Smoke Screening Procedures: the "low tech" version

The following procedure was developed to aid the fire practitioner in limiting smoke impacts from prescribed burns. It does not offer the quantified emissions projections of some models, but its simplicity is attractive in many ways. Chiefly, there is no "black box" of assumptions en route to computing an answer. The direct, visual nature of the procedure makes judgements and assumptions more apparent to the user. It also does not require any expensive equipment.

This procedure was developed for use primarily in rural areas. In urban situations, the screening system may identify hundreds of critical smoke sensitive sites which cannot be entirely avoided if prescribed fires are to be conducted. In this situation, the system may be useful in identifying the most crucial sensitive areas, and in developing a list of neighbors and businesses to target for notification and education programs.

Additional steps can be added to this procedure that incorporate other fuel types and smoke-producing characteristics of the fuels. See: Wade, D.D. and J.D. Lunsford. 1989. A Guide for Prescribed Fire in Southern Forests. USDA Forest Service, Southeast Region. Technical Publication R8-TP 11.

To complete this procedure, you will need: an administrative map of the area, pencil, ruler, pencil compass (for drawing circles), and protractor or smoke plotter. A county map, showing roads, schools, churches, etc., is usually the appropriate scale for this procedure.

STEP 1. Determine Area Affected by Smoke Plume

A. Using an administrative map, plot wind direction from planned burn for the distance indicated:
    1. 5 miles for grass, any ignition technique
    2. 5 miles for backing fires in other fuels
    3. 10 miles for heading fires or large burns (>500 acres)

B. Draw lines from each end of fire at an angle of 30 degrees from wind direction and draw arcs at distance indicated above. This is your probable smoke impact area during the day (with variable winds, use 45 degrees).

C. Go down drainage for one-half the distance determined in A, spreading out over the valley or bottom. This is your probable impact area during the night.

STEP 2. Identify Smoke Sensitive Areas

A. Identify and mark any smoke-sensitive areas located within either probable impact areas plotted in STEP 1.

B. If no smoke-sensitive areas are found, you may burn as prescribed.

C. If any smoke-sensitive areas are found, continue screening procedure.

STEP 3. Identify Critical Smoke Sensitive Areas

A. Critical smoke sensitive areas are:
    1. Areas already with an air quality or visibility problem.

2. Areas within the probable smoke impact areas as determined below:
    a. 5 miles - any sensitive area within one-half mile of burn is **critical**.
    b. 10 miles - any smoke-sensitive area within one mile is **critical**.

B. If any critical smoke-sensitive area is identified, DO NOT BURN without considering one of the following changes:
    1. Prescribe a new wind direction that will miss the critical smoke-sensitive area.
    2. If smoke sensitive area is in the outer half of the distance criteria, ensure burn area is small, and complete burn (including complete mop-up) by 5 pm.
    3. Consider alternatives to burning.

C. If no critical smoke-sensitive areas are found, or if criteria in "B" above are met, continue screening procedure.

STEP 4: Minimize Risk

If your planned burn meets all the criteria so far and you can answer yes to the following questions, you may burn as prescribed. If not, change prescription so all answers are "yes" or DO NOT BURN.

1. Is mixing height 1,700 feet or greater?
2. Is transport windspeed 9 mph or greater?
3. Is background visibility at least 5 miles?
4. If there are stumps and snags, are you taking steps to keep them from burning, or providing for adequate mop-up?
5. If smoke-sensitive area is in the overlapping trajectory of two smoke plumes, is it at least one mile from either source?

If your prescribed fire complies with all the conditions in the 4 steps, you should be able to safely burn without causing a smoke problem. If you have any marginal answers, areas extra sensitive to smoke, heavier than normal fuel loadings, or wet fuels, further adjustment may be in order.

Remember, this is a tool. *You* must make the final decision about when it is safe to burn.