

ELECTRONIC IMPORT, VALIDATION, AND VERIFICATION OF TEOM DATA

Purpose This Meteorology and Air Quality Group (MAQ) procedure describes the steps to import the TEOM Electronic Data Deliverable (EDD) into the AIRNET database and evaluate these TEOM field data for acceptance, qualification, or rejection.

Scope This procedure applies to the importation, validation and verification of field data collected by the TEOM.

In this procedure This procedure addresses the following major topics:

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General information about this procedure

Attachments This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	TEOM Field Data Validation and Verification Database Inspection	1

History of revision

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	2/4/02	New document.
1	4/22/05	Update steps for electronic importation and review of data to reflect use of new computerized methods.

Who requires training to this procedure?

The following personnel require training before implementing this procedure:

- Personnel assigned to import and/or evaluate TEOM data
-

Training method

The training method for this procedure is **on-the-job training** conducted by a previously trained individual and is documented in accordance with the procedure for training (MAQ-024).

General information, continued

**Definitions
specific to this
procedure**

TEOM (Tapered Element Oscillating Microbalance): an instrument designed to give real-time mass concentrations of particulate collected when ambient air is drawn through a filter that is continuously weighed.

Electronic Data Deliverable (EDD): The computer-compatible file that is delivered to MAQ.

Validation: A systematic process for reviewing a body of data or a report against a set of criteria to provide assurance that the data or report are adequate for their intended use. Validation consists of data reviewing, screening, checking, auditing, verification, certification, and review.

Verification: The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services or documents conform to specified requirements.

References

The following documents are referenced in this procedure:

- MAQ-Office, "General Office Safety, Security, and Computer Responsibilities for All Employees"
 - MAQ-024, "Personnel Training"
 - AIRNET Database Users Guide
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Note

Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

Importing the TEOM EDD into the AIRNET Database

Description of upload process The EDD is received from the TEOMs via a datalogging system. The data are transferred to the FTP folder on the Users drive. Format and content is defined by the TEOM manufacturer and requires customized Access software to import it into the AIRNET database. The uploading process is described in detail in the AIRNET Database Users Guide.

Steps to import data To import the data, perform the following steps (the order is designed into the database form). Note that query confirmations are not included in steps:

Step	Action
1	Open the AIRNET database using MS Access. From the AIRNET – Main Switchboard, click on the gray button entitled “NonRadNet Operations.”
2	From the NonRadNet – Main Switchboard, select the “Field Sampling: TEOM & TSP” button, which opens the NonRadNet Field Data Management form.
3	Select the blue “Import TEOM data” button, which opens the “NonRadNet Field Data Management – TEOM Data Import” form.
4	From toolbar at the top of the page select: File – Get External Data – Import.
5	Choose the Users Drive/ FTPFILES/ Teom folder and select the folder name for the specific TEOM data.
6	Under Files of Type, select Text Files Select the file to import – Click on the Import button. From the Import Text Wizard screen, select “Delimited” format and click “Next”.
7	On the following screen, choose “Comma” for delimiter type. Then check “First Row Contains Field Names”. Click “Next”. From this screen select “In an Existing Table” and choose the “NRN_TEOM_Import” table to temporarily store the import data. Click “Finish” to store data and exit Import Text Wizard. This returns you to the NonRadNet Field Data Management – TEOM Data Import” screen.
8	Select the appropriate TEOM ID. To associate the TEOM ID with the imported data, click the “Enter TEOM ID in Import Table” button CAUTION: Confirm that the correct TEOM ID is highlighted or ID may be assigned to the incorrect TEOM data!.
9	Click “Transfer from Import to VV Table” which moves the imported data to the Validation and Verification (VV) Table. Click “Clear Import Table”.

Step	Action
10	Repeat steps 4-9 until all desired files have been transferred to the TEOM_VV table. When the import process is completed and the data reside in the TEOM_VV table, you may close the database, or proceed to the V&V process detailed in the next chapter.

**Repeat for
each TEOM
data set**

Repeat the process in the steps above to load the data for each TEOM station.

Checking and Evaluating TEOM Data

Evaluating data

In addition to particulate data requested by the project leader, instrument function parameters are collected and may include main flow rate, auxiliary flow rate, instrument status, percent filter loading, noise, etc. Use the TEOM Field Data Validation and Verification Database Inspection checklist (Attachment 1) to document the checks performed.

Data inspection and evaluation

The field data V&V process has been largely automated within the group's AIRNET database. The specific details of how to use the software to perform these checks are contained in the [AIRNET Database User's Guide](#) and provided via on-line "Help" buttons on the various database forms. The inspections shown below need to be conducted to verify (V), qualify (Q), or reject (R) each data record from each TEOM unit prior to archiving the data.

Elements to check within the data

To check the data, perform the following steps (the order is designed into the database form):

Step	Action
1	From the "NonRadNet Field Data Management" form, select the "TEOM V&V" button, which opens the "NonRadNet Field Data Management – TEOM V&V form." Click on the "TEOM V&V Form" button to print a copy of the checklist to document validation steps.
2	Select the specific TEOM unit (letter) in the TEOM_ID window.
3	Click on the "V&V Table all data for selected sampler" button: <ul style="list-style-type: none"> Review the data for the selected TEOM unit that remain in the V&V table (both verified and unverified), sorted by date and time. Check that the dates appear correct and the times are <i>24-hr clock</i> time format. Exit.
4	Click on the "Procedure MAQ-245 Reviews" button to conduct the specific checks (buttons on the subsequent form are in this order).
5	Select the "Zero/Null Ave Review" button: <ul style="list-style-type: none"> Ensure values are not null or zero. Reject data that have zero values in both the 30-min ave and 24-hr ave. fields by using the "Reject Zero/Null Review Data" button.
6	Select the "Null Review" button: <ul style="list-style-type: none"> Ensure fields are not null. If a null field is present, use the "Null Field Verification" button and check data before and after the null field to determine if data are acceptable.

Checking and Evaluating TEOM Data, continued

Step	Action
7	Select the “Status > 0 Review” button: <ul style="list-style-type: none"> Look for values in the “Status” column not equal to zero. Explanations of status codes are on the form. If anything other than zero is displayed in the status column, qualify or reject these data points in the “Qualifier” column. Use best professional judgement.
8	Select the “Status > 0 Review” button: <ul style="list-style-type: none"> Inspect for significant negative mass concentrations using the button provided. For “30-min Avg” data, negative numbers less than -2 have been determined not to be accurate. Reject those data.
9	Select the “Aux Flow Review” button: <ul style="list-style-type: none"> In general, these numbers should be within 1 lpm of 13.7 lpm. If the flow is between 0.4 and 1 lpm of 13.7 lpm, qualify. If the flow is less than 12.7 or greater than 14.7, lpm, reject the data.
10	Select “Main Flow Review” button: <ul style="list-style-type: none"> Generally, these values should be within 0.1 lpm of 3.0 lpm. Qualify if between 2.7 and 2.9 or between 3.1 and 3.3 lpm. Reject data with main flows less than 2.7 or greater than 3.3 lpm (outside 10% of 3.0 lpm).
11	Select “Total Flow Review” button: <ul style="list-style-type: none"> These should be within 16.7 ± 1.0 lpm according to the instrument manufacturer. Qualify data if less than or equal to ± 1.0 lpm and reject those greater than 1.0 lpm based upon manufacturer’s recommendations. Close this form, returning to the “NonRadNet Field Data Management – TEOM V&V” form.
12	Open the “V&V Table Qualifier Summary” report: <ul style="list-style-type: none"> Review the “Missing Data Status” column and ensure that there are 48 data records for each day. If not, use the “Logbook Inspection” button. Choose the date(s) in question to determine specifically which records are missing and use best professional judgment to comment on the cause.
13	If a determination can not be made regarding missing or questionable data, consult the field logbook. Record pertinent information in the database “Comments” field.
14	If all qualifying and rejecting actions have now been taken, click “Verify all remaining data for the Selected Sampler” button to mark all the rest of the records in the V&V table as “Verified” (V) for the selected TEOM sampler.

Steps continued on next page.

Checking and Evaluating TEOM Data, continued

Step	Action
15	When validation, verification, and qualification of data are complete, move data into the archive table using the “Archive Validated Data” button.
16	“Delete Transferred Validated Data from VV Table” by clicking on the button provided.
17	Complete the form (sign and date) “TEOM Field Data Validation and Verification Database Inspection” (Attachment 1).
18	Return to step 4 above and select another TEOM unit for data verification. Continue until all desired units have undergone V&V and their data are archived.

Records resulting from this procedure

Records

The following records generated as a result of this procedure are to be submitted **annually** as records to the records coordinator:

- TEOM Field Data Validation and Verification Database Inspection

Meteorology and Air Quality Group

TEOM Field Data Validation and Verification Database Inspection

This form is from MAQ-245

07/10/02 version

TEOM Start and End Dates of Data Collected: _____

TEOM Sampler ID: _____ TEOM Location: _____

Data Element Inspected	Inspected in MS Access AIRNET database	Comments	Within expected range, appear normal or qualified	Expected range
FIELD DATA READY FOR V&V				
Date (no null fields, readable format, consistent with collection dates, etc)	Y - N - NA		Y - N - NA	Month, day and year
Time (no null fields, MST, consistent with collection times, etc)	Y - N - NA		Y - N - NA	00:00:00 to 24:59:59
TEOM Sampler ID	Y - N - NA		Y - N - NA	
30-Minute Average Data (no null fields, look for negative numbers)	Y - N - NA		Y - N - NA	
24 Hr Avg MC (no null fields, look for negative numbers)	Y - N - NA		Y - N - NA	---
Total Mass	Y - N - NA		Y - N - NA	Not negative
Status Normal?	Y - N - NA		Y - N	0 - Normal > 0 - Abnormal
Filter Loading	Y - N - NA		Y - N - NA	1-100%
Comments included	Y - N - NA		NA	---
Auxiliary Flow	Y - N		Y - N - NA	13.7 ± 1 lpm
Main Flow	Y - N		Y - N - NA	3.0 ± 0.1 lpm
Total Flow (Auxiliary + Main flows)	Y - N		Y - N - NA	16.7 ± 1.0 lpm
Mass Concentration fairly consistent?	Y - N - NA		Y - N - NA	---
Data Qualifiers in use	Y - N		NA	Q or R
Field logbook entries in database?	Y - N - NA		NA	---
Move to archive table	Y - N			---

Verified by:

Signature

Name (print)

Date