

UCD CSN Technical Information #302B

Receiving and Inventorying of CSN Samples

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

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1. PURPOSE AND APPLICABILITY

The subject of this technical information (TI) document is receiving and inventorying of samples collected for the Chemical Speciation Network (CSN). The scope is to ensure good laboratory practice of receiving samples by checking condition and amounts with the chain-of-custody forms, as well as inventorying and preparing samples for analysis.

2. SUMMARY OF THE METHOD

Laboratory Technician in AQRC will receive shipments of CSN samples and perform integrity checks. Descriptive information will be entered for each batch of samples into the appropriate database using web application tools. Sample analysis queues will be generated and reviewed prior to analyses. Samples are stored in cold storage, unless undergoing analysis.

3. DEFINITIONS

Inventory: The list includes the number of samples received, type of filter (sample, lab blank, field blank etc.) as well as analysis order.

Chain-of-custody (COC) form: The form received with the samples including the itemized list, amount, sample type, ship date and name, as well as a field for receive date and name.

Analysis Request ID: WOOD PLC assigns a batch number to each shipment of filters, e.g. A0000001. Other names include Batch ID, and ContractorBatchNumber.

Filter Analysis ID: WOOD PLC assigns a barcode to each sample format F#####, e.g. F000002. Other names include Barcode ID, and ContractorFilterAnalysisId.

Teflon filter ID#: Manufacturer serial number stamped on the outer membrane of a filter, eg220812072. Also known as manufacturer ID or manufacturer code.

SampleId (Id): The number assigned to the electronic record in CSN database.

XRF Application: The program contains the parameters for measuring a sample by XRF; specific to each instrument

XRF queue file: A list of electronic records associated with a Batch of CSN samples to be analyzed by XRF. Each record includes the following information; Barcode ID, SampleId and XRF Application, e.g. F000002, 325, CSNv1.1_Nanna.

CSN Data Management Site: User interface web application for the CSN database (*csn.aqrc.ucdavis.edu*).

Laboratory Technician: Authorized personnel responsible for processing of CSN samples; must receive prior approval from the Lab Manager. The lab tech shall have access to Jungerman Hall room 116 where the XRF instruments and refrigerators are located.

Wood: Short for WOOD PLC, is the Environmental Protection Agency (EPA) subcontractor for sampling handling including deployment of filters, sample processing,

and electronic record delivery and shipping samples to University of California, Davis (UCD).

4. HEALTH AND SAFETY WARNINGS

Not applicable.

5. CAUTIONS

Not applicable.

6. INTERFERENCES

Not applicable.

7. PERSONNEL QUALIFICATIONS, DUTIES, AND TRAINING

Only trained lab personnel designated by the Laboratory Manager may receive and inventory CSN samples.

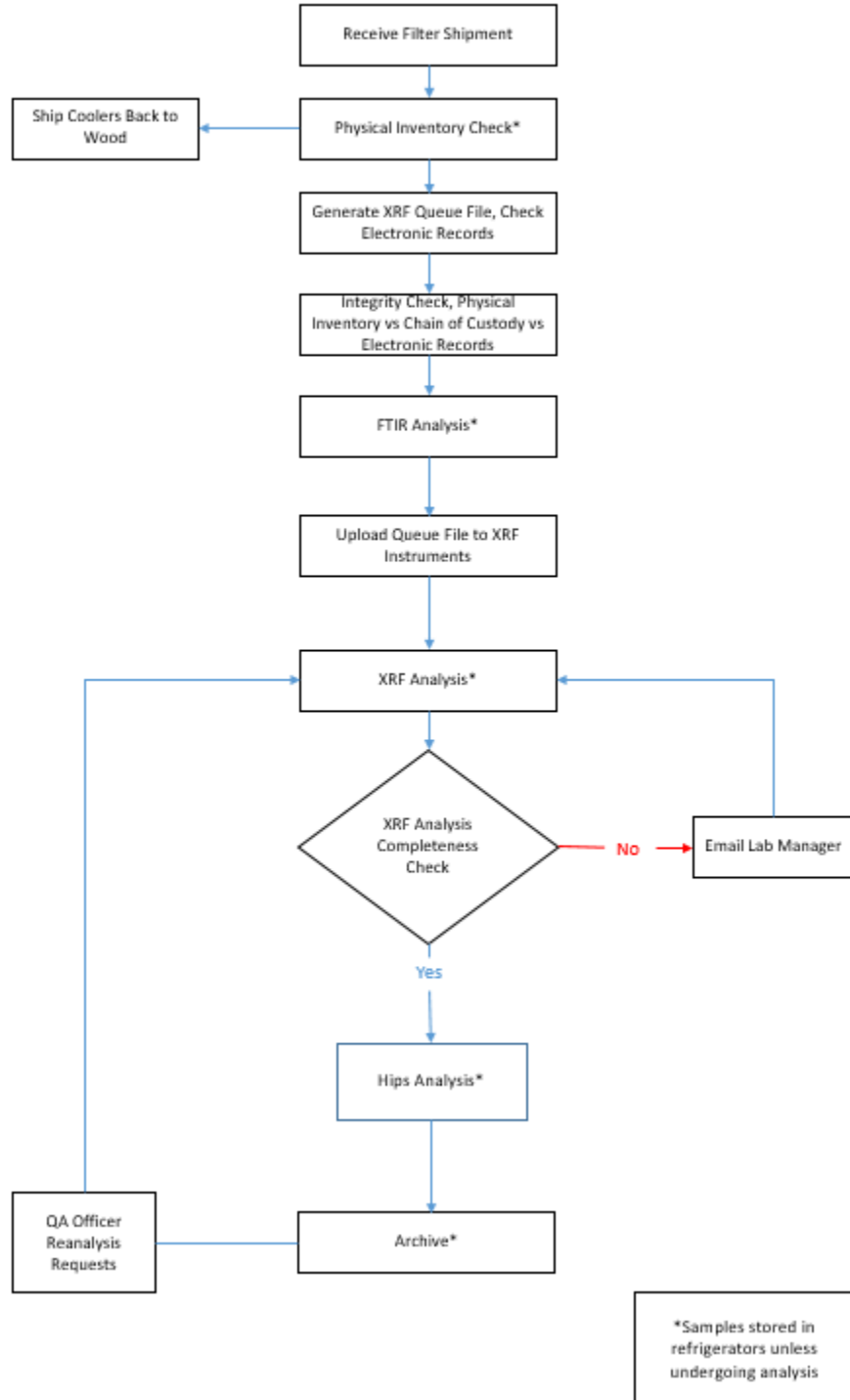
8. EQUIPMENT AND SUPPLIES

Not applicable.

9. PROCEDURAL STEPS

The flowchart of sample receiving and inventorying shown in Figure 1.

Figure 1. The flowchart of sample receiving to archiving.










9.1. Receiving of Samples

The CSN samples are shipped in coolers from Wood to UC Davis with accompanied COC forms (Figure 2). Upon receipt, the laboratory technician will sign, and write down the date and time on the COC. The COC includes the following information for each sample: Filter Analysis ID, intended sample date, analysis requested, Teflon filter ID#, set #, and status flag.

The laboratory technician unpacks the boxes in a designated location (Jungerman Hall, room 116) and inventories the filters.

Figure 2. Example of chain of custody form.

Analysis Request ID		Intended Sample Date	1/1/2020	
 00000062 Batch ID		Set #	7Q	
Barcode/Filter Analysis ID	Filter Type	Analysis Requested	Invalid?	
 Filter Analysis ID F185748	Teflon 220812082	XRF Analysis type	<input type="checkbox"/>	
 Filter Analysis ID F185751 Barcode ID	Teflon 220812083	XRF	Status flag <input type="checkbox"/>	
 Filter Analysis ID F185754	Teflon 220812084 Manufacturer serial number	XRF	<input type="checkbox"/>	
 Filter Analysis ID F185757	Teflon 220812085	XRF	<input type="checkbox"/>	
 Filter Analysis ID F185760	Teflon 220812086	XRF	<input type="checkbox"/>	
 Filter Analysis ID F186764	Teflon 220642149	GravXRF	<input type="checkbox"/>	
 Filter Analysis ID F186779	Teflon 220812495	XRF	<input type="checkbox"/>	
 Filter Analysis ID F186782	Teflon 220812496	XRF	<input type="checkbox"/>	
 Filter Analysis ID F186785	Teflon 220812498	XRF	<input type="checkbox"/>	
 Filter Analysis ID F186788	Teflon 220812499	XRF	<input type="checkbox"/>	
 Filter Analysis ID F186791	Teflon 220812500	XRF	<input type="checkbox"/>	
 Filter Analysis ID F186794	Teflon 220812501	XRF	<input type="checkbox"/>	

9.2. Inventorying

The purpose of inventorying is to verify if the physical filter count is equal to the number of samples listed on the COCs and the number of electronic records received from Wood. In addition, the laboratory technician verifies the BarcodeID and manufacturer number prior to loading samples into the XRF instruments. After completing inventory, the laboratory technician sends an email to the laboratory manager and QA officer with results of this integrity check, including any discrepancies.

The samples are organized and shipped by Wood, where each shipment is assigned a batch number. Each batch contains multiple boxes of Petri trays. Each Petri box can hold two Petri trays, while each tray contains 50 Petri slides. The samples are organized in numerical order based on the COC. The boxes and each Petri tray are labeled with the sampling date and set numbers. The samples are also labelled with a unique barcode sticker, which relates to the Filter Analysis ID (e.g., F000002) on the Petri slide.

Using the COC as a guide, check the 1st, 25th, 26th, and 50th sample of each Petri tray. This ensures the samples in the Petri tray are in the same order as on the COC. Prior to analysis, each filter analysis ID (e.g., F000002) and the unique manufacturer serial number (e.g., 220812072) will be verified with the COC.

Using a black or red pen the following notations will be made directly on the COC forms. At the top of each page with a red pen you will write the tray information in the following format T# (e.g. T1). If a page contains samples for two trays, write both tray numbers in the following format T#/T# (e.g. T1/T2). Use a red pen, to mark the COC with a small dash (-) before the first sample of each tray to designate the start of the tray. The tray number is also written in red pen next to this mark. Use a black pen to mark the COC with a small dash (-) after the 25th sample of each tray. If less than 50 samples are received in a Petri tray or Ziploc bag, continue with the sample procedure by checking the first and last filters in the tray or bag. Note the number of filters received and the number of filter records on the COC.

In addition, a barcode label is placed on each tray in the format B#T# (e.g., B7T1). The file for generating barcode labels is located here:

U:\IMPROVE_Lab\XRF_Epsilon5\CSN\Labels\Teflon_CSN Tray labels.xlsx.

To update this file, change the Batch Number on the “Tray List” worksheet (only update the tray numbers if needed). Next click on the “Tray Stickers” worksheet and go to add-ins and click “TBarCode Panel” opening the TbarCode Office submenu. Click “select all barcodes”, refresh all barcodes and then print.


For samples received without COC documentation, leave the sample in the tray. Draw an asterisk (*) between the two records where the filter is located. On the bottom of the COC draw an asterisk and record the Filter Analysis ID, the Manufacturer number, and the comment “Sample missing from COC, refer to appendix for further sample information.” Initial and date the comment. Open the UCD COC file, located at U:\IMPROVE_Lab\XRF_Epsilon5\CSN\Forms\UCD COC.xlsx, and enter the requested information in the worksheet “Enter Data.” The UC Davis Laboratory Chain of Custody


Form will then be generated, shown in Figure 3. Print the form and place it behind all the COCs for the specific batch.

Figure 3. UC Davis Chain of Custody Form.

UC Davis Laboratory Chain of Custody Form
 Form to be used for samples received from Wood without a Chain of Custody Form

Received Name _____ Date/ Time _____

Analysis Request ID

 A0000036

Barcode/ Filter Analysis ID	Filter Type/ Manufacturer ID	Analysis Requested/ Intended Sample Date	Invalid? Set #
Filter Analysis ID  F080769	Teflon 220462458	XRF 10/4/2017	7Q

Report the integrity check information (Figure 4) and discrepancies to the Laboratory Manager and QA officer via email. The “Filter Count” field is the number of samples received within a Batch. The “COC” field refers to the number of samples included in the COC forms. The “Electronic Records” field refers to the number of records in the database for the specific Batch. Note that different terminology is used in the database. To view the number of electronic records, log into the CSN Data Management site web application and go to Batches, select the corresponding batch number from the list and click the “view batch details” icon. In Batch Details, locate the Teflon Count. The Teflon Count is the number of electronic records for the Batch. Record the number of records in Figure 4.

Figure 4. Integrity check table.

Filter Count	COC	Electronic Records
# of samples received	# of samples listed	# of records in the file

To receive boxes, go to the CSN Data Management site (Figure 5), and update the following information for the batch: BoxReceivedDate, BoxSampleCount,

BoxFirstSampleDate and BoxLastSampleDate. Refer to Section 3.3, CSN Data Management Site for instructions.

Figure 5. CSN Data Management Site.

The screenshot shows a web form titled "Receive Box for Batch A0000007". The form contains several input fields and a text area:

- BoxReceivedDate:** A date and time field with the value "04/27/2016 9:57 AM" and a calendar icon.
- BoxReceivedBy:** A text field with the value "marigaby".
- BoxSampleCount:** A text field with the value "975" and a dropdown arrow.
- BoxFirstSampleDate:** A date and time field with the value "02/03/2016 12:00 AM" and a calendar icon.
- BoxLastSampleDate:** A date and time field with the value "02/27/2016 12:00 AM" and a calendar icon.
- Comments:** A large empty text area for entering notes.

At the bottom of the form, there are two buttons: a blue "Save" button with a checkmark icon and a "Back" button with a circular arrow icon.

9.3. CSN Data Management Site

CSN Data Management Site is the user interface to the electronic data associated with CSN for all sample types (Quartz, Nylon, and Teflon). The electronic files are provided by Wood in a PDF. The electronic data is ingested into the CSN database by the UC Davis QA officer. The URL for the CSN Data Management Site (CSN web app) is <https://csn.agrc.ucdavis.edu/>. A valid UC Davis ID and password are required. For access to the CSN web app, check with developers and/or Crocker IT.

The CSN web app has four main menus: Home, Analyses, Import and Admin. The Home menu has seven submenus:

1. The *Filters* submenu (Figure 6) is helpful when reviewing and selecting specific records for a given batch.

Figure 6. Filter results.

Filter Results

Filter Type: Teflon

Batch: All

Site: All

IntendedUseDate: Start: 03/09/2016, End:

Filter Purpose: All

Invalid: Not Set

Null Code: All

Qualifier Code: All

Comments:

SampleEventId:

Set:

ManufacturerNumber:

Lot:

Max Results: 100

Filter Close

2. The *Filter Details* submenu (Figure 7) is helpful when searching for detailed information for a given filter. Qualifier codes and comments are added in this view. It is possible to search records by Filter Barcode or Filter ID.

Figure 7. Filter details.

Filter Details

Filter Barcode/Id: Go

Id: 6959

ContractorFilterAnalysisId: F007456

ContractorBatchNumber: A0000006

Sampler: 30-049-0004: Seiben Flats, MT (id: 133)

IntendedUseDate: 1/31/2016 12:00:00 AM

SampleStartDate: 1/31/2016 12:00:00 AM

SampleEndDate: 2/1/2016 12:00:00 AM

FilterPurpose: SA - Sample (id: 1)

AqsNullCodeId: Edit AQS Null Code

Invalid: False

QualifierCodes: Edit Qualifier Codes

Filter Type: Teflon

ChannelPosition: 5

SampleVolume: 9.67 m³

AvgFlow: 6.72 LPM

AvgFlowCv: 0.01

AvgAmbTemp: -3.50 °C

AvgBp: 658.00 mm Hg

Analysis Type: XRF

ContractorSampleEventId: Q0672016013101

ContractorSetNumber: 6q

ManufacturerNumber: T6645775

LotNumber: MTLCY2015

Comments: Edit Comments

Edit Back to List

- The *Batches* submenu (Figure 8) includes a list of all shipments received and the corresponding electronic records. Batch Details provides the details of the Batch including Receiving Box and the “Generate XRF Queue” function.

Figure 8. Batch list.

Batches							
	ContractorBatchNumber	BoxReceivedDate	BoxSampleCount	BoxFirstSampleDate	BoxLastSampleDate	BoxReceivedBy	Comments
	A0000001	12/16/2015 8:38:43 PM	346	11/20/2015 12:00:00 AM	12/21/2015 12:00:00 AM	marigaby	Initial import of data received
	A0000002	1/28/2016 9:51:00 AM	2409	11/20/2015 12:00:00 AM	12/14/2015 12:00:00 AM	marigaby	

- The Batch Details submenu is accessed via the Batches submenu and (Figure 10) provides a view of the details for the batch including Teflon count, invalid count, list of samples without barcodes, Box received, and XRF queue file generation.

Figure 9. Batch details.

Batch Details

Receive Box Generate XRF Queue Back to List

Inventory information from COC and integrity check. Enter during Box Receiving

ContractorBatchNumber	A0000040
BoxReceivedDate	4/4/2018 9:45:00 AM
BoxSampleCount	1252
First IntendedUseDate	2/1/2018 12:00:00 AM
Last IntendedUseDate	2/28/2018 12:00:00 AM
BoxReceivedBy	marigaby

Comments: --

Imports (9)		
Type	Date	Records Added / Updated
Filter	4/4/2018	3758 / 0
Flags	4/4/2018	533 / 0
NullCodes	4/4/2018	0 / 129
Filter	4/5/2018	0 / 2
Filter	4/12/2018	0 / 2
Mass	4/13/2018	13 / 0
Filter	4/13/2018	0 / 2
NullCodes	4/13/2018	0 / 1
Filter	4/16/2018	0 / 2

First SampleStartDate	2/1/2018 12:00:00 AM
Last SampleStartDate	2/28/2018 12:00:00 AM
Filter Count	3758 (Blanks: 430)
Invalid Count	126 (3%)
Teflon Count	1252 (Blanks: 143)
Invalid Teflon Count	37 (2%)

Data from electronic records

Sets (18) IntendedUseDates (10) Filters missing Barcodes (0)

- The *Lab Blanks* submenu (Figure 10) can view and generate the electronic records for the laboratory blanks.

Figure 10. Lab Blanks.

Lab Blanks ADD Lab Blank														
	Batch	Sampler	FilterPurpose	AqsNullCode	FilterType	Invalid	IntendedUseDate	SampleVolume	AnalysisType	ContractorFilterAnalysisId	ContractorSampleEventId	ContractorSetNumber	ManufacturerNumber	LotNumber
		LB			Teflon	False			XRF	T6571484		T6571484		MTLKY2015

6. The Sites submenu has a list of all CSN sites.
7. The Archive submenu is used for archiving Batches of Teflon samples as detailed in *UCD CSN SOP #901 Long-Term Archiving of Filters*. Additionally, generating text files for delivering CSN filters to FTIR is listed under the archive submenu.

9.4. Delivering Filters to FTIR

CSN filters are delivered to FTIR following inventory (before XRF analysis). Prior to delivery to FTIR the CSN batch will need to be archived in order to generate the necessary text files. Refer to *UCD CSN SOP #901 Long-term Archiving of Filters* for step-by-step procedure on generating archive boxes and trays.

1. Log-in to the CSN web app at <https://csn.crocker.ucdavis.edu> and select Archive
2. The archive tab will default to Teflon, if it does not then click Teflon (Figure 11)

Figure 11. Teflon Archive

The screenshot shows the CSN Management Site interface. The top navigation bar includes 'Home', 'Analyses', 'Import', and 'Admin'. A secondary navigation bar contains 'Home', 'Filters', 'Filter Details', 'Batches', 'Batch Details', 'Lab Blanks', 'Sites', and 'Archive'. The 'Archive' tab is selected. Below the navigation, the page title is 'Filter Archive Boxes'. There are two tabs: 'Teflon' (highlighted with a red box) and 'Quartz'. An 'Add Box' button is visible. Below the tabs is a table with the following data:

Year	Box Number	BoxLabel	StorageTrays	Created	ArchivedDate
2020	35	CSN Box 35	28	3/4/2020 1:29:33 PM	Details

3. Select the box that contains the trays that will be delivered to FT-IR by clicking on Details, in most cases this will be the box most recently created.
4. From the tray list find the first tray based on the tray label, format CSN Batch ## Tray # (e.g. Batch 63 Tray 1), click details.
5. This opens a detailed filter inventory list, click FT-IR and save the file as a .txt to the following folder U:\FTIR Tray Files from Lab\CSN. The file will auto-save with the following name CSN_SampleList_YYYY_Batch_##_Tray_###.txt
6. Repeat step 5 for all trays within a given CSN batch.
7. Open the txt files in excel and print each document (settings may need to be changed to print each tray list on 1 sheet).
8. Fold and place the sheets inside the zippered plastic bags for each tray.
9. Trays are now ready for delivery to FT-IR and should only be delivered when a laboratory technician is available to sign for them. The FT-IR group will send an email

once CSN trays are ready for pickup. The XRF laboratory technician will sign for any trays picked up for FT-IR.

9.5. XRF Queue Generation

XRF queue files include the BarcodeId, SampleId, and Application information. The sample changer software uses the data within the queue file to link the Filter Analysis Barcode with the Sample identity and the application. The queue file includes all samples regardless of status and may include lab blanks. For additional information regarding generation and uploading queue files to the Epsilon 5 instruments, refer to *UCD CSN TI #302C: Sample Changes for 8-Position Trays*.

9.6. XRF Inventory

Sample information is verified at XRF stations upon loading by scanning directly into the sample changer software for the Epsilon 5 instruments. The laboratory technician will verify individual sample receipt by comparing Filter Analysis Barcode ID with the COC. Record the instrument name, tray and position number for the first and last samples in the XRF tray (Figure 12).

Figure 12. COC with XRF assigned Instrument Name, Tray and Position number.

CSN Laboratory Chain of Custody Form

Ship Date and Name: 3/3/2020 Knoll
 Receive Date and Name: 3/4/2020 C ID: 80am TI
 Analysis Request ID: [Barcode] Intended Sample Date: 1/1/2020
 Set #: 7Q

Barcode/Filter Analysis ID	Filter Type	Analysis Requested	Invalid?
[Barcode] F185715	Teflon	XRF First Sample: Instrument name, tray and position	<input checked="" type="checkbox"/> TI Name AI
[Barcode] F185718	Teflon	XRF	<input type="checkbox"/>
[Barcode] F185721	Teflon	XRF	<input type="checkbox"/>
[Barcode] F185724	Teflon	XRF	<input type="checkbox"/>
[Barcode] F185727	Teflon	XRF	<input type="checkbox"/>
[Barcode] F185730	Teflon	XRF	<input type="checkbox"/>
[Barcode] F185733	Teflon	XRF	<input type="checkbox"/>
[Barcode] F185736	Teflon	XRF Last Sample: Instrument name, tray and position	<input checked="" type="checkbox"/> Name AB
[Barcode] F185739	Teflon	XRF	<input type="checkbox"/>
[Barcode] F185742	Teflon	XRF	<input type="checkbox"/>
[Barcode] F185745	Teflon	XRF	<input type="checkbox"/>

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9.7. Laboratory Blanks

Wood will provide a box of 50 filters every time the Teflon lot changes. The Lab Manager will inform the laboratory technician when to prepare the lab blanks for analysis.

Lab blanks have a manufacturer code (manufacturer serial number), which is also used as the Teflon filter ID, format #####. Generate a barcode sticker for each filter using the Teflon filter ID. Prepare a subset (typically 16 laboratory blanks) to be analyzed by XRF. Refer to *UCD CSN TI #302C: Sample Changes for 8-Position Trays* for further details.

9.8. Quartz filters

Quartz filters are received from Wood in the same shipment as Teflon filters. Shipments are accompanied by a COC specific to filter type. The inventory procedure for quartz filters is described in *UCD CSN TI402A Receiving and Inventorying*.

Samples can be stored as per section 9.9 and archived as per *UCD CSN SOP #901 Long-Term Archiving of Filters*.

9.9. Storage

CSN samples are stored between 0 and 4° C. Two refrigerators are available for CSN sample storage, located in Jungerman Hall room 116. Archive samples for long-term storage after XRF analysis. Refer to *UCD CSN SOP #901: Long-Term Archiving of Filters*.

9.10. Cooler Return

The laboratory technician will prepare and ship the ice packs/coolers back to Wood, using the provided UPS return labels. If labels are not provided, contact Wood for shipping account information.

9.11. XRF Analysis Completeness

When XRF analysis of a batch is completed verify completeness by comparing the number of results generated to the Teflon count received. Check XRF data and verify each sample has a valid XRF result, also check for duplicates. If there are any discrepancies notify the Lab manager.

To check Analysis completeness, go to the website <http://analysis.crocker.ucdavis.edu:3838/csnStatus/>. On the left side of the page, select *Analysis Completeness*, then select the appropriate Year and Month. Review the list *Filters Not Yet Analyzed by XRF*. If any samples are on the list, review the comments and verify the samples were received. Notify the Laboratory Manager of any discrepancies.

To check for duplicate analyses, go to the CSN web app (<https://csn.aqrc.ucdavis.edu/>). Click on “Analyses” and then XRF. From the Batch dropdown select the corresponding batch number and then check the “Has Multiple Analyses” box, then click go. This will display any duplicate analyses for this batch. Only one valid result is allowed for any given sample. Duplicate results should be resolved before data is delivered.

10. QUALITY ASSURANCE AND QUALTY CONTROL

Not Applicable.

11. REFERENCES

Not Applicable.