

REPORT
of
Eight Focus Groups on the Ozone Map,
the Pollutant Standards Sub-Index for Ozone, and
the Ozone Health Effects Booklet

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EXECUTIVE SUMMARY

In 1976, the U.S. Environmental Protection Agency (EPA) developed a uniform air quality index, called the Pollutant Standards Index (PSI), to provide the public with timely and accurate information about air quality and associated health effects. The PSI serves as the basis for various outreach tools to help members of the public understand when local concentrations of ground-level ozone pose a health concern and what actions they can take to protect their health. Three key components of this public outreach include the Ozone Map, cautionary statements about ozone, and a booklet that provides information on the health effects of ozone. The map provides the general public with timely information about local ozone concentrations. The cautionary statements and ozone health effects booklet provide information about precautions that sensitive groups and the general public can take to protect their health from ozone exposure.

Working through a contractor, EPA's Office of Research and Development/National Center for Environmental Assessment (ORD/NCEA) commissioned eight focus groups held in August, September, and October 1998 in eight cities across the United States to determine how effectively the Ozone Map, the cautionary statements, and the ozone health effects booklet communicate ozone-related information to the general public and targeted audiences. This report documents the results of these focus groups.

The purpose of the focus groups was to evaluate how effectively the Ozone Map, the cautionary statements for ozone, and the ozone health effects booklet communicate information to the general public and target audiences. The following specific items were discussed during the meetings:

- Different mock-ups of the Ozone Map were compared to evaluate how well they convey the air quality message.
- The ozone cautionary statements associated with the map and the PSI were discussed to evaluate their effectiveness in providing cautionary information on ozone exposure in an understandable form.
- The ozone health effects booklet (*Smog—Who Does It Hurt?*) was evaluated for how well the text conveys potential ozone exposure-related effects in an easily readable and understandable form, clearly identifies sensitive sub-populations, and adequately identifies ways to minimize ozone exposure.

Five focus groups were comprised of members of the general public (Denver, Atlanta, Houston, San Bernardino, and St. Louis). Participants in these groups were selected to fit a profile that matched the demographic characteristics of each city in terms of ethnicity, age, gender, and education level. Another focus group, held in Miami, was comprised of people over 50 years of age with chronic lung disease (asthma, chronic bronchitis, or emphysema). A seventh focus group, held in Chicago, was

comprised of parents of asthmatic children. All participants in this group had 12 years or less of education. The eighth focus group, held in Los Angeles, was comprised of journalists and was held during the 1998 Annual Meeting of the Society of Professional Journalists. (Individuals specializing in environmental journalism were intentionally not included in the focus group.)

Participants were shown four versions of the Ozone Map. Participants seemed to have a clear understanding of the maps. They understood that the maps show different levels of air quality, and that air quality is unhealthy in areas shown in orange, red, and dark red, and more healthy in areas shown in yellow and green. Participants provided their views and opinions about aspects of the maps that they found particularly helpful and effective or confusing and ineffective.

Participants also provided their perspectives on the “moderate,” “unhealthy for sensitive groups,” and “generally unhealthy” ozone cautionary statements associated with the map and the PSI. For the most part, participants understood the cautionary statements’ messages, and they provided their views and opinions about aspects of the cautionary statements that they found particularly helpful and effective or confusing and ineffective.

Participants were asked to read sections of the ozone health effects booklet entitled *Smog—Who Does It Hurt?* Overall, people responded positively to the booklet. Most thought it contained the right amount of information, and many commented that it was informative, well-organized, and easy to understand. Participants also provided suggestions for ways to improve the booklet. Participants appeared to have a good understanding of the health effects of ozone, based on their reading of the booklet.

The results of the discussions were fairly consistent across the eight groups. It should be noted that participants in the San Bernardino focus group appeared to be more knowledgeable about air quality issues than participants in the other focus groups. Of all focus group participants, those in the Chicago group (parents of asthmatic children) felt most strongly that the cautionary statements are too wordy and should be simplified. Also, it is noteworthy that the content of the focus group discussions with people over 50 years of age with chronic lung disease and with parents of asthmatic children did not differ significantly from the content of the discussions in the five focus groups with members of the general public. Participants in the Los Angeles focus group (professional journalists) were the most outspoken in their views about how the maps, cautionary statements, and ozone health effects booklet could be improved.

1. INTRODUCTION

1.1 BACKGROUND

In recent years, the U.S. Environmental Protection Agency (EPA) has conducted a number of outreach activities to help members of the public understand when local concentrations of ground-level ozone pose a health concern and what actions they can take to protect their health. The Pollutant Standards Index forms the basis for three key components of these outreach activities which include: 1) the Ozone Map; 2) cautionary statements about ozone; and, 3) a booklet that provides information on the health effects of ozone. In August, September, and October, 1998, working through a contractor, EPA commissioned eight focus groups held in cities across the United States to test how effectively each of these tools, described below, communicates ozone-related information.

This report documents the results of these focus groups. Section 1 provides background on the purpose, location, participants, and agenda of the focus groups. Section 2 summarizes and synthesizes the results of all eight focus groups. Appendices A through H document the results of the individual focus groups, and Appendix I provides profiles of the focus group participants.

1.1.1 The Ozone Map

The Ozone Map is a contour map that uses color to show different concentrations of ozone, in categories ranging from good to moderate to varying degrees of unhealthy. The map is created from real-time, hourly ozone data provided by a network of more than 400 air monitoring stations from South Carolina to Wisconsin and Maine. The focus groups tested four different versions of the Ozone Map.

The Ozone Map is part of the Ozone Mapping Project, which is a cooperative effort of the EPA, State and local air pollution control agencies, and regional organizations. The Ozone Mapping Project is part of EPA's Environmental Monitoring for Public Access and Community Tracking (EMPACT) Initiative, which provides State and local governments and the public with information about local environmental pollution concentrations to allow for better public health protection.

In 1998, EPA's Office of Air and Radiation assumed coordination of the Ozone Mapping Project and will provide the largest U.S. metropolitan areas (designated EMPACT cities) with access to time-relevant air quality data on ozone in an easily accessible and understandable format by the 2001 ozone season.

1.1.2 Cautionary Statements for Ozone

The focus groups also tested a number of cautionary statements for ozone that are associated with the Ozone Map and the Pollutant Standards Index. The PSI is a tool that enables Federal, State, and local agencies to report levels of ozone and other common air pollutants in a uniform way. EPA developed the PSI to make it easier for the public to understand the health significance of air pollution levels. The PSI is used to “translate” levels of air pollutants to a standard index that ranges from 0 to 500. The higher the PSI level, the greater the health concern. The PSI includes subindices that are specific to individual pollutants, including ozone. The draft PSI Sub-Index for Ozone contains information about precautions that sensitive groups and the general public can take to protect their health at different ambient ozone levels. Several of these statements were tested in the focus groups.

1.1.3 Ozone Health Effects Booklet

Also under the EMPACT Program, described above, EPA has developed a draft booklet entitled *Smog—Who Does It Hurt? What You Need To Know About Ozone and Your Health*. The booklet, which was tested during the focus group discussions, provides information for the general public about ozone health effects. It is based on scientific information gained in the recent review of the ozone standard. EPA developed this ozone health effects booklet to provide the public with detailed information about the health effects associated with different levels of air pollution. *Smog—Who Does It Hurt?* was designed to provide, in simple language, enough detail for individuals to understand who is most at risk from ozone exposure and why, the nature of ozone health effects, and a detailed explanation of how individuals can reduce the likelihood of exposure using common everyday activities as examples.

1.2 FOCUS GROUP LOCATIONS AND DATES

The table below lists the dates and locations of the eight focus groups, as well as the types of participants who attended. Five were held with members of the general public, one with people over 50 years of age with chronic lung disease (i.e., asthma, chronic bronchitis, and/or emphysema), one with parents of asthmatic children, and one with professional journalists (not including environmental journalists).

Date	Location	Participants
August 11, 1998	Denver, CO	General public (residents of the city of Denver)
August 17, 1998	Atlanta, GA	General public (residents of the city of Atlanta)

Date	Location	Participants
August 20, 1998	Houston, TX	General public (residents of the city of Houston)
August 25, 1998	Riverside, CA	General public (residents of the city of San Bernardino)
August 26, 1998	St. Louis, MO	General public (residents of the city of St. Louis)
August 28, 1998	Miami, FL	People over 50 years of age with chronic lung disease
September 24, 1998	Chicago, IL	Parents of asthmatic children (residents of the city of Chicago)
October 24, 1998	Los Angeles, CA	Professional journalists (not including environmental journalists)

1.3 PURPOSE

The purpose of the focus groups was to evaluate how effectively the Ozone Map, the cautionary statements for ozone, and the ozone health effects booklet communicate information to the general public and target audiences. The following specific items were discussed during the meetings:

- Different mock-ups of the Ozone Map were compared to evaluate how well they convey the air quality message.
- The cautionary statements associated with the map and the PSI were discussed to evaluate their effectiveness in providing cautionary information on ozone exposure in an understandable form.
- The ozone health effects booklet (*Smog—Who Does It Hurt?*) was evaluated for how well the text conveys potential ozone exposure-related effects in an easily readable and understandable form, clearly identifies sensitive sub-populations, and adequately identifies ways to minimize ozone exposure.

1.4 SELECTION OF FOCUS GROUP PARTICIPANTS

Five focus groups were comprised of members of the general public (Denver, Atlanta, Houston, San Bernardino, and St. Louis). Participants in these groups were selected to fit a profile that matched the demographic characteristics of each city in terms of ethnicity, age, gender, and education level. Demographic information for each of the five cities was obtained using 1990 data from the U.S. Bureau of the Census. During recruitment, preference was given when possible to people who had never before participated in a focus group discussion. Potential participants were also asked if they were comfortable reading maps and a brochure written in English.

The focus group held in Miami was comprised of people over 50 years of age with chronic lung disease (asthma, chronic bronchitis, or emphysema). Ethnicity and education level were not considered during participant recruitment; however, preference was given when possible to people who had never before participated in a focus group discussion. Potential participants were also asked if they were comfortable reading maps and a brochure written in English. Also, an attempt was made to balance the group between men and women.

The focus group held in Chicago was comprised of parents of asthmatic children. Criteria for inclusion in the group were years of education (12 or less) and that the asthmatic child in the participant's care is 18 years of age or younger. Ethnicity was not considered during participant recruitment. Preference was given when possible to people who had never participated in a focus group discussion. Potential participants were also asked if they were comfortable reading maps and a brochure written in English. Also, an attempt was made to balance the group between men and women.

The focus group in Los Angeles was comprised of professional journalists and was held during the 1998 Annual Meeting of the Society of Professional Journalists. Individuals specializing in environmental issues were intentionally not included in the focus group.

Twelve people participated in the focus groups in Denver, Atlanta, St. Louis, and San Bernardino, eleven participated in the focus groups in Houston and Miami, nine participated in the focus group in Chicago, and thirteen participated in the focus group in Los Angeles. Appendix I details the demographic characteristics of participants in each of the focus groups.

1.5 AGENDA FOR THE FOCUS GROUP DISCUSSIONS

Each focus group was moderated by a facilitator who asked participants a series of scripted questions about different versions of the Ozone Map, the cautionary statements associated with the PSI Sub-Index for ozone, and the ozone health effects booklet. When appropriate, the facilitator asked follow-up questions to identify and explore any areas of confusion that may have emerged and to confirm the different understandings that participants had and the reasons for these understandings. Each discussion was 2 hours long. Approximately 10 minutes were devoted to the introduction, 40 minutes to the

Ozone Map, 25 minutes to the PSI Sub-Index, and 45 minutes to the ozone health effects booklet (which included time for participants to read the booklet).

1.5.1 Introduction

During the introductory section of the focus group, the facilitator framed the discussion by stating:

Our discussion tonight concerns air pollution and health. During the meeting, we will be reading a brochure and looking at maps designed to help you understand what you can do to protect your health from air pollution. We've asked you to come here because we would like to get your views and opinions about whether these materials are clear and effective.

The facilitator also explained the discussion ground rules and asked an ice-breaking question: “*What is the first word that comes to mind when you hear the words ‘air pollution’?*”

1.5.2 Ozone Map

During this section of the focus group discussion, participants were shown different versions of the Ozone Map and asked a series of questions to elicit their impressions of and opinions about each version. Each map shows ozone levels in the eastern third of the United States at 3:00 p.m. on July 14, 1997. The maps differ accordingly:

- In the legend for Map 1, orange, red, and dark red are labeled “unhealthy.”
- In the legend for Map 2, orange is labeled “unhealthy for sensitive groups,” red is labeled “generally unhealthy,” and dark red is labeled “very unhealthy.”
- Maps 2 and 3 have the same legend, but Map 3 contains the following definition of sensitive groups: “active children, outdoor workers, and people with respiratory disease, such as asthma.”
- Map 4 is the same as Map 3, except that the “moderate” category shows two different shades of yellow instead of one. (The legend shows one shade of yellow only, which is labeled “moderate.”)

A PDF file of each map was projected on a screen using a laptop computer and a LitePro projector. The facilitator displayed the maps one at a time, and participants were asked to comment on each map as it was projected. After each map was discussed individually, the four maps were displayed side-by-side, and the facilitator asked participants to discuss their views about which map does the best job communicating whether air quality is good or bad for people’s health. In six of the focus groups, participants were also asked which map they preferred. Appendix J contains the versions of the Ozone Map shown to participants.

To ensure the comfort and accommodate the needs of participants with chronic lung disease, the agenda for the Miami focus group was modified to allow for a 15-minute break. Participants were

shown Map 3 only (which contains a single shade of yellow in the moderate category and includes the definition of sensitive groups). Discussion of the dual moderate cautionary statement was also removed, because participants had no context to discuss the two shades of yellow in the moderate category.

1.5.3 Cautionary Statements for Ozone

During this section of the focus group discussion, the facilitator asked participants a series of questions to elicit their impressions of and opinions about the cautionary statements associated with the following categories of the PSI Sub-Index for ozone:

- The single “moderate” statement
- The dual “moderate” statement
- The “unhealthy for sensitive groups” statement
- The “generally unhealthy” statement

The cautionary statements were discussed one at a time. Prior to discussion of each statement, the facilitator read the statement aloud and projected the text on a screen, using a laptop computer and a LitePro projector. Participants were not shown the index values associated with each level of air quality. When necessary, the facilitator projected the relevant version of the Ozone Map to help provide participants with context for the cautionary statements.

During four of the eight focus group discussions (Houston, Atlanta, Miami, and Chicago), participants were also shown a modified version of the PSI Sub-Index for ozone, in which the table was modified to include three columns only: Index Values, Descriptor, and Cautionary Statement. (To avoid confusing participants, the Ozone Health Effects column was removed because it contains information that had not been introduced at that point in the discussion.) Participants were asked which title they preferred for the table: “Pollutant Standards Index” or “Air Quality Index.”

1.5.4 Ozone Health Effects Booklet

During this section of the focus group discussion, participants were asked to read the following sections of the ozone health effects booklet entitled *Smog—Who Does It Hurt? What You Need to Know About Ozone and Your Health*:

- What is ozone?
- Should I be concerned about ozone exposure?
- Who is most at risk from ozone?
- How might ozone affect my health?
- How can I tell if I am being affected by ozone?

- What can I do to avoid unhealthy exposure to ozone?
- What does exertion have to do with ozone-related health effects?

After reading the booklet, participants were asked questions to determine (1) their general impressions of the booklet and (2) their understanding of the health effects of ozone based on their reading of the booklet. They were asked not to refer to the booklet when answering those questions.

2. SUMMARY OF FOCUS GROUP DISCUSSIONS

This section of the report summarizes the results of the eight focus group discussions and highlights key themes and findings. It also highlights specific points made by individual participants. The questions posed by the facilitator are presented in italics, and the participants' responses are summarized beneath the question. Occasional quotes (also presented in italics) are used to highlight key points, articulate common themes, and generally convey the flavor and tone of the discussion.

For the most part, the results of the discussions were fairly consistent across the eight groups. It should be noted that participants in the San Bernardino focus group appeared to be more knowledgeable about air quality issues than participants in the other focus groups. Also, it is noteworthy that the content of the focus group discussions with people over 50 years of age with chronic lung disease and with parents of asthmatic children did not differ significantly from the content of the discussions in the five focus groups with members of the general public. Participants in the Los Angeles focus group with professional journalists were the most outspoken in their views about how the maps, cautionary statements, and ozone health effects booklet could be improved.

2.1 OZONE MAPS

The facilitator framed the discussion of the four versions of the Ozone Map accordingly:

I'm going to show you some maps that are intended to inform people about levels of air pollution. You might see these maps on television, or you might see them in a newspaper. Or, if you have access to a computer in your library or home, you might see them on the Internet. Each map presents information in a slightly different way. I want to get your views and opinions about the different ways in which this information is presented.

2.1.1 Summary of Comments on Map 1

After projecting Map 1¹, the facilitator said:

Here's the first map. It shows different levels of air quality. This happens to be the northeast section of the U.S. For purposes of our discussion, that's not important. We could just as easily have picked another part of the country. As you look at the map, I would like you to think about the following question: What does this map tell you?

¹ Orange, red, and dark red labeled "unhealthy"

Participants seemed to have a clear understanding of the map. They understood that the map shows different levels of air quality, and that air quality is unhealthy in areas shown in orange, red, and dark red, and more healthy in areas shown in yellow and green.

The facilitator then asked: “*What does the word ‘unhealthy’ mean to you?*” Participants had a wide variety of responses, some of which are highlighted below:

- *Allergies and disease.*
- *Not good for you.*
- *Stay inside.*
- *Hard to breathe.*
- *You wouldn’t want to go there.*
- *The air can be irritating to certain people.*
- *High levels of lung disease.*
- *It’s an alert or a warning.*
- *My child has asthma, and when the air is like this, you take precautions to prevent the asthma.*

Many participants expressed the view that people should stay indoors when air quality is “unhealthy.”

The facilitator next asked: “*What does the word ‘moderate’ mean to you?*” Participants had a wide variety of responses, some of which are highlighted below:

Some participants viewed air quality in the moderate category as average.

- *Not too bad. Normal.*
- *It’s average air.*
- *A healthy person would not be affected.*
- *Acceptable area to live and acceptable air cleanliness.*
- *There’s a slight risk, but you can live with it.*

Other participants had a negative view of “moderate” air quality:

- *I see “moderate” as bad. I’d want to live where air is always “good.” I wouldn’t want to be where air is “moderate.”*
- *What’s “moderate” for some might be totally unhealthy for others.*
- *May take years off your life.*

Others expressed the view that air in the “moderate” category is in flux between “good” and “unhealthy:”

- *Could become unhealthy.*
- *Could become good, so don't worry about it because it could change.*
- *Moderate could mean "borderline." It could get worse.*
- *Be watchful and wait to see which way it is going to go—good or bad.*
- *Could get bad, could get better.*

Then the facilitator asked: “What does the word ‘good’ mean to you?” Representative responses included:

- *The color green for “good” means that everything is just fine.*
- *Green makes it seem more healthy.*
- *Green and good.*
- *Fresh, clean air.*
- *You could do outdoor activities without fear.*
- *Better quality of life; you can exercise more and be outside more than if you were in the unhealthy area.*
- *Not as concerned for your children who can play outside.*

Some participants in the Los Angeles focus group with professional journalists proposed the words “healthy” and “clean” as alternatives to “good.” Eight participants preferred “healthy” to “good.”

(Note: Map 1 was not tested during the Miami focus group meeting.)

2.1.2 Summary of Comments on Map 2

After displaying Map 2², the facilitator asked the following question:

Here’s the second map that I’d like you to think about. In this map, the key has been changed to include more information. What does this new information mean to you?

Participants noted immediately that the map provides greater specificity. Many commented that Map 2 presents useful information not contained in Map 1:

- *I like this map better because it’s more explanatory.*
- *It’s a better warning for those in sensitive groups.*
- *This map is more helpful for people with asthma.*

²Orange labeled “unhealthy for sensitive groups,” red labeled “generally unhealthy,” and dark red labeled “very unhealthy”

A few participants commented that the three categories of air quality associated with orange, red, and dark red are vague. They suggested that it would be more useful if these levels of air quality were quantified in some way.

The facilitator then asked: “*What does the term ‘very unhealthy’ mean to you?*”

A number of participants commented that it means to stay inside. One participant stated: “*I’m even concerned about being inside. Why is the air inside better than the air outside?*”

Other representative comments included:

- *It’s time to move.*
- *There’s a higher risk.*
- *Red alert.*
- *Potentially life-threatening*

The facilitator then asked: “*What does the term ‘generally unhealthy’ mean to you?*”

Many participants felt that this term means that air in this category is unhealthy for the general population.

- *It’s pretty much bad for everybody.*
- *There may be some people who can tolerate air in the category “unhealthy for sensitive groups,” but when you get to “generally unhealthy,” they can no longer tolerate it.*
- *It’s unhealthy for everyone—for the general population.*

Many people responded negatively to the word “generally,” and several participants indicated that they would prefer the term “unhealthy” to “generally unhealthy:”

- *That’s so vague.*
- *Who does ‘generally’ refer to?*
- *What’s ‘generally?’*
- *Just take ‘generally’ out and leave as ‘unhealthy.’*
- *I don’t see ‘generally unhealthy’ as different from ‘very unhealthy.’*

Three participants in Chicago commented that the term “generally unhealthy” suggests that the air is “unhealthy most of the time.” One person said: “*‘Generally unhealthy’ means that’s the way it always is, maybe not just that day but always.*”

The facilitator then asked: “*What does the term ‘unhealthy for sensitive groups’ mean to you?*”

Participants responded that air in this category is unhealthy for people with conditions such as asthma, emphysema, allergies, or suppressed immune systems. Others mentioned “chronic conditions.” Some participants thought that people with heart disease are a sensitive group. In nearly all of the focus groups, people commented that children and the elderly would be included as sensitive groups. In the Chicago focus group with parents of asthmatic children, one participant commented: *“If my daughter was to look at this, she would know, O.K., I need to bring my inhalers with me. If it’s in “moderate,” she may not have to, but if it’s in “unhealthy,” she would know that this is something she would need to do.”* Overall, people clearly understood that “sensitive groups” does not refer to the general public.

(Note: Map 2 was not tested during the Miami focus group meeting.)

2.1.3 Summary of Comments on Map 3

After displaying Map 3³, the facilitator asked the following question:

This is the third map that I’m going to ask you to think about. It’s the same as the last map that I showed you, except that it now includes some new information here at the bottom of the map. What does this new information tell you?

Many participants commented that the definition of sensitive groups provides additional information that they found useful. Some made comments such as *“It adds to the meaning.”* However, there were one or two participants in nearly each focus group who remarked that the definition provided little information that they didn’t already know: *“I would think that most people would know if they’re sensitive or not.”* Four or five participants in the Chicago focus group commented that people within sensitive groups are already likely to be aware that they are sensitive.

Some people—particularly those in the San Bernardino focus group—said that they would prefer that the map contain information about the times of day with the highest potential for unsafe ozone levels or about recommended lengths of time for exertion rather than the definition of sensitive groups.

In some of the focus groups, participants were surprised that the definition includes outdoor workers as a sensitive group. One participant stated: *“I don’t see how outdoor workers can be in the sensitive group. If you are an outdoor worker, you must be in pretty good health.”* Participants in the focus group held in St. Louis were alarmed that outdoor workers are included in the definition of sensitive groups. One participant stated that he works outdoors for a living, as does another participant’s

³Map 3 defines “sensitive groups” as “active children, outdoor workers, and people with respiratory disease, such as asthma.”

spouse, and the two felt that they were powerless to protect their health or that of family members who work outdoors, because “*the company is not going to shut down just because it is a red alert day.*”

In several of the focus groups, people were surprised that the elderly and people with allergies were not included as sensitive groups. In the Denver focus group, about half the participants were surprised that joggers and people who exercise outdoors were not included as sensitive groups.

(Note: Map 3 *was* tested during the Miami focus group meeting.)

2.1.4 Summary of Comments on Map 4

After displaying Map 4⁴, the facilitator asked the following question:

Here's the fourth and final map I'd like you to think about. In this map, the "moderate" category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. What does this new information tell you?

In all of the focus groups, people found the two shades of yellow to be unnecessary because this offers too much information or information of questionable value. Representative comments included:

- *I don't know why you'd need that much information if it's moderate. If it's bad, then that's what you should be worried about. You can do away with it.*
- *One moderate color is good enough.*
- *It's too much information, and at the same time not enough.*
- *I would add that lighter color in the legend. Without it there, I would be confused. I would still just look at the colors that are there [in the key] and not the lighter yellow. I would think that is just a blank space.*

Often, participants were confused by the addition of a second shade of yellow. Although many understood that the lighter shade of yellow represents better air quality than the darker shade, many remained confused:

- *My assumption is that lighter yellow is better than darker yellow, but I can't know that for sure.*
- *What does the different yellow stand for?*
- *Is this new shade of yellow better than moderate or worse than moderate?*
- *What does it mean? It could mean "danger."*
- *Where does that light yellow fit in?*

A participant in the Los Angeles focus group said he would not have noticed that the map contains two shades of yellow had the facilitator not pointed this out. Two other participants in this focus group commented that they had difficulty distinguishing two shades of yellow.

People wondered why two shades of yellow are shown on the map but only one is shown on the legend. In every focus group, a large number of participants felt that the new shade of yellow should be explained in the key.

⁴Map 4 contains two different shades of yellow in the 'moderate' category.

The facilitator then asked: “*Is this new information helpful?*” Very few participants felt that the addition of a lighter shade of yellow was helpful. The handful of participants who did find it useful felt that it is important to know what kind of air quality you have in your area and thus would welcome the two different shades of yellow if the legend explained what they indicate about air quality.

(Note: Map 4 was not tested during the Miami focus group meeting.)

2.1.5 Summary of Comments on Comparison of the Four Maps

The facilitator displayed the four maps side-by-side and asked participants: “*Which of these maps does the best job communicating whether air quality is good or bad for your health?*”

At seven of the eight focus groups, the facilitator asked for a show of hands. (This question was not asked during the Miami focus group meeting.) Here are the summed results from the focus groups:

- Nine participants voted for Map 1.
- Fifteen participants voted for Map 2.
- Forty-seven participants voted for Map 3.
- Eight participants voted for Map 4.

Several participants did not vote.

Many participants who voted for Map 3 said they did so because they felt it communicates the most information. Many who voted for Maps 1 and 2 said they preferred these maps because of their comparative simplicity. One person who voted for Map 4 said “*It gives more information for the person interested in really studying air pollution and its effects.*”

In six of the eight focus groups, participants were next asked which of the four maps they *prefer*. At each focus group, the facilitator asked for a show of hands. Here are the summed results from the six focus groups:

- Thirteen participants voted for Map 1.
- Eleven participants voted for Map 2.
- Thirty-eight participants voted for Map 3.
- Five participants voted for Map 4.

Several participants did not vote. Map 3 received the highest number of votes. Those who preferred Maps 3 and 4 said they did so because these maps contain the most information. Those who preferred Map 1 said they did so because it is simplest.

2.1.6 Key Results

- **Map 1:** Participants seemed to have a clear understanding of the map. They understood that the map shows different levels of air quality, and that air quality is unhealthy in areas shown in orange, red, and dark red, and more healthy in areas shown in yellow and green.
- **Map 2:** Many participants commented that Map 2 presents useful information not contained in Map 1. Many participants felt that the term “generally unhealthy” means that air in this category is unhealthy for the general population. Many people responded negatively to the word “generally,” and several participants indicated that they would prefer the term “unhealthy” to “generally unhealthy.” When commenting on the term “unhealthy for sensitive groups” before seeing the definition (which is contained in Map 3), participants assumed that likely members of sensitive groups include people with chronic lung conditions, the elderly, children, and people with heart conditions.
- **Map 3:** Many participants commented that the definition of sensitive groups provides additional information that they found useful. However, one or two participants in nearly each focus group remarked that the definition provides little information that they didn’t already know. Four or five participants in the Chicago focus group commented that people within sensitive groups are already likely to be aware that they are sensitive.
- **Map 4:** Very few participants felt that the addition of a lighter shade of yellow is helpful. Although many understood the lighter shade of yellow to represent better air quality than the darker shade, many were confused. People wondered why two shades of yellow are shown on the map but only one is shown on the legend. In every focus group, a large number of participants felt that the new shade of yellow should be explained in the key. A participant in the Los Angeles focus group said he would not have noticed that the map contains two shades of yellow had the facilitator not pointed this out. Two other participants in this focus group commented that they had difficulty distinguishing two shades of yellow.
- **Side-by-Side Comparison of the Maps:** Most participants felt that Map 3 does the best job communicating whether air quality is good or bad for your health, and many commented that it communicates the most information. Many who voted for Maps 1 and 2 said they preferred these maps because of their comparative simplicity. In six of the eight focus groups, participants were also asked which map they prefer. Map 3 received the highest number of votes. With five or six exceptions, most participants preferred the same map that they thought does the best job communicating whether air quality is good or bad for your health.
- **Additional Comments:** Professional journalists in the Los Angeles focus group provided their views about how the map could be improved. Several journalists in this focus group felt strongly that the map would be clearer and more useful if it contained more information (e.g.,

the pollutant levels associated with each color or the lung cancer rate associated with each level). Two or three others suggested that the data source should be included on the map. Another suggested that the map would be clearer if it indicated the locations of some key cities, adding that many people have a poor knowledge of geography. One journalist said that it did not make sense to her that the air quality scale ranges from “good” to “unhealthy.” She added: “*You need to use antonyms. If you’re going to say ‘healthy,’ then the opposite side of the scale should be ‘unhealthy.’ If you’re going to use ‘good,’ then the opposite side of the scale should be ‘bad.’*” Another journalist pointed out that people who are color blind would not be able to differentiate among the colors and could not read the map accurately. She also commented that some newspapers do not have the capacity to print in color. She suggested that a second map be created that uses black-and-white shades and patterns (e.g., black, white, gray, dots, cross-hatching) to differentiate among the different levels of air quality.

- A professional journalist in the Los Angeles focus group commented that the color scheme of the map makes sense, and he added that it is easy to understand because it is in keeping with the understanding that people have developed from reading the color-coded *USA Today* weather map. He added “*We recognize the red areas as hot/unhealthy. For me, when I first look at this, I’m going to assume that dark red is the worst.*” Two or three other participants in the Los Angeles focus group agreed with this perspective.

2.2 CAUTIONARY STATEMENTS FOR OZONE

The facilitator framed the discussion of the PSI Sub-Index cautionary statements accordingly:

I’m going to read a series of statements to you. These statements describe actions that people can take to protect their health at different levels of air pollution. You might hear these statements when you listen to the local weather report on television or radio, or you could read them in your local newspaper. Each of these statements corresponds to the air quality level associated with one of these colors on the map.

2.2.1 Summary of Comments on the Single “Moderate” Statement

To begin the discussion of the first cautionary statement, the facilitator stated: “*Now I’m going to read the health statements associated with some of the colors shown on the map. For folks living in the areas colored in yellow, the following information applies: **When air quality is in the upper end of this range, extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.***”

The facilitator first asked: “*What does ‘extremely sensitive children and adults’ mean to you?*”

Representative responses included:

- *People with asthma.*
- *People with respiratory problems.*
- *Infants.*
- *People with allergies.*
- *The elderly.*
- *It's referring to people with health problems, like heart problems or asthma.*

Some participants interpreted the phrase “extremely sensitive children and adults” to mean “extremely sensitive children and all adults” rather than “extremely sensitive children and extremely sensitive adults.”

In two focus groups, participants commented that “extremely sensitive” suggests a person’s emotional state (i.e., “*their feelings could be hurt*”).

Some participants were bothered by the fact that the statement refers to “the upper end of this range” when the map indicates only one category of air quality in yellow.

The facilitator then said: “*Imagine that you are an extremely sensitive adult and ozone levels in your area are at this level. The statement tells you that you ‘should consider limiting prolonged, moderate exertion outdoors’.*” The facilitator asked: “*What does ‘consider limiting prolonged, moderate exertion outdoors’ mean to you?*”

Representative responses included:

- *Don't exercise.*
- *Don't play outside.*
- *Do your yard work another time.*
- *You should limit exercise outdoors.*
- *“Consider” means think about it.*
- *Stay inside.*
- *If you don't have to go outside, don't unless it's an emergency situation.*
- *Avoid outdoor activities like yard work.*
- *Manage my kids and keep an eye on how long they are playing outside.*

One participant in the Chicago focus group stated: “*Parents need to watch out for their children. I have a daughter who has asthma, and she won't stop playing until she starts wheezing. During summer I have to bring her in and make her stop, because she's not going to stop on her own.*”

Some people were confused by the “moderate” statement. They found the terms “*prolonged*” and “*moderate*” to be contradictory when used back-to-back. One participant commented: “*Using ‘moderate,’ and ‘exertion’ next to each other—They don’t go together.*” Others clearly understood that “*prolonged*” refers to length of time of exertion, while “*moderate*” refers to intensity of exertion.

Some participants noted that “*prolonged, moderate exertion*” for one person is likely to be different for another person. Referring to outdoor workers, one participant in Chicago commented: “*It’s different for different people. You couldn’t compare what a carpenter does to what a pipefitter does.*”

In nearly all the focus groups, a few participants commented that the statement is too wordy.

2.2.2 Summary of Comments on the Dual “Moderate” Statement

To begin the discussion of this cautionary statement, the facilitator projected Map 4 and stated: “*Now I’m going to show you a different map. We’ve seen it before. In this map, the ‘moderate’ category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. For folks living in the areas covered by the lighter shade of yellow, there is no health statement. For folks living in the areas covered by the darker shade of yellow, the following health statement applies: **Extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.***” The facilitator then asked: “*Is this clearer than the previous version you saw, in which there was a single shade of yellow and a single health statement?*”

Very few participants found the dual moderate statement clearer than the single moderate statement. Many people found the two shades of yellow to be confusing, and many thought that the light yellow range without any health statement is unnecessary because it provides no new information. Representative comments include:

- *If the light yellow has no health statement, then why isn’t it green?*
- *What’s the point of having light yellow? Why can’t it be the green color?*
- *Is it clearer? No.*
- *It looks like light yellow is the same as green.*
- *It might as well be green if there is no health statement.*
- *Whatever applies to the dark yellow should apply to the light yellow. It’s better to be safe than sorry.*

2.2.3 Summary of Comments on the “Unhealthy for Sensitive Groups” Statement

To begin the discussion, the facilitator stated: “Now we’re going to talk about the health statement that is associated with air quality in the areas shaded in orange. For folks living in these areas, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should limit prolonged moderate exertion outdoors.**” The facilitator then asked: “What does ‘sensitive children and adults and people with respiratory disease, such as asthma’ mean to you?”

A number of participants interpreted the phrase “sensitive children and adults” to mean “sensitive children and all adults” rather than “sensitive children and sensitive adults.”

Some participants found this health statement to be too similar to the “moderate” health statement. Representative comments included:

- *Isn’t this statement the same as the dark yellow?*
- *It’s too close to the statement that ran with the dark yellow. “Extremely” is the only thing different in the two statements.*
- *If those two statements [the one for dark yellow and the one for orange] ran together on the same page, that would REALLY be confusing.*
- *If you put those two statements together [the one for dark yellow and the one for orange], you’d glance over it and miss those differences. I think it should be worded differently so that the two health statements stand apart from one another.*

Some participants were confused by the difference between “extremely sensitive” and “sensitive.” Some individuals commented that “extremely sensitive” seems more alarming to them than “sensitive,” and it seemed to them that “extremely” should be contained in the “unhealthy for sensitive groups” health statement rather than in the “moderate” statement.

Several participants from the Los Angeles focus group with professional journalists found the use of the word “sensitive” to be unclear in this context. One participant suggested eliminating the term “sensitive children and adults and people with respiratory disease, such as asthma” and replacing it with “members of sensitive groups.” Another suggested replacing this term with “people who suffer from respiratory disease such as asthma.”

The facilitator then asked: “Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would ‘should limit prolonged, moderate exertion outdoors’ mean to you?” Representative responses included:

- *Don’t stay outside, and limit your activity.*
- *Don’t stay outside for long periods of time.*
- *If you run 2 miles a day, you should only run 1 mile a day. You should cut your activity in half.*

- *It's a good way to make people think; it places responsibility on the person reading it, the person who's got to make the choice.*
- *You would need to take your medication.*

2.2.4 Summary of Comments on the “Generally Unhealthy” Statement

To begin the discussion, the facilitator stated: “*For folks living in the areas colored in red, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should avoid moderate exertion outdoors; everyone else, especially children, should limit prolonged, moderate exertion outdoors.***” The facilitator then asked: “*Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would the statement ‘should avoid moderate exertion outdoors’ mean to you?’*”

Representative responses included:

- *Don't take your normal daily half-hour walk.*
- *If I have a bad day, then I should not go outside.*
- *If you have asthma, you should move.*
- *For people who are sensitive, they are saying “avoid” whereas everyone else should consider limiting activities.*
- *Don't do more than you have to.*
- *Don't do what you normally do, like walking around the block.*
- *It means no playing, no running.*
- *It frightens me as a parent.*

Again, some participants interpreted the phrase “sensitive children and adults” to mean “sensitive children and all adults” rather than “sensitive children and sensitive adults.”

Some participants commented that this statement is too wordy.

Some people appeared to be confused by the word “sensitive” in this context. Representative comments included:

- *What does ‘sensitive’ mean? I thought sensitive people were people with asthma, but if they use people with respiratory disease as an example, that must mean there are other types of sensitive people.*
- *It's as if everyone should limit their activities.*
- *This statement makes it seem that everyone is sensitive.*

The facilitator then asked participants: “What would ‘should limit prolonged moderate exertion’ mean to you?” Responses included:

- *This statement is just trying to let you know that if you’re going to do those things, try to do them at a time of day, or in an area, where the air is more safe.*

It was also noted by some that the terms “should limit prolonged moderate exertion outdoors” and “should avoid moderate exertion outdoors” are too much alike.

The facilitator then pointed out that the “generally unhealthy” statement refers to “children” twice and asked participants if the differences were clear to them and if they understood why the word “children” appears twice. Overall, participants seemed to understand the distinction between the two groups of children in the cautionary statement. (“Children with asthma and respiratory diseases should take it easy, while all other children can do a little more but must also take it easy.”) (Participants in the St. Louis focus group, however, appeared not to understand that the statement differentiates between sensitive children and all children.)

2.2.5 Title of PSI Sub-Index Table

In four of the five focus groups (Atlanta, Houston, Chicago, and Miami), the facilitator showed participants a modified version of the PSI Sub-Index for ozone, in which the table was modified to include three columns only: Index Values, Descriptor, and Cautionary Statement. (To avoid confusing participants, the Ozone Health Effects column was removed because it contains information that had not been introduced at that point in the discussion.) Participants were asked which title they preferred for the table: “Pollutant Standards Index” or “Air Quality Index.”

Nearly all participants preferred “Air Quality Index” to “Pollutant Standards Index.” Representative comments included:

- *Air quality gets my attention more.*
- *Air quality is better because it says what the objective should be, what my goal is.*
- *More clear because we’re talking about air, not water.*
- *The word “quality” is in it.*
- *It’s very a general yet direct statement everyone can relate to.*
- *PSI could refer to air, or water, or any other kind of pollution.*
- *[Referring to AQI] It’s smoother.*

2.2.6 Key Results

- Some participants commented that, overall, the cautionary statements are too lengthy, and some added that more concisely phrased statements would be more effective and easier to understand. Others commented that the differences in wording among the cautionary statements are too subtle. Of all focus group participants, those in the Chicago and Los Angeles groups (parents of asthmatic children and professional journalists, respectively) seemed to feel most strongly that the cautionary statements are too wordy and should be simplified.
- Very few participants found the dual “moderate” statement (two shades of yellow) to be clearer than the single “moderate” statement (one shade of yellow). Many people found the two shades of yellow to be confusing, and many thought that the light yellow range without any health statement is unnecessary because it provides no new information.
- A number of participants interpreted the phrase “sensitive children and adults” to mean “sensitive children and all adults” rather than “sensitive children and sensitive adults.”
- Some participants were confused by the difference between “extremely sensitive” and “sensitive.” Some individuals commented that “extremely sensitive” seems more alarming to them than “sensitive,” and it seemed to them that the word “extremely” should be contained in the “unhealthy for sensitive groups” health statement rather than in the “moderate” statement.
- Overall, participants understood the distinction between the two groups of children in the “generally unhealthy” statement.
- Some participants were confused by the juxtaposition of the words “prolonged” and “moderate” and found the two words to be contradictory, while others understood that “prolonged” refers to duration of activity and “moderate” refers to the intensity of the activity.
- Nearly all participants preferred the title “Air Quality Index” to “Pollutant Standards Index.”

2.3 OZONE HEALTH EFFECTS BOOKLET

After participants read the booklet on ozone health effects (entitled *Smog: Who Does It Hurt?*), the facilitator asked participants questions to elicit their overall impressions of the booklet and to assess the booklet’s success in communicating information about the health effects of ozone.

2.3.1 Summary of General Impressions of the Booklet

The facilitator asked participants the following questions to elicit their impressions of the booklet:

I would like to find out whether you feel the booklet could have done a better job. In what ways could it have done a better job? Who feels the booklet did a good job?

Overall, people responded positively to the ozone health effects booklet. (Notably, participants in the St. Louis focus group had more negative comments about the booklet than participants in other focus groups, and participants in the Los Angeles focus group with professional journalist seemed to be the most enthusiastic about the booklet.) Most participants thought it contained the right amount of information, and many commented that it was informative, well-organized, and easy to understand. Often, people commented that it contains information that was new to them. Representative comments include:

- *Good guidelines.*
- *Clear.*
- *I learned a lot.*
- *Very informative.*
- *I like the way it told you exact hours for certain activities.*
- *I liked the paragraph that compared it to sunburn, which is something everyone can relate to.*
- *It makes me conscious of things I've previously taken for granted.*
- *It contained a lot of information I didn't know.*
- *I learned a lot more than I expected to.*

Some participants commented that the portion of the text that quantifies ozone levels in parts per million needs additional explanation. A few participants commented that further explanation of “parts per million” would be helpful.

In Denver, one person stated: *“It was good reading, but the majority of people aren't going to sit and read a 5-page or 6-page thing like this.”* Several people in Denver agreed and thought something shorter, such as a fact sheet, would be useful.

Several participants appeared to be confused by the distinction between ground-level and stratospheric ozone. Some participants suggested that the booklet should include more information about ground-level ozone versus stratospheric ozone.

A few participants disagreed with examples provided in the booklet of activities that involve moderate and heavy exertion. One person commented: *“I don't agree with what they describe as moderate exercise—construction work, pushing a wheel barrow, using a sledge hammer. That's moderate?”*

Some participants commented that they were puzzled by and would like more information about “people with unusual susceptibility to ozone,” which the booklet lists as a group at risk from ozone.

One or two participant commented that this is new information that is not presented in the cautionary statements or on the Ozone Map.

A participant from the Los Angeles focus group with professional journalists thought the booklet is wrong to focus on summer months only. She commented that in her area (Phoenix, Arizona), air quality is worse in winter than in summer. Another participant from this group pointed out that the use of a photograph of a smoggy city skyline could lead people from rural areas to believe that the booklet is irrelevant to them. Yet another participant from this focus group remarked that she would re-order the sections, because it is not clear from reading the initial sections that everyone can be affected by ozone. She thought that this point is made clear near the end of the booklet in two sections entitled “How might ozone affect my health?” and “How can I tell if I am being affected by ozone?” Two or three others agreed with this comment.

2.3.2 Summary of Comments Regarding Understanding of the Health Effects of Ozone

To help assess the booklet’s success in communicating information about the health effects of ozone, participants were asked the following questions:

Who would agree with the following statement: The higher the ozone level, the more likely it is that people’s health could be affected.

Who would agree with the following statement: The higher the ozone level, the more serious the health affects that ozone may cause.

Participants clearly understood that the higher the ozone level, the more likely it is that people’s health could be affected. They also clearly understood that the higher the ozone level, the more serious the health effects.

The facilitator then stated: “*The booklet talks about different things people can do to protect their health when ozone levels are high. What are some of those things?*”

Based on their reading of the booklet, participants had a good understanding of actions people can take to protect their health from ozone, although some continued to believe that, to protect their health, it is necessary to go inside. (Participants in the San Bernardino focus group appeared to have the clearest understanding that it is not necessary to go inside but rather to limit the duration and level of outdoor exertion.) Representative responses included:

- *Stay inside.*
- *Limit outdoor activities.*

- *Breathe slowly.*
- *Consider indoor activity.*
- *Workout indoors instead of outdoors.*

The facilitator then said:

I would like to check to see if there are different understanding about who is sensitive to ozone. I'm going to name a few groups. For each group, I'd like to get a quick show of hands to see whether you think that group is sensitive to ozone or not.

Overall, people understood that active children, all children, outdoor workers, and people with chronic lung disease are more sensitive to ozone than the general population. In nearly all of the focus groups, some participants believed that the elderly and people with heart disease are more sensitive to ozone than the general population. Even when challenged by other members of the group with text from the booklet that says “so far there is no evidence to suggest that either the elderly or people with heart disease have heightened sensitivity to ozone,” some participants were unconvinced and suggested that the booklet is incorrect. Others, however, had a clear understanding that the elderly are at higher risk if they suffer from respiratory disease, are active outdoors, or are unusually susceptible to ozone.

2.3.3 Key Results

- Overall, people responded positively to the ozone health effects booklet. Most thought it contained the right amount of information, and many commented that it was informative, well-organized, and easy to understand.
- Several participants appeared to be confused by the distinction between ground-level and stratospheric ozone. Some participants suggested that the booklet should include more information about ground-level ozone versus stratospheric ozone.
- A few participants took exception to examples provided in the booklet of activities that involve moderate and heavy exertion. In at least two focus groups, participants suggested that the booklet include a table listing activities considered moderate and vigorous to help people determine if they are doing too much outdoors on a day with high ozone levels.
- A participant from the Los Angeles focus group with professional journalists pointed out that the use of a photograph of a smoggy city skyline could lead people from rural areas to believe that the booklet is irrelevant to them. Another participant from this focus group remarked that she would re-order the sections, because it is not clear from reading the initial sections that everyone can be affected by ozone. She thought that this point is made clear near the end of

the booklet in two sections entitled “How might ozone affect my health?” and “How can I tell if I am being affected by ozone?” Two or three others agreed with this comment.

- Participants clearly understood that the higher the ozone level, the more likely it is that people’s health could be affected. They also clearly understood that the higher the ozone level, the more serious the health effects.
- Participants had a good understanding of actions people can take to protect their health from ozone, although some continued to believe that, to protect their health, it is necessary to go inside.
- Overall, people understood that active children, all children, outdoor workers, and people with chronic lung disease are more sensitive to ozone than the general population. In nearly all of the focus groups, many participants believed that the elderly and people with heart disease are more sensitive to ozone than the general population.

APPENDIX A REPORT OF THE DENVER FOCUS GROUP

The Denver focus group meeting was held on August 11, 1998 with members of the general public. Twelve individuals participated. Profiles of participants are contained in Appendix I.

1. OZONE MAPS

1.1 Summary of Comments on Map 1

After projecting Map 1 (with orange, red, and dark red labeled “unhealthy”), the facilitator asked the following question:

Here’s the first map. It shows different levels of air quality. I’d like you to look at the map and answer the following question. After I ask the question, I’m going to give you a moment to think about your response before we start the discussion. What does this map tell you?

Participants seemed to have a clear understanding of the map. To begin the discussion, one participant stated that the map shows different levels of air quality, and that air quality is unhealthy in areas shown in orange, red, and dark red, and more healthy in areas shown in yellow and green. The facilitator asked for a show of hands to see who shared this understanding, and each participant raised his or her hand.

The facilitator then asked: “*What does the word ‘unhealthy’ mean to you?*” Participants had a wide variety of responses, including:

- *Life-threatening*
- *Respiratory problems*
- *Asthma*
- *Harmful to your breathing and your eyes*
- *Allergies and disease*
- *Not good for you*
- *Brown air*

The facilitator next asked: “*What does the word ‘moderate’ mean to you?*” Participants generally had a negative view of “moderate” air quality:

- *Between good and bad. You can still breathe it, but you are still getting some germs.*
- *Could get worse.*

- *I see “moderate” as bad. I’d want to live where air is always “good.” I wouldn’t want to be where air is “moderate.”*
- *What’s “moderate” for some might be totally unhealthy for others.*

Then the facilitator asked: “*What does the word ‘good’ mean to you?*” Participants had the following responses:

- *Not bad*
- *The opposite of “unhealthy”*
- *Average*
- *Green and good*
- *Encouraging*
- *Positive*

1.2 Summary of Comments on Map 2

After displaying Map 2 (with orange labeled “unhealthy for sensitive groups,” red labeled “generally unhealthy,” and dark red labeled “very unhealthy”) the facilitator asked the following question:

Here’s the second map that I’d like you to think about. In this map, the key has been changed to include more information. What does this new information mean to you?

Participants had the following responses:

- *It’s more specific.*
- *This map is more helpful for people with asthma.*
- *This map lets you know that “moderate” air is probably not that bad for you.*
- *It lets you know that air quality is an individual thing.*
- *The map lets you know there is a lot air that is **good** to breathe.*
- *In New Jersey, I wouldn’t want to be outside at 3:00 p.m. on July 14, 1997 .*

The facilitator then asked: “*What does the term ‘unhealthy for sensitive groups’ mean to you?*” Participants responded that air in this category is unhealthy for people with asthma, emphysema, allergies, and congestive heart disease.

Next, the facilitator asked: “*What does the term ‘generally unhealthy’ mean to you?*” Participants had the following responses:

- *Some people can take it and others can’t.*
- *It’s pretty much bad for everybody.*

- *If you're out in this air for an extended period of time, it could be real bad for you.*
- *If you're a jogger, you may not want to jog when air is "generally unhealthy."*
- *There may be some people who can tolerate air in the category "unhealthy for sensitive groups," but when you get to "generally unhealthy," they can no longer tolerate it.*

One participant stated: *"I'm not sure I'd say that 'generally unhealthy' is worse than 'unhealthy for sensitive people'. Maybe these two categories should be flip-flopped."* Two or three participants said that they, too, felt that "unhealthy for sensitive groups" connotes worse air quality than "generally unhealthy." Another participant suggested that "unhealthy" might be a better descriptor than "generally unhealthy."

Two or three participants commented that the three categories of air quality associated with orange, red, and dark red are vague. They suggested that it would be more useful if these levels of air quality were quantified in some way.

The facilitator then asked: *"What does the term 'very unhealthy' mean to you?"* Participants had the following responses:

- *I wouldn't want to live there.*
- *I'd stay inside.*
- *Wear a gas mask.*
- *When air is like this, you expose yourself to things you otherwise wouldn't be exposed to.*

1.3 Summary of Comments on Map 3

After displaying Map 3, which defines "sensitive groups" as "active children, outdoor workers, and people with respiratory disease, such as asthma," the facilitator asked the following question:

This is the third map that I'm going to ask you to think about tonight. It's the same as the last map that I showed you, except that it now includes some new information here at the bottom of the map. What does this new information tell you?

Three or four participants felt that the definition provided little information that they didn't already know. One participant said that she was surprised that children were listed among the sensitive groups, and four or five other people agreed that this information was new to them. No one expressed surprise that outdoor workers and people with respiratory disease were listed as sensitive groups.

About half the participants were surprised that joggers and people who exercise outdoors were not included as sensitive groups. The other half assumed that these people were included in the category of "outdoor workers." One participant suggested that a better wording than "outdoor workers" would be

“people active outdoors.” Another person commented that “outdoor workers,” by nature of their occupation, are forced to be outside, while others have a choice. She therefore assumed that the definition specifies “outdoor workers” for this reason.

1.4 Summary of Comments on Map 4

After displaying Map 4, which contains two different shades of yellow in the ‘moderate’ category, the facilitator asked the following question:

Here’s the fourth and final map I’d like you to think about. In this map, the “moderate” category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. What does this new information tell you?

One participant felt that the two shades of yellow provided extraneous detail. Another stated that, if the maps were to provide additional detail, it would be more useful if the detail were provided in the “unhealthy” categories.

Several participants were confused by the addition of a second shade of yellow. Some wondered why two shades of yellow are shown on the map but only one is shown on the legend. One participant asked: *Is this new shade of yellow better than moderate or worse than moderate?* Every participant felt that the new shade of yellow should be explained in the key.

The facilitator then asked: *Is this new information helpful?* None of the participants felt that the new information was helpful.

1.5 Summary of Comments on Comparison of the Four Maps

The facilitator displayed the four maps side-by-side and asked participants: *Which of these maps does the best job communicating whether air quality is good or bad for your health?*

The facilitator asked for a show of hands. No participants voted for Map 1, three voted for Map 2, eight voted for Map 3, and 1 voted for Map 4.

Two or three participants commented that they voted for Map 3 because they felt it communicated the most information (the definition of “sensitive group”), but they preferred Map 2 because it is simpler. One of these individuals commented that she felt she had a good understanding of “sensitive groups” and did not need the definition to appear on the map.

1.6 Key Results

- **Map 1:** Participants seemed to have a clear understanding of the map’s meaning.

- **Map 2:** Some participants had the impression that “unhealthy for sensitive groups” connotes worse air quality than “generally unhealthy.”
- **Map 3:** Some participants felt that the definition of “sensitive groups” provided them with little information they didn’t already know. About half the participants expressed surprise that joggers and people who exercise outdoors were not included in the definition. Some participants were surprised that active children were included as a sensitive group.
- **Map 4:** Several participants were confused by the addition of a second shade of yellow in the “moderate” category. Every participant felt that both shades of yellow should be explained in the map’s key.
- **Side-by-side comparison of the four maps:** Most participants felt that Map 3 did the best job communicating whether air quality is good or bad for people’s health. Some commented, however, that they preferred Map 2 because it is simpler.

2. PSI SUB-INDEX CAUTIONARY STATEMENTS

2.1 Summary of Comments on the Single “Moderate” Statement

To begin the discussion of the first cautionary statement, the facilitator stated: “*Now I’m going to read the health statements associated with some of the colors shown on the map. For folks living in the areas colored in yellow, the following information applies: **When air quality is in the upper end of this range, extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.***”

The facilitator first asked: “*What does ‘extremely sensitive children and adults’ mean to you?*”

Participants had the following responses:

- *People with asthma*
- *You should start thinking about going inside, or about taking your kids inside.*
- *You would need to relocate if you were “extremely sensitive.”*
- *People with respiratory problems.*
- *Infants.*
- *People with allergies.*
- *The elderly*

The facilitator then stated: “*Imagine that you are an extremely sensitive adult. You hear this statement and it tells you that you ‘should consider limiting prolonged, moderate exertion outdoors to protect your health.’*” The facilitator asked: “*What does ‘consider limiting prolonged, moderate exertion outdoors’ mean to you?*”

Participants had the following responses:

- *You should drive instead of walk to where you’re going.*
- *You should limit the time you spend outdoors.*
- *If you had plans to play golf or softball, you might want to cancel.*
- *Be cautious about activities where you need to exert yourself more than normal.*

One participant commented that the statement is directed at people with *extreme* health problems. Another commented that she had a hard time believing that air quality would cause problems for anyone when it’s in the “yellow” range.

One participant stated that she was bothered by the fact that the statement refers to “the upper end of this range” when the map indicates only one category of air quality in yellow. Three or four other participants agreed that they were troubled by the fact that the map only shows one shade of yellow.

2.2 Summary of Comments on the Dual “Moderate” Statement

To begin the discussion of this cautionary statement, the facilitator projected Map 4 and stated: “*Now I’m going to show you a different map. We’ve seen it before. In this map, the ‘moderate’ category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. For folks living in the areas covered by the lighter shade of yellow, there is no health statement. For folks living in the areas covered by the darker shade of yellow, the following health statement applies: **Extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.***” The facilitator then asked: *Is this clearer than the previous version you saw, in which there was a single shade of yellow and a single health statement?*

One participant responded: “*What’s the point of having light yellow? Why can’t it be the green color?*” The facilitator asked if others shared this opinion, and four or five people raised their hands. Another commented: “*What’s the difference between green and light yellow?*”

Another person commented: “*This makes me feel that dark yellow is a lot worse than it used to be.*” The facilitator asked if others shared this impression, and five people raised their hands.

When the facilitator asked: “*Who finds this version clearer?*”, each participant indicated that he or she found this version clearer. However, one individual commented that the health statement is too subtle and that numerical guidelines are needed to help people distinguish between the two shades of yellow. Another commented: “*Why should there be two colors of yellow when there is one color of green? To me, it seems like you’re hiding someone.*” Yet another participant commented that it was difficult for him to distinguish the two shades of yellow on the map.

2.3 Summary of Comments on the “Unhealthy for Sensitive Groups” Statement

To begin the discussion, the facilitator stated: “*Now we’re going to talk about the health statement that is associated with air quality in the areas shaded in orange. For folks living in these areas, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should limit prolonged moderate exertion outdoors.***” The facilitator then asked: “*What does ‘sensitive children and adults and people with respiratory disease, such as asthma’ mean to you?*”

A number of participants appeared to be puzzled by the difference between “extremely sensitive” and “sensitive.” For example, one participant responded: “*The same group: Kids with asthma, people with respiratory problems, the elderly.*”

Two or three individuals commented that “*extremely sensitive*” seems more alarming than “*sensitive*,” and therefore it seems that air quality in the yellow category is worse for people’s health than air quality in the orange category. Other people understood that “sensitive” includes a broader group of people than “extremely sensitive.” One person commented that the wording of the health statements “*follows the chart and is right on the money.*”

The facilitator then asked: “*Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would ‘should limit prolonged, moderate exertion outdoors’ mean to you?*”

One participant, who identified herself as asthmatic, responded: “*As an asthmatic, you don’t go outside and exercise, and, as an asthmatic, I can say that the words “extremely sensitive” and “sensitive” make perfect sense to me.*”

Three or four participants commented that the difference between “should limit” and “should consider limiting” are too subtle. For these individuals, these two phrases mean the same thing. Several other participants indicated that “should limit” is a stronger cautionary statement than “should consider limiting.”

One participant commented that she would like to see a number of hours implied by the word “prolonged.”

One participant commented that, overall, the cautionary statements are too lengthy and subtly worded. He added that more concisely phrased statements would be more effective.

2.4 Summary of Comments on the “Generally Unhealthy” Statement

To begin the discussion, the facilitator stated: “*For folks living in the areas colored in red, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should avoid moderate exertion outdoors; everyone else, especially children, should limit prolonged, moderate exertion outdoors.***” The facilitator then asked: “*Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would the statement ‘should avoid moderate exertion outdoors’ mean to you?*”

One participant responded: “*These people shouldn’t go outside*” Three or four other participants had the same understanding.

Another participant responded: “*Walking, bike riding and other activities come to mind as “moderate exertion.”*” Others added:

- *Mowing the lawn*
- *Just being outside*
- *Just breathing*

Another participant commented that “moderate” has a different meaning for different age groups. She added that riding a bike may be more than “moderate” exercise for older people, but “moderate” for younger individuals. Three of four other people agreed with this perception.

The facilitator asked participants what “prolonged” meant to them. Responses included:

- *I'd say an hour or so.*
- *As long as it takes to cut the lawn. That's prolonged!*
- *More than 30 minutes.*
- *“Prolonged” equates to whatever physical condition you're in. Its very personal.*

The facilitator then asked participants what the phrase “should limit prolonged moderate exertion outdoors” meant to them. One participant commented that the statements “*should limit prolonged moderate exertion outdoors*” and “*should avoid moderate exertion outdoors*” are too much alike.

The facilitator then pointed out that the health statement refers to “children” twice and asked participants if the differences were clear to them and if they understood why the word “children” appears twice.

One participant stated that she found it interesting that children were included in the statement, whether it be “sensitive” children or “regular” children. She added: “*It sounds as if there's a lot more danger for children than there is for adults.*”

Another participant commented that the cautionary statements are subtly worded and require considerable analysis. Another added that people are likely to read the statements once and rely on their first impressions.

2.5 Key Results

- A number of participants were troubled by the fact that no health statement accompanies the areas of the map colored light yellow. Some wondered why the light yellow areas were shown in light yellow instead of green.
- Throughout the discussion, several participants commented that they would like the health statements to contain more quantitative information. For example, some stated that they would

like to see numerical values associated with the different levels of air quality. (Participants were provided only with the cautionary statements and were not shown the index values contained in the PSI.) Others indicated that they would like to see numbers of hours associated with the term “prolonged moderate exertion.”

- Some participants were confused by the difference between “extremely sensitive” and “sensitive.” Two or three individuals commented that “extremely sensitive” seems more alarming to them than “sensitive,” and it seemed to them that “extremely” should be contained in the health “unhealthy for sensitive groups” statement rather than in the “moderate” statement.
- Some participants commented that the difference between “should limit” and “should consider limiting” was too subtle.
- Throughout the discussion, a number of participants indicated that they think it is necessary for people to go inside to protect their health when air quality is poor.

3. OZONE HEALTH EFFECTS BOOKLET

3.1 Summary of General Impressions of the Booklet

Participants were asked two questions to elicit their impressions of the booklet:

1. What three words come to mind that summarize your general impressions of the ozone booklet?

About half the participants repeated key concepts or elements presented in the booklet (e.g., ozone, children, exertion, exposure). The other half provided words that described their impressions of the booklet, all of which were positive (e.g., informative, clear, organized, educational, useful, detailed, defined, easy to understand).

2. Did you feel the booklet provided too much information, too little information, or just the right amount of information?

Most (ten) participants felt the booklet contained the right amount of information. One felt that it contained too much information, and another felt that it contained too little information.

To gather additional information about people's general impressions of the booklet, the facilitator asked the group the following question: *"After reading the booklet, do you feel it does a good job in conveying information about when ozone is a health issue and what people can do to protect their health?"*

Several commented that they found the booklet very understandable. Two participants commented that they had to read the booklet two or three times before the information began to sink in.

One participant commented that the booklet provided him with little valuable new information except for the information that quantifies in parts per million the levels of ozone that can cause health effects.

One person stated: *"It was good reading, but the majority of people aren't going to sit and read a 5-page or 6-page thing like this."* The facilitator asked if people thought something shorter, such as a fact sheet, would be useful. Several people like the idea of a fact sheet. Two or three participants commented that they found the booklet repetitive.

Next, the facilitator asked: *"Take a moment to look at the minuses you marked when you read the booklet and think about why you marked them. Please tell us about the most important "minus" that you marked."*

Two participants commented that the portion of the text that quantifies ozone levels in parts per million needs additional explanation. A few participants commented that charts that explain “parts per million” would be helpful. One person suggested that this chart could be substituted for some of the photos that show people playing tennis and children outdoors.

The facilitator concluded the discussion by asking people about the most important “plus” that people marked in their booklet. Responses included:

- *Parts per million and hours of exertions was good information to have. We finally got to the point where we quantified some of the things we discussed.*
- *The information about how people can become sensitized to the effects of ozone.*
- *The part about what exertion has to do with ozone health effects.*
- *Suggestions about what I can do to protect my health from ozone.*
- *Information about damage to the lining of lungs.*

3.2 Summary of Comments Regarding Understanding of the Health Effects of Ozone

To help assess the booklet’s success in communicating information about the health effects of ozone, participants were asked the following questions:

1. After reading the booklet, do you feel you have a good understanding of the health effects of ozone? Please explain.

Participants had a wide variety of responses:

- *As the ozone deteriorates, the effects it causes on people’s health is pretty well stated.*
- *Yes, particularly the information that ozone effects can desensitize the physical effects.*
- *Yes, I understand the correlation between limiting your outdoor exposure and activity level.*
- *High levels of ozone are bad for everyone’s health even if tolerance is built up by prolonged exposure.*
- *Ozone effects primarily lung function and breathing. Too much ozone, especially during strenuous activity, can cause lung damage and reduced capacity.*
- *Ozone is a more insidious concern than generally recognized. More respiratory problems.*
- *More dangerous to unhealthy people than healthy.*

One participant's response reveals some confusion about the differences between stratospheric and ground-level ozone:

- *As the ozone deteriorates, the effects it causes on people's health is pretty well stated.*

2. Which groups are more sensitive to ozone than the general population?

- Nine participants indicated "all children," and three indicated "active children."
- Four participants indicated "the elderly."
- Nine participants indicated "people with asthma," and 7 indicated "people with other chronic lung disease"
- Two participants indicated "people with heart disease."
- Six participants indicated "outdoor workers," and seven indicated "all people who are active outdoors."
- No one indicated "people who are not active outdoors."

3. When ozone levels are high, what can you do to protect your health?

Many participants' responses indicated that they understood the booklet's messages about how they can protect their health from ozone:

- *Less hours outside.*
- *Going jogging for shorter times.*
- *Not being out breathing heavily.*
- *Limit outdoor activities and things that stress the body.*
- *When ozone levels are high, refrain from extended periods of even moderate exertion out-of-doors.*
- *Decrease your exertion level, i.e., walk rather than run.*
- *Don't prolong activities outdoors.*
- *Avoid strenuous exercise on high pollution days.*
- *Limit strenuous activity (most especially any activity that causes heavy breathing) for prolonged periods outside.*

Other responses, however, reveal that some people believe they need to go indoors to protect their health:

- *Stay indoors.*
- *Spend less time outside.*
- *Reduce outdoor exposure.*

- *Try to stay inside when ozone levels are high, until it drops.*

4. *When ozone levels are high, do you have to go inside to protect your health?*

Participants' responses reveal some confusion about this point. Seven people responded that it is necessary to go inside, and four responded that it is not necessary.

5. *Are the following statements true or false?*

- A. *The higher the ozone level, the more likely it will affect my health.***
- B. *The higher the ozone level, the more serious the health effects that ozone may cause.***
- C. *When ozone levels are high, it won't make any difference to my health how long I exercise outdoors.***

- Only one participant incorrectly marked Statement A as false.
- Two participants incorrectly marked Statement B as false.
- Only one participant incorrectly marked Statement C as true.

3.3 Key Results

- Overall, people responded positively to the ozone health effects booklet. They thought it contained the right amount of information, and they commented that it was informative, well-organized, and easy to understand.
- Several participants thought a shorter fact sheet about ozone health effects would also be useful.
- Many people had a good understanding of the booklet's messages about what people can do to protect their health from ozone; however, many participants (seven) believe it is necessary to go indoors to protect yourself from ozone.
- Participants had a good understanding of groups that are sensitive to ozone. However, some people (four) believe the elderly are a sensitive group, and two people believe people with heart disease are a sensitive group.
- Based on their reading of the booklet, people understand that the higher the ozone level, the more likely it is to affect their health and the more serious the health effects are likely to be.

They also understand that it is important to limit the duration of outdoor exercise to protect their health when ozone levels are high.

APPENDIX B REPORT OF THE ATLANTA FOCUS GROUP

The Atlanta focus group meeting was held on August 17, 1998 with members of the general public. Twelve individuals participated. Profiles of participants are contained in Appendix I.

1. OZONE MAPS

1.1 Summary of Comments on Map 1

After projecting Map 1 (with orange, red, and dark red labeled “unhealthy”), the facilitator asked the following question:

Here’s the first map. It shows different levels of air quality. As you look at the map, I’d like you to think about the following question: What does this map tell you?

Participants seemed to have a clear understanding of the map. They were able to identify the problem areas (depicted in orange, red, and dark red) as well as the areas where air quality was considered “moderate” and “good” (yellow and green areas). The participants also honed in on the red and dark red areas surrounding the Atlanta metropolitan area (where this focus group took place). However, many seemed pleased to note that much of Georgia was “in the green.”

The facilitator then asked: “*What does the word ‘unhealthy’ mean to you?*” Participants offered a variety of responses, including:

- *Costly, in terms of health insurance.*
- *You could be physically damaged very seriously just by breathing.*
- *Brown clouds, thick air.*
- *You shouldn’t be out walking or biking.*
- *Ozone alert.*
- *You wouldn’t want to go there.*

The facilitator next asked: “*What does the word ‘moderate’ mean to you?*” Some participants (4-5) felt that the word “moderate” could be loosely interpreted. One said: “*It depends on how you look at it. It’s the old cliché: it’s either half-empty or it’s half-full. If you’re an optimist you would say ‘oh, it’s not that bad.’*” Other participants expressed different understandings of the word “moderate”:

- *Not too bad.*
- *Normal.*

- *Nothing to be concerned about.*
- *The average person can handle it.*
- *“Moderate” could mean borderline: it could get worse.*
- *“Moderate” is not clear. You could almost just fall into “unhealthy” very easily, more easily than into “healthy.”*

The facilitator then asked: “What does the word ‘good’ mean to you?” Participants had the following responses:

- *Healthy.*
- *Fresh, clean air.*
- *Less sickness.*

1.2 Summary of Comments on Map 2

After displaying Map 2 (with orange labeled “unhealthy for sensitive groups,” red labeled “generally unhealthy,” and dark red labeled “very unhealthy”) the facilitator asked the following question:

Here’s the second map that I’d like you to think about. In this map, the key has been changed to include more information. What does this new information tell you?

Participants had the following responses:

- *It suggests that you wouldn’t want to live there at all.*
- *You’re just having one of those really bad days where pollution is really high. It’s just not a really good day to be outside.*
- *Stay inside as much as possible.*
- *It’s probably like that all the time; this is an area where they have a lot of problems with pollution.*

The facilitator next asked: “What does the term ‘generally unhealthy’ mean to you?” A few of the participants (2-3) had a negative view of the modifier “generally.” One stated: “That terminology is almost political in the sense. It seems that whoever wrote this is downgrading ‘very unhealthy’ by replacing ‘very’ with ‘generally’ without explaining why.” Other responses included:

- *Some days are good, others are bad.*
- *It depends on what organization is putting the information out; different people are going to have different opinions of what “generally unhealthy” means.*
- *It would be better without the “generally.”*
- *“Generally” is similar to “mostly.”*

- *There really isn't a difference between "very unhealthy" and "generally unhealthy."*

The facilitator then asked: "What does the term 'unhealthy for sensitive groups' mean to you?" There seemed to be some confusion with this term. While some of the participants read it to mean the air in question is unhealthy for a subgroup of unhealthy people, others questioned what kinds of people make up these "sensitive groups." One participant stated her concern this way: "You never know when you are going to become that sensitive group." Other comments included:

- *It's a warning signal.*
- *It a warning for people with chronic problems.*
- *It's addressed to people that work outdoors.*
- *This commentary gives you mixed messages, because if it's "unhealthy for sensitive groups" but your dark brown shade is "very unhealthy," what are the sensitive groups going to do in "very unhealthy"? It's not clear.*
- *It's for people who are unhealthy. If you're healthy, I think you'll be okay.*
- *I have a son who is asthmatic, and if I saw a map like this I'd say I'm not going to take him anywhere beyond "moderate."*

1.3 Summary of Comments on Map 3

After displaying Map 3, which defines "sensitive groups" as "active children, outdoor workers, and people with respiratory disease, such as asthma," the facilitator stated:

This is the third map that I'm going to ask you to think about tonight. It's the same as the last map that I showed you, except that it now includes some new information here at the bottom of the map. What does this new information tell you?

Participants understood that it talked about sensitive groups, but three participants felt that the definition should have included people with other allergies besides asthma and the elderly. They were particularly concerned that a warning to the elderly was not included.

The facilitator then asked: "Is this new information helpful?"

Most participants said they thought the new information is helpful, saying such things as, "It adds to the meaning," and "It's an attempt to clarify." One participant, however, didn't find this new information to be helpful, stating, "I would think that most people would know if they're sensitive or not. This category isn't clearly defined. It just muddies things."

1.4 Summary of Comments on Map 4

After displaying Map 4, which contains two different shades of yellow in the ‘moderate’ category, the facilitator asked the following question:

Here’s the fourth and final map I’d like you to think about. In this map, the ‘moderate’ category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. What does this new information tell you?

Most responding participants were uncomfortable that the newly added lighter shade of yellow was not present in the color key. They felt it made the map less clear rather than more clear. However, some (5-6) found the new information useful. Remarks from the group varied:

- *The lightest is the best.*
- *Even in those types of areas where they lose control and the air is worse, you still find some areas that are still good.*
- *I would add that lighter color in the legend. Without it there, I would be confused. I would still just look at the colors that are there [in the key] and not the lighter yellow. I would think that is just a blank space.*
- *I want to know if it’s “very good” or “slightly moderate” or “fair.”*
- *What is it?*
- *If you’re not going to define it, then don’t include it.*

The facilitator then asked: *“Is this new information helpful?”*

Most of the participants (9-10) felt the new information was *not* helpful. One stated: *“We’re approaching a point here where we’re getting almost too much information.”* Another added: *“Now ‘moderate’ is starting to become a wishy-washy term.”* However, one participant did feel the new information was helpful.

1.5 Summary of Comments on Comparison of the Four Maps

The facilitator displayed the four maps side-by-side and asked participants: *“Which of these maps does the best job communicating whether air quality is good or bad for your health?”*

- No participants voted for Map 1
- One participant voted for Map 2
- Seven participants voted for Map 3
- Two participants voted for Map 4
- Two participants did not vote

The facilitator then asked: *“Which of these maps do you prefer?”*

All participants preferred the map that they voted for previously. One participant, however, preferred Map 1, but would like to see it include the definition of “sensitive groups.” Many (7-8) of the participants felt that the definitions of “unhealthy” and “sensitive groups” should be added to all the maps. Another participant found the vertical color key easier to read than the horizontal keys: “*The gradation is more apparent.*”

1.6 Key Results

- **Map 1:** Participants had a clear understanding of the map's meaning, but many wanted a bit more detail.
- **Map 2:** Many participants (6-7) expressed concern about the term "generally unhealthy," particularly the word "generally." Some felt that "unhealthy" would be clearer than "generally unhealthy." Some participants (4-5) were also unclear as to what kinds of people were included in "sensitive groups."
- **Map 3:** Some participants (4-5) found the definition of "sensitive groups" to be very useful. However, a few (2-3) were disturbed that people with respiratory problems other than asthma were not explicitly called out in the definition. Some participants (4-5) also wanted to see the elderly included in this group.
- **Map 4:** Most participants (9-11) were confused by the addition of a second shade of yellow in the "moderate" category. All 12 participants felt that if the map contains two shades of yellow, both shades should be explained in the legend.
- **Side-by-side comparison of the four maps:** Most participants (7) felt that Map 3 did the best job communicating whether air quality is good or bad for people's health.

2. PSI SUB-INDEX CAUTIONARY STATEMENTS

2.1 Summary of Comments on the Single “Moderate” Statement

To begin the discussion of the first cautionary statement, the facilitator stated: *“Now I’m going to read the health statements associated with some of the colors shown on the map. For folks living in the areas colored in yellow, the following information applies: **When air quality is in the upper end of this range, extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.**”*

The facilitator first asked: *“What does ‘extremely sensitive children and adults’ mean to you?”*

The word “extremely” appeared to confuse some participants (4-5). They were not sure how the phrase “extremely sensitive children and adults” differs from “sensitive groups.” One commented that the word “extremely” can be interpreted differently by people. One said, *“Using ‘extremely’ is worse than just leaving it off.”*

Another participant commented that it left her feeling more uneasy about the other categories: *“When you put this kind of commentary under the yellow, what are you saying about ‘moderate’?”*

Other comments included:

- *It’s referring to people with asthma.*
- *It’s a warning to the elderly.*
- *People with severe allergies need to take note.*
- *Infants shouldn’t be outside.*
- *It’s a precautionary warning.*

The facilitator then asked: *“Imagine that you are an extremely sensitive adult. You hear this statement and it tells you that you ‘should consider limiting prolonged, moderate exertion outdoors to protect your health.’”* The facilitator asked: *“What does ‘consider limiting prolonged, moderate exertion outdoors’ mean to you?”*

Participants had the following responses:

- *You should limit exercise outdoors.*
- *Outdoor workers.*
- *“Consider” means think about it.*

The facilitator followed with another question: *“What does ‘prolonged’ mean to you?”*

All the participants agreed that “prolonged” means doing a certain exercise or strenuous activity for a long period of time, or according to one participant, “*longer than you should.*”

The facilitator then asked: “*What does ‘moderate exertion’ mean to you?*”

The term “moderate exertion” bothered some participants. Most participants (8-9) felt that each person could interpret “moderate” differently. One said, “*It’s anybody’s opinion whether they’re exerting enough.*” Another said it could mean one person shouldn’t cut the grass, while another shouldn’t run 10 miles. Another participant agreed: “*That whole statement is really unclear. What I might think is ‘moderate’ is not moderate to others.*”

2.2 Summary of Comments on the Dual “Moderate” Statement

To begin the discussion of this cautionary statement, the facilitator projected Map 4 and stated: “*Now I’m going to show you a different map. We’ve seen it before. In this map, the ‘moderate’ category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. For folks living in the areas covered by the lighter shade of yellow, there is no health statement. For folks living in the areas covered by the darker shade of yellow, the following health statement applies: **Extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.***”

The facilitator then asked: “*Is this clearer than the previous version you saw, in which there was a single shade of yellow and a single health statement?*”

All 12 of the participants felt the statement to be too wordy and confusing. One participant responded: “*It’s getting to be too much, it’s getting too confusing.*” Another participants expressed similar frustration: “*At what stage do you put the green now? We still haven’t really defined yellow, but then you throw in dark yellow with a comment.*”

2.3 Summary of Comments on the “Unhealthy for Sensitive Groups” Statement

To begin the discussion, the facilitator stated: “*Now we’re going to talk about the health statement that is associated with air quality in the areas shaded in orange. For folks living in these areas, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should limit prolonged moderate exertion outdoors.***”

The facilitator then asked: “*What does ‘sensitive children and adults and people with respiratory disease, such as asthma’ mean to you?*”

A few participants seemed very concerned that the elderly were not mentioned in the warning. One stated: *“I think they always should include children AND ELDERLY even though it says adults. I think they should always make an emphasis on elderly.”* Other comments included:

- *If orange is in our unhealthy stage, I think people with respiratory problems need to be cautioned.*
- *It says to me if you have any kind of breathing problem that you might not be able to breathe so well outdoors.*

The facilitator then asked: *“Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would ‘should limit prolonged, moderate exertion outdoors’ mean to you?”*

One participant commented that “should limit” is “*more direct*” than “consider limiting.” Another participant felt the words “should” and “sensitive” are “*wishy-washy.*” Other comments included:

- *Whatever my limitations are, I can’t do it. Again, everyone knows their limitations.*
- *If you’re a sensitive person or you fall into that category, you have to make a decision: Should I limit my exertion?*
- *It’s a good way to make people think; it places responsibility on the person reading it, the person who’s got to make the choice.*
- *This tells me to take it easy, watch myself.*
- *I like the wording on this statement.*

2.4 Summary of Comments on the “Generally Unhealthy” Statement

To begin the discussion, the facilitator stated: *“For folks living in the areas colored in red, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should avoid moderate exertion outdoors; everyone else, especially children, should limit prolonged, moderate exertion outdoors.**”*

The facilitator then asked: *“Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would the statement ‘should avoid moderate exertion outdoors’ mean to you?”*

There seemed to be a lot of confusion over the phrase “sensitive children and adults and people with respiratory problems.” Some of the participants (4-5) read the statement to mean “sensitive children,” all “adults” (not sensitive adults) and “people with respiratory problems.” One participant said: *“It’s redundant. You’ve already said ‘sensitive children and adults and people’—that pretty well*

covers most everyone. Then you say ‘everyone else.’ I’m not sure what that means unless we have aliens living here.” Other comments included:

- *You’ve got it covered with “sensitive children and adults.” You don’t need “people.”*
- *I’m not sure who “everyone else” is.*
- *We came from “sensitive children” in the orange and now we’re moving into the red and I don’t think you have to state that again. That should already be known.*
- *The problem here is the word “adults.” I read it as “elderly.” I read it as “sensitive children and the elderly and also people with respiratory disease.”*
- *It should be cut to read “everyone, especially children, should limit prolonged, moderate...”*

The facilitator next asked: *“Imagine that you are a sensitive adult or someone with a respiratory diseases, such as asthma. What does ‘should avoid moderate exertion outdoors’ mean to you?”*

The participants seemed more at ease with this statement. One said: *“‘Should avoid’ tells you definitely what NOT to do, as opposed to ‘should limit.’”* Another participant read it as saying: *“Don’t do anything that goes beyond your normal routine.”*

The facilitator then asked participants what *“should limit prolonged moderate exertion”* meant to them. Participants felt that this wording could be interpreted differently by different people. Comments included:

- *It’s saying be mindful about what you’re going to do.*
- *People are going to do what they want to do.*
- *This statement is just trying to let you know that if you’re going to do those things, try to do them at a time of day, or in an area, where the air is more safe.*

The facilitator then pointed out that the health statement refers to “children” twice and asked participants if the differences were clear to them and if they understood why the word “children” appears twice.

One participant stated that both statements are needed, but their differences might be made clearer if the statement was broken into two separate sentences. Others agreed. Everyone thought the differences were clear, but would have preferred it written as two separate statements.

The facilitator then asked: *“Are any of these statements telling you that you need to go inside to protect your health?”* Most of the participants responded that it depends on the how bad the air is in the area you live.

2.5 Summary of Comments on the Title of the PSI Sub-Index Table

The facilitator showed participants a modified version of the PSI Sub-Index for ozone, in which the table was modified to include three columns only: Index Values, Descriptor, and Cautionary Statement. (To avoid confusing participants, the Ozone Health Effects column was removed because it contains information that had not been introduced at that point in the discussion.) Participants were asked which title they preferred for the table: “Pollutant Standards Index (PSI),” or “Air Quality Index (AQI).”

All 12 preferred AQI. Their comments included:

- *More clear because we're talking about air, not water.*
- *The word "quality" is in it.*
- *It's very a general yet direct statement everyone can relate to.*

2.6 Key Results

- Most participants (9-10) were troubled by the fact that no health statement accompanies the areas of the map colored light yellow. They wondered why the light yellow areas were shown in light yellow instead of green.
- Throughout the discussion, several participants (5-6) commented that they would like the health statements to contain more specific information, for example, exactly what types of people would be considered members of "sensitive groups." They felt that even asthmatics vary in severity and therefore some of the warnings aimed at sensitive people might not be specific enough. (Note: Participants were provided only with the cautionary statements and were not shown the index values contained in the PSI.)
- Some participants (4-5) were confused by the difference between "extremely sensitive" and "sensitive." Many felt the word "extremely" could have been left off completely.
- Some participants (4-5) preferred "should limit" to "should consider limiting." Those same participants liked the phrase "should avoid," saying that it was comforting to know exactly what to do.
- Most participants generally felt that decisions concerning how much outdoor activity one does on high ozone days was a personal decision. Many reiterated the view that people are different and therefore their reactions to ozone will be different.

3. OZONE HEALTH EFFECTS BOOKLET

3.1 Summary of General Impressions of the Booklet

The facilitator asked participants the following questions to elicit their impressions of the booklet:

We want to gauge how helpful the booklet was in helping you understand the effects of ozone. How could it have done a better job?

Participants felt that the booklet did a good job, but could have offered more information. They wanted an expanded definition of smog; a discussion of air pollutants other than ozone; an explanation of why ozone is more dangerous in summer months as opposed to winter months; and direction on where to find more information.

Again, the issue of the elderly came up again during the discussion on the booklet, as it did during the discussion of the maps and health statements. Some participants (5-6) seemed to be bothered by a statement in the booklet that scientists have not found that there is any evidence to suggest that elderly or people with heart disease have heightened sensitivity. One participant added: *“It does say that elderly people will be at higher risk of ozone exposure if they suffer from it—it sort of contradicts itself.”*

Other comments included:

- *They could have put some tables in at the very end where they could describe the different kinds of activities that were “moderate.”*
- *It talked about ozone only. What about other air pollutants?*
- *They say ozone is a major ingredient of smog, but it doesn’t talk about the other ingredients of smog.*
- *They should put the elderly in the category of “people at risk.”*
- *I keep hearing on the radio or wherever they are talking about it [ozone] that one of the symptoms to know that you are being affected are stinging, watery eyes. It doesn’t say anything in there about how I can tell if I’m being affected by ozone.*
- *Playing tennis is very vigorous, and they have it listed as a “moderate” activity. They should get the opinions of people who do this stuff.*
- *The booklet doesn’t tell the reader where to find more information.*
- *It only talks about ozone problems in the summer months and neglects to mention ozone in other seasons, or give a reason why ozone is not a problem in other seasons. Is shoveling snow dangerous during the winter months because of ozone? What are the peak seasons for ozone?*

The facilitator then asked: *“In what ways did the booklet do a good job?”*

Overall, people had a very positive view of the booklet. Comments included:

- *Excellent booklet*
- *Good guidelines*
- *Overall it was good*
- *Overall it was informative*

3.2 Summary of Comments Regarding Understanding of the Health Effects of Ozone

To help assess the booklet's success in communicating information about the health effects of ozone, participants were asked the following questions:

- 1. *Who would agree with the following statement: The higher the ozone level, the more likely it is that people's health could be affected.***

All agreed.

- 2. *Who would agree with the following statement: The higher the ozone level, the more serious the health affects that ozone may cause.***

All agreed.

- 3. *The booklet talks about different things people can do to protect their health when ozone levels are high. What are some of those things?***

- *Workout indoors instead of outdoors*
- *Don't stay outside long*
- *Be aware if you are in one of the sensitive groups*

- 4. *Which groups are more sensitive to ozone than the general population?***

- Seven said "all children." Six said "active children."
- Eleven said the "elderly."
- Participants seemed more uncertain about "people with heart disease." Many participants (8-9) disagreed with a statement in the book which says there is no scientific evidence that people with heart disease have a higher sensitivity.
- All participants agreed that outdoor workers are at risk.
- One participant wanted to know more about indoor air quality and whether harmful ozone could get indoors.

3.3 Key Results

- Overall, people responded positively to the ozone health effects booklet. They thought it contained the right amount of information, was informative, well-organized, and easy to understand. One participant went so far as to say that she has a reading comprehension problem and yet was able to understand the booklet.
- Almost all of the participants felt the booklet should have included a table listing the activities considered moderate and vigorous to help people determine if they are doing too much outdoors on a given ozone day.
- Many participants (7-8) had a good understanding of the booklet's messages about what people can do to protect their health from ozone. However, after having read the booklet many participants (8-9) felt it is necessary to go indoors to protect yourself from ozone.
- Participants had a good understanding of groups that are sensitive to ozone. However, almost all participants believe the elderly are more sensitive to ozone than the general population as are people with other allergies and heart disease.
- Based on their reading of the booklet, the participants understood that the higher the ozone level, the more likely it is to affect their health and the more serious the health effects are likely to be.

APPENDIX C

REPORT OF THE HOUSTON FOCUS GROUP

The Houston focus group meeting was held on August 20, 1998 with members of the general public. Eleven individuals participated. Profiles of participants are contained in Appendix I.

1. OZONE MAPS

1.1 Summary of Comments on Map 1

After projecting Map 1 (with orange, red, and dark red labeled “unhealthy”), the facilitator asked the following question:

Here’s the first map. It shows different levels of air quality. As you look at the map, I’d like you to think about the following question: What does this map tell you?

Participants seemed to have a clear understanding of the map. They understood that the map shows different levels of air quality, and that air quality is unhealthy in areas shown in orange, red, and dark red, and more healthy in areas shown in yellow and green.

The facilitator then asked: “*What does the word ‘unhealthy’ mean to you?*” Participants offered a variety of responses, including:

- *Where there’s more pollution than normal*
- *Life-shortening*
- *Cancer*
- *High levels of lung disease*
- *Don’t go outside, because there’s too much air pollution*
- *Emphysema*
- *Chronic, long-lasting*

One participant remarked that it’s dangerous for people working outside in such areas who, after time, get so accustomed to pollution they are no longer aware of its presence and potential hazards. Another participant agreed with this comment.

The facilitator next asked: “*What does the word ‘moderate’ mean to you?*”

Participants’ responses included:

- *Not as dangerous, but it still affects your health*

- *May take years off your life*
- *It's not good, but it's still there*
- *May not be as much danger, but there may be some danger*
- *Could become unhealthy*
- *Could become good, so don't worry about it because it could change*

Then the facilitator asked: “What does the word ‘good’ mean to you?” Participants had the following responses:

- *Breathe all you want*
- *Clear skies*
- *Better quality of life; you can exercise more and be outside more than if you were in the unhealthy area*
- *Green makes it seem more healthy*
- *You would not be as concerned for your children, who can play outside*

1.2 Summary of Comments on Map 2

After displaying Map 2 (with orange labeled “unhealthy for sensitive groups,” red labeled “generally unhealthy,” and dark red labeled “very unhealthy”) the facilitator asked the following question:

Here's the second map that I'd like you to think about. In this map, the key has been changed to include more information. What does this new information tell you?

One participant said that the “unhealthy for sensitive groups” means people who may already have health problems and should stay out of that area. Three other participants added that “sensitive groups” may mean those with lung problems or allergies or the very young and very old.

Other participant responses included:

- *The map is more defined by scale. You can tell more about the groups.*
- *‘Generally unhealthy’ makes the range much larger compared to ‘very unhealthy’*
- *It's a better warning for those in sensitive groups who would not want to move to that area*

The facilitator then asked: “What does the term ‘very unhealthy’ mean to you?” Participants had the following responses:

- *You've got one foot in the grave*
- *It's time to move*

- *Stay inside the house*
- *There's a higher risk*

Next, the facilitator asked: “*What does the term ‘generally unhealthy’ mean to you?*” Participants, overall, thought this term was unclear. Responses included:

- *It's such a broad range that one day may be bad, and the next day could be worse, but it's not saying which day is which.*
- *There may be more days that are bad than are good.*
- *Who does ‘generally’ refer to?*
- *What’s ‘generally?’*
- *Just take ‘generally’ out and leave as ‘unhealthy.’*
- *Generally means ‘most of the time.’*

The facilitator then asked: “*How many prefer ‘unhealthy’ rather than ‘generally unhealthy’?*” Seven participants preferred “unhealthy.” One participant preferred “generally unhealthy” because it is helpful in communicating “on average.” Three participants were undecided.

The facilitator then asked: “*What does the term ‘unhealthy for sensitive groups’ mean to you?*”

- *Pre-existing conditions*
- *Senior citizens*
- *Young children*
- *Asthma patients*
- *Age groups like the very young or very old*

Three participants said “unhealthy for sensitive groups” means anyone with health problems.

1.3 Summary of Comments on Map 3

After displaying Map 3, which defines “sensitive groups” as “active children, outdoor workers, and people with respiratory disease, such as asthma,” the facilitator stated:

This is the third map that I’m going to ask you to think about. It’s the same as the last map that I showed you, except that it now includes some new information here at the bottom of the map. What does this new information tell you?

Two participants said that it talks about sensitive groups. Another said it refers to people with particular health problems or in particular age groups. Two other participants said that this map is more helpful because it is more defined.

Then the facilitator asked: *“Are there any surprises here about who the sensitive groups are?”*

One participant said: *“If you go from a building to your car, you’re O.K. But, if you work outside, you’re better to stay home.”* Another said that sensitive groups should include other people such as those with heart disease [he noted here that he works as a nurse], because these people are at higher risk than those with asthma. Another participant said it should include those with any type of lung disease.

The facilitator then asked: *“Is this new information is helpful?”*

Ten participants responded yes, while one said it could be better. One participant said that *“everybody should know who the sensitive groups are.”* This remark prompted another participant to say that it is difficult to list all groups of people that should be included in the “sensitive group,” and two other participants said that if you are a member of a “sensitive group” you’re probably aware of it.

1.4 Summary of Comments on Map 4

After displaying Map 4, which contains two different shades of yellow in the ‘moderate’ category, the facilitator asked the following question:

Here’s the fourth and final map I’d like you to think about. In this map, the “moderate” category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. What does this new information tell you?

All responding participants thought that the two levels were unnecessary, while two participants said it was unclear. Remarks included: *“You’re not giving us what the two colors mean.”* Another participant agreed with this. Another said *“I don’t know why you’d need that much information if it’s moderate. If it’s bad, then that’s what you should be worried about.”* Other remarks included:

- *You can do away with it.*
- *Maybe a lighter and a darker brown would be more useful, where it’s unhealthy.*
- *One moderate color is good enough.*

The facilitator then asked: *Is this new information helpful?*

Only two participants found the two shades of yellow to be helpful. One of the participants who thought it was helpful said *“More information is always helpful. Rather than going straight from healthy to unhealthy, another area gives some warning,”* and the other said that it helps to show you areas where there is no pollution.

1.5 Summary of Comments on Comparison of the Four Maps

The facilitator displayed the four maps side-by-side and asked participants: *Which of these maps does the best job communicating whether air quality is good or bad for your health?*

- No participants voted for Map 1
- One participant voted for Map 2
- Nine participants voted for Map 3
- One participant voted for Map 4

The facilitator then asked: “*Which of these maps do you prefer?*”

All participants preferred the map that they voted for previously. One participant, however, said that while she preferred the map she voted for previously, she thought Map 1 was good because it is simple and very clear about communicating dangerous levels.

1.6 Key Results

- **Map 1:** Participants seemed to have a clear understanding of the map. They understood that the map shows different levels of air quality, and that air quality is unhealthy in areas shown in orange, red, and dark red, and more healthy in areas shown in yellow and green.
- **Map 2:** Over half of the participants expressed concern about the term “generally unhealthy,” saying the term was unclear and vague. Only one participant indicated that he liked this term. The participants seemed to understand the types of people who would be included in “sensitive groups,” with two saying they would include the elderly.
- **Map 3:** Ten out of eleven participants found the definition of “sensitive groups” to be helpful and to provide clarity. Three participants thought that anyone in a sensitive group would be aware of his or her inclusion in such a group.
- **Map 4:** Nine out of eleven participants found the two shades of yellow to be unnecessary because they offer no useful information.
- **Side-by-side comparison of the four maps:** Nine out of eleven participants believed Map 3 does the best job communicating whether air quality is good or bad for people’s health.

2. PSI SUB-INDEX CAUTIONARY STATEMENTS

2.1 Summary of Comments on the Single “Moderate” Statement

To begin the discussion of the first cautionary statement, the facilitator stated: *“Now I’m going to read the health statements associated with some of the colors shown on the map. For folks living in the areas colored in yellow, the following information applies: **When air quality is in the upper end of this range, extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.**”*

The facilitator first asked: *“What does ‘extremely sensitive children and adults’ mean to you?”*

There was a wide range of responses to this question, reflecting several different interpretations and some confusion. At the outset of the discussion, one participant said the phrase means *“someone with lung disease or respiratory disease,”* while another said it refers to those with more allergies.

One participant remarked that the phrase is unclear because of the modifier “sensitive.” He pointed out that it could refer to children only or to both children and adults. Another participant said that “extremely” referred to children and adults, and that this phrase means those with very serious health problems who should not be outdoors for a long time. Yet another participant questioned the distinction between children and adults, saying that it should just say “individuals.” Another participant said that the distinction is more specific and is needed; another participant agreed with this view.

Two participants found this health statement to be particularly confusing. One participant said it was contradictory. The word “extremely” caused her to think that this phrase should be associated with the other end of the spectrum, i.e., the unhealthy levels. This participant said that if the level was in this upper area, *“they shouldn’t have extreme concern.”* One other participant agreed with this point.

Another participant said that “extremely sensitive” suggests a person’s emotional state (i.e., at this level *“their feelings could be hurt”*). This participant said the wording could be clarified by including something about illness or disease. Two other participants agreed with this. Finally, one participant remarked that, in the moderate level, anyone should take precautions, not just extremely sensitive groups. Another participant said that “extremely” is not needed because it adds no additional meaning.

The facilitator then stated: *“Imagine that you are an extremely sensitive adult and ozone levels in your area are at this level. The statement tells you that you ‘should consider limiting prolonged, moderate exertion outdoors’.”* The facilitator asked: *“What does ‘consider limiting prolonged, moderate exertion outdoors’ mean to you?”*

Participants had the following responses:

- *Walking in the park*
- *Exercising*
- *Bicycling*
- *Running*
- *Children staying outdoors all day*
- *Walking*

The facilitator followed with another question: “*What does ‘prolonged’ mean to you?*”

Only two participants had responses to this question. One said it could mean cutting the grass, while another said “*It won’t take long for you to become exerted.*”

2.2 Summary of Comments on the Dual “Moderate” Statement

To begin the discussion of this cautionary statement, the facilitator projected Map 4 and stated: “*Now I’m going to show you a different map. We’ve seen it before. In this map, the ‘moderate’ category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. For folks living in the areas covered by the lighter shade of yellow, there is no health statement. For folks living in the areas covered by the darker shade of yellow, the following health statement applies: **Extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.***” The facilitator then asked: “*Is this clearer than the previous version you saw, in which there was a single shade of yellow and a single health statement?*”

At this point, one participant commented that “*If the light yellow has no health statement, then why isn’t it green?*” Three participants agreed with this comment, with one saying that the light yellow isn’t needed because it would not cause him to take any precaution anyway.

Another participant asked “*Why put green before light yellow?*” He added that, following the color spectrum, the yellow range would represent healthier levels than the relatively darker green. Three other participants responded to this view by saying that, for them, the colors make sense because green represents a healthy environment.

2.3 Summary of Comments on the “Unhealthy for Sensitive Groups” Statement

To begin the discussion, the facilitator stated: “*Now we’re going to talk about the health statement that is associated with air quality in the areas shaded in orange. For folks living in these areas,*

the following information applies: Sensitive children and adults and people with respiratory disease, such as asthma, should limit prolonged moderate exertion outdoors.” The facilitator then asked: “What does ‘sensitive children and adults and people with respiratory disease, such as asthma’ mean to you?”

Two participants commented that, for them, the word “extremely” belongs with the worse level of air quality. Yet another participant questioned why “extremely sensitive” groups would not be included in this “*more cautious area.*” Three participants then helped to clarify the context, understanding that “sensitive” groups expanded the number of people who could be potentially affected at the moderate level. One participant said that the statement is “*straightforward and plain and simple,*” and another participant then said that the statement was very clear to her.

The facilitator then asked: “*Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would ‘should limit prolonged, moderate exertion outdoors’ mean to you?*”

- *Get into your car with air conditioning.*
- *Don’t stay outside, and limit your activity.*
- *Don’t stay outside for long periods of time.*
- *If you run two miles a day, you should only run 1 mile a day. You should cut your activity in half.*

One participant asked “*What should people do who are outside this sensitive group?*” Two other participants agreed that this was a good point. Another participant said that “*preventative measures are always necessary.*” Four people thought that everyone should be included in the health statement for this level, because eventually this quality of air could harm you.

2.4 Summary of Comments on the “Generally Unhealthy” Statement

To begin the discussion, the facilitator stated: “*For folks living in the areas colored in red, the following information applies: Sensitive children and adults and people with respiratory disease, such as asthma, should avoid moderate exertion outdoors; everyone else, especially children, should limit prolonged, moderate exertion outdoors.*” The facilitator then asked: “*Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would the statement ‘should avoid moderate exertion outdoors’ mean to you?*”

Participants responses included:

- *Leave exercise out all together.*
- *Don’t do it.*

- *Shouldn't go outside.*
- *Stay inside.*
- *You can walk to your car.*
- *Don't do more than you have to.*
- *Don't do what you normally do, like walking around the block.*

At this point, one participant said that the elderly should be mentioned in the “everyone else” group, and three other participants agreed with this comment. Four or five participants thought that the statement was too lengthy. One other participant said that this group “*should avoid any activity outdoors.*” Two others agreed with this comment.

Nearly all the participants were confused by the term “sensitive children and adults and people with respiratory disease.” One participant said that the group should be defined as “*any sensitive person with respiratory disease,*” replacing children, adults and people. Another remarked that children and adults are people. It appears that some people interpret the health statement to mean “sensitive children and *all* adults, rather than “sensitive children and sensitive adults.” Another remarked that in the red level, anyone with “*any health challenges*” should avoid activity.

The facilitator then asked participants: “*What would “should limit prolonged moderate exertion” mean to you?*” Responses included:

- *It's O.K. to do it, but limit yourself.*
- *Don't let your children play outside for too long, maybe for 30 minutes at a time.*

The facilitator then pointed out that the health statement refers to “children” twice and asked participants if the differences were clear to them and if they understood why the word “children” appears twice.

One participant stated that “*The first part refers to sensitive children, while the second part refers to children and playing, and how long they can stay out and play.*” Another participant remarked that the first reference means children with health problems. All other participants agreed with this comment.

The facilitator then asked: “*Are any of these statements telling you that you need to go inside to protect your health?*” No one said that the statements said outright that you need to go inside. However, one participant remarked that the need to go indoors is implied. One other participant commented that “*But there's the question of the air quality indoors.*”

2.5 Summary of Comments on the Title of PSI Sub-Index Table

The facilitator showed participants a modified version of the PSI Sub-Index for ozone, in which the table was modified to include three columns only: Index Values, Descriptor, and Cautionary Statement. (To avoid confusing participants, the Ozone Health Effects column was removed because it contains information that had not been introduced at that point in the discussion.) Participants were asked which title they preferred for the table: “Pollutant Standards Index” or “Air Quality Index.”

Only one participant voted for PSI. The other 10 preferred AQI. Their comments included:

- *PSI gets my attention more as a health risk; and it's more realistic.*
- *AQI includes pollution, so it covers more.*
- *Air quality gets my attention more.*
- *Air quality is better because it says what the objective should be-What my goal is.*
- *PSI makes it seem like there is pollution all the time.*

2.6 Key Results

- Some participants were confused by the difference between “extremely sensitive” and “sensitive.” Some individuals commented that “extremely sensitive” seems more alarming to them than “sensitive,” and it seemed to them that “extremely” should be contained in the “unhealthy for sensitive groups” health statement rather than in the “moderate” statement.
- There was a general understanding of “*limiting prolonged, moderate exertion outdoors.*” Participants listed walking in the park, exercising, bicycling, running, and children playing outdoors all day.
- Several people found the dual shades of yellow to be confusing. Four participants thought that the first lighter yellow range without any health statement was unnecessary since it provided no new information.
- Four participants thought that the “generally unhealthy” statement should specify the elderly rather than “everyone else.” Five participants thought that this health statement was too lengthy.
- Some participants interpreted the phrase “sensitive children and adults” to mean “sensitive children and all adults” rather than “sensitive children and sensitive adults.”
- All participants understood the distinction between the two groups of children in the “generally unhealthy” statement.

- Ten out of eleven participants preferred the title “Air Quality Index” to “Pollutant Standards Index.”

3. OZONE HEALTH EFFECTS BOOKLET

3.1 Summary of General Impressions of the Booklet

The facilitator asked participants the following questions to elicit their impressions of the booklet:

We want to gauge how helpful the booklet was in helping you understand the effects of ozone. What kind of a job did it do in helping you understand the effects of ozone?

Participants' responses included:

- *It created awareness.*
- *It gave new information on sensitive groups, who I thought were unhealthy people; but this explained that it meant active people who spend time outdoors.*
- *Very educational.*
- *Great job!*

Are there any ways that the booklet could have done a better job in presenting the information?

One participant said that he did not like the first sentence in the section: "Should I be concerned about ozone exposure?" He said that it should be more precise, because "*no one is untouchable.*"

3.2 Summary of Comments Regarding Understanding of the Health Effects of Ozone

To help assess the booklet's success in communicating information about the health effects of ozone, participants were asked the following questions:

Who would agree with the following statement: The higher the ozone level, the more likely it is that people's health could be affected.

All agreed.

Who would agree with the following statement: The higher the ozone level, the more serious the health affects that ozone may cause.

All agreed.

The booklet talks about different things people can do to protect their health when ozone levels are high. What are some of those things?

- *Limit activity.*
- *Consider indoor activity.*
- *There are several things that result in exertion, that I hadn't thought of before.*

Which groups are more sensitive to ozone than the general population?

- Ten out of 11 participants said “all children.” All participants said “active children.”
- Eight out of 11 said the “elderly.” Two said the elderly are not more sensitive, and one was not sure.
- Six out of 11 participants thought that “people with heart disease” are more sensitive. Two thought they are not, and three were unsure.
- All participants believed that outdoor workers are at risk.

3.3 Key Results

- Overall, participants responded positively to the ozone health effects booklet. They commented that it helped build awareness and was interesting and educational.
- All participants understood that the higher the ozone level, the more likely it is that people's health could be affected. All participants also understood that ozone levels affect the seriousness of health effects.
- Based on their reading of the booklet, participants had a good understanding of actions people can take to protect their health from ozone.
- Based on their reading of the booklet, 10 of the 11 participants said “all children” are more sensitive to ozone, and all 11 said “active children” are more sensitive to ozone. Eight thought the “elderly” are more sensitive to ozone than the general population, while six participants thought that “people with heart disease” are more sensitive. All participants thought that outdoor workers are at risk.

APPENDIX D REPORT OF THE SAN BERNARDINO FOCUS GROUP

The San Bernardino focus group meeting was held on August 25, 1998 with members of the general public. Twelve individuals participated. Profiles of participants are contained in Appendix I.

1. OZONE MAPS

1.1 Summary of Comments on Map 1

After projecting Map 1 (with orange, red, and dark red labeled “unhealthy”), the facilitator asked the following question:

Here’s the first map. It shows different levels of air quality. As you look at the map, I’d like you to think about the following question: What does this map tell you?

Participants seemed to have a clear understanding of the map. They were able to identify the problem areas (depicted in orange, red, and dark red) as well as the areas where air quality is considered “moderate” and “good” (yellow and green areas).

The facilitator first asked: “*What does the word ‘unhealthy’ mean to you?*”

One participant noted that the word “unhealthy” is used in the map’s legend to describe three different categories without differentiating between them and suggested having each color defined for greater clarity. All of the participants agreed. Comments included:

- *The air can be irritating to certain people.*
- *Air quality is troublesome to old and young people.*
- *You wouldn’t want to go outdoors and exercise.*
- *You wouldn’t live very long if you lived in an environment where the air quality was “unhealthy” all your life.*

The facilitator then asked: “*What does the word ‘moderate’ mean to you?*”

The participants had similar understandings of the word “moderate”:

- *Not the best air, but better than “unhealthy.”*
- *It’s an in-between classification.*
- *If you weren’t sensitive, you wouldn’t have any particular reaction to it.*
- *It’s average air.*

- *A healthy person would not be affected.*
- *It wouldn't cause problems for healthy people.*

The facilitator then asked: “*What does the word ‘good’ mean to you?*”

Participants had the following responses:

- *You'd want to live in those areas.*
- *You could do outdoor activities without fear.*
- *It's allergy-free air quality.*
- *Pollution is not a factor in those areas.*

1.2 Summary of Comments on Map 2

After displaying Map 2 (with orange labeled “unhealthy for sensitive groups,” red labeled “generally unhealthy,” and dark red labeled “very unhealthy”), the facilitator asked the following question:

Here's the second map that I'd like you to think about. In this map, the key has been changed to include more information. What does this new information tell you?

All of the participants preferred Map 2 to Map 1, primarily because it contains more detail. “*Each color has its own explanation,*” said one participant. Other comments included:

- *It gives you more information about the shaded areas and about who should and shouldn't go outside where.*
- *It depends on what kind of group you're in.*
- *I like this map better because it's more explanatory.*
- *The map is more specific.*

The facilitator then asked: “*What does the phrase ‘unhealthy for sensitive groups’ mean to you?*”

Participants understood this term in the following ways:

- *People with asthma or bronchial problems would be more sensitive to the air.*
- *Elderly and children would have problems.*
- *Heart patients.*
- *People with respiratory problems.*
- *People with skin-related problem.*

The facilitator then asked: “*What does ‘very unhealthy’ mean to you?*”

Comments included:

- *Stay in the house.*
- *Move to another area.*
- *I'm even concerned about being inside. Why is the air inside any better than the air outside?*
- *What are the effects? There is not enough information? What will happen? They should explain more.*

The facilitator next asked: “*What does the term ‘generally unhealthy’ mean to you?*”

About 8 participants felt that this means that air is unhealthy for the general population. One participant felt that all of the terms used in the legend represent some kind of exposure rate: “*‘Generally unhealthy’ doesn’t necessarily mean you can’t go outside, but if you do go outside you should stay out only a short period of time because you don’t want to be exposed to those kind of air conditions for too long.*”

Other comments included:

- *It’s unhealthy everyday for everyone, for the general population.*
- *I’d like to have the legend flipped upside down, so that it starts at “good” and goes down to “very unhealthy.”*

1.3 Summary of Comments on Map 3

After displaying Map 3, which defines “sensitive groups” as “active children, outdoor workers, and people with respiratory disease, such as asthma,” the facilitator stated:

This is the third map that I’m going to ask you to think about tonight. It’s the same as the last map that I showed you, except that it now includes some new information here at the bottom of the map. What does this new information tell you?

Most of the participants (9-11) preferred this map to the previous two. Comments included:

- *It gives me more information to decide whether or not I should be outside.*
- *That statement applies to three of the categories: “generally unhealthy,” “very unhealthy” and “unhealthy for sensitive groups.”*
- *If I were included in the sensitive group, which actually I am, I would consider relocating.*

The facilitator then asked: “*Were you surprised by the kinds of people included in the definition for ‘sensitive groups’?*”

Some of the participants (4-5) said they were not surprised and believed people would know if they were in a sensitive group or not. A few (3-4) were surprised to find outdoor workers included in the definition.

Some participants (4-5) said they would be more interested in knowing how long they could stay outdoors and still be safe, as opposed to reading a general warning about “sensitive groups.” Others added that giving information on which times of day have the highest ozone potential would also be useful.

Other comments included:

- *I assume that if you were in one of those groups, you’d know that.*
- *I wouldn’t consider an “outdoor worker” to be in a sensitive group if they didn’t have a health problem. If you had a respiratory disease, you probably couldn’t handle outdoor work.*
- *I would rather see time frames for these ‘unhealthy’ zones.*
- *If you’re in that group, you’d know what time to go out.*

The facilitator then asked: “*Were you surprised to see ‘active children’ included in the definition of ‘sensitive groups’?*”

The reaction to this question was mixed:

- *All children are active.*
- *I don’t think ozone affects children as much as it does middle-aged or older people.*
- *No, because children’s lung are still developing.*
- *They can develop respiratory problems by being exposed to smog.*

The facilitator then asked: “*Is this new information helpful?*”

All 12 participants agreed that the new information was helpful.

1.4 Summary of Comments on Map 4

After displaying Map 4, which contains two different shades of yellow in the “moderate” category, the facilitator asked the following question:

Here's the fourth and final map I'd like you to think about. In this map, the "moderate" category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow.

The facilitator then asked: *"What does this new information tell you?"*

Many participants were uncomfortable to find that the newly added lighter yellow was not included in the map's key. Most (9-11) felt the addition of a second shade of yellow made the map less clear instead of more clear. One stated: *"If you hadn't called it to our attention that there are two shades of yellow here, it would have just escaped me. I would have figured it was poor coloring."* Other comments included:

- *It's more confusing.*
- *What does the different yellow stand for?*
- *We're supposed to assume by looking at it that the darker yellow is obviously more unhealthy, but when you're watching the news and making dinner, you don't have time to ask those questions. If you want us to know something, put it up there.*
- *An explanation is missing.*
- *It's too much information, and at the same time not enough.*
- *There's too much information to explain.*
- *People like simplicity.*
- *The problem is not that there is too much information on the map, it's that there is not enough information in the legend.*
- *Take it off.*

The facilitator then asked: *"Is this new information helpful?"*

Nine participants felt that the new information was *not* helpful. The remaining three felt that it is important to know what kind of air quality you have in your area, and thus would welcome the different shades of yellow if the legend explained what the two colors say about air quality.

1.5 Summary of Comments on Comparison of the Four Maps

The facilitator displayed the four maps side-by-side and asked participants: *"Which of these maps does the best job communicating whether air quality is good or bad for your health?"*

- Two participants voted for Map 1
- Two participants voted for Map 2
- Eight participants voted for Map 3
- No participants voted for Map 4

One of the participants who voted for Map 1 said that *“for the average person it gives a good scale and not much explanation.”* The other Map 1 proponent suggested using a scale that goes from “good” to “bad” ozone levels to make it even more simple to understand.

The facilitator then asked: *“Which map do you prefer?”*

- Three participants voted for Map 1
- One participant voted for Map 2
- Eight participants voted for Map 3
- One participant voted for Map 4

The facilitator then asked participants who voted for two different maps to explain their changes in map preference:

Map 1: *“It’s easier to look at a glance”; “The scale is easier to read.”*

Map 2: *“Gives more detail.”*

Map 3: *“It alerts sensitive groups”; “It’s more informative.”*

Map 4: *“It gives more information for the person interested in really studying air pollution and its effects.”*

1.6 Key Results

- **Map 1:** Participants seemed to have a clear understanding of the map’s meaning.
- **Map 2:** The participants liked this map because it offered more information than the first. Some even suggested using the first map for its simplicity and adding to it the additional information on sensitive groups.
- **Map 3:** Most participants (9-11) found the definition of “sensitive groups” to be very helpful and provide clarity. Overall, this seems to have been the clearest map, although 3 or 4 said they would prefer a scale that read horizontally rather than vertically.
- **Map 4:** All 12 participants expressed concern about this map, mainly because it includes a color (light yellow) that is not delineated in the key. While most said it was too detailed, they explained that it is also not detailed enough (referring to the omission of the light yellow

definition) and if the two shades of yellow were distinguished in the key, they might be more comfortable with it.

- **Side-by-side comparison of the four maps:** Most participants (8) felt that Map 3 did the best job communicating whether air quality is good or bad for people's health.

2. PSI SUB-INDEX CAUTIONARY STATEMENTS

2.1 Summary of Comments on the Single “Moderate” Statement

To begin the discussion of the first cautionary statement, the facilitator stated: *“Now I’m going to read the health statements associated with some of the colors shown on the map. For folks living in the areas colored in yellow, the following information applies: **When air quality is in the upper end of this range, extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.**”*

The facilitator first asked: *“What does ‘extremely sensitive children and adults’ mean to you?”*

One participant said the statement referred to *“people who are asthmatic or have respiratory problems,”* and the other participants agreed.

The facilitator then asked: *“Imagine that you are an extremely sensitive adult. You hear this statement and it tells you that you ‘should consider limiting prolonged, moderate exertion outdoors to protect your health.’ What does ‘consider limiting prolonged, moderate exertion outdoors’ mean to you?”*

One participant was troubled to see the words “prolonged” and “moderate” used back-to-back, feeling that they contradicted each other. Three other participants agreed. Three or four others felt that the two words describe two different things, with “prolonged” referring to duration and exposure and “moderate” referring to intensity of activity. Four or five people felt that the use of the word “moderate” is unnecessary. Other comments included:

- *Stay inside.*
- *If you don’t have to go outside, don’t unless it’s an emergency situation.*
- *“Prolonged moderate exertion” is different for everyone.*
- *Avoid outdoor activities like yard work.*
- *The phrase is wordy; I would take out ‘moderate.’*

2.2 Summary of Comments on the Dual “Moderate” Statement

To begin the discussion of this cautionary statement, the facilitator projected Map 4 and stated: *“Now I’m going to show you a different map. We’ve seen it before. In this map, the ‘moderate’ category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. For folks living in the areas covered by the lighter shade of yellow, there is no health statement. For folks living in the areas covered by the darker*

*shade of yellow, the following health statement applies: **Extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.***

The facilitator then asked: *“Is this clearer than the previous version you saw, in which there was a single shade of yellow and a single health statement?”*

Most participants (7-8) felt that this statement is less clear than the first:

- *It leaves you hanging.*
- *It’s pointless.*
- *The health statement should be used for both yellows.*
- *Why did they include the light yellow if they don’t give you any information? Are we supposed to ask questions about it?*

2.3 Summary of Comments on the “Unhealthy for Sensitive Groups” Statement

To begin the discussion, the facilitator stated: *“Now we’re going to talk about the health statement that is associated with air quality in the areas shaded in orange. For folks living in these areas, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should limit prolonged moderate exertion outdoors.**”*

The facilitator then asked: *“What does ‘sensitive children and adults and people with respiratory disease, such as asthma’ mean to you?”*

While most of the participants (9) found this new information useful, three found it frustrating and said they would rather have it explained simply by calling the group “sensitive people” instead of “sensitive children and adults.” Other responses included:

- *This is too much. It’s getting me crazy.*
- *That’s why I picked the first map—it’s simpler.*
- *Sensitive people know their limitations.*

The facilitator then asked: *“Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would ‘should limit prolonged, moderate exertion outdoors’ mean to you?”*

Some participants (4-5) read this statement as a strong warning, while others said it could be interpreted a number of ways:

- *You can’t even take a walk.*

- *It depends, because there are so many different variables.*
- *Each person knows their abilities.*

2.4 Summary of Comments on the “Generally Unhealthy” Statement

To begin the discussion, the facilitator stated: *“For folks living in the areas colored in red, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should avoid moderate exertion outdoors; everyone else, especially children, should limit prolonged, moderate exertion outdoors.**”*

The facilitator then asked: *“Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What does the statement ‘sensitive children and adults and people with respiratory problems’ mean to you?”*

There appeared to be some confusion concerning the definition of “sensitive.” Comments included:

- *What does ‘sensitive’ mean? I thought sensitive people were people with asthma, but if they use people with respiratory disease as an example, that must mean there are other types of sensitive people.*
- *It’s as if everyone should limit their activities.*
- *Where do I fit in here?*

The facilitator then asked: *“What does ‘should avoid moderate exertion outdoors’ mean to you?”* One participant stated: *“To avoid something is to stay away from it.”* Others agreed.

The facilitator then pointed out that the health statement refers to “children” twice and asked participants if the differences were clear to them and if they understood why the word “children” appears twice. Comments included:

- *First part is talking about sensitive children, whereas the second part is talking about normal children.*
- *Average children should limit their time outside.*

2.5 Key Results

- A number of participants (7-8) were troubled by the fact that no health statement accompanies the areas of the map colored light yellow. Some wondered why the light yellow areas weren’t just shown in green.

- Throughout the discussion, several participants (4-5) commented that they would like the health statements to contain more information, such as a more complete listing of what types of people would fall under the category of “sensitive groups.” About five of the participants said they felt they had to guess which group they fell into.

3. OZONE HEALTH EFFECTS BOOKLET

3.1 Summary of General Impressions of the Booklet

The facilitator asked participants the following questions to elicit their impressions of the booklet:

We want to gauge how helpful the booklet was in helping you understand the effects of ozone. How could it have done a better job?

Comments included:

- *It could have been better organized.*
- *I don't understand the measure "ppm."*
- *I was confused between the two different types of ozone, ground-level and stratospheric. I would like that to be better explained.*
- *What is an "average person"? How do they become sensitive?*

The facilitator then asked: *"In what ways did the booklet do a good job?"* Comments included:

- *Well written*
- *Clear*
- *I learned a lot*
- *Very informative*
- *This is more than I ever knew*

3.2 Summary of Comments Regarding Understanding of the Health Effects of Ozone

To help assess the booklet's success in communicating information about the health effects of ozone, participants were asked the following questions:

Who would agree with the following statement: The higher the ozone level, the more likely it is that people's health could be affected.

All agreed.

Who would agree with the following statement: The higher the ozone level, the more serious the health affects that ozone may cause.

Eleven agreed. One disagreed, saying *"it sounds like everyone could be affected."*

The booklet talks about different things people can do to protect their health when ozone levels are high. What are some of those things?

- *Avoid outdoor activities.*
- *Limit outdoor activities.*
- *Stay inside.*
- *Take short breaths.*

Which groups are more sensitive to ozone than the general population?

- Nine participants said “all children.” All 12 said “active children.”
- Four said the “elderly.”
- No participants said that “people with heart disease.”
- All 12 said “outdoor workers” were at risk.

3.3 Key Results

- Overall, people responded positively to the ozone health effects booklet. They thought it contained useful information, commenting that it is informative, well-organized, and easy to understand.
- Almost all of the participants (9-11) felt the booklet should have included a table listing the activities considered moderate and vigorous to help people determine if they are doing too much outdoors on a given ozone day.
- Many participants (7-8) had a good understanding of the booklet’s messages about what people can do to protect their health from ozone.
- Participants had a good understanding of groups that are sensitive to ozone. Interestingly enough, while four or five of the participants early on in the discussion rejected the idea that outdoor workers were more at risk than the average person, all 12 believed this to be true after reading the booklet.

APPENDIX E

REPORT OF THE ST. LOUIS FOCUS GROUP

The St. Louis focus group meeting was held on August 26, 1998 with members of the general public. Twelve individuals participated. Profiles of participants are contained in Appendix I.

1. OZONE MAPS

1.1 Summary of Comments on Map 1

After projecting Map 1 (with orange, red, and dark red labeled “unhealthy”), the facilitator asked the following question:

Here’s the first map. It shows different levels of air quality. As you look at the map, I’d like you to think about the following question: What does this map tell you?

Participants seemed to have a clear understanding of the map. They were able to identify the problem areas (depicted in orange, red, and dark red) as well as the areas where air quality was considered “moderate” and “good” (yellow and green areas).

The facilitator then asked: “*What does the word ‘unhealthy’ mean to you?*”

One participant noted that the word “unhealthy” is used in the map’s legend to describe three different categories without differentiating between them and suggested having each color defined for greater clarity. All of the participants agreed. Other comments included:

- *It’s bad for you.*
- *Hard to breathe.*
- *Stay inside.*
- *It’s a very soft word. To me that looks worse than unhealthy. “Unhealthy” isn’t a strong enough word for what the map is showing.*
- *They need to divide up those shades of brown and use a stronger word as they get to the farther end of that spectrum.*
- *There are two rankings here. One identifies each color, the “good” and the “moderate,” while all the rest are just lumped into “unhealthy.”*

The facilitator next asked: “*What does the word ‘moderate’ mean to you?*”

The participants all had similar understandings of the word “moderate”:

- *An acceptable amount.*
- *Moderate what you do.*
- *Be watchful, wait to see which way it is going to go—good or bad.*

The facilitator then asked: “*What does the word ‘good’ mean to you?*”

Participants had the following responses:

- *Clean environment.*
- *Healthy.*
- *The color green for “good” means that everything is just fine.*
- *That’s where air quality is supposed to be at all times.*

1.2 Summary of Comments on Map 2

After displaying Map 2 (with orange labeled “unhealthy for sensitive groups,” red labeled “generally unhealthy,” and dark red labeled “very unhealthy”) the facilitator asked the following question:

Here’s the second map that I’d like you to think about. In this map, the key has been changed to include more information. What does this new information tell you?

About five participants preferred the first map for its simplicity. They described Map 2 as becoming too detailed. Comments included:

- *Map 2 is a better map.*
- *Map 2 is more specific.*
- *Gives more information to people who have respiratory problems.*
- *I think it’s too wordy, even though I was asking for the first map to be more specific.*
- *It uses a color coding similar to USA Today’s weather page. You could do a more detailed analysis in print, but for a TV spot it should be more simple.*

The facilitator then asked: “*What does ‘very unhealthy’ mean to you?*”

- *Alert*
- *Caution*
- *Bad*
- *Red alert*

The facilitator then asked: “What does ‘generally unhealthy’ mean to you?” For the most part, the participants did not like the use of the word “generally.” One said it was “too vague.” Other comments included:

- *“Generally unhealthy” and “unhealthy for sensitive groups” are basically the same.*
- *It doesn’t mean anything.*
- *I think there should be only three degrees on the scale: good, moderate, and red alert.*

The facilitator then asked: “What does the term ‘unhealthy for sensitive groups’ mean to you?” Participants understood this term in the following ways:

- *People who are impacted by pollution.*
- *If you are asthmatic you need to pay attention.*
- *Depends on who you are, whether or not you pay attention to air quality.*
- *There are different degrees of “sensitive groups.” For instance the elderly are going to be impacted differently than asthmatic people.*

1.3 Summary of Comments on Map 3

After displaying Map 3, which defines “sensitive groups” as “active children, outdoor workers, and people with respiratory disease, such as asthma,” the facilitator stated:

This is the third map that I’m going to ask you to think about tonight. It’s the same as the last map that I showed you, except that it now includes some new information here at the bottom of the map. What does this new information tell you?

Comments included:

- *It gives me more information for your sensitive groups, but it can still be reduced to three categories: good, moderate, and red alert.*
- *I work outdoors everyday, and I don’t think that makes me a member of a “sensitive group.”*
- *How does OSHA come into play here? If you work outdoors but it’s a hazardous ozone day, would you be forced to work under those conditions?*
- *If there was a red alert day, the company with employees working outdoors wouldn’t shut down because the quality of the air is bad.*
- *This gives a definition for “unhealthy,” but what does it do to the “very unhealthy” group? Now I want to know more.*

The facilitator then asked: “*Were any of you surprised by the kinds of people included in the definition of ‘sensitive groups’?*”

Four or five of the participants were alarmed that outdoor workers are included in the definition of sensitive groups. One participant said that he works outdoors for a living, as did another participant’s spouse, and the two felt that they were powerless to protect their health or the health of a family member, because “*the company is not going to shut down just because it is a red alert day.*” Other participants (2-3) wondered aloud if the Occupational Health and Safety Administration (OSHA) considered air quality a workplace condition for outdoor workers.

1.4 Summary of Comments on Map 4

After displaying Map 4, which contains two different shades of yellow in the “moderate” category, the facilitator asked the following question:

Here’s the fourth and final map I’d like you to think about. In this map, the “moderate” category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. What does this new information tell you?

All 12 participants were uncomfortable with the newly added lighter shade of yellow because it was not present in the color key. They felt it made the map more confusing rather than more clear. Comments included:

- *It tells you nothing.*
- *It’s not helpful.*
- *What is that lighter yellow? Between good and moderate?*
- *Now I don’t know which way moderate goes.*
- *There’s no information, no data.*
- *It is too easily misinterpreted.*
- *This new information leaves you guessing.*
- *It just isn’t clear*

The facilitator then asked: “*Is this new information helpful?*”

All 12 participants responded that the new information is not helpful.

The facilitator then asked: “*What do you think about the definition of ‘sensitive groups’ that has been included on this map and the one before it? Is that definition helpful information?*”

Responses varied:

- *I’m surprised that the word elderly is not there.*
- *To put “active” and “children” as two words together seems silly. What child is not active?*
- *If a child is just out in the backyard playing, is that different than a child playing on an organized team?*
- *It’s too broad—by children you can be referring to anyone between a newborn to a 16-year-old.*
- *When I think of “sensitive groups” I think of people with respiratory disease. I didn’t really think that outdoor workers and children could be included in that group.*
- *I don’t see how outdoor workers can be in the sensitive group. If you are an outdoor worker, you must be in pretty good health.*

- *I think this definition is referring to a period of time. It's the length of time that you're outside that is unhealthy.*

1.5 Summary of Comments on Comparison of the Four Maps

The facilitator displayed the four maps side-by-side and asked participants: “*Which of these maps does the best job communicating whether air quality is good or bad for your health?*”

- Three participants voted for Map 1
- Four participants voted for Map 2
- Three participants voted for Map 3
- No participants voted for Map 4
- Two participants expressed a “don’t know” vote.

The facilitator then asked: “*Which map do you prefer?*”

- Four participants voted for Map 1
- Four participant voted for Map 2
- Four participants voted for Map 3
- No participants voted for Map 4

The facilitator then asked participants who voted for two different maps to explain their changes in map preference:

Map 1: “*I liked this map because I like reading the scale from left to right. But I do like the explanations given on Map 2.*”

Map 3: “*I preferred Map 3 because it delineated what impact the air quality impact had on me. I liked Map 1 because it was easier to read. If you combined Map 1 with some kind of an explanation of what unhealthy meant, that would be better.*”

1.6 Key Results

- **Map 1:** Participants seemed to have a clear understanding of the map’s meaning.
- **Map 2:** Many participants preferred Map 2 because it offers more information than Map 1.
- **Map 3:** Most participants found the definition of “sensitive groups” to be very helpful and provide clarity. Overall, participants found this to be the clearest map, although three or four participants said they would prefer a scale that read horizontally rather than vertically.

- **Map 4:** All participants expressed concern about this map, mainly because it includes a color (light yellow) that is not delineated in the key. Two shades of yellow seemed to be more confusing to the participants than clarifying.
- **Side-by-side comparison of the four maps:** In this group, map preferences were evenly split between the first three maps, with no one voting for Map 4. Most participants felt that Map 3 does the best job communicating whether air quality is good or bad for people's health.

Other Comments:

- Many participants (4-5) felt the maps should be simplified to three health categories only: good, moderate and unhealthy. This theme was repeated by various participants throughout the map viewing portion of the focus group.
- One participant suggested titling the maps to help readers understand them better: *“If it said ‘Air Quality’ or ‘Health Alert’ or ‘Regional Conditions’ that might influence how you approached the information.”*
- Many participants (5-6) in St. Louis were troubled to find that the elderly are not included in the definition of sensitive groups.
- Many participants (6-7) were concerned to see “outdoor workers” included in the definition of sensitive groups. While two participants felt they should not be included at all, the others expressed concern that outdoor workers, unlike the other members in the “sensitive group” category, have very little control over their level and duration of exposure on unhealthy ozone days.

2. PSI SUB-INDEX CAUTIONARY STATEMENTS

2.1 Summary of Comments on the Single “Moderate” Statement

To begin the discussion of the first cautionary statement, the facilitator stated: *“Now I’m going to read the health statements associated with some of the colors shown on the map. For folks living in the areas colored in yellow, the following information applies: **When air quality is in the upper end of this range, extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.**”*

The facilitator first asked: *“What does ‘extremely sensitive children and adults’ mean to you?”* One participant said *“it refers to people with asthma or chronic breathing problems”* and the others agreed.

The facilitator then asked: *“Imagine that you are an extremely sensitive adult. You hear this statement and it tells you that you ‘should consider limiting prolonged, moderate exertion outdoors to protect your health.’ What does ‘consider limiting prolonged, moderate exertion outdoors’ mean to you?”*

Participants had the following responses:

- *You may have to reorganize your schedule.*
- *Stay inside.*
- *Limit your period of exposure outside.*
- *“Prolonged” and “moderate” are contradictory. I view “prolonged exertion” as different from “moderate exertion.”*
- *I think “prolonged” is referring to the length of time, while “moderate” is referring to the intensity of the exertion.*
- *Extremely sensitive people know their limits, so it depends on the individual.*

The facilitator then asked: *“What does ‘moderate exertion’ mean to you?”*

- *Walking.*
- *Gardening.*
- *It depends on the person. Each person has to decide.*

2.2 Summary of Comments on the Dual “Moderate” Statement

To begin the discussion of this cautionary statement, the facilitator projected Map 4 and stated: *“Now I’m going to show you a different map. We’ve seen it before. In this map, the ‘moderate’*

*category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. For folks living in the areas covered by the lighter shade of yellow, there is no health statement. For folks living in the areas covered by the darker shade of yellow, the following health statement applies: **Extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.***

The facilitator then asked: “*Is this clearer than the previous version you saw, in which there was a single shade of yellow and a single health statement?*”

All 12 participants felt that if there is no health statement given for light yellow, light yellow is therefore the same as green and should not be differentiated. Comments included:

- *Is it clearer? No.*
- *It looks like light yellow is the same as green.*
- *Don't even put it up there. You're messing with me.*
- *If thing get too complex no one is going to pay attention to it.*
- *Why don't you use a positive statement about yellow, something like this would be a good day to go outside.*
- *If there's no health statement, it's not a health hazard.*
- *It might as well be green, if there is no health statement.*

2.3 Summary of Comments on the “Unhealthy for Sensitive Groups” Statement

To begin the discussion, the facilitator stated: “*Now we're going to talk about the health statement that is associated with air quality in the areas shaded in orange. For folks living in these areas, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should limit prolonged moderate exertion outdoors.***”

The facilitator then asked: “*What does ‘sensitive children and adults and people with respiratory disease, such as asthma’ mean to you?*”

Many participants (7-8) felt this health statement is too similar to the one that accompanies the dark yellow. Comments included:

- *Isn't this statement the same as the dark yellow?*
- *It's too close to the statement that ran with the dark yellow. “Extremely” is the only thing different in the two statements.*
- *If those two statements [the one for dark yellow and the one for orange] ran together on the same page, that would REALLY be confusing.*
- *I think this differentiation between children and adults is not necessary.*

- *If air quality is going to affect your breathing, I would think that you'd also have some kind of respiratory disease.*

The facilitator next asked: *“Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would ‘should limit prolonged, moderate exertion outdoors’ mean to you?”*

One participant felt that the wording for the dark yellow and orange health statements is too similar and suggested that they be written differently so that they stand out from one another. All 12 participants agreed with this observation. Comments included:

- *“Should limit” means don’t do it.*
- *It’s a stronger statement.*
- *When you use the word “consider” it’s leaving it up to your judgement. But the phrase “should limit” is more definite.*
- *If you put those two statements together [the one for dark yellow and the one for orange], you’d glance over it and miss those differences. I think it should be worded differently so that the two health statements stand apart from one another.*

2.4 Summary of Comments on the “Generally Unhealthy” Statement

To begin the discussion, the facilitator stated: *“For folks living in the areas colored in red, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should avoid moderate exertion outdoors; everyone else, especially children, should limit prolonged, moderate exertion outdoors.**”*

The facilitator then asked: *“Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What does the statement ‘sensitive children and adults and people with respiratory problems’ mean to you?”*

One participant felt that the statement was *“too wordy”* and others agreed. Comments included:

- *Why did you have “extremely” in the very low category and not here?*
- *Instead of saying “children and adults” it should just say “people.”*
- *It shouldn’t say “should limit” because when you’re in red, you shouldn’t be outdoors, period.*
- *For people who are sensitive, they are saying “avoid” whereas everyone else should consider limiting activities.*

The facilitator then pointed out that the health statement refers to “children” twice and asked participants if the differences were clear to them and if they understood why the word “children” appears twice. Participants seemed not to understand that the statement differentiates between sensitive children and all children.

- *Basically they are saying that if you are a child, you shouldn't be outside, period.*
- *They are emphasizing children.*
- *It is a double reminder about the health hazards to children.*
- *Children should not be outside, regardless of their health.*
- *They are placing more emphasis on children than adults.*

The facilitator then asked: “How many people find the differences between children in the first part and children in the second part clear?”

Only one participant felt that the differences are clear.

2.5 Key Results

- Most participants (10-11) were troubled by the fact that no health statement accompanies the areas of the map colored light yellow. Many read it to be the same as green (no health statement) and therefore unnecessary.
- A few of the participants (3) viewed the use of the words “prolonged” and “moderate” together as contradictory, while others understood that “prolonged” refers to duration of activity and “moderate” refers to the intensity of the activity.
- A few participants (2-3) were confused that the word “extremely” was used in the first health statement but not in subsequent health statements. They felt “extremely” should refer to extremely bad air as opposed to extremely sensitive people.
- Participants seemed unable to differentiate between the two groups of children referenced in the “generally unhealthy” health statement.

3. OZONE HEALTH EFFECTS BOOKLET

3.1 Summary of General Impressions of the Booklet

The facilitator asked participants the following questions to elicit their impressions of the booklet:

We want to gauge how helpful the booklet was in helping you understand the effects of ozone. How could it have done a better job?

Initially, the participants did not seem to like the booklet. Comments included:

- *It presents a lot of information but it's very scrambled. For example, early on it talks about members of sensitive groups but it doesn't define those groups until later on.*
- *Needs better organization.*
- *It doesn't adequately describe what ozone is.*
- *It doesn't differentiate well between ground-level ozone and stratospheric ozone.*
- *It doesn't explain what parts per million (ppm) is.*
- *What is a normal level of ozone? It doesn't say.*
- *The authors are hedging their bets in the section that describes who's at risk for ozone, because they say there is no evidence that asthma is caused by ozone but it is exacerbated by it and even some healthy people are affected by ozone.*
- *I don't agree with what they describe as moderate exercise—construction work, pushing a wheel barrow, using a sledge hammer. That's moderate?*
- *The booklet asked "Should I be concerned about ozone?" But shouldn't everyone be concerned about it?*
- *I'd like to see what can be done about the problem. This simply states what you can do to protect against it.*
- *If you go by this, nobody would work outside.*

The facilitator then asked: *"In what ways did the booklet do a good job?"*

Despite their initially negative reactions, many, participants offered a number of positive comments:

- *I like the way it told you exact hours for certain activities.*
- *I got a lot of good information out of the booklet.*
- *Lots of information.*
- *It contains good points.*
- *I haven't read this much information about this before.*
- *I liked the paragraph that compared it to sunburn, which is something everyone can relate to (7-8 other people agreed with that statement).*

3.2 Summary of Comments Regarding Understanding of the Health Effects of Ozone

To help assess the booklet's success in communicating information about the health effects of ozone, participants were asked the following questions:

Who would agree with the following statement: The higher the ozone level, the more likely it is that people's health could be affected.

All agreed.

Who would agree with the following statement: The higher the ozone level, the more serious the health affects that ozone may cause.

All agreed.

The booklet talks about different things people can do to protect their health when ozone levels are high. What are some of those things?

- *Stay inside.*
- *Limit outdoor activities.*
- *Does a mask help?*
- *Breathe slowly.*
- *Is air quality different inside?*
- *Don't mow the lawn or drive a car.*

Which groups are more sensitive to ozone than the general population?

- All 12 participants said "active children." All 12 participants said "all children."
- Five felt the "elderly" are more sensitive to ozone, while seven disagreed.
- One participant wanted more information about who would be in the group designated in the booklet as "people with unusual susceptibility to ozone."

3.3 Key Results

- Overall, people responded somewhat negatively to the ozone health effects booklet. While they thought it contained useful information, most participants felt it was not well organized.
- Almost all of the participants felt the booklet should have included a table listing the activities considered moderate and vigorous to help people determine if they are doing too much outdoors on a day with high ozone levels.

- Many people had a good understanding of the booklet's messages about what people can do to protect their health from ozone; however, many participants believe it is necessary to go indoors to protect yourself from ozone.
- Participants had a good understanding of groups that are sensitive to ozone. While four or five of the participants early on in the discussion rejected the idea that outdoor workers are more at risk than the average person, most (9-10) believed this to be true after reading the book.

APPENDIX F REPORT OF THE MIAMI FOCUS GROUP

The Miami focus group meeting was held on August 28, 1998 with people over 50 years of age with chronic lung disease (asthma, emphysema, and/or chronic bronchitis). Eleven individuals participated. Profiles of participants are contained in Appendix I.

1. OZONE MAP

1.1 Summary of Comments on the Ozone Map

The facilitator projected Map 3, with orange labeled “unhealthy for sensitive groups,” red labeled “generally unhealthy,” and dark red labeled “very unhealthy.” The map defines “sensitive groups” as “active children, outdoor workers, and people with respiratory disease, such as asthma.” The facilitator stated:

Here’s the first map. It shows different levels of air quality. As you look at the map, I’d like you to think about the following question: What does this map tell you?

Participants seemed to have a clear understanding of the map. They understood that the map shows different levels of air quality, and that air quality is unhealthy in areas shown in orange, red, and dark red, and more healthy in areas shown in yellow and green. One participant commented: “*Basically, it presents information clearly.*”

Facilitator: “*What does the term ‘very unhealthy’ mean to you?*”

Participants’ responses included:

- *I would not want to live there*
- *High level of pollution*
- *High air pollution*
- *Don’t go there*

Facilitator: “*What does the term ‘generally unhealthy’ mean to you?*”

Participants had a range of responses:

- *Various levels of unhealthiness*
- *Problems from several different sources*
- *Every-day stress*

- *Need more information to say*

Facilitator: *“What does the term ‘unhealthy for sensitive groups’ mean to you?”*

One participant noted that “sensitive groups” are defined at the bottom of the map. Another participant remarked that it means children breathing large amounts of air from being active. Another participant asked why the definition did not include all children. One other participant then commented that it shouldn’t include all children because some children are not active outdoors.

Facilitator: *“Is it helpful to have the definition of sensitive groups included on the map?”*

All participants thought the inclusion of the definition was helpful.

Facilitator: *“Is anyone surprised by the people included in the definition of sensitive groups?”*

Participants had a clear understanding of the people included in this definition. Two participants remarked that it made sense that this definition includes outdoor workers who are “exposed to the elements” and active children who are “breathing a lot of air.”

Facilitator: *“Is anyone surprised by the inclusion of ‘people with respiratory diseases, such as asthma’?”*

No participants had comments that indicated any issues with this part of the definition.

Facilitator: *“In the yellow range of this map, what does ‘moderate’ mean to you?”*

Participants had similar understandings of “moderate”:

- *Just minor problems, like being sensitive to cat hair*
- *It’s a safer place to live and work*
- *It’s acceptable area to live and acceptable air cleanliness*

Facilitator: *“What does the word ‘good’ mean to you?”*

Participants’ responses included:

- *No problem*
- *Not perfect, but it’s acceptable*
- *More tolerable*
- *Fewer things that trigger allergies*

1.2 Key Results

- Participants seemed to have a clear understanding of the map. They understood that the map shows different levels of air quality, and that air quality is unhealthy in areas shown in orange, red, and dark red, and more healthy in areas shown in yellow and green.
- Participants had a clear understanding of the people included in the definition of “sensitive groups.” It is noteworthy that people in this focus group were not surprised that the elderly are not included within the definition of “sensitive groups.”
- Participants found the inclusion of the definition of sensitive groups to be helpful.
- At least two participants thought the term “generally unhealthy” was unclear.

2. PSI SUB-INDEX CAUTIONARY STATEMENTS

2.1 Summary of Comments on the Single “Moderate” Statement

To begin the discussion of the first cautionary statement, the facilitator stated: *“Now I’m going to read the health statements associated with some of the colors shown on the map. For folks living in the areas colored in yellow, the following information applies: **When air quality is in the upper end of this range, extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.**”*

Facilitator: *“What does ‘extremely sensitive children and adults’ mean to you?”*

Participants had a range of comments and interpretations of this phrase. Five participants thought there should be two yellow ranges to help indicate when air quality poses potential problems, with one saying that she had the impression that the yellow range was safe. Two participants remarked that ‘extremely’ is not needed in the definition, because someone either is or is not sensitive. Another participant thought ‘extremely’ is important to help further define the types of people sensitive to air quality in this range.

Facilitator: *“Imagine that you are an extremely sensitive adult. You hear this statement and it tells you that you ‘should consider limiting prolonged, moderate exertion outdoors to protect your health.’ What does ‘consider limiting prolonged, moderate exertion outdoors’ mean to you?”*

Participants had the following responses:

- *Don’t exercise*
- *Don’t play outside*
- *Do your yard work another time*
- *Prolonged could be different for different people*

Facilitator: *“What does ‘prolonged’ mean to you?”*

Participant responses included:

- *Several hours*
- *More than two hours*
- *It’s different for everybody*

Facilitator: *What does ‘moderate exertion’ mean to you?”*

Two participants commented that it depends on the individual. One said that it could mean walking for one person and running for the next person.

2.2 Summary of Comments on the “Unhealthy for Sensitive Groups” Statement

To begin the discussion, the facilitator stated: *“Now we’re going to talk about the health statement that is associated with air quality in the areas shaded in orange. For folks living in these areas, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should limit prolonged moderate exertion outdoors.**”*

Facilitator: *“What does ‘sensitive children and adults and people with respiratory disease, such as asthma’ mean to you?”*

Six participants thought that this statement basically has the same meaning as the moderate statement. One participant remarked that the statements should be reversed; for her, the ‘unhealthy’ statement should be associated with the “moderate” range and vice versa. This participant continued by saying that the orange health statement does not seem to communicate a higher level of air pollution. Two participants said that this statement and the previous (“moderate”) statement were clearly understandable to them.

Facilitator: *“Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would ‘should limit prolonged, moderate exertion outdoors’ mean to you?”*

Participants offered the following responses:

- *“Prolonged” is not specific enough.*
- *Everyone is different. The general warning needs to be interpreted individually.*
- *The season of the year can affect this statement, such as allergy irritants.*

2.3 Summary of Comments on the “Generally Unhealthy” Statement

To begin the discussion, the facilitator stated: *“For folks living in the areas colored in red, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should avoid moderate exertion outdoors; everyone else, especially children, should limit prolonged, moderate exertion outdoors.**”*

Facilitator: *“Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would the statement ‘should avoid moderate exertion outdoors’ mean to you.”*

Responses included:

- *Don’t take your normal daily half-hour walk.*
- *If I have a bad day, then I should not go outside.*

- *It says don't do it.*
- *If you have asthma, you should move.*

Facilitator: “*What does ‘should limit prolonged moderate exertion’ mean to you?*”

One individual responded that “*You should stop when you don’t feel like exerting yourself*” and that “*It’s up to me when I stop doing something.*” Another participant questioned how “prolonged” is defined. Another participant remarked that it depends on the individual.

The facilitator then pointed out that the health statement refers to “children” twice and asked participants if the differences were clear to them and if they understood why the word “children” appears twice.

One participant remarked that the first reference means children with health problems or difficulties, while the second reference means children in general. All other participants agreed with this comment.

Facilitator: “*Are any of these statements telling you that you need to go inside to protect your health?*”

One participant said that the words “should avoid” mean that a person with respiratory problems must go inside. All other participants agreed that none of the statements say that you need to go inside.

2.4 Summary of Comments on the Title of PSI Sub-Index Table

The facilitator showed participants a modified version of the PSI Sub-Index for ozone, in which the table was modified to include three columns only: Index Values, Descriptor, and Cautionary Statement. (To avoid confusing participants, the Ozone Health Effects column was removed because it contains information that had not been introduced at that point in the discussion.) Participants were asked which title they preferred for the table: “Pollutant Standards Index” or “Air Quality Index.”

Only one participant voted for PSI. The other 10 preferred AQI. One participant said that he preferred AQI because the title refers to the subject at hand (i.e., air quality). Another participant said AQI is more specific.

2.5 Key Results

- For the “Moderate” health statement, there was a wide range of responses to the question “*What does ‘extremely sensitive children and adults’ mean to you?*” Five participants thought there should be two yellow ranges to help indicate when air quality posed potential problems, with one saying that she had the impression that the yellow range was safe. Two participants remarked that ‘extremely’ is not needed in the definition, because someone either is or is not sensitive.

- Several participants repeatedly commented that the meaning of recommended activity phrases, such as “moderate exertion” and “prolonged,” depend on the individual.
- Six participants thought that the “Unhealthy for Sensitive Groups” statement had basically the same meaning as the “Moderate” statement.
- At least three participants commented on the ambiguity of the word “prolonged.” Two participants questioned how “prolonged” is defined, while another participant remarked that it depends on the individual.
- All participants understood the distinction between the two groups of children in the “Generally Unhealthy” statement.
- Only one of eleven participants preferred the title “Pollutant Standards Index” to “Air Quality Index.”

3. OZONE HEALTH EFFECTS BOOKLET

3.1 Summary of General Impressions of the Booklet.

The facilitator asked participants some questions to elicit their impressions of the booklet:

Facilitator: *“We want to gauge how helpful the booklet was in helping you understand the effects of ozone. How could it have done a better job?”*

One participant said the booklet was very informative and made him aware of things that he did not know would be important to his and his family’s health. Another participant said the pictures were helpful. Another participant said that it was helpful in explaining that you should take precautions when ozone levels are high. Another participant said that the booklet does not tell the reader what ozone is, and so faulted it for presenting ozone as a hazard without defining what exactly it is. This participant said that the booklet is a “deliberate distortion of a lot of things and it’s designed to scare people about ozone.” Most participants disagreed with his perspective.

Facilitator: *“Are there any ways that the booklet could have done a better job in presenting the information?”*

Three participants said that the booklet should include more information on defining ground- level ozone versus stratospheric ozone. (Several people appeared to be confused by the distinction.) One participant thought the booklet could better address the question of who should be concerned about ozone by stating that everyone should be concerned, since anyone can potentially be affected by it.

One participant disagreed with examples provided in the booklet of activities that involve moderate and heavy exertion. He commented that activities listed as “moderate” seemed like “heavy exertion” to him. Others agreed.

Next the facilitator asked a series of questions designed to determine if the participants gained an understanding about a number of points.

Facilitator: *Who would agree with the following statement: The higher the ozone level, the more likely it is that people’s health could be affected.*

All participants agreed.

Facilitator: *Who would agree with the following statement: The higher the ozone level, the more serious the health affects that ozone may cause.*

All participants agreed.

Facilitator: *“The booklet talks about different things people can do to protect their health when ozone levels are high. What are some of those things?”*

Two participants said you should stay indoors to prevent yourself from being exposed to ozone, and a third participant said you should limit your activities. Some wondered whether indoor air was free of ozone, and stated that they would like the booklet to clarify this issue.

3.2 Summary of Comments Regarding Understanding of the Health Effects of Ozone

To help assess the booklet’s success in communicating information about the health effects of ozone, participants were asked the following questions:

Facilitator: *Which groups are more sensitive to ozone than the general population?*

- Seven out of 11 participants said “all children” are more sensitive, while 3 said they are not more sensitive, and 1 was unsure. Seven out of 11 said “active children” are more sensitive, and 5 did not respond.
- Nine out of 11 participants said the “elderly” are more sensitive, while 2 said they are not.

3.3 Key Results

- Overall, participants responded positively to the ozone health effects booklet. They commented that it helped build awareness about ozone and its health affects, and was educational in describing what activities to consider limiting during periods of high ozone levels.
- Three participants thought that the booklet should further distinguish the differences between ground-level and stratospheric ozone.
- All participants understood that the higher the ozone level, the more likely it is that people’s health could be affected. All participants also understood that ozone levels affect the seriousness of health effects.
- Based on their reading of the booklet, 7 of the 11 participants said “all children” are more sensitive to ozone than the general population, and 7 again said “active children” are more sensitive. Nine thought the “elderly” are more sensitive to ozone than the general population.

APPENDIX G REPORT OF THE CHICAGO FOCUS GROUP

The Chicago focus group meeting was held on September 24, 1998 with parents of asthmatic children. Participants had no more than 12 years of education. Nine individuals participated. Profiles of participants are contained in Appendix I.

1. OZONE MAPS

1.1 Summary of Comments on Map 1

After projecting Map 1 (with orange, red, and dark red labeled “unhealthy”), the facilitator asked the following question:

Here’s the first map. It shows different levels of air quality. As you look at the map, I’d like you to think about the following question: What does this map tell you?

Participants seemed to have a clear understanding of the map. They were able to identify the problem areas (depicted in orange, red, and dark red) as well as the areas where air quality was considered “moderate” and “good” (yellow and green areas).

The facilitator then asked: “*What does the word ‘unhealthy’ mean to you?*”

Comments included:

- *Not appropriate environment.*
- *Dirt and dust.*
- *What you’re breathing in isn’t good.*
- *Don’t go outside that day.*
- *Stay inside.*
- *It’s an alert or a warning.*

One participant said: “*My child has asthma, and when the air is like this, you take precautions to prevent the asthma.*”

The facilitator next asked: “*What does the word ‘moderate’ mean to you?*”

The participants all had similar understandings of the word “moderate”:

- *Okay, but not great.*

- *Better than “unhealthy.”*
- *Average.*
- *There’s a slight risk, but you can live with it.*

The facilitator then asked: “*What does the word ‘good’ mean to you?*” Participants had the following responses:

- *Favorable*
- *Just what is says: Good.*

1.2 Summary of Comments on Map 2

After displaying Map 2 (with orange labeled “unhealthy for sensitive groups,” red labeled “generally unhealthy,” and dark red labeled “very unhealthy”) the facilitator asked the following question:

Here’s the second map that I’d like you to think about. In this map, the key has been changed to include more information. What does this new information tell you?

Three participants stated that they preferred the first map because it is simpler, and they described Map 2 as too wordy and detailed:

- *It’s more detailed in what it’s telling us about the atmosphere, but from what I’m seeing, it’s the same as the first map.*
- *I don’t like the new key. It’s too wordy.*

Six participants felt the new information was useful. Their comments included:

- *I like the additional detail. I think it’s good.*
- *I like the addition of “unhealthy for sensitive groups,” because it alerts sensitive people to potential problems.*
- *It would be useful information if you were traveling to a location like that.*
- *If my daughter was to look at this, she would know, O.K., I need to bring my inhalers with me. If it’s in “moderate,” she may not have to, but if it’s in “unhealthy,” she would know that this is something she would need to do.*

The facilitator then asked: “*What does the term ‘unhealthy for sensitive groups’ mean to you?*” Participants understood this term in the following ways:

- *People with respiratory problems should be careful.*
- *Elderly and allergies.*

- *Sick people shouldn't be outside.*
- *The elderly should take it easy.*

The facilitator then asked: “*What does ‘generally unhealthy’ mean to you?*” For the most part, the participants felt that “generally unhealthy” means that the air in that area is more unhealthy for a larger number of people than in the areas colored in orange (“unhealthy for sensitive groups”). One participant commented that, to her, the term “generally unhealthy” suggests that the air is “unhealthy for most of the time.” She added: “*‘Generally unhealthy’ means that’s the way it always is, maybe not just that day but always.*” The facilitator asked if others shared this impression, and two or three other participants said that they did. Other comments included:

- *It’s unhealthy for everyone.*
- *Very unhealthy.*
- *I don’t see “generally unhealthy” as different from “very unhealthy.”*
- *I see it as worse than the others, because there’s something going on there but it’s not stated.*

The facilitator then asked: “*What does ‘very unhealthy’ mean to you?*”

- *Warning,*
- *Stay away. There’s a lot of pollution.*
- *Danger.*
- *You shouldn’t go outside unless you have to.*

1.3 Summary of Comments on Map 3

After displaying Map 3, which defines “sensitive groups” as “active children, outdoor workers, and people with respiratory disease, such as asthma,” the facilitator stated:

This is the third map that I’m going to ask you to think about. It’s the same as the last map that I showed you, except that it now includes some new information here at the bottom of the map. What does this new information tell you?

Comments included:

- *It makes me appreciate who the sensitive groups are.*
- *The definition of “sensitive groups” includes everybody.*
- *Most people already know what “sensitive groups” means.*

At this point, one or two participants commented that the addition of the definition provides too much information.

The facilitator then asked: “*Were any of you surprised by the kinds of people included in the definition of ‘sensitive groups’?*” One participant wondered why “adults active outdoors” were not listed along with “outdoor workers.” Another commented: “*Sensitive groups should include everyone. Just like people who are not smokers are affected by second-hand smoke, people who are not sensitive are going to be affected by ozone.*”

Then the facilitator asked: “*Is this new information useful?*”

Four or five participants said “no”. Some commented that people within sensitive groups are already likely to be aware that they are sensitive, and the inclusion of the definition is therefore not particularly useful because it does not provide any new information. Comments included:

- *I just see this as the same as the other maps. They just added the definition of sensitive groups. It doesn’t really give much information at all.*
- *Even though they define it, most people know who the sensitive groups are.*
- *I think it’s helpful for alerting sensitive people that certain days are unhealthy.*
- *I would think sensitive people should be alerted to problems in the red zone, not in the orange “moderate” zone.*

1.4 Summary of Comments on Map 4

After displaying Map 4, which contains two different shades of yellow in the ‘moderate’ category, the facilitator asked the following question:

Here’s the fourth and final map I’d like you to think about. In this map, the “moderate” category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. What does this new information tell you?

Participants reacted negatively to the newly added lighter shade of yellow. Some were confused, and others found it to be too much information. Others wondered why the lighter shade of yellow was not presented in the color key. Comments included:

- *It’s really confusing.*
- *It’s too much.*
- *If it’s not specified in the key, what is it telling you? Is it worse than the other yellow, or better?*
- *It’s not telling you much at all.*

- *What does it mean? It could mean “danger.”*
- *Where does that light yellow fit in?*
- *Less is better.*

The facilitator then asked: *“Is this new information helpful?”*

All 9 participants responded that the new information was not helpful. One participant stated: *“I don’t find it confusing. I just find that it’s not giving me more information than the other maps”.*

Another person commented: *“I find it confusing, because if you’re looking at this, you’re looking at the five colors [shown on the key]. Then there’s this real light color, and where does IT fit in?”*

Another asked: *“Why isn’t this color on the key?”*

1.5 Summary of Comments on Comparison of the Four Maps

The facilitator displayed the four maps side-by-side and asked participants and asked: “*Which of these maps does the best job communicating whether air quality is good or bad for your health?*”

- Three participants voted for Map 1
- Five participants voted for Map 2
- One participant voted for Map 3
- No participants voted for Map 4

The facilitator then asked: “*Which map do you prefer?*”

- Five participants voted for Map 1
- Four participant voted for Map 2
- No participants voted for Map 3
- No participants voted for Map 4

Participants who voted for Map 1 said they preferred it because it is simpler. Five or six participants commented that they found the key to be easier and more natural to read when it is presented horizontally (Map 1) rather than vertically (Maps 2, 3, and 4).

The facilitator then asked the participants who voted for two different maps to explain their changes in map preference. One responded: “*The first map tells you about the air quality, but the third map defines sensitive groups. But I preferred the simplicity of the first map.*”

1.6 Key Results

- **Map 1:** Participants seemed to have a clear understanding of the maps’ meaning.
- **Map 2:** Three participants commented that they preferred Map 1 to Map 2 because Map 1 is simpler. Six commented that they preferred Map 2 to Map 1 because it offers more information about which areas are unhealthy.
- **Map 3:** Four or five participants thought that the addition of the definition of sensitive groups was either not useful or simply presented too much information. Some commented that people within sensitive groups are already aware that they are sensitive, and therefore the inclusion of the definition is not particularly useful.
- **Map 4:** None of the participants found the addition of two shades of yellow in the “moderate” category to be useful. Most participants felt that these two maps contained too much

information which led to confusion rather than clarity. Some wondered why the lighter shade of yellow was not contained in the key.

- **Side-by-side comparison of the four maps:** Participants' preferences were divided nearly evenly between Map 1 and Map 2. Those who preferred Map 1 preferred it for its simplicity. Those who preferred Map 2 thought the addition of the terms "unhealthy for sensitive groups," "generally unhealthy," and "very unhealthy" provided useful information. Five or six participants said that they were more comfortable reading the "left-to-right" key of Map 1 than the vertically arrayed keys on the other maps.

2. PSI SUB-INDEX CAUTIONARY STATEMENTS

2.1 Summary of Comments on the Single “Moderate” Statement

To begin the discussion of the first cautionary statement, the facilitator stated: *“Now I’m going to read the health statements associated with some of the colors shown on the map. For folks living in the areas colored in yellow, the following information applies: **When air quality is in the upper end of this range, extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.**”*

Two or three individuals immediately commented that they found the statement to be too wordy.

The facilitator asked: *“What does ‘extremely sensitive children and adults’ mean to you?”*

Comments included:

- *It’s referring to people with health problems, like heart problems or asthma.*
- *Overweight people.*
- *Elderly people.*

The facilitator then asked: *“Imagine that you are an extremely sensitive adult. You hear this statement and it tells you that you ‘should consider limiting prolonged, moderate exertion outdoors’ to protect your health.’ What does that statement mean to you?”*

Responses included:

- *Think about how long you are going to be outside.*
- *Manage my kids and keep an eye on how long they are playing outside.*
- *There are certain activities you wouldn’t want to do be involved in.*

Another commented: *“Parents need to watch out for their children. I have a daughter who has asthma, and she won’t stop playing until she starts wheezing. During summer I have to bring her in and make her stop, because she’s not going to stop on her own.”*

Three participants commented that the phrase is too wordy. One person stated: *“I’d cut out a few words so it reads ‘extremely sensitive children and adults should limit prolonged exertion outdoors.’ It’s too wordy.”* However, another disagreed, stating: *“Those extra words are helpful for some.”*

Another participant commented that the phrase contains words that seem contradictory: *“Using ‘moderate,’ and ‘exertion’ next to each other—They don’t go together.”*

The facilitator then asked: “*What does the word ‘prolonged’ mean to you?*” Responses included:

- *Hourly.*
- *Long.*

The facilitator then asked: “*What does ‘moderate exertion’ mean to you?*” Responses included:

- *Light, easy, daily activity.*
- *Not a lot of exertion.*
- *People may define “moderate exertion” differently from one another.*
- *A jog around the block instead of a run around the block.*
- *It’s different for different people. You couldn’t compare what a carpenter does to what a pipefitter does.*

2.2 Summary of Comments on the Dual “Moderate” Statement

To begin the discussion of this cautionary statement, the facilitator projected Map 4 and stated: “*Now I’m going to show you the map in which the ‘moderate’ category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. For folks living in the areas covered by the lighter shade of yellow, there is no health statement. For folks living in the areas covered by the darker shade of yellow, the following health statement applies: **Extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.***”

The facilitator then asked: “*Is this clearer than the previous version you saw, in which there was a single shade of yellow and a single health statement?*”

Most participants did not feel this version was clearer. Comments included:

- *They should just keep those categories as one shade of yellow.*
- *Whatever applies to the dark yellow should apply to the light yellow. It’s better to be safe than sorry*

Some seemed confused:

- *I thought sensitive groups should be alerted in the red zone, not the other zones.*

One participant wondered why the two shades of yellow were not shown in the map’s key.

2.3 Summary of Comments on the “Unhealthy for Sensitive Groups” Statement

To begin the discussion, the facilitator stated: “Now we’re going to talk about the health statement that is associated with air quality in the areas shaded in orange. For folks living in these areas, the following information applies: ***Sensitive children and adults and people with respiratory disease, such as asthma, should limit prolonged moderate exertion outdoors.***”

The facilitator then asked: “What does ‘sensitive children and adults and people with respiratory disease, such as asthma’ mean to you?”

Comments included:

- *It’s an alert to people who have trouble breathing.*
- *What does sensitive children mean? All children with those diseases are sensitive.*
- *“Sensitive” refers to people who have allergies.*

The facilitator next asked: “Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would ‘should limit prolonged, moderate exertion outdoors’ mean to you?”

Comments included:

- *Take precautions.*
- *Stay indoors if you don’t have to go out.*
- *You would need to take your medication.*
- *Inventory your activities.*

One participant comment that the phrase was too wordy: “It should just say ‘Should limit outdoor activities’.”

2.4 Summary of Comments on the “Generally Unhealthy” Statement

To begin the discussion, the facilitator stated: “For folks living in the areas colored in red, the following information applies: ***Sensitive children and adults and people with respiratory disease, such as asthma, should avoid moderate exertion outdoors; everyone else, especially children, should limit prolonged, moderate exertion outdoors.***”

The facilitator then asked: “Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What does the statement ‘sensitive children and adults and people with respiratory problems’ mean to you?”

Reactions to this statement were mixed. Comments included:

- *It's too wordy.*
- *This statement makes it seem that everyone is sensitive.*
- *The statement uses the words "moderate" and "outdoors" twice.*
- *It tells those with real problems that they should not go outside.*
- *This is the only statement I'd pay attention to. The others all say sensitive too, and if I listened to them I would never go outside at all.*

The facilitator then asked: "What does 'should avoid moderate exertion outdoors' mean to you?" Comments included:

- *Just do light activities outside.*
- *It means no playing, no running.*
- *Everyone's system is not the same, so 'moderate' may be a confusing term.*

The facilitator then asked: "What does 'should limit moderate exertion outdoors' mean to you if you were in that 'everyone else' category?" Comments included:

- *Don't do it.*
- *Don't work that day.*
- *Drink more water, take more breaks.*

The facilitator then pointed out that the health statement refers to "children" twice. He asked participants if the differences were clear to them and asked: "What is your understanding of who these two groups of children are?" Overall, participants understood the differences between "children" in the first and second parts of the statement. Specific comments included:

- *Children with asthma and respiratory diseases should take it easier, while the ones who are healthy and normal can do a little more but not over-do it.*
- *"Especially children" in the second part is a little confusing.*

2.5 Summary of Comments on the Title of the PSI Sub-Index Table

The facilitator showed participants a modified version of the PSI Sub-Index for ozone, in which the table was modified to include three columns only: Index Values, Descriptor, and Cautionary Statement. (To avoid confusing participants, the Ozone Health Effects column was removed because it contains information that had not been introduced at that point in the discussion.) Participants were asked which title they prefer for the table: "Pollutant Standards Index (PSI)," or "Air Quality Index (AQI)."

All 9 preferred AQI. One participant commented that he preferred AQI because he had heard the term used many times before and was familiar with it. Other comments included:

- *It's smoother.*
- *PSI could refer to both air and water or anything.*
- *It deals with the air, which is basically what you are describing.*

2.6 Key Results

- Most participants (7-8) found the health statements to be too wordy. They felt the statements should be shorter and more direct
- A few of the participants (3) viewed the use of the words “prolonged” and “moderate” together as contradictory.
- All participants (9) preferred the title “Air Quality Index” to “Pollutant Standards Index.”

3. OZONE HEALTH EFFECTS BOOKLET

3.1 Summary of General Impressions of the Booklet

The facilitator asked participants the following questions to elicit their impressions of the booklet:

We want to gauge how helpful the booklet was in helping you understand the effects of ozone. How could it have done a better job?

Overall, participants responded very positively to the booklet about the booklet. To elicit feedback about areas for improvement, the facilitator asked people to talk about the most important “minus” that they marked in the booklet’s margin. One participant commented that the picture next to the statement “active children” shows private-school children playing at recess; she suggested that a picture of “all kinds of kids” playing on a summer day might be more representative and meaningful to more people. Another participant added that, when describing the health effects caused by ozone, the word negative should be used, as in the “negative health effects of ozone.”

The facilitator then asked: “*In what ways did the booklet do a good job?*”

Some participants commented that it contained information that was new to them:

- *It makes me conscious of things I’ve previously taken for granted.*
- *It contained a lot of information I didn’t know.*
- *It was shocking information.*

Other comments included:

- *I thought it was concise and very informative. It defined some of the things we were talking about.*
- *It was very interesting.*
- *It was organized nicely.*
- *It makes me appreciate why the government has certain air quality regulations, like emissions inspections for cars.*

3.2 Summary of Comments Regarding Understanding of the Health Effects of Ozone

To help assess the booklet’s success in communicating information about the health effects of ozone, participants were asked the following questions:

Who would agree with the following statement: The higher the ozone level, the more likely it is that people's health could be affected.

All agreed.

Who would agree with the following statement: The higher the ozone level, the more serious the health affects that ozone may cause.

All agreed.

The booklet talks about different things people can do to protect their health when ozone levels are high. What are some of those things?

Some people had a good understanding of things people can do to protect their health:

- *Reduce outdoor activities.*
- *Be aware of how long you are outside.*
- *Watch for the warning signs of the effects of ozone.*
- *Go for a walk instead of jogging.*

However, others seemed to have misconceptions of actions people can take to protect their health:

- *Don't eat heavy foods.*
- *Keep a lot of liquids in your bodies to keep your throat moist.*
- *If you're going to be outside, try to be in a shaded area, where you could get a breeze and be shielded from the rays of the sun.*

The facilitator asked: "Is the information in the booklet telling you that you must go indoors to protect your health?" Participants understood that it is not necessary to go indoors to protect your health. One commented: "You'd be best advised to go indoors, but sometimes you can't." Another participant commented: "There are also things inside that may also affect your health. The carpet affects my daughter, and she has asthma."

Which groups are more sensitive to ozone than the general population?

- All 9 participants said "active children," and 8 participants said "all children."
- Eight thought the elderly are more sensitive to ozone than the general population. Only one participant thought the elderly are not more sensitive, and she referred to information provided in the ozone health effects booklet to support her view.
- All 9 participants thought outdoor workers are more sensitive to ozone.
- All 9 participants thought that "people active outdoors" are more sensitive to ozone.

- Seven thought that “people with heart disease” are more sensitive to ozone.

3.3 Key Results

- Participants responded very positively to the booklet. They felt it was well written and well organized, and they thought it contained interesting and useful information.
- People had a mixed understanding of what people can do to protect their health from ozone. Some had a clear understanding of the booklet’s messages, while others suggested measures such as “don’t eat heavy food,” drink lots of water,” and “stay in the shade.” Participants understood that it is not necessary to go indoors to protect your health.
- All participants understood that the higher the ozone level, the more likely it is that people’s health could be affected. All participants also understood that ozone levels affect the seriousness of health effects.
- Based on their reading of the booklet, all participants said “all children” are more sensitive to ozone, and 9 said active children are more sensitive to ozone. Eight thought the elderly are more sensitive to ozone than the general population, while seven participants thought that people with heart disease are more sensitive. All participants thought that outdoor workers are at risk.

APPENDIX H

REPORT OF THE LOS ANGELES FOCUS GROUP

The Los Angeles focus group meeting, held on October 24, 1998, was comprised of professional journalists from a wide range of specializations. (However, individuals specializing in environmental journalism were intentionally not included in the focus group.) It was held during the 1998 Annual Meeting of the Society of Professional Journalists. Thirteen individuals participated. Profiles of participants are contained in Appendix I.

1. OZONE MAPS

1.1 Summary of Comments on Map 1

After projecting Map 1 (with orange, red, and dark red labeled “unhealthy”), the facilitator asked the following question:

Here’s the first map. It shows different levels of air quality. As you look at the map, I’d like you to think about the following question: What does this map tell you?

Generally, participants seemed to have a clear understanding of the map. They understood that the map shows different levels of air quality. They were able to identify problem areas (depicted in orange, red, and dark red) as well as the areas where air quality was considered “moderate” and “good” (yellow and green areas).

Several (six or seven) participants felt strongly that the map would be clearer and more useful to readers if it contained more information (e.g., the pollutant levels associated with each color, or the lung cancer rate associated with each level). Two or three others suggested that the data source should be included on the map. Another suggested that the map would be clearer if it indicated the locations of some key cities. She added that many people have a poor knowledge of geography.

One participant said that it did not make sense to her that the air quality scale ranges from “good” to “unhealthy.” She added: “*You need to use antonyms. If you’re going to say ‘healthy,’ then the opposite side of the scale should be ‘unhealthy.’ If you’re going to use ‘good,’ then the opposite side of the scale should be ‘bad.’*”

1.2 Summary of Comments on Map 2

After displaying Map 2 (with orange labeled “unhealthy for sensitive groups,” red labeled “generally unhealthy,” and dark red labeled “very unhealthy”) the facilitator asked the following question:

Here's the second map that I'd like you to think about. In this map, the key has been changed to include more information. What does this new information tell you?

Overall, participants found this map easier to understand. One participant also remarked that the distinction between “generally unhealthy” and “unhealthy for sensitive groups” is helpful. He added: “*There are a lot of people, including myself, who have allergies, and this is good information to know.*”

Another participant said that the vertical format of the scale is clearer and more effective than the horizontal format of Map 1.

One participant commented that the color scheme of the map makes sense, and he added that it is easy to understand because it is in keeping with the understanding that people have developed from reading the color-coded *USA Today* weather map. He added “*We recognize the red areas as hot/unhealthy. For me, when I first look at this, I'm going to assume that dark red is the worst.*” Two or three other participants agreed with this perspective.

The facilitator then asked: “*What does the term ‘very unhealthy’ mean to you?*” Participants had the following responses:

- *Bad*
- *Dangerous*
- *Lung cancer*
- *Asthma, emphysema*
- *Allergies*
- *Potentially life-threatening*
- *You don't want to be there*

Next, the facilitator asked: “*What does the term ‘generally unhealthy’ mean to you?*”

One participant remarked that “dangerous” would be a better term than “generally unhealthy.” Three or four others disagreed with this view, because they thought that “dangerous” implies an *immediate* threat.

Another said that examples or statistics (e.g., new cases of lung cancer per year) would provide a useful parameter to help people understand what is meant by “generally unhealthy.”

The facilitator then asked: “*What does the term ‘unhealthy for sensitive groups’ mean to you?*” Responses included:

- *High risk*

- *Asthma*
- *Cystic fibrosis*
- *Small children*
- *The elderly*
- *Respiratory problems*
- *People with suppressed immune systems*

One participant remarked that this term seems unclear and asked how “sensitive” is defined. Another person said that “groups” should be further defined, such as by age or medical condition. Three other participants shared this view.

The facilitator next asked: “*What does the word ‘moderate’ mean to you?*” Participants’ responses included:

- *I don’t know what it means*
- *It’s getting worse, but it’s not bad enough to be unhealthy for sensitive people*
- *It’s the middle*
- *Don’t worry*
- *Could get bad, could get better*

Then the facilitator asked: “*What does the word ‘good’ mean to you?*” Participants had the following responses:

- *It’s not excellent, so it’s just a ‘B’*
- *Clean*
- *Safe*
- *Healthy*

Some participants felt that the term “good” is not appropriate for air quality in the “green” level. Some suggested “healthy” and others suggested “clean” as alternatives to “good.” The facilitator then asked: “*How many prefer the word ‘healthy’ to ‘good’?*” Eight preferred “healthy” to “good.” The facilitator then asked: “*How many prefer ‘clean’ to ‘good’?*” Three preferred “clean” to “good.”

1.3 Summary of Comments on Map 3

After displaying Map 3, which defines “sensitive groups” as “active children, outdoor workers, and people with respiratory disease, such as asthma,” the facilitator stated:

This is the third map that I'm going to ask you to think about. It's the same as the last map that I showed you, except that it now includes some new information here at the bottom of the map. Do you find this new information helpful?

One participant noted that the elderly are not included as a sensitive group. Another participant stated that she was surprised that the elderly are not included, because they are generally considered at risk. Another participant said that it cannot be assumed that all elderly have respiratory problems. Another commented that if the elderly were to be included, the appropriate term would be "frail elderly." Another person expressed surprise that people with heart disease are not included in the definition.

The facilitator then asked: "*How many think this new information is helpful?*"

All participants except one thought that the new information is helpful. The one dissenter felt that the definition does not go far enough in providing information about who is included as a member of a sensitive group.

1.4 Summary of Comments on Map 4

After displaying Map 4, which contains two different shades of yellow in the "moderate" category, the facilitator asked the following question:

Here's the fourth and final map I'd like you to think about. In this map, the "moderate" category has been changed so that it describes two different levels of air quality, which are shown in two different shades of yellow. What does this new information tell you?

Almost all participants thought that the addition of a second shade of yellow is confusing. One participant commented: "*My assumption is that lighter yellow is better than darker yellow, but I can't know that for sure.*"

Another participant said he would not have noticed that the map contains two shades of yellow had the facilitator not pointed this out. Two other participants commented that they had difficulty distinguishing two shades of yellow.

One participant pointed out that people who are color blind would not be able to differentiate among the colors and could not read the map accurately. She also commented that some newspapers do not have the capacity to print in color. She suggested that a second map be created that uses black-and-white shades and patterns (e.g., black, white, gray, dots, cross-hatching) to differentiate among the different levels of air quality.

The facilitator then asked: “Is this new information helpful?” Most participants found the inclusion of two yellow shades more confusing than helpful.

1.5 Summary of Comments on Comparison of the Four Maps

The facilitator displayed the four maps side-by-side and asked participants: “*Which of these maps does the best job communicating whether air quality is good or bad for your health?*”

No participants voted for Map 1
No participants voted for Map 2
Eleven participants voted for Map 3
One participant voted for Map 4

(One participant did not vote.)

The facilitator then asked: “*Which of these maps do you prefer?*”

One participant voted for Map 1
No participants voted for Map 2
Ten participants voted for Map 3
One participant voted for Map 4

(One participant did not vote.)

Ten participants preferred the map that they thought does the best job communicating whether air quality is good or bad for your health. One participant said that he preferred Map 1 because it is simple and “more pleasing,” adding: “*I don’t like clutter.*” Another participant said that she preferred Map 4 because it provides the most information.

1.6 Key Results

Map 1: Participants seemed to have a clear understanding of the map. They understood that it shows different levels of air quality and that air quality is unhealthy in areas shown in orange, red, and dark red, and more healthy in areas shown in yellow and green. Six or seven participants felt strongly that the map would be clearer and more useful to readers if it contained more information (e.g., the pollutant levels associated with each color, or the lung cancer rate associated with each level).

Map 2: Overall, participants thought that Map 2 is clearer than Map 1. Some commented that the color scale makes intuitive sense. At least two participants found the term “unhealthy for sensitive groups” to be ambiguous. Three or four participants said that “groups” should be further defined, such as by age or medical condition. Some participants felt that the term “good” is not appropriate for air quality in the “green” level. Some suggested “healthy” and others suggested “clean” as alternatives to “good.”

Map 3: All participants except one thought that the addition of the definition of sensitive groups is helpful. At least two participants thought that the elderly should be included in “sensitive groups.”

Map 4: Almost all participants thought that the addition of a second shade of yellow is confusing. Three participants commented that they had difficulty noticing or distinguishing between the two shades of yellow. One participant pointed out that people who are color blind would not be able to differentiate among the colors and could not read the map accurately. She also commented that some newspapers do not have the capacity to print in color. She suggested that a second map be created that uses black-and-white shades and patterns (e.g., black, white, gray, dots, cross-hatching) to differentiate among the different levels of air quality.

Side-by-side comparison of the four maps: Eleven out of twelve participants believed Map 3 does the best job communicating whether air quality is good or bad for people’s health.

2. PSI SUB-INDEX CAUTIONARY STATEMENTS

2.1 Summary of Comments on the Single “Moderate” Statement

To begin the discussion of the first cautionary statement, the facilitator stated: *“Now I’m going to read the health statements associated with some of the colors shown on the map. For folks living in the areas colored in yellow, the following information applies: **When air quality is in the upper end of this range, extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.**”*

The facilitator first asked: *“What does ‘extremely sensitive children and adults’ mean to you?”*

Two or three participants remarked that this phrase should be more clear about who is included as “extremely sensitive children and adults.” One commented: *“Does this mean asthmatics? People with asthma?”*

Another participant said that “extremely sensitive” suggests a person’s emotional state (i.e., *“their feelings could be hurt”*). Two or three others agreed that the term could be read in this way.

The facilitator then stated: *“Imagine that you are an extremely sensitive adult and ozone levels in your area are at this level. The statement tells you that you ‘should consider limiting prolonged, moderate exertion outdoors.’”* The facilitator asked: *“What does ‘consider limiting prolonged, moderate exertion outdoors’ mean to you?”*

Overall, participants thought this wording is unclear. One participant commented: *“I think ‘prolonged’ and ‘moderate’ are conflicting things. ‘Prolonged’ doesn’t seem ‘moderate’ to me somehow.”* Another said that he didn’t understand what “prolonged” and “moderate” mean in this context. Another responded and said: *“It means that you go outside at your own risk.”*

Four or five participants felt that the entire statement is too long and should be rewritten to be more clear and concise, and she commented that the term “consider limiting prolonged, moderate exertion outdoors” is particularly ambiguous. Another participant suggested that the statement be rewritten as “Be advised that air quality at this level may be dangerous to your health.” At least two other participants liked the phrase “be advised” and agreed with this suggestion.

2.2 Summary of Comments on the Dual “Moderate” Statement

To begin the discussion of this cautionary statement, the facilitator projected Map 4 and stated: *“Now I’m going to show you a different map. We’ve seen it before. In this map, the ‘moderate’ category has been changed so that it describes two different levels of air quality, which are*

*shown in two different shades of yellow. For folks living in the areas covered by the lighter shade of yellow, there is no health statement. For folks living in the areas covered by the darker shade of yellow, the following health statement applies: **Extremely sensitive children and adults should consider limiting prolonged, moderate exertion outdoors.***” The facilitator then asked: *“Is this clearer than the previous version you saw, in which there was a single shade of yellow and a single health statement?”*

All participants thought that this version is less clear than the first health statement. One participant remarked that this version leads the reader to question why there is no health statement associated with the light yellow level. Another participant thought that the yellow health statement is too wordy. Yet another participant said: *“This is just too vague for me.”*

2.3 Summary of Comments on the “Unhealthy for Sensitive Groups” Statement

To begin the discussion, the facilitator stated: *“Now we’re going to talk about the health statement that is associated with air quality in the areas shaded in orange. For folks living in these areas, the following information applies: **Sensitive children and adults and people with respiratory disease, such as asthma, should limit prolonged moderate exertion outdoors.**”*

The facilitator then asked: *“What does ‘sensitive children and adults and people with respiratory disease, such as asthma’ mean to you?”*

Three or four participants thought that this statement is clear, but several others thought it was unclear and too long. One participant wondered how “sensitive children and adults” differ from “people with respiratory disease.” Two participants thought that the term “sensitive children and adults” is unclear and that it should be deleted from the statement. Another suggested eliminating the term “sensitive children and adults and people with respiratory disease, such as asthma” and replacing it with “members of sensitive groups.” Yet another suggested replacing this term with “people who suffer from respiratory disease such as asthma.”

The facilitator then asked: *“Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would ‘should limit prolonged, moderate exertion outdoors’ mean to you?”*

One participant said that it means not taking a long, brisk walk, while another said it means not mowing the lawn. One participant questioned how long “prolonged” is, saying that it could be 10 minutes or 1 hour. Another participant said that the meaning of “prolonged” and “moderate” depend on the individual.

2.4 Summary of Comments on the “Generally Unhealthy” Statement

To begin the discussion, the facilitator stated: *“For folks living in the areas colored in red, the following information applies: Sensitive children and adults and people with respiratory disease, such as asthma, should avoid moderate exertion outdoors; everyone else, especially children, should limit prolonged, moderate exertion outdoors.”*

The facilitator then asked: *“Imagine that you are a sensitive adult or someone with respiratory disease, such as asthma. What would the statement ‘should avoid moderate exertion outdoors’ mean to you?”*

Participants responses included:

- *Don’t take an hour-long walk because you’re in danger*
- *It frightens me as a parent*
- *Kids should be allowed to play, but not to play soccer*
- *Take caution*

One participant commented that he did not like the style in which the health statements are written because *“They read like a government manual.”*

One participant said that she found the references to children to be confusing: *“If I were reading this as a parent, I’d have to ask ‘Where do my kids fit in?’”* Two participants, however, said that this statement is clear to them.

The facilitator then pointed out that the health statement refers to “children” twice and asked participants if the differences were clear to them. For the most part, people found the differences clear; however, three people found it to be unclear. One person stated: *“It’s not clear to me because you use ‘children’ twice. First you have a specific category for children, and then they become a nonspecific category.”* Another questioned what type of health conditions children would have if they are categorized as “sensitive children.”

2.6 Key Results

- Throughout the discussion, some of the participants (at least four or five) felt that the health statements are too long and should be rewritten to be more clear and concise.
- In the context of discussing the first health statement, two or three participants thought that the statements would be improved if they began with the phrase “be advised” (e.g., “Be advised that when air quality is at this level, extremely sensitive...”).

- Throughout the discussion of the health statements, several participants found the use of the word “sensitive” to be problematic. One person said that “extremely sensitive” suggests a person’s emotional state (i.e., “*their feelings could be hurt*”). Two or three others agreed that the term could be read in this way. During discussion of the “unhealthy for sensitive groups” statement, one participant wondered how “sensitive children and adults” differ from “people with respiratory disease.” Two participants thought that the term “sensitive children and adults” is unclear and that it should be deleted from the statement.
- Many participants found the term “prolonged moderate exertion” to be confusing.
- Everyone thought that the health statement associated with the dual shades of yellow is less clear than the statement associated with the single shade of yellow.

3. OZONE HEALTH EFFECTS BOOKLET

3.1 Summary of General Impressions of the Booklet

The facilitator asked participants the following questions to elicit their impressions of the booklet:

We want to gauge how helpful the booklet was in helping you understand the effects of ozone. What kind of a job did it do in helping you understand the effects of ozone?

Overall, people's responses to the booklet were very positive. Representative comments include:

- *I learned a lot more than I expected to.*
- *I give this an A⁺ because I understand everything. I'd publish this in a newspaper as-is.*
- *It's really informative and thorough. I liked the way it presented information.*
- *It was informative, an easy read, and fairly understandable.*

The facilitator then asked: *“Are there any ways that the booklet could have done a better job presenting the information?”* Participants offered some suggestions:

- One person thought the booklet is wrong to focus on summer months only. She commented that in her area (Phoenix, Arizona), air quality is worse in the winter than in summer.
- Another made a suggestion about a section of the booklet entitled “Who is most at risk from ozone?” This section lists “people with unusual susceptibility to ozone” as a sensitive group. He suggested adding a sentence here such as “Ask your doctor if you are in doubt or if you have further questions about the health effects of ozone.”
- One participant pointed out that the use of a photograph of a smoggy city skyline could lead people from rural areas to believe that the booklet is irrelevant to them.
- Another remarked that she would reorder the sections, because it is not clear from reading the initial sections that everyone can be affected by ozone. She thought that this point is made clear near the end of the booklet in two sections entitled “How might ozone affect my health?” and “How can I tell if I am being affected by ozone?” Two or three others agreed with this comment.

3.2 Summary of Comments Regarding Understanding of the Health Effects of Ozone

To help assess the booklet's success in communicating information about the health effects of ozone, participants were asked the following questions:

Who would agree with the following statement: The higher the ozone level, the more likely it is that people's health could be affected.

All agreed.

Who would agree with the following statement: The higher the ozone level, the more serious the health affects that ozone may cause.

All agreed.

Which groups are more sensitive to ozone than the general population?

- Eight out of 13 said the "elderly." Three said the elderly are not more sensitive, and two were not sure.
- Two out of 13 participants thought that "people with heart disease" are more sensitive. Eight thought they are not, and three were unsure.
- All participants thought that outdoor workers are more sensitive.

3.3 Key Results

- Overall, participants responded positively to the ozone health effects booklet. They commented that it is informative, thorough, and easy to read.
- A few participants felt the initial sections of the booklet did not make it clear that everyone can be affected by ozone.
- All participants understood that the higher the ozone level, the more likely it is that people's health could be affected. All participants also understood that ozone levels affect the seriousness of health effects.
- Based on their reading of the booklet, eight thought the elderly are more sensitive to ozone than the general population, while two participants thought that people with heart disease are more sensitive. All participants thought that outdoor workers are at risk.

**APPENDIX I
FOCUS GROUP PARTICIPANT PROFILES**

Denver, Colorado (General Public)

Participant	Gender	Age	Ethnicity	Years of Education	Occupation⁵
A	F	29	Caucasian	16	Web site administrator
B	F	62	Caucasian	18	Teacher
C	F	47	Caucasian	14	Bank teller
D	F	29	Caucasian	16	Computer programmer
E	F	71	African-American	14	Nurse
F	M	41	Caucasian	11	Painter
G	F	55	Caucasian	12	Homemaker
H	F	67	Caucasian	18	Retired paralegal
I	M	37	Hispanic	12	Student
J	M	69	Caucasian	13	Retired
K	M	36	Caucasian	14	Sales-Mechanical Equipment
L	F	51	Caucasian	8	House cleaner

⁵Occupation was not a criterion for screening participants; however, this information is included to provide additional information about the focus group participants.

Atlanta, Georgia (General Public)

Participant	Gender	Age	Ethnicity	Years of Education	Occupation
A	F	50	Caucasian	18	Art sales
B	M	36	Caucasian	18	Transportation planner
C	M	48	African-American	12	Self-employed/retail
D	M	42	African-American	13	Telecommunications engineer
E	F	31	African-American	13	Government clerk
F	F	38	Hispanic	14	Administrative assistant
G	M	26	Caucasian	16	Structural engineer
H	F	36	African-American	14	Tax analyst
I	M	68	Caucasian	10	Retired
J	F	50	Caucasian	9	Payroll clerk
K	F	41	African-American	12	Human resources coordinator
L	M	27	African-American	12	Machine operator

Houston, Texas (General Public)

Participant	Gender	Age	Ethnicity	Years of Education	Occupation
A	F	43	Hispanic	12	Teacher's aide
B	M	27	Hispanic	12	Customer service representative
C	F	28	African-American	14	Child support officer
D	F	37	African-American	12	Computer technician
E	F	30	Caucasian	12	Pre-school teacher
F	M	43	Caucasian	16	Registered nurse
G	M	21	Caucasian	12	Warehouse clerk
H	M	42	Caucasian	8	Fitter/layout worker
I	M	51	African-American	18	Assistant principal
J	F	63	Caucasian	12	Teacher's aide
K	F	63	Caucasian	8	Insurance company manager

San Bernardino, California (General Public)

Participant	Gender	Age	Ethnicity	Years of Education	Occupation
A	F	39	Hispanic	12+	Management
B	M	21	Hispanic	12+	Student
C	F	41	Caucasian	16	Teacher
D	F	43	African-American	14	Eligibility worker
E	M	25	Hispanic	12	Warehouse
F	M	62	Caucasian	12	Purchasing manager
G	M	71	Caucasian	12+	Retired
H	M	34	Asian	16	DMV clerk
I	F	57	Caucasian	12	Forensic specialist
J	F	30	Caucasian	12+	Housewife
K	M	31	African-American	16	Civil engineer
L	F	48	Caucasian	unknown	Receptionist

St. Louis, Missouri (General Public)

Participant	Gender	Age	Ethnicity	Years of Education	Occupation
A	F	39	Caucasian	12	Insurance agent
B	F	53	Caucasian	16	Hair stylist
C	M	31	African-American	12	Postal worker
D	F	61	African-American	9	Disabled
E	M	68	African-American	13	Retired
F	F	74	Caucasian	14+	Retired
G	M	49	Caucasian	12	Law enforcement
H	F	65	African-American	12	Retired
I	M	21	Asian	16	Student
J	M	69	African-American	9	Funeral director
K	F	32	Caucasian	14	Personnel specialist
L	M	48	Caucasian	18	Designer

Miami, Florida (People Over 50 with Chronic Lung Disease)⁶

Participant	Gender	Age	Condition	Ethnicity	Years of Education	Occupation
A	F	50-59	chronic bronchitis	Caucasian	12	Homemaker
B	M	70-79	asthma	Caucasian	18	Retired
C	M	50-59	chronic bronchitis	Caucasian	12	Retired
D	F	60-69	emphysema	Caucasian	12	Retired
E	M	60-69	chronic bronchitis	Caucasian	12	Retired
F	F	50-59	asthma	Caucasian	12	Retired
G	F	50-59	asthma	Hispanic	12	Homemaker
H	F	50-59	chronic bronchitis	Caucasian	12	Office manager
I	M	60-69	chronic bronchitis, emphysema	Caucasian	16	Retired
J	M	70-79	asthma	Caucasian	12	Retired
K	M	70-79	emphysema	Caucasian	12	Retired

⁶ Only age and chronic lung disease were used as criteria to screen participants for the Miami focus group. Information on gender, ethnicity, years of education, and occupation is included to provide additional demographic information about the focus group participants.

Chicago, Illinois (Parents of Asthmatic Children)⁷

Participant	Gender	Age	Ethnicity	Years of Education	Occupation
A	M	34	African-American	12	Outreach specialist
B	F	30	Caucasian	12	Homemaker
C	F	38	Hispanic	12	Medical assistant
D	F	57	Caucasian	12	Homemaker
E	F	32	Caucasian	12	Wedding coordinator
F	F	37	Caucasian	12	Cashier
G	M	26	Hispanic	12	Carpenter
H	F	38	Caucasian	12	Homemaker
I	M	41	African-American	12	Carpenter

⁷ Criteria used to screen participants for the Chicago focus group were years of education (12 or less) and being a parent of an asthmatic child under the age of 18. Information on gender, ethnicity, and occupation is included to provide additional demographic information about the focus group participants.

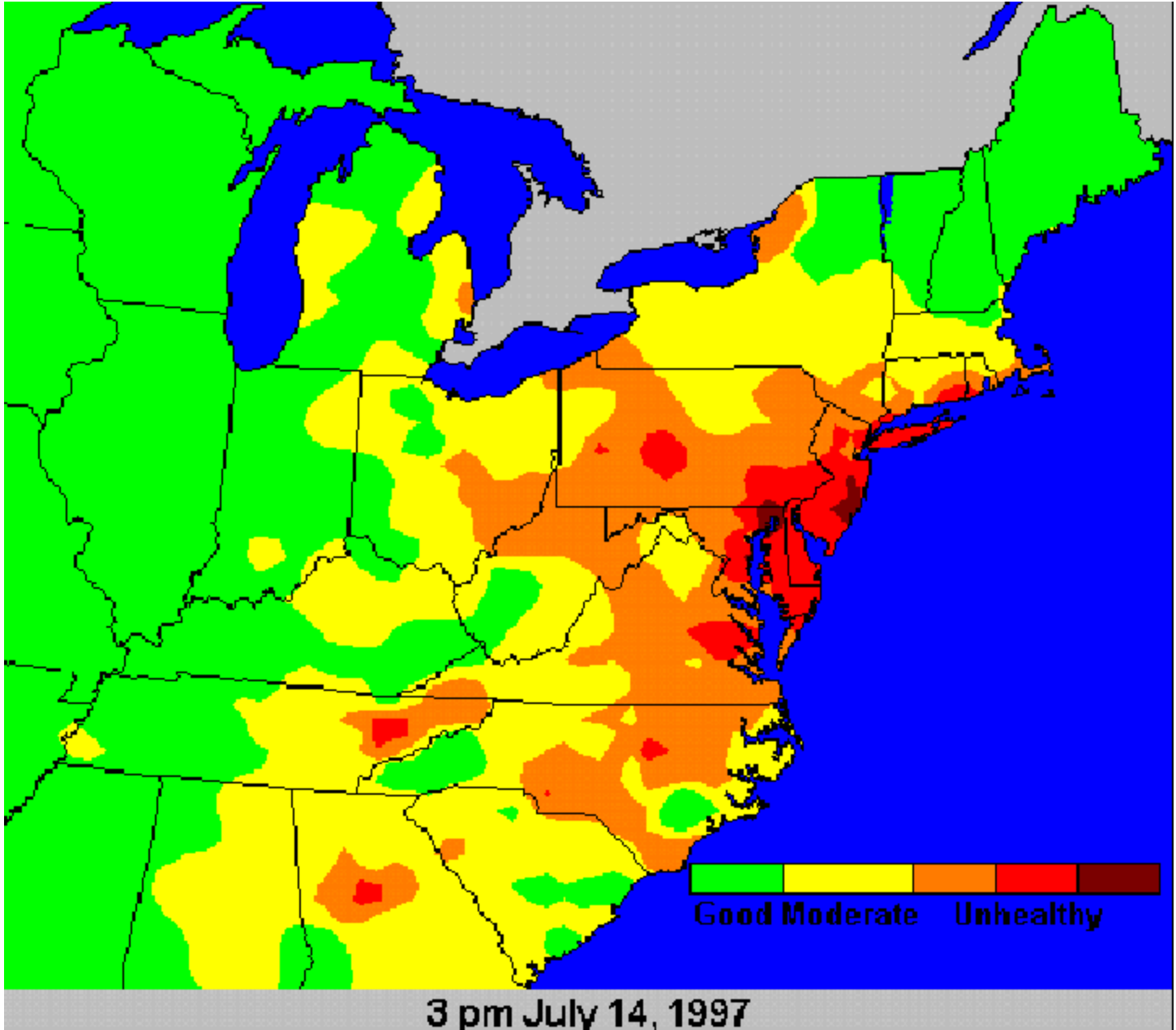
Los Angeles, California (Professional Journalists)⁸

Participant	Gender	Years in Field	Media	Topic(s) of Specialization	Geographic Area Covered
A	F	7	Print	General assignment reporter	Kansas
B	F	20+	Print	Workplace benefits, health care, labor	National
C	F	25	Print	Own/edit weekly newspaper in city with population of 63,000 people	Central Arkansas
D	M	7	Print	Business, health care	Southeast Michigan
E	F	7	Print	Education	Southern West Virginia
F	M	21	Print	General	West Virginia/Ohio
G	M	38	Print	Editorial writing	Southwestern Pennsylvania
H	M	14	Print	Education, crime	Western North Carolina
I	M	10	Television	[not provided]	Utah
J	M	54	Print, radio, television	General	Chicago, Illinois
K	M	7	Print	Federal Aviation Administration (FAA) safety	Colorado, Kansas, Oklahoma, Texas
L	F	30+	Print	Feature writer (spirituality, women's issues, animal rights, ecology)	Midwestern U.S., Tennessee, Virginia, Northern California
M	F	30	Print	Feature writer (health and medicine, bioethics, seniors, disability and ergonomic issues)	Phoenix, Arizona

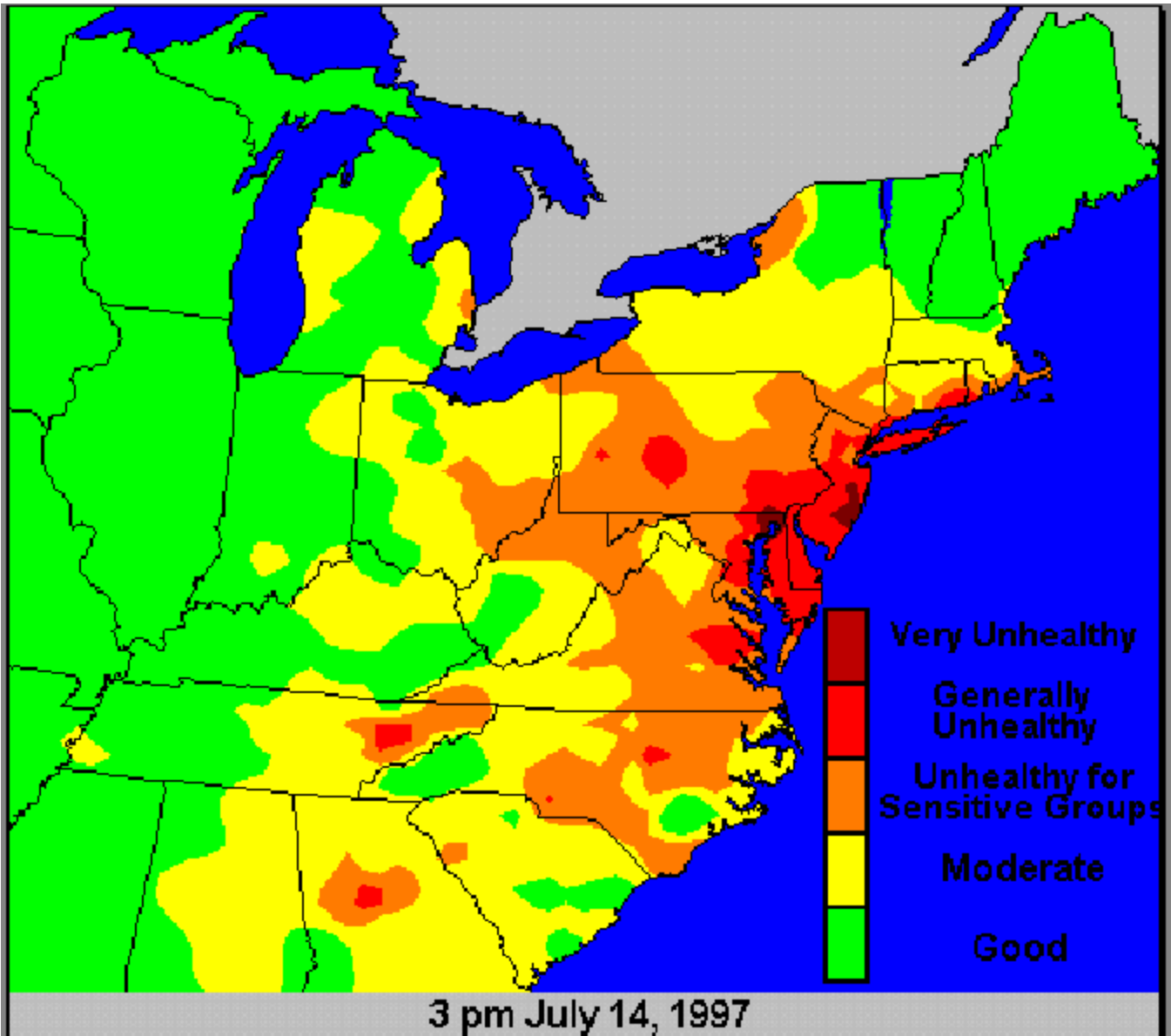
⁸Journalists specializing in environmental issues were intentionally not included in the focus group.

APPENDIX J
MAPS USED IN FOCUS GROUPS

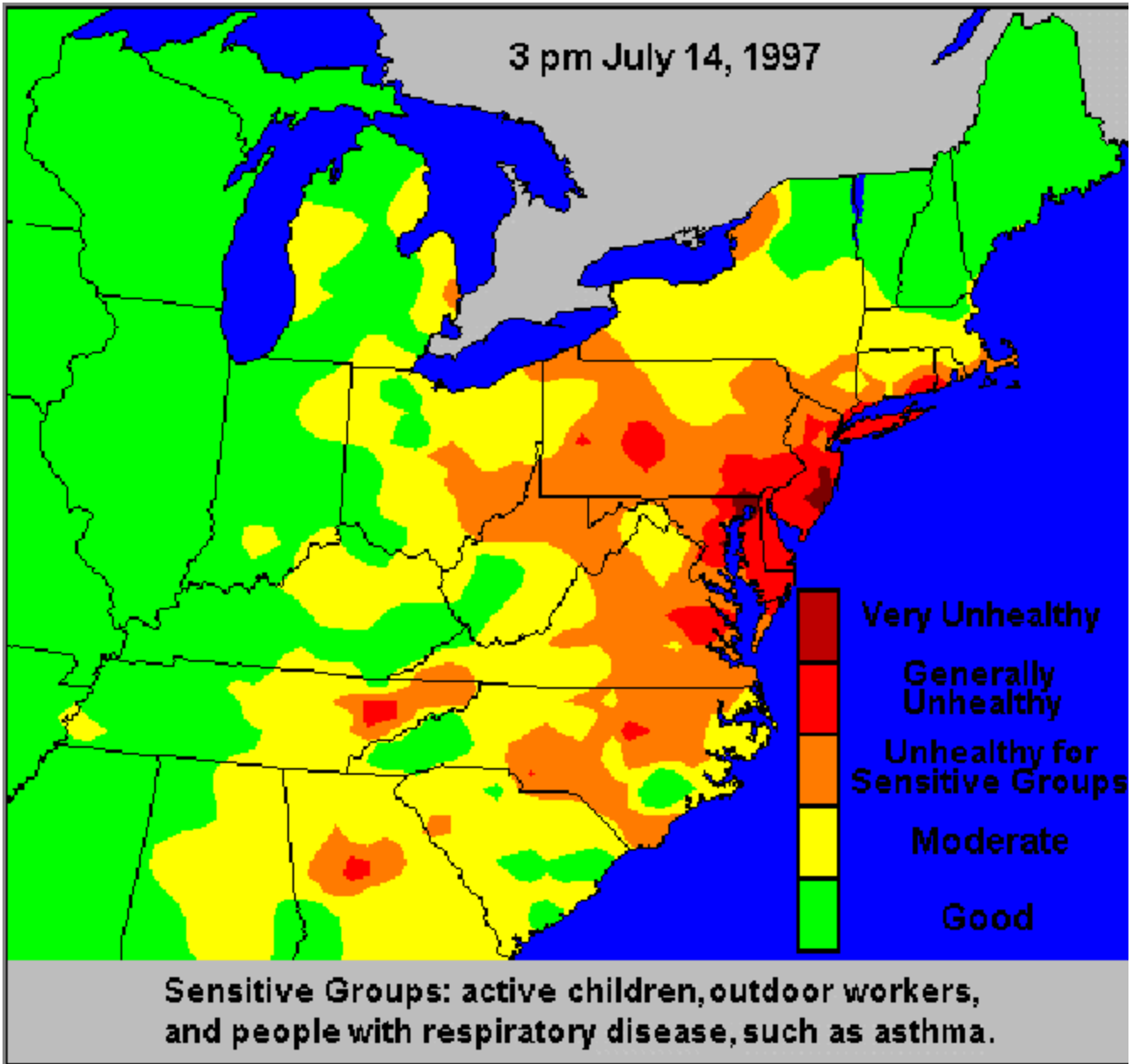
Map 1



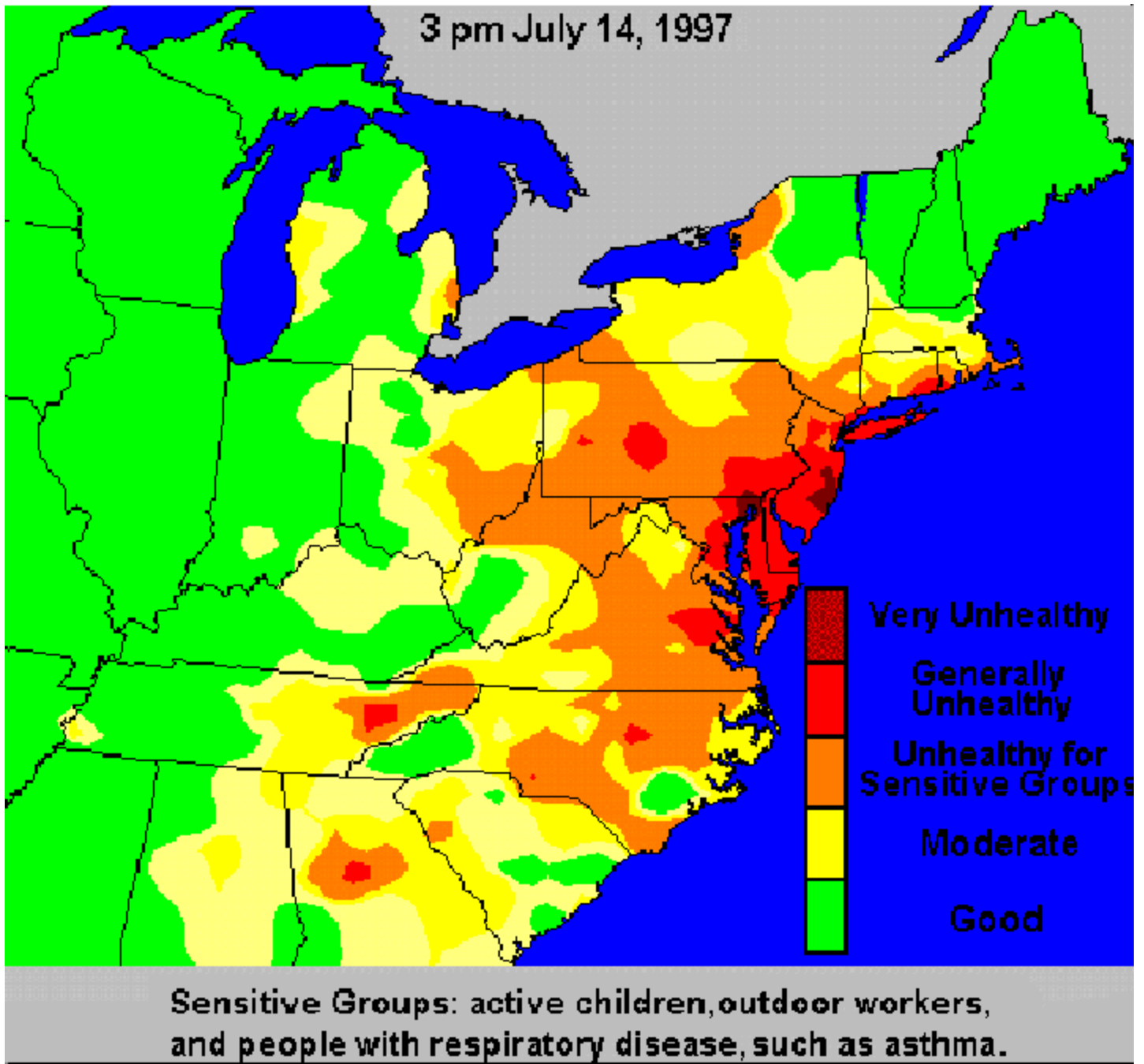
Map 2



Map 3



Map 4



Map 5

