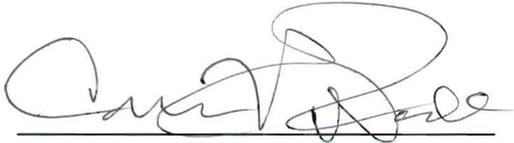


# Standard Operating Procedure for Assigning Data Validation Flags for The Chemical Speciation Network

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\* RTI International is a trade name of Research Triangle Institute.

## Contents

<b>Section</b>	<b>Page</b>
1.0 Procedural Section .....	3
1.1 Purpose.....	3
1.2 Summary of Data Flagging Method .....	3
2.0 Procedure .....	3
2.1 PM <sub>2.5</sub> CSN Custody and Field Data Forms.....	4
2.2 Field Sampling Null Value and Validity Coding Form .....	6
2.3 Level 0 Validation SHAL Form .....	7
2.4 Aliquot Creation Form.....	7
3.0 Invalidation of Data .....	9
4.0 Special Samples, Flags, and Procedures.....	9
4.1 Blanks and Sampling Event Conversions .....	9
4.2 Time, Temperature, and Flow Rate .....	12
4.3 Incomplete Data Recording .....	13
4.4 Alternate Channel Run.....	13
5.0 Summary of Quality Assessments for Data Entry Operations.....	13

## List of Figures

<b>Figure</b>	<b>Page</b>
Figure 1. Chemical Speciation Network Custody and Field Data Form. ....	5
Figure 2. Chemical Speciation Network Field Sampling Null Value and Validity Coding Form .....	8
Figure 3. Chemical Speciation Network Level 0 Validation Form. ....	9
Figure 4. Aliquot Creation Form. ....	11

## List of Tables

<b>Table</b>	<b>Page</b>
Table 1. Acceptance Criteria for Flow Rates.....	13

## **Standard Operating Procedure for Assigning Data Validation Flags for The Chemical Speciation Trends Network**

### **1.0 Procedural Section**

#### **1.1 Purpose**

The Chemical Speciation Network (CSN) is a laboratory program operated for the U.S. Environmental Protection Agency (EPA) by RTI International (RTI). This standard operating procedure (SOP) describes how data validation flags are assigned to field data prior to entering the data into the RTI CSN data base. The data flags and their corresponding validation criteria are described in Section B of the Quality Assurance Project Plan (QAPP) for RTI's Sample Handling and Archiving Laboratory (SHAL). This SOP assumes the use of the current version of the CSN data management system developed for this program. In this SOP, a routine sampling event is defined as any event employing a sampler other than the URG 3000N sampler. Instructions specific to the URG 3000N are identified as such.

The quality control (QC) checks included in this procedure are applied to the information recorded on the field custody forms and the QC forms. These forms will contain documentation generated by both the technicians at the SHAL and the field operators at the sampling sites.

#### **1.2 Summary of Data Flagging Method**

Data sheets received from the field operators contain information used for assigning validation flags and for determining the overall validity status of data for a particular exposure. The data sheets are examined by a senior staff member who assesses the form for completeness and validity, marks any necessary changes, and assigns validation flags based on set criteria. Special instruction and data validation flags are recorded in the comments section of the SHAL validation form. As a QC measure, the assigned data flags and their transfer to the field custody forms are reviewed by another staff member (flag reviewers) before the forms are submitted to the data entry team. All flagging is reviewed by the Quality Assurance Officer (QAO) before reporting to the state agencies.

### **2.0 Procedure**

The following CSN data forms are required for this procedure.

- PM<sub>2.5</sub> Custody and Field Data Form
- Field Sampling Null Value and Validity Coding Form
- Level 0 Validation – SHAL Form
- Aliquot Creation Form.

For a single sampling event, the forms must be stapled together. The preferred order for the stapled forms is as listed above. As noted in the next section, there are slight differences between the forms used for the routine sampling events and events occurring at sites running the URG 3000N sampler. For these samplers, care must be taken to assure not only the use of the appropriate forms but also that each field custody form is attached to its unique QC form(s) and measurement request form.

During the data review, any assigned flags are written in red ink on the field custody form. The reviewer acknowledges the completion of the data flag review by initialing, dating, and checking the appropriate box on the batch identification form.

## 2.1 PM<sub>2.5</sub> CSN Custody and Field Data Forms

The PM<sub>2.5</sub> Custody and Field Data Form (i.e., field custody form) used for routine sampling events is shown in Figure 1. This form will appear first in the stack of forms to be reviewed and processed by the SHAL staff. In order to be more visible to the data entry team, the data validation flags must be copied from the forms at the back of the stack to the field custody form. Two separate field custody forms, which are slightly different from the routine event form, are used to record the data for the sites operating a URG 3000N sampler. Although the data for the Teflon<sup>®</sup> and nylon filters are recorded together on a single form, the data for the quartz filter are recorded on another form. Except for recording the module position for the quartz filter, all other data parameters appearing on the URG 3000N forms are the same as what appears on the form for the routine events. A third field custody form is used to document the occasional 24-hour blank event at the URG 3000N sites.

**Note:** For the URG 3000N data, each sampling event—Teflon<sup>®</sup>/nylon, quartz, and 24-hour blank—must be flagged individually. If a flag for a single event is entered in the “Sampling Event Flags” field in the database, all events will receive that flag. The flag for each event must be entered in the “Channel Flags” field. **This rule is to be followed whether the flag applies to a single event or all events.** The events are linked through a single measurement request identification number, which appears on the Aliquot Creation Form (see Figure 4).

 Q84261F	<b>PM 2.5 CSN CUSTODY AND FIELD DATA FORM</b>	c. White (return to lab) c. Yellow (site retains) c. Pink (lab)						
<b>A. CUSTODY RECORD (Name, Date)</b>		<b>Bin ID:</b> B1649M <b>Set:</b> 3						
1. Laboratory, Out _____		3. Site, Out _____						
2. Site, In _____		4. Lab, In _____						
<b>B. SITE AND SAMPLER INFORMATION</b>								
1. Site AIRS Code <u>123456789</u>		5. Site Name <u>Test Site</u>						
2. Sampler S/N _____		6. Intended date of use <b>Thursday, July 29, 2004</b>						
3. Sampler Type <u>SASS</u>		7. Date of Sampler set-up _____						
4. Sampler POC <u>5</u>		8. Operator's name _____						
<b>C. SAMPLER CHANNEL COMPONENTS</b>								
Channel No.	Component ID No.	Component Description						
1	Kept at Site	SASS cyclone						
1	I3319E	SASS cassette (Teflon filter) (GREEN)						
2	Kept at Site	SASS cyclone						
2	I33207	SASS cassette (MgO denuder, nylon filter) (RED)						
3	Kept at Site	SASS cyclone						
3	I33218	SASS cassette (quartz filter) (ORANGE)						
<b>D. START, END, AND RETRIEVAL TIMES</b>								
Channel No.	Start date	Start time	End date	End time	Retrieval date	Retrieval time		
1								
2								
3								
<b>E. SAMPLER CHANNEL INFORMATION (Post-Sampling)</b>								
Channel No.	Run Time	Run Time, Flag	Sample Volume (m3)	Avg. flow (L/min)	Avg. flow CV (%)	Avg. ambient T (°C)	Max. ambient T (°C)	Min. ambient T (°C)
1								
2								
3								
Channel No.	Δ T Flag	Avg. Filter T (°C)	Max. Filter T (°C)	Min. Filter T (°C)	Avg. BP (mm Hg)	Max. BP (mm Hg)	Min. BP (mm Hg)	
1								
2								
3								
<b>F. Comments</b> _____ _____ _____								

**Figure 1. Chemical Speciation Network Custody and Field Data Form.**

- 2.1.1 Review the field custody form for completeness. If any required data are missing, contact the SHAL Manager, who can either supply the missing data or contact the site operator regarding the data. Based on other information written on the field custody form, certain data can be filled in during the QC check. For example, if missing, the average flow rate can be calculated using the elapsed sampling time and the total sample volume.
- 2.1.2 If data are calculated as noted in Section 2.1.1, assign the "FCE" flag to the affected channel. This code is also used when the field operator records data in the wrong column, and it is then necessary for the data reviewer to make the correction(s).
- 2.1.3 Verify that each sampling component was operated on the correct channel. If channel assignments were changed by the field operator, assign the appropriate "FC" data flag for the altered channel. Include the component ID number.
- 2.1.4 Examine the field custody form to make sure that the data meet the acceptance criteria specified in Section 1.2 of the QAPP.
- 2.1.5 Assign appropriate flags if the data does not meet the QAPP specifications.

**Note:** Most range checking of this type has been converted to automated checking performed by the database software. This checking is run later in the data management process, prior to review by the RTI project QAO.

## 2.2 Field Sampling Null Value and Validity Coding Form

The Field Sampling Null Value and Validity Coding Form is shown in Figure 2. This form contains additional flags assigned to the sampling event by the field operator. The data reviewer from the RTI senior staff may also use this form to indicate validation codes omitted by the field operator.

- 2.2.1 Examine the flag(s) for reasonableness based on information written on the other forms. The flags on this form are a subset of the Air Quality System (AQS) null value codes and AQS validity status codes that are applicable to STN data. To ensure that the flags are seen by the data entry staff, transfer the flags noted here to the field custody form.
- 2.2.2 If the flag(s) applies to all channels, note it on the field custody form as a "Sampling Event" (applicable to routine sampling events only).
- 2.2.3 If the flag applies to a specific channel(s), identify the affected channel.
- 2.2.4 If an event is identified as not having been run, make sure that a notation identifying the invalid channel(s) appears on the field custody form.

### **2.3 Level 0 Validation SHAL Form**

The Level 0 Validation SHAL Form is shown in Figure 3. When coolers arrive from the field, this form is used by the SHAL staff to note the internal temperatures and any additional flags assigned based on unusual physical conditions. Observations will include shipping temperatures out of range, module end caps missing, filters missing, etc.

- 2.3.1 Consider the notes made about the physical conditions of the cooler and assign appropriate flags to the affected channels.
- 2.3.2 Review and transfer to the field custody form any notations made in the comment section by the senior staff.

### **2.4 Aliquot Creation Form**

The Aliquot Creation Form is shown in Figure 4. When incoming modules are disassembled in the SHAL, this form is used by SHAL personnel to record their observations while assigning aliquots. Their notations generally indicate whether valid laboratory aliquots were created for analysis. The information on the form is also used to ensure that the aliquots are distributed to the correct laboratories.

- 2.4.1 Review the comments concerning the aliquot and the analysis of the filters.
- 2.4.2 If a laboratory aliquot number was created, but no sample was sent to the laboratory for analysis, mark the aliquot as invalid.
- 2.4.3 Transfer to the field custody form notations concerning filters that have been invalidated and, as a result, should not be analyzed.

Chain of Custody Sampling Request ID: Q \_\_\_\_\_

Cooler Number: C \_\_\_\_\_

Chemical Speciation Network  
Level 0 Validation - SHAL

Date  
Received  
in SHAL:



Wednesday, May 14, 2008

OBSERVATION	STATUS	FLAG ASSIGNED	COMPONENT ID's FLAGGED
1. Cooler received intact with all ice packs and bin components?	Y / N / NA		
2. Contents received at = 4 degrees C? Time Temp. Measured: _____	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 onto Laboratory Chain of Custody forms?	Y / N / NA		

\_\_\_\_\_ Aliquot flags entered  
 \_\_\_\_\_ Aliquot flags reviewed  
 \_\_\_\_\_ First data entry complete  
 \_\_\_\_\_ Second data entry complete

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\_\_\_\_\_ Signature

\_\_\_\_\_ Date Completed

**Figure 2. Chemical Speciation Network Field Sampling Null Value and Validity Coding Form**

Chain of Custody Sampling Request ID: Q \_\_\_\_\_

Cooler Number: C \_\_\_\_\_

Chemical Speciation Network  
Level 0 Validation - SHALDate  
Received  
in SHAL:

Wednesday, May 14, 2008

OBSERVATION	STATUS	FLAG ASSIGNED	COMPONENT ID's FLAGGED
1. Cooler received intact with all ice packs and bin components?	Y / N / NA		
2. Contents received at = 4 degrees C? Time Temp. Measured: _____	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 onto Laboratory Chain of Custody forms?	Y / N / NA		

\_\_\_\_ Aliquot flags entered

\_\_\_\_ Aliquot flags reviewed

\_\_\_\_ First data entry complete

\_\_\_\_ Second data entry complete

Comments:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_\_\_\_\_\_  
Signature\_\_\_\_\_  
Date Completed**Figure 3. Chemical Speciation Network Level 0 Validation Form.**

### 3.0 Invalidation of Data

Flagged data may optionally be marked as “invalid.” Invalid data are sent to AQS with a null value code, whereas suspicious data receive a validity status code in AQS. The QAO and the state agencies will review the validity status before the data are sent to AQS. Reasons for invalidating an event, channel or aliquot include serious events, such as missing filters, lost shipments, seriously damaged filters, etc. When transferring notations concerning invalidated events, the appropriate billing code (i.e., APB, ANB, SPB, or SNB) must be included as a validation flag to be entered into the database.

### 4.0 Special Samples, Flags, and Procedures

#### 4.1 Blanks and Sampling Event Conversions

Information about sampling events identified as field or trip blanks is not keyed into the database by the data entry team.

- 4.1.1 Write “DO NOT ENTER” across the top of the field custody form for a “blank” sampling event (original or converted).
- 4.1.2 If the blank sampling event is the result of converting a routine sampling event to a blank event, make the changes in the database to reflect the new status for the event.
- 4.1.3 For the URG 3000N, make a notation about the conversion in the comments' field of the database.
- 4.1.4 To show that the status of the converted sample has been changed, initial the bottom of the field custody form.



Measurement Request: R426171

Sampling Request: Q425901

Location: Phoenix Supersite

Sample Date: 11/1/2002

**I1566J SASS cassette (Teflon filter) (GREEN)**

*Teflon Filter*

	<i>Analysis</i>	<i>Laboratory</i>	<i>Aliquot ID</i>
Metals	Trace elements	Chester LabNet	_____
GRAV	Mass - PM2.5	Gravimetric Analysis Lab	_____

**I1567K SASS cassette (MgO denuder, nylon filter) (RED)**

*Nylon Filter*

	<i>Analysis</i>	<i>Laboratory</i>	<i>Aliquot ID</i>
Cations	Cations - PM2.5 (NH4, Na, K)	Ion Analysis Lab	_____
NO3nylo	Nitrate - PM2.5	Ion Analysis Lab	_____
SO4	Sulfate - PM2.5	Ion Analysis Lab	_____

**I1568L SASS cassette (quartz filter) (ORANGE)**

*Quartz Filter*

	<i>Analysis</i>	<i>Laboratory</i>	<i>Aliquot ID</i>
2EXT/O	Organic, elemental, and CO3 carbon Ext2 PM2.5	OC/EC Analysis Lab	_____

*Aliquot Created By:* \_\_\_\_\_

*Creation Date:* \_\_\_\_\_

**Figure 4. Aliquot Creation Form.**

- 4.1.5 If the field operator identifies a sampling event that has been changed to a blank because the event did not run, use the appropriate windows in the database to convert the event to the specified type of blank.
- 4.1.6 Trip and field blanks from the URG 3000N sites that receive data flags must be identified in the database. Use the following steps to process the flagged blanks:
- Enter the identification number for the Teflon<sup>®</sup>/nylon module in the “Component ID” field of the database.
  - Write “TRIP BLANK” or “FIELD BLANK” in the comments field of the database.
  - Enter the same information for the quartz module, including the loading position (i.e., numbered placement of the filter in the cassette).

## 4.2 Time, Temperature, and Flow Rate

Under Section E of the field custody form, flags for run time, elapsed sample time, temperature differences, and flow rate differences noted by the field operator are only entered into the database if acceptable numerical or alpha codes are noted.

- 4.2.1 Draw a single line down through the data column if “zero,” “none,” “no,” or “dashes” are written as data points for these flags.

Table 1 shows the nominal, minimum, and maximum flow rates for each type of sampler and the expected operating channel. If flow(s) noted by the field operator are outside the range, write the data flag for the data point on the field custody form. The data flag for a flow rate that does not meet specification is “AH.”

For the URG 3000N, the “run time,” which is usually expressed by the field operator in minutes, will need to be converted to hours. This conversion is accomplished by dividing the minutes noted by 60. Write the result of the conversion to the left of the indicated run time and then draw a circle around the notation. No flags are to be assessed for converting this data point.

**Table 1. Acceptance Criteria for Flow Rates**

<b>Sampler Type</b>	<b>Operating Channel</b>	<b>Nominal Flow Rate</b>	<b>Minimum Flow Rate</b>	<b>Maximum Flow Rate</b>
FRM	1	16.7	15	18.33
MASS	2 (450)	16.7	15	18.33
	1 (400)	16.7	15	18.33
RASS	1	16.7	15	18.33
	2	7.3	6.57	8.03
	5	7.3	6.57	8.03
	4	16.7	15	18.33
RSPEC	GREEN	16.7	15	18.33
	RED	10	9	11
	ORANGE	10	9	11
SASS	3	6.7	6.03	7.37
	4	6.7	6.03	7.37
	1	6.7	6.03	7.37
	2	6.7	6.03	7.37
URG 3000N	---	± 10% of 22	19.8	24.2

### 4.3 Incomplete Data Recording

It is understood that data entered for the first channel, but not for subsequent channels, are applicable to all of the channels. If the field operator enters data for the first channel, but not for the remaining channels, let the data entry team know that the data points should be entered for all of the channels by drawing an arrow down from the first channel to the last. For this action, record on the field custody form an "FES" data flag.

### 4.4 Alternate Channel Run

If the field operator changes the channel on which the components are run, record an appropriate "FC" flag for the corresponding channel.

## 5.0 Summary of Quality Assessments for Data Entry Operations

In order to assure the accuracy of the data entry operations, data are entered into the database by two different staff members. A third person then uses the database to generate a table of comparison, which shows the agreement between the data points in the two sets of entries. If inconsistencies arise, they are resolved by consulting the original field custody form to determine which of the offending data points needs to be corrected. The comparison table is regenerated and the forms reviewed until there is 100% agreement between the two sets of entries.