ARD-05-1

GUIDANCE AND PROCEDURE FOR PERFORMING AIR QUALITY IMPACT MODELING IN NEW HAMPSHIRE

Prepared by the
New Hampshire Department of Environmental Services
Air Resources Division
29 Hazen Drive
Concord, NH 03302-0095

July, 2006

I. Introduction

Part Env-A 606 of the *New Hampshire Code of Administrative Rules Governing the Control of Air Pollution* (hereinafter, the Rules) details the requirements for performing an air quality impact modeling analysis for stationary sources. For those sources requiring an air permit under the Rules, a demonstration must be made that the impact from their emissions meets applicable ambient air quality standards. This applies to any new source or modification to an existing source, with exemptions as listed in Env-A 606. This demonstration is most often made using an air quality dispersion modeling analysis. A modeling analysis may also be needed to show compliance with Part Env-A 1400 of the Rules, which deals with Regulated Toxic Air Pollutants (RTAPs). Both sections of the Rules should be consulted to determine whether modeling is necessary for a particular source. An official copy of the Rules is available by contacting the Department of Environmental Services (DES) or on-line at http://www.des.state.nh.us/rules/air.htm.

This document was developed by DES to assist facility owners, consultants and other parties who are involved in stationary source permitting and air quality analysis. It outlines the accepted procedures for performing such analyses in New Hampshire and conforms with EPA modeling guidance as contained in 40 CFR 51, Appendix W (EPA *Guideline on Air Quality Models*). The *Guideline*, which is available at http://www.epa.gov/scram001/guidance/guide/appw_01.pdf, contains detailed information on various aspects of air quality dispersion modeling and lists the models currently approved for use in compliance determinations.

On November 9, 2005 a Federal Register notice was published in 40 CFR 51 to revise the *Guideline on Air Quality Models*. This revision recommends the use of the AERMOD pollution dispersion model as the primary tool for predicting air quality impacts for permitting purposes. The date proposed for the application of this model for stationary source permitting is November 9, 2006.

In an effort to increase familiarity with AERMOD among the stakeholder community and to ensure a smooth transition to the new model before the November 9, 2006 deadline, DES is requiring all new and unpermitted sources, and sources making physical modifications who are subject to Env-A 606 and Env-A 1400, to use AERMOD in advance of the November 9, 2006 date. Any applicable source that either submits a modeling analysis or requests that modeling be performed by DES after July 31, 2006 will be required to use AERMOD as the primary method for determining compliance with National Ambient Air Quality Standards, Class II PSD Increments and Ambient Air Limits. There will be no changes as to which sources are required to submit modeling under Env-A 606 or Env-A 1400. The only change involves which model is acceptable for use by sources subject to these Parts.

Since AERMOD will soon become the standard dispersion model for air permitting, this document refers specifically to this model and all references to previous *Guideline* models such as ISCST3 and SCREEN3 have been deleted. Because AERMOD and its associated algorithms are relatively new, changes to the code and the way the model is applied can be expected. Applicants are encouraged to frequently check DES' modeling web page at http://www.des.state.nh.us/ard/air_modeling.html for updated information.

This document assumes that the reader has a basic understanding of the principles of air quality modeling. Any questions or issues regarding model applicability, proper model inputs and interpretation of results should be discussed with DES staff prior to the submittal of a final report.

II. Air Quality Criteria

When performing air quality dispersion analyses in New Hampshire, impacts from facility emissions may be evaluated against several sets of criteria, depending upon the pollutants that are being emitted. Federal standards exist for the set of air contaminants commonly referred to as "criteria pollutants." These include carbon monoxide, sulfur dioxide, particulate matter, nitrogen dioxide, ozone and lead. A source cannot receive a permit from DES if it is predicted to cause or contribute to a violation of a federal air quality standard.

New Hampshire has also established standards known as Ambient Air Limits (AALs) for RTAPs under Env-A 1400 of the Rules. Standards for the criteria pollutants and RTAPs are described in the subsections below.

A. National and New Hampshire Ambient Air Quality Standards

Through the Clean Air Act, EPA established Ambient Air Quality Standards (AAQS) for a number of pollutants which specify maximum concentrations allowed in ambient air. Depending on the pollutant, standards are set for short-term (24-hours and less) and long-term (annual) exposure periods. New Hampshire has adopted these federal standards. The AAQS for the criteria pollutants are listed in Table 1 below. For practical purposes, a criteria pollutant modeling analysis is only needed for SO_2, PM10, NO_2 and CO, though permit modeling for PM2.5 is under consideration by EPA. Lead is an RTAP and should be evaluated under Env-A 1400, while ozone is typically not analyzed on a source-specific basis.

Table 1
National and New Hampshire Ambient Air Quality Standards

Pollutant	Averaging Period	Ambient Air Quality Standard	
		$\mu g/m^3$	ppm
Particulate Matter (PM10)	24-hour	150	--
	Annual	50	--
Particulate Matter (PM2.5)	24-hour	65	--
	Annual	15	--
Sulfur Dioxide (SO_2)	3-hour	1,300	0.50
	24-hour	365	0.14
	Annual	80	0.03
Carbon Monoxide (CO)	1-hour	40,000	35
	8-hour	10,000	9
Nitrogen Dioxide (NO_2)	Annual	100	0.05
Ozone	1-hour	235	0.12
	8-hour	157	0.08
Lead	Quarterly	1.5	--

Notes:
$\mu g/m^3$ = micrograms per cubic meter.
ppm = parts per million.
PM10 and PM2.5 refer to particulate matter less than 10 and 2.5 microns in aerodynamic diameter, respectively.
More information on the National Ambient Air Quality Standards is available at http://www.epa.gov/ttn/naaqs/.

B. PSD Increments

The Prevention of Significant Deterioration (PSD) regulations are designed to protect air quality in a more stringent manner than the AAQS by not allowing significant incremental degradation beyond a baseline concentration. For more information on the federal PSD and New Source Review programs, consult EPA's *New Source Review Workshop Manual (Draft)* or visit http://www.epa.gov/nsr/. PSD allowable increment consumption standards, known as increments, have been promulgated for SO_2, PM10 and NO_2. Increments represent the maximum allowable increase in concentration of any of these pollutants (due to a new source or a modification to an existing source) over a baseline concentration. A baseline concentration is the ambient concentration of a given pollutant at the time when the first PSD application was submitted for the area in question, i.e., the baseline date. DES evaluates impacts against these increments when a new source is being constructed, when an existing source is adding a new device or when an existing source is making an operational change that increases emissions, e.g., increasing its fuel use. DES evaluates increment consumption for all new and modified sources which require a permit in New Hampshire, not just for PSD major sources. In accordance with EPA guidance, short-term increment consumption should be evaluated using potential emissions. Annual increment consumption, however, may use actual emissions at the time of baseline, if available.

Table 2 gives the PSD increments for Class II and Class I areas. Class I areas are defined as areas of special national or regional value from a natural, scenic, recreational or historic perspective. In New Hampshire the only Class I areas are in the White Mountains in southern Coos County. The remainder of the state is classified as a Class II area.

Table 2
Class II and Class I PSD Increments

Pollutant	Averaging Period	Class II Increment ($\mu g/m^3$)	Class I Increment ($\mu g/m^3$)
Sulfur Dioxide (SO_2)	3-hour	512	25
	24-hour	91	5
	Annual	20	2
Particulate Matter (PM10)	24-hour	30	8
	Annual	17	4
Nitrogen Dioxide (NO_2)	Annual	25	2.5

Note:
PM2.5 Class I increments are being considered by EPA.

Table 3 provides the minor source baseline dates for all applicable areas in the state. Class II increment tracking has yet to be triggered for minor sources for any pollutant in Coos County. Increment will be tracked in Coos County once a PSD permit application has been received and the source is determined to have significant impacts. Until this time, increment consumption impacts from sources within Coos County need not be addressed. Increment consumption should be evaluated, however, in neighboring counties for sources located in Coos County, provided that the modeled source has the potential for causing significant impacts in another county.

Table 3
Minor Source Increment Baseline Dates

Pollutant	Minor Source Baseline Dates	
	Seven Southern Counties	Grafton & Carroll Counties
Sulfur Dioxide (SO_2)	May 14, 1986	April 22, 1988
Particulate Matter (PM10)	February 9, 1987	April 22, 1988
Nitrogen Dioxide (NO_2)	March 21, 1988	April 22, 1988

Notes:
The seven southern counties include Belknap, Cheshire, Hillsborough, Merrimack, Rockingham, Strafford and Sullivan. Increment tracking has not yet been triggered in Coos County

The above increment baseline dates refer only to minor sources, which are defined in EPA's *New Source Review Workshop Manual (Draft)* as sources with the potential to emit less than 100 tons/year or 250 tons/year of any federally-regulated air pollutant, depending on the source category. Any major source (emitting more than the threshold amounts given above) which consumes increment should compare its emissions to the major source baseline dates, as shown in Table 4.

Table 4
Major Source Increment Baseline Dates

Pollutant	Major Source Baseline Dates
	All Counties
Sulfur Dioxide (SO_2)	January 6, 1975
Particulate Matter (PM10)	January 6, 1975
Nitrogen Dioxide (NO_2)	February 8, 1988

C. Significant Impact Levels

Significant Impact Levels (or SILs) can be used to evaluate whether impacts due to facility emissions are "significant", therefore requiring a detailed modeling analysis. The SILs can also be used to determine if a source contributes significantly to a violation of an AAQS and whether additional criteria pollutant sources need to be added into the modeling analysis. The SILs should not be confused with PSD increments. Table 5 presents the Significant Impact Levels for Class II and Class I areas.

Table 5
Significant Impact Levels

Pollutant	Averaging Period	Class II Area SIL ($\mu g/m^3$)	Class I Area SIL ($\mu g/m^3$)
Sulfur Dioxide (SO_2)	3-hour	25	1.0
	24-hour	5	0.2
	Annual	1	0.08
Particulate Matter (PM10)	24-hour	5	0.2
	Annual	1	0.08
Nitrogen Dioxide (NO_2)	Annual	1	0.08

Note:
The Class I area SILs are provided as guidance and have not been formalized by EPA.
Class I area SILs for PM2.5 are under development by EPA.

D. New Hampshire Ambient Air Limits

In Env-A 1400 of the Rules, DES established Ambient Air Limits AALs for over 750 compounds that it has designated as RTAPs. The complete list of RTAPs and their associated AALs can be found in Table 1450-1 of Env-A 1400: Regulated Toxic Air Pollutants (available at http://www.des.state.nh.us/rules/air.htm). It should be noted that lead, which is a criteria pollutant, is also a New Hampshire RTAP and should be evaluated against the AALs, which are more stringent than the AAQS.

III. Modeling Applicability

New sources and existing sources undergoing modifications and which emit criteria pollutants are subject to the permitting process as detailed in Env-A 600 of the Rules. Env-A 606 specifically gives the dispersion modeling requirements under the permitting program and lists several exemptions to these requirements. Sources that emit New Hampshire RTAPs are also subject to the requirements of Env-A 1400. All sources requiring modeling shall be subject to the most recent model versions and procedures contained in 40 CFR 51, Appendix W (EPA *Guideline on Air Quality Models*).

A. Subject Source

For modified sources that emit criteria pollutants, when a new device is proposed for installation it should be modeled along with all other existing permitted devices at the facility that emit the same pollutants. For example, if an existing facility proposes to install a new boiler to increase steam capacity, and this facility already has two boilers permitted by DES, then the impacts of all three boilers should be accounted for in the modeling analysis. Criteria pollutant impacts need not be calculated at locations that preclude access to the general public, e.g., within a fenced area. However, on-property impacts of criteria pollutants need to be evaluated if the general public has access to the facility.

For RTAPs, all devices at the subject source that emit the same compound should be modeled, regardless of whether they are permitted by DES. When evaluating impacts from toxic air pollutants, only impacts at and beyond the subject source's compliance boundary (i.e., property line) need to be compared to the AALs for determining compliance. Compliance must also be demonstrated on leased or rented property within the subject source's property.

B. Interactive Sources

For an analysis of criteria pollutants, DES may require the modeling of interactive sources (i.e., permitted sources beyond the subject source's property) if significant impacts are predicted from the subject source. This determination is primarily based on the significant impact area of the subject source (as defined by the SILs), though other factors may be considered. These include the distance a potential interactive source is from the subject source, source type and size, concentration gradient in the vicinity of the subject source, monitored background and the likelihood of modeled violations of air quality standards. Applicants submitting a criteria pollutant modeling analysis should contact DES to determine which interactive sources, if any, need to be modeled in conjunction with the subject source. Interactive modeling may be required for increment consumption as well as AAQS if an increment analysis is being performed at the subject source. Modeling input data for interactive sources will be provided to the applicant by DES if available.

IV. Air Quality Models and Model Inputs

The EPA *Guideline on Air Quality Models*, as contained in Appendix W to 40 CFR Part 51, is used by DES as the basis for performing air quality dispersion modeling analyses for stationary sources. Facility owners, consultants, and others should refer to this document when performing air quality modeling and selecting appropriate models. Appendix W should also be used to select any additional models needed to address concerns such as visibility degradation, mobile source impacts, reactive plumes and long-range transport. Use of additional models for these purposes must be approved in advance by DES.

Modeling analyses submitted to DES should use the most recent EPA-approved version of the dispersion model. Information on current model versions, as well general air quality modeling information, can be found on EPA's Support Center for Regulatory Air Models (SCRAM) website at www.epa.gov/ttn/scram.

AERMOD

As of November 9, 2006 AERMOD will become the primary, all-terrain dispersion model for all stationary source permitting projects. In order to increase familiarity with AERMOD and to ensure a smooth transition to the new model before the November 9, 2006 deadline, DES is requiring any applicable source that either submits a modeling analysis or requests that modeling be performed by DES after July 31, 2006 to use AERMOD for determining compliance with Ambient Air Quality Standards, Class II PSD Increments and Ambient Air Limits.

All sources intending to submit an air quality impact analysis using AERMOD before November 9, 2006 are required to either contact DES first or submit a brief protocol on how the model will be used.

A. Meteorological Data

AERMOD contains a meteorological data processing algorithm called AERMET which combines surface and upper air weather observations with surface characteristics based on land use to develop local dispersion parameters. In order to simplify the AERMET analysis, DES has ready-to-use, pre-processed meteorological data files (in the form of .SFC and .PFL files) which are available on request and on our web site at http://www.des.state.nh.us/ard/air_modeling.html. The files incorporate land use data centered on the meteorological monitoring sites (i.e., airport weather towers), so surface characteristic data processing by the applicant using AERMET is not necessary.

There are four sets of surface meteorological files which cover the entire state. The location of the source for which modeling is required determines which data set should be used. Figure 1 shows graphically which surface files should be used within the state. The four surface stations (Concord, Keene, Portsmouth and Whitefield) have been processed with Gray, Maine upper air data for the years 2000-2004.

In addition to the region-specific meteorological data files, the base elevation for these site locations are also needed in order to run AERMOD. Table 6 provides this additional data.

Table 6
Meteorological Site Base Elevations

Site	Profile Base Elevation (ft)
Concord	346
Keene	481
Portsmouth	128
Whitefield	1074

If one year of on-site meteorological data is available then this data should be used in the modeling analysis. DES should be contacted before applying on-site data since additional data and data processing are needed. All on-site meteorological data files which are used, including raw data, need to be reviewed by DES before the modeling analysis can be completed.

B. Receptor Placement

When performing dispersion modeling, a receptor network should be developed in a manner as to capture and adequately define the area of maximum impact. Either discrete receptors or polar or cartesian receptor grid networks may be used and should be of an appropriate size and density. Polar grids should generally contain 36 radii spaced at 10-degree intervals. A set of receptors should also be placed along the facility's property line or fence line at a maximum interval of 20 meters. Special attention should also be paid to sensitive receptors such as schools, playgrounds, hospitals and senior housing developments to insure that AAQS, PSD increments or AALs are not exceeded at these locations.

Since AERMOD contains the PRIME downwash algorithm and therefore can calculate impacts in the near-wake region of structures, a receptor spacing of no more than 20 meters is recommended in the immediate vicinity of the stacks and nearby buildings. A grid spacing of 100 meters is recommended for distances out to approximately 1 kilometer in all directions from the source. A larger grid spacing may be used at distances greater than 1 kilometer.

The AERMAP processor (or an equivalent) should be used to determine receptor elevations for all receptors. AERMAP uses digital elevation model (DEM) data to calculate terrain elevations and associated hill heights for use in AERMOD. DES can supply readily usable DEM terrain data for the entire state of New Hampshire. Free digital elevation data is also available for download from a number of websites. Information on DEM terrain data is available from the USGS at http://erg.usgs.gov/isb/pubs/factsheets/fs04000.html.

C. AERMOD Model Options

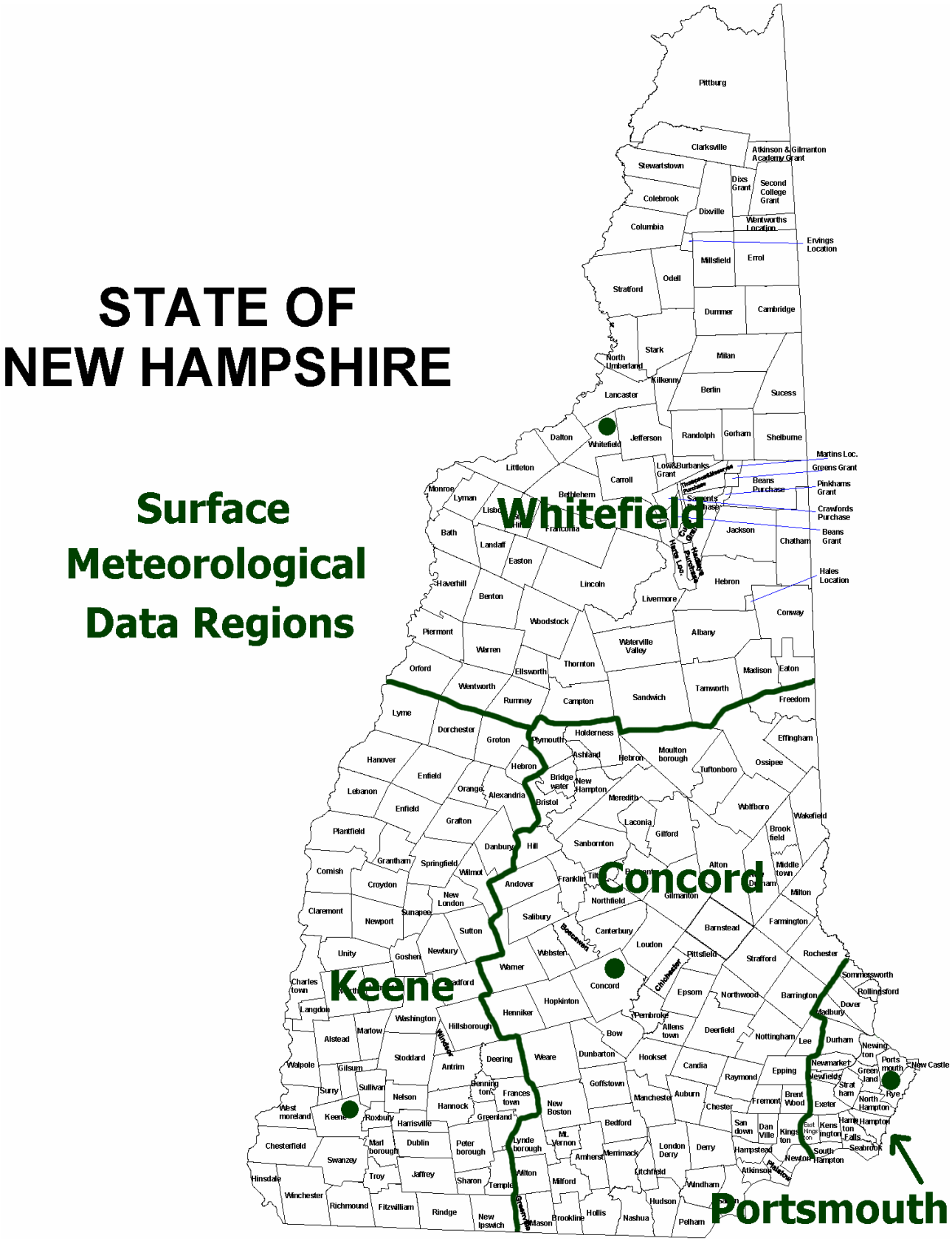
1. *Regulatory Default*

AERMOD should be run in regulatory default mode for all modeling applications in New Hampshire.

2. *Urban Option*

For conservatism, the urban option should not be employed for any location within the state.

Figure 1
Surface Meteorological Data Regions



V. General Modeling Procedures

A. GEP Stack Height Determination

For stacks that are on or close to a building or other solid structure, GEP stack height is determined as follows:

GEP stack height = H_b + 1.5 L

Where:

H_b = Height of the building relative to the stack base elevation
L = Lesser of H_b or the maximum projected width (usually the diagonal of the building)

GEP should be determined for all buildings and solid structures that are within 5L of the stack. The dispersion modeling should include projected heights and widths for all of the buildings and structures within 5L for which the stack height is less than GEP. DES recommends the use of BPIP for the determination of GEP and the calculation of projected heights and widths.

B. Combustion Device Load Conditions

Maximum air quality impacts are most often associated with a device operating at its highest design capacity. Occasionally, however, maximum impacts may be predicted when a device such as a boiler or engine is operating at less than 100% load because of the lower plume rise associated with lower operating loads. Therefore, additional load cases (e.g., 75% and 50% loads) should be analyzed where appropriate. Screening modeling may be used to determine the worst-case load condition.

C. Stack Discharge Configuration

For some types of devices, it is common for the stacks or vents to discharge in a horizontal or downward direction. It is also common for exhaust stacks to have rain caps that limit plume rise. For these stack configurations (either horizontal, downward or capped), the modeled exit velocity should be set to 0.001 meters per second and the stack diameter and exhaust temperature should be modeled at their actual values.

D. Background Concentrations

Modeled compliance with each AAQS is determined by adding background levels (for the appropriate pollutant and averaging time) to modeled levels and comparing these concentrations to the standard. Updated background concentrations are available on the DES website at http://www.des.state.nh.us/ard/air_modeling.html. Sources wishing to use a different set of background data should contact DES for approval.

Background data are established by ambient air monitors located at various sites throughout the state. In selecting an appropriate background concentration for a given pollutant, a monitoring site representative of the location at which the modeling is being performed should be chosen (i.e., similar topography, demography and overall site characteristics). DES should be contacted to determine which background site(s) would be most appropriate for a particular AAQS analysis if there is any doubt regarding site use.

Sources subject to federal PSD requirements should contact DES to determine the need for pre-construction or post-construction ambient air monitoring.

E. Fugitive Emissions Sources

Fugitive emissions are those emissions that are not captured and vented through a stack. For example, fugitive emissions can result from the open storage and handling of fine materials or from vapors that escape from vents and windows at a manufacturing facility. Fugitive emissions sources present special difficulties in their treatment for dispersion modeling and DES should be contacted in advance of modeling if fugitive emissions are a concern. The fact that emissions may not be exhausted through a stack or vent does not preclude a device from undergoing a dispersion modeling analysis.

F. AERMOD Modeling Domain

The AERMAP terrain processor requires the user to define a modeling domain. The domain needs to be large enough to include all receptors and sources, and also needs to accommodate any significant terrain elevations. Significant terrain elevations include all the terrain that is at or above a 10% slope from each and every receptor, as per the AERMAP User's Guide. To ensure that all significant terrain points have been addressed in the modeling analysis, additional DEM files may be needed, though it should be noted that this will slow AERMAP processing time. Applicants should consult the AERMAP User's Guide for an explanation of significant terrain and how it is determined.

G. Screening Modeling

A screening version of AERMOD known as AERSCREEN has been proposed by EPA as a way to provide a simplified yet conservative estimate of air quality impacts. Applicants may use AERSCREEN at any time once it is approved as an alternative to AERMOD. Applicants should refer to the AERSCREEN User's Guide to determine the proper use of the model.

H. Evaluation of Modeled Impacts

1. *Criteria Pollutants*

As described in Section II, criteria pollutant impacts for sources in New Hampshire are evaluated against the AAQS, SILs, and, where appropriate, the PSD increments. For an initial assessment of modeled criteria pollutant impacts, the maximum impacts predicted with the methodologies described above may be compared with the SILs. If all maximum predicted impacts are less than the SILs, no further evaluation of criteria pollutant impacts is required for that source.

For sources that are significant (i.e., impacts above SILs), DES should be consulted to determine whether or not interactive sources should be included in the criteria pollutant modeling analysis (see Section III.B.). Interactive sources have the potential to contribute to impacts from the subject source and, conversely, may be causing AAQS or increment violations at receptors where subject source may be contributing.

The combined impacts of the subject source and any applicable interactive sources should be added to the appropriate pollutant background concentrations for evaluation against the AAQS. For all sources outside of Coos County that meet the requirements discussed in Section II.B., predicted impacts (including interactive sources) should be evaluated against the Class II increments. Background concentrations should not be added to modeled impacts for purposes of increment evaluation, however. In addition, emissions at the time of the baseline date can be accounted for in the increment evaluation. This is frequently accomplished by modeling the existing device (or devices) at a negative emission rate to represent the source contribution at baseline conditions.

Increment-applicable sources should assess impacts in Class I areas (see Section II for a discussion of Class I areas) if they are within 100 km of a Class I area, are a major stationary source (as defined in EPA's *New Source Review Workshop Manual (Draft))* or making a major modification, and have the potential for significant Class I impacts. For Class I areas, any 24-hour pollutant impact of 1 $\mu g/m^3$ or more is considered significant. For a source meeting these criteria, visibility impacts should also be evaluated.

Three Class I areas are potentially within 100 km of sources in New Hampshire. These include:

- Great Gulf Wilderness Area – New Hampshire
- Dry River Wilderness Area – New Hampshire
- Lye Brook Wilderness Area – Vermont

DES should be consulted on how to model impacts in these areas and which parameters should be evaluated. Additional analyses beyond evaluation of Class I increment consumption may be required based on review by DES and/or the Federal Land Manager.

Finally, some additional considerations should be observed in the evaluation of criteria pollutant impacts:

- For conservatism, DES recommends the use of the highest 2^{nd}-high PM10 impact for evaluating compliance against the 24-hour PM10 AAQS and increments. EPA and DES also allow the use of the highest 6^{th}-high PM10 impact over five years to be evaluated against the 24-hour AAQS and increments, though applicants must correctly apply the methodology mentioned in Section 7.2.1.1 of EPA's *Guideline on Air Quality Models.* Annual PM10 averages may be calculated the same as for other criteria pollutants.

- DES allows a 0.75 NOx to NO_2 conversion factor in the evaluation of NO_2 impacts. When modeling NO_2 impacts, the maximum predicted impact may be multiplied by 0.75 to account for the fact that only 75% of total NOx emissions are converted to NO_2.

2. *RTAPs*

Predicted impacts for New Hampshire RTAPs should be evaluated against the AALs described in Section II. D. When evaluating RTAP impacts from a source, only those RTAPs that do not meet the deminimus and in-stack concentration requirements need to be evaluated in the dispersion modeling analysis. The methodologies for performing deminimus threshold and in-stack concentration analyses are described in detail in Env-A 1400.

Note that RTAP impacts need only be evaluated against the AALs for areas at and beyond the source's compliance boundary. Though a source may wish to know if exceedances of an AAL are

predicted within their property, this information is not used in determining the source's compliance with Env-A 1400.

I. Preparation of a Modeling Protocol

To expedite the permitting process and ensure that modeling analyses received by DES are complete and are performed in accordance with this guidance document, DES requires that an applicant submit a modeling protocol in advance of the modeling. The protocol should document the input parameters, models and assumptions that will be used in the analysis. The modeling protocol should be brief and may be in the form of a checklist, an example of which is shown in Appendix A. Submittal of a protocol in advance of modeling allows DES to review and accept the proposed inputs, methodologies and assumptions and can prevent the need for additional model runs. A more detailed modeling protocol is required for sources subject to federal PSD regulations. Applicants submitting analyses for PSD sources should contact DES for the specific modeling protocol requirements.

VI. Reporting

Any modeling analysis prepared by a source or consultant should be presented in a clear, concise manner and a modeling report should be provided to DES for review. The report should include sufficient information and list any assumptions made such that DES can duplicate the documented results. All modeling files should also be submitted to expedite DES' review. The requirements for modeling reports submitted to DES are summarized in Sections A and B below. Proper submittal of modeling results allows for faster processing time with little or no delay in the permitting process.

At a minimum, a modeling report should address the following items:

A. Input Data

1. *Emission Rates and Stack Parameters*

Emission rates for all criteria pollutants and/or RTAPs that were evaluated should be listed for each source modeled, including those for any interactive sources. The basis of the emission rates (emission factors, stack test data, etc.) and the methodologies used in the emission rate calculations should be clearly explained and referenced. Stack parameters (including stack height, diameter, exit velocity, volumetric flow, and exhaust temperature) should be listed for each emission point. The stack discharge configuration (vertical, horizontal, capped, etc.) should also be documented.

2. *Buildings and Structures*

Scaled maps or drawings should be provided to show all buildings and solid structures that were assessed in the modeling. The peak height of each structure should be listed in the report or shown by means of a scaled profile drawing. The locations of the buildings and structures should be clearly shown with respect to the modeled stack locations.

3. *Location Map and Site Plan*

A location map showing the source location relative to nearby roads and landmarks should be submitted. A scaled site plan should also be provided, showing the property line and/or fence line of the facility, along with stack locations. Again, note that New Hampshire RTAPs need only be evaluated against the AALs for locations beyond the property line. Criteria pollutants need not be evaluated in areas where public access is precluded by means of a fence or other physical barrier.

4. *Receptor Grid*

The receptor locations used in the modeling should be described in detail or shown by means of a map or drawing. The methodology used to develop terrain elevations for the receptors should also be described. The source of the elevation data should be referenced.

5. *Meteorological Data*

The meteorological data used in the modeling should be documented in the report and the source of the data should be referenced, especially if the data were not provided by DES.

6. *Background Air Quality Data*

The criteria pollutant background concentrations that were used in the assessment should be listed. The most recent three years of background air quality data should be used.

B. Results

1. *GEP Results*

All GEP calculations that were made should be clearly documented in the modeling report.

2. *Modeling Impacts*

The results of the dispersion modeling analysis should be thoroughly documented in clear, tabular form. For criteria pollutant analyses that include interactive sources, results should show the contribution from the source of interest alone as well as the overall impacts from all modeled sources.

C. Data Files

In addition to the modeling report, DES requests that all model input/output files be submitted along with the report (or earlier) in electronic format either through e-mail or on disk. All model runs should be submitted, not just those that resulted in the worst-case impacts. Model input/output files should be submitted for all analyses performed, including the GEP calculations. Filenames should be self-explanatory, or a listing should be provided that describes the content of each file. To save paper and/or disk space, DES does not require that supplemental output files be provided (e.g., graphics files), but sufficient input/output data should be submitted so that the reported results can be verified and reproduced. Review of any modeling submitted to DES will not proceed until all data files are made available.

The contacts for the DES Air Quality Dispersion Modeling Unit are:

Lisa Landry – (603) 271-6803 – llandry@des.state.nh.us
Dave Healy – (603) 271-0871 – dhealy@des.state.nh.us
Jim Black – (603) 271-1377 – jblack@des.state.nh.us

Appendix A
Permit Modeling Protocol Checklist

1) Dispersion Model to be Used

☐ AERMOD ☐ AERSCREEN ☐ Other: _____

2) Meteorological Data to be Used

☐ Concord ☐ Keene ☐ Portsmouth ☐ Whitefield

☐ On-Site ☐ AERSCREEN Default Data

3) Background Air Quality Data (specify pollutants in space next to monitor location)

☐ Berlin _____ ☐ Concord _____

☐ Manchester _____ ☐ Northumberland _____

☐ Portsmouth _____ ☐ Keene _____

☐ Claremont _____ ☐ Pembroke _____

☐ Nashua _____ ☐ Brentwood _____

4) Receptor Spacing

Spacing of Inner Grid: _____ meters

Spacing of Outer Grid(s): _____ meters

Receptor Spacing Along Property Line or Fence Line: _____ meters

5) Terrain Elevation Data to be Used

☐ USGS DEM (datum year: _____) ☐ Survey Data ☐ Other: _____

6) Stack Orientation

Are all stacks vertical and unobstructed? ☐ Yes ☐ No

If no, refer to Section V.C. of this guidance document

7) Interactive Sources for Criteria Pollutant Analyses

Will interactive sources be modeled? ☐ Yes ☐ No

If yes, please provide an approximate Significant Impact Area:

- Radius of _____ meters around the subject source

DES should be contacted for the most recently updated list of interactive sources.