TITLE: Field Shipping and Handling

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1.0 Introduction

1.1 Scope and Applicability

The Filter Shipping and Handling Unit (FiSH) is responsible for the preparation of filter media to be sent to sampling sites in the Chemical Speciation Network (CSN). Filters are prepared, packaged, and shipped from the FiSH to the field sites prior to the scheduled sampling dates. Following the sampling event, the field site returns the filter media to the FiSH, where the filters are removed from their modules and sent to laboratories for analysis.

1.2 Summary of Method

The following procedures will describe the shipping and handling process from the receipt of unexposed filters from vendor to storage of exposed filters prior to shipment to contract analysis laboratories.

1.3 Definitions

EPA	United States Environmental Protection Agency
CF Card	Compact flash card
CSN	EPA PM 2.5 Chemical Speciation Network
FiSH	Wood Filter Shipping and Handling Unit, Newberry, FL
DRI	Desert Research Institute, Reno, NV
QA	Quality Assurance
XRF	X-Ray Fluorescence
NIST	National Institute of Standards and Technology

1.4 Health & Safety Warnings

Employ lifting equipment and other handling aids to eliminate the need to move heavy objects manually. Do not strain to lift any object.

1.5 Cautions

Not following procedures in the established order may result in inaccurate filter records.

1.6 Interferences

Not Applicable.

1.7 Personnel Qualifications/Responsibilities

Personnel should be certified for these procedures by a qualified person following standards set forth in GLO3110-001 *Training Chemical Speciation Network Filter Shipping and Handling Personnel*. Certification shall be documented on the FiSH demonstration of capability form.

1.8 Equipment and Supplies

To perform these procedures, it is necessary to have:

- Access to the CSN front end of the CSN Tracking Database
- CF Card Reader
- Bar Code reader
- Bar Code Printer
- Label Printer (Shipping Room)
- Label Printer (Filter Loading/Unloading Room)
- Two Piece Document Printer
- Normal Document Printer
- CSN UPS shipping computer.
- Powder Free Gloves
- Deionized Water
- Isopropanol
- Kimwipes or equivalent
- SASS Allen Wrench
- SASS cassette opener
- URG cassette opening tool
- 2 sets of nylon forceps
- petri slides.

2.0 Batch Label Printing

This procedure describes printing batches of identification labels, which are used in various parts of sampler processing and shipping. Batch labels are generated by utilizing the CSN Tracking front end of the CSN Database. Printed labels are used for:

- **Component ID:** Applies a unique property number with bar code to each component in use in the CSN program. Used periodically when new components are received, or old label is unreadable. Labels are printed using the Label Printer in the Filter Loading/Unloading Room on 1.5” by 0.75” labels. Labels are generated using “Labels InventoryIDs” report (Figure 1), right click on report, double click black square to access property sheet, double click ellipses on data tab (Figure 3), to open design view enter criteria for which Component ID bar codes need to be applied (Figure 2). Close and Save design, click File>Print and select correct printer “Datamax Label Maker – Lab”, press ok to print. Make sure all bar codes are useable, destroy unusable bar code labels and print replacements.

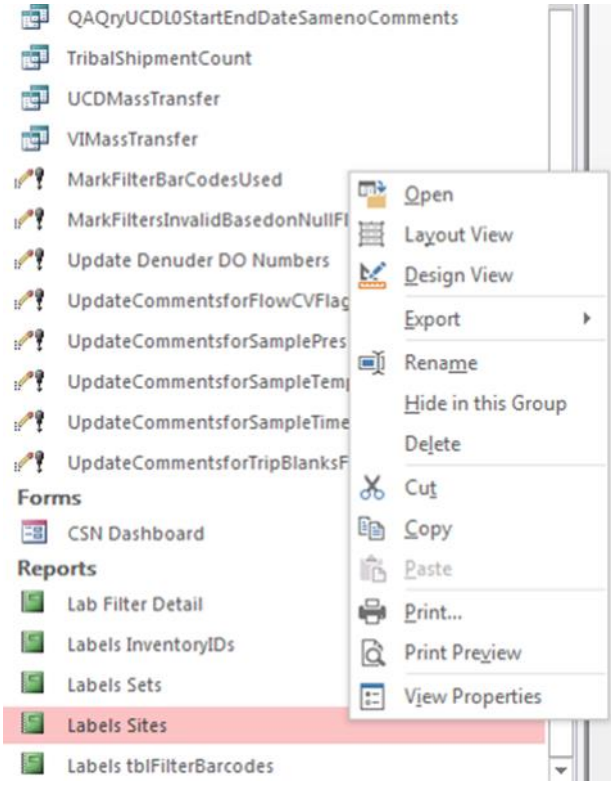


Figure 1. List of reports used to print labels

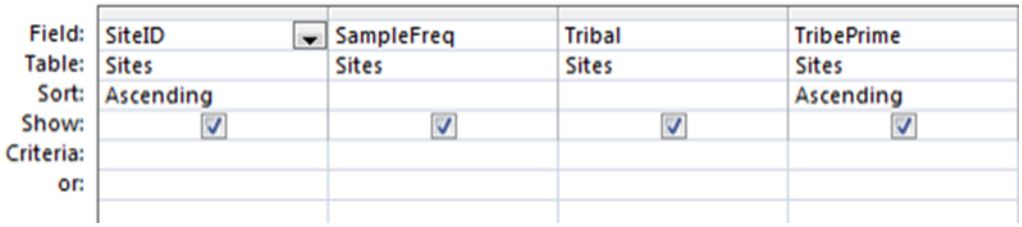


Figure 2. Design View for manipulating label criteria

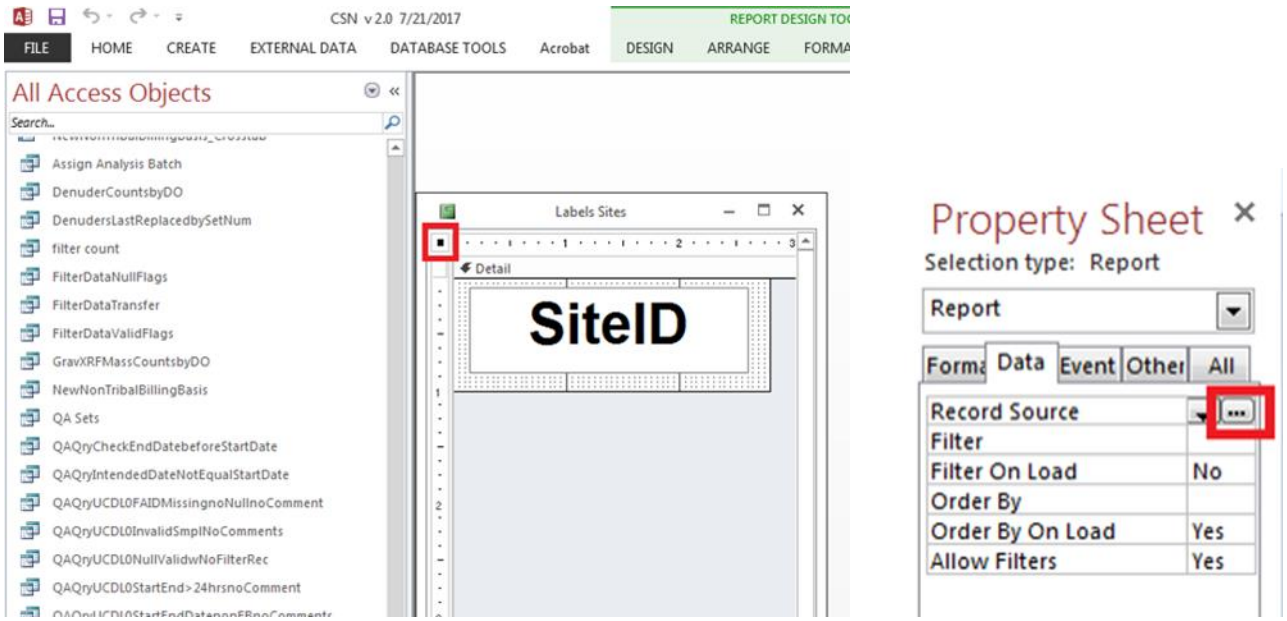


Figure 3. Black Box and Ellipses

- **Filter Analysis ID:** Applies a unique number with bar code to a petri slide which corresponds to each filter prior to analysis. These labels are generated by accessing the CSN Tracking Dashboard. Filter Analysis ID labels are usually printed in batches of 500 at a time, and pre-applied to petri slides for use as needed. Labels are printed using the Label Printer in the Filter Loading/Unloading Room on 1.5" by 0.75" labels. To do this, access the CSN Tracking Dashboard, select "Print Filter ID Barcodes" check that there are 0 total Filter ID labels available (If not 0, click button to "mark all filter barcodes Used"). Proceed to "Generate Filter IDs", click "Generate Filter IDs" button. Enter desired number, click to populate table. Close out, and open "Print Filter ID Barcodes" again, make sure the desired number now shows up as available, then click "Print All Filter Barcodes", this will show a print preview, click Print and select correct printer - "Datamax Label Maker – Lab", press "ok" to print. Make sure all bar codes are useable, destroy unusable bar code labels and print replacements.
- **Site ID:** Applied along with Sample Set labels to the sides of sample shipping boxes as a highly visible way to determine what site each box is from. Labels are printed using Label Printer in Shipping room on 1" by 3" labels. Labels are generated by opening the "Labels Sites" report (Figure 1) on the CSN Tracking Front End (hold shift, double click CSN Tracking Icon), from this point, right click, design view, double click black box and ellipses (Figure 3) which accesses the design view to manipulate criteria (Figure 2), to print labels for all sites of a certain sample frequency, or just a specific site, or labels for all sites. Close view, select Save then select File>Print. For reference, the Sites table with active and inactive sites is located on the QA front end of the database

- **Sample Set:** Applied along with Site ID labels to the sides of sample shipping boxes as a highly visible way to determine what set each box is from. With hundreds of boxes in circulation at any one time this makes searching for boxes more efficient. Labels are printed using Label Printer in Shipping room on 1" by 3" labels. Labels are generated "Labels Sets" report (Figure 1) on the CSN Tracking Front End (hold shift, double click CSN Tracking Icon), from this point, right click, design view, double click black box and ellipses (Figure 3) which accesses the design view to manipulate criteria (Figure 2), which enables printing of labels for all sets or just a specific set. See Figure 4 for a list of active set numbers arranged by sample frequency.
- **After printing, review label stock inventory**, if less than 1 roll of labels remain, alert Program Manager or Purchaser to reorder.

2.1 Quality Control and Quality Assurance

- All Bar Codes shall be unique, if duplicates are found the database is programmed to reject them and pops up a visual cue that the number is a duplicate.
- If bar code labels are not readable by the bar code reader, they shall be reprinted and the original unreadable bar code shall be destroyed.

Active CSN Sets 1-in-6	Active CSN Sets Sequential 1-in-3
1A	1Q
2A	2Q
3A	3Q
4A	4Q
5A	5Q
6A	6Q
7A(Field Blank)	7Q
	8Q(Field Blank)

Figure 4. Active CSN Set Numbers

3.0 Log-In Parts to database

3.1 Summary of Task

This procedure describes receipt of incoming sampler accessory parts from clients.

3.2 Procedure

1. Receive package with parts. Verify that all components shipped to the FiSH are present in the shipment. If parts are missing immediately notify the Program Manager to follow up with the shipper to determine if the shipment is incomplete or was lost during shipping.
2. Identify and assign an inventory number to each component in the shipment. The list of current inventory numbers is located in the CSN Tracking database in the “InventoryList” table (see Figure 5). New inventory IDs can be generated by the Program Manager or Database Manager and added to the “InventoryList” table prior to printing bar code labels (see section 1.9.1.1) to attach to each component.

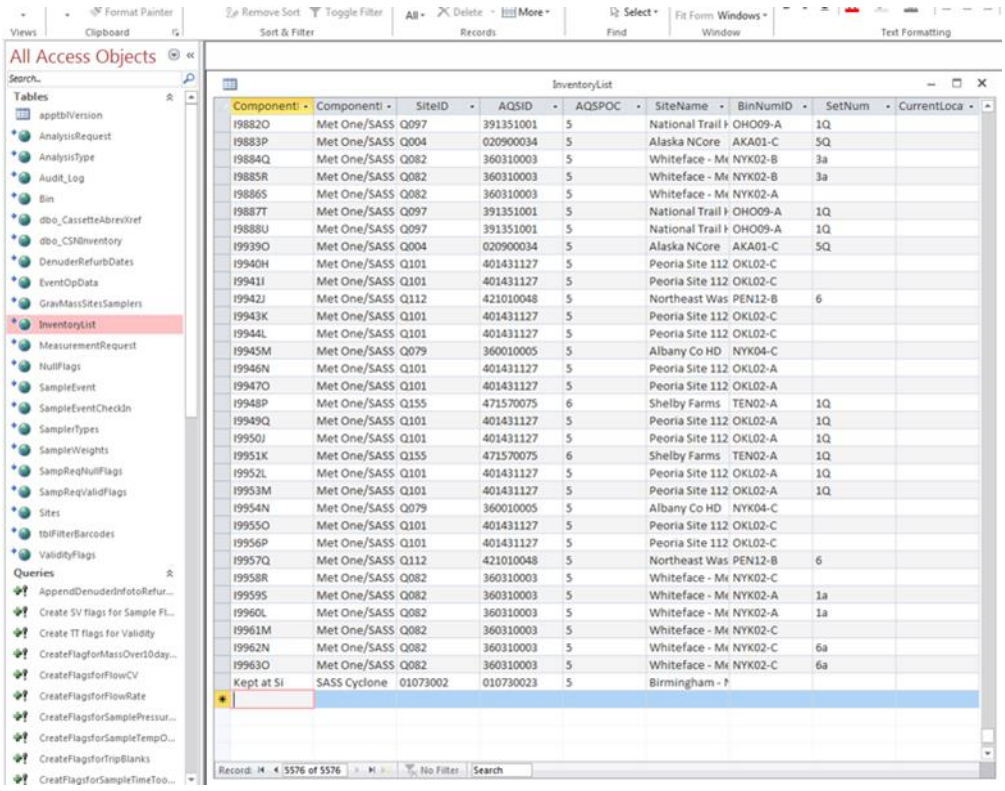


Figure 5. Inventory List

3. Disassemble each module and verify that all parts are included. If not, notify the Program Manager for follow up and resolution.
4. Enter inventory information into the “InventoryList” table in the database.

5. Label each component with an Inventory Label. (see Figure 6)
6. Color code each SASS module by affixing a colored dot to the module (if applicable) Red for Nylon, Green for Teflon. (see Figure 6)
7. If a component will immediately be assigned to a site, place it into the corresponding site bin. If not immediately assigned, store the component in the unassigned inventory bin, organized by component type, located in shipping room.
8. If the module is placed in a site bin, locate bin in Shipping room (for 1-in-6 sites) or Filter Loading room (Sequential and 1-in-3 sites).

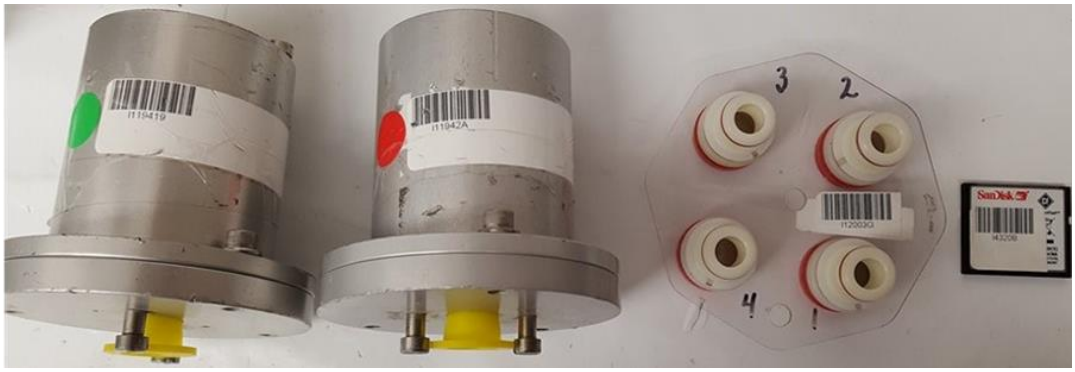


Figure 6. CSN Components with labeling system

3.2.1 Quality Control and Quality Assurance

The CSN tracking database performs automated checks to track components to ensure that they aren't erroneously recorded as being in two places at one time. Each component in field use is assigned to a bin within the site on the inventory list.

4.0 Filter Types and Handling

4.1 Summary of Task

This section describes in general terms the care and handling of filters in the FiSH. Wear gloves when handling filters and modules.

4.2 Care and Handling

1. Filters that may be handled in the FiSH include: Teflon, Nylon, and Quartz (Figure 7).
2. Before assembling modules with clean filters, examine filters for tears, holes, etc. If any are damaged, discard the filter. Wear gloves when handling filters and modules. Use nylon forceps when handling the filters. In order to prevent dust from Quartz being transferred to Nylon or Teflon filters, two sets of forceps are to be used. One set for quartz only and one set for Teflon and nylon.
3. Filters will be pretreated in the laboratories prior to being received in the FiSH.
   a. Teflon filters are equilibrated at a constant temperature and humidity, and a specified amount of Teflon filters will be pre-weighed for use in gravimetric analyses.

b. Quartz filters are pre-fired at high temperature by DRI to remove any carbon. This step is performed during the acceptance testing.

4. Post treatment of filters following sampling will be done in the FiSH and the analytical laboratories.
   a. Teflon filters that require gravimetric analysis are post-treated by equilibrating in a temperature- and humidity-controlled room followed by reweighing those filters that were pre-weighed prior to field sampling. This procedure is described in SOP GLM3180-009. Teflon filters which have completed gravimetric analysis shall be kept refrigerated before further analysis (if GravXRF) or archiving (if GravMass).
   b. Quartz filters are kept frozen in Freezer 1 located in the FiSH “Red Room” prior to analysis. This freezer is checked for temperature using a NIST traceable thermometer on a daily basis and recorded on the Freezer Temperature Log (Freezer 2 is not logged for temperature and thus should only be used to freeze ice packs for analysis batch shipment).
   c. Teflon filters needing XRF analysis along with all Nylon filters are kept refrigerated in the cooler in the FiSH Shipping Room before analyzing. This cooler is checked for temperature using a NIST traceable thermometer on a daily basis and recorded on the Cooler Temperature Log.
5. Orientation and appearance of filter types (Figure 7):
   a. Teflon filters have an outer ring and an inner delicate Teflon membrane. The filter top will curve down. Teflon filters have a unique identifying number stamped on the edge of the filter.
   b. Nylon filters are thin, curved filters with no outer ring. Both sides appear the same. Place these filters in the holders such that the curved downside of the filter collects the particulate matter.
   c. Quartz filters are thicker than Teflon filters with no outer ring. The top has a bumpy texture, and the bottom has a grid pattern. Quartz filters are smaller than either nylon or Teflon (25 mm vs 47 mm).
6. Handling of Filter types (always use nylon forceps and gloves):
   a. Teflon – pick up using forceps grasping the ring because the inner Teflon tears easily.
   b. Quartz and Nylon – pick up filter using forceps on outer portion of filter making sure not to damage filter.

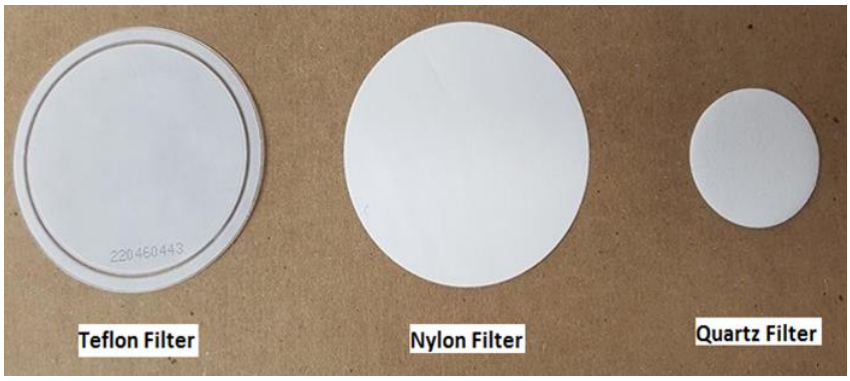


Figure 7. Filter Types

5.0 Receiving Acceptance Tested Filters from Contract Laboratory

5.1 Summary of Task

This procedure details the receipt of acceptance tested filters from the analytical laboratory performing the acceptance testing. For this contract, only nylon filters and quartz filters are acceptance tested.

5.2 Quartz Filter Procedure

1. Quartz filters are acceptance tested and pre-fired by DRI. DRI ships sets of filters to Wood in small Igloo type cooler. Upon receipt of the cooler, verify that the package received is intended for the FISH.
2. Inspect the package for damage. If any damage has occurred during shipment, set aside and report to Program Manager.
3. Maintain any freezer packs in the packaging (cooler) for return to DRI.
4. Compare the filters to the custody form or packing list, if included. Note any discrepancies. Sign and date the custody form or packing list, acknowledging receipt of the package contents.
5. The Quality Specialist reviews the acceptance testing data provided by DRI. Values for OC, EC, and TC are checked against the acceptance criteria in the QAPP (OC Acceptance Test <1.5 µg/cm2, EC Acceptance Test <0.5 µg/cm2, TC Acceptance Test <2.0 µg/cm2). Sucrose values should fall between 17.1 – 18.9 µg C/filter and System Blanks must be <2.0 µg/cm2 as stated in the QAPP.
6. The Quality Specialist produces a Quality Audit Report for each batch of acceptance testing data and stores the report on the CSN SharePoint site.
7. Scan the packing list and store on the server in assigned directory located on the <Z:\Filter Acceptance Testing\Base Year\Quartz>. Files are named in the following format YYYYMMDD.
8. Store all filters in Freezer 1 in the FiSH “Red Room” until ready for use.

5.3 Nylon Filter Procedure

1. Nylon filters are acceptance tested by Wood. Nylon filters batches are delivered to the Wood laboratory upon receipt from the vendor. The Wood laboratory records the batch number of each batch of filters received in the filter acceptance testing file of the local network. Acceptance testing is then performed according to SOP GLM3180-010.
2. Results of all acceptance testing is provided to the Program Manager in spreadsheet format. The spreadsheets containing results of the acceptance testing are stored in the CSN directory on Wood’s file server.
3. Filter lots that have successfully passed the acceptance testing are stored in the CSN cold room until ready for use.

6.0 Prepare Sampler Modules for Shipment

6.1 Summary of Task

This procedure describes the assembly of sampler modules prior to shipment. Details specific to individual sampling modules are covered in separate sections of this procedure. Wear gloves when handling filters and modules.

6.2 Procedure

1. Schedule work for processing period by performing the following steps
   a) Open CSNTrackingv2SQL
   b) Click “Run Sample Event Creation Form” from the Prepare Sampling Events tab of CSN Dashboard.
   c) Enter Sampling Date, Sampling Frequency and Sampler Type, then click to “Create Events” (Figure 8).
   d) This must be done for each sampler type, SASS, URG, Tribal, Field Blank, Trip Blank. Making sure to check box for GravMass sites. Ensure the proper number of sample events have been created. If not, alert Program or Database Manager to rectify the issue.
   e) Close “Sample Event Creation Form” dialog box.
   f) Open “Generate/Print Measurement Requests”.
   g) Click to “Generate or Print Measurement Requests” (Figure 9).

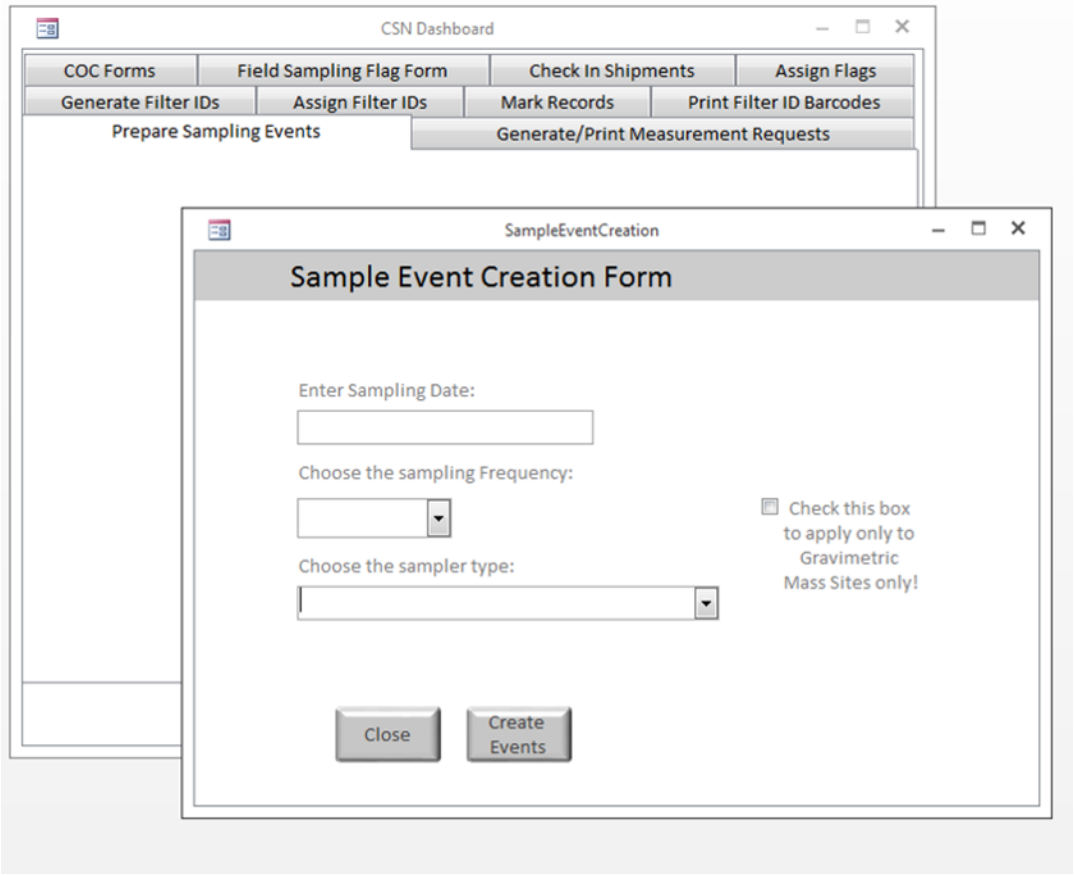


Figure 8. Sample Event Creation Form

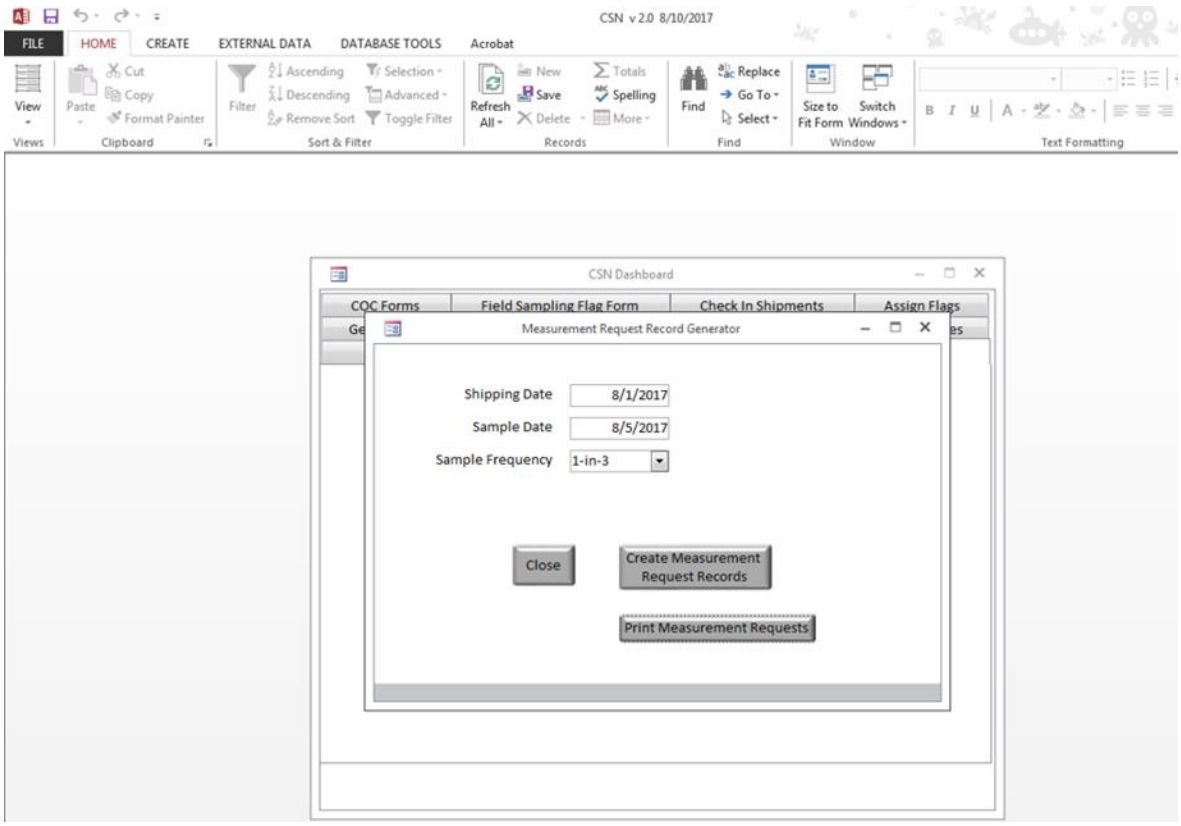


Figure 9. Generate and Print Measurement Request

h) Insert Shipping Date, Sample Date and Sample Frequency, then click “Create Measurement Requests”. Ensure that correct number of Measurement Requests have been created. If not alert Program or Database Manager to rectify the issue.
i) Follow this by clicking “Print Measurement Requests”, this will bring you to the print preview screen.
j) Click File, then Print to selected printer. This will print the measurement requests for the specific frequency “set” for a specific intended sample date.
k) For Tribal GravMass sites, you must run steps h-j again with the Tribal Sites Only box checked.
l) Close Print Preview and Measurement Request screen.
m) Distribute printed Measurement Request forms to FiSH technicians as assigned (Figure 10).

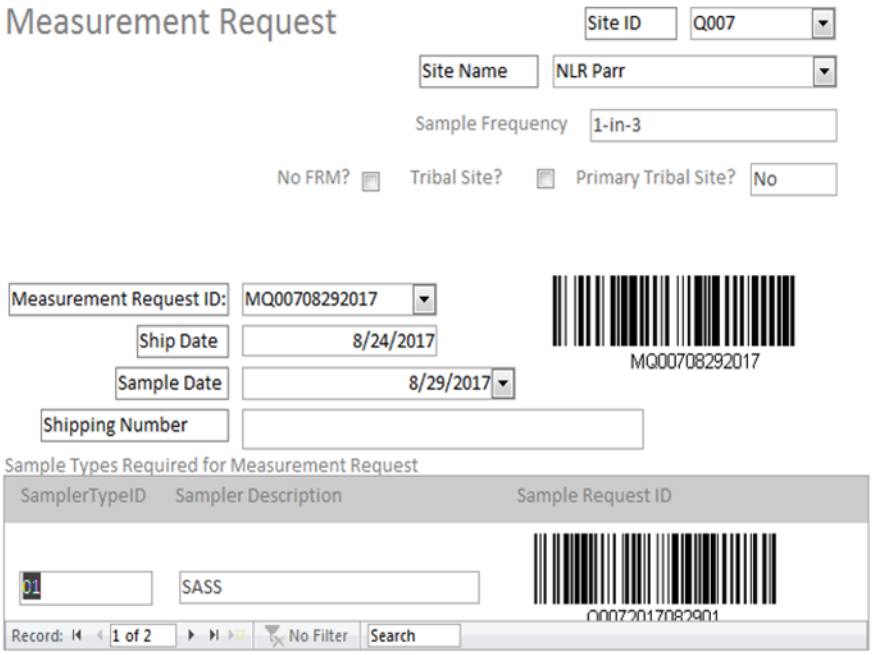


Figure 10. Measurement Request Form

2. Assemble each module, placing the correct filter/filters in each module type listed on Measurement Request Form. Specific assembly instructions for each module type are covered below.
   a. MET ONE (SASS) Module Assembly
      i. Place the disassembled MET ONE modules (for Teflon and nylon filters – Figures 14 and 15) on Bytac counter protector film in front of you and place the base of the module into the white module holder or on a clean space on the table in front of you. If using the module holder, place the MET ONE module into the holder by placing the two long screws at the bottom of the module into the two holes on the module holder.
      ii. Ascertain module filter media content by the colored dot on the module and/or by the inventory code number listed on the electronic FSCOC in the database. The sample event ID code (Q number) can be scanned into the "find" function of the MS Access database to locate the correct MET ONE/SASS FSCOC. Entry of the bin number into the electronic FSCOC will provide a list of inventory IDs to choose from (see Database Operations SOP GLO3180-044). Selecting the correct module inventory ID will enter the data into the FSCOC. Enter Set #, Technician Name, and Lab Out date.
      iii. Enter the channel # (Figure 11), Component ID# and then Record the Unique Filter ID (Teflon only, printed on the filter) and the batch number of each filter on the Filter ID Input Form (Figure 12) in the MS Access database. This form opens when the module inventory ID is selected on the appropriate FSCOC form. Record Channel 2 for the nylon filter and record batch/lot number.

Channel # Filter type	Sequential 1-in-3 Day Set #	1-in-6 Day Set #
Channel 1 Teflon	1Q, 3Q, 5Q, 7Q	1a, 2a, 3a, 4a, 5a, 6a
Channel 2 Nylon	1Q, 3Q, 5Q, 7Q	1a, 2a, 3a, 4a, 5a, 6a
Channel 3 Teflon	8Q Field Blank	7a Field Blank
Channel 4 Nylon	8Q Field Blank	7a Field Blank
Channel 5 Teflon	2Q, 4Q, 6Q	Not used
Channel 6 Nylon	2Q, 4Q, 6Q	Not used

Figure 11. Example Channel Number and Component ID

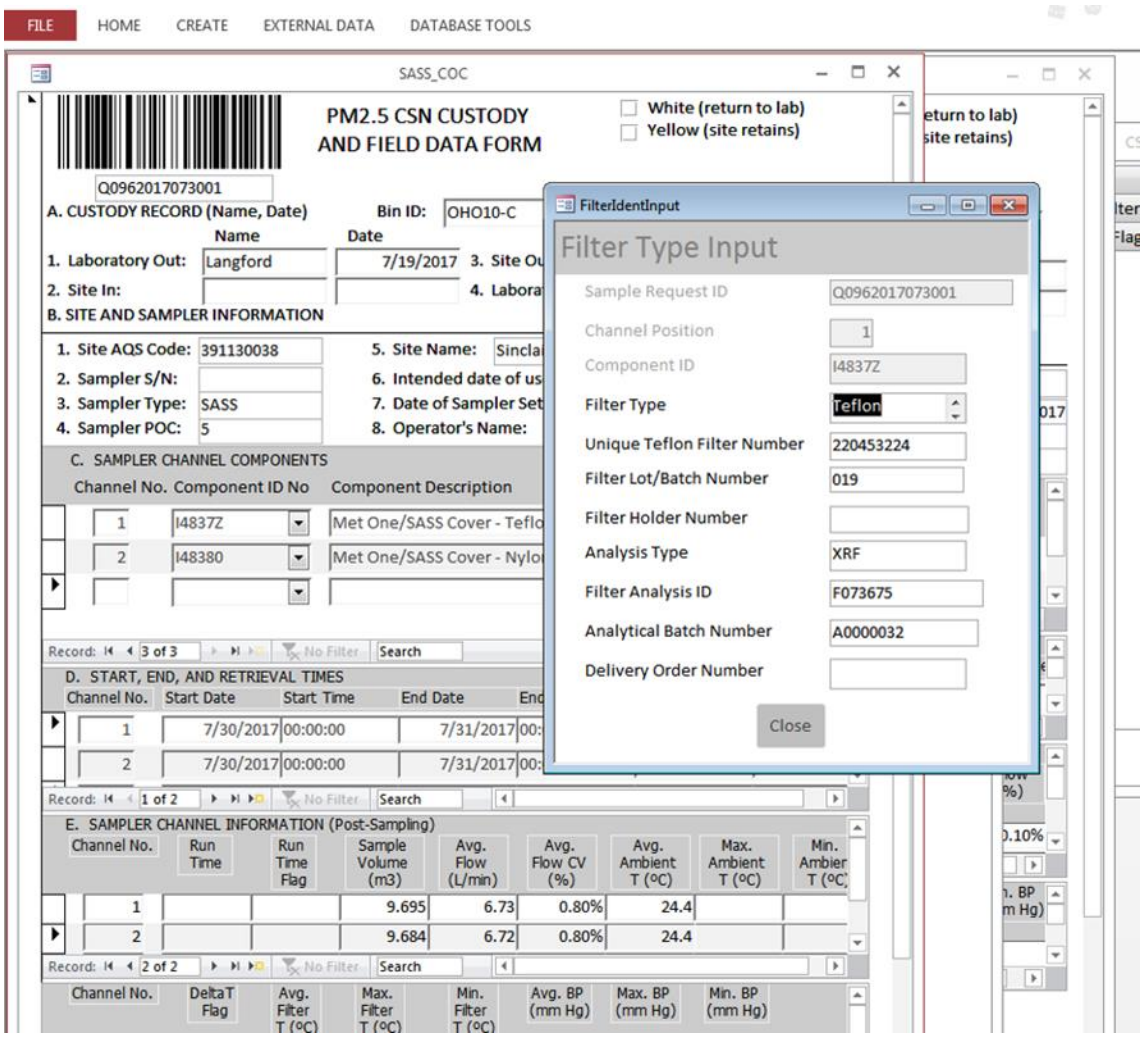
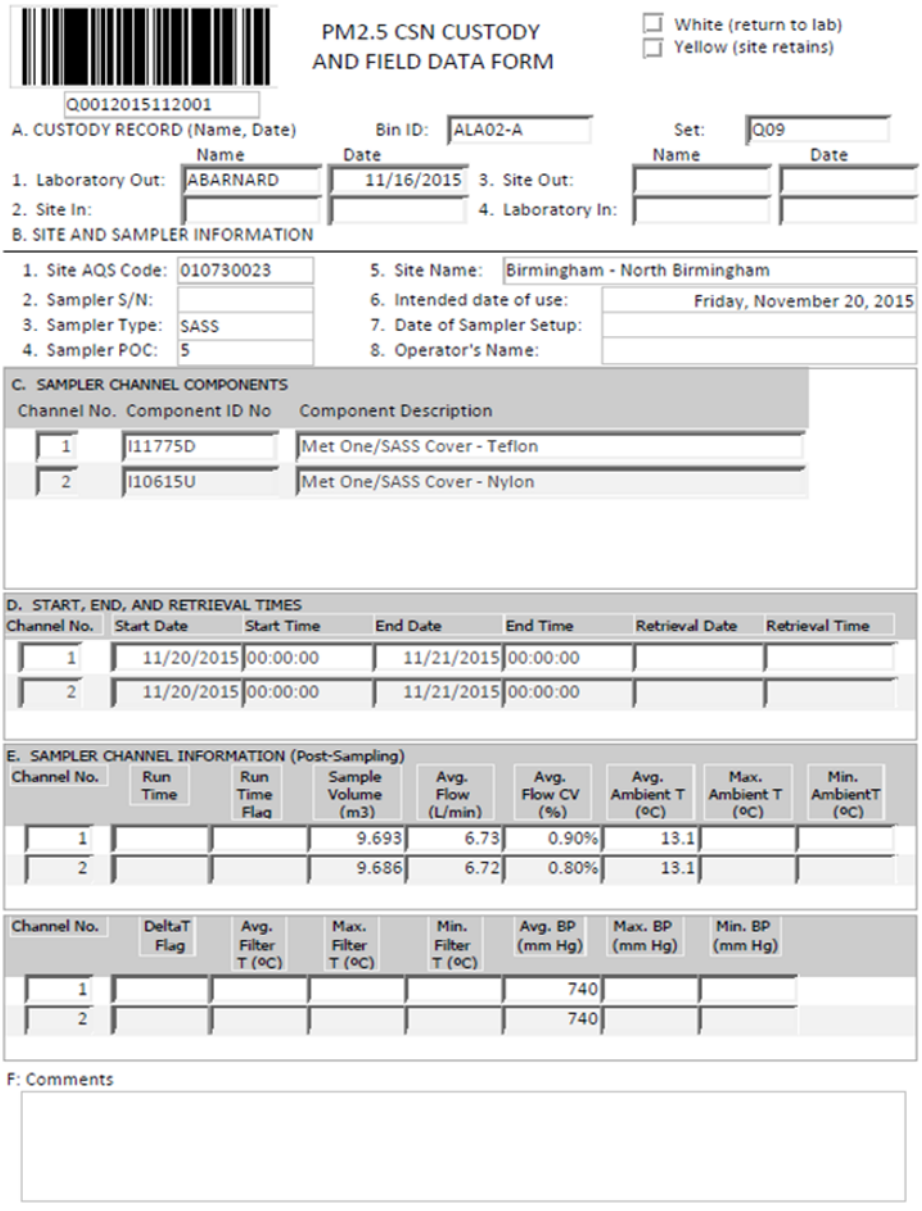


Figure 12. Filter Type Input Form

iv. Print SASS FSCOC (Figure 13)
v. If loading filters directly after unloading operations, clean each module according to the cleaning procedure detailed in Section 9.0 Module Cleaning and Drying.



PM2.5 CSN CUSTODY AND FIELD DATA FORM

☐ White (return to lab)
☐ Yellow (site retains)

Q00120151120O1

A. CUSTODY RECORD (Name, Date) Bin ID: ALA02-A Set: Q09

	Name	Date		Name	Date
1. Laboratory Out:	ABARNARD	11/16/2015	3. Site Out:		
2. Site In:			4. Laboratory In:		

B. SITE AND SAMPLER INFORMATION

1. Site AQS Code:	010730023	5. Site Name:	Birmingham - North Birmingham
2. Sampler S/N:		6. Intended date of use:	Friday, November 20, 2015
3. Sampler Type:	SASS	7. Date of Sampler Setup:	
4. Sampler POC:	5	8. Operator's Name:	

C. SAMPLER CHANNEL COMPONENTS

Channel No.	Component ID No	Component Description
1	I11775D	Met One/SASS Cover - Teflon
2	I10615U	Met One/SASS Cover - Nylon

D. START, END, AND RETRIEVAL TIMES

Channel No.	Start Date	Start Time	End Date	End Time	Retrieval Date	Retrieval Time
1	11/20/2015	00:00:00	11/21/2015	00:00:00		
2	11/20/2015	00:00:00	11/21/2015	00:00:00		

E. SAMPLER CHANNEL INFORMATION (Post-Sampling)

Channel No.	Run Time	Run Time Flag	Sample Volume (m3)	Avg. Flow (L/min)	Avg. Flow CV (%)	Avg. Ambient T (ºC)	Max. Ambient T (ºC)	Min. AmbientT (ºC)
1			9.693	6.73	0.90%	13.1		
2			9.686	6.72	0.80%	13.1		

Channel No.	DeltaT Flag	Avg. Filter T (ºC)	Max. Filter T (ºC)	Min. Filter T (ºC)	Avg. BP (mm Hg)	Max. BP (mm Hg)	Min. BP (mm Hg)
1					740		
2					740		

F: Comments

Figure 13. SASS FSCOC Screen

vi. Place the space holding cassette back in the base of SASS Module (Figures 14 and 15).
vii. Place the metal spacer piece on top of it.
viii. Open the filter holder cassette (if not already open due to unloading operations) and place the appropriate filter on top of the screen, using tweezers. Securely close the ring and place it on the spacer.
ix. Place the empty metal ring or the denuder on top of the cassette with filter.
x. Finally, place the metal MET ONE SASS covering over the pieces lining it up in the same direction it was taken off.
xi. Tighten all the screws half way down then all the way down securely (Figure 16). This is done to make sure the module is closed evenly to prevent leaks during sampling.
xii. Place the module in a clean resealable plastic bag.

b. URG 3000N Cartridge Assembly
i. Place the URG 3000N filter holder cassette on a clean work surface for assembly.
ii. If not already removed, remove the red caps and open the filter cassette using the URG cassette opening tool (Figure 17), if not already open from an unloading operation (Figure 18). If not already cleaned, clean the filter cassette and support screen. Allow all parts to air dry completely. (See cleaning instructions in Section 10.0 Module Cleaning and Drying). While the parts are drying, format the CF card so that it is ready to be written to during the sampling event. This is accomplished by inserting the card into the CF card reader, deleting old files and re-formatting the card.
iii. The sample event ID code (Q number) can be scanned into the “find” function of the MS Access database to locate the correct URG FSCOC. Entry of the bin number into the electronic FSCOC will provide a list of inventory IDs to choose from (see Database Operations SOP GLO3180-044). Selecting the correct module inventory ID will enter the data into the FSCOC.
iv. Record the batch number for the quartz filter(s). Multiple filters may be required for URG blanks but will have separate FSCOC forms.
v. Carefully insert a quartz filter texture side down on the bottom ring for each channel to be sampled on the cassette using tweezers. Gloves should be used at all times during this procedure.
vi. Place the red caps back onto each inlet on the cassette.
vii. Close each channel by firmly pressing cassette parts together with red cap on bottom.
viii. URG filter cassette and freshly formatted CF card are wrapped in bubble wrap and placed in a clean, resealable plastic bag for shipment back to the field sampling site.

Figure 14. Nylon SASS Exploded View

Figure 15. Teflon SASS Exploded View

Figure 16. SASS Module with Wrench

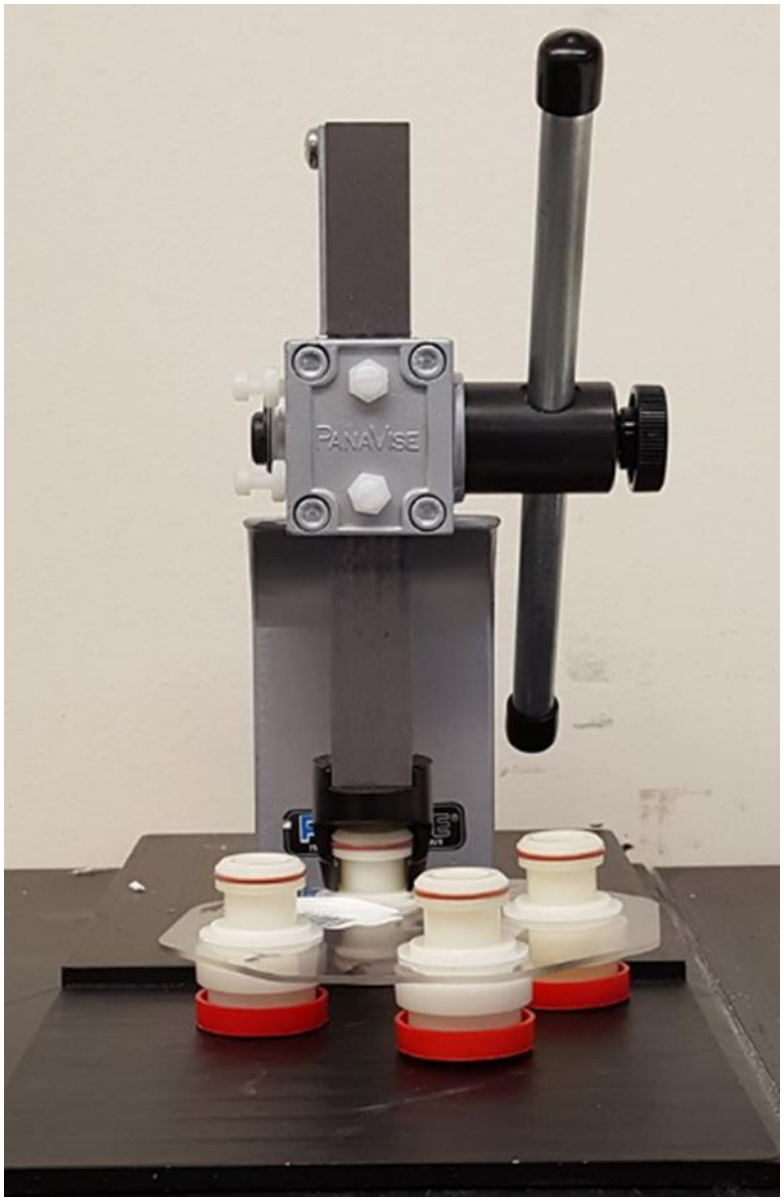


Figure 17. URG Cassette Opening Tool

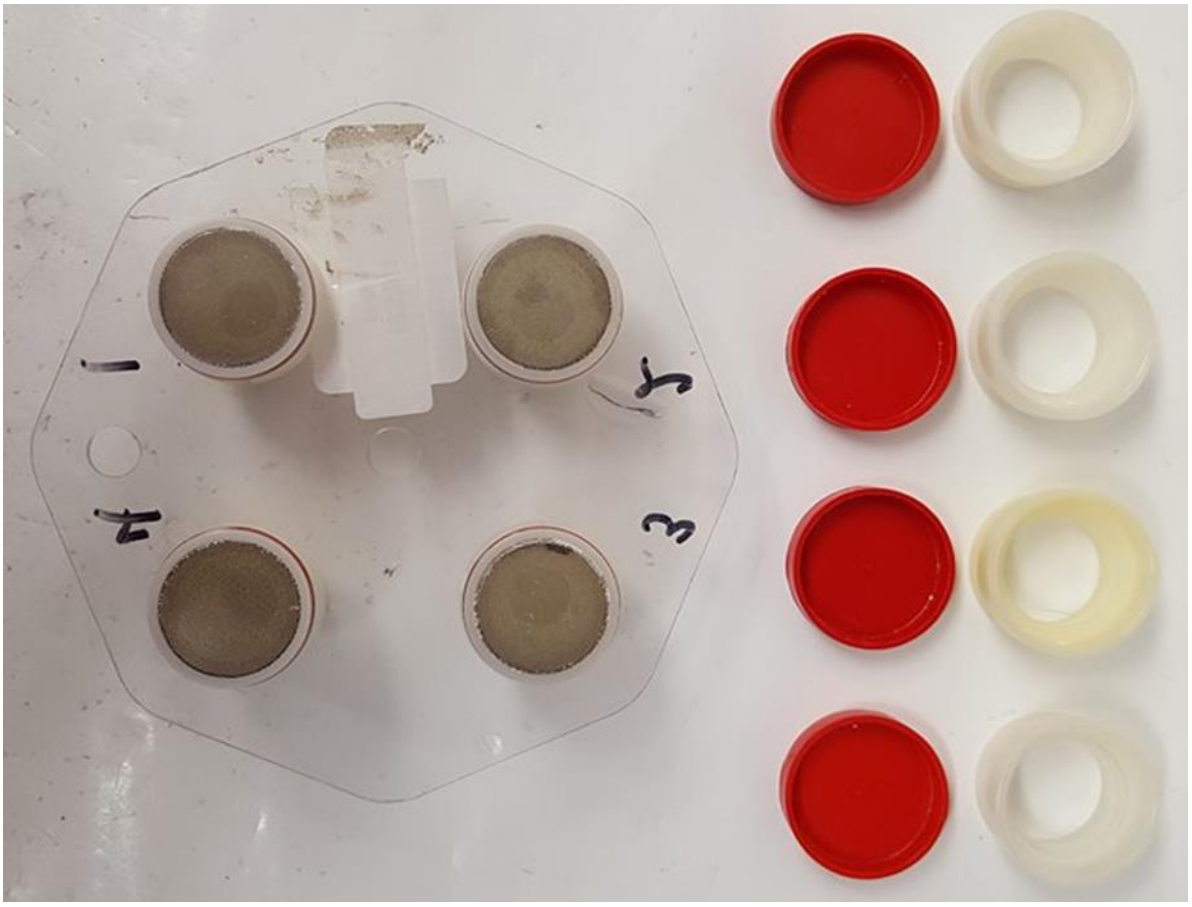


Figure 18. Exploded View of URG Cassette

c. Andersen (RAAS 2.5-400) Cassette Assembly
    i. Place the open Andersen Cassette (Figure 19) on a clean work area for assembly.
    ii. Remove metal lid pieces.
    iii. If not already open, use the appropriate cassette opening tool to open them (Figure 27).
    iv. Clean each part of the Andersen filter holder module. Allow all pieces to air dry completely.
    v. The sample event ID code (Q number) can be scanned into the “find” function of the MS Access database to locate the correct TAMS/FRM FSCOC. Entry of the bin number into the electronic FSCOC will provide a list of inventory IDs to choose from (see Database Operations SOP GLO3180-044). Selecting the correct module inventory ID will enter the data into the FSCOC.
    vi. Record the specific filter ID (printed on the filter) and the batch number of all Teflon filters on the Filter ID Input Form in the MS Access database. These modules require preweighed filters. This form opens when the module inventory ID is selected on the appropriate FSCOC form. Carefully insert a Teflon filter on the

bottom ring of the cassette using tweezers. Gloves should be used at all times during this procedure. Place the top half of the holder onto the filter and close tightly. (Note: Unique Filter IDs will pop up a visual cue if there is a duplicate number. Follow on screen directions and report to Program Manager or Database Manager).

Figure 19. Anderson Cassette

3. Package the assembled module/cassette in the shipping box. The shipping box is an insulated container designed to keep contents cold when packed with frozen ice packs. Each shipping box is marked with the site ID and set number ID.
4. Complete the Field Sampling Null Value and Validity Coding Form for this sampling event. Electronically sign/date the FSCOC Form, transferring custody to receiving party.
5. Print FSCOC form. Print a Field Sampling Null Value and Validity Coding Form for this sampling event.
6. Place the FSCOC and Field Sampling Null Value and Validity Coding Form in the shipping box. The documents will be placed on top of the modules in a resealable plastic bag, clearly visible to the person receiving the shipment, with the date of the sampling event prominently displayed on the top of the form.
7. Check the contents of the package using the FiSH Cooler Checklist (Figure 20) to verify that the contents are correct. Correct any problems before proceeding.
8. QA of the set will be performed by one of the FiSH technicians, by clicking on the QA Sets button in the CSN QA dashboard (Figure 22). Clicking on the button opens the QA sets form shown in Figure 23.

In order to QA outgoing shipments to field sites, to make sure that all filter information is correct, that all channel associations are correct and to ensure that the correct number of sites are included, the user should perform the following steps:

a) Select either SASS or URG sampler type using the radio buttons for choosing the sampler type
b) Choose the set number to be checked from the Set number combo box
c) Choose the intended use date (the most current date will appear first in the combo box) – NOTE: When the set number is specified a date will show in this combo box, however it needs to be selected in order to highlight it and ensure that the actual date is selected.
d) Once the date is selected the channels available for the sampler type, set number and date will appear on the channel number combo box. Choose the one that you want to evaluate.
e) Once the sampler type, set number, intended use date and channel have been selected, click the QA Sets button. The button will run a query with the parameters specified for the selected items. Once the query is run, it will appear on screen. The user can then visually inspect the values and correct (if necessary) any values that appear to be incorrect.
f) Once the data reviewer has determined that all the values are correct they can close the query window by clicking on the X in the upper right corner of the query window.
g) Additional sets can be evaluated using the same process outlined in steps a through e inclusive.
h) Once all sets have been quality checked, the QA Sets form can be closed by clicking on the close button which will return the user to the QA dashboard.
i) Document all steps performed on the set QA Checklist (Figure 21).

9. Package the shipping box with 5 ice packs placed between large shipment bag and foam insulation, which protects from ice pack leakage.
10. Shipping information will be generated by clicking on the Create UPS Shipping Text File button in the CSN MS Access database application and then entering the information related to the sampling frequency, the sample date and whether or not the shipment is for Tribal sites as well as the folder and name of the file. The text file generated is then copied to a USB memory stick and imported into the UPS shipping computer for use in the UPS shipping program. Shipping status can then be tracked using the UPS shipping computer. The UPS computer is used to print all shipping labels (both outgoing and return).
11. After the box has been checked and the inspection completed satisfactorily, place the return shipping label in the box for each site/sample event and then securely tape the cooler and attach the outgoing shipping air bill.
12. Place the box in the designated area for outgoing shipments.

FiSH COOLER CHECKLIST

- ☐ **Sampling date, Site name and "Q" number(s) on custody form match with those on the Measurement request(s).**
- ☐ **Site indicated on Custody form agrees with airbill shipping address.**
- ☐ Compare outgoing airbill to return airbill. Both airbills show the same "Q" number.
- ☐ Custody form(s), Flag validation form(s), Operator instructions, and any extra information is included in shipment.
- ☐ Custody form(s) is/are signed (printed)/dated in Section A, #1 "Laboratory Out".
- ☐ Modules in bin are correct type of module as indicated on Custody form(s).
- ☐ Correct numbers of modules are in bin. Memory card is included if needed.
    - Routine CSN – SASS modules – 2, URG- 1 modules, one memory card
    - Routine CSN blanks – SASS modules – 2, URG – 1 module (position 4)
    - Sequential 1-in-3 – SASS Modules – 2 in each box, URG – 1 with 2 filters in Open First box (3rd filter in position 4 if blank week), memory card – separate COC in each box, blank COC in Open First box
    - Tribal – One 47mm filter module unless Tribal Primary site, then 3 47 mm filter modules (field blank, trip blank, sample) – Tribal Primary will need THREE COC forms, one for each
- ☐ Correct number of freeze packs in cooler. (6 in winter, 8 during summer months)
- ☐ All packing materials are present.
- ☐ All modules and icepacks are placed in ziplock bags
- ☐ Every Ziplock bag is in good condition.

Measurement request number: _____

Inspected by: _____

Date: _____

Figure 20. FiSH Cooler Checklist

Set:
Intended Use Date:
Q&A Completed By:

Q&A of Outgoing Set Check List

- ☐ **Teflon**
- ☐ # of entries match # of boxes per set type
- ☐ Correct set # for all entries
- ☐ Correct channel position
- ☐ Each entry has a component id # associated with it
- ☐ Ship out lab name spelled correctly
- ☐ Lot # is correct for all entries (compare against filter lot list on akea drive)
- ☐ Unique Teflon filter # is entered correctly
    - Should go in ascending order per ship out lab name (ex. 220454826, 220454827)
- ☐ **Nylon**
- ☐ # of entries match # of boxes per set type
- ☐ Correct set # for all entries
- ☐ Correct channel position
- ☐ Each entry has a component id # associated with it
- ☐ Ship out lab name spelled correctly
- ☐ Lot # is correct for all entries (compare against filter lot list on akea drive)
- ☐ **Memory card**
- ☐ # of entries match # of boxes per set type
- ☐ Correct set # for all entries
- ☐ Correct channel position
- ☐ Each entry has a component id # associated with it
- ☐ Ship out lab name spelled correctly
- ☐ **Quartz**
- ☐ # of entries match # of boxes per set type
- ☐ Correct set # for all entries
- ☐ Correct channel position
- ☐ Each entry has a component id # associated with it
- ☐ Ship out lab name spelled correctly
- ☐ Lot # is correct for all entries (compare against filter lot list on akea drive)

Figure 21. Set QA Checklist

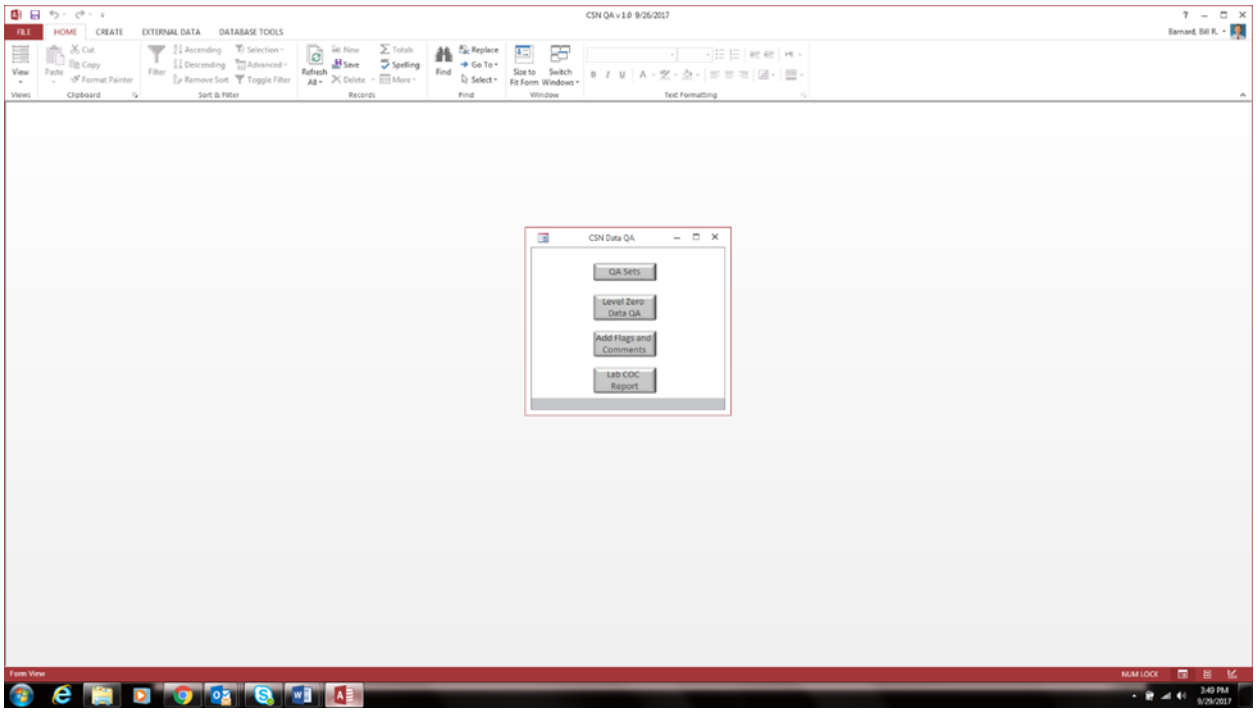


Figure 22. CSN QA Dashboard

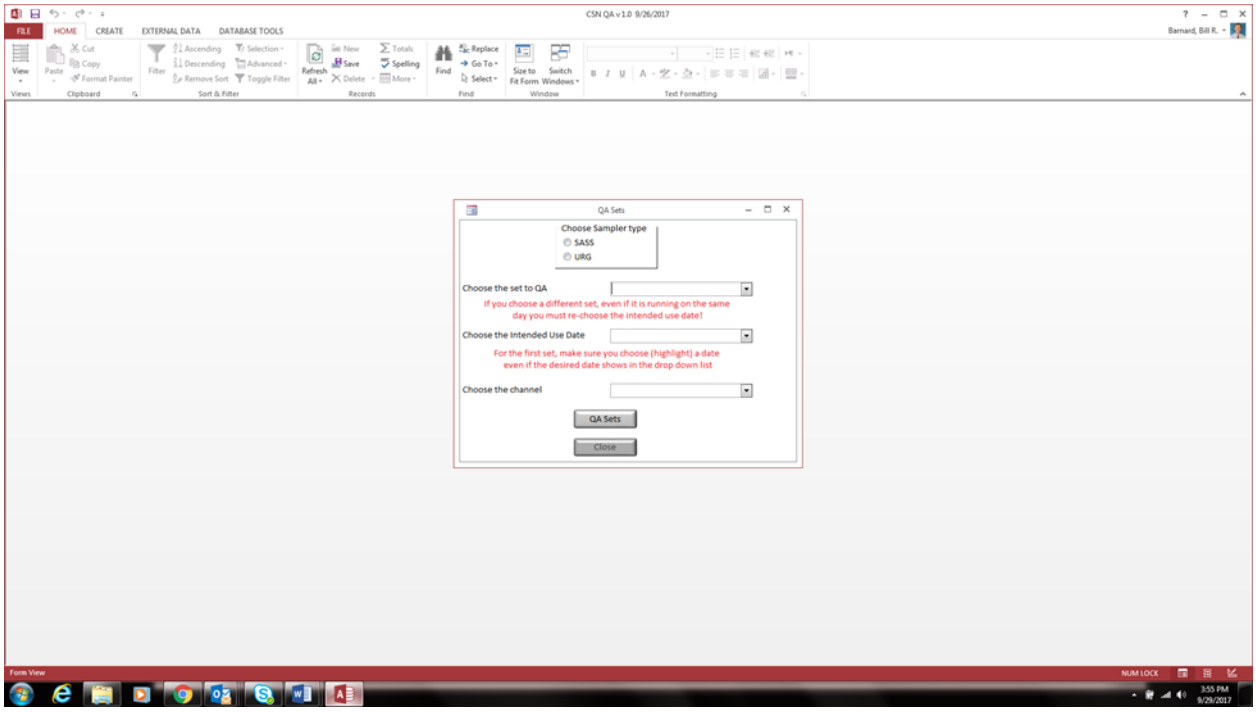


Figure 23. QA Sets Tab

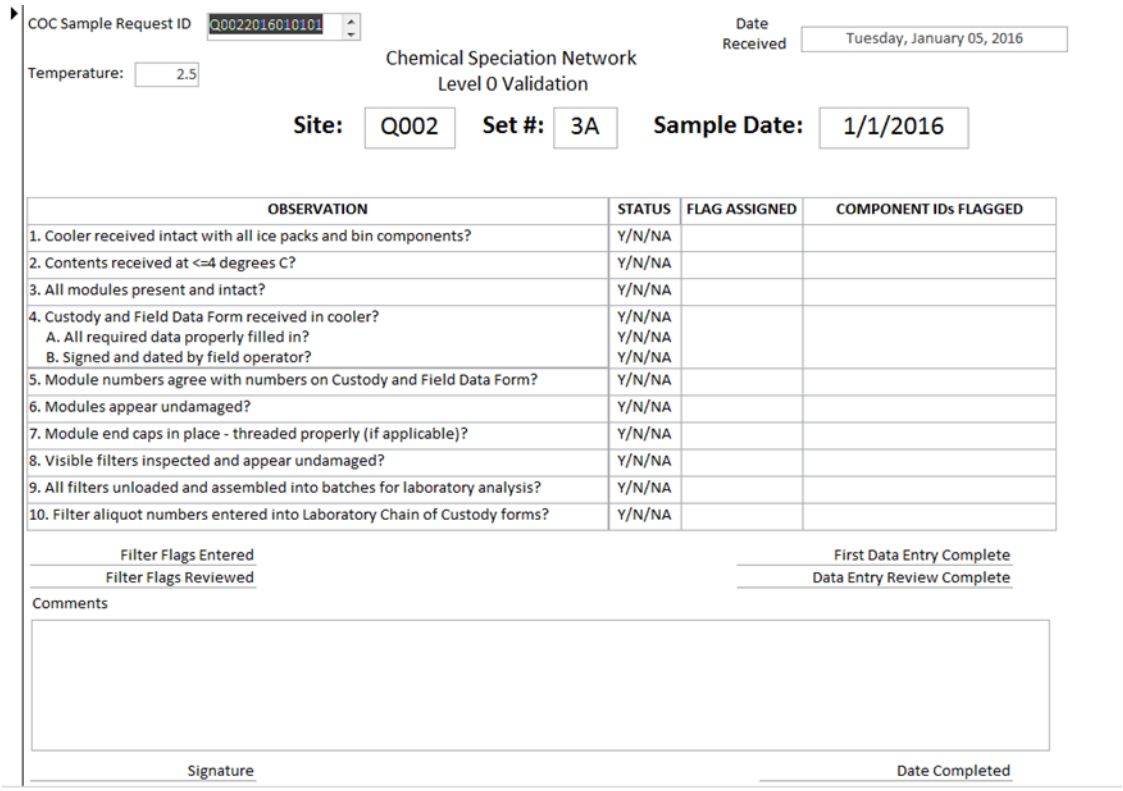
7.0 Receive Incoming Sampler Modules

7.1 Summary of Task

This procedure describes the receipt of incoming sampler modules. Disassembly and processing of pieces are not covered in this procedure, but are included as separate procedures.

7.2 Procedure

1. Receive packages from delivery service.
2. Open each package inspect FSCOC for set number. Group all incoming packages by set number.
3. Print CSN Level 0 Validation Form (Figure 24) by selecting set and intended sample date from “Check In Shipments” tab on CSN Dashboard. Then click File>Print to print all Check In forms for each individual set.
4. Distribute CSN Level 0 Validation Forms using Sample Request ID to specific boxes based upon Set number and Site ID.
5. Remove Ice Packs and store in gray ice pack storage bin until needed for outgoing shipments.
6. Measure temperature of received filter modules using a NIST traceable infrared sensor or other appropriate thermometer or sensor.
7. Record receipt temperature and date on the CSN Level 0 Validation Form and check that the paperwork (FSCOC and CSN Field Sampling Null Value and Validity Coding Form) are in each box.
8. CSN Level 0 Validation Forms can be pre-printed for each sampling event prior to check in.
9. Once each box has been checked in, transfer the Boxes to cold room area for storage by Set number. Boxes with horizontal Red Duct tape applied to them denote that gravimetric analysis is needed. These boxes should be set by themselves in the cooler and unloaded for analysis within 48 hours.



COC Sample Request ID: Q0022016010101 | Date Received: Tuesday, January 05, 2016

Temperature: 2.5

Chemical Speciation Network
Level 0 Validation

Site: Q002 **Set #:** 3A **Sample Date:** 1/1/2016

OBSERVATION	STATUS	FLAG ASSIGNED	COMPONENT IDs FLAGGED
1. Cooler received intact with all ice packs and bin components?	Y/N/NA		
2. Contents received at <=4 degrees C?	Y/N/NA		
3. All modules present and intact?	Y/N/NA		
4. Custody and Field Data Form received in cooler? A. All required data properly filled in? B. Signed and dated by field operator?	Y/N/NA Y/N/NA Y/N/NA		
5. Module numbers agree with numbers on Custody and Field Data Form?	Y/N/NA		
6. Modules appear undamaged?	Y/N/NA		
7. Module end caps in place - threaded properly (if applicable)?	Y/N/NA		
8. Visible filters inspected and appear undamaged?	Y/N/NA		
9. All filters unloaded and assembled into batches for laboratory analysis?	Y/N/NA		
10. Filter aliquot numbers entered into Laboratory Chain of Custody forms?	Y/N/NA		

Filter Flags Entered
Filter Flags Reviewed
First Data Entry Complete
Data Entry Review Complete

Comments

Signature
Date Completed

Figure 24. Level 0 Validation Check in Sheet

8.0 Disassemble Incoming Sampler Modules and Associate with Sampling and Analysis Events

8.1 Summary of Task

This procedure describes the overall steps needed to disassemble incoming sampler modules, remove the exposed (or blank) filters, and associate those filters with sampling events. Details of disassembly for a specific module are included in this procedure. Always wear gloves when handling filters and modules.

8.2 Procedure

1. Remove boxes of filter components from the cold room. Place in the FiSH “Red” room to allow the components to warm for at least 4 hours, between 12 and 24 hours is preferred.

   Once the components have been allowed to warm, move the boxes into the sample processing area by set. Remove the component(s) from the box.
2. Place all of the component(s) from the box on the table along with the FSCOC forms Null Code and Validity forms and Level 0 Validation forms.
3. Compare individual components to those specified on FSCOCs.
4. Enter Sample Request ID into Database by scanning FSCOCs.
5. Sign and date FSCOC forms to indicate receipt of contents at the FiSH.
6. Determine sampling configuration from FSCOC form and/or database.

7. Note any discrepancies between received components and those on FSCOC forms.
8. Notify Program Manager if any discrepancies are found. Resolve discrepancies before proceeding.
9. Document in comments on FSCOC any discrepancies and corrective actions.
10. Open SASS COC form on CSN Tracking Database (Figure 25).
11. Highlight Sample Request ID and click the find tool, a popup box will appear, scan FSCOC bar code to find electronic FSCOC form (Figure 26).

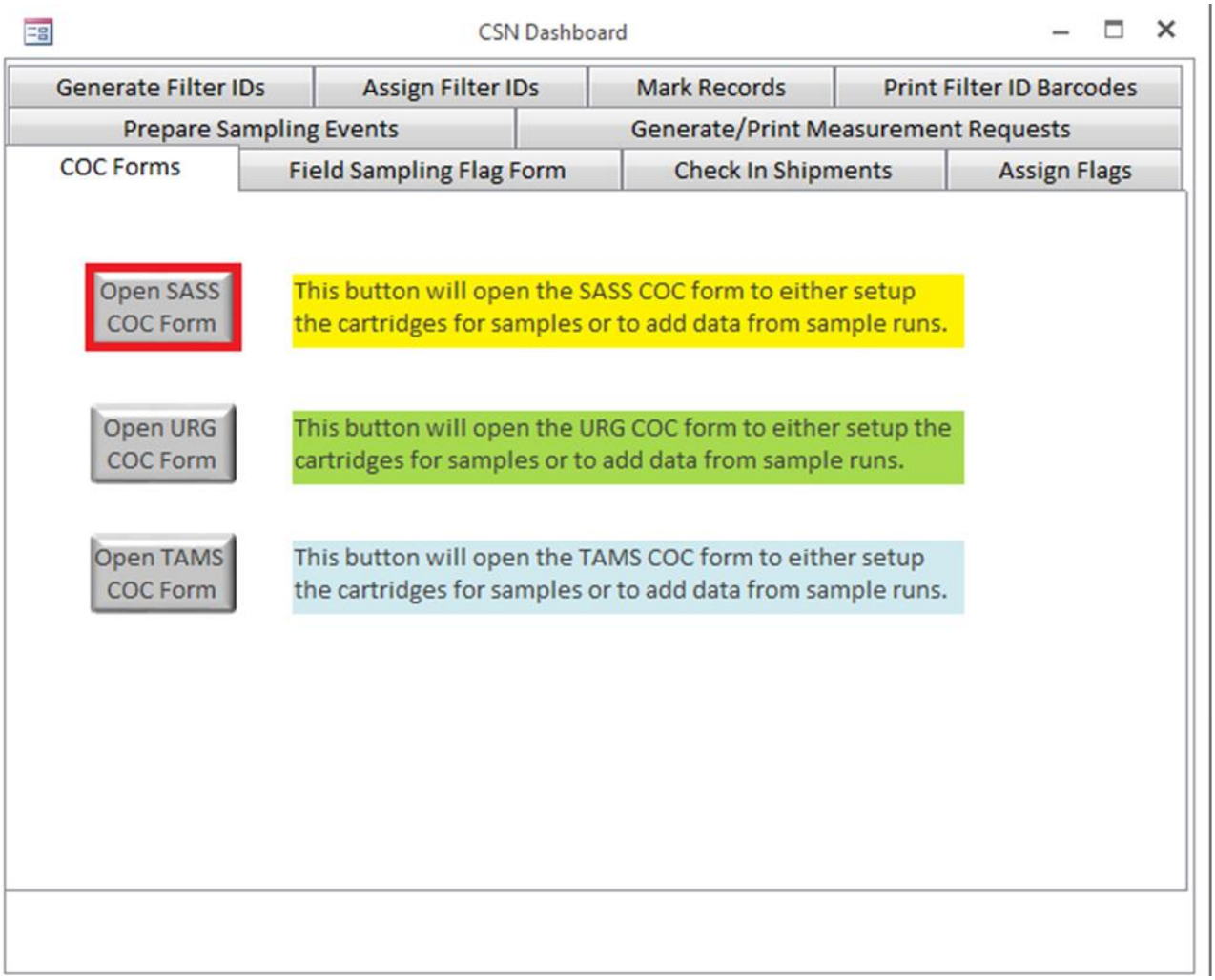


Figure 25. CSN Dashboard

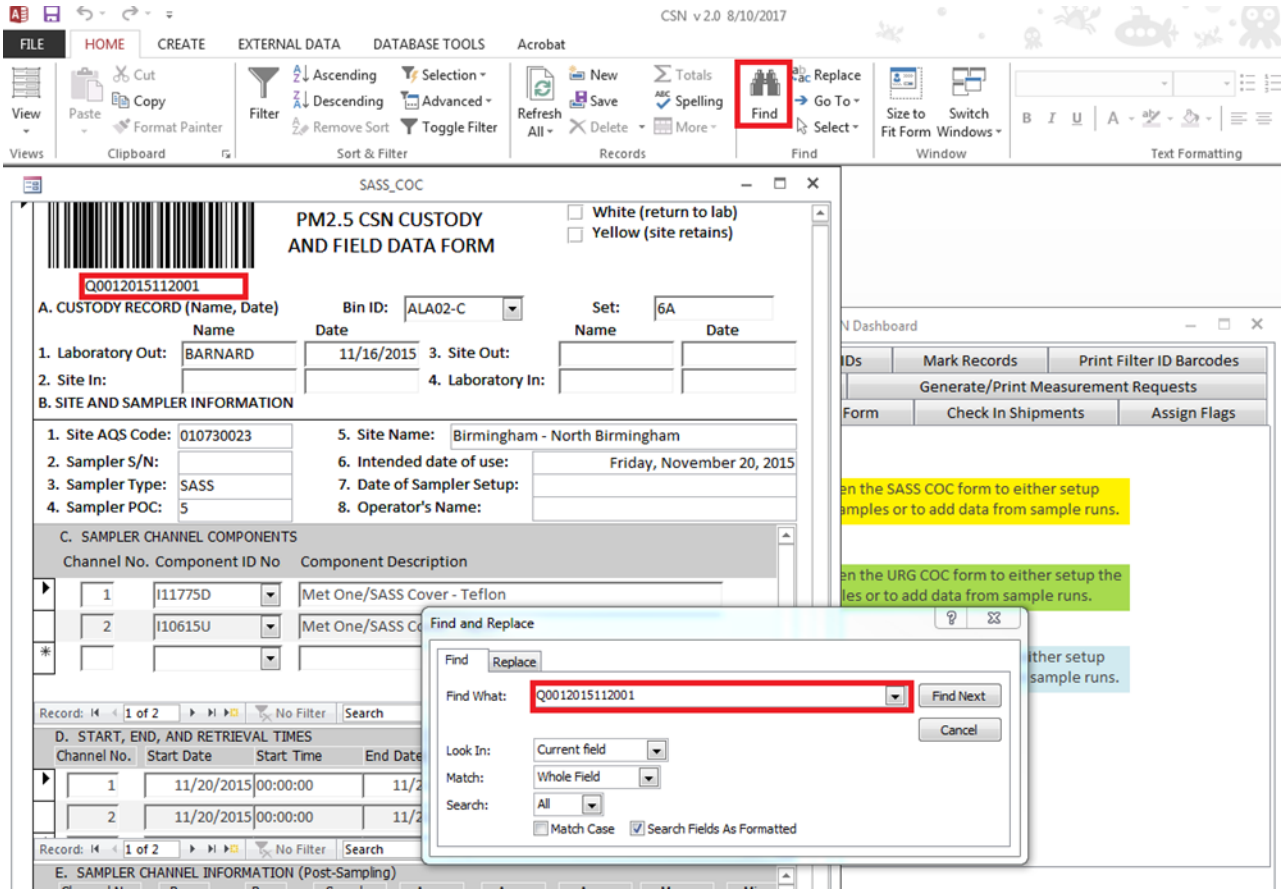


Figure 26. CSN Electronic COC with Find Tool

12. MET ONE (SASS) Module Disassembly
    a. Place the module on the work area in front of you, with bar code facing.
    b. Take the MET ONE wrench and unscrew all three screws only half way. Then remove them completely.
    c. While keeping the screws and washers in the module, lift up and remove the metal covering of the MET ONE module. Place it to the side. Then remove/open each piece placing the pieces in order on the table from first to last.
    d. Prior to unloading filters, scan the barcode on the petri dish to enter the Filter Analysis ID into the Filter ID input form for that sample event/filter combination (already entered).
    e. On the Filter ID Input form in the MS Access database, enter the analysis type for each filter in the database, based on the filter type.
    f. Unload filters from filter holding cassette using cassette opening tool and using nylon forceps, place in pre-labeled petri dishes (Figures 27 and 28). These labels will contain the Bar Coded Filter Analysis ID number generated from the CSN Tracking database discussed in the batch label section.

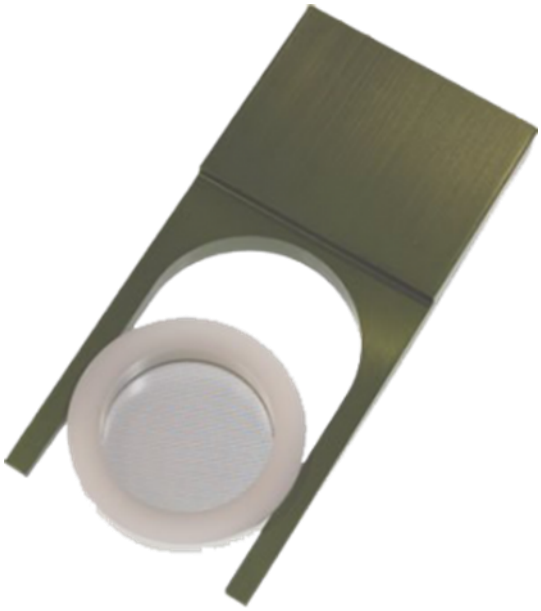


Figure 27. Cassette Opening Tool

Figure 28. Petri Slide with Filter Analysis Barcode

g. When unloading the filters ensure that the filters are placed with the exposed surface facing the lid of the petri slide. Sample events that used Teflon filters that were pre-weighed for gravimetric mass analysis will display a message in orange and red indicating that the filter needs to be weighed for gravimetric mass. Those filters will be set aside and turned over to the Gravimetric Mass laboratory personnel for conditioning and weighing using SOP GLM3180-009.
h. Clean all of the module parts and allow to air dry completely using the cleaning procedure detailed in Section 9.0 Module Cleaning and Drying.

13. URG 3000N Cartridge Disassembly
    a. Place the URG 3000N filter holder cassette on a clean work surface for disassembly.
    b. Remove the red caps and open the filter cassette using the URG cassette opening tool. (Figure 17)
    c. Carefully remove the filter using tweezers. Gloves should be used at all times during this procedure.
    d. Place the filter in a pre-labeled petri slide, with the deposit side up. (Figure 29)
    e. Using the barcode scanner, scan the barcode on FSCOC to enter the Filter Analysis ID into the Filter ID input form for that sample event/filter combination (already entered).
    f. On the Filter ID Input form in the MS Access database, enter the analysis type for each filter in the database, based on the filter type.

g. Clean the filter cassette and support screen. Allow all parts to air dry completely. (See cleaning instruction in Section 12.)
h. While the parts are drying, insert CF card into card reader and download the compact flash memory card data to the appropriate directory in the CSN directory. Directories are created for each sample set and month/year combination. After successfully downloading data, delete files from CF card for next use.

Figure 29. Sample quartz filter in petri slide

14. Andersen (RAAS 2.5-400) Filter Cassette Disassembly
    a. Remove the Andersen filter holders from the returned box. Place them on a clean work area for disassembly.
    b. Remove cover pieces from filter holder.
    c. Open the filter holder using the cassette opening tool. (Figure 27)
    d. Remove the filter from the bottom half of the cassette using filter forceps.
    e. Place the filters into pre-labeled, bar-coded petri slides.
    f. Using the barcode scanners, locate the appropriate Sample Event by using the Find function of MS Access scanning the FSCOC to input the SampleEventID in the Filter ID Input form.
    g. After locating the correct sample event, scan the FilterAnalysisID from the petri slides into the Filter Analysis ID field on the Filter ID Input form in the MS Access database.
    h. On the Filter ID Input form in the MS Access database, enter the analysis type for each filter in the database, based on the filter type.
    i. Teflon filters that were pre-weighed for gravimetric mass analysis will display a message in orange and red indicating that the filter needs to be weighed for gravimetric mass. (Figure 30) Those filters will be set aside and

transferred to Gravimetric Mass laboratory personnel for conditioning and weighing using SOP GLM3180-009.

j. Clean each part of the Andersen filter holder module following the procedures in Section 10 Module cleaning and drying.

15. Once filters are unloaded and associated with the correct sample event, store Samples in FiSH cooler for Teflon or Nylon filters or in the freezer for Quartz filters.

16. Compile the FSCOC forms, Chemical Speciation Network Level 0 Validation Form, and Chemical Speciation Network Field Sampling Null Value and Validity Coding Forms together.

17. Place the forms in the folder by set/intended sample date for transfer to data entry.

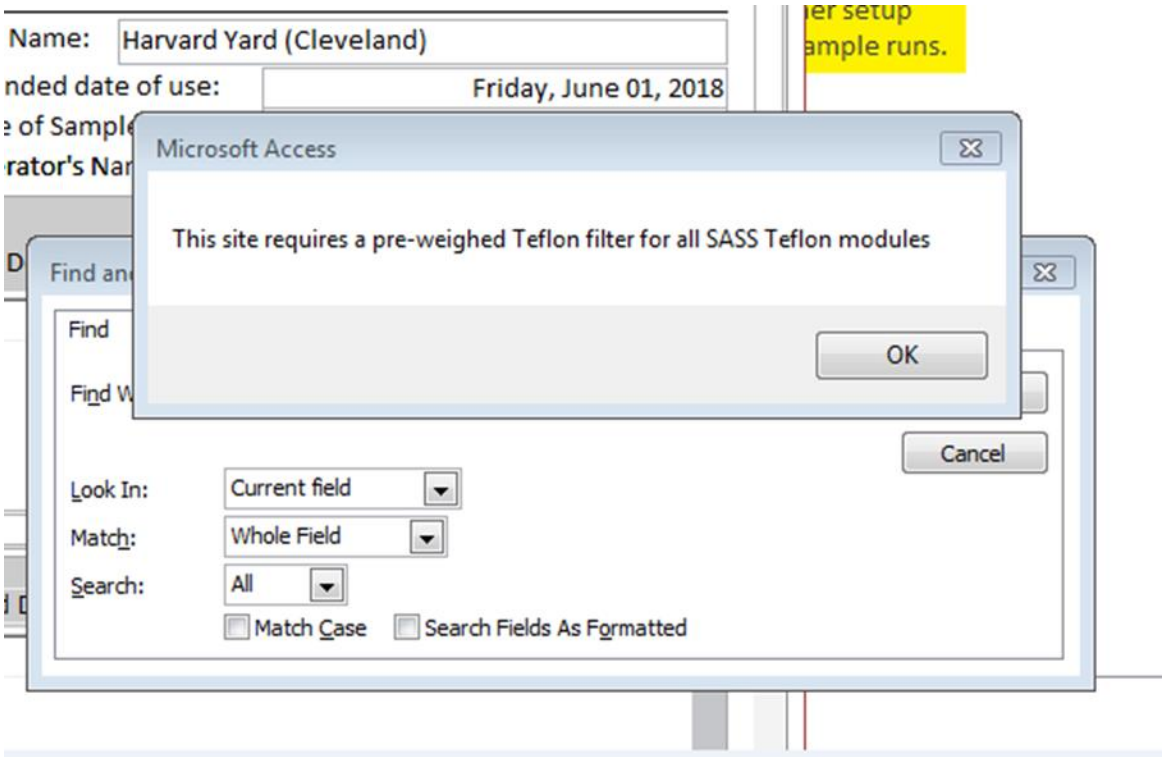


Figure 30. Display message indicating filter needs weighed for gravimetric mass

9.0 Data Entry and Flag Events

9.1 Summary of Task

This procedure describes how data is entered into the database and how any unusual events are identified and marked accordingly for reporting purposes.

9.2 Procedure

1. Data is entered by a certified data entry technician.

2. The technician opens the COC for a specific sample event by opening the specific COC form from the CSN Dashboard. Use the Find tool to scan the hard copy FSCOC returned with the samples from the field site.
3. Technician enters the sample parameters into the reflective cells of the Electronic FSCOC. This adds them to the database. Many of the parameters have popup visual cues if an entry is out of specification, technician should double check hard copy to confirm or fix entry (Figure 31).
4. Technician adds receipt temperature and date received to the Level 0 Validation Check in Form.
5. Technician will assign any flags applied by site operator onto Field Sampling Null Value and Validity Coding Form. This is done by clicking the Assign Flags tab on the CSN Dashboard and Click to “Add Null Flags” or “Add Validity Flags”, then assigning based on Sample Request ID and Channel Number.
6. Use of Validation Visual Cues during Data Entry
   When data are entered into the electronic FSCOC form as part of the data entry process, the data entered into each field is evaluated to determine if the data meet specific requirements for that data field. This can be as simple as determining if a date is in the current year or to determine if the data entered are within what would be the “normal” operational range for the data (e.g., is the Flow CV within the normal expected range for the sampler type). When the data entry personnel have entered the data, if the data are outside of the expected range of values, then a message box is shown on screen indicating that the value is outside of the expected range of values (Figure 29). The message box indicates that the data entry personnel should check the entered value to ensure that the value entered was correct. If the value is correct, it is simply maintained but the date entry personnel should enter a comment in the comment field indicating that the data have been confirmed.
7. If any of the AIRS null value codes are assigned by the site operator on Null Value and Validity Coding Form (Figure 32), the event will be invalidated in the database for reporting purposes.
8. During data entry, the Data Entry Analyst will review site operator and FiSH technician comments on the FSCOC along with site operator marked flags. The Analyst will determine which flags are appropriate and mark them for data entry. If unsure, they will request assistance from Program or Database Manager.
9. Treatment of Samples That Were Not Run as Scheduled
   a. Samples that were scheduled as Routine, but were not run by the operator:
      i. If the sample did not run, but will be invalidated, (for example a machine malfunction or power failure), do not convert it to a blank. Add the indicated flags (on the FSCOC) which will be used to mark the data as invalid.
      ii. If there was a Field blank scheduled for the same date and it is visibly apparent (either from visually inspecting the filters, or from comments/ data in the paperwork) that the operator ran the Blank instead of running the Routine, the analyst will work with the Program Manager (or other qualified database administrator) to ensure that the sample event is documented correctly.

b. Samples that were scheduled as Blanks, but were run as Routine samples by the operator:
    i. If the event appears to be a valid Routine sample, then the analyst will work with the Program manager (or other qualified database administrator) to ensure that the sample event is documented correctly.
    ii. If the sample was run, but must be invalidated, it is invalidated by assigning the appropriate flags.

10. Forms ready for data entry are grouped by set, based upon common sample frequency and intended sample date(s).
11. Setting Level 0 and Level 1 Validation Flags during Data Entry
    a. While performing data entry, inspect Sample Event Check In Form. Verify procedures are completed and initialed.
    b. Sample Event Sets are kept together during the post sample data entry process as each step of the data entry process is completed.
    c. Data Entry steps are logged in CSN Data Entry log (Figure 33).
    d. Data from operational parameters are entered (e.g. flow, average temperature) on the electronic FSCOC forms.
    e. Null and validity flags are entered on the electronic Null and Validity Flag Selection Form. Access to the correct form is via scanning of the barcode using the barcode scanner and the MS Access “find” function.
    f. Validation of the data (including the use of flags marked during this data entry process) is discussed in more detail in CSN QAPP.

9.3 Quality Control and Quality Assurance

In addition to visual cues for data entries that are out of specification, the following procedures have been implemented to reduce data entry errors. Further quality checks are performed prior to Analysis Batch Shipment.

a) The Quality Specialist will run the “QA Sets” query from the CSN Database QA Front End is run to bring up the data associated with a given batch including information regarding sample request ID, start date, start time, end date, end time, sample volume, average flow, average flow CV, average ambient temperature, average BP, filter type, filter ID, set number, intended use date, comments, and check-in temperature. Additionally, if flags were assigned to the data by the operator on the field sampling null value and validity coding form, those flags are checked in the database to ensure that they were entered or that the correct flags were assigned.
b) All of this information is checked against the FSCOC, the Field Sampling Null Value and Validity Coding Form, and the Level 0 Sample Event Check In Form for each individual record to determine if data entry errors exist.
c) Should a data entry error be found, the error is recorded in the comments section of the CSN Data Entry Log.
d) The batch of data is returned to the person who entered it to make any corrections necessary.
e) Corrections noted by the Quality specialist on the data entry log are initialed once complete, providing documentation that the corrections were made.

f) Once the corrections are complete, the batch of data is returned to the Program Manager for a final assessment.

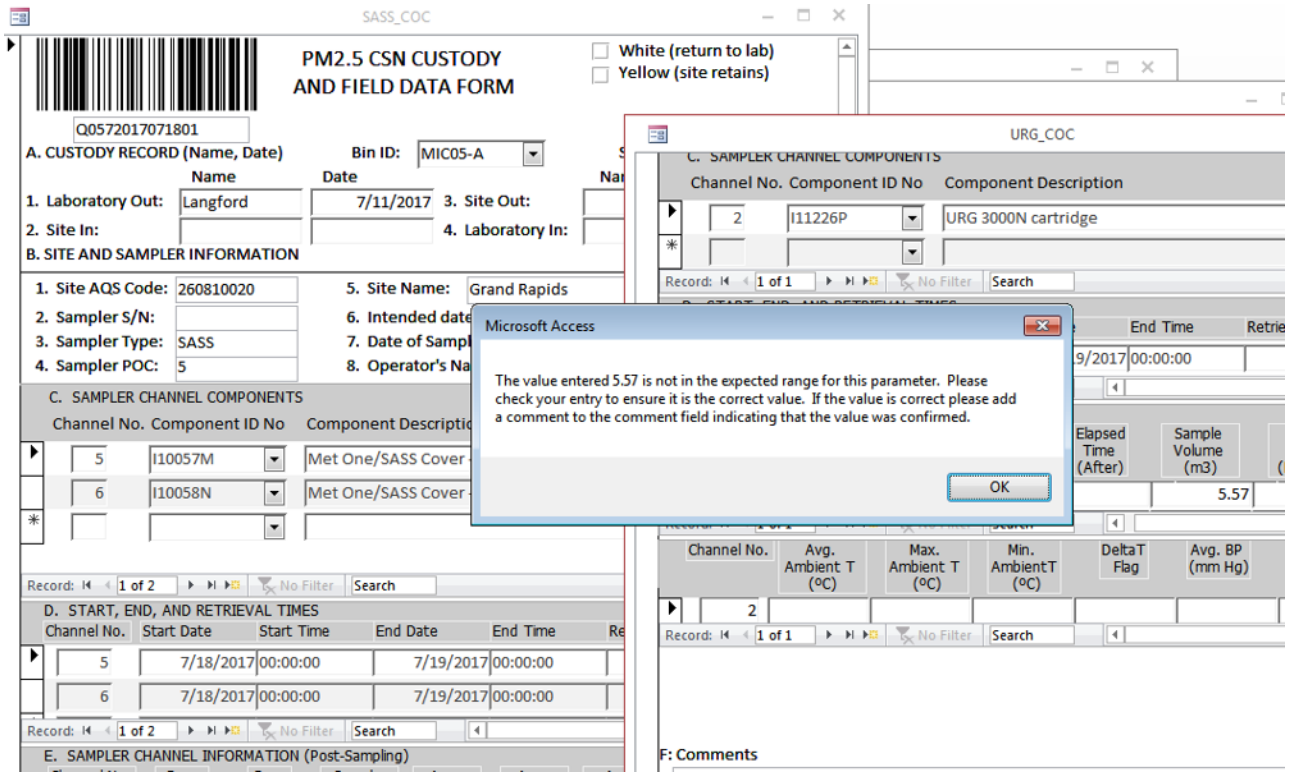


Figure 31. Visual Checks Example

Chemical Speciation Network
Field Sampling Null Value and Validity Coding Form

☐ White (return to lab)
☐ Yellow (site retains)

Chain of Custody Sampling Request ID:	Q0012015112001	Intended Use Date	11/20/2015
		Sample Date (if different from Intended Use Date)	
Date Received in FiSH		Received in FiSH by:	

Instructions to Field Sampling Operator: For the sampling event identified by the Chain of Custody Sampling Request ID indicated above, please circle all applicable flags in the tables below. If no flags apply to this sampling event, please check the box below the tables.

Table A. Null Value Codes
* selection of any flag in this table will invalidate sample

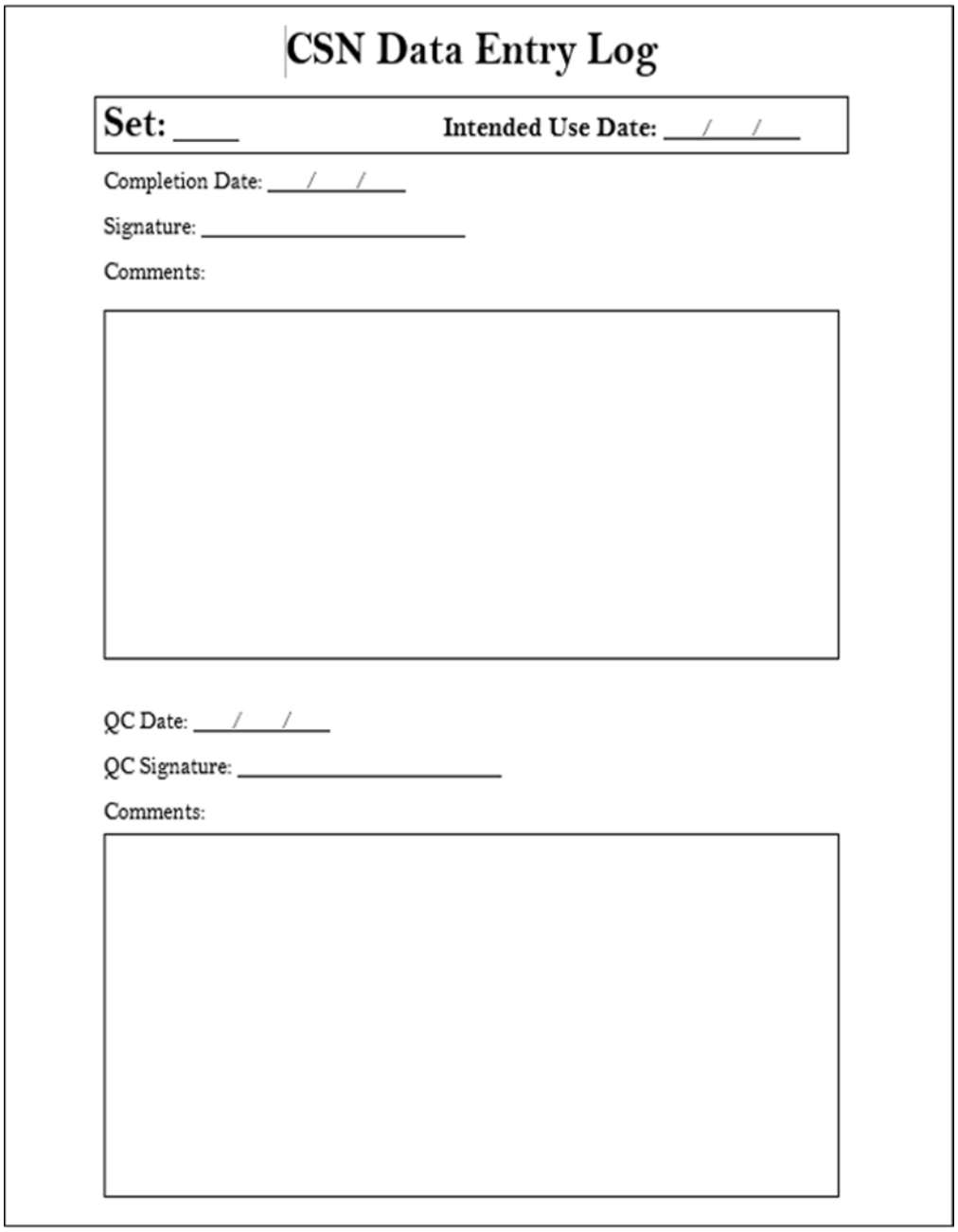
Flag	Description
AB	TECHNICIAN UNAVAILABLE
AC	CONSTRUCTION/REPAIRS IN AREA
AD	SHELTER STORM DAMAGE
AE	SHELTER TEMPERATURE OUTSIDE LIMITS
AF	SCHEDULED BUT NOT COLLECTED
AG	SAMPLE TIME OUT OF LIMITS
AH	SAMPLE FLOW RATE OUT OF LIMITS
AI	INSUFFICIENT DATA (CAN'T CALCULATE)
AJ	FILTER DAMAGE
AK	FILTER LEAK
AL	VOIDED BY OPERATOR
AM	MISCELLANEOUS VOID
AN	MACHINE MALFUNCTION
AO	BAD WEATHER
AP	VANDALISM
AQ	COLLECTION ERROR
AR	LAB ERROR
AS	POOR QUALITY ASSURANCE RESULTS
AU	MONITORING WAIVED
AV	POWER FAILURE (POWR)
AW	WILDLIFE DAMAGE
AZ	QC AUDIT (AUDT)
BA	MAINTENANCE/ROUTINE REPAIRS
BB	UNABLE TO REACH SITE
BE	BUILDING/SITE REPAIR
BI	LOST OR DAMAGED IN TRANSIT
BJ	OPERATOR ERROR
DA	ABERRANT DATA
SA	STORM APPROACHING
TS	HOLDING TIME OR TRANSPORT TEMPERATU

Table B. Validity Flags
* samples marked with any of these flags will be analyzed and reported with flags noted

Flag	Description
2	Operational Deviation
3	Field Issue
4	Lab Issue
5	Outlier
6	QAPP Issue
IA	African Dust
IB	Asian Dust
IC	Chem. Spills and Industrial Accidents
ID	Cleanup After a Major Disaster
IE	Demolition
IF	Fire - Canadian
IG	Fire - Mexico/Central America
IH	Fireworks
II	High Pollen Count
IJ	High Winds
IK	Infrequent Large Gatherings
IL	Other
IM	Prescribed Fire
IN	Seismic Activity
IO	Stratospheric Ozone Intrusion
IP	Structural Fire
IQ	Terrorist Act
IR	Unique Traffic Disruption
IS	Volcanic Eruptions
IT	Wildfire - U.S.
T	Multiple Flags: Misc
TT	Transport Temperaure is Out of Specs.
V	Validated Value
W	Flow Rate Average Out of Spec
X	Filter Temperature Difference Out of Spec
Y	Elapsed Sample Time Out of Spec

☐ No flags assigned to this sampling event Signature _____ Date _____

Figure 32. Null Flag and Validity Coding Form



CSN Data Entry Log

Set: ____ Intended Use Date: ___/___/___

Completion Date: ___/___/___

Signature: _____

Comments:

QC Date: ___/___/___

QC Signature: _____

Comments:

Figure 33. CSN Data Entry Log

10.0 Module Cleaning and Drying

10.1 Summary of Task

This procedure describes the cleaning of the disassembled modules.

10.2 Procedure

1. Nylon cassette components should be rinsed with DI water, then rinsed with isopropanol (methanol could also be used but is more expensive). Additional pieces in nylon module are to be wiped with a DRY Kimwipe.
2. All other components can be wiped with Kimwipes that are moistened with DI water.
3. Allow the components to air dry, then wipe with a DRY Kimwipe.

11.0 Denuder replacement in sass nylon modules

11.1 Summary of Task

This procedure describes the replacement of denuders in the SASS Nylon modules by FiSH personnel.

11.2 Procedure

1. Freshly recoated denuders (see SOP GLO-3180-040) for scrubbing of gases will be supplied to the FiSH by the denuder refurbishment laboratory.
2. Denuders will only be employed to “scrub” gases from the sampled air.
3. The FiSH staff will load the denuder into sampling modules for subsequent shipment to the field sampling locations. This is accomplished by removing the old denuder component in the SASS Nylon module and replacing it with a freshly coated denuder. The denuder is simply stacked on top of the filter ring and held in place by the external SASS module piece. The denuder will be identified by the unique inventory number of the SASS filter module in which it is installed.
4. Denuders will be installed into modules containing nylon filters.
5. Upon their return to the FiSH from the field sampling location, the denuders will be removed from the modules during the filter unloading process.
6. Denuders may then be reinstalled in the module for the next sampling event. Denuders are replaced approximately every year following a first in first out pattern.
7. Denuders are replaced approximately every year. The replacement of the denuders is tracked using the CSN Tracking database. Denuder replacement is performed by sample set. Entire sample sets of modules are replaced at the same time and documented by Program or Data Manager in the “DenuderRefurbDates” table in the QA CSN Tracking Frontend.