August 21, 2000

Docket No. A-99-05
Air Docket (6102), Room M-1500
Waterside Mall, US EPA
401 M-Street, S.W.
Washington, DC 20460

To Whom It May Concern:

On behalf of the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO), thank you for the opportunity to comment on EPA's the proposed changes of EPA's "Guideline on Air Quality Models." The associations' comments are as follows:

1. We welcome the addition of AERMOD, CALPUFF, and ISC-PRIME as they add significant new improvements over existing models listed in Appendix A to 40 CFR Part 51, Appendix W. However, some states and local agencies will be expressing their individual concerns regarding these models.

2. We strongly encourage EPA to implement the PRIME downwash algorithms into AERMOD as soon as possible. Many other speakers at the Conference also expressed this theme. This addition can greatly expand the usability of AERMOD. We also note that both the AERMOD algorithms and the PRIME downwash algorithms have already been peer-reviewed by the scientific community. For this reason, we further request that AERMOD-PRIME be included in the Appendix A list of approved regulatory models as soon as it meets the testing, performance evaluation, and peer scientific review criteria.

3. In the 4/21/2000 FR, the proposed action shows different niches for ISC-PRIME and AERMOD. It is unfortunate that AERMOD has to be limited in the way. Page 21508 invites comments on the possible burden of jointly using both AERMOD and ISC-PRIME. We strongly recommend that EPA restrain from requiring the joint use of two models for a single modeling application. This is similar to what happened in the 1980's for evaluating "intermediate terrain." It was a confusing and burdensome policy, as EPA did not provide the tools to do this work. Instead, many entities had to

develop such tools independently. This was extremely inefficient. Until EPA can provide a tool to perform this model merging, these models should only be required to be used independently. Such a tool can be AERMOD-PRIME.

4. As AERMOD is being recommended for adoption without PRIME, we request that EPA expand the defined niche for AERMOD's use before the proposed rules are finalized. Currently EPA is limiting that niche to include situations where downwash is not important. This should be expanded to include situations where AERMOD with the current downwash algorithms can be shown as being conservative with respect to ISC-PRIME predictions. Here, EPA may be able to use existing ISCST3/ISC-PRIME evaluation studies that have already identified some cases where ISCST3 is conservative with respect to ISCST-PRIME. The domain could be expanded further to include cases where AERMOD is found to be conservative relative to ISC-PRIME.

   Here are some examples that should be explored to show that AERMOD's predictions are more conservative than those from ISC-PRIME:

   - That certain building obstacle designs produce more conservative predictions. Examples could be for tall narrow buildings under all meteorological conditions.
   - That tall stacks (even next to tall buildings) modeled with AERMOD may show higher impacts than ISC-PRIME. This may occur as tall stacks modeled with AERMOD's convective boundary layer (CBL) algorithms produce significantly higher predicted impacts compared to ISC. This is a situation where AERMOD's different treatment of tall stacks with CBL conditions alone may be more important than a better treatment of downwash.
   - That certain meteorological conditions may cause one downwash algorithm to be more important than the other.

   These types of comparisons may show that be AERMOD is conservative over a wide range of conditions and AERMOD's further application to these areas could greatly increase the range of AERMOD modeling. We would like to emphasize that the purpose of this request is not to limit AERMOD's use but to expand it.

5. ISC-PRIME is being proposed with less documentation as compared to AERMOD. Specifically, there is no model formulation document available for PRIME. If a model formulation document cannot be provided, then we request that the following minimum documentation be released regarding PRIME's empirical equations before the rules are finalized:

   - That all empirical equations used in PRIME be provided in a concise and detailed manner.
   - That all variables and assumptions in these equations be clearly identified.
   - That support data and its analysis for deriving the assumptions, variables, and equations be clearly identified and provided.

This is not a large request as there are not that many equations. During the Conference, journal articles and source code were offered as possible answers to this problem. However, journal articles rarely provide the detail needed to fully describe these needs. The model source code is also a poor substitute as it does not provide the necessary level of detail and it is not easy to read.

6. We request several bookkeeping upgrades to AERMOD. These are:

   - The proposed version of AERMOD is based on revisions to a 1992 version of ISCST2, which is far from being the latest version. AERMOD's code should be upgraded. One advantage of the newer ISCST3 code is that it takes advantage of FORTRAN-90 (with dynamic array allocation) and can make future upgrades easier for the AERMOD code.

   - The proposed executable code for AERMOD only allows for 1500 receptors. This is inadequate for many applications. We request that EPA provide a compiled version that increases this to 25,000 receptors. We also request that the number of allowed point sources be significantly increased. Modern desk computers are much more powerful than when AERMOD was first developed. Providing these executables also would eliminate the need for users to purchase FORTRAN compilers themselves.

   - The addition of an event model to AERMOD is necessary if AERMOD is to be effectively used for determining significant contributors at predicted exceedance receptors and in helping to develop control strategies for SIPs. This event model is currently available in ISCST3.

   An opportune time to make these changes in when PRIME downwash is added to AERMOD.

7. ISC-PRIME is also based on an earlier version of ISCST and needs to be upgraded to include upgrades and features that are now available in ISCST3. Most of the above requests to change AERMOD's code also apply to ISC-PRIME's code.

8. Page 21509 of the FR mentions that AERMOD lacks a general (all-terrain) screening tool. We recommend that such a tool be created as soon as possible. We are encouraged by the recent formation of a workgroup (headed by Jim Haywood of Michigan) to address this issue.

9. SCREEN3 is being recommended as an interim screening tool for AERMOD. This may not be advisable, as a recent study by the San Diego APCD has found that SCREEN3 may underestimate close-in impacts by two orders of magnitude. This comparison was made by comparing AERMOD predictions using one-year of local data with SCREEN3 predictions.

10. We welcome CALPUFF for inclusion into Appendix A. It is currently recommended by IWAQM for modeling long-range transport and chemical transformation. This inclusion also opens CALPUFF for areas of "complex winds" for sources within 50-km on a case-by-case basis. We also support this recommendation. However, we request that the proposed language be changed to allow **the delegated PSD authorities** to determine its applicability for "complex winds" on a case-by-case basis. This would allow for a less bureaucratic and more scientific decision.

11. We request that a comparison be made between CALPUFF and AERMOD predictions in the near-field (<< 50 km) area. In general, maximum predicted impacts often occur within 1-5 km of the source.

    How do their impacts compare:

    - During convective conditions on simple terrain?
    - On complex terrain?
    - Overall, in determining design concentrations?

    These comparisons will be important in making case-by-case decisions regarding CALPUFF in the near-field area.

12. We recommend that CALPUFF also be modified and tested by including the PRIME downwash algorithm. This would improve its utility for near-field modeling. We understand that this work is already in progress.

13. The latest version of Calpuff does not have the aqueous phase chemistry mechanisms and we encourage the release of this expected version.

14. We question the need for always requiring the use of NWS surface data in CALMET. Currently, CALMET wind fields are not significantly modified by including NWS data when mesoscale modeling results are used for the initial wind fields. Instead, the NWS data only affects a small area defined by variables "R1" and "RMAX1." Also, there is work being done which is evaluating ways to run CALMET with mesoscale meteorology alone. We request that language be removed which makes NWS surface data always necessary for CALMET.

15. In general, we support the language proposed in section 8.3.1.2 d. regarding the length of meteorological data needed for long-range transport and complex winds. However, there may be some cases where this requirement may be too onerous for modeling complex winds. These may involve cases where mesoscale wind fields are not available (e.g., Alaska) or where one-year of detailed local meteorological data is available. In areas of complex winds (for near-field predictions), the use of the detailed local data may be preferred over the use of five years of NWS data from large distances away or even over coarse mesoscale wind data from a different period.

16. Section 5.2.4 d now brings back OLM as a third-level for modeling NO_2. However, expanded flexibility is needed for modeling of multiple sources. Here, we are asking EPA to clarify its position on the use of OLM per its recommendation in Clearinghouse Memorandum #107. We are concerned without such affirmative language in the Guideline, that we may see a resurgence of the total NO_x vs. total O_3 problem if OLM is applied.

17. We are encouraged by the proposed section 5.2.4 g, which allows for the consideration of more refined techniques for modeling NO_2 on a case-by-case basis. The Alaska DEC currently has a request into EPA regarding the use of a technique called PVRM. However, we are not recommending any one refined model for consideration in this area.

18. DEM data is now being used more extensively for establishing receptor elevations in air quality models. AERMAP exclusively relies on this data. We recommended the following:

    - That users be encouraged to use Level-2 DEM data over Level-1 data. There are tighter quality control requirements for Level-2 data and errors are less common. Users also need to be warned that they need to be knowledgeable of the quality of the DEM data being used in their applications.
    - That USGS 7.5' DEM data be required for use over 1-degree data where it is available. The 1-degree DEM data often loses the detail that is available in the finer 7.5' resolution data. Although, the 1-degree DEM data is reported at intervals with less than 100 m spacing, these elevations are only approximations based on low-resolution data. For example, a sharp-faced hill may be shown with a more gradual slope with the 1-degree DEM data. The use of this more detailed data should not be a problem as the 7.5' DEM data is now available for most of the USA on the Internet.
    - Users need to be cautioned about the different types of the data files. One problem is that some of the files are reported in meters, while others are reported in feet. Another problem may arise because of the use of different datum references. Some of the data is referenced with respect to the North American Datum of 1927 (NAD27) while others are reference with respect to the North American Datum of 1983 (NAD83). This reference change can effectively move some receptors by over 100 m in some areas. It can also be a problem when some data is extracted from paper maps (often using NAD27), while receptors may be generated electronically (sometimes using NAD83). Users need to be aware of these differences.
    - **AERMAP should include a scheme to validate the digitized terrain data similar to what AERMET has for the met data**. The warnings from this validation would be useful in identifying situations such as different units, different datum references, sudden changes in elevation, and other spurious data. In a recent situation, AERMAP was run with 1-degree data and with 7.5-minute data. Something strange was in the input. After several weeks of reviewing the source code and talking with one of the developers, it was discovered that the

terrain data contained some 9999's. Another user found that there were mixed English and Metric unit elevations within a single map file.

19. EPA recently updated their MPRM Meteorological processor to accept FSL formatted upper air data and HUSWO formatted surface data. AERMET and CALMET also need to be modified to accept data in these formats. Another surface data format (ISHD) will soon be adopted by NCDC. This format also needs to be accepted by MPRM, AERMET, and CALMET.

20. AERMET is the least user-friendly module of the AERMOD system. This is due to its origins in MPRM. At some point, AERMET needs to be modified to improve its users interface.

21. EPA has solicited comments on its recommendation to require the use of the most recent 5-year data when NWS is applicable. In most cases, this should instead require the use of non-ASOS NWS data (often available on SCRAM). ASOS data suffers by missing higher cloud layers that can affect definition of stability. It also suffers by classifying more winds as being "calm" (due to using a higher threshold for defining calm winds).

22. AERMET should be modified to allow input of adequate on-site meteorology alone when it is available. The current version still relies on cloud cover data to calculate heat flux when on-site data is used. Good SRDT data should also serve this need.

23. We question the recommendation to include EDMS in the modeling Guidelines if it does not use EPA models and is not subject to peer evaluation.

24. We are encouraged by AERMOD's performance evaluation in complex terrain. It not only often does better than ISCST3, but also equals or exceeds CTDMPLUS's performance in studies to date. While CTDMPLUS has had extensive investment and development, it has had very limited use. AERMOD is also much easier to apply to PSD Modeling and is less subjective in defining terrain, as no "ellipse fitting" is required.

25. AERMAP needs to be applied in ways that make the domain maximum elevation less important for defining the receptor height scale (h_c). One way of doing this for single point sources is to modify AERMAP so that it only looks at maximum terrain elevations by sector.

26. The proposed editorial changes in sections 5.2.1 and 5.2.2.1 of the FR notice aggressively promote Models-3. At a local level, the Models-3 framework still has too many hardware/software requirements and other limitations (e.g., portability, run times & training needs) to be so strongly promoted. Further, there are limited performance evaluations of its dispersion model (CMAQ). Finally, an important emissions preprocessor (SMOKE) is not yet implemented in the framework. It may

be premature to remove traditional ozone models until Models-3 and REMSAD are better understood.

27. EPA has solicited comments on the timing for the application of these models (FR p. 21508). We request that the delegated PSD permitting agencies be allowed to apply AERMOD, Calpuff, and ISC-PRIME as soon as possible.

28. Finally, we would like to have the subject of "gaming" models addressed. This could be a problem because as many as four models are being proposed for possible use in near-field modeling. These are ISCST3, ISC-PRIME, AERMOD, and CALPUFF. A methodology to identify a single model (or limited option of models) needs to be identified by the permitting authority. Their decisions should be based on the best science for their particular application. Applicants should not just select the model that gives the lowest predicted concentrations. We recommend that individual states and local agencies share information on protocols that they use in dealing with this problem.

Thank you for this opportunity to comment on these proposed new modeling techniques. If you have any questions, please contact me at (503) 229-6048.

Sincerely,

Patrick Hanrahan,
STAPPA/ALAPCO Representative
Emissions and Modeling
Committee