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October 19, 2005

Ms. Joelle Burleson
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North Carolina Division of Environmental and Natural Resources
1641 Mail Service Center
Raleigh, North Carolina 27699-1641

Subject: **Comments on September 20, 2005 *Protocol for the Application of the CALPUFF Model for Analyses of BART***

Dear Ms. Burleson:

URS Corporation (URS) is pleased to provide comments in response to your September 28, 2005 e-mail requesting comments on the revised draft BART Modeling Protocol dated September 20, 2005. In your e-mail, you specifically requested comments by October 19, 2005 via e-mail. We would like to recognize the hard work and dedication of the individuals within the VISTAS regional planning organization who assisted in the preparation of the draft protocol and the following comments are provided in hopes of improving on a job well done.

Comments on VISTAS Modeling Protocol

URS Corporation has reviewed and provided comments on the revised draft *Protocol for the Application of the CALPUFF Model for Analyses of BART* dated September 20, 2005. URS' review comments on the modeling protocol are summarized below for your consideration. In addition, we have provided in Attachment 1 a red-lined/strike-out version of the protocol with additional comments in the right hand margin. Attachment 2 contains a technical presentation regarding regional haze and CALPUFF given at the EPA's 8th Conference on Air Quality Modeling, and Attachment 3 contains a copy of a technical paper prepared by L Willard Richards regarding the use of the deciview metric. We also provided comments to the initial protocol on February 23, 2005.

Comment 1: States Should Approve Modeling Protocol, Evaluations, and Results

Based on the EPA BART guidance rule and as described in the draft protocol, we support allowing the States to make the final approval of all modeling protocols, modeling evaluations, and modeling results. This includes modeling approaches allowed for in the VISTAS guidance protocol as well as other alternative models and modeling approaches.

Comment 2: Using the CALPUFF Model in a Screening Mode

As you know, each state will be responsible for determining the exact procedures and process on how they wish to conduct individual single source BART modeling. We are concerned that there is still not an easy to implement and cost effective screening level modeling approach for the BART eligibility exclusion process in the modeling protocol, since historically and even in the proposed rule preamble, all regulatory modeling has included some degree of screening level dispersion modeling assessments. The draft Protocol does include an optional "screening" level option, but it requires three years of a 12-km grid spacing, prognostic meteorological data set. The refined level option requires a sub-regional fine-scale meteorological data set. The only difference between the Protocol's screening level and refined level analysis is the refinement of the meteorological data grid and the inclusion of actual surface and upper air observational data in the refined data set. We believe that a true screening level analysis should be allowed using existing five year meteorological data sets and screening techniques currently described and allowed for in the Interagency Workgroup on Air Quality Models (IWAQM) and FLAG guidance documents.

Industry has performed true screening level CALPUFF modeling for many years, and has become very efficient at conducting these reviews because it is a known quantity. VISTAS should strongly reconsider allowing the use of the IWAQM and FLAG screening level CALPUFF modeling approaches for the simple reason it is easy to implement, covers a larger averaging period than VISTAS is proposing and is a highly cost effective modeling methodology. URS has demonstrated the highly conservative nature of the modeling approach in presentations to the NCDAQ and the US EPA (see attached slide presentation for the EPA's 8th Conference on Air Quality Modeling).

We understand the hard work, level of dedication, and level of sophistication of all the modeling VISTAS has conducted up to this point and can understand where current modeling contractors may consider CALPUFF modeling, in this mode, a somewhat unsophisticated modeling tool, especially at the screening level and would push for a more refined modeling approach. However, it is worth remembering that screening level CALPUFF modeling procedures are being used every day to cost-effectively determine whether a single facility needs to conduct refined CALPUFF modeling in every part of the country. Why this approach is allowed for New Source Review (NSR) permit applications and not acceptable as an option for BART-exclusion modeling is unclear.

If resistance to using this methodology relates to the possibility that the screening procedure is not always conservative, then this should be investigated more closely and a better (more conservative) procedure can be adopted. URS does understand there may be certain complicated modeling areas where CALPUFF Screen may under predict. However, as an example, for relatively flat terrain areas near the coast it has been our experience that screening level

CALPUFF modeling generally over predicts deciview impacts by a factor of 2.76 to 4.93 depending on source distance from the Class I area.

URS has investigated several published references with respect to the conservative nature of CALPUFF screening. One paper referenced in the Air Quality Modeling Guidelines evaluated extinction above background for five facility configurations at six Class I areas nationwide. There was no case where CALPUFF Screen under predicted the refined modeling. The average over prediction for CALPUFF Screening was a factor of 3.9. Another paper presented at a 2001 modeling conference by John S. Irwin and John P. Notar reported one CALPUFF Screen under prediction for a 3-hour SO_2 concentration. However, the same paper indicates that predicted SO_2 concentrations for a 24-hour time period are not under predicted. In fact CALPUFF Screen over predicts 24-hour SO_2 by a factor of 4.93. This is important since this time period better relates to regional haze modeling periods. The paper does not present any regional haze modeling comparisons.

The BART exclusion process should be made-up of the following components:

1) An option to perform a simple screening level CALPUFF modeling based on conservative plume transport assumptions and existing meteorological data sets as allowed for in the existing IWAQM and FLAG guidance documents,
2) An option to perform the VISTAS screening level modeling using the 12-km spacing meteorological data grid, and
3) An option to perform refined level CALPUFF modeling using the sub-regional fine-scaled meteorological data grid with the inclusion of surface and upper air observational data.

Furthermore, since the EPA BART guidance rule states that modeling results should be based on the 98^{th} percentile value, the 98^{th} percentile should be applied to all CALPUFF modeling results, except for the simple screening option No. 1 (IWAQM and FLAG guidance approaches).

In conclusion, allowing screening level CALPUFF modeling for the BART eligibility analysis is a cost effective and environmentally sound way to assess a source's impact at Class I areas and it upholds EPA's long standing approach of using a conservative screening level model followed by a more refined approach. This can be seen in every form of modeling discussed in the Air Quality Modeling Guidelines ranging from simple to complex terrain to visibility modeling or SCREEN3/ISCST3/AERMOD, CTSCREEN/CTDM/AERMOD, and VISCREEN/PLUVUE II.

Comment 3: Limits Associated with Microsoft Windows

VISTAS should be aware that most regulatory modeling is performed on personal computers using the Windows operating system. The maximum file size is 2.1 gigabytes. UNIX does not limit file size. When supplying MM5 data to stakeholders please note this limitation.

Comment 4: Protocol Should Spend Less Time on Model Overview and Concentrate on the use of Alternative Models and Approaches

The protocol spends a great deal of time discussing the CALPUFF modeling system. The protocol should be streamlined with an emphasis on the screening level and refined level modeling approaches and the evaluation of data. Should the reader need more information about CALPUFF a wealth of information is provided on the SCRAM website which could be easily referenced. Since VISTAS will be providing training to new government users of CALPUFF most of this information could be considered redundant. The protocol should focus the readers' attention on how to setup and execute the CALPUFF modeling system for BART modeling and less time describing the model. This space could be easily filled with more detailed information on how to setup and apply other alterative models such as PLUVUE-II and SCIPUFF.

Comment 5: More discussion should be given to describing what are the key factors that can cause the CALPUFF modeling system, or other alternative model, to over and under predict impacts on regional haze.

Providing this kind of information would help the analyst or reviewer to focus their time on the real important key issues and less time on minor setup options that are more fine tuning concerns. The Federal Land Manager (FLM) provided this kind of information at a recent modeling conference in New Orleans, La. See example below:

EXAMPLES OF BALANCING WITHIN THE VISIBILITY ANALYSIS

- Reduces impacts < Lack of Aqueous phase chemistry
- Reduced impacts < 24-Hour Value accounts for model uncertainty
- Reduces impacts < simple first order chemistry
- Increases impacts > Single Receptor instead of sight path integration and Monte Carlo radiative transfer
- Increases impacts > No explicit WX obscuration
- Reduces impacts < RH MAX=95% accounts for some WX in the west
- Reduces impacts < 80*80 km & 36*36 km MM5 is not refined, does not depict terrain
- Reduces impacts < 3-5 years of met data does not represent all weather conditions for the lifetime

It would be helpful for the regulated community to understand the importance of each of the items described above. For example, Bullet 4 above indicates using a single receptor will generally increase predicted impacts. But it does not say by how much it increases the predicted estimates. It is our experience that Bullet 4, single receptor calculations, over predicts the deciview change by a factor of 2. Using the line of sight path approach, which is how regional haze changes should be calculated, provides a more realistic estimate of the changes to regional haze along the sight path of an observer at a Class I area (see Attachment 3).

Comment 6: Accounting for Precipitation and Fog.

Bullet 5 above relates to weather effects, such as precipitation and fog, on predicted regional haze impacts. The CALPOST model currently has the ability to address this issue using Method 7 for a 24 hour time period. The FLM has recently proposed a Method 7' which incorrectly assumes that natural background values, for dry conditions, would not vary on an hourly basis. Natural condition background values where developed from 24-hour monitoring data. Method 7' erroneously assumes this dry value is constant over the 24-hour period. Until a better estimate for an hourly natural conditions value is known, the current CALPOST Method 7 methodology, which uses a 24-hour average value, provides the best mechanism for addressing weather conditions such as precipitation and fog. Thus, we support using Method 7 in site-specific modeling protocols.

Comment 7: Protocol Frequently Uses the Term Visibility Instead of Regional Haze.

As can be seen in Attachment 1, there are many instances in the protocol where the term visibility is frequently used. It is not clear why the term regional haze isn't used but it may be intentional on VISTAS part. Many in industry believe that BART modeling of plumes for a 24-hour time period is more often than not, an evaluation of an individual plume (visibility situation) rather than an analysis of regional haze. Many plots of CALPUFF output have shown that worst-case impacts at Class I areas show a very distinct plume for the 24-hour averaging period – see Attachment 2 URS slide presentation from the EPA's 8th Conference on Air Quality Models. This leads into the next comment with respect to the importance of line-of-sight modeling of individual point sources.

Comment 8: Line-of-Sight (LOS) Modeling of Point Sources

The comments below are also provided as a comment block in the attached protocol review. A LOS modeling approach was originally discussed by the VISTAS technical consultant in the initial draft of the VISTAS Modeling Protocol dated January 31, 2005 under section 4.1.4 (Additional Technical Considerations). The following paragraphs have been extracted from the Initial Draft VISTA Modeling Protocol and clearly indicate the technical consultant understands the concept of LOS modeling when using CALPUFF to estimate regional haze impacts.

Statement 1 from Initial VISTAS Draft Protocol:

"A more difficult issue to address is that CALPOST calculates the extinction coefficient at each receptor point. That value represents extinction in the vicinity of that point, but does not necessarily represent the impact of the source on extinction over any sight path, particularly over the longer sight paths that are likely under natural conditions. The human perception of visibility takes place over sight paths, not at points.

For example, consider a 40-km sight path that represents the visual range and includes 10 CALPUFF receptor points on a 4 km grid. If there is a 10% change in extinction (a 1 dv change) at two receptors and no change at the others, the actual change in haziness over the sight path is 2% (or 0.2 dv). If, as the EPA asserts in its BART proposal, a 0.5 dv change is barely perceptible, then this change in haziness would be wholly imperceptible even though two receptor points exceed the 0.5 dv threshold!

Thus, if the scale of the plume is small compared to the visual range under natural conditions, which is likely to be the case at all but the longest transport distances (and will be especially true for the small plumes very close to the source), the change in extinction at any receptor point is not representative of the effect of the source on the ability to see through the haze. Rather, in such cases, a sight path must be selected and the average change in extinction over that sight path calculated."

Statement 2 from Initial VISTAS Draft Protocol:

"… Also, when the plume is narrow, the aerosol concentrations across it may vary considerably from one CALPUFF receptor to the next, and the concentration field is unlikely to be uniform over the distance one can see (the visual range), especially if the background is assumed to be at default natural conditions. Therefore the light extinction impact of the source will vary depending on the sight path. In such situations, this variability of the aerosol from one CALPUFF receptor to the next should be taken into account by averaging the CALPOST-calculated light extinction over all receptors along each of the sight paths of interest within a Class I area."

We suggest that when conducting an hourly plume visibility analysis for sources located less than 50 kilometers from a Class I area the LOS modeling approach should automatically be triggered. For a source greater than 50 kilometers from a Class I area, a source should have the option of making a demonstration that a LOS modeling approach is applicable by providing plots that show the plume distribution within the modeling domain. If a highly concentrated plume is shown over the 24-hour period then a LOS analysis can and should be conducted. Examples of

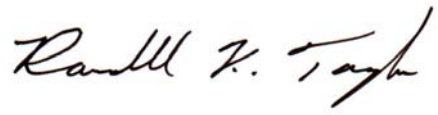
these kind of plots are contained in a slide presentation from the 8th Conference on Air Quality Modeling (see Attachment 2).

Comment 9: Provide Examples of the Modeling Process

The final protocol should provide several examples of how the modeling process will work. The final protocol should also contain figures showing any proposed modeling sub domains for each Class I area. Examples showing how modeling results will be used for the BART determination analysis would be useful. More discussion and an example are needed with respect to using the PLUVUE II model. For example, what would be the acceptable model inputs for each Class I area when using PLUVUE II?

We appreciate the opportunity to provide our initial comments and look forward to working with you in the months ahead. If you have any questions regarding the above comments, please call Randall Taylor of URS Corporation at (919) 461-1520.

Sincerely,



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