

Comments and Recommendations for the Future of the Fall Line Air Quality Study (FAQS)

This report was prepared by an **External Review Panel for FAQS** consisting of:

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This report was prepared after the **FAQS Science and Policy Workshops**

which were held at
Georgia Tech's School of Earth and Atmospheric Sciences, and in the
Georgia Regional Transportation Authority Offices
on October 19-20, 2000

Prior to our arrival at the Science Workshop, the Panel received a series of documents including:

- 1) A detailed Agenda for the FAQS Science Workshop and the following FAQS Policy Workshop
- 2) An Overview of FAQS describing:
 - A) The general objectives of FAQS:
"A scientific assessment of urban and regional air pollution, identifying the sources of pollutants and pollutant precursors, and recommending solutions to realized and potential poor air quality in the Augusta, Macon, and Columbus, Georgia metropolitan areas"
 - B) The total budget for FAQS -- \$3 million provided by the Georgia General Assembly and \$1 million provided by Georgia Tech (SCISSAP mobile laboratory)
 - C) The time period of FAQS -- January 1, 2000 -- December 31, 2002
with four distinct study periods:
Period 1 -- January 2000-June 2000 -- Organization and Initial Setup Phase
Period 2 -- July 2000-June 2001 -- Initial Field Study, Model Development, Design of Field Study #2
Period 3 -- July 2001-June 2002 -- Field Study #2, Monitoring Network Design, Training, Tech Transfer
Period 4 -- July 2002-December 2002 -- Technology Transfer, Recommendations for Action
 - D) The organizational structure of FAQS which is patterned after that of the Southern Oxidants Study.
 - E) The following statements of the expected Legacy of FAQS:
"At the conclusion of FAQS, Augusta, Macon, and Columbus will be provided with sufficient information to begin making the difficult decisions necessary to meet or maintain state and federal air quality standards. Where poor air quality is identified by FAQS to result from [regional] factors beyond the political jurisdiction of these metropolitan areas, the EPD [Georgia Environmental Protection Division] or the USEPA will be provided with information necessary to address these externalities. Further, as political, environmental, or economic conditions change in the future, each community will have sufficient skills and computational tools to evaluate and modify alternate action plans. Finally, each community will possess a basic monitoring system capable of assessing regional and local air quality conditions, and tracking progress in meeting and maintaining air quality standards."
- 3) A printed "Summary of Year to Date Accomplishments and FY 01-FY02 Budget Justification"

Introduction

During the FAQS Science Workshop at Georgia Tech, the External Review Panel mainly listened to (but also asked pertinent questions about) reports by various members of FAQS Science Team. The topic covered included:

- Overview of the Phase I Pilot Studies in and around Augusta, Macon, and Columbus
- Results of:
 - Gas phase and meteorology measurements
 - VOC measurements
 - PM mass and optical properties measurements
 - PM composition measurements
- Emissions inventory update
- Initial synthesis and integration of Phase I results including comparison of measurements made in and around Augusta, Macon, and Columbus during the summer of 2000
- FAQS Phase II planning

Following these FAQS Science and Policy Workshops, the three Panel Members prepared and exchanged our individual impressions, comments, and recommendations. On the basis of these written statements and verbal and E-mail communications, we offer the attached **General Comments about Phase I Results and Recommendations for the Future of FAQS**. These comments are offered in the hope that they will help ensure the success of the FAQS research program in fulfilling the expectations outlined in the FAQS Legacy (see above).

GENERAL COMMENTS ABOUT PHASE I RESULTS AND RECOMMENDATIONS FOR THE FUTURE OF FAQS

General Comment 1) The FAQS Science Team includes a very high quality group of investigators.

The FAQS Chemical and Meteorological Measurements Work Group is led by Professor William Chameides of Georgia Tech's School of Earth and Atmospheric Sciences. He coordinates the pollutant monitoring and diagnostic analysis components of FAQS in connection with his leadership of the Southern Center for Integrated Study of Secondary Air Pollutants (SCISSAP). Professor Karsten Baumann provides leadership for the chemical and meteorological field measurements using the facilities of the Georgia Tech Mobile Laboratory and other chemical analytical facilities within the Georgia Tech School of Earth and Atmospheric Sciences.

The FAQS Emissions, Models, and Effects Work Group is led by Professor Armistead (Ted) Russell, of Georgia Tech's Air Resources Engineering Center (AREC). He and his graduate student colleagues are responsible for development of the FAQS emissions inventories and relevant air quality models which will be used to execute the simulations of various air quality scenarios in cooperation with personnel from Augusta, Macon, and Columbus.

Overall project management for FAQS is provided by Dr. Michael Chang of Georgia Tech's Center for Urban and Regional Ecology (CURE) with general guidance provided by professor C. S. Kiang who serves as Senior Advisor for FAQS.

General Comment 2) A vary good initial effort has been made by the FAQS Science Team to get a "good intellectual grip" on the air quality problems of all three cities with the limited financial and human resources that are available.

General Comment 3) The three sponsoring municipalities, the Georgia state legislature, and the FAQS Science team all are to be commended for "getting out in front" of the air quality challenges of these three Near-Non--Attainment Areas within the state of Georgia. Having even a limited amount of measurement data and information that is carefully assessed, is certainly better than no data and only continuing uninformed speculation about the air-quality status and future of the three FAQS cities.

We caution, however, that these same three groups of stakeholders should not have too high expectations for the general outcome of FAQS. The data so far accumulated are very limited -- only 2-3 weeks in each metropolitan area within one particular year -- and analysis and interpretation have only just begun. The high goals of FAQS will be achieved only after very careful analysis and interpretation of these initial observations in the light of what is known from previous research both within and outside of Georgia. These "initial observations" are a good foundation for development of a "climatology" of observations in and around these three cities. Such a climatology will need to be constructed before firm conclusions can be drawn with reliability. In essence, more observations in Field Season #2 and beyond will be needed in order to firm up, improve, and probably revise these initial insights over time.

General Comment 4) The most intensive field measurements for FAQS will begin in earnest during Field Season #2. Additional measurement sites to be operated under the guidance of the Georgia Tech Science Team are already in place. That is very good.

General Comment 5) The FAQS Website [<http://www.cure.gatech.edu/faqs.asp>] established by Director Michael Chang and maintained in cooperation with his several colleagues on the FAQS Science Team provides a publicly accessible record of:

- 1) The origins of FAQS, the original FAQS Proposal, the FAQS Memorandum of Understanding,
- 2) The qualifications of the FAQS Science Team,
- 3) Minutes of the several meetings of the FAQS Coordinating Council,
- 4) FAQS Outreach and Extension efforts, and
- 5) Progress achieved during the Phase I Science and Policy Workshop on October 19-20, 2000.

In this connection, we were pleased to see again, some of the 68 graphic displays on the FAQS Website which included much of the original data which were shared with us and among member of the FAQS Science Team during the FAQS Science Workshop meetings on October 19 and 20. These detailed graphic displays and verbal expositions included the following topics: 1) review of Georgia's Air Quality "Climate," 2) Regional Relationships, 3) Local Relationships, 4) Other Chemical Data, 5) FAQS Phase I Questions, 6) "Eyeball" Analysis of VOC Data, 7) Fine particulate Matter -- Concentrations, Composition, and Effects, 8) Relationships between Ozone and PM, and 9) Forming Hypotheses about "What it all means."

A preliminary assessment of results from the Pilot Study in Field Season #1 (2000) also was posted on the FAQS Website on October 24, 2000 -- a few days after the FAQS Science and Policy Workshops on October 19-20, 2000:

"The key findings from the pilot study were: 1) local areas may simultaneously contribute to and be affected by high concentrations of ozone across the southeastern region -- this is most evident

in Augusta and Columbus; 2) in Macon, like Atlanta, the underlying regional effects sometimes may be dwarfed by local effects; 3) high ozone concentrations in each of the three Fall Line cities appear to be associated most frequently with light or stagnant winds; 4) total hydrocarbon concentrations and isoprene fractions observed in the three cities were similar in relative magnitude to those observed in previous studies of Atlanta suggesting controls on NO_x emissions may be needed to reduce ozone concentrations; and 5) fine particulate matter was observed to be composed largely of organic carbon and sulfates."

In this connection, we believe it is important to repeat the caution offered in General Comment 3 (above). We believe that the verbal interpretations associated with the graphic display of data presented at the FAQs Science and Policy Workshops and on the FAQs Website constitute what we suggest be called "Initial Impressions" rather than "Key Findings." In our opinion, the limited observations so far made in the Pilot Study in Phase I of the FAQs Study (2000) should be regarded mainly as "Hypotheses which have not yet been fully tested." In essence we believe the term "Key Findings" should be reserved for analyses and interpretations made after Field Study #2 has been completed and that the term "Initial Impressions" is more appropriate to the present verbal interpretations of "What it all means."

We appreciate the completeness and timeliness of many of the publicly accessible FAQs Website records. The originating documents, qualifications of team members, minutes of meetings, etc. help satisfy the need for "public education" and are consistent with the idea of the "public's right to know." At the same time, we emphasize the need to ensure that high standards of quality are maintained both in the FAQs data (numbers) and the FAQs information (written statements) posted on the FAQs Website. As indicated in the immediately preceding paragraph, we believe special care should be taken, especially when posting:

- FAQs field measurement data,
- Initial impressions from preliminary analyses of FAQs data and information, and especially when
- Major conclusions and (later) policy implications of observations are formulated for posting on the FAQs Website.

Recommendation 1) If FAQs is to be maximally productive, full funding for the remaining three phases of the FAQs study plan should be secured and provided to the FAQs Science Team in a timely way. Also, care should be taken to allow adequate time for thorough analyses and interpretations of the data collected in Field Season #1 before Field Season #2 is initiated.

Recommendation 2) All data collected at the present measurements sites and additional measurement sites as discussed in Recommendations 4 and 5 below, should follow carefully determined quality control and quality assurance procedures. These quality control and quality assurance procedures should be identified in a written QA plan in order to maintain data integrity to the highest degree possible.

Recommendation 3) We recommend that the Georgia EPD be invited to participate in these QA/QC processes to provide oversight of data collection processes. In this way, EPD will have the opportunity to review the measurement and QA/QC processes as they develop.

Recommendation 4) Regional monitoring should be considered as important as the current urban-focused (upwind-downwind) design for Field Season #2. The proposed study of ozone transport between the three Fall Line cities as well as transport from the Atlanta metropolitan area should be realized. Additional sampling stations should be established at carefully selected locations between Atlanta and

Macon, between Macon and Columbus, and between Macon and Augusta. Ideally, these additional stations should include continuous monitoring of ozone, CO, SO₂, NO_x, NO_y, PM_{2.5} mass, basic meteorology, and canister sampling for VOCs.

Recommendation 5) In addition to the regionally focused monitoring sites discussed in Recommendation 4 (above), we suggest that consideration should be given to outfitting the Georgia EPD sampling stations in most parts of Georgia, with the same type of continuous monitoring equipment (including instrumentation for measurements of ozone, CO, SO₂, NO_x, NO_y, PM_{2.5} mass and chemical speciation, basic meteorology, and canister sampling for VOCs). This would provide information on the effectiveness of each existing and new sampling station in determining three important features:

- 1) The age of the air masses passing these established sampling stations,
- 2) The effectiveness of each sampling station in explaining peak ozone concentrations, and
- 3) Identifying regions of Georgia that are tending toward "NO_x sensitivity," "VOC sensitivity," or the "transition" between these two air-quality management regimes.

Recommendation 6) While FAQs should be seeking to understand what is happening at both peak and low (near background) ozone and PM concentrations, we also encourage the FAQs Science Team and its various stakeholders to recognize that the question of attainment vs. non-attainment in the three Fall Line cities is likely to have appreciably different dimensions and significance for air-quality management in the state or Georgia, if the new ozone standard is adopted (0.08 ppmv averaged over 8 hours) compared to the old ozone standard (0.120 ppmv averaged over 1 hour).

Recommendation 7) Additional funding should be sought for investment in FAQs for the long term. These additional resources will be especially useful for three interrelated purposes:

- 1) Additional field measurements,
- 2) Additional analysis, interpretation, and assessment activities, and
- 3) Additional training and technology-transfer functions as outlined in the FAQs study plan and Legacy statements.

Recommendation 8) The External Review Panel is aware that a more detailed Progress Report for the Pilot Study completed in Field Season # 1 will soon be completed for consideration and response by the FAQs Coordinating Council. All of us on the External Review Panel would welcome the opportunity to review and comment on this Progress Report whenever it is completed. We suggest that this be done both before the Progress Report is submitted to the Coordinating Council and perhaps also after the Coordinating Council has offered their comments and reactions to the Progress Report.

In Conclusion:

We hope that the six **General Comments** and eight **Recommendations** offered above will be useful to the FAQs Science Team, the FAQs Coordinating Council, officials in the three Fall Line cities (Augusta, Macon, and Columbia), and other stakeholders in the management of air quality in the state of Georgia -- as they continue to work together to make further progress toward fulfilling the Legacy of FAQs.

If we can be of further help in these matters, please let us know. Please also let us know if we have misunderstood or misinterpreted any aspects of the purposes of FAQs and/or the significant progress that has been achieved by FAQs to date.