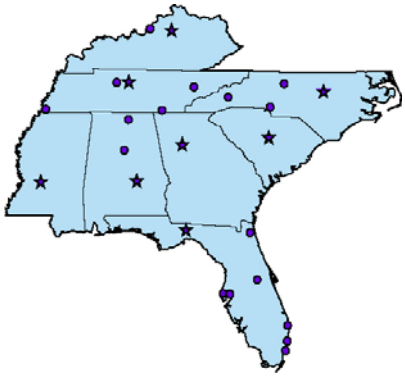
Metro 4, Inc. – SESARM
The Southeastern Local Air Pollution Control Agencies
Southeastern States Air Resource Managers, Inc.



POINT SOURCE, ON-ROAD, AND FIRE BASE YEAR, FUTURE YEAR, AND CONTROL STRATEGY EMISSIONS INVENTORIES

DRAFT QUALITY ASSURANCE PROJECT PLAN

for

CONTRACT #: S-2009-06-02
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Effective Date: August 2009

SOUTHEASTERN STATES AIR RESOURCE MANAGERS, INC.

POINT SOURCE, ON-ROAD, AND FIRE BASE YEAR, FUTURE YEAR, AND CONTROL STRATEGY EMISSIONS INVENTORIES

QUALITY ASSURANCE PROJECT PLAN

Effective Date: August 2009

APPROVED BY

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1.0 PROJECT OVERVIEW

1.1 Project/Task Organization

Figure 1 identifies the individuals and organizations participating in the project. Their specific roles and responsibilities include:

- Mr. John Hornback, SESARM Contract Officer (hornback@metro4-sesarm.org, 404-361-4000), will oversee all activity on the contract, and supervise managerial aspects of the project. He will help facilitate communications among State/local agencies, MACTEC, and the SESARM Project Coordinator.
- Mr. Ron Methier, SESARM Project Coordinator (ronmethier@comcast.net, 770-785-7978), will work with the SESARM Contract Officer and State/local Agency Coordinators to define the emission inventory development activities needed to support regional haze modeling and planning activities.
- State/local Agency Coordinators will compile and submit data to MACTEC, participate in QA/QC reviews, and help revise, update, and correct the inventory.
- William Barnard, MACTEC Program Manager and Fire Task Leader (wrbarnard@mactec.com, 352-333-6617), will direct and monitor technical and financial performance throughout the project and will serve as a senior primary contact with SESARM on contract and project management issues. Mr. Barnard will also direct aspects of the projection inventory development related to fire and mobile sources. He will plan and conduct the technical aspects of the development of the fire and mobile source inventories, supervise daily activities, identify effective QC procedures and make recommendations on needed QC procedures.
- Edward Sabo, MACTEC Point Source Task Leader (ejsabo@mactec.com, 703- 471-8383), will plan and manage all point source activities. He will plan and conduct the technical aspects of the development of the point source inventory, supervise daily activities, identify effective QC procedures and make recommendations on needed QC procedures.
- Dan Meszler, MACTEC Mobile Source Task Leader (dan@meszler.com, 410- 569-0599), will plan and manage all mobile source activities. He will plan and conduct the technical aspects of the development of input files for the MOBILE/MOVES models. He will help identify effective QC procedures and make recommendations on needed QC procedures.
- Mr. Gregory Stella, QA Coordinator (gms@alpinegeophysics.com, 828- 675-9045), will help ensure that adequate QA/QC procedures are incorporated into the inventory development process. He will work independent of the inventory development Task Leaders to assist in the conduct of project QA/QC assessments.

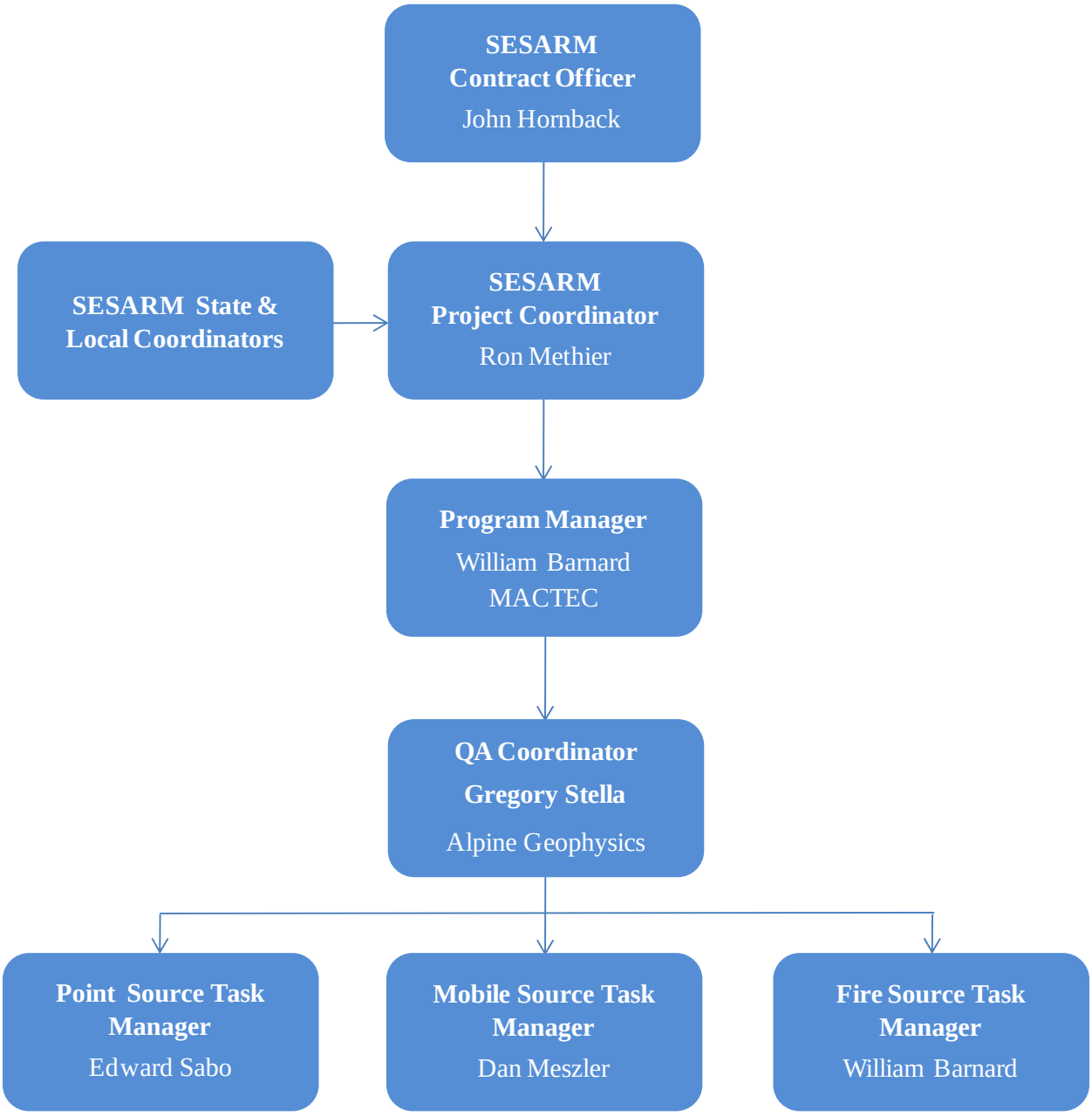

FIGURE 1 – PROJECT ORGANIZATION CHART

1.2 Problem Definition/Background

Southeastern States Air Resource Managers Inc. (SESARM) is a corporation registered in the state of Georgia and organized under the nonprofit provisions of the Internal Revenue Code, Title 26, Subtitle A, Chapter 1, Subchapter F, Part I, Section 501 (c)(3). It was formed by, and serves the needs of, the air pollution control agencies located in the southeastern region of the United States, to which the Environmental Protection Agency (EPA) refers as Region 4. Eight states are members of SESARM – Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee. SESARM maintains its corporate office in Forest Park, Georgia.

The United States Environmental Protection Agency (EPA) designated SESARM as the organization responsible for conducting regional air quality planning in the Southeast, specifically for regional haze. SESARM created a collaborative effort called Visibility Improvement – State and Tribal Association of the Southeast, also known as VISTAS.

In 2001, SESARM invited the contiguous states of Virginia and West Virginia to join the regional haze effort. SESARM also invited the local agencies in the Southeast to be represented by the Knox County, Tennessee air pollution control program. Though southeastern tribes are not required to develop and submit tribal implementation plans, SESARM invited the Eastern Band of Cherokee Indians to represent the six federally-recognized Southeastern tribes.

The participating state agencies have obligations to protect human health and the environment from the impacts of air pollutants. They are responsible for air quality planning efforts and have primary authority and responsibility to develop, adopt, and implement state implementation plans (SIPs) for all air pollutants and aesthetic concerns including fine particles, ozone, and regional haze.

A memorandum of understanding was developed in 2001 by SESARM and executed among the participating agencies to formalize their regional haze project commitment as well as to establish formal goals and procedures for technical air quality analyses. An unsigned copy of the memorandum is provided in Appendix A. A policy board (the STAD), a day-to-day operations group (the Coordinating Committee), and three work groups (Data, Planning, and Technical Analysis) were created to oversee, guide, and conduct the collaborative work within SESARM's structure. The projects continue to be managed in this manner. Later, fine particle and ozone SIP support was identified as an additional critical opportunity for SESARM to assist the participating state agencies in managing, improving, and maintaining air quality.

The work of SESARM and the in-kind services of the participating agencies are designed to produce technical analyses to aid the participating agencies in developing SIPs required by the Clean Air Act. SESARM solicits input from various stakeholders to the fine particle, ozone, and regional haze projects. Participation is also encouraged from representatives of federal agencies including EPA, the Department of Agriculture's Forest Service, and the Department of Interior's National Park Service and Fish and Wildlife Service; the regulated community; academia; environmental groups; and the general public.

The project supported by this contract shall consist of development of a comprehensive annual emissions inventory for the Southeast to support modeling and assessment of the emissions and atmospheric processes that result in fine particles, ozone, and regional haze. This work shall include development of at least one base year inventory consistent with the Environmental Protection Agency's (EPA's) criteria for emission reporting. Candidate modeling base years for inventory development are 2005 and 2008. States are also considering whether meteorological conditions in 2006 or 2007 would be more representative as the modeling base year. In consultation with its participating agencies and EPA, SESARM will decide which year to use as the base year before the inventory work begins.

This project shall include developing emissions inventories for at least one future year for emissions and air quality modeling purposes. SESARM will select the future modeling year or years as appropriate to support fine particle, ozone, and regional haze objectives.

Finally, this project shall also include development of emissions inventories for future year control strategies that will support modeling and assessment of controls necessary to assess the extent of NAAQS attainment and regional haze.

The purpose of this Quality Assurance Project Plan (QAPP) is to outline and guide the process for quality assuring the inventory development to ensure the development of complete, accurate, and consistent emission inventories. The QAPP is consistent with the recommendations in the EPA quality assurance requirements[1] and the Emission Inventory Improvement Program's QA guidance[2]. The QAPP includes tasks associated with obtaining State data, merging and augmenting State submittals with available EPA databases, improving the activity data and emission factors for important source categories, obtaining and developing growth and control factors, obtaining State and stakeholder review of the emission inventory, and providing documentation of the maintenance (revisions, updates, corrections) of the inventory.

1.3 Project/Task Description

MACTEC will produce preliminary and final sets of comprehensive annual base year and future year emissions inventories for point sources, on-road mobile sources, and fire sources for the participating states to support regional air quality modeling and assessment of fine particles, ozone, and regional haze. Emissions shall be reported by source category (i.e., point, on-road mobile, fire) by county for each county in Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. The emissions inventory development shall be specific to these states only. SESARM shall obtain emissions inventories for other states directly from those states or their respective regional organizations. Additional reporting requirements for the major source categories are discussed below.

The emissions inventories shall consist of all primary and precursor emissions necessary to accurately model fine particles and ozone including ammonia (NH_3), carbon monoxide (CO), nitrogen oxides (NO_x), particles with a diameter less than 2.5 micrometers ($PM_{2.5}$), particles with a diameter less than 10 micrometers (PM_{10}), sulfur dioxide (SO_2), and volatile organic compounds (VOCs) for point sources, on-road mobile sources, and fire sources.

To project emissions from the base year to future years, MACTEC will review, summarize, and recommend methods and growth and control factors consistent with SESARM's objective to develop future year base case and control strategies for demonstrating attainment with the $PM_{2.5}$ and ozone National Ambient Air Quality Standards (NAAQS) and to meet reasonable progress obligations for improving visibility. These methods and factors shall include the control technologies and associated percentage reductions, rule effectiveness, rule penetration values, growth rates, and energy efficiency factors used to generate the future year base case and control strategy emissions inventories.

The emission inventories shall be delivered in electronic format consistent with the requirements for conducting regional emissions and air quality modeling. The emission model input formats shall be defined once the emissions model has been selected. Inventories shall also be provided consistent with EPA's current emissions inventory reporting requirements. The SESARM Project Coordinator shall provide more specific direction on inventory formats, if clarification is needed, after development of a detailed work plan is initiated.

Current emission inventory reporting requirements can be found in a variety of documents available on EPA's website. Links to some of these documents include sections 6, 7, 9, 10 and 11 of the 2008 NEI/EIS implementation plan found at http://www.epa.gov/ttn/chief/net/neip/index.html, as well as more general guidance documents which can be found at http://www.epa.gov/ttn/chief/publications.html. Finally aspects of both the Air Emissions Reporting Rule (AERR) and Consolidate Emissions Reporting Rule (CERR) will be employed in developing inventories for this project. Documents detailing emission reporting requirements under these two rules can be found at http://www.epa.gov/ttn/chief/aerr/ and http://www.epa.gov/ttn/chief/cerr/index.html, respectively.

MACTEC will work consistent with Contract provisions, federal grant and project requirements, and the final project work plan to collect, quality assure, document, and prepare recommendations for the use or revision of these data for the purposes of developing base year and future year inventories. MACTEC will participate in meetings and conference calls and provide insight, background, and suggestions within their areas of expertise. Further, MACTEC will provide upon request written reports and/or analyses of certain aspects of the inventory development work. The methods used to develop the inventories shall be documented in technical reports for purposes of supporting state implementation plans (SIPs) for fine particles, ozone, and regional haze. All revisions to inventories and the sources of the revisions shall be clearly documented.

The Project Coordinator shall provide overall SESARM program management and specific technical direction to this project.

This QAPP focuses on the tasks associated with developing these inventories.

Base Year Inventory Activities.

The effort includes the following point, on-road and fire emission activities:

EGU Point Source Activities. For point sources, the following tasks will be performed:

1. Obtain State/local 2005 CERR submittals from EPA's ftp site (or directly from the State/local agency if the State/local agency has updated the 2005 inventory since submittal to EPA). Version 3 of the 2005 NEI (containing the 2005 CERR submittals) will be the primary source of this data.
2. Obtain unit-level 2005 EGU annual emissions and other data from CAMD's eGRID database.
3. Obtain 2005 EGU hourly CEM data from CAMD website; determine whether State/local agencies have CEM data that differs from or is in addition to the CAMD data; perform QA/QC checks of CEM data to identify missing data or potential outliers.
4. Develop a cross-reference file from the above three data sets to relate unit identifiers in the CERR submittals with the CAMD unit identifiers; coordinate with State/local agencies in resolving inconsistencies.
5. Compare the 2005 data to SESARM's 2002 Best and Final Inventory and identify any unmatched units or large changes in emissions.
6. Analyze the PM emissions in the CERR submittal and determine which PM species are present (i.e. PM_{10} vs. $PM_{2.5}$, filterable vs. condensable); augment data as necessary using EPA's NEI PM data augmentation procedures or recently developed PM condensable emission factors for EGUs.
7. Prepare an easily reviewable master EGU cross-reference table for 2005 that includes the following elements: CERR and CAMD unit identifiers; annual NO_x and SO_2 emissions, heat input, and base year air pollution control systems from the three data sources (CERR, CAMD annual, CAMD hourly); PM emissions as reported in the CERR along with any adjustments resulting from the PM augmentation procedure; emissions of other criteria pollutants; and stack parameters and location coordinates.
8. Provide the EGU table for review and verification by the State/local agencies.
9. Determine which source of emissions data is preferred for use in the base year file, either for the SESARM region as a whole or on a case-by-case basis as directed by SESARM or the State/local agencies.
10. Perform QA/QC checks on stack and location data to identify missing data or potential outliers.
11. Prepare electronic data files in NIF output format, maintaining data fields to clearly document the source of data used for each emission value.
12. Execute EPA's Basic Format and Content Checker tool to verify referential integrity of the database.

The above items assume a 2005 base year. If an alternative base year is selected the methods will be revised to reflect the change in base year. In some cases this will result in elimination of some items and in others the comparisons made will differ. For example if 2008 is chosen as the base year the 2008 inventory developed will use updated data from the States on the EGUs and will

be compared to the 2005 CERR submittals rather than to 2002 Best and Final Inventory (or a comparison of all three inventories may be made).

In addition to the actual emission base year inventory, MACTEC will prepare a typical base year inventory for EGUs to correct for possible non-typical operating conditions during the modeling base year. We will obtain and review any existing ERTAC EGU Temporal and CEM Data Work Group methods or recommendations, and provide any additional recommendations to SESARM. We will obtain CEM data for EGUs for the 2001-2005 (and additionally 2006-2008, if directed by SESARM) so that we have five years of data corresponding to the five years that contribute to the base year design value. Previously, MACTEC used the average heat input from the contributing years to define heat input and emissions for the typical EGU inventory. The specific methods and years to be used for typical EGU emissions will be determined in consultation with SESARM.

Non-EGU Point Source Activities. For non-EGU point sources, the following tasks will be performed:

1. Obtain State/local 2005 CERR submittals from EPA's file transfer protocol (ftp) site (or directly from the State/local agency if the State/local agency has updated the 2005 inventory since submittal to EPA). Version 3 of the 2005 NEI (containing the 2005 CERR submittals) will be the primary source of this data.
2. Remove any units from the CERR file that have already been accounted for in the EGU file developed above to ensure that no double-counting of emissions occurs, particularly for co-generation plants where double-counting was a concern during the development of the 2002 Best and Final Inventory.
3. Execute EPA's Basic Format and Content Checker to identify errors or anomalies in the 2005 CERR data; coordinate with State/local agencies in resolving any issues.
4. Determine whether State/local agencies have hourly CEM data for non-EGU sources that are not in the CAMD database; obtain CEM data and perform QA/QC checks to identify missing data or potential outliers.
5. Compare the 2005 data to the SESARM's 2002 Best and Final Inventory and identify any unmatched facilities or facilities with large differences in emissions between 2002 and 2005; provide comparison to State/local agencies for verification.
6. Analyze the particulate matter (PM) emissions in the CERR submittal and determine which PM species are present (i.e. PM_{10} vs. $PM_{2.5}$, filterable vs. condensable); augment data as necessary using EPA's NEI PM data augmentation procedures or recently developed PM condensable emission factors for non-EGUs.
7. Perform QA/QC checks on stack and location data to identify missing data or potential outliers, focusing review on the larger non-EGU sources.
8. Prepare electronic data files in NIF output format, maintaining data fields to clearly identify the source of data used for each emission value.

9. Re-execute EPA's Basic Format and Content Checker tool to verify referential integrity of the database.

As with EGU sources, if a different base year from 2005 is chosen the methods listed will be modified to work with the year chosen.

Fire Emission Activities. For fire emissions, the following tasks will be performed:

1. Data collection and data entry - available electronic fire activity data will be collected for at least for one year from 2005 to 2008, from state and federal forestry agencies in the Southeast all available electronic records of fire activity for wild fire, prescribed fire, land clearing, and agricultural burning. If states do not have an electronic version of prescribed fire records, MACTEC will consult with SESARM to receive further direction. MACTEC will review all submitted electronic records and shall identify to state and federal forestry agencies missing data records. An important aspect of this work is to identify duplicate records since activity data received from State and Federal agencies may contain overlapping records. MACTEC will use comparisons of time, date, latitude and longitude and other identification tools to assist in indentifying the duplicate records. Data for land clearing and agricultural burning will also be collected.
2. Development of an initial fire inventory for the modeling base year – MACTEC will work with State and Federal forestry agencies to modify or update the existing CONSUME database if necessary to calculate emissions consistent with fire characteristics in the Southeast. Information updated will include methods to define acreage and parameters for calculating emissions for wild land fires, prescribed fires, land clearing, and agricultural burning. Because fuel loading is one of the keys to assessing fire emissions, MACTEC will use a reasonable fuel loading model. Data for daily emissions shall be collected and summarized monthly by county, state, fire type, and pollutant.
3. Evaluation and merger of satellite and ground-based fire activity data - the ground-based fire activity data collected from the State and Federal forestry agencies will be compared to the SMARTFIRE activity data based on satellite records of fire occurrence. Depending upon funding availability, the efficiency of SMARTFIRE in merging the two fire activity data sets will be evaluated for a single modeling year. MACTEC will compare, for the modeling base year only, the ground-based fire activity records developed and the merged satellite and ground-based fire activity records from SMARTFIRE and provide a technical assessment of SMARTFIRE's performance in identifying and merging corresponding fire events. MACTEC will recommend methods that might improve the merged satellite and ground-based data for the modeling year and secondarily, for an average of the period 2005-2008. MACTEC will then provide methods and costs to complete this evaluation and recommendations including options to review records for a single state rather than ten states as an approach to reduce the costs of the evaluation. The State and Federal forestry and air quality agencies will review these recommendations and available funding to determine the level of effort that will be authorized to expand on

merging SMARTFIRE and SESARM ground based fire activity data. If authorized by the SESARM Project Coordinator, MACTEC will implement the methods approved by state and federal agencies for merging the satellite and ground-based data.

4. Apply approved fire inventory development methods to merged fire activity data and electronically archive – MACTEC will work with all parties to finalize the methods to be used for the Southeast to develop a base year fire emissions inventory for SESARM's regional air quality modeling purposes. MACTEC will apply approved fire inventory development methods to merged satellite and ground-based fire activity data
5. Document fire inventory - the fire inventory methods and results will be summarized in a report. A draft report will be delivered with the initial fire inventory. That report will be revised to reflect the methods and results arising from later tasks (e.g., the SMARTFIRE comparison).
6. Develop typical modeling base year fire inventory - a typical fire inventory will be developed and reported consistent with emissions and air quality modeling requirements. To correct for possible non-typical fire activity during the modeling base year for purposes of future year inventory projections for each county and/or state, MACTEC will develop average activity data for 2005-2008 for wild fire and prescribed fires. MACTEC will adjust acreage for individual fires in the modeling year by the average acreage for the county or state over the period 2005-2008. The specific methods applied shall be resolved in consultation with SESARM and federal forestry and air quality agencies.

On-road Mobile Source Emission Activities. For on-road mobile source emission sources, the following tasks will be performed:

1. MACTEC will collect the latest available on-road mobile data from southeastern agencies and EPA for the selected modeling base year. Southeastern air quality agencies shall coordinate with local air agencies, state transportation agencies, and/or local planning organizations as necessary to obtain relevant mobile model input data for the base year. Link-level mobile activity data shall be obtained for those states that request that link data be used in mobile modeling. At this time, Georgia is on-record with such a request.
2. Currently, on-road emissions are calculated using the MOBILE6 emissions model. EPA is developing a new model called MOVES (Motor Vehicle Emission Simulator) that will eventually replace the MOBILE and NONROAD models, and that states may soon be required to use for on-road and/or non-road mobile emissions calculations.. EPA released a draft version of MOVES on April 9, 2009, requested comments on "Draft MOVES2009" by July 2009, and plans to release a "final" version of MOVES (for on-road sources; draft for nonroad) by the end of 2009. The final version of MOVES is expected to be functional for emissions modeling, but it is unclear how/if it will interface with air quality modeling emissions processors (e.g., SMOKE). MACTEC will process local and state data and provide model inputs to the southeastern agencies for review and confirmation. Upon direction from the SESARM Project Coordinator, the Contractor may

be requested to run MOBILE6/SMOKE or MOVES to produce mobile emissions that are consistent with relevant EPA emission inventory reporting requirements. For emissions modeling purposes, MACTEC will provide the approved model inputs to the emissions and air quality modeling contractor to process the mobile emissions. As the status of MOVES becomes more certain, MACTEC will, at SESARM's request, prepare a specific scope of work revision and cost estimate for work resulting from this transition that is not reflected in this Contract. MACTEC will initiate and complete work consistent with the revised scope of work upon direction from SESARM.

3. SESARM is participating in a national project to evaluate particulate matter emission profiles for highway vehicles using results of an emission measurement study for gasoline and diesel vehicles in Kansas City, Kansas. The current project will develop revised mobile emissions profiles for two northern cities, Detroit, Michigan and New York, New York and compare these revised profiles to those currently used in MOBILE6. MACTEC will review these findings and recommend modifications, if any, to mobile emissions profiles for southeastern states.

In addition to developing a base year inventory, MACTEC will also be developing projection year inventories. The projection year is anticipated to be either 2012 or 2013. Projection inventory activities are listed below.

Projection Inventory Activities.

The effort includes the following activities:

1. Assemble preliminary "base case" data for 2012/2013.
2. Prepare the draft "base case" inventory for 2012/2013.
3. Growth and control factor review and assessment. Growth and control factors available for use in developing the draft and final 2012/2013 inventory will be reviewed, assessed and recommendations which factors to use will be made to SESARM. Any required changes will be made and applied to the final inventory. This will include an evaluation of preparation of EGU projections both with and without proprietary projection models (e.g., IPM).
4. Assemble the final 2012/2013 "base case" inventory. This inventory will be based off of the latest revision to the base year inventory, revised control information and revised growth factors.
5. Recommend methods for control strategies.
6. Prepare control strategy inventories (if funded).
7. Develop a projection inventory for an alternative future year (if funded).
8. Develop a "typical year" inventory for electric generating units (EGUs)
9. Develop a "typical year" inventory for wild and prescribed fires.

Other Activities. In addition to the above tasks related to base and projection year inventories, the following tasks will be performed:

1. Contingencies related to other work tasks.
2. Preparation of reports.
3. Data display and archive.

1.4 Quality Objectives and Criteria for Measurement Data

The goal of the inventory process is to provide the best possible inventory under given resource constraints. Data Quality Objectives (DQO) are statements about the level of acceptable uncertainty or error. Their purpose is to ensure that the final data will be sufficient for the intended use of the inventory. A well developed and implemented quality assurance program fosters confidence in the inventory and any resulting regulatory program. It also gives the end user important information about the limitations of the emission estimates in order to avoid misuse of data.

Table 1 summarizes the Data Quality Objectives for the SESARM inventories that will be compiled for this contract. The first column of Table 1 defines four data quality objectives: accuracy, completeness, comparability and representativeness. The second column identifies the procedures that will used to achieve each objective. The third column identifies Data Quality Indicators (DQI), which are qualitative and quantitative descriptors used in interpreting the degree of acceptability or utility of data.

1.5 Special Training Requirements / Certification Listed

All staff performing data review and analysis are air quality professionals and have sufficient education/experience to perform emission estimation calculations and work with emission inventory databases. Most staff have received specific emission inventory training through conferences, workshops, self-study programs, and on-the-job work experiences. There are no specifically mandated training requirements for work performed on this project.

1.6 Documentation and Records

QAPP Control. Any changes to this QAPP will be initiated either by the Program Manager, the Task Leaders, or the QA coordinator. Each change will be given a revision number and date in the document control block in the upper corner of the affected pages. It will be the responsibility of the initiating person to distribute copies of the changed pages to all the persons on the Distribution List and to the appropriate project team members.

Data Collection Records. Clear documentation of the data collected from the State/local agencies, EPA, and other agencies is integral to the quality analysis review. Records will be maintained containing a description of the data received, the name of the person and agency submitting the data, the date of the submission, and other relevant information about the data submission. The following types of data will be collected during this project:

- EPA's 2005 National Emission Inventory (version 3)
- State CERR submittals
- State/local agency data submittals in NIF 3.0 format
- Forestry officials data submittals for wild and prescribed fires
- Mobile source input files provided by State/local air agencies or EPA
- EPA's Final Summary Emission Reports for CEM information for electric utilities regulated by the Acid Rain Program
- EPA's Toxic Release Inventory for ammonia emissions data
- State agency submittals of information necessary to calculate fire emissions and geographically locate where these fires occurred in the base year.
- State/local agency revisions, updates, corrections in response to various QA/QC checks. These may be provided in a variety of formats depending on the nature of the response.
- Department of Energy fuel efficiency data
- EGAS or other growth factors available from EPA, DOE, or the States
- VMT data

TABLE 1

DATA QUALITY OBJECTIVES, PROCEDURES, AND INDICATORS

Data Quality Objective	Procedures	Example Indicators
Accuracy - reduce uncertainty in emission estimates where possible, validate that data elements needed for modeling are within accepted parameters, and verify that emission estimates agree with accepted reference values.	1. Identify weaknesses in existing inventories, identify new methods/data to reduce uncertainty, and obtain new activity/emission factor data where available. 2. Use EPA's NIF QA tool and ad-hoc reports to perform computerized checks of valid codes/data ranges and to identify outliers. 3. Conduct senior technical review of pollutant totals by facility, source category, state, and region. 4. Compare to other published data.	1. Qualitative assessment of the inventory's strengths and weaknesses. 2. 100% of stack data and temporal factors in valid ranges for > 100 tpy sources. 3. 100% of sources have valid geographic coordinates. 4. 100% correction of significant outliers. 5. Agreement of SESARM emissions and EPA CEM data and EPA TRI data. 6. Compare projection emissions to base year emissions to ensure that values are within expected ranges.
Completeness – include all major point sources, include emission estimates for $PM_{2.5}$ and ammonia, verify that all on-road mobile source categories and fire sources are accounted for.	1. Compare SESARM utility data to EPA CEM data. 2. Compare SESARM point source ammonia data to EPA TRI data. 3. State/local agencies compare facility list to their Title V permit lists. 4. Compare small point source emissions to area source emissions. 5. Compare PM_{10} and $PM_{2.5}$ emissions. 6. Plot fire sources by type.	1. 100% of all utilities accounted for in database. 2. 100% of large ammonia sources in TRI accounted for in database. 3. 100% of Title V sources accounted for in database 4. Small point sources included as either small point sources or as area sources. 5. $PM_{2.5}$ and ammonia emissions included in inventory 6. Fire emissions for all counties in region accounted for. 7. All mobile sources accounted for. 8. Explanation of any missing data or sources.
Comparability – verify that emission estimates are similar to other peer-reviewed inventories and that any major deviations are explained.	1. Compare emission totals by source category, pollutant, geographic region, and year with previous emission inventories.	1. Explanation for large discrepancies in emissions
Representativeness – use emission estimation methods that reflect local conditions and the time period of interest.	1. Identify where national defaults used instead of local activity data. 2. Identify where emissions were grown for base year 2002 data were not available. 3. Identify growth factors for projection years.	1. Explanation for use of national defaults. 2. Determination of representative values for "typical years" for some sources for projections (i.e., fires, utility emissions).

Data Handling Records. Another key element of the QA program is maintaining written documentation of calculations, assumptions, and all other activities associated with incorporating the State/local agency submittals and other data with the EPA's National Emission Inventory. Nearly all data being developed and/or compiled will use computerized databases or other electronic files. For many of these databases, we will use blank fields in the database tables to keep track of the source of the data. We will also maintain a log of activities to document how the data described above were incorporated to create the SESARM inventories. The log will include complete descriptions of the data sources used, the procedures used to incorporate the data, the approach used to determine the completeness, and any contacts made with data submitters to resolve questions. A file will be maintained to ensure that the data handling records are retained and easily located.

QA/QC Records. We will perform a variety of quality control reviews of the inventory. For example, we will check stack parameters, source classification codes, and geographic coordinates for point sources that emit at least 100 tons of any pollutant per year. Reports containing the results of these checks will be transmitted to the State/local agencies for investigation and correction. Documentation of each finding will include a description of the action or data reviewed that led to the quality concern and will provide recommendations for corrective actions.

Corrective Action Records. Records of corrective and follow-up actions identified during the quality review process will be maintained. Both the corrective action identified and the results of the actions taken in response will be documented for inclusion in the final report. If no corrective action can be made, we will document the implications on the overall quality of the inventory.

Data Reporting Package. The final data reporting package will contain four elements:

- An emission summary report that describes the emissions inventory by pollutant and source category, summarizes the methods and data used to compile the inventory, assesses the limitations and appropriate uses of the inventory data, and contains any other information pertinent to the inventory (including emission density maps);

- A quality assurance summary report that describes the quality assurance efforts completed, summarizes the corrective actions taken, and provides suggestions for further inventory improvement based on the results of the quality assurance process;

- Electronic data files containing the SESARM inventories in NIF 3.0 format as well as SMOKE or other specified format (including GIS shape files where applicable); and

- Electronic and paper files containing all original data submittals and all backup documentation will be stored on file at MACTEC for a period of no less than three years.

2.0 SAMPLING

This section describes any sample handling, sampling methods, analytical methods, quality control requirements as they relate to samples, instrumentation testing, inspection, maintenance and calibration, consumable inspection and acceptance criteria, data acquisition requirements for non-direct measurements and data management operations.

Since this project is an emission inventory development effort most of the sampling areas are not applicable to this work.

2.1 Sampling Process Design (Experimental Design)

No sampling will be performed as part of this work, thus this section does not apply to this work effort.

2.2 Sampling Methods Requirements

No sampling will be performed as part of this work, thus this section does not apply to this work effort.

2.3 Sample Handling and Custody Requirements

No sampling will be performed as part of this work, thus this section does not apply to this work effort.

2.4 Analytical Methods Requirements

No sampling will be performed as part of this work, thus no analyses will be performed so this section does not apply to this work effort.

2.5 Quality Control Requirements

No sampling will be performed as part of this work, thus this section does not apply to this work effort.

2.6 Instrument / Equipment Testing Inspection, and Maintenance Requirements

No sampling will be performed as part of this work, thus this section does not apply to this work effort.

2.7 Instrument Calibration and Frequency

No sampling will be performed as part of this work, thus this section does not apply to this work effort.

2.8 Inspection / Acceptance Requirements for Supplies and Consumables

No supplies or consumables affecting quality will be acquired as part of this work effort thus this section is not applicable.

2.9 Data Acquisition Requirements for Non-direct Measurements

The base year and projection year SESARM inventories will rely primarily on air emission information from existing databases. The data collection, handling, and management process is described below, along with the associated quality control procedures and methods. The QC system is designed to:

- Provide routine and consistent checks and documentation points in the inventory development process to verify data integrity, correctness, and completeness;
- Identify and reduce errors and omissions;
- Maximize consistency within the inventory preparation and documentation process;
- Facilitate internal and external inventory review processes.

The data acquisition process should be viewed as an iterative process. As decisions are made, new questions will surface that require solutions, until the iterations are complete.

2.9.1 Base Year Inventory Update Procedures

For the base year inventory update, the following procedures will be used to compile and quality assure the revised base year SESARM emission inventory:

1. Discuss with States what information was submitted to EPA as part of the CERR process to determine where differences are between CERR and SESARM base year inventory
2. For those States that indicate that CERR submittals should be used, obtain State CERR inventory submittals
    a. Download State files from EPA ftp site or EPA NEI version 3 files
    b. Prepare and review emission summaries at the SCC level to verify that emissions by source category, geographic region, and pollutant are complete and reasonable.
    c. Maintain log of data received and identify format.
    d. Compare facility level emissions from State/local agency submittal with CERR, identify significant discrepancies in emissions (especially $PM_{2.5}$ and ammonia), identify potentially missing facilities.
    e. Provide State/local agencies with results of 2(b) and 2(d) and ask for State/local agency assistance in resolving any problems/issues that have been identified
    f. Obtain and process State/local agency corrections/updates as required
3. Augment with $PM_{2.5}$ data if State/local submittal did not include $PM_{2.5}$ using EPA NEI augmentation methodology
4. Augment with ammonia emissions data if State/local submittal did not include ammonia using EPA NEI augmentation methodology or possibly augment with ammonia emission data from the EPA TRI database (point sources only).
5. Assess the procedures used to evaluate and to account for potential double counting.

6. Compare and augment (if necessary) with base year specific NO_x and SO_2 emissions data collected by ETS/CEM procedures by EPA's Clean Air Market Division
7. Track comments/concerns received and corrective actions taken
8. Provide inventory for review by State/local agencies
    a. Prepare an emission summary report that describes the emissions inventory by pollutant and source category, summarizes the methods and data used to compile the inventory, assesses the limitations and appropriate uses of the inventory data, and contains any other information pertinent to the inventory
    b. Prepare a QA/QC summary report that describes the efforts completed, summarizes the corrective actions taken, and provides suggestions for further inventory improvement based on the results of the quality assurance process
    c. Provide data files containing the base year SESARM inventory in NIF 3.0 or other specified format
    d. Provide electronic data files in SMOKE or other specified format
    e. Track comments/concerns received and corrective actions taken
9. Incorporate feedback from stakeholders and prepare final reports and electronic files.

2.9.2 Projection Year Inventory Procedures

For the projection inventories, the following procedures will be used to compile and quality assure the inventory:

1. Prepare Base Growth Inventory
    a. Use the final version of the SESARM Base/Typical Year inventory
    b. Back calculate uncontrolled emissions for Base/Typical Year inventory to use as starting point for sources that will be grown for the projection inventory.
2. Prepare/Obtain Growth and Control files
    a. Obtain growth factor files from EGAS or other appropriate growth factor source for use with categories that will be grown with growth factors.
    b. Obtain control factors for "on-the-book" and "on-the-way" controls as well as any controls for control strategy evaluations. Controls will be obtained from recent EPA rulemakings, proposed rules, and State SIPs.
    c. Obtain and calculate DOE energy efficiency factors for use with combustion sources.
    d. Determine/obtain growth factors for non-EGAS sources. Growth factors for these sources will be calculated from existing projection inventories prepared by EPA. Growth factors will be calculated using linear interpolation of projected emissions if the actual year is not available.
3. Project sources using growth and control factors
    a. For sources to be grown using growth factors, apply growth and control factors.
    b. For combustion sources apply energy efficiency factor.

c. Identify and resolve any errors/discrepancies from the use of growth factors or other growth factor data
d. Track comments/concerns received and corrective actions taken

4. Determine emissions for sources requiring "typical" year emissions.
    a. These sources include EGUs and fires
    b. For fires obtain long term estimates of acres burned. Determine average fire emissions across the period that the data cover. Estimate "typical" emissions based on either average spatial distribution or random selection of fires across time period.
    c. Obtain typical year emission data from EGU sources coupled with long term reported CEM data.
    d. Alternatively use IPM projection inventories for projection years. If this approach is taken, review by stakeholders prior to final inventory.

5. Develop mobile source emission inventories

    a. Prepare projected VMT for review by States/stakeholders for onroad mobile sources.

    b. Prepare MOBILE or MOVES input files for review by States/stakeholders. MOBILE/MOVES input files will contain required control programs either "on--the-books" or "on-the-way".

6. Conduct QA/QC to identify errors and inconsistencies
    a. Prepare emission density maps and ad-hoc reports to identify gaps and logical inconsistencies.
    b. Ask States/local agencies to provide feedback on large scale inconsistencies and on missing sources.
    c. Update database with State/local supplied revisions.
    d. Track comments/concerns received and corrective actions taken

7. Provide inventory for review by State/local agencies
    a. Prepare an emission summary report that describes the emissions inventory by pollutant and source category, summarizes the methods and data used to compile the inventory, assesses the limitations and appropriate uses of the inventory data, and contains any other information pertinent to the inventory (including emission density maps for all source categories)
    b. Prepare a quality assurance summary report that describes the quality assurance efforts completed, summarizes the corrective actions taken, and provides suggestions for further inventory improvement based on the results of the quality assurance process
    c. Provide electronic data files containing the SESARM inventories in NIF 3.0 or other appropriate format
    d. Provide electronic data files in SMOKE or other appropriate format (including GIS shape files)
    e. Track comments/concerns received and corrective actions taken

8. Incorporate feedback from stakeholders and prepare final reports and electronic files

2.10 Data Management

MACTEC will provide to SESARM at least one electronic copy of all input files and output files for emissions models used to develop the emissions inventories (e.g., MOBILE/SMOKE or MOVES) and any supporting technical analyses to the SESARM Project Coordinator and State and Local Agencies in accordance with SESARM's prescribed schedule.

Inventory data shall be designed for archival on a common SESARM data website. MACTEC will promptly post the electronic inventory data on an interim web site. When a new version of the inventory is developed, previous versions of inventory shall be moved to an archive section of the website so that it is clear which data sets are the most recent. Some data may be kept on a password protected website. MACTEC will keep the website up-to-date. The procedures for data archival will be clearly described in the draft and final reports. At the conclusion of the project, MACTEC will provide the interim and final products in a format prescribed by SESARM to SESARM's webmaster for permanent posting.

Data storage and retrieval will be performed using MACTEC's computer and Microsoft Access database management software. Some data may be stored in MySQL files (if MOVES is used to prepare the on-road emission estimates).

Data file storage will be on MACTEC's servers. The data on these servers is backed up nightly to a tape backup system. Restoration of lost or damaged files can be accomplished in a matter of hours. All data on MACTEC's servers are limited access using password protected user profiles and storage spaces. Delivered files can be password protected or delivered in an uneditable format (e.g., locked PDF files). Spreadsheets will be protected to mitigate changes to any data submitted.

3.0 REPORTS TO MANAGEMENT

The subsections in this group address the activities for assessing the effectiveness of project implementation and associated QA and QC activities. The purpose of the assessment is to ensure that the QA Project Plan is implemented as prescribed. The assessment consists of external activities that include a planned system of review and audit procedures by personnel not actively involved in the inventory development process. The key concept of this component is independent objective review by a third party to access the effectiveness of the internal Quality Control program and the quality of the inventory, and to reduce or eliminate any inherent bias in the inventory process.

3.1 Project Status Reports

Monthly project status reports will be delivered via telephone by the MACTEC Program Manager to the SESARM Technical Coordinator. The monthly status reports will include a discussion of any QA issues arising from either scheduled audits or interim findings as a result of on-going QA procedures.

3.2 Results of Performance Evaluations and Audits

The MACTEC Quality Assurance Coordinator will conduct technical systems audits throughout the project. Audits are managerial tools used to evaluate how effectively the emission inventory team complies with predetermined specifications for developing an accurate and complete inventory. The MACTEC QAC will conduct audits at the initiation of each project to review the Work Plan and QAPP, at the 50% complete and 75% complete levels to review the technical aspects of each project and at the 95% completion level to review the data submittal package. This provides assessment of the project during the planning stage, the data collection stage, the emissions calculations stage, and the report preparation stage. An example audit checklist for point sources is presented in Figure 2.

3.3 Results of Periodic Data Quality Assessments

Audit reports will be distributed within two weeks of the conduct of each audit to the persons interviewed and the MACTEC Task Leaders. A summary of the types of quality concerns found will be periodically forwarded to the MACTEC Program Manager to keep him informed of the quality issues found and actions being taken to resolve them. Audit reports will be retained in a file and used to conduct subsequent audits and plan follow-up activities. When an audit team finds items that require immediate action, they will inform the MACTEC Program Manager of the necessary corrective actions.

AUDIT CHECKLIST

Auditor: _____

Date: _____

Data/Procedure Reviewed: _____
_____

Project Personnel Involved in Work: _____
_____

Instructions: Select a facility or source category with high emissions and evaluate the quality of the data and adequacy of the data handling procedures. Record the findings and recommendations for corrective actions, if any, on this checklist and comment sheet. If recommendations for corrective actions are made, discuss them with the Project Manager immediately following the audit. Conduct follow-up activities to determine if the actions taken in response to the recommendations appropriately resolved the quality issues identified.

I. DATA

A. Identify the source category evaluated: _____

B. Describe the data included in the master file for the facility or source category.
_____
_____

C. Are the data documented in a manner that will not have the potential to be misinterpreted? Y/N
Were the instructions for documenting the data followed? ..... Y/N

D. Are there missing data fields? ..... Y/N
What procedures are taken by the Task Leaders to ascertain missing?
_____
_____

At what point in the inventory process are requests for missing data made?
_____
_____

How is the receipt of the missing data handled?
_____
_____

Is the procedure followed to ascertain missing data efficient and adequate? ..... Y/N

E. How do emissions compare to other inventories?
2005 NEI _____
2005 TRI _____
2005 ETS/CEM _____
Are differences in emissions understandable and explainable? ..... Y/N
If any of the values are incorrect, explain how the emissions data were corrected.
_____

Figure 2 Audit Check Form

II. EMISSIONS DATABASE

A. Who provided the data for incorporation into the database? _____
_____

B. Was there evidence that the data were reviewed for accuracy and completeness prior to incorporation in the database? ..... Y/N

C. Were data logs maintained to describe how the data was incorporated? ..... Y/N

D. Ask the data incorporation personnel to explain the QC procedures followed to ensure data quality. Do they agree with the procedures described in the QAPP? ..... Y/N

E. Does the computer system appear to be adequate for its intended use? (Ask the data processing personnel about the problems they have experienced with the system.) ..... Y/N

F. Is the data entry progressing as expected and are the procedures followed adequate to ensure data quality? ..... Y/N

III. RECOMMENDATIONS FOR CORRECTIVE ACTIONS

_____
_____
_____
_____
_____

IV. COMMENTS

_____
_____
_____
_____
_____

V. SIGNATURES

_____ (QA Auditor)

_____ (QA Coordinator)

_____ (Program Manager)

_____ (Task Manager)

_____ (Project Participant)

_____ (Project Participant)

Figure 2 Audit Check Form (Concluded)

4.0 DATA REVIEW AND VALIDATION

Section 4 addresses the QA activities that occur after the data collection phase of the project is completed. Implementation of these subsections determines whether or not the data conform to the specified criteria, thus satisfying the project objectives.

4.1 Data Review, Validation, and Verification

A qualitative discussion of accuracy will include an assessment of the extent to which the initially identified weaknesses in the inventory have been remedied through the use of improved activity data, emission factors, or other sources of information. Remaining weaknesses will be assessed.

The accuracy assessment will include a summary of whether any data identified as outside of its valid range remained outside of the valid range in the final inventory. If any data remained outside of its valid range, an explanation will be given. The qualitative discussion will also include a summary of errors or discrepancies identified in the QA/QC process.

A final semi-quantitative discussion of accuracy will consist of pollutant summaries for individual facilities, industry types, source categories, and statewide totals. The SESARM inventory will be compared to other peer-reviewed inventories, and where major discrepancies exist, we will provide an assessment of the reasons for the differences in emission estimates.

4.2 Validation Methods and Verification Methods

A statement will be prepared assessing whether all required facilities, source categories, pollutants, and data elements were included in the inventory. If any facilities or source categories were not included, an explanation of the omission will be provided. If any individual data elements were not provided, we will discuss the elements, frequency of omissions, and overall impact on the quality of the inventory.

4.3 Reconciliation with User Requirements

Several summations of emissions data will be made to address comparability. Overall percentage differences for individual facilities (current year to prior year), industry types, processes, and statewide inventory will be calculated. Explanations of any large differences will be made.

4.4 Representativeness Assessment

A statement will be prepared describing where national defaults have been used instead of local activity data.

5.0 REFERENCES

1. U.S. Environmental Protection Agency. March 2001. *EPA Requirements for Quality Assurance Project Plans* (EPA/240/B-01/003). http://www.epa.gov/quality/qs-docs/r5-final.pdf

2. Emission Inventory Improvement Program (EIIP) Document Series - Volume VI Quality Assurance Procedures and DARS Software. EPA | TTN CHIEF | EIIP | Technical Reports | Volume VI Quality Assurance Procedures

3. U.S. Environmental Protection Agency. November 18, 2002. 2002 Base Year Emission Inventory SIP Planning: 8-hr Ozone, $PM_{2.5}$ and Regional Haze Programs. http://www.4cleanair.org/members/committee/criteria/EPA200211181.pdf

Appendix A – Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING VISIBILITY IMPROVEMENT - STATE AND TRIBAL ASSOCIATION OF THE SOUTHEAST (VISTAS)

WHEREAS, The national goal of the visibility program, as set forth by Congress, is to remedy any existing impairment and prevent any future impairment in mandatory Class I Federal areas that are caused by human activity;

WHEREAS, The visibility program highlights the need to implement other regional planning processes to improve air quality in the geographic area located within the States of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia;

WHEREAS, These States and Tribes, who have the authority and responsibility to develop, adopt, and implement their individual State and Tribal air quality implementation plans, recognize the benefits of coordination on many of the projects relating to air quality that are underway in the region;

WHEREAS, The Southeastern States Air Resource Managers (SESARM) has been designated by the United States Environmental Protection Agency (EPA) as the entity responsible for coordinating and implementing regional planning for the eight SESARM states (Alabama, Florida, Kentucky, Georgia, Mississippi, North Carolina, South Carolina and Tennessee) plus Virginia, West Virginia, and Tribes.

NOW, THEREFORE, it is hereby agreed to by the signatories as follows:

1. The parties agree to collaborate in the initiation and coordination of planning activities associated with the management of regional haze, visibility, and other air quality issues. This collaboration shall be known as Visibility Improvement - State and Tribal Association of the Southeast (VISTAS).

2. The purposes of VISTAS are as follows:

   To promote the coordinated efforts of States and Tribes in their efforts to address federal regional haze and visibility requirements.

   To identify regional or common air management issues.

   To conduct research and undertake other activities to provide the membership with scientific and technological information which may be of value in development of agency strategies.

   To develop strategies on regional haze and other air quality issues for use by member States and Tribes, where appropriate, in developing their implementation programs, regulations and laws.

4. VISTAS shall operate as described more fully in the attached Bylaws, which are hereby adopted by the parties to this Memorandum of Understanding (MOU).

5. SESARM shall continue to operate as the entity responsible for applying for, receiving, and disbursing funds necessary for coordinating and implementing regional planning for the eight SESARM states plus Virginia, West Virginia, and Tribes.

6. VISTAS shall not apply for, receive, or disburse any funds. In the Bylaws, “VISTAS funds”, “expenses of VISTAS”, and other such references shall mean SESARM funds used for VISTAS purposes.

7. VISTAS has no independent regulatory authority and has no authority to direct or establish individual State or Tribal law or policy. Participants retain their own rights and legal authorities.

8. This MOU is not a binding agreement. It is a voluntary collaboration of the parties to aid in planning activities associated with the management of regional haze, visibility, and other air quality issues.

The Parties hereto have executed this MOU.

Agreed to this_____ day of _____, 2001:

For the Southeastern States Air Resource Managers (SESARM):

Executive Director

The Parties hereto have executed this MOU

Agreed to this_____ day of _____, 2001:

For The State of Virginia:

Title

The Parties hereto have executed this MOU

Agreed to this_____ day of _____, 2001:

For the State of West Virginia:

Title

The Parties hereto have executed this MOU

Agreed to this_____ day of _____, 2001:

For the Eastern Band of Cherokee Indians:

Title