible Connection | Flexible Teflon Line |
| Number of Impingers | 4 | 4 |
| Impinger Stem Types | | |
| Impinger 1 | Shortened Stem (open tip) | Shortened Stem (open tip) |
| Impinger 2 | Modified Greenburg-Smith | Modified Greenburg-Smith |
| Impinger 3 | Modified Greenburg-Smith | Modified Greenburg-Smith |
| Impinger 4 | Modified Greenburg-Smith | Modified Greenburg-Smith |
| Impinger 5 | | |
| Impinger 6 | | |
| Impinger 7 | | |
| Impinger 8 | | |
| **CPM Filter Description** | | |
| Filter Location | Between 2nd and 3rd Impingers | Between 2nd and 3rd Impingers |
| Filter Holder Material | Glass, Stainless Steel or Teflon | Borosilicate Glass |
| Filter Support Material | Teflon | Teflon |
| Cyclone Material | None | None |
| Filter Heater Set-Point | >65°F but ≤85°F | >65°F but ≤85°F |
| Filter Material | Teflon Membrane | Teflon Membrane |
| **Gas Density Determination** | | |
| Sample Collection | Multi-point integrated | Multi-Point Integrated |
| Sample Collection Medium | Flexible Gas Bag | Vinyl Bag |
| Sample Analysis | Orsat or CEM Analyzer | CEM |
| **Sample Recovery Information** | | |
| Nozzle Brush Material | Nylon Bristle or Teflon | Nylon Bristle |
| Nozzle Rinse Reagent | Acetone | Acetone |
| Nozzle Rinse Wash Bottle Material | Glass or Polyethylene | Inorganic in polyethylene, organic in Teflon |
| Nozzle Rinse Storage Container | Glass or Polyethylene | Glass |
| Filter Recovered? | Yes | Yes |
| Filter Storage Container | FH filter in petri dish, CPM filter in petri dish | FH filter in petri dish, CPM filter in petri dish |
| Impinger Contents Recovered? | Yes | Yes |
| Impinger Rinse Reagent | DI Water/Acetone/Hexane | DI Water/Acetone/Hexane |
| Impinger Wash Bottle | Inorganic in polyethylene, organic in Teflon | Inorganic in polyethylene, organic in Teflon |
| Impinger Storage Container | Inorganic in polyethylene, organic in glass | Inorganic in amber glass, organic in amber glass |
| **Analytical Information** | | |
| Method 4 $H_2O$ Determination by | Volumetric or Gravimetric | Gravimetric and Volumetric |
| Filter Preparation Conditions | Dessicate 24 Hours or Filter Extraction | See Analytical Flow Chart |
| Front-Half Rinse Preparation | Evaporate at ambient temperature and pressure | Evaporate at ambient temperature and pressure |
| Back-Half Analysis | Sonication and Extraction | See Analytical Flow Chart |
| Additional Analysis | N/A | None |

# EPA Method 5/202
# Sampling Train Configuration




<u>Impinger Contents</u>

| | |
|---|---|
| Impinger 1 | Empty |
| Impinger 2 | Empty |
| Impinger 3 | DI $H_2O$ |
| Impinger 4 | Silica Gel |

# EPA Method 202
# Glassware Preparation Procedures

Wash with soap and hot tap water

↓

Rinse 3X with hot tap water

↓

Rinse 3X with D.I. water

↓

Rinse 3X with acetone

↓

Rinse 3X with hexane

↓

*Bake at 300 degrees C for six hours

↓

Cover all openings with aluminum foil

Before each run, rinse the train glassware with deionized, distilled, ultra-filtered water containing 1 ppmwv residual mass or less.

*As an alternative to baking glassware, a field train proof blank can be performed on the sampling train glassware.

# EPA Method 5
# Sample Recovery Flowchart

- Tare all sample containers before sample collection
- Mark all liquid levels and final weights on the outside of each sample container
- Seal all sample containers with Teflon tape
- If recycling, bake silica gel for two hours at 350 degrees F (175 degrees C)

**Container 1**
**Quartz Filter**
**Petri Dish**

↓ Remove with tweezers to original container. Brush any loose particulate or filter fibers into sample container

↓ If necessary fold in half and place into container

↓ Visual Inspection

**Container 2**
**Front Half (FH) Rinse**
**250 ml Glass**

↓ **Probe liner, nozzle, cyclone or cyclone bypass and filter FH**

↓ Brush/rinse 3X with acetone (6X for metal components)

↓ Visual Inspection

↓ Label container and measure volume by weight

**Container 3**
**Silica Gel**

↓ Measure volume by weight, note any color change

↓ Recycle silica gel

**Container 4***
**Back Half (BH) Rinse**
**500 ml Plastic**

↓ **BH filter housing, Z-piece, impingers 1, 2, 3 and U-Bends**

↓ Measure volume by weight

↓ Empty contents into labeled container

↓ Rinse with water

↓ Visual Inspection

↓ Label container and measure volume by weight

**Blanks**

**Container 5**
**Filter Blank**
**Plastic Petri Dish**

↓ Clean, unused tared filter

**Container 6**
**Acetone Blank**
**250 ml Glass**

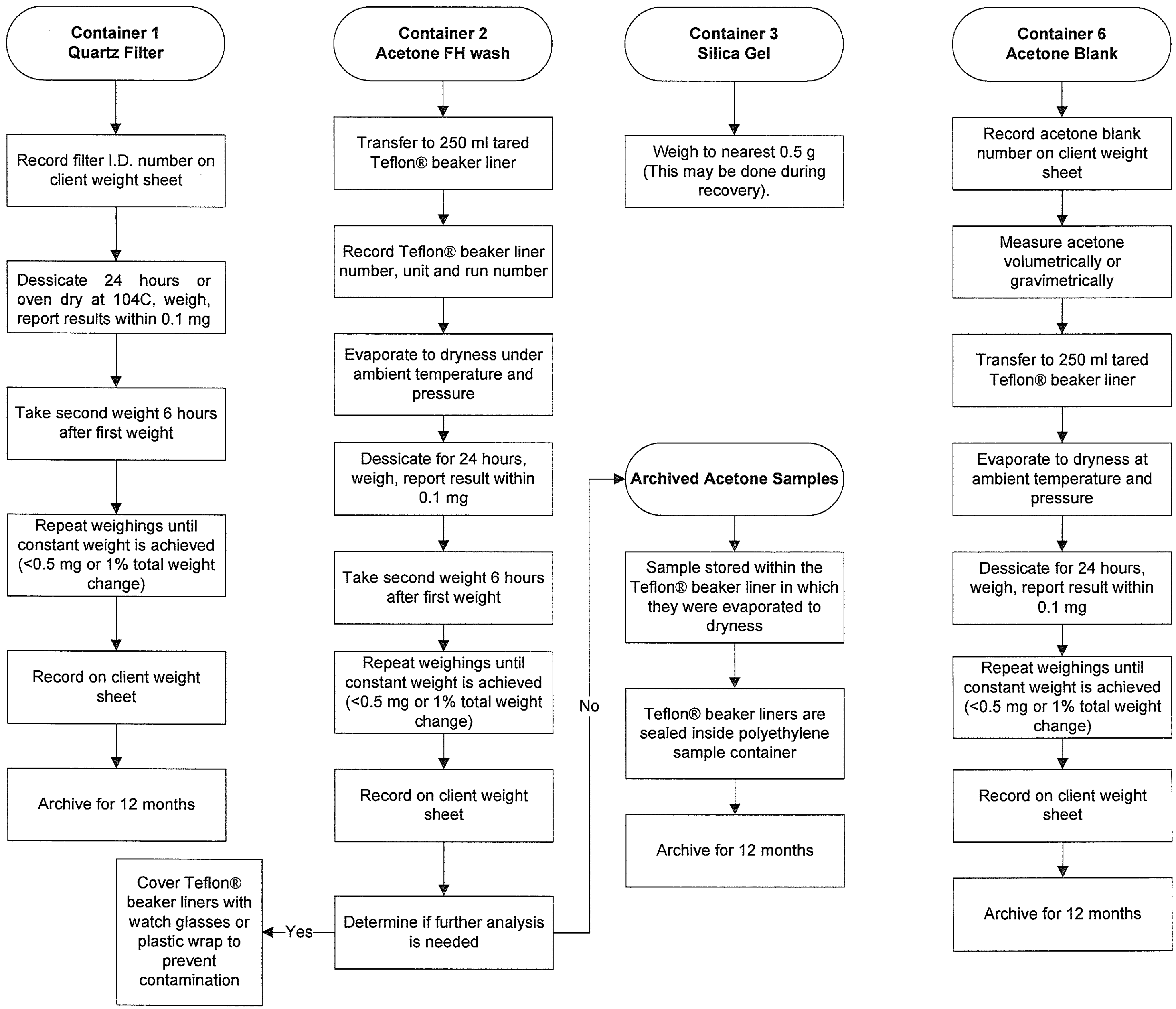
↓ 200 ml of acetone from rinse bottle. Record lot number

**Container 7***
**D.I. Water Blank**
**250 ml Plastic**

↓ 200 ml of water from rinse bottle

*Containers 4 and 7 are required when the testing includes a back half analysis

# EPA Method 5
# Analytical Flowchart



# EPA Method 202
## Sample Recovery Flowchart (1 of 2)

- Tare all sample containers before sample collection
- Mark all liquid levels and final weights on the outside of each sample container
- Seal all sample containers with Teflon tape
- If recycling, bake silica gel for two hours at 350 degrees F (175 degreesC)
- Samples must be maintained at or below 85 degrees F (30 degrees C) during shipping.

### Post-Test N2 Purge*

1. Transfer water collected in condenser and water dropout impinger to back-up impinger; measure and record volume or weight
2. Conduct purge on condenser, back-up impinger and CPM filter with N2 at 14 LPM for one hour

***Purge Notes:***

- *Continue operating condenser recirculation pump and maintain gas temperature at exit of CPM filter >65°F but ≤85°F.*
- *If volume of water in moisture traps was not determined prior to purge, maintain trap temperature and keep gas temperature at exit of silica gel impinger below 68°F.*
- *At conclusion of purge, simultaneously turn off delivery and pumping systems.*
- *For high moisture sampling, weigh and change out silica gel prior to purging.*

### CPM Container 1 – Inorganic Rinse – 950 ml Amber Glass

1. **Back-half FPM filter holder, probe extension, condenser, dropout and back-up impingers, connecting glassware, front-half CPM filter holder**
2. Measure and record impinger volume by weight
3. Empty contents into labeled container
4. Rinse 2X with deionized, distilled, ultra-filtered water and add to sample container
5. Visual Inspection
6. Mark liquid level and label container

### CPM Container 2 – Organic Rinses – 950 ml Amber Glass

1. **Back-half FPM filter holder, probe extension, condenser, dropout and back-up impingers, connecting glassware, front-half CPM filter holder**
2. Rinse 1X with acetone and add to sample container
3. Rinse 2X with hexane and add to sample container
4. Visual Inspection
5. Mark liquid level and label container

### CPM Container 3 – Filter Sample – Petri Dish

1. **CPM filter**
2. Use tweezers and/or disposable surgical gloves to remove CPM filter and place in Petri dish
3. Visual Inspection
4. Label container

### CPM Container 4** – Cold Impinger Water – 500 ml Plastic

1. **Cold impinger that follows the CPM filter**
2. Quantitatively transfer liquid into sample container
3. Visual Inspection
4. Mark liquid level and label container

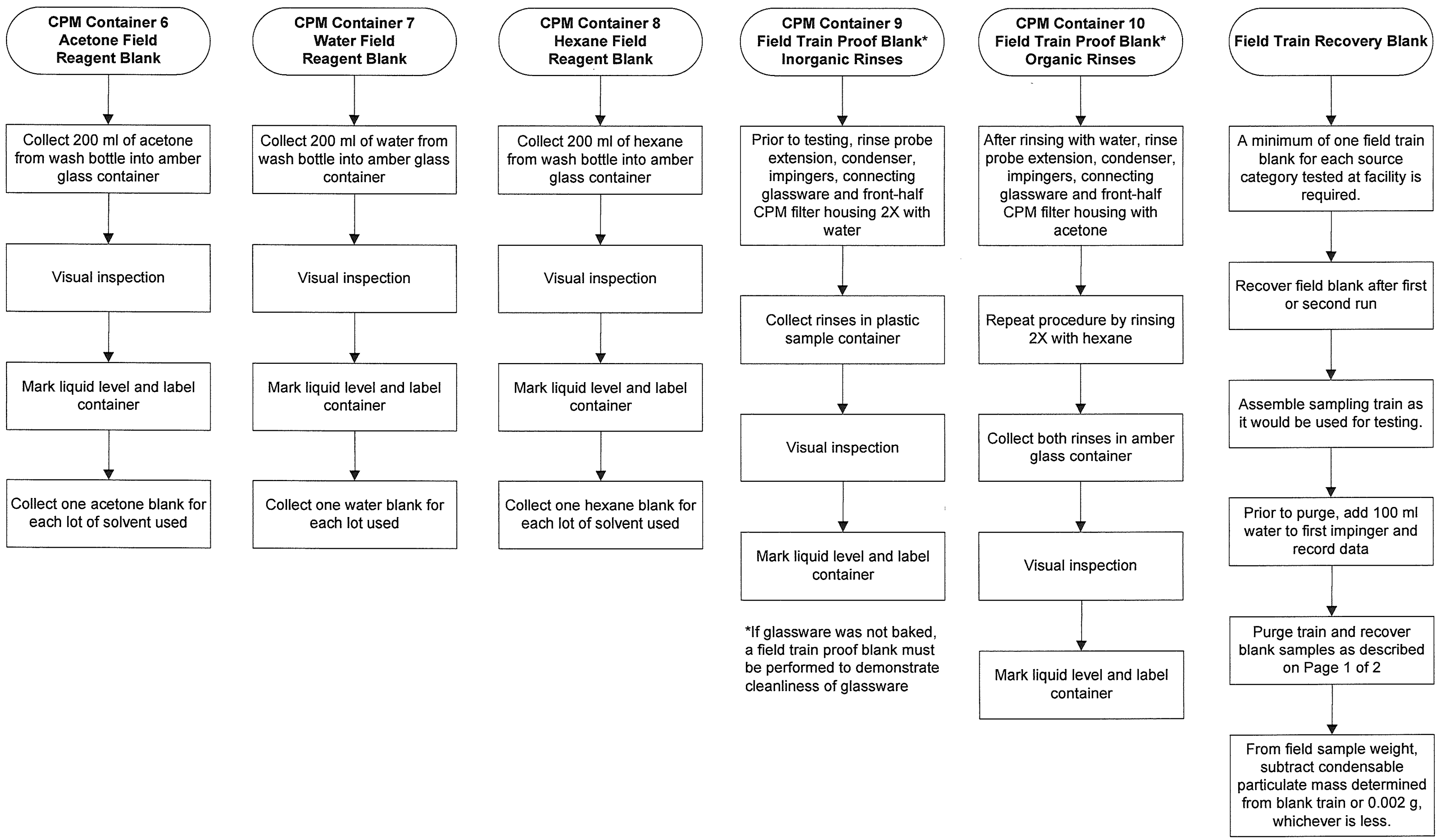
**If the water has been weighed in the field, it can be discarded.

### CPM Container 5 – Silica Gel

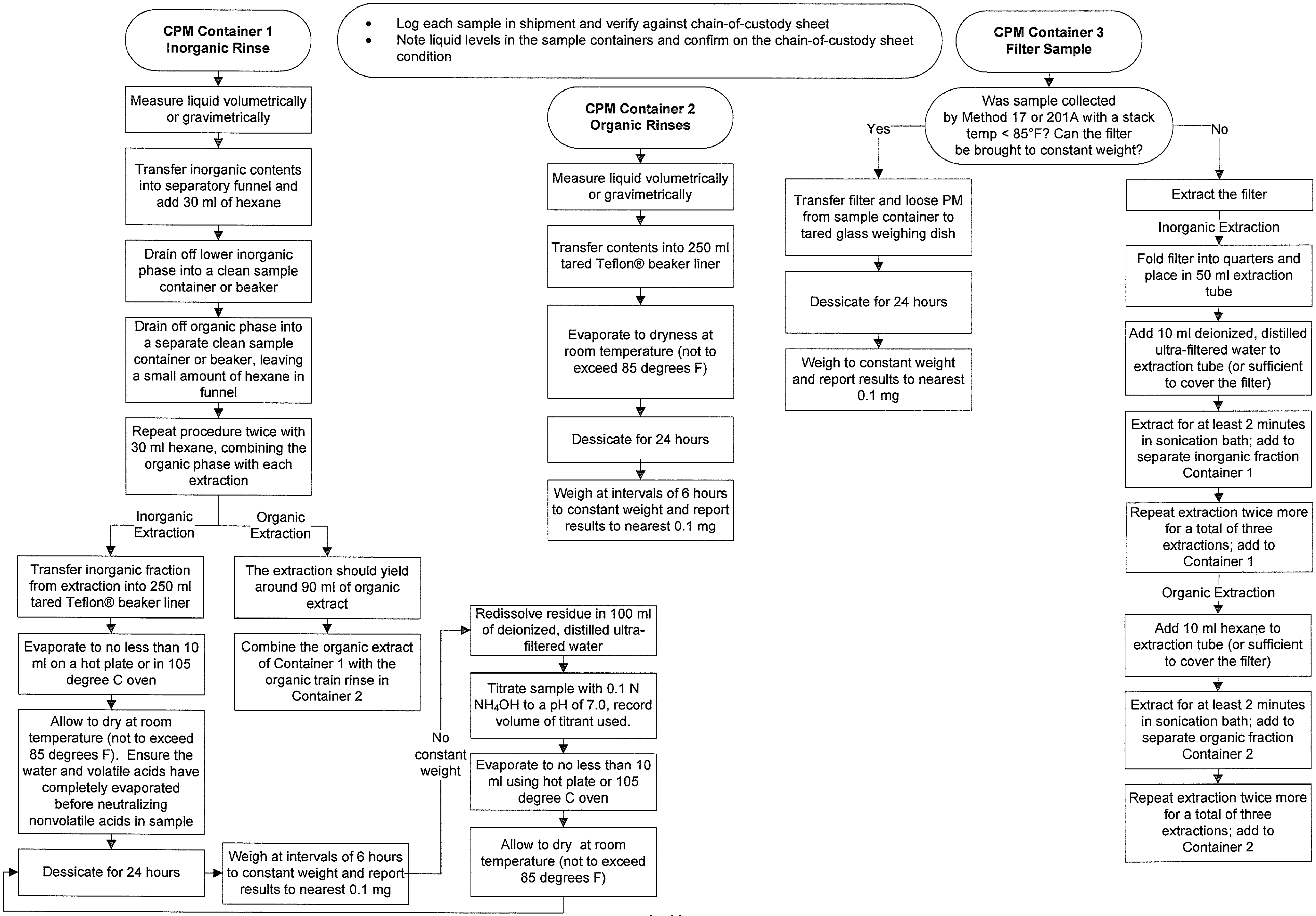
1. Measure volume by weight, note any color change
2. Recycle silica gel

# EPA Method 202
# Sample Recovery Flowchart (2 of 2)

- Tare all sample containers before sample collection
- Mark all liquid levels and final weights on the outside of each sample container
- Seal all sample containers with Teflon tape
- If recycling, bake silica gel for two hours at 350 degrees F (175 degrees C)
- Samples must be maintained at or below 85 degrees F (30 degrees C) during shipping.



# EPA Method 202
# Analytical Flowchart (1 of 2)



# EPA Method 202
# Analytical Flowchart (2 of 2)

- Log each sample in shipment and verify against chain-of-custody sheet
- Note liquid levels in the sample containers and confirm on the chain-of-custody sheet condition

**CPM Container 4* Cold Impinger Water**
↓
Measure liquid volumetrically or gravimetrically

**CPM Container 5* Silica Gel**
↓
Weigh to nearest 0.5 g

*May have been performed in the field during sample recovery

**CPM Container 6 Acetone Field Reagent Blank**
↓
Transfer 150 ml of acetone to 250 ml tared Teflon® beaker liner and evaporate to dryness at room temperature (not to exceed 85 degrees F)
↓
Dessicate for 24 hours
↓
Weigh at intervals of 6 hours to constant weight and report results to nearest 0.1 mg

**CPM Container 7 Water Field Reagent Blank**
↓
Transfer 150 ml of water to 250 ml tared Teflon® beaker liner and evaporate to dryness at room temperature (not to exceed 85 degrees F)
↓
Dessicate for 24 hours
↓
Weigh at intervals of 6 hours to constant weight and report results to nearest 0.1 mg

**CPM Container 8 Hexane Field Reagent Blank**
↓
Transfer 150 ml of hexane to 250 ml tared Teflon® beaker liner and evaporate to dryness at room temperature (not to exceed 85 degrees F)
↓
Dessicate for 24 hours
↓
Weigh at intervals of 6 hours to constant weight and report results to nearest 0.1 mg