



**STANDARD OPERATING PROCEDURE FOR:
AIR DATA TRANSFER TO EQ_uIS™ AND AQS DATABASES**

TVA-KIF-SOP-45

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for
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1.0 PURPOSE

This standard operating procedure (SOP) provides the general technical requirements and operational guidelines for the proper transfer of ambient air monitoring data collected for the Kingston Fossil Plant (KIF) Ash Recovery Project. The ambient air data are loaded into the EQuIS™ database and submitted to the U.S. Environmental Protection Agency's (EPA's) Air Quality System (AQS) database. These procedures have been developed to identify the sources of air data, establish the expected deliverables from these sources and the parties responsible for delivery, and to ensure the correctness and completeness of the final ambient air monitoring data.

2.0 GENERAL CONSIDERATIONS

Prior to data collection, personnel review project work control documents such as the site-specific *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Ash Recovery Project* (TVA-KIF-QAPP, 2009), *Data Management Plan for the Tennessee Valley Authority Kingston Ash Recovery Project* (TVA-KIF-DMP-001, 2009), *Ambient Air Monitoring Plan For the TVA Kingston Fossil Plant Fly Ash Release Remediation* (AAMP, 2010), relevant SOPs, and data specifications. These documents determine the activity-specific collection procedures (unless otherwise noted), define project and program quality assurance/quality control (QA/QC) requirements, and specify data deliverable formatting.

Several teams are involved in the collection, validation, and transfer of air data as defined below. Key contact information for the following teams is provided in Table 1.

- **Air Sample Team** – Collects instrument downloads and filter-based media.
- **TVA Air Team** – Collects and validates meteorological and continuous particulate matter (PM) data; transfers and submits the data to the Data Management Team and AQS, respectively. Conducts QA/QC review of filter-based gravimetric and metals data for compliance with the Federal Reference Methods, reaches consensus on the correctness and usability of the data with the Data Management Team, and submits filter-based PM analytical laboratory data to AQS. Team consists of Environmental Permitting and Compliance Support Manager and support personnel.
- **Project Air Team** – Provides oversight of Air Sample Team and field collection activities; and coordinates supplies, schedules, and analytical needs with the gravimetric and metals analytical laboratories. Team consists of the Onsite Air Manager and support personnel.
- **QA/QC Team** – Performs secondary review of instrument downloads and analytical laboratory data. Conducts QA/QC review of filter-based gravimetric, metals, and silica data for usability and method compliance and reaches consensus on the correctness and

usability of the data with the TVA Air Team for filter-based gravimetric and metals data. Team consists of QA/QC Lead and support personnel.

- **Data Management Team** – Performs completeness and correctness of electronic data deliverables (EDDs) and loads data into EQUIS™ (an environmental data management software with analysis and visualization capabilities). Submits filter-based metals analytical laboratory data to AQS. Team consists of the Data Management Lead, Data Project Manager, QA specialists, and data processors.

The Data Management Team is responsible for overall implementation of this procedure and compliance with current standards. The TVA Air Team is responsible for notifying the teams of changes and upgrades in the Agilaire™ E-DAS database, Central Data Exchange (CDX), and EPA's AQS database. The intent is to ensure consistent and timely delivery of ambient air monitoring data to the EQUIS™ and AQS databases.

3.0 PROCEDURES

The following sections describe procedures for delivery and loading of air data into EQUIS™ and submittal of ambient air data to AQS. Any variation in these procedures is approved by the Project Manager and QA Officer and is fully documented. Work progresses as deviations are approved or resolved.

To provide data on air quality for the KIF Ash Recovery Project, air data are collected from meteorological towers, continuous PM monitors, and filter-based samplers which provide PM and metals data. Data transfer procedures for each of these air systems are presented below.

3.1 Meteorological Data Transfer

This section describes the procedures required for transferring meteorological data into the EQUIS™ and AQS databases.

3.1.1 Collection of Meteorological Tower Data

Meteorological instruments collect data on temperature and humidity at the 2-m level; wind speed, direction, variability, and gusts at the 10-m level; and precipitation at ground level. Meteorological data from these instruments are downloaded from the meteorological tower data loggers hourly via internet protocol (IP) addressable wireless cellular modem links. LoggerNet software uses error-checking protocols to ensure data integrity during the download process. Data are stored on the polling computer and automatically copied to shared drives ([\\knxpgfp16\kif_emt\kifmet](#)), and to project file transfer protocol (ftp) (password-protected area in TVA's ftp site info.tva.gov), and to the TVA KIF Ash Recovery public website following download.

3.1.2 QA/QC of Meteorological Data

Once a month the data, pertinent calibrations, quarterly internal instrument audits, and field notes, are reviewed following TVA's *Quality Assurance Instruction—Validation of Continuous Aerometric Data* (2000) and flagged following EPA quality-assurance guidance (*Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements*, EPA, Jan 2008) by the TVA Air Team. The data and flags are combined and reformatted as an EDD file for input to the EQuIS™ and AQS databases.

3.1.3 Correctness, Reasonability, and Completeness Tests

After QA/QC review by the TVA Air Team, the meteorological EDD is forwarded to TVAEDD@envstd.com and tested for correctness as follows.

- a. Meteorological data are converted into a format compatible with EQuIS™ by the TVA Air Team and forwarded to TVAEDD@envstd.com. The EDD is delivered on a monthly basis and conforms to the requirements established in the *Meteorological Data Basic Results Specification* (Environmental Standards, Inc., 2010).
- b. Once received, the meteorological EDD is tested by the Data Management Team against specification requirements. EDDs which fail correctness are forwarded on an on-going basis to the TVA Air Team for correction. Once errors identified by Data Management Team have been corrected, TVA Air Team re-issues the EDD to TVAEDD@envstd.com. This process is repeated until the EDD passes the correctness test.
- c. The Data Management Team tests the meteorological EDD for the following reasonability and completeness tests:
 - Relative humidity >0% and <103%,
 - Hourly rain >2 inches,
 - Ambient temperature > negative 10°F and <110°F,
 - Wind speed \geq 0 mph and <50 mph, and
 - Wind direction \geq 0° and <360°.
- d. The TVA Air Team and Project Air Team are notified of the results of the reasonability tests (pass or fail). If data points do not pass reasonability testing, the Data Management Team compiles a list of those points which require action and forwards to the TVA Air Team for resolution on an ongoing basis.

3.1.4 Meteorological EDD Transfer into EQUIS™ and AQS

Once the meteorological EDD has been formatted and completed QA/QC review, reasonability, and completeness evaluation, the data are transferred to the EQUIS™ and AQS databases.

- a. The meteorological EDD is loaded into the EQUIS™ database after passing reasonability and completeness tests.
- b. For AQS, site-specific codes are included for each monitor file by the TVA Air Team. The monitor file is configured and formatted according to specifications in the *AQS Data Coding Manual* and is saved as a text file.
- c. The monitor file is loaded into AQS through EPA's CDX database. A batch session is then initiated in AQS where error checks and statistical analyses are performed prior to data production posting. Data are submitted to AQS and post production reports are retrieved to verify successful AQS submittal.

3.2 Transfer of Continuous Particulate Matter (PM) Data

This section describes the procedures required for transferring continuous PM data (from Tapered Element Oscillating Microbalances [TEOMs], Beta Attenuation Mass Monitors [BAMs], and/or similar continuous Federal Equivalent Method instruments) into the EQUIS™ and AQS databases. Figure 1 provides a cross-functional flow chart of how the continuous PM and meteorological data are transferred.

3.2.1 Collection of Continuous PM Data

Continuous PM instruments are designed to measure PM_{2.5} (PM_{2.5} is particulate matter ≤ 2.5 micrometers in aerodynamic diameter) or PM₁₀ (PM₁₀ is particulate matter ≤ 10 micrometers in aerodynamic diameter). Data are recorded onsite by data loggers from instrument analog and/or serial outputs (TVA R&TA SDP-10.1, 2004). The data loggers and/or instruments are polled by a central computer where telemetry is utilized for acquiring both analog and serial data. Manual connection to the instrument is conducted periodically to record actual display and operating parameters. Systems are designed so that air team personnel at KIF, Muscle Shoals, and remote locations have access to data from shared drives (\\knxpgfp16\kif_emt\KIF_PM_TEOM) and ftp websites instrument links and data (<ftp://kgwastra@info.tva.gov>).

3.2.2 QA/QC of Continuous PM Data

Frequent data integrity checks are conducted on raw continuous PM data by the TVA Air Team.

- a. Routine values are invalidated or flagged for periods during audits, calibrations, maintenance, power fails, and other exceptional events (EPA 40 Code of Federal

Regulations [CFR] Part 50, Appendix L, 2009; 40 CFR Part 53, 53.50-53.59, 2009; 40 CFR Part 58, Appendices A and C, 2009).

- b. Data verification is performed by comparing reported values to criteria that identify whether the data are within acceptable range.
- c. Questionable data are evaluated to identify underlying causes. Data are invalidated with null codes according to the specifications in *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II*, Section 17 (EPA, 2008). Invalid data are not used in calculations.
- d. Flagged data are used in calculations and accompanied by a qualifier code documenting the circumstances in accordance with information from telemetry, site logbooks, and operator message logs.

3.2.3 Correctness, Reasonability, and Completeness Tests

Following QA/QC review by the TVA Air Team, the continuous PM data are further evaluated for correctness, reasonability, and completeness.

- a. Continuous PM data are converted into a format compatible with EQuIS™ by the TVA Air Team and forwarded to TVAEDD@envstd.com. The EDD is delivered on a monthly basis and conforms to requirements established in the *Continuous Particulate Matter Basic Results Specification* (Environmental Standards, Inc., 2010).
- b. Upon receipt, the continuous PM EDD is tested by the Data Management Team against the specification requirements.
- c. EDDs which fail correctness are forwarded to the TVA Air Team on an ongoing basis for correction. Once errors identified by the Data Management Team have been corrected, the TVA Air Team re-issues the EDD to TVAEDD@envstd.com. This process is repeated until the EDD passes the correctness test.
- d. The Data Management Team tests the continuous PM EDD for the following reasonability and completeness tests:
 - Null values assigned a valid null code,
 - Valid date/time stamps on data records,
 - Continuous PM_{2.5} concentrations not to exceed the National Ambient Air Quality Standards,
 - Continuous PM concentrations no lower than negative 10 µg/m³, and
 - No more than three repeating results.
- e. The TVA Air Team and Project Air Team are notified of the results of the continuous PM reasonability tests (pass or fail). If data points do not pass

reasonability, the Data Management Team compiles a list of those points which require action and forwards to the TVA Air Team for resolution on an ongoing basis.

3.2.4 Continuous PM EDD Transfer into EQuIS™ and AQS

Once the continuous PM EDD has been formatted and completed QA/QC review, reasonability, and completeness evaluation, the data are transferred to the EQuIS™ and AQS databases.

- a. The continuous PM EDD is loaded into EQuIS™ after passing reasonability and completeness tests.
- b. For AQS, site-specific codes are included for each monitor file. The monitor file is configured and formatted according to specifications in the *AQS Data Coding Manual* and is saved as a text file.
- c. The monitor file is loaded into AQS through EPA's CDX database. A batch session is then initiated in AQS where error checks and statistical analyses are performed prior to data production posting. Data are submitted to AQS, and post production reports are retrieved to verify successful AQS submittal.

3.3 Transfer of Filter-Based Gravimetric Data

This section describes the procedures required for transfer of filter-based gravimetric data from a process wherein pre-weighed filters are placed in air samplers, exposed to an airstream, and then removed from instruments and subsequently analyzed in a laboratory for PM_{2.5} and PM₁₀ mass by difference. Figure 2 provides a cross-functional diagram showing the transfer steps for filter-based gravimetric data.

3.3.1 Collection of Filter-Based Samples for Gravimetric Analysis

Twenty-four-hour (24-hr) air samples are collected onto 46.2-mm Teflon filters. The pre-weighed 46.2-mm filters collect particulates using low-volume (16.67 L/min) air sampling instruments configured for cut points of PM_{2.5} or PM₁₀ (refer to details in *PM_{2.5} and PM₁₀ Air Monitoring Using Low-Volume Sampler* SOP [TVA-KIF-SOP-55]). Sample parameters referred to as “instrument download files” are electronically collected from air sampling instruments. Downloaded data file contained in the instrument download files includes the following:

- Instrument component identification,
- Sample filter identification,
- Total sample collection time,
- Total sample volume,
- Error flags (if present),

- Sampler set flow rate,
- Average sample collection flow rate,
- Minimum, maximum, and average ambient temperature and barometric pressure during the sample collection period,
- Coefficient of variation for the flow rate,
- Start and stop sample collection time (recorded in Local Standard Time), and
- Five-minute average barometric pressure, ambient temperature, filter temperature, and flow rate for the sample collection period.

Other pertinent field conditions are recorded on the “instrument data report” by the Air Sample Team according to *Quality Assurance Guidance Document 2.12* (EPA, 1998). The instrument data report contains the following information:

- The same information contained in the instrument download except for five-minute averages,
- Filter comments and sample comments,
- Leak test information,
- Ambient and filter temperature, barometric pressure, and flow verification, and
- QC information.

The filters are removed at this time and sent in a cooler to the laboratory for gravimetric (mass) analysis. Instrument download files and instrument data reports accompany the filters to the laboratory. Results from the laboratory are called “analytical laboratory data.”

3.3.2 Transfer of Low-Volume Instrument Downloads

This section describes the procedures for preparing the instrument downloads from the filter-based low-volume instruments for transfer into EQUIS™ and AQS.

3.3.2.1 QA/QC of Instrument Downloads

Instrument downloads are used to verify the accuracy of the information contained in the instrument data reports. Portions of this process occur simultaneously with actions in Section 3.3.3.

- a. The Air Sample Team uploads the instrument downloads (or recorded run data) to the server (<https://ims.shawgrp.com/TVA/Login.aspx?ReturnUrl=%2fTVA%2fDefault.aspx>) within 24 hours after sample collection. Once on the server, the Air Sample Team reviews the data for completeness, reasonability (values within appropriate ranges), and validating to raw data sources.
- b. After completion of this review, the Air Sample Team releases and forwards a field data package to the analytical laboratory, QA/QC, and TVA Air Teams within 72 hours of sample shipment. This field data package includes instrument download files and instrument data reports.

- c. The QA/QC Team performs a review of the instrument download files and the instrument data reports. The review is completed within one business day of receipt of the instrument downloads and instrument data reports.
- d. The QA/QC Team immediately notifies the Air Sample and TVA Air Teams if information contained in the instrument data report cannot be duplicated and verified. Corrections to the instrument data report are made by the Air Sample Team and resubmitted. This process is repeated until information contained in the instrument data report appear correct and complete as determined by the QA/QC Team.
- e. The QA/QC Team notifies the TVA Air Team, the Air Sample Team, and the analytical laboratory when the instrument data report appear correct and complete (“finalized”) as confirmed by the QA/QC Team.
- f. The QA/QC Team compiles a summary of instrument data reports and field collection issues identified during the review process for internal use during the data validation process.
- g. The Air Sample Team submits finalized instrument data report summaries as an EDD to TVAEDD@envstd.com. The EDD conforms to the requirements established in the *Sample Parameter Specification* (Environmental Standards, Inc., 2009).
- h. Once received, the instrument data report EDD is tested by the Data Management Team against the formatting requirements. EDDs which fail correctness are forwarded on an on-going basis to the Air Sample Team for correction. This process is repeated until the EDD passes the correctness test.
- i. Upon successful correctness testing, the instrument download EDD is loaded into EQuIS™.

3.3.3 Transfer of Filter-Based Analytical Laboratory Gravimetric Data

The filters from the low-volume air sampling instruments are sent to a laboratory for gravimetric analysis. This section describes the procedures required for QA/QC review and preparation of filter-based analytical laboratory gravimetric data for EQuIS™.

3.3.3.1 QA/QC Review of Analytical Laboratory Gravimetric Data

Within five business days of receipt of the filter-based samples, instrument downloads, and instrument data reports, the analytical laboratory issues the EDD and limited results hardcopy to the QA/QC, Data Management, and TVA Air Teams. The analytical laboratory forwards the EDD, which conforms to the requirements specified in the *Simple EDD Specification* (Environmental Standards, Inc., 2009) to TVAEDD@envstd.com and a limited data deliverable to TVA_Deliverables@envstd.com. The analytical laboratory also

forwards both the EDD and limited data deliverable to the TVA Air Team at mlvalente@tva.gov and mfbroder@tva.gov.

This section describes the process by which the QA/QC Team reviews filter-based analytical laboratory data, including the EDD and limited data deliverable.

- a. Upon receipt of the analytical laboratory EDD, the Data Management Team tests the correctness and completeness of analytical laboratory EDD against the specification requirements.
- b. EDDs which fail completeness and correctness are forwarded to the analytical laboratory for correction. Once errors identified by the Data Management Team have been corrected, the laboratory re-issues the EDD and the limited data deliverable, if necessary, to the Data Management and the TVA Air Teams. This process is repeated until the EDD conforms to requirements set forth in the *Simple EDD Specification*.
- c. Analytical laboratory EDDs that pass correctness and completeness testing are loaded into EQUIS™ and set to “Draft” status.
- d. Manual verification is performed on the data reported in the EDD and limited data deliverable. During verification, the laboratory-reported sample and QC results are reviewed to ensure these results have been reported consistently. In addition, the laboratory-reported QC data are compared to the QAPP-specified and method-specified acceptance criteria.
- e. If errors or issues are noted with the data in the EDD or limited results hardcopy during the manual verification process, the laboratory must reissue/revise the EDD and/or the limited results report. Once errors identified by the Data Management or QA/QC Team have been corrected, the laboratory re-issues the EDD and/or limited results hardcopy to the Data Management and TVA Air Teams. This process is repeated until the issues/errors identified in the EDD and/or limited results hardcopy are corrected.
- f. Data qualifiers are added to the database when QC sample results are not within the QAPP-specified, method-specified or EPA’s *Guidance on Data Verification and Data Validation* (2002) acceptance criteria. Guidelines used during data review are described in the QAPP.
- g. Once appropriate data qualifiers have been added to the database, the data are set to “Verified” status by Chain of Custody (COC).
- h. Once a COC is set to “Verified” status, validation commences upon receipt of the full data package deliverable, field service reports, instrument downloads, and other applicable field and instrument data. During validation, field data are reviewed

against the validation templates in *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II*, Appendix D (EPA, 2008). Laboratory data are reviewed for completeness of data deliverables, correctness of the reported investigative sample and QC sample results, compliance with the published analytical method and QAPP, and usability of the results with guidance from the EPA's *Guidance on Environmental Data Verification and Data Validation* (2002).

- i. If missing deliverables or issues/errors are noted within the full data deliverable, the laboratory must reissue/revise all or part of the full data deliverable and/or the EDD if the missing items or issues/errors affect data reported on the EDD.
- j. Validation null codes and AQS qualifiers are added to the database when laboratory and/or field QA/QC are not within acceptance criteria according to the published analytical method, the QAPP, or applicable EPA guidance documents.
- k. Once appropriate null codes and AQS qualifiers have been added to the database, the data are set to "Validated" status by COC.

3.3.4 Submittal of Instrument Data Reports and Analytical Laboratory Gravimetric Data to AQS

Once analytical laboratory gravimetric data and instrument data reports have been formatted and completed QA/QC review, reasonability, and completeness evaluation, the data are transferred to the AQS database.

3.3.4.1 Reconciliation of Null Codes and AQS Validation Qualifiers

Prior to submission to AQS, the QA/QC and TVA Air Teams perform a reconciliation of the concentrations and the AQS qualifiers.

- a. Upon completion of validation by the QA/QC Team, the Data Management Team generates a final dataset for review by the TVA Air Team. The dataset includes sample concentrations and AQS qualifiers assigned by the QA/QC Team, sample comments, and field parameter data.
- b. The TVA Air Team compares the dataset generated during its review to the dataset generated by the Data Management Team to identify discrepancies. When discrepancies are observed, the TVA Air Team issues a summary to the QA/QC Team for review and resolution. When the datasets are consistent (that is, no discrepancies are observed), the TVA Air Team advises the QA/QC Team that the data are final.
- c. Once data are final, the TVA Air Team generates the AQS deliverable. For AQS, site-specific codes are included for each monitor file. The monitor file is configured and formatted according to specifications in the *AQS Data Coding Manual* and is saved as a text file.

- d. TVA Air Team loads the monitor file into AQS through EPS's CDX database. A batch session is then initiated in AQS where error checks and statistical analyses are performed prior to data production posting. Data are submitted to AQS, and post production reports are retrieved to verify successful AQS submittal.

3.4 Transfer of Filter-Based Metals Data

This section describes the procedures required for transfer of filter-based metals data from a process wherein filters are placed in air samplers, exposed to an airstream, and then removed from instruments and subsequently analyzed in a laboratory for metals (EPA Method IO-3.5, 1999). Figure 3 provides a cross-functional flow diagram of the transfer of data for the filter-based metals data.

3.4.1 Collection of Filter-Based Samples for Metals Analysis

Twenty-four-hour (24-hr) air samples are collected onto 8-by-10-inch quartz filters. These air samples are collected using high-volume instruments configured for high-volume PM₁₀ sampling (HVPM10; operating range of 1,020 – 1,240 L/min) and total suspended particulates (TSP) (operating range of 1,100 – 1,700 L/min) which are subsequently analyzed for metals and silica (refer to details in *PM₁₀ Air Monitoring Using High-Volume Samplers* SOP [TVA-KIF-SOP-52] and *TSP Air Monitoring Using High-Volume Samplers* SOP [TVA-KIF-SOP-53]). High-volume instrument flow data are calculated from flow recorder charts and monthly calibration information (for HVPM10 instruments) and by using a manometer and lookup tables (for TSP instruments) (Tisch Environmental, Inc. *Operating Manual for TE-6000 Series PM10, Particulate Matter 10 Microns and less High Volume Air Sampler*, and Tisch Environmental, Inc. *Operations Manual for TE-5170-DV-BL Total Suspended Particulate, Brushless VFC High Volume Air Sampler*) following the 24-hr sample collection by the Air Sample Team according to *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II* (EPA, 2008), TVA-KIF-SOP-52, and TVA-KIF-SOP-53. The filter is removed and sent to the laboratory for metals analysis along with the instrument data reports and flow recorder charts (paper chart which provides a reading of the mass-flow controller for the HVPM10 instrument and verifies flow of the TSP instrument).

Transfer of the operating parameters and metals analyses and the subsequent transfer of the data into EQUIS™ and AQS are presented below.

3.4.2 Transfer of High-Volume and TSP Instrument Downloads to EQUIS™

This section describes the procedures for preparing the instrument data reports for the filter-based high-volume instruments for transfer into EQUIS™.

3.4.2.1 QA/QC Instrument Data

The instrument data undergoes QA/QC review before upload and submittal to EQUIS™. Portions of this process occur simultaneously with actions in Section 3.4.3.

- a. The Air Sample Team calculates the total volume for the HVPM10 and TSP air sampling instruments using flow recorder charts and monthly calibration information (for HVPM10 instruments) and by using a manometer and lookup tables (for TSP instruments) and ambient air conditions (temperature and pressure during the 24-hour sample collection period). Total volume calculations are reported and contained in the instrument data reports.
- b. The Air Sample Team uploads the instrument data report to the server (<https://ims.shawgrp.com/TVA/Login.aspx?ReturnUrl=%2fTVA%2fDefault.aspx>) within 24 hours after sample collection. Once on the server, the Air Sample Team reviews the data for completeness, reasonability (values within appropriate ranges), and validating to raw data sources.
- c. The Air Sample Team releases and forwards these calculations and sample parameter information contained in the instrument data report to the analytical laboratory and QA/QC team within 24 hours of sample shipment. This data package also includes the flow recorder charts.
- d. The QA/QC Team performs a review of the instrument data reports and the calculations contained in those reports. The review is completed within one business day of receipt of the instrument data report.
- e. The QA/QC Team immediately notifies the Air Sample Team if information contained in the instrument data report cannot be duplicated and verified. Corrections to the instrument data report are made by the Air Sample Team and resubmitted. This process is repeated until information contained in the instrument data report appear correct and complete as determined by the QA/QC Team.
- f. The QA/QC Team notifies the Air Sample Team and the analytical laboratory when the instrument data report appear correct and complete (“finalized”) as confirmed by the QA/QC Team.
- g. The QA/QC Team compiles a summary of instrument data reports and field collection issues identified during the review process for internal use during the data validation process.

- h. The Air Sample Team submits finalized instrument data reports as an EDD to TVAEDD@envstd.com. The EDD shall conform to the requirements established in the *Sample Parameter Specification* (Environmental Standards, Inc., 2009).
- i. Once received, the instrument download EDD is tested by the Data Management Team against the specification requirements. EDDs which fail correctness are forwarded on an on-going basis to the Air Sample Team for correction. This process is repeated until the EDD passes the correctness test.

3.4.3. Transfer of Filter-Based Analytical Laboratory Metals Data

The filters from the high-volume and TSP air sampling instruments are sent to a laboratory for metals analysis. This section describes the procedures required for QA/QC review and preparation of filter-based analytical laboratory metals data for EQUIS™ and AQS.

3.4.3.1 QA/QC Review of Analytical Laboratory Metals Data

Within five business days of receipt of the filter-based samples, instrument downloads and field service reports, the analytical laboratory reports initial results to the QA/QC and Data Management Teams as an EDD and a limited results hardcopy. The analytical laboratory forwards the EDD, which conforms to the requirements specified by the *Simple EDD Specification* (Environmental Standards, Inc., 2009) to TVAEDD@envstd.com and a limited data deliverable to TVA_Deliverables@envstd.com.

This section describes the QA/QC review process of filter-based analytical laboratory data, including the EDD, limited results and hard copy reports.

- a. Upon receipt of the analytical laboratory EDD, the Data Management Team tests the correctness and completeness of the EDD against the specification requirements.
- b. EDDs which fail completeness and correctness are forwarded to the analytical laboratory for correction. Once errors identified by the Data Management Team have been corrected, the laboratory re-issues the EDD and the limited data deliverable, if necessary, to the Data Management Team. This process is repeated until the EDD conforms to specification requirements.
- c. Analytical laboratory EDDs that pass correctness and completeness testing are loaded into EQUIS™ and set to “Draft” status.
- d. Manual verification is performed on the data reported in the EDD and limited data deliverable. During verification, the laboratory-reported sample and QC results are reviewed to ensure these results have been reported consistently. In addition, the laboratory-reported QC data are compared to the QAPP-specified and method-specified acceptance criteria.

- e. If errors or issues are noted with the data in the EDD or limited results hardcopy during the manual verification process, the laboratory must reissue/revise the EDD and/or the limited data deliverable. Once errors identified by the Data Management or QA/QC Team have been corrected, the laboratory re-issues the EDD and/or limited data deliverable to the Data Management Team. This process is repeated until the issues/errors identified in the EDD and limited data deliverables are corrected.
- f. Data qualifiers are added to the database when QC sample results are not within the QAPP-specified or method-specified acceptance criteria as specified in the QAPP, the published analytical method, or EPA's *Guidance on Data Verification and Data Validation* (2002). Guidelines used during data review are described in the QAPP.
- g. Once appropriate data qualifiers have been added to the database, the data are set to "Verified" status by Chain-of-Custody (COC).
- h. Once a COC is set to "Verified" status, validation commences upon receipt of the full data deliverable, flow recorder charts, and other applicable field and instrument data. During validation, field data are reviewed against the validation templates in *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II*, Appendix D (EPA, 2008). Laboratory data are reviewed for completeness of data deliverables, correctness of the reported investigative sample and QC sample results, compliance with the published analytical method and QAPP, and usability of the results with guidance from the EPA's *Guidance on Environmental Data Verification and Data Validation* (2002).
- i. If missing deliverables or issues/errors are noted within the full data deliverable, the laboratory must reissue/revise all or part of the full data deliverable and/or the EDD if the missing items or issues/errors affect data reported on the EDD.
- j. Data qualifiers and AQS qualifiers are added to the database when laboratory and/or field QA/QC are not within acceptance criteria according to the published analytical method, the QAPP, or applicable EPA guidance documents.
- k. Once appropriate data qualifiers and AQS qualifiers have been added to the database, the data are set to "Validated" status on a COC basis.

3.4.4 Submittal of Analytical Laboratory Metals and Instrument Downloads to AQS

Once analytical laboratory metals data and instrument data have been formatted and completed QA/QC review, reasonability, and completeness evaluation, the data are submitted to the AQS database.

3.4.4.1 Review of Concentration Data Prior to AQS Submittal

Prior to submission to AQS, the QA/QC and TVA Air Teams perform a reasonability check of the metal concentrations.

- a. Upon completion of validation, by the QA/QC Team, the Data Management Team generates a final dataset for submission to AQS.
- b. The TVA Air Team reviews the dataset for submission to AQS with respect to historical project and regional data and screening levels of constituents of potential concern (COPCs) used by the project. The TVA Air Team may make expert recommendations regarding data quality, data variability, the impact of events or activities on the data, COPCs, the identification of outliers, and sampling protocol.
- c. Once the factors, if any, contributing to outliers have been identified, the Data Management Team generates the AQS deliverable. For AQS, site-specific codes are included for each monitor file. The monitor file is configured and formatted according to specifications in the *AQS Data Coding Manual* and is saved as a text file.
- d. The monitor file is loaded into AQS through EPS's CDX database. A batch session is then initiated in AQS where error checks and statistical analyses are performed prior to data production posting.
- e. Data are submitted to AQS, and post production reports are retrieved to verify successful AQS submittal.

4.0 REFERENCES

- Environmental Standards, Inc. *Sample Parameter Specification*; September 2009.
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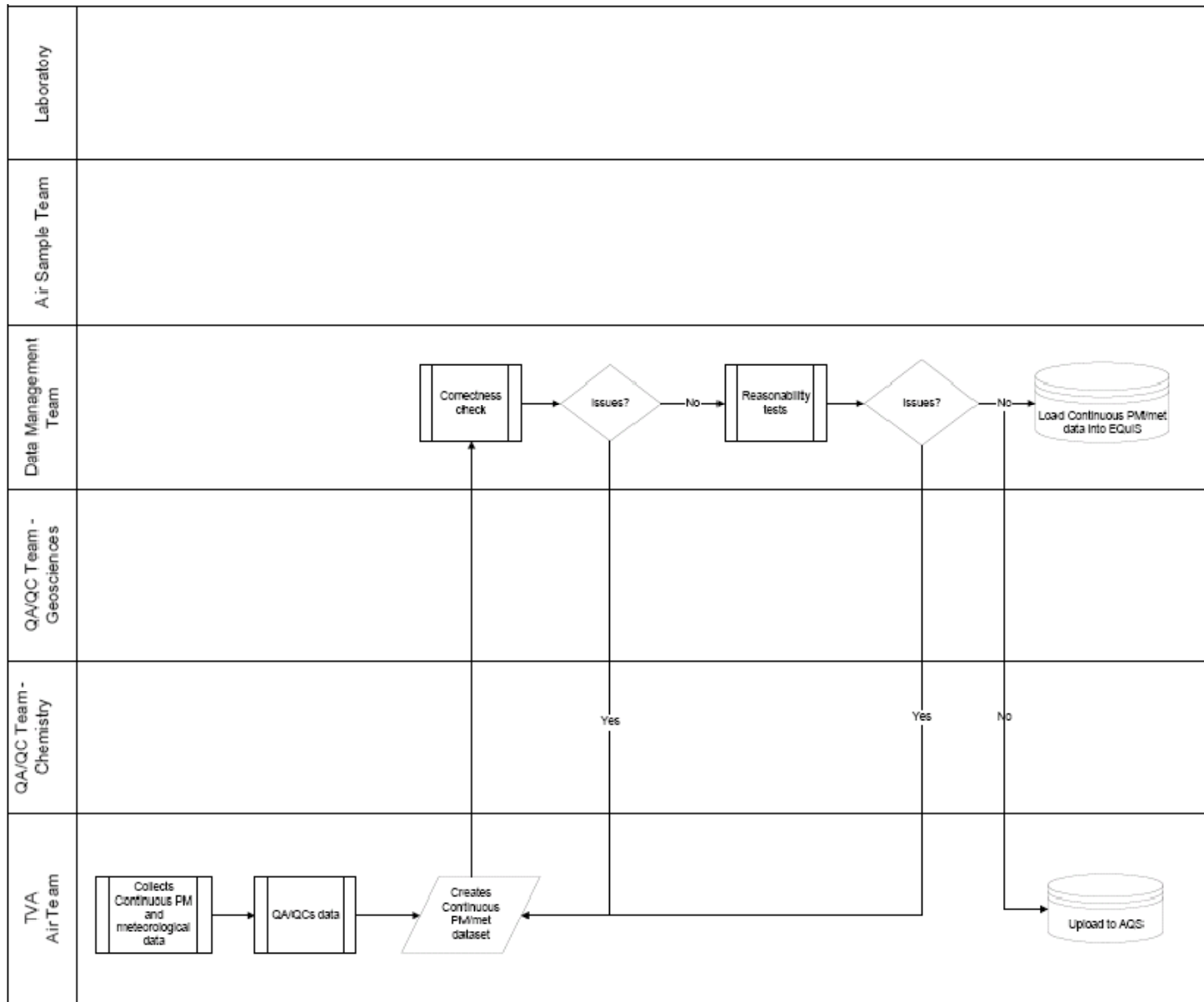


Figure 1. Continuous Particulate Matter and Meteorological Data Cross-Functional Flow Chart.

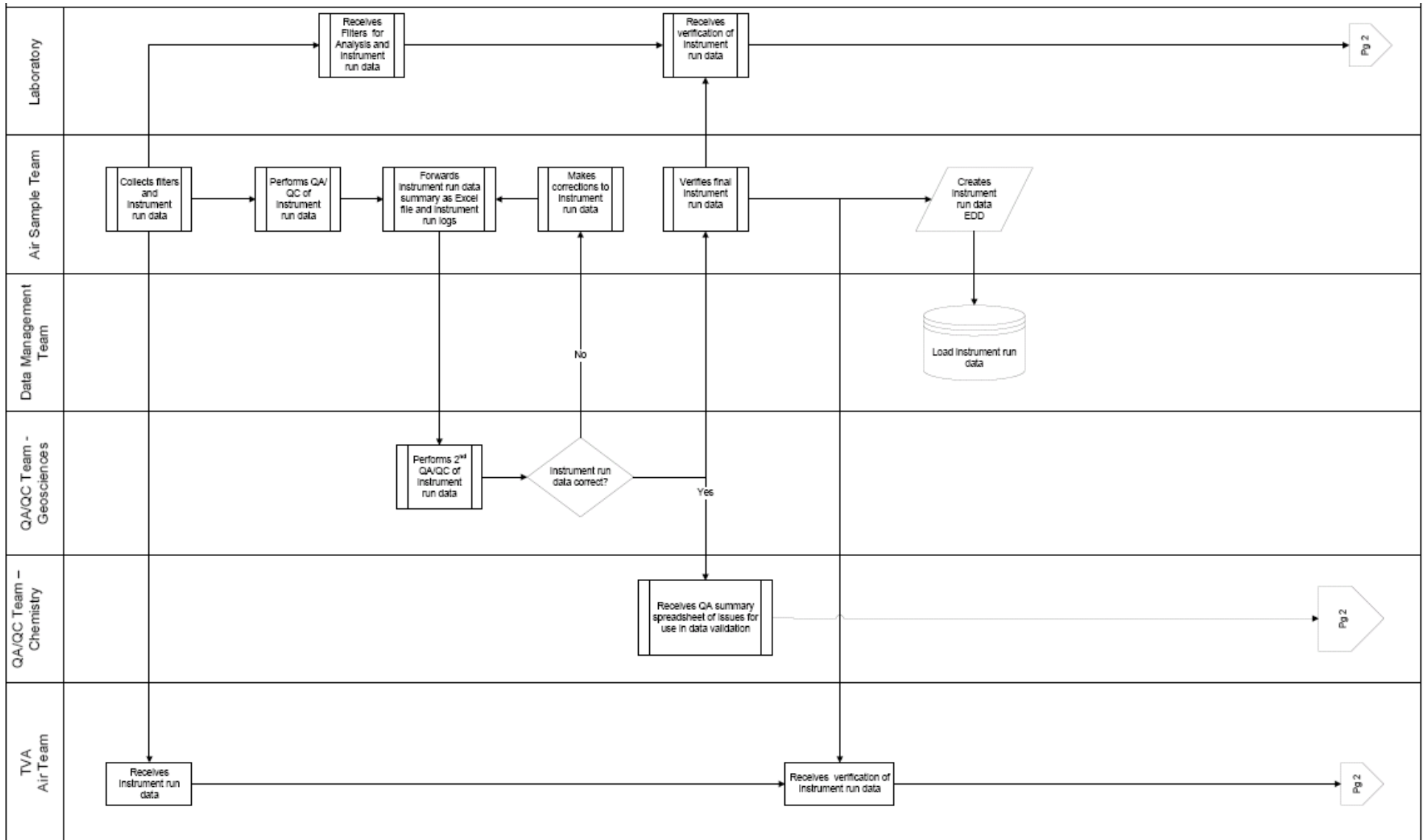


Figure 2. Filter-Based Particulate Matter Data Cross-Functional Flow Chart.

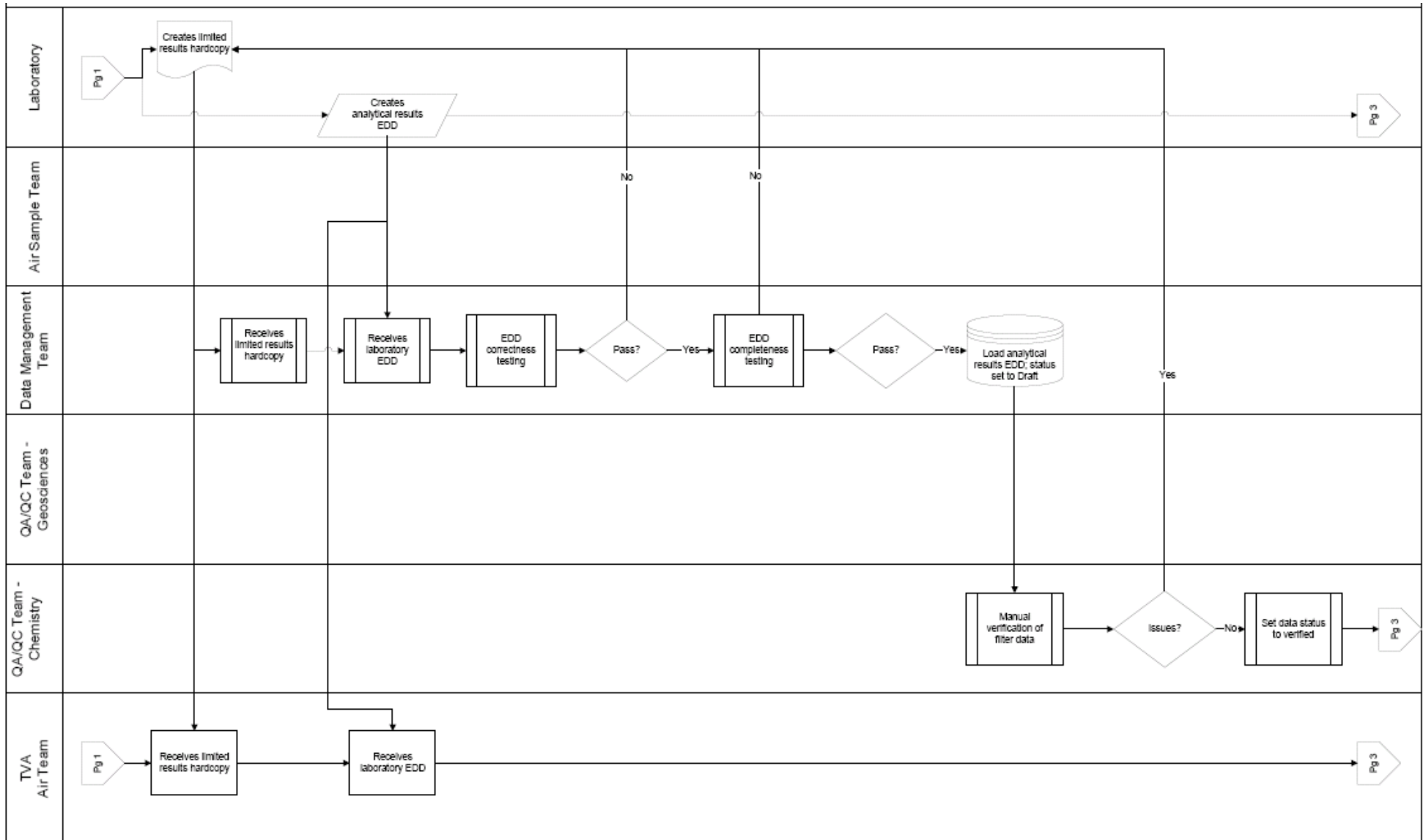


Figure 2. Filter-Based Particulate Matter Data Cross-Functional Flow Chart (continued as page 2).

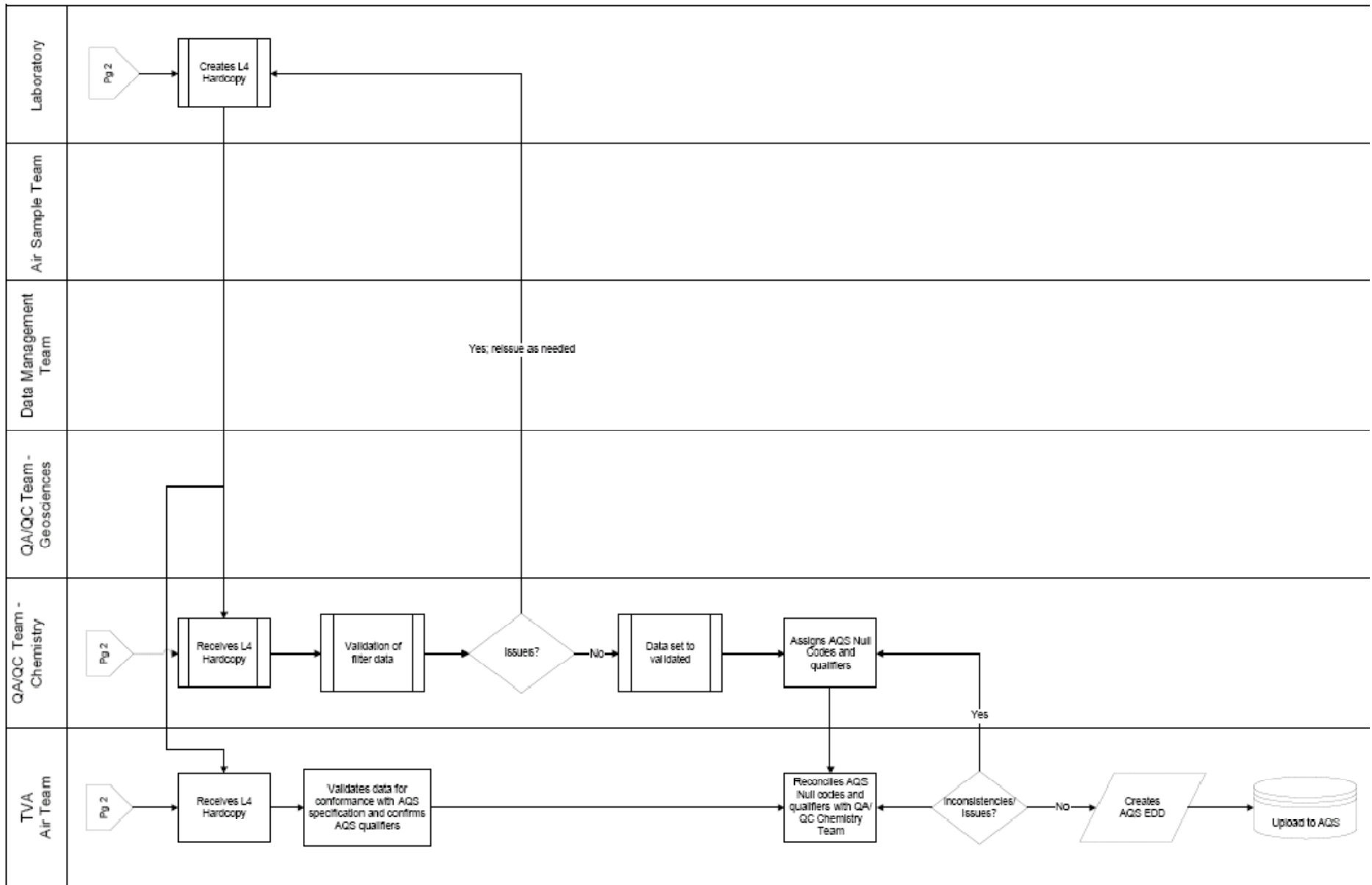


Figure 2. Filter-Based Particulate Matter Data Cross-Functional Flow Chart (continued as page 3).

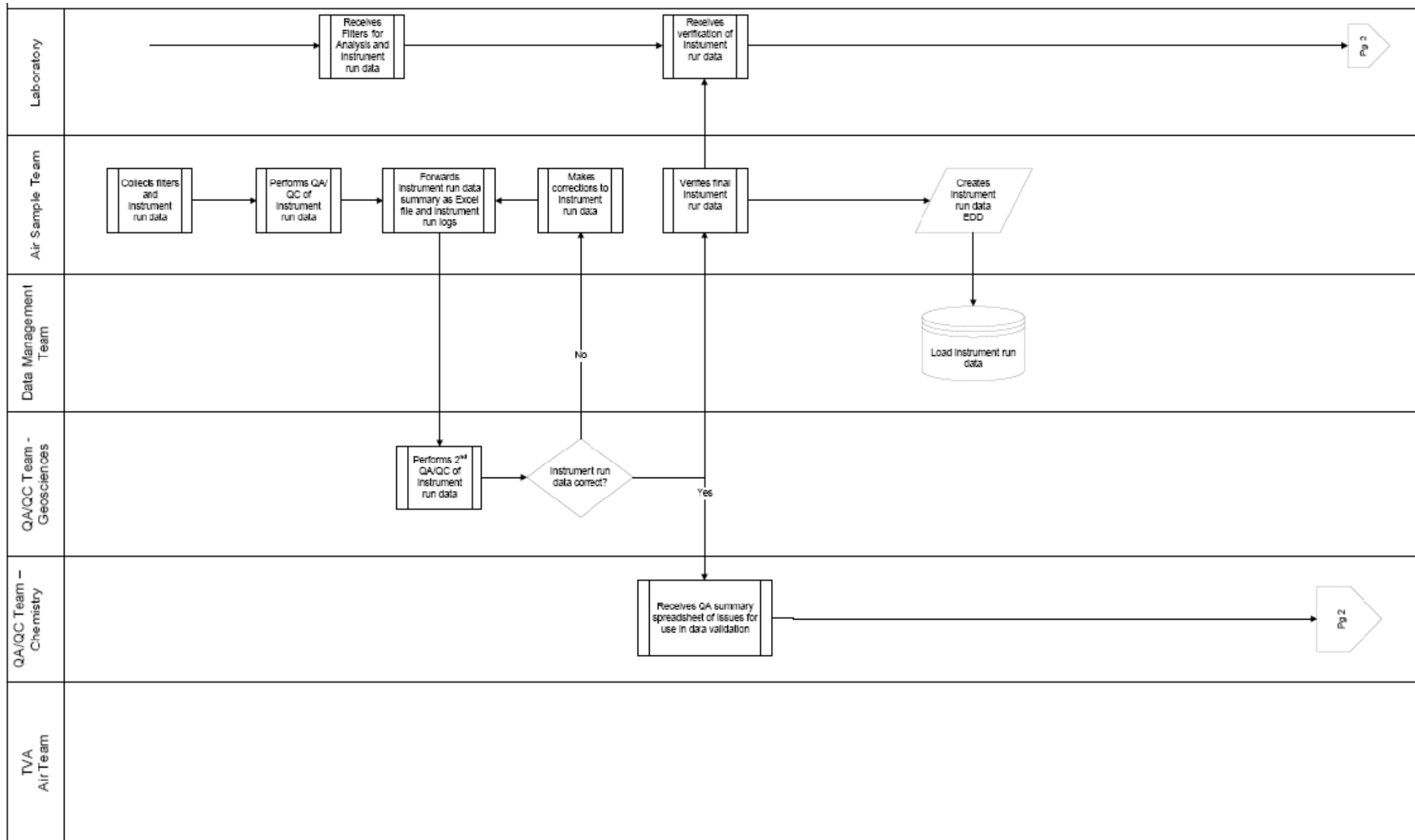


Figure 3. Filter-Based Metals Data Cross-Functional Flow Chart.

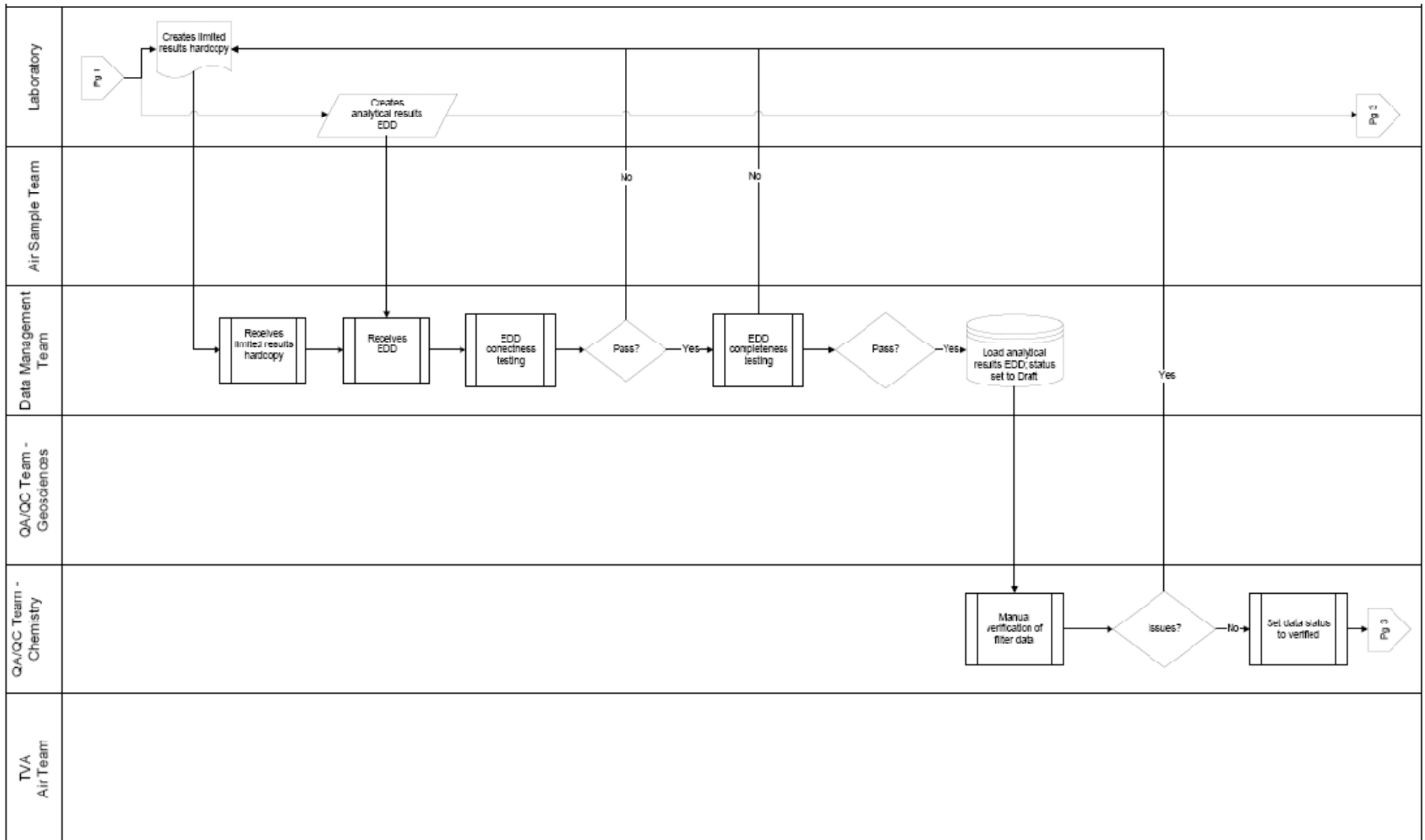


Figure 3. Filter-Based Metals Data Cross-Functional Flow Chart (continued as page 2).

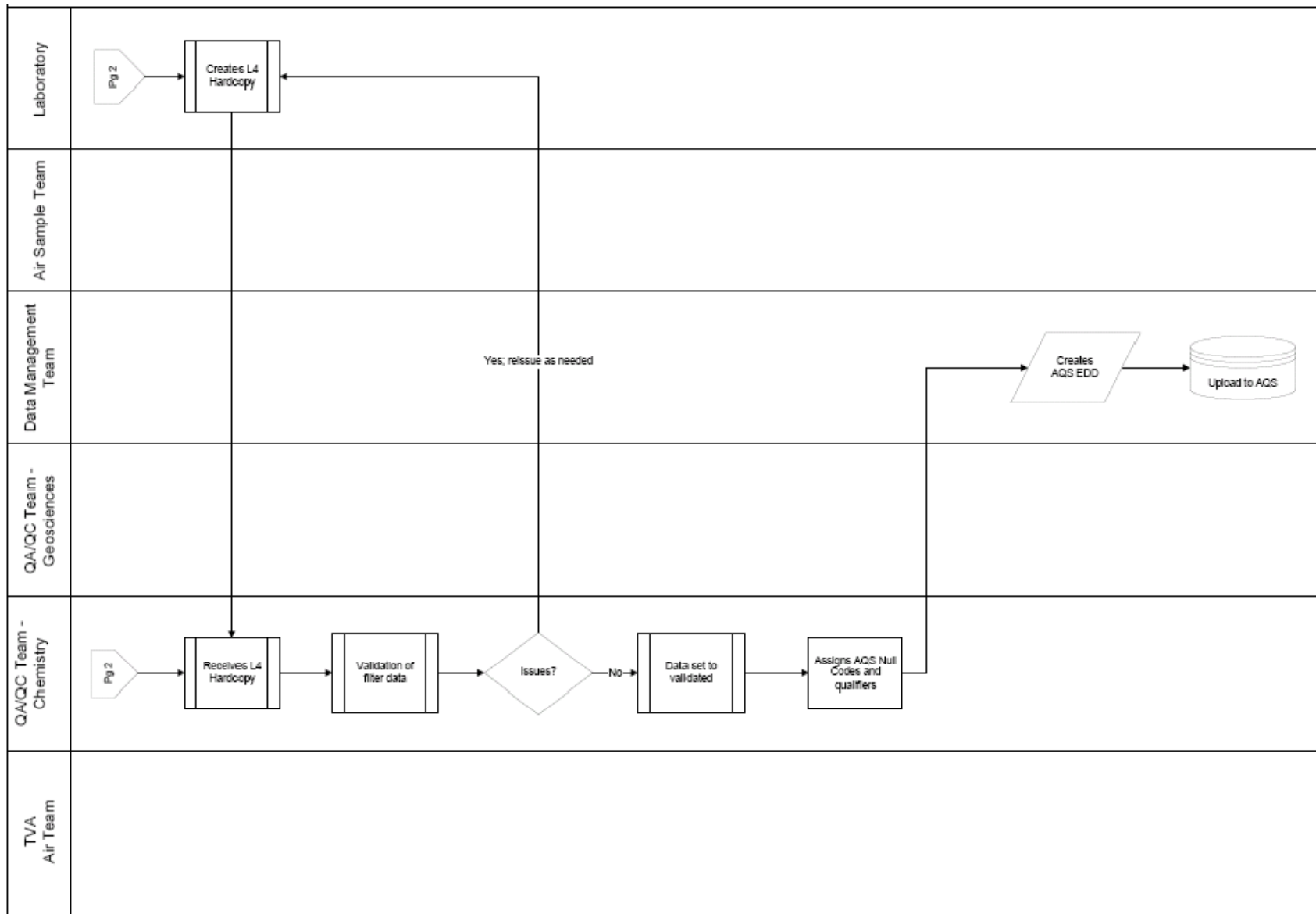


Figure 3. Filter-Based Metals Data Cross-Functional Flow Chart (continued as page 3).

End of Procedure