

## **Appendix E**

### **Evaluation of Smoke Dispersion**

SMP I – Time of day and setback requirements *or* SMP II requirements

SMP II – Required (Wildland fire use is exempt from this requirement)

Evaluation of smoke dispersion is defined as the use of meteorological conditions to assess the ability to minimize smoke impacts.

#### **E.1. SMP I**

For SMP I burners, there are two approaches to meet the requirements of this element. The first option provides simple requirements that are easy to follow for the burner. For burners choosing Option 1, the AQB will provide general smoke dispersion information to assist with burning under optimal conditions, e.g., providing weather information on a hotline or website. The second option parallels SMP II requirements for this element, and involves more effort on the part of the burner. It is the burner's choice as to which option to follow under this element.

##### Option 1

Active ignition is only allowed during daylight hours, from one hour after sunrise to one hour before sunset. Burning is not allowed within a 300-foot setback from occupied structures or where people congregate on other property, so that the impacts from smoke are minimized.

If a burner needs to burn outside of these hours or within the setback, a waiver must be obtained from the AQB on a case-by-case basis. For example, a waiver for night burning may require a detailed description of the circumstances, the submittal of a map showing diurnal drainage(s), and a smoke mitigation plan. A request for waiver must be submitted no later than two weeks prior to the planned ignition date. Once the AQB staff receives the waiver request, they have seven days to consider the waiver and inform the burner of an approval or denial. The burner must receive written confirmation of the waiver to initiate the burn. (See Appendix H for waiver information and Appendix P for the Waiver Form.)

##### Option 2

Instead of the requirements under Option 1 above, the burner may choose to follow the ventilation requirements for this element as described in SMP II below, in addition to conducting visual monitoring as described in Appendix F.

#### **E.2. SMP II**

##### **E.2.1. Ventilation Index**

A ventilation index category describes the potential for smoke or other pollutants to ventilate away from a source, and is expressed in categories of Excellent, Very Good, Good, Fair, and Poor. Burning is allowed only in ventilation categories of Good or above.

The ventilation index is obtained by multiplying the mixing height by the transport winds. This information can be found in the National Weather Fire Forecast, which is available either via the internet (<http://www.srh.noaa.gov/abq/firewx/fw-3.htm>) or from the AQB by phone or fax. Mixing height must be adjusted to each specific burn's elevation. Once the ventilation index (a

value) has been calculated for a specific project elevation, it can be compared to the established range.

If there are specific needs to burn under Fair or Poor ventilation categories (for example, night burning where there is a minimal mixing height and thus poor dispersion), special consultation is required with the AQB for a waiver to this requirement. Additional information that the AQB may request includes, but is not limited to, the justification for burning under Fair or Poor categories, a map showing prescribed wind direction, and a smoke mitigation plan.

A request for waiver of ventilation category must be submitted no later than 10:00 a.m. one business day prior to planned ignition date (i.e., the notification deadline). The waiver submittal timeframe, in this case, is set to accommodate the limited time for assessing meteorological conditions. However, you may send in your ventilation waiver request at time of registration and obtain a waiver for the entire project. As with other waivers, no waivers for ventilation category will be approved by default. (See Appendix H for waiver information and Appendix P for the Waiver Form.)

Use of this ventilation index is not to be confused with assessing fire safety. For example, a day providing excellent ventilation conditions may also be a “red flag warning” day, meaning it might be unsafe to burn. There are other agencies (e.g., local fire marshal, fire department, State Forestry, etc.) enforcing fire safety, which overrides air quality considerations.

#### **E.2.2. Instructions for Determining Burn Site Ventilation Category**

1. To determine the ventilation category at the burn location go to: <http://www.srh.noaa.gov/abq/firewx/fw-3.htm>.
2. Here you will find a clickable map of the fire weather forecast zones in New Mexico. Find the zone the burn is in and click to be taken to a narrative of the fire weather forecast of that area.
3. Scrolling through the narrative of the forecast you will find the location and reference elevation used to determine the general ventilation category for the forecast zone (Or see the list below for reference elevation).
4. The forecast gives mixing height and transport winds for today and tomorrow. Make sure to choose the right one.
5. To determine the ventilation index at the burn site use the following formulas:

Mixing height at burn location =  
(forecasted mixing height + reference elevation) - elevation of burn

Ventilation index of burn =  
mixing height at burn location x average forecasted transport wind speed

OR

Use the above information and insert it into the Excel form the AQB has created and posted on their website ([www.nmenv.state.nm.us/aqb/SMP/smp\\_index.html](http://www.nmenv.state.nm.us/aqb/SMP/smp_index.html)) to do the calculations for you.

- Using the number obtained from above, check the ventilation category table and determine the adjective rating (Good, Poor, etc.) for the burn location.

**E.2.3. Example of Determining Burn Site Ventilation Category**

- Go to the web site and find the fire weather zone for the burn location. (Example: Zone 103)
- Find the reference location and elevation. (Example: Location Taos, Elevation 7050’ MSL)
- Find the forecasted mixing height. (Example: 7750’ AGL)
- Find the forested transport winds. (Example: South 20-25 knots)
- Determine the elevation of the burn from a topographic map. (Example: 9050’ MSL)

- Using the formulas:

Mixing height of burn:  
 $(7750 + 7050) - 9050 = 5750$

Ventilation Index of Burn:  
 $5750 \times 23 = 132,250$

- Using the number above (132,250), go to the Ventilation Categories and Values Table and determine the Category. For this example the Category is “Very Good”.

**E.2.4. Ventilation Categories and Values Table**

CATEGORY	KNOT-FEET
Excellent	$\geq 150,000$
Very Good	100,000 – 149,999
Good	60,000 – 99,999
Fair	40,000 – 59,999
Poor	$< 40,000$

**E.2.5. List of Reference Elevations by Zone**

- |                               |                                  |
|-------------------------------|----------------------------------|
| 101 – Farmington – 5500' MSL  | 109 – Magdalena RAWs – 8500' MSL |
| 102 – Jemez RAWs – 7700' MSL  | 110 – Reserve – 5900' MSL        |
| 103 – Taos – 7050' MSL        | 111 – Deming – 4300' MSL         |
| 104 – Clayton – 5000' MSL     | 112 – Las Cruces – 3900' MSL     |
| 105 – Grants – 6600' MSL      | 113 – Ruidoso – 6900' MSL        |
| 106 – Albuquerque – 5300' MSL | 114 – Queen – 5605' MSL          |
| 107 – Mountainair – 6500' MSL | 115 – Artesia – 3400' MSL        |
| 108 – Tucumcari – 4050' MSL   |                                  |

### Worksheet for Determining Ventilation Category

1. Enter Reference Elevation \_\_\_\_\_
2. Enter Forecasted Mixing Height \_\_\_\_\_
3. Add Lines 1 and 2 and enter sum here \_\_\_\_\_
4. Enter the burn elevation \_\_\_\_\_
5. Subtract the burn elevation from line 3, and enter here \_\_\_\_\_  
This is the burn site mixing height
6. Enter the average forecasted transport winds \_\_\_\_\_
7. Multiply line 5 by line 6, enter product here \_\_\_\_\_  
This is the burn site ventilation value
8. Look up the ventilation value on chart below to get the ventilation category for the burn.

### Ventilation Categories and Values Table

CATEGORY	KNOT-FEET
Excellent	$\geq 150,000$
Very Good	100,000 – 149,999
Good	60,000 – 99,999
Fair	40,000 – 59,999
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### **E.3. Definitions**

AGL – above ground level.

Diurnal drainage – topographic area(s) where smoke may collect or flow on a daily or recurring cycle.

Fire weather forecast – a weather prediction specially prepared for use in wildland fire operations and prescribed fire.

Knot – nautical miles per hour, equal to 1.15mph.

MSL – mean sea level, for these purposes it implies altitude above sea level.

Mixing height – the maximum height that rapid vertical mixing takes place in the atmosphere. The more unstable the atmosphere, the higher the mixing height is as a rule.

Red flag warning – term used by fire weather forecasters to alert forecast users to an on-going or imminent critical fire weather pattern.

Ridgetop winds – winds forecasted at approximately 10,000 feet above MSL.

Smoke mitigation plan – a plan in which the burner has identified areas that could be affected by smoke and documents ways they will reduce/mitigate these impacts.

Surface winds – air movement measured at 20 feet above the average vegetative cover, averaged over a 10-minute period.

Topographic map – a map having lines of equal elevation that represent the land surface.

Transport winds – an average of the horizontal wind speed (the surface and ridgetop winds) and direction from the surface to the mixing height.

Ventilation – the product of the mixing height and transport wind speeds.

Ventilation category – a classification that describes the potential for smoke or other pollutants to ventilate away from its source, and that is expressed in terms of Excellent, Very Good, Good, Fair, or Poor.

### **E.7. References**

#### **Regional Haze Rule**

Published in the Federal Register on July 1, 1999, 64 FR 35714.

[http://www.epa.gov/ttn/oarpg/t1/fr\\_notices/rhfedreg.pdf](http://www.epa.gov/ttn/oarpg/t1/fr_notices/rhfedreg.pdf)

#### **National Weather Service, New Mexico**

<http://www.srh.noaa.gov/abq/firewx/fw-3.htm>

**Smoke Management Techniques RX-410 Student Workbook**  
National Wildfire Coordinating Group. NFES #2476. October 1994.

**Ventilation Values**  
Southwest Area Mobilization Guide. March 2002.

**WRAP Policy on Enhanced Smoke Management Programs for Visibility**  
Approved by the Western Regional Air Partnership, November 12, 2002.  
[http://www.wrapair.org/forums/fejf/documents/esmptt/policy/030115\\_ESMP\\_Policy.pdf](http://www.wrapair.org/forums/fejf/documents/esmptt/policy/030115_ESMP_Policy.pdf)

**Air Quality Bureau Smoke Management Webpage**  
[http://www.nmenv.state.nm.us/aqb/SMP/smp\\_index.html](http://www.nmenv.state.nm.us/aqb/SMP/smp_index.html)