

**2002 SOUTHEAST EMISSIONS INVENTORY
DEVELOPMENT FOR ONROAD MOBILE AND
NONROAD MOBILE EMISSION SOURCES**

Draft Quality Assurance Plan

Prepared by
E.H. Pechan & Associates, Inc.

February 3, 2003

for the
Visibility Improvement—State and Tribal Association of the Southeast

Pat Brewer, VISTAS Project Manager

Date _____

VISTAS Quality Assurance Officer

Date _____

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I. QA PLAN FOR MOBILE SOURCES

This Quality Assurance Plan (QAP) specifies how data quality objectives of accuracy, completeness, and representativeness will be met in developing a 2002 mobile source emission inventory for the Visibility Improvement—State and Tribal Association of the Southeast (VISTAS). Once this draft QA plan has been reviewed, Pechan will revise this QA plan as appropriate.

A series of checklists will be prepared to implement the QA steps. The QA checklists will include information on the specific QA item, the date that the QA check was performed, and the person who performed the QA check. The QA Plans for the onroad and nonroad portions of the 2002 mobile source inventory are detailed separately below, but each contains the same general QA elements.

II. QA PLAN FOR ONROAD MOBILE SOURCES

A. Project Management

Specific project management elements are discussed below

1. Distribution List

Pat Brewer, VISTAS Contracting Officer
Laura Boothe, VISTAS Technical Contact
VISTAS Quality Assurance Officer
James H. Wilson, Pechan Corporate QA/QC Coordinator
Maureen Mullen, Pechan Project Manager
Stephen Roe, Pechan QA Reviewer

2. Project / Task Organization

This project is being performed by E.H. Pechan and Associates, Inc. under contract to VISTAS.

Ms. Pat Brewer, the VISTAS Contracting Officer, will be the primary technical contact for this contract. Ms. Laura Boothe, the VISTAS technical contact, will provide technical project oversight. The VISTAS Quality Assurance Manager (QAM) will be involved in all QA/QC activities.

Pechan's QA/QC policy requires that all work be documented, defensible, of known and acceptable quality, and consistent with all contract requirements. This policy is implemented through an integrated three-tiered approach that includes corporate, department, and program elements. At the corporate level, Pechan management provides oversight of the QA/QC program and approves and enforces the overall program. To assist in implementing these functions, Pechan maintains a corporate QA/QC unit that monitors the program, prepares guidelines, and conducts independent program audits. The Pechan Corporate QA/QC Program is implemented through the Corporate QA/QC Plan and corporate guidelines. The corporate plan is an internal

document that states the corporate policy and the requirements for department and project plans. The plan is supplemented by guidelines that are used to develop or update department plans and standard operating procedures (SOPs). Department management ensures the technical and fiscal quality of work through management oversight of projects assigned to the department and work performed by department staff; establishes and enforces department plans; approves project plans, budgets and schedules; and ensures a thorough technical and department management review of work

The Pechan Corporate QA/QC Coordinator, Mr. James H. Wilson, is responsible for QA/QC functions throughout the firm, and has the necessary authority and independence to identify, report, and correct any existing quality problems. The Pechan QA reviewer for this contract will be Mr. Stephen Roe.

Pechan's Project Manager, Ms. Maureen Mullen, will direct all onroad inventory development tasks for this project. Ms. Mullen will ensure that all support staff are familiar with and understand the data quality objectives, and the procedures to be followed for meeting the objectives, as well as the requirements of the QA plan (e.g., completion of QA/QC forms).

VISTAS state, local, and tribal (S/L/T) agencies will be providing data, which Pechan will use in the development of the 2002 emission inventories. The agencies will also review the results that Pechan generates under this contract.

3. Problem Definition / Background

The purposes of the project are to collect data and to prepare 2002 onroad emissions inventories for the VISTAS states. The results of this project are intended to be used in regional haze state implementation plans (SIPs), with the possibility of being used in PM₁₀, PM_{2.5}, and 8-hour ozone SIPs.

Highway vehicles contribute to PM_{2.5}, SO₂, NO_x, NH₃, and VOC emissions in the VISTAS region. Much of the data needed to estimate onroad source emissions to support regional haze programs are the same as those used to estimate onroad source emissions of ozone precursors, however regional haze requires inventories that cover the entire year and the entire region.

SIPs for regional haze mitigation must contain emissions inventories. Related emissions inventories are needed for air quality modeling of regional haze. Inventories prepared for SIP submittal and for use in modeling are prepared in different formats, but both should be derived from the same or comparable input data. Furthermore, regional modeling will encompass states outside VISTAS, so inventory methods should be coordinated with other regions. 2002 has been chosen by the eastern Regional Planning Organizations (including VISTAS) as the baseline year for regional haze modeling. In order to demonstrate progress in improving visibility, it will be necessary to forecast emissions for future years.

4. Project / Task Description

The description of this project by task can be found in the document: "2002 Southeast Emissions Inventory Development for Onroad Mobile and Nonroad Mobile Sources, Draft Work Plan" dated October 21, 2002.

5. Data Quality Objectives

The main data quality objectives that Pechan will work to fulfill include:

- Accuracy – To achieve this objective, 100 percent of the procedures/calculations used in calculating emissions will be checked by staff member generating the emissions data. Sample calculations will be documented covering all vehicle types and roadway types. Totals from vehicle miles traveled (VMT) calculations will be compared with VMT totals provided by the S/L/T agencies to ensure that all VMT allocations fully allocate the provided VMT data. Calculations will be spot-checked by the project manager.
- Completeness – As part of the quality control process, review by Pechan, as well as S/L/T agencies may indicate any significant missing sources for a particular county or jurisdiction. For example, Pechan will indicate which counties appear to be missing specific roadway types or vehicle types that would be expected to occur in that county.
- Representativeness – Emission estimates will be developed using data determined to best represent the areas being modeled during the 2002 calendar, given the project schedule and resources. MOBILE6 input parameters and VMT data will be reviewed by the project manager for reasonableness. Similar to completeness checks, Pechan will also rely on review by S/L/T agencies to ensure that the area-specific parameters and any necessary VMT adjustments that were performed represent local activity and conditions.
- Comparability – The VISTAS 2002 onroad emissions inventory will be compared to the most recent versions of the 1999 NEI and the 2002 NEI. Significant differences between these inventories will be evaluated. Where the reason for the difference is not obvious (e.g., proportional to changes in VMT or VMT mix), Pechan will send the inventory comparisons to the appropriate S/L/T for review.

6. Documents and Records

Pechan maintains a records management system to ensure that completed work meets EPA documentation requirements. Pechan also maintains a record keeping plan to identify and file information. The company assigns unique control numbers to all documents and records prepared for and delivered to EPA. These numbers link the materials to the correct contract and work assignment, and are used to store the materials in hard copy and electronically in chronological order. The records management coordinator at each Pechan office location assigns the control numbers and maintains these files. Pechan's Contracts Administrator also stores hard copy or electronic versions of all documents and records submitted as contract deliverables as part of the company's contract files.

The Pechan Project Manager will be responsible for the following document and records management activities:

- Determining all deliverables under a project, including work plans, progress reports, and all technical products;

- Determining the time lines for various stages of the document (that is, outline, draft, and final);
- Determining the appropriate review cycle (internal versus external review);
- Determining the appropriate reviewers; and
- Ensuring that all documents and records are incorporated into Pechan's filing system and are distributed to the appropriate recipients.

B. Data Generation and Acquisition

For this 2002 onroad inventory for VISTAS, data acquisition is an important component of the inventory development. It is hoped that significant portions of the data needed to prepare the MOBILE6 input files and VMT data will be provided by the S/L/T agencies. Thus, the agencies supplying the data will also need to be active in the review of the resulting processed data and emissions inventory.

Pechan expects to collect a significant amount of onroad data from S/L/T agencies for use in preparing the 2002 onroad emission inventory. Data received for this work will be tracked in a spreadsheet indicating the name and agency of the person submitting the data, the date of the submittal, file names of data supplied, and comments indicating the type and level of detail of the submitted data.

The onroad data has been provided in a number of different formats. Thus, Pechan will need to process the data into a common format for use in preparing the onroad inventory. Prior to setting up the MOBILE6 input files based on the S/L/T data, Pechan will prepare a county-level data file summarizing the key data elements. This summary table will be provided to the states for review before the MOBILE6 modeling is begun.

In addition to this county level summary file, Pechan will prepare tables listing the seasonal fuel properties and monthly temperatures input to be used in the MOBILE6 modeling. Pechan will perform data checks on these inputs to ensure that RVP values, sulfur values, and temperatures fall within the allowable MOBILE6 range. After these QC checks are performed, these tables will be sent to the states for review.

Inputs provided by S/L/T agencies for registration distributions, VMT mixes, and other similar inputs will be reviewed to ensure that all totals that should sum to 1 do. If any inputs need to be normalized, after performing the normalization, Pechan will send the revised inputs back to the states for review.

Any I/M inputs that are not provided in MOBILE6 format will be converted to MOBILE6 format. Pechan will ensure that the converted inputs can be run through MOBILE6 without error. The MOBILE6-formatted inputs will be sent to the states for review.

In addition to MOBILE6 inputs, Pechan will also collect VMT data from the S/L/T agencies for this project. Various agencies will have the data available at different levels of detail. These VMT data will also be tracked in the tracking spreadsheet described above. In addition, another

VMT tracking spreadsheet will be developed. This VMT tracking spreadsheet will indicate: county coverage of VMT data, year(s) of VMT data, seasonality of VMT data (e.g., ozone season day or annual), level of VMT data by roadway type, level of VMT data by vehicle type, any VMT growth factor information, and temporal VMT adjustment factors.

C. Assessment and Oversight

Pechan uses assessments to evaluate and improve the quality of environmental data operations. The assessments are an independent process of evaluating the project to ensure that specified requirements of the project are being fulfilled. Pechan will perform periodic audits of data quality, and will coordinate with VISTAS's QAM to allow for ongoing oversight of project quality.

D. Data Review and Validation

1. MOBILE6 Input File Review

Once all of the individual inputs have been appropriately reviewed, Pechan will prepare the necessary MOBILE6 files using monthly scenarios at the speed and road type combinations needed for each area. Pechan will spot check these input files for the following:

- Have monthly temperatures and seasonal fuel parameters been correctly input?
- Have control programs been included in the necessary counties and scenarios? (For example, reformulated gasoline needs to be modeled in combination with the "SEASON" command so that the appropriate RFG properties are included in each month.)
- Are I/M programs included in the appropriate input files?
- Is the correct set of speeds being modeled?
- Are local inputs such as registration distributions and diesel sales fractions included in the corresponding input files?

The staff member performing these QC checks will make a list of these items checked and the input file names that these items have been reviewed in. The county-level database discussed above will be used determining which inputs should be included in each input file. These input files will then be run through the MOBILE6 model. Any run time errors will be investigated, and necessary corrections will be made. The MOBILE6 output files will be reviewed to verify that all scenarios within a file have successfully been run through MOBILE6. If requested, Pechan will also provide the final QCed MOBILE6 input files to the S/L/T agencies for further review.

2. VMT Database

The VMT data collected will be converted to an annual 2002 database by county, roadway type, and vehicle type. In some cases, this will involve the use of growth factors or allocation factors. The final VMT database will be compared to the 2002 NEI VMT database. A summary of the VMT differences between these two files will be prepared for review by the S/L/T agencies. In cases where growth factors or allocation factors were applied, these will be noted. Pechan will QC the final VMT database to ensure that all counties are included. For areas where growth factors or allocation factors were applied, a Pechan staff member will hand check sample calculations to ensure that these factors were properly applied.

3. 2002 Onroad Emissions

Once the 2002 onroad emissions have been calculated, Pechan will first perform spot checks covering random counties. Hand calculations will be performed covering all vehicle types and all roadway types to ensure that the appropriate emission factors and VMT data have been matched and that the emissions calculation equation was applied properly. These checks will be repeated for all pollutants.

Pechan will prepare the following summaries in its QC of the emissions:

- annual and monthly emissions by state and vehicle type for each pollutant and corresponding VMT;
- annual and monthly emissions by state and roadway type for each pollutant and corresponding VMT; and
- annual emissions and VMT by county and pollutant.

By including VMT data in each of these summaries, Pechan will be able to estimate an equivalent emission factor for each of these groupings in a spreadsheet. This is a helpful tool in assessing whether the emission factors and VMT have been properly combined. By factoring out the VMT, Pechan can also assess whether control programs included in various states have the expected impact. For example, a state with I/M and RFG programs statewide would be expected to have lower equivalent emission factors for gasoline vehicle types than a state without these programs or a small area of coverage of these programs. These equivalent emission factors can also be compared with the corresponding information from the draft 2002 NEI. Significant differences should be able to be explained based on the differences in the MOBILE6 inputs between these two inventories.

4. Final Emission Inventory Check

After development of the emissions estimates, the following items will be checked prior to providing the inventory to VISTAS.

- Does the county Federal Information Processing Standards (FIPS) code exist? Make sure that all FIPS county codes are legitimate by comparing the county FIPS codes in the data base with the National Institute of Standards and Technology (NIST) Federal Information Processing Standards Publications (FIPS PUBS).

- Are there duplicate records in the data base? The appropriate unique identifiers are state FIPS, county FIPS, and SCC. The QA check for unique records will be to run a grouping query on these fields, and then compare the number of records returned to the total number of records in the data base (without grouping). Pechan will run this check and identify any duplicate records. These records will be investigated and corrected or removed if necessary.
- Are there any emission estimates that seem to be unexpectedly higher relative to other records in the inventory? For each pollutant, Pechan will rank emission records in descending order and review the top records to identify any potential outliers.
- Are all primary particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers (PM_{2.5}) emissions less than PM₁₀ emissions? These records will be investigated and corrected as necessary.
- As an overall check, Pechan will review state and SCC-level annual emissions summaries. Verify that emissions as reported by state and by SCC are reasonable and expected for 2002.

5. Final Review

The Pechan Project Manager will review the checklists developed for the QA plan. The Project Manager will ensure that all checklists have been completed and signed. In addition, the Project Manager will perform spot checks of several different components of the emission inventories. The tests will be random so that other staff conducting the QA will not know what QA steps will be repeated. All data products and reports will also be reviewed by the Pechan QA reviewer before delivery.

III. QA PLAN FOR NONROAD MOBILE SOURCES

A. Project Management

Specific project management elements are discussed below.

1. Distribution List

Pat Brewer, VISTAS Contracting Officer
 Laura Boothe, VISTAS Technical Contact
 VISTAS Quality Assurance Officer
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2. Project / Task Organization

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Ms. Pat Brewer, the VISTAS Contracting Officer, will be the primary technical contact for this contract. Ms. Laura Boothe, the VISTAS technical contact, will provide technical project oversight. The VISTAS Quality Assurance Manager (QAM) will be involved in all QA/QC activities.

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The Pechan Corporate QA/QC Coordinator, Mr. James H. Wilson, is responsible for QA/QC functions throughout the firm, and has the necessary authority and independence to identify, report, and correct any existing quality problems. The Pechan QA reviewer for this contract will be Mr. Stephen Roe.

Pechan's Nonroad Project Manager, Ms. Kirstin Thesing, will direct all nonroad inventory development task for this project. Ms. Thesing will ensure that all support staff are familiar with and understand the data quality objectives, and the procedures to be followed for meeting the objectives, as well as the requirements of the QA plan (e.g., completion of QA/QC forms).

VISTAS S/L/T agencies will be providing data that Pechan will use in the development of the 2002 emission inventories. The agencies will also review results that Pechan generates under this contract.

3. Problem Definition / Background

The purposes of the project are to collect data and to prepare 2002 nonroad emissions inventories for the VISTAS states. The results of this project are intended to be used in regional haze state implementation plans (SIPs), with the possibility of being used in PM₁₀, PM_{2.5}, and 8-hour ozone SIPs.

Off-highway vehicles contribute to PM_{2.5}, SO₂, NO_x, NH₃, and VOC emissions in the VISTAS region. Much of the data needed to estimate nonroad source emissions to support regional haze programs are the same as those used to estimate nonroad source emissions of ozone precursors, however regional haze requires inventories that cover the entire year and the entire region.

SIPS for regional haze mitigation must contain emissions inventories. Related emissions inventories are needed for air quality modeling of regional haze. Inventories prepared for SIP submittal and for use in modeling are prepared in different formats, but both should be derived from the same or comparable input data. Furthermore, regional modeling will encompass states outside VISTAS, so inventory methods should be coordinated with other regions. 2002 has been chosen by the eastern Regional Planning Organizations (including VISTAS) as the baseline year for regional haze modeling. In order to demonstrate progress in improving visibility, it will be necessary to forecast emissions for future years.

4. Project / Task Description

The description of this project by task can be found in the document: “2002 Southeast Emissions Inventory Development for Onroad Mobile and Nonroad Mobile Sources, Draft Work Plan” dated October 21, 2002.

5. Data Quality Objectives

The main data quality objectives that Pechan will work to fulfill include:

- Accuracy – To achieve this objective, 100 percent of the procedures/calculations will be checked by the data generator, and the calculations will be spot-checked by the project manager.
- Completeness – As part of the quality control process, review by Pechan, as well as S/L/T agencies may indicate any significant missing sources for a particular county or jurisdiction. For example, if data for the geographic allocation factor are not available to allocate emissions to a specific county or state, zero emissions would be assigned, perhaps incorrectly.
- Representativeness – Emission estimates will be developed using data determined to be the best available, given the project resources. Category-specific estimates will be reviewed by the project manager for reasonableness. Similar to completeness checks, Pechan will also rely on review by S/L/T agencies to ensure that category-specific emission estimates represent local activity and conditions.

6. Documents and Records

Pechan maintains a records management system to ensure that completed work meets EPA documentation requirements. Pechan also maintains a record keeping plan to identify and file information. The company assigns unique control numbers to all documents and records prepared for and delivered to EPA. These numbers link the materials to the correct contract and work assignment, and are used to store the materials in hard copy and electronically in chronological order. The records management coordinator at each Pechan office location assigns the control numbers and maintains these files. Pechan’s Contracts Administrator also stores hard copy or electronic versions of all documents and records submitted as contract deliverables as part of the company’s contract files.

The Pechan Project Manager is responsible for the following document and records management activities:

- Determining all deliverables under a project, including work plans, progress reports, and all technical products;
- Determining the time lines for various stages of the document (that is, outline, draft, and final);
- Determining the appropriate review cycle (internal versus external review);
- Determining the appropriate reviewers; and
- Ensuring that all documents and records are incorporated into Pechan's filing system and are distributed to the appropriate recipients.

B. Data Generation and Acquisition

The procedures used to generate nonroad emission estimates generally do not require Pechan to perform emission calculations (i.e., obtain equipment populations and other activity data, and multiply the activity by emission factors). The NONROAD model performs all necessary calculations to produce emissions at the specified level of geographic detail (i.e., county, state, nation). It also provides default values for all the needed variables. However, one exception is NH₃ for nonroad sources. County-level fuel consumption will be obtained from the model to use as the basis for estimating NH₃ emissions, since the model does not generate NH₃ directly. Other PM precursor pollutants [e.g., elemental carbon (EC), organic carbon (OC)] may also be estimated outside the model.

For estimating aircraft, commercial marine vessel, and locomotive emissions, the need for growth factors and potential improvements to the geographic allocation will warrant data collection and review. Limited activity data for these categories are expected to be available and acquired.

NONROAD Model

For this effort, Pechan will collect available area-specific data to replace the defaults in the NONROAD model. For State-level runs, average seasonal variations in temperature and RVP will replace the model default values as reflected in the scenario option files. Pechan will use the latest monthly/seasonal State-level temperatures and RVP inputs available (likely to be 2001), but will use 2002 data for these variables as they become available.

EPA's NONROAD model contains default activity data, including equipment populations, that form the basis of county-level emission estimates. For the more significant sources of PM and NO_x (e.g., diesel construction and agricultural equipment), and for significant VOC sources (e.g., gasoline recreational marine, lawn and garden), Pechan will determine if States have data available for the equipment populations and other activity data to replace model default values. Pechan will also adjust county allocation factors (used to allocate equipment

populations to counties) within the model, if provided by States, to better reflect the actual geographic distribution of nonroad equipment activity within a State and within the VISTAS region.

Revised input data may be provided in either standard NONROAD model input file format, or values for the variables may be provided and incorporated by Pechan into the scenario option files, or the referenced data input files.

For the scenario option files, at least four seasonal files will be created for each State for the year 2002. In cases where fuel program input data (e.g., RVP, oxygenated fuel, Stage II) are available for specific counties in ozone nonattainment areas, Pechan will create additional county-specific input files.

Pechan will develop a spreadsheet to house all these input variables, indicating the variable, the corresponding value, the geographic area to which it applies, and the source of the data. Before populating the option files with the collected input data, Pechan will prepare an automated routine that will perform range checks on the spreadsheet data to be incorporated. The QA checks, including range checks, are specified below:

Input Parameter	QA Check
Reid vapor pressure (RVP)	Values should fall within range of 6.8 to 14.9 psi
Maximum temperature, °F	Ensure that maximum > average > minimum
Minimum temperature, °F	
Average temperature, °F	
% Oxygen in fuel by weight	Values should fall within range of 0.0 - 3.5 % O ₂
% Stage II Controls	Values should fall within range of 0 - 100%

To generate these multiple option files, Pechan will prepare a macro in Excel that extracts values from a spreadsheet and inserts the value into the appropriate field in the ASCII text option file. This ASCII text file can then be printed out so that any changes can be reviewed for correctness.

T Pechan will perform spot checks of the county-level option files to ensure that the macro works as designed and that the appropriate inputs were incorporated.

In cases where default activity data inputs are replaced by user-supplied data:

T Pechan will review and test all revised input files to ensure that the input values are correct, and will ensure that the option files refer to the correct updated input file.

Aircraft, CMVs, and Locomotives

Pechan will review and select growth factors for application to base year emission estimates for these categories. Pechan will compile the data at the finest level of geographic specificity available.

- T Once compiled, Pechan will review all growth factors for any incorrect or abnormally high or low values.

C. Assessment and Oversight

Pechan uses assessments to evaluate and improve the quality of environmental data operations. The assessments are an independent process of evaluating the project to ensure that specified requirements of the project are being fulfilled. Pechan will perform periodic audits of data quality and will coordinate with VISTAS's QAM to allow for ongoing oversight of project quality.

D. Data Review and Validation

1. NONROAD Output Review

Once all the necessary inputs are obtained and the option files are created, Pechan will run the NONROAD model to generate seasonal emission estimates. The NONROAD model includes a reporting utility that processes model output results into various reports as specified by the user. However, these custom reports do not provide an option for generating an SCC-level, county-level inventory. The output data will be processed through a custom Visual Basic application designed by Pechan that replicates the functionality of the NONROAD model reporting utility, generating an SCC-level, county-level emissions inventory for the VISTAS region.

- T Perform spot checks of random counties to ensure that emission results calculated using our custom application match results obtained using the NONROAD reports.

For all pollutants, county-level emissions estimates for each of the four seasons will be summed to estimate annual emissions.

- T Check to ensure that the annual county-level emissions/fuel consumption equal the sum of the county-level seasonal emissions/fuel consumption.
- T If speciation factors are applied to PM emissions to estimate EC and OC emissions, check the factors for reasonableness and check that they were applied correctly.

County-level fuel consumption estimates will be multiplied by the appropriate NH₃ emission factors to estimate NH₃ emissions. Emission factors depend on whether the SCC corresponds to gasoline or diesel fueled equipment.

- T Check that VISTAS regional NH₃ emissions, as calculated at the county-level, equal NH₃ emissions as calculated using total regional fuel consumption multiplied by the appropriate emission factor.

2. Aircraft, CMV, and Locomotive Review

Emission estimates for these categories not included in the NONROAD model will first be checked for representativeness, then projected to 2002 using economic indicators or other appropriate surrogate indicators.

- T S/L/T agencies to review 1999 NEI emission estimates. . EPA's Emission Factor and Inventory Group (EFIG) has already posted these files for S/L/T agency review. This review will also be facilitated by preparation of county-level pollutant emission maps for each category to show the geographic distribution of emissions.
- T Perform checks of the projected 1999 emission estimates for 2002 to ensure that growth factors were correctly applied to the base year estimates.
- T If speciation factors are applied to PM emissions to estimate EC and OC emissions, check the factors for reasonableness and check that they were applied correctly.

3. Final Emission Inventory Check

After development of the emissions estimates, the following items will be checked prior to providing the inventory to VISTAS.

- Does the county Federal Information Processing Standards (FIPS) code exist? Make sure that all FIPS county codes are legitimate by comparing the county FIPS codes in the data base with the National Institute of Standards and Technology (NIST) Federal Information Processing Standards Publications (FIPS PUBS). One commonly miscoded FIPS code includes Miami-Dade County in Florida, which is county FIPS 086, not 025.
- Are there duplicate records in the data base? The appropriate unique identifiers are state FIPS, county FIPS, and SCC. The QA check for unique records will be to run a grouping query on these fields, and then compare the number of records returned to the total number of records in the data base (without grouping). Pechan will run this check and identify any duplicate records. These records will be investigated and corrected or removed if necessary.
- Are there any emission estimates that seem to be unexpectedly higher relative to other records in the inventory? For each pollutant, Pechan will rank emission records in descending order and review the top records to identify any potential outliers.
- Are all primary particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$) emissions less than PM_{10} emissions? These records will be investigated and corrected as necessary. For most nonroad categories, $PM_{2.5}$ should range from 92 to 100 percent of PM_{10} .
- As an overall check, Pechan will review state and SCC-level annual emissions summaries. Verify that emissions as reported by state and by SCC are reasonable and expected for 2002.

4. Final Review

The Pechan Project Manager will review the checklists developed for the QA plan. The Project Manager will ensure that all checklists have been completed and signed. In addition, the Project Manager will perform spot checks of several different components of the emission inventories. The tests will be random so that other staff conducting the QA will not know what QA steps will be repeated. All data products and reports will also be reviewed by the Pechan QA reviewer before delivery.