UCD CSN Standard Operating Procedure #901

Long-Term Archiving of Filters

Chemical Speciation Network
Air Quality Research Center
University of California, Davis

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1. **PURPOSE AND APPLICABILITY**

This standard operating procedure (SOP) describes the procedure for long-term archiving of samples (Teflon and quartz filters, and extracts of nylon filters) analyzed under the EPA Chemical Speciation Network (CSN) contract.

2. **SUMMARY OF THE METHOD**

Filter samples collected for the CSN network are archived under specific conditions for potential reanalysis. This method describes the documentation and sample handling practices necessary to maintain sample integrity.

3. **DEFINITIONS**

- **Chemical Speciation Network (CSN)**: EPA’s PM$_{2.5}$ sampling network, with sites located primarily in urban areas.

4. **HEALTH AND SAFETY WARNINGS**

Not applicable.

5. **CAUTIONS**

Not applicable.

6. **INTERFERENCES**

Not applicable.

7. **PERSONNEL QUALIFICATIONS, DUTIES, AND TRAINING**

The Air Quality Research Center (AQRC) laboratory staff assigned to this project have been trained on this SOP.

8. **ARCHIVING CONDITIONS**

Quartz and Teflon filters are stored for the life of the contract in Petri slide holders within Petri slide trays. Petri slide trays of filters are placed in heavy-duty zippered plastic bags and stored in refrigerators or cold storage rooms maintained between 0 °C and 4 °C. Quartz and Teflon filters for the current CSN contract are stored in the following locations, refrigerators housed in Jungerman hall, UC Davis Buckeye Cottage, UC Davis Sprocket Building and UC Davis Surge building. The temperature of refrigerators within
Jungerman hall used for storing CSN filters are monitored daily by laboratory staff. The temperature of cold storage rooms located at UC Davis Buckeye Cottage and Sprocket Building are monitored at all hours via a remote alarm system.

8.1 Quartz Filters

Quartz filters for the current CSN contract are stored on the UC Davis campus at Jungerman hall and UC Davis Buckeye Cottage. Quartz filters from previous CSN contracts are stored by UC Davis off-campus at a cold storage facility in Sacramento, California. Full trays are placed in heavy-duty plastic zippered bags and plastic boxes (36 trays per box) for storage in a refrigerated room. Individual filters are located by box number, batch number, tray number and ContractorFilterAnalysisID.

8.2 Teflon Filters

Teflon filters are archived for the life of the contract, sorted by ContractorBatchNumber, IntendedUseDate, ContractorSetNumber, and ContractorFilterAnalysisID into Petri slide trays. Individual filters are located by box number, batch number, tray number, and ContractorFilterAnalysisID.

Teflon filters from the current and previous CSN contracts are stored on-campus at UC Davis. For the first five years (current contract), Teflon filters are housed in Jungerman Hall, UC Davis Sprocket Building and UC Davis Buckeye Cottage. After that time, samples are stored at room temperature in the UC Davis storage facility (Surge Building).

8.3 Nylon Filter Extracts

Nylon filter extracts are archived for six months in extraction vials. They are grouped in laboratory batches, and placed in heavy-duty plastic zippered bags and plastic bins for refrigerated storage maintained at or below 4 °C (but not below freezing).

Filter extracts are stored by the ions analysis laboratory subcontractor (RTI; Research Triangle Park, North Carolina).

9. PROCEDURE FOR ARCHIVING FILTERS

9.1 Sample Shipping and Receiving

Refer to RTI SOP and UCD TI for shipping and receiving:

UCD CSN TI #302B: Receiving and Inventorying of CSN Samples
RTI SOP: Determination of Anions and Cations Extracted from Nylon Filters by Ion Chromatography (IC)

9.2 Generating Archive List

The CSN Archive list is an electronic list of the samples in a Petri tray. The Archive list is filter type specific that includes the following information for each sample; the position number, FilterID, BarcodeID, Intended Use Date, Set, Batch, type, Purpose, Null code, and Manufacturer number (for Teflon filters only).
9.3 Teflon/Carbon Filters – Archive Labels

**Filter Labels:** Filter labels are generated by Wood PLC and correspond to the `ContractorFilterAnalysisID`. Labels have a barcode and text (Figure 1), and may be located on the front or back of the Petri slide.

Figure 1. Filter label (same as `ContractorFilterAnalysisID` and `BarcodeID`).

**Petri Tray Labels:** The laboratory technician prints unique Petri tray labels during the inventory process. The labels include the `ContractorBatchID`, tray number, and QR barcode for each Petri tray (Figure 2). Only the last two digits of the `ContractorBatchID` are used for the label (e.g. A0000019 is Batch 19). To differentiate between Teflon and Quartz trays add “Quartz” to the tray label (e.g. Quartz - B19T1).

Figure 2. Petri tray label.

**Archive Box Labels:** The archive box label includes the box name, the range of trays, and QR barcode (Figure 3). The box range is indicated as `Batch XX Tray XX – Batch XX Tray XX`. To differentiate between Teflon and Quartz boxes, add “Quartz” to the box label (e.g. Quartz- CSN Box 6).

Figure 3. Archive box label.
9.4 Full Trays

Once a tray is full, the TrayID is associated with the box number. Thirty-six trays are assigned to each box number, and a list of trays (including archive date and laboratory technician initials) is generated for each box (Figure 4). Filters remain in trays in the archive boxes until they are logged out or removed (e.g. returned to a state, turned over to EPA, etc.).

Figure 4. Partial Tray list for CSN Box 5.

<table>
<thead>
<tr>
<th>Trays</th>
<th>Trays</th>
<th>Filters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Batch 11 Tray 15</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>Batch 11 Tray 16</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>Batch 11 Tray 17</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>Batch 11 Tray 18</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>Batch 11 Tray 19</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>Batch 11 Tray 20</td>
<td>50</td>
</tr>
<tr>
<td>7</td>
<td>Batch 11 Tray 21</td>
<td>49</td>
</tr>
<tr>
<td>8</td>
<td>Batch 11 Tray 22</td>
<td>50</td>
</tr>
<tr>
<td>9</td>
<td>Batch 11 Tray 23</td>
<td>50</td>
</tr>
<tr>
<td>10</td>
<td>Batch 11 Tray 24</td>
<td>50</td>
</tr>
<tr>
<td>11</td>
<td>Batch 11 Tray 25</td>
<td>50</td>
</tr>
<tr>
<td>12</td>
<td>Batch 11 Tray 26</td>
<td>50</td>
</tr>
<tr>
<td>13</td>
<td>Batch 11 Tray 27</td>
<td>50</td>
</tr>
<tr>
<td>14</td>
<td>Batch 11 Tray 28</td>
<td>50</td>
</tr>
<tr>
<td>15</td>
<td>Batch 12 Tray 1</td>
<td>50</td>
</tr>
<tr>
<td>16</td>
<td>Batch 12 Tray 2</td>
<td>50</td>
</tr>
<tr>
<td>17</td>
<td>Batch 12 Tray 3</td>
<td>50</td>
</tr>
<tr>
<td>18</td>
<td>Batch 12 Tray 4</td>
<td>50</td>
</tr>
</tbody>
</table>

9.5 Transportation Conditions

Pack the Archive box with ice packs to keep the temperature between 0-4 °C during transportation. Remove the ice packs after placing the box in the refrigerator.

10. PROCEDURE FOR REMOVING FILTERS FROM ARCHIVING

10.1 Identify Samples

Samples can be searched in the CSN web app by Filter ID or Barcode ID on the filter details page. The filter detail page shows the box number, batch number, tray number and the position number for a specific sample. Information for retrieving filters is recorded in the CSN Archive form, "U:\IMPROVE_Lab\XRF_Epsilon5\CSN\Filter Archive\CSN_Archive_YYYYMMDD_Template.xlsx".
10.2 Locate Samples

After collecting the electronic information for the sample(s) from the web app the laboratory technician can then retrieve the filter(s) from archive. The CSN Archive form is filled out prior to retrieving samples from archive and is used to assist in physical retrieval of samples. Locate the archive bin containing the sample, locate the tray where the sample is stored and then based on the position retrieve the individual sample. Once samples have been retrieved from archive the CSN Archive form is updated with the date removed and initials.

10.3 Return Samples to Archive

Samples are returned to archive by placing the samples in the correct position, tray and box. The CSN filter archive form used for retrieving samples from archive is utilized for returning filters. Once samples are returned to archive the CSN Archive form is updated with the date returned and initials.

11. EQUIPMENT AND SUPPLIES

Archival of samples makes use of Petri slides, slide trays, and archive bins. These holders are available commercially from multiple scientific product vendors.

12. QUALITY ASSURANCE AND QUALITY CONTROL

Not Applicable.
13. REFERENCES

UCD CSN TI #302B: Receiving and Inventorying of CSN Samples

RTI SOP: Determination of Anions and Cations Extracted from Nylon Filters by Ion Chromatography (IC)