

Assessing Public Opinions on Visibility Impairment due to Air Pollution: Summary Report

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Disclaimer

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Summary Report

I. Project Overview

The EPA is currently reviewing the National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM). In doing so, the EPA has proposed to conduct a series of focus groups throughout the U.S. to obtain information on public opinions concerning visibility impairment. EPA will use the findings from these focus groups to review and evaluate the Secondary NAAQS Standard for PM. Secondary NAAQS standards are established to protect against adverse effects on public welfare, as opposed to primary NAAQS standards that address human health effects. Visibility impairment is an adverse welfare effect associated primarily with human-induced particulate air pollution. The proposed focus groups will provide important information on public opinion regarding the discernability and acceptability of differing levels of visibility impairment.

On November 16, 2000, Abt Associates coordinated a pilot focus group session in Washington, D.C. as a trial run for the future focus group sessions. The intent of the pilot focus group was to test both the session design and the survey questions to ensure the collection of useful responses. The pilot focus group, however, was only an informative qualitative process. It was not meant to be a statistical sample. This summary report details the results of the pilot session and provides analysis of those results, though any conclusions made are not based upon statistical relationships. We also include discussion on focus group limitations and include suggestions for the future focus groups.

We designed the pilot focus group session after a 1989 Denver, Colorado study by Ely et al. titled, "The Establishment of the Denver Visibility Standard." Ely et al. conducted the study to gather public opinion on the level of visibility impairment considered acceptable in the metropolitan Denver area. The study required participants to view and rate a series of slides with different levels of visibility impairment using a typical view of the Denver metropolitan area. The study findings were used in the establishment of a local visibility standard of $76 \mu\text{g}/\text{m}^3$ (about 32 miles visual range, or 20.3 deciviews). The study based this standard on a 50% acceptability criterion, meaning the visual air quality level that would divide the slides into two groups: those judged acceptable and those judged unacceptable by a majority of the people in the study.¹

The authors of the Colorado study believed that "since visual air quality (VAQ) is an aesthetic judgement, the use of public judgement was appropriate and necessary for public acceptance" of a visibility standard. They based their study methods on previous studies conducted by the National Park Service (NPS) and the

¹ Ely, Daniel W, et al. *The Establishment of the Denver Visibility Standard*, Air and Waste Management Association, presentation at Annual Meeting on June 16-21, 1991, p. 11.

National Center for Atmospheric Research (NCAR).² These studies revealed that judgements of VAQ are reliable and valid. They found that VAQ judgements are highly correlated from one person or group to the next, and that judgments made in the field are highly correlated to judgments made later from slides taken during the original field judgment. The studies by the NPS and NCAR also showed that VAQ judgments made in different locations by different people around the city were strongly associated.

Jon A. Krosnick, Ph.D. also assisted in the design of this study. Dr. Krosnick is a professor of Psychology and Political Science at The Ohio State University with extensive knowledge in the cognitive processes involved in responding to survey questionnaires. We used his advice to develop the format of the focus group session, to design the slide rating process, and to formulate the questions we asked respondents.

II. Methods

A. Participant information

We chose nine individuals that represented a cross-section of the general public in the metropolitan Washington, DC area for the pilot focus group session. Our selection criteria required that at least two participants meet each of the following specifications:

- ▶ Household Income: under \$25,000 per year; between \$25,000 and \$60,000 per year; and over \$60,000 per year;
- ▶ Age: 18 – 25; 26-55; 56 and older;
- ▶ Race/ethnicity: African American or Hispanic;
- ▶ Residence: District of Columbia, Maryland, Virginia.

Exhibit 1 lists the demographic characteristics of each of the nine participants.

² Studies conducted by the National Park Service (Malm, W.C. et al., “Human perception of visual air quality (uniform haze)”) and the National Center for Atmospheric Research (Stewart, T.R. et al., “Urban visual air quality judgements: reliability and validity”).

Exhibit 1: Participant Demographics								
Participant	Gender	Age	Region	Race ^a	Education ^b	Household Income	Number of People in Household	Number of People in Household under Age 18
1	F	56	MD	A	A	\$25K-\$34K	3	0
2	M	25	DC	B	B	\$25K-\$34K	1	0
3	F	27	VA	B	B	> \$100K	2	0
4	F	34	DC	B	C	\$40-\$59K	1	0
5	F	58	DC	B	C	\$25K-\$34K	1	0
6	F	39	MD	A	C	> \$100K	4	2
7	M	42	MD	B	C	> \$100K	2	0
8	M	34	MD	A	B	\$60K-\$99K	1	0
9	F	34	MD	B	C	\$40K-\$59K	1	0

a: A = Black or African American; B = White

b: A = Some college or trade school; B = College graduate; C = Graduate school or advanced degree

B. Slide development

Air Resource Specialists (ARS) developed the photographic slides used in this study. ARS is a Fort Collins, Colorado-based firm with many years of experience in conducting optical monitoring for the IMPROVE visibility monitoring network, and in the modeling of visual air quality. ARS developed a series of 25 high-quality 35 mm slides of the same vista of Washington, DC as viewed from across the Potomac River near Arlington Cemetery. The vista includes the Mall in downtown Washington, DC, and several well-known landmarks, including the Lincoln Memorial, Washington Monument, Capitol Building, Union Station, and Library of Congress. The sight path to the furthest landmark in the scene (the Anacostia neighborhood) is fairly short - approximately 8 kilometers.

The slide images were generated from a single base image taken on a very clear day using a series of sophisticated algorithms used to simulate the optical properties of varying pollutant concentrations on a scene. These algorithms were published and peer-reviewed in a 1994 article

by Molenaar et. al. in the journal Atmospheric Environment.³ ARS also makes available a more simplified, Windows-based version of this modeling technique called WinHaze.

The EPA recommended that the levels of PM_{2.5} represented in the slides range from estimated natural conditions (about 2.3 ug/m³) to high haze conditions (65 ug/m³) in order to simulate a broad range of pollutant concentrations. ARS used the same pollutant mix and relative humidity level in each slide so that changes in visual air quality from slide to slide could be attributed solely to changes in PM mass concentrations.

Visibility impairment is the result of light scattering and absorption by particles and gases in the atmosphere. Light scattering by fine particles (e.g. PM_{2.5}) is the principle cause of haze. For each image, the percent of total PM_{2.5} mass assigned to each component was chosen based on annual average values derived from data collected at the Washington, DC IMPROVE monitoring site from 1988 to 1999. For each PM_{2.5} level, the assumed pollutant mix was as follows: sulfate = 50%; nitrate = 10%; organic carbon = 25%; elemental carbon = 10%; fine soil = 5%.

Coarse particles (greater than PM_{2.5} but less than PM₁₀) also cause light scattering, but are less efficient per unit mass. Based on the relationship of PM₁₀ and PM_{2.5} values from Washington, DC IMPROVE data, a standard mass value was assigned to PM₁₀ for each image equal to 30 % of the PM_{2.5} mass. Light absorption by particles that make up blue sky is known as Rayleigh scattering, and a standard value of 10 Mm⁻¹ was assumed in generating the slides. Light absorption by gases is commonly attributed to NO₂, which gives a brownish cast to the sky color, particularly in urban areas. Based on a review of AIRS data for Washington, DC, an annual average value of 16 ppb was assumed for NO₂ and taken into account in the image modeling process.

We refer to slides within this report by their PM_{2.5} concentrations because this component is the principle contributor to total light extinction. However, as noted above, the total light extinction, or visual air quality, represented for each image also incorporates the less significant contributions of coarse PM, Rayleigh extinction, and gaseous NO₂. Visual air quality is often described by one of three mathematically-related visibility metrics. These metrics are visual range, expressed in kilometers or miles; the light extinction coefficient (Bext), expressed in inverse megameters (Mm⁻¹); and the deciview, which expresses changes in visual air quality that are incremental in terms of perception across the range of conditions.⁴ Exhibit 2 lists the PM_{2.5} concentration and visibility metrics associated with each slide used in the study.

We removed Slide 2 (60 µg/m³), Slide 4 (52.5 µg/m³), Slide 6 (47.5 µg/m³), Slide 8 (42.5 µg/m³), and

³ Molenaar, J.V., et al., *Visual Air Quality Simulation Techniques*, Atmospheric Environment, vol. 28, no. 5, p. 1055-1063, March 1994.

⁴ Ibid.

Slide 10 ($37.5 \mu\text{g}/\text{m}^3$) from the original set of 25 slides and did not show them to the focus group participants. We removed the slides because feedback received from an internal trial run of the focus group session indicated that the visual air quality changes between Slides 1 through 10, which had high concentration levels, were hard to discern.

Exhibit 2: Washington, DC Visual Air Quality Modeling Slides				
Slide Number	PM_{2.5} Concentration ($\mu\text{g}/\text{m}^3$)	Visual Range (km)	Deciview (dv)	Bext (Mm^{-1})
Slide 1	65	8.5	38.3	460
Slide 3	55	10.0	36.7	391
Slide 5	50	11.0	35.7	357
Slide 7	45	12.1	34.7	323
Slide 9	40	13.6	33.6	288
Slide 11	35	15.4	32.3	254
Slide 12	32.5	16.5	31.6	237
Slide 13	30	17.8	30.9	219
Slide 14	27.5	19.3	30.1	202
Slide 15	25	21	29.2	185
Slide 16	22.5	23	28.2	168
Slide 17	20	26	27.1	151
Slide 18	17.5	29	25.9	133
Slide 19	15	34	24.5	116
Slide 20	12.5	39	22.9	99
Slide 21	10	48	21.0	82
Slide 22	7.5	60	18.7	65
Slide 23	5	82	15.6	48
Slide 24	2.5	129	11.1	30
Slide 25	2.32	163	8.8	24

C. Visual presentation

Shugoll Research, a full service research organization located in Bethesda, Maryland, hosted the focus group session in a room with a one-way mirror for observation. Abt Associates used a Kodak AMT Ektagraphic Projector, equipped with a high quality projection lens (f2.8), to project slides onto a matte white finish screen. We chose the lens and the matte white finish screen to ensure image sharpness and excellent color reproduction. We also placed the slide projector on a stand to ensure that the image was centered on the screen to eliminate geometric distortion. The lights were off while participants viewed the slides.

Participants sat around a rectangular table placed parallel to the screen. Half of the participants were seated facing the screen while the other half had to swivel around from the table to view the screen. We provided participants seated with their backs to the screen clipboards to record their responses in the answer booklet when they turned around.

D. Focus group session

The pilot focus group section lasted approximately two hours, and was organized in two parts. The first part of the session consisted of the data collection process. The second section consisted of a group discussion. In order to ensure that an accurate, unbiased opinion was given by participants, we did not inform them that EPA was sponsoring the session until the conclusion of the focus group session. Throughout the focus group, we made a conscious effort to ensure that participants focused only on the aesthetic qualities of visibility. The facilitator made no mention of the possible health effects due to air pollution.

In the first part of the session, participants received a brief lesson on what visibility is and how air pollution can affect visibility conditions. They were then shown a series of four “warm-up” slides that represented nearly the entire range of visibility conditions they would be asked to rate. Participants were then asked to rate a set of 25 slides twice, first rating the VAQ of each slide, and then rating whether the level of visibility impairment in each slide was acceptable or unacceptable. We also gathered information on the length of time certain visibility conditions would be acceptable. The first part of the session concluded with an economic valuation question that required participants to choose between two pollution control options resulting in differing levels of visibility impairment improvement. Section III of this report contains additional information on each of these parts.

During a 15 minute break after the first session, we tallied participant responses to the acceptability / unacceptability question and chose four slides for the group discussion in the second part of the session. The four slides chosen consisted of:

- ▶ the slide with the highest level of visibility impairment that all participants found acceptable,
- ▶ the slide with the lowest level of visibility impairment that all participants found unacceptable,
- ▶ the slide with the highest level of visibility impairment that five participants found acceptable and

- four participants found unacceptable,
- ▶ the slide with the highest level of visibility impairment that five participants found unacceptable, and four participants found acceptable.

The second part of the session consisted of a group discussion on: the slides selected during the break, the length of time differing levels of visibility impairment would be acceptable, and other topics or questions participants wished to discuss. We discuss the slides chosen for discussion, as well as their visibility impairment levels, in more detail in Section III. F. The group discussion also included a participant evaluation of the pilot focus group.

III. Results

A. Representativeness of view

To begin the focus group session, we had participants view the vista of Washington, DC that was going to be presented on each slide during the session. Participants then answered two questions to determine if the standard vista of Washington, DC was a typical view for the participants. We held a brief discussion regarding their answers after participants had recorded their responses. The slide we chose for this section had a PM concentration of $15 \mu\text{g}/\text{m}^3$.

The first question asked participants how often they see a view like the one in the slide shown to them. The responses they had to choose from included: Never, Rarely (once a year), Infrequently (once a month), Occasionally (once a week), Frequently (once a day), Other. Four participants (Participants 2, 4, 5, 8) answered that they occasionally saw a view similar to the vista in the slide, and three participants (Participants 1, 6, 9) answered that they infrequently saw a view similar to that in the slide. Participant 3 answered “several times per year”, and Participant 7 answered that they saw a view similar to the one shown both occasionally and frequently.

The second question asked participants what they were doing when they saw a view similar to the one presented in the slide. We asked this question to determine if a participant’s activity influenced their opinion of what an acceptable or unacceptable visibility level was. Participants had a series of responses from which to choose including: Commuting to/from work, At home, Performing day-to-day activities, Outdoor leisure activities, Other. Four participants (Participants 1, 2, 3, 9) answered that they see a view similar to the one presented when they are performing outdoor leisure activities. Two participants (Participants 7, 8) see the vista when they are at work, and two (Participants 8, 9) see one similar when they are performing day-to-day activities. One participant (Participant 8) sees a similar view while they are commuting to work, and one (Participant 4) sees the view when they are at home. Three participants see a vista similar to the one in the slide while doing other activities such as, visiting friends or relatives, or touring the city when relatives visit them.

The intent of the discussion for this section was to determine how the vista compared to the view

participants normally see and to determine what aspects of the vista were different. Participant responses were not, however, consistent with our intent. Instead, participants offered opinions on what time of year the level of visibility impairment was similar to, and when they might see the vista. Participants mentioned that the level of visibility impairment was similar to a typical overcast summer day, but that visibility conditions can also be much worse than the level shown. A few participants discussed that they experience this vista on weekends and holidays when they travel into Washington, DC.

B. Strength of Attitude

We asked participants two questions during the session to assess their level of commitment to environmental issues. We also asked these questions to determine whether participants were answering later questions based on their opinions or if they were influenced by the session itself. Participants answered these questions before learning more about visibility. The first question asked participants how often they notice the quality of visibility on a given day. Six of the 9 participants (Participants 1, 2, 4, 5, 6, 8) reported that they “frequently” (once a day) notice the quality of visibility and 3 of the 9 participants (Participants 3, 7, 9) reported that they “infrequently” (once a month) notice the quality of visibility. The second question asked participants how important visibility conditions are to them. Four participants (Participants 4, 5, 6, 9) reported that visibility conditions are “extremely important” to them, 4 participants (Participants 1, 2, 3, 8) noted that visibility conditions are “important” and one participant (Participant 7) answered that they are “somewhat important”.

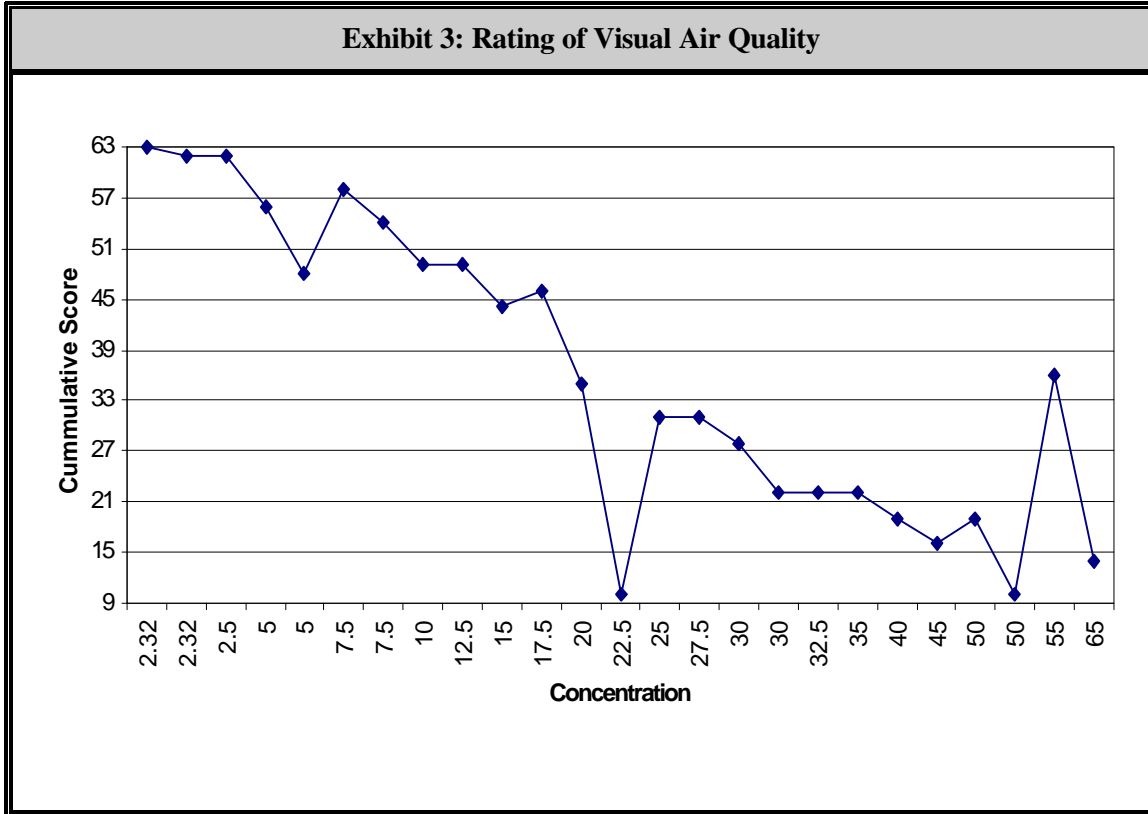
C. Rating of visibility conditions

Participants viewed 25 slides of the same vista of Washington, D.C. with varying levels of visibility impairment. Twenty of the 25 slides had different levels of visibility and 5 of the 25 were “reliability” slides that had repeat visibility levels. We projected the 20 unique slides in random order with the randomly chosen duplicates appearing as the last five slides. Participants rated the slides on a scale ranging from Very Poor to Very Good. We used a seven point scale with only the anchors of Very Poor and Very Good defined. Each slide was shown for approximately 5 to 10 seconds.

The rating of visibility conditions provided participants with an opportunity to practice rating slides, and also provided calibration to the range of visibility conditions presented in the slides. The rating also provided an opportunity to check consistency with opinions presented in the rating of unacceptable/ acceptable slides discussed in the next section.

We calculated a cumulative score for each slide by totaling all nine participant responses. Each response had a value ranging from 1 (Very Poor) to 7 (Very Good) based on the box checked by the participant in the response booklet. The highest cumulative score a slide could receive was a 63 (all participants reported the slide had “Very Good” visibility conditions) and the lowest cumulative score a slide could receive was a 9 (all participants reported the slide had “Very Poor” visibility conditions). Exhibit 3 graphs the cumulative score of each slide versus the concentration level for each slide.

In the graph, one can see that slides with lower levels of concentration received higher cumulative scores than slides with higher levels of concentration. The slides with concentration levels of 22.5 $\mu\text{g}/\text{m}^3$ and 55 $\mu\text{g}/\text{m}^3$, however, were not consistent with this trend. Reasons for this are discussed in Section G.



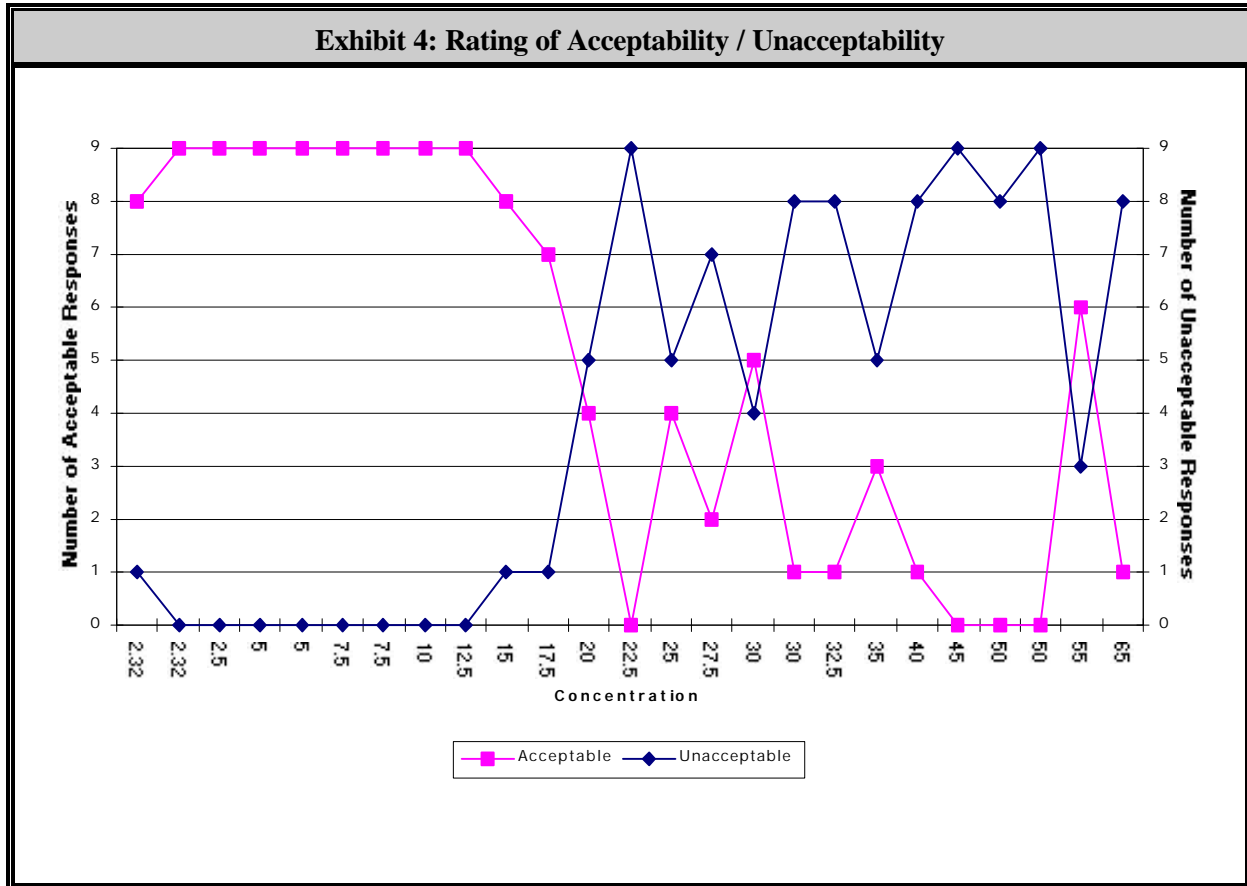
D. Rating of acceptability/unacceptability

Participant responses to the rating of acceptable/unacceptable levels of visibility impairment will be used to assess public opinion on what level of concentration the Secondary NAAQS standard should be set at. The facilitator discussed with participants that different people will have different opinions on what level of visibility impairment is acceptable or unacceptable to them, and that their responses should be based on their own opinion.

For the rating of acceptability/unacceptability, participants viewed the same set of 20 slides and 5 duplicates in the same order that they viewed them in the previous section. Participants rated the level of visibility impairment in each slide as either acceptable or unacceptable. We let participants view each slide for approximately 5 to 10 seconds while participants recorded their responses in booklets.

Exhibit 4 displays the number of acceptable/unacceptable responses by level of concentration in each slide.

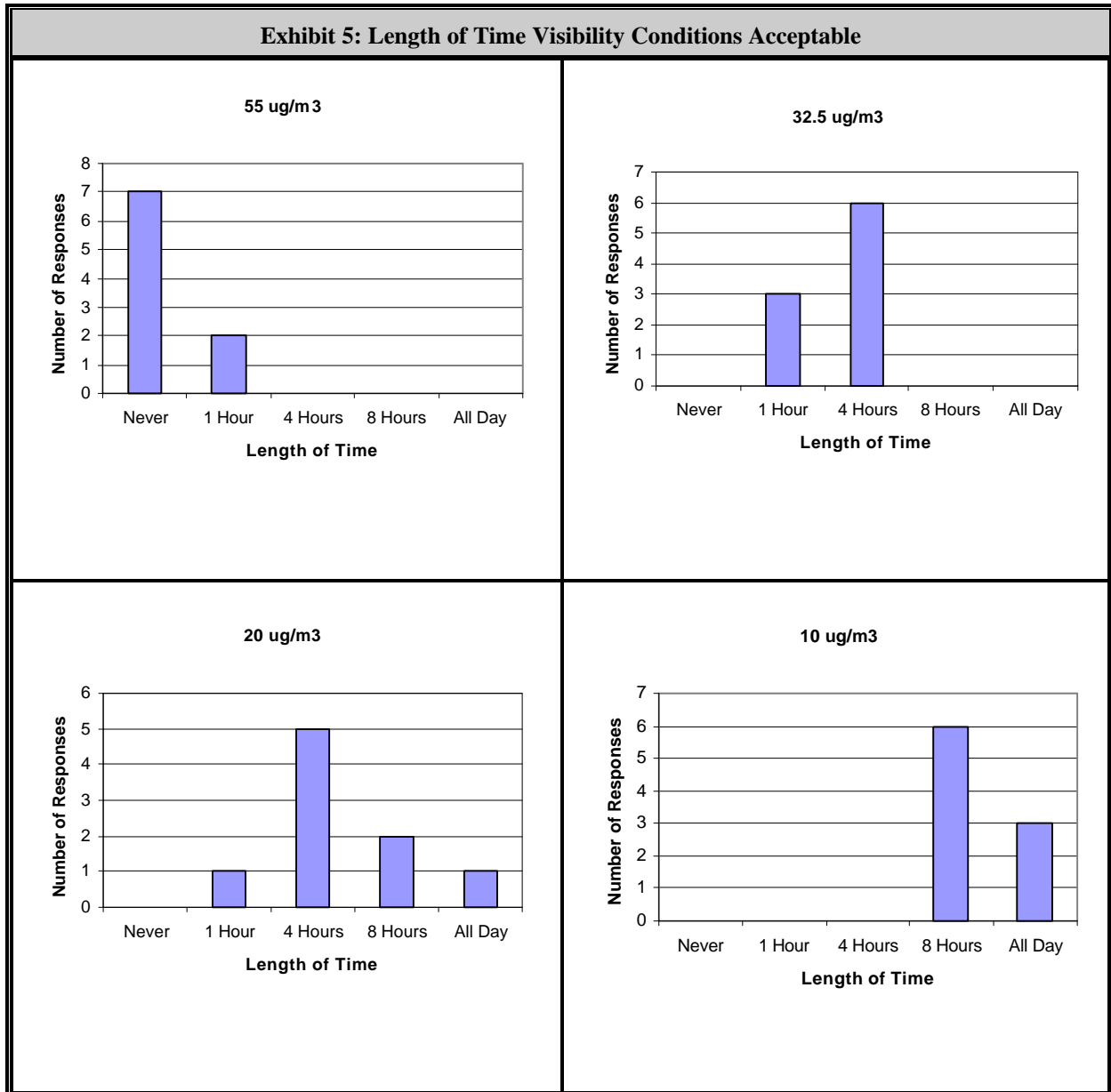
The number of acceptable responses is presented on the left-hand y-axis and the number of unacceptable responses is presented on the right-hand y-axis. Participants were consistent in their rating of slides with concentrations levels of 20 $\mu\text{g}/\text{m}^3$ and below. Levels below 20 $\mu\text{g}/\text{m}^3$ were consistently ranked as acceptable by most participants. Most participants found levels of concentration above 30 $\mu\text{g}/\text{m}^3$ to be unacceptable. The drastic change in participant responses at 22.5 $\mu\text{g}/\text{m}^3$ and 55 $\mu\text{g}/\text{m}^3$ is discussed in Section G.



E. Length of time visibility conditions are acceptable

To obtain public opinions on the length of time certain levels of visibility impairment would be acceptable, participants viewed four slides of different levels of visibility impairment (55 $\mu\text{g}/\text{m}^3$, 32.5 $\mu\text{g}/\text{m}^3$, 20 $\mu\text{g}/\text{m}^3$, and 10 $\mu\text{g}/\text{m}^3$). We asked participants how long each level of visibility impairment would be acceptable to them and gave them the choices of: Never, 1 Hour, 4 Hours, 8 Hours, All Day. The facilitator introduced the section by informing participants that visibility conditions are not always constant and can vary throughout the year, day, and from one point in the day to another. The facilitator then asked participants to view the slides and imagine that the level of visibility impairment shown was the worst it would be over the course of any given day.

The first slide shown had a concentration level of $55 \mu\text{g}/\text{m}^3$. Participants rated the two slides with the highest level of visibility impairment ($55 \mu\text{g}/\text{m}^3$) and lowest level of visibility impairment ($10 \mu\text{g}/\text{m}^3$) almost never acceptable or almost always acceptable, respectively. Participants rated the two other slides with concentrations levels of $32.5 \mu\text{g}/\text{m}^3$ and $20 \mu\text{g}/\text{m}^3$ with a variety of responses. Exhibit 5 presents participant responses to each of the four slides.



F. Visibility valuation

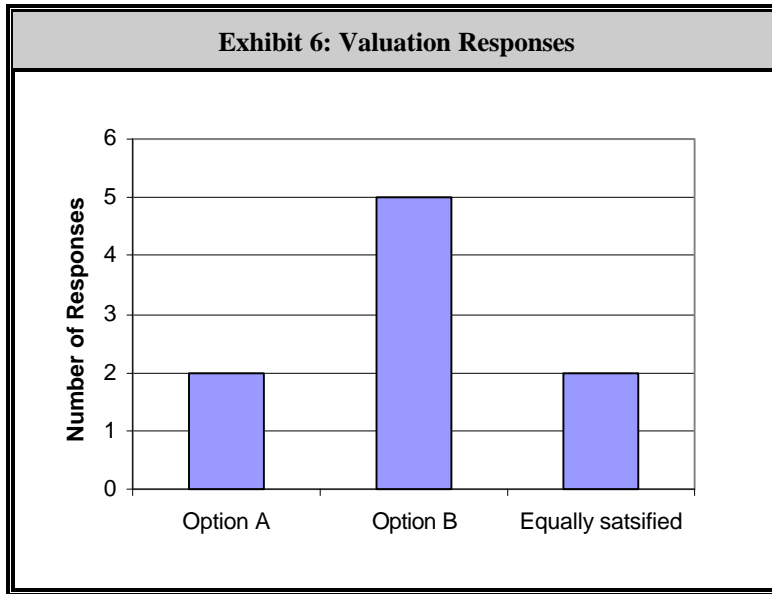
In this section, we asked participants to choose between two policy options that resulted in different levels of visibility improvement at different costs. We chose a slide with a concentration level of $32.5 \mu\text{g}/\text{m}^3$ to

represent the “present day” visibility conditions, and two slides with concentration levels of $22.5 \mu\text{g}/\text{m}^3$ and $15 \mu\text{g}/\text{m}^3$ to represent Option A and Option B, respectively. Option A would result in a cost of living increase of \$10 per year, and Option B would result in a cost of living increase of \$50 per year. The valuation question presented participants with a trade off situation. If participants were to choose Option B, it would result in a higher cost of living increase, and they would be required to give up something they currently have in order to have a better level of visibility. We instructed participants on what an increase in their cost of living increase would mean and then gave them an example. We also gave participants an example of a trade off situation. A choice between a sit down dinner in a restaurant costing \$10, and a fast food dinner costing \$5, illustrated the point.

Participants viewed each of the three slides representing Option A, Option B, and the baseline. We then asked them to compare the slides. We projected Option A first followed by the baseline. We then projected Option B followed by the baseline again. Participants viewed the sequence of slides as many times as they requested and then recorded their response in the booklet. Participants chose between 5 responses: No change, Option A, Option B, Equally satisfied with either Option A or Option B, Don't know.

We added the valuation question to the focus group session as a test of whether participants would be able to answer a trade off question. We did not intend for the cost of the policy options to be representative of what an improvement in visibility impairment would cost the public, and no quantitative data on willingness to pay was expected from the responses.

Exhibit 6 shows participant responses. All participants were able to answer the question, and none chose the No change or Don't know responses. The nine participants provided a range of the remaining three responses with 2 choosing Option A, 2 choosing Equally satisfied, and 5 choosing Option B. We believe that the respondents in this focus group were able to answer the tradeoff question. Additional discussion regarding the valuation question is in Section VI.



G. Slide and respondent inconsistencies

To keep track of the air quality present in each randomly ordered slide, we prepared a key that matched a slide’s identification number to its air quality concentration. Prior to the focus group session, we used this key to place slides into the slide projector tray. Once respondent results were tallied, we noted that for two slides there was a discrepancy between results recorded for the slides in question and results associated with slides of similar levels of air quality. The slides in question had air quality concentrations of 22.5 $\mu\text{g}/\text{m}^3$ and 55 $\mu\text{g}/\text{m}^3$.

We believe that the two slides were reversed when loaded into the tray. In the random order used to present slides to the focus group participants, the two slides were supposed to be viewed in succession, with the 22.5 $\mu\text{g}/\text{m}^3$ shown first and the 55 $\mu\text{g}/\text{m}^3$ following. Based upon the unexpected responses, however, we believe that their order became reversed, with the 55 $\mu\text{g}/\text{m}^3$ slide shown first and the 22.5 $\mu\text{g}/\text{m}^3$ following. This reversal did not bias participant responses, since there was no particular order in which the slides were supposed to be shown. However, the reversal did result in inconsistent results when participant responses were matched with the slide key.

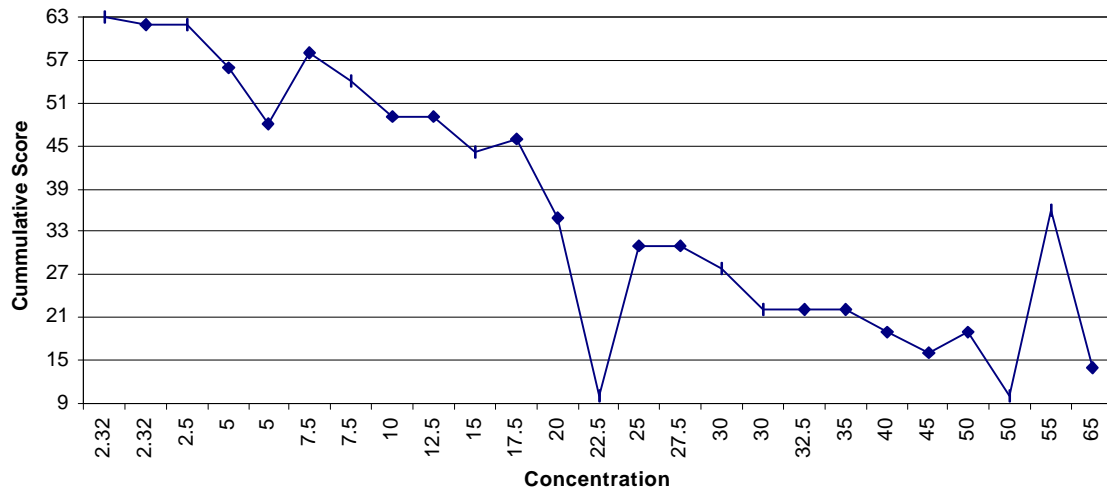
In Exhibits 7 and 8 we reproduce two of the earlier figures, the ranking of VAQ and the acceptability/unacceptability slide ranking. In each, we correct for the reversal between the order in which they were shown and the key. One can see that when the two are reversed, the results are more consistent with results recorded for other slides.

In addition to the slide order discrepancy, the response tally yielded problems with two focus group participants. Participant 8 left one response to the VAQ ranking portion of the focus group blank. The

missed slide was the third one shown (the $22.5 \mu\text{g}/\text{m}^3$ slide). We believe that the omission yielded an additional error: on the next slide ($50 \mu\text{g}/\text{m}^3$) Participant 8 rated it as very good, while the other participants rated the slide as either very poor, poor, or below average. It appears that the rest of Participant 8's responses were not affected.

Participant 4 did not provide an acceptable/unacceptable rating for three slides located near the beginning of the slide presentation order. The three missed slides were in positions 4, 6, and 8 and had air quality concentrations of $50 \mu\text{g}/\text{m}^3$, $17.5 \mu\text{g}/\text{m}^3$, and $35 \mu\text{g}/\text{m}^3$ respectively. Participant 4's omissions appear to have caused an additional ranking problem. For the seventh slide shown, which had an air quality concentration of $2.32 \mu\text{g}/\text{m}^3$, Participant 4 marked the slide unacceptable. All of the other participant responses for this slide were acceptable.

Exhibit 7: Rating of Visual Air Quality with Original Data



Rating of Visual Air Quality with Slide Correction

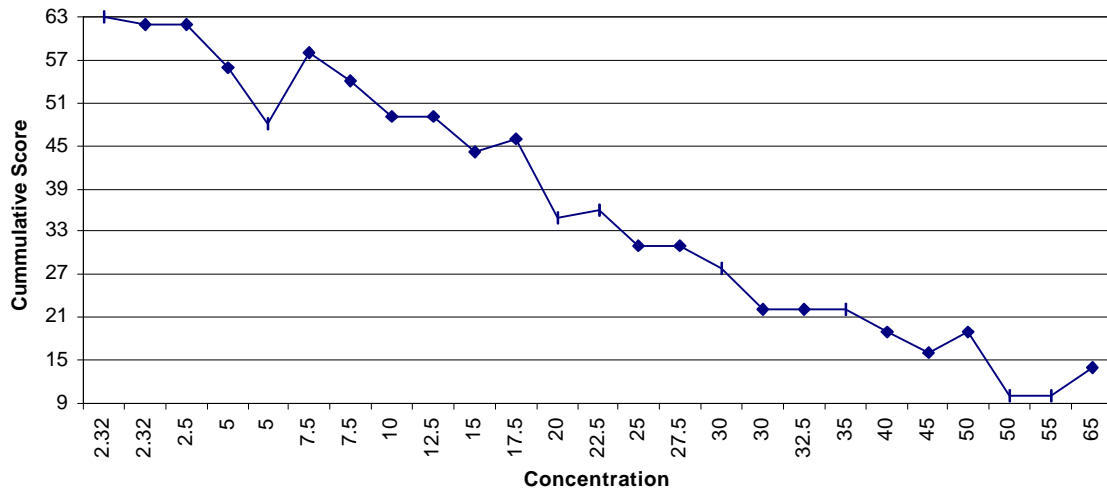
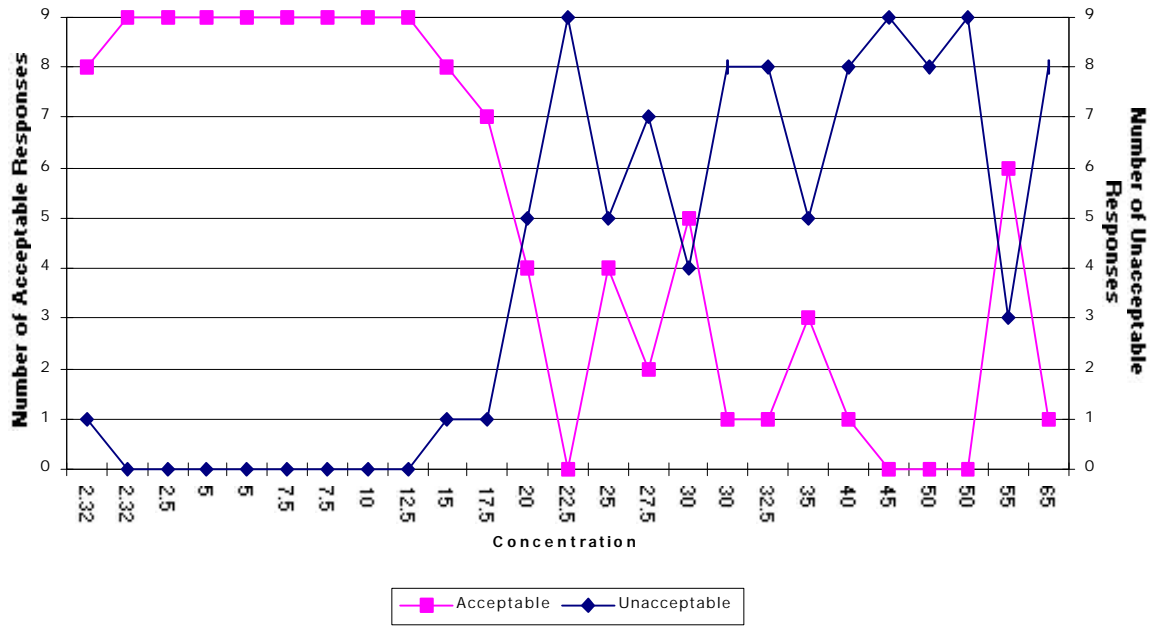
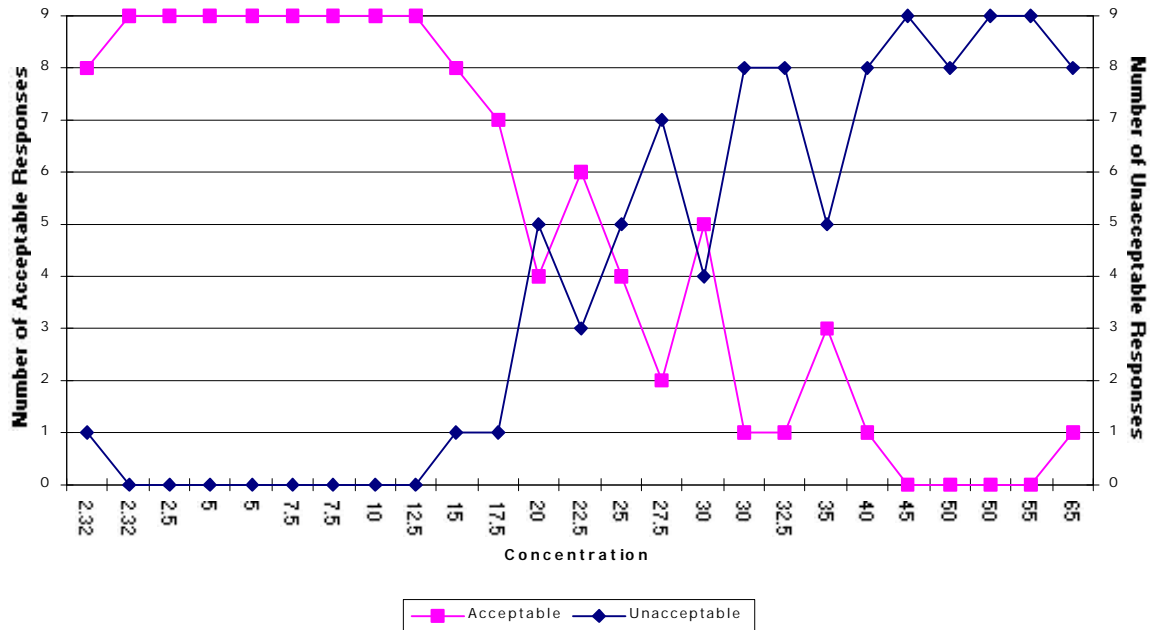


Exhibit 8: Rating of Acceptability / Unacceptability with Original Data



Rating of Acceptability / Unacceptability with Slide Correction



H. Summary of focus group discussion

In the discussion of the slide rating process, participants revealed the guidelines they used in deciding whether a slide was acceptable or unacceptable. Participants used objects, such as the top of the Capital Building and the Washington Monument, to discern changes in visibility conditions. Participants discussed that they looked for color changes in these objects, as well as color changes in the sky and horizon. Participant 2 discussed that the really unacceptable slides were the ones where the sky was the same color as the white of the buildings in the slide.

Participants also used the quality of crispness in objects as a rating tool. Participants discussed that in shots with poor visibility, the trees in the foreground blurred together, and you could not distinguish one tree for another. One participant looked at both the trees in the foreground of the slide and smoke stacks on a building in the distance to assess whether or not the level of visibility impairment was acceptable. Participants acknowledged that their opinion on whether a slide was acceptable or not could have been influenced by the slide they saw previous to it.

Exhibit 9 lists the slides chosen for discussion in the second part of the focus group session. These slides were chosen after participant responses were tallied for the rating of acceptability / unacceptability.

Exhibit 9: Slides Chosen for Discussion		
Concentration (μm^3)	Number of Acceptable Responses	Number of Unacceptable Responses
12.5	9	0
55	0	9
30	5	4
25	4	5

Slides with concentration levels of $12.5 \mu\text{g}/\text{m}^3$ and $55 \mu\text{g}/\text{m}^3$ had the highest and lowest levels of visibility impairment that all participants found acceptable or unacceptable, respectively. All participants rated the concentration level of $12.5 \mu\text{g}/\text{m}^3$ as acceptable, however, Participant 5 noted in her response booklet that the level of visibility impairment was only “barely” acceptable. The overall response to the slide was that the level of visibility was not optimal, but compared to some of the other levels of visibility impairment shown, it was acceptable. One participant acknowledged that she wasn’t sure if her response was based solely on the level of visibility impairment in the slide, or a reaction to the slide shown previous to it, which had a level of visibility impairment of $30 \mu\text{g}/\text{m}^3$.

The second slide participants discussed had a visibility impairment of $55 \mu\text{g}/\text{m}^3$. All participants rated this slide as unacceptable. Discussion surrounding the slide involved comments on how the level of visibility impairment was “so bad that you could not see the Washington Monument and the Lincoln Memorial.”

Participants discussed that without being able to see these things, they wouldn't know that they were looking at a photograph of Washington, DC.

The slides with concentration levels of $25 \mu\text{g}/\text{m}^3$ and $30 \mu\text{g}/\text{m}^3$ are considered the "threshold" slides. Unacceptable/acceptable ratings were divided for these slides, and a few participants noted in their response booklet that the visibility was "so-so," "border line," and a "middle choice". Much of the discussion for these slides involved talk about the conditions looking like a hazy, hot, and humid day. Participants discussed the criteria they used for rating these two slides. The criteria consisted of the crispness of the trees in the foreground of the slide and the color changes in the Washington Monument from the haze line.

Participants discussed that they were thinking of the time of day that visibility conditions would look similar to the conditions in the slide. The visibility conditions resembled morning rush hour to the participant, with the expectation that the conditions would improve by the afternoon. Another participant had the opposite reaction to the visibility conditions in the slide. She thought that the conditions would only worsen throughout the day.

We asked participants if they were influenced by the length of time visibility conditions would be acceptable or unacceptable to them when they were rating the slides. Most participants responded that they were not thinking of how long conditions would be acceptable, and that they made their decision by simply using their initial reaction when looking at the slide.

We also asked participants if they were thinking about the negative health effects that might be associated with the higher level of visibility impairment in some of the slides. One participant is employed at an environmental organization, and found it difficult not to associate the visibility conditions with adverse environmental and public health effects. Other participants discussed that it was difficult because they know that air pollution and negative health effects "go together." For example, one participant discussed that the level of visibility impairment shown in the slide made her think of the negative health effects associated with a day similar to the one shown. She discussed that on a day similar to the one shown, her sinuses would bother her, and she would feel that the air quality for the day was bad for her health. Another participant discussed that he works outdoors and that while viewing the slides he was thinking about how long his crew could work in the visibility conditions shown.

Most participants mentioned that they were confused by the mistaken assumption that the different visibility conditions shown in the slides were a result of weather. Many discussed that it was hard to differentiate between weather and pollution, and that they would have different opinions on what is acceptable if the visibility conditions were a result of weather. One participant was confused by the slide shown while educating participants on visibility. The slide listed that one of the factors affecting visibility is weather. For many of the slides with higher concentration levels, participants thought that the level of impairment could be a result of fog or snow. One participant did add however, that the foreground of the picture was always in sunlight, therefore representing that the weather is constant in all slides. A participant suggested that for future focus groups we inform participants in the beginning of the rating

process that the weather conditions in all slides are the same, and that the only change in the slides is the particulate matter concentration level.

I. Agreement between duplicate slides

As mentioned previously, focus group participants viewed 25 slides of a Washington, D.C. vista, obscured by varying levels of air pollution. They rated visibility conditions on a scale of very good to very poor, and whether the VAQ in a given slide was acceptable or unacceptable. Of the 25 slides, 20 had unique levels of visibility and five were randomly chosen “reliability” slides that duplicated previous slides. The 20 unique slides were shown in random order first, with the randomly chosen duplicates appearing as the last five slides. Participants therefore unknowingly evaluated 5 slides twice in each rating exercise.

We included duplicate slides to test the agreement between participant responses within a given rating exercise. The results from each are compared in Exhibit 10.

Exhibit 10: Duplicate Slide Ratings				
Concentration ($\mu\text{g}/\text{m}^3$)	Rating of VAQ		Rating of Acceptability/Unacceptability	
	Original Slide	Duplicate	Original Slide	Duplicate
2.32	63	62	8/1 ^a	9/0
5.0	56	48	9/0	9/0
7.5	58	54	9/0	9/0
30.0	28	22	5/4	1/8
50	19	10	0/8	0/9

^a Number of respondents rating the slide acceptable/Number of respondents rating the slide unacceptable.

In general, respondents evaluated slides consistently between the first and the second viewing. In the rating of VAQ, the cumulative score for each slide decreased by an average of 5.6 on the second viewing (the higher the score, the better respondents felt the VAQ was). The smallest decrease was one point and the largest was 9. No slide received a larger cumulative score on the second viewing. This may be related to slide order effects. For the three duplicate slides with the smallest air quality concentrations, the difference in visual air quality between the first viewing of the duplicate slide and the slide that preceded it was greater than the difference between the second viewing of the duplicate slide and its preceding slide. The 30 $\mu\text{g}/\text{m}^3$ had similar slides precede it on each viewing (45 and 50 $\mu\text{g}/\text{m}^3$ respectively). The slides that preceded those, however, were extremely different, possibly causing the decreased VAQ rating on the

second viewing (35 and 40 $\mu\text{g}/\text{m}^3$ compared to 2.32 and 5 $\mu\text{g}/\text{m}^3$). Finally, we believe that one respondent mistakenly rated the 50 $\mu\text{g}/\text{m}^3$ on the first viewing. Respondent inconsistencies are addressed in the next section.

For the rating of acceptability and unacceptability, the participants' responses were generally consistent between viewings with one notable exception. On the second viewing of the 30 $\mu\text{g}/\text{m}^3$ slide, all but one of the respondents rated the slide as unacceptable, an increase in four unacceptable ratings from the first viewing. This may have been related to opinions wavering on slides located in the middle of the air quality range. We also believe that the order associated with the 30 $\mu\text{g}/\text{m}^3$ slide, as described above, contributed to the ranking change.

IV. General interpretation of results

We based the interpretation of results on response data corrected to incorporate the slide reversal. This is because the error was external to the administration of the focus group and did not affect participant responses. Participant errors and omissions, however, have not been adjusted in the response data set. Since we can not be certain that responses were given in error, we analyze all participant responses as they were given.

A. Relationship between PM concentration and slide VAQ rating

The respondents related a consistent judgement between visibility conditions and the level of air quality concentration present in the slide. At lower concentration levels, respondents consistently regarded the view as very good while at higher concentration levels, respondents consistently regarded the view as very poor. Respondents were also able to evaluate intermediate slides consistently, calibrating their responses between the best and worst slides. Exhibit 11 presents the array of slides shown to participants (arranged in order from low PM concentrations to high) and the corresponding average VAQ given by all 9 respondents. It appears that participant-judged VAQ was related, at least in part, to the air quality concentrations present in the slide.

B. Relationship between PM concentration and slide acceptability/unacceptability

The majority of respondents agreed that slides with an air quality concentration less than 20 $\mu\text{g}/\text{m}^3$ were acceptable, and slides with an air quality concentration greater than 30 $\mu\text{g}/\text{m}^3$ were unacceptable. In fact, at levels up to and including 12.5 $\mu\text{g}/\text{m}^3$ (with one exception at 2.32 $\mu\text{g}/\text{m}^3$), all participants agreed that the views were acceptable. At 45 $\mu\text{g}/\text{m}^3$ (with one exception at 65 $\mu\text{g}/\text{m}^3$), all participants found the views to be unacceptable. Participant responses to slides with concentrations between 20 $\mu\text{g}/\text{m}^3$ and 30 $\mu\text{g}/\text{m}^3$, however, revealed no clear pattern.

Ratings of acceptability and unacceptability were often split 5 to 4 or 4 to 5 in this range. For instance, slides with a concentration of 20 $\mu\text{g}/\text{m}^3$ and 25 $\mu\text{g}/\text{m}^3$ received 5 unacceptable ratings and 4 acceptable

ratings. A slide with $30 \mu\text{g}/\text{m}^3$, however, received 5 acceptable and 4 unacceptable ratings. Other slides within this range received 6 acceptable and 3 unacceptable ratings ($22.5 \mu\text{g}/\text{m}^3$) and 7 unacceptable and 2 acceptable ratings ($27.5 \mu\text{g}/\text{m}^3$).

Slide order may have influenced participant responses. For instance, the slide that preceded the $22.5 \mu\text{g}/\text{m}^3$ slide was $65 \mu\text{g}/\text{m}^3$, potentially swaying respondents towards an acceptable rating, while the slide that preceded the $27.5 \mu\text{g}/\text{m}^3$ slide, $10 \mu\text{g}/\text{m}^3$, may have pushed respondents in the opposite direction. Despite the effect slide order may or may not have on participant response, it is worth noting that slides with concentrations between $20 \mu\text{g}/\text{m}^3$ and $30 \mu\text{g}/\text{m}^3$ straddle the acceptability/unacceptability rating.

Many factors beyond the visibility present in each slide can have an impact on a participant's decision to rate a slide acceptable or unacceptable. What people consider to be acceptable or unacceptable is very subjective. Like the rating of VAQ, however, it appears that the participants' subjective determination of acceptability and unacceptability was related to the air quality concentrations in the slides. Exhibit 11 lists the percent of acceptable responses that correspond with the air quality concentration present in each slide.

C. Agreement between ratings of VAQ and acceptability

The relationship between PM measurements and VAQ judgements found in this focus group demonstrates that participants were able to link air quality to a personal judgement about the quality of the visibility. The same can be said for participant judgements of visibility acceptability/unacceptability. Both of these ranking exercises were based on responses to air quality concentrations present in the same set of slides. Whether or not participant responses were consistent between the rating of VAQ and acceptability/unacceptability is another question.

Exhibit 11		
PM Concentration ($\mu\text{g}/\text{m}^3$)	Average VAQ (7=Very Good; 1=Very Bad)	Percent Acceptable
2.32	7	89%
2.32	7	100%
2.5	6.875	100%
5	6.125	100%
5	5.375	100%
7.5	6.375	100%
7.5	6	100%
10	5.375	100%
12.5	5.375	100%
15	4.75	89%
17.5	5	88%
20	3.875	44%
22.5	4.286	67%
25	3.625	44%
27.5	3.25	22%
30	3.25	56%
30	2.5	11%
32.5	2.625	11%
35	2.375	38%
40	2.125	11%
45	1.875	0%
50	2	0%
50	1.125	0%
55	1.125	0%
65	1.5	11%

If we believe that participant rankings of VAQ are related to judgements of acceptability and unacceptability, there should then be some correlation between the two. To test this, we compare the percent of acceptable responses for a given slide to its corresponding average VAQ. The responses are located in Exhibit 11. For those slides with a percent of acceptability near 50% (20, 22.5, and 25 $\mu\text{g}/\text{m}^3$), the corresponding average VAQ ratings were 3.875, 4.286, and 3.625 respectively. A VAQ rating of 4 represented average visual air quality. We would expect a rating of average visual air quality to correspond with the 50% acceptability/unacceptability threshold. It therefore appears that for this group, there is agreement between ratings of VAQ and acceptability.

D. Duration of acceptability

The duration portion of the focus group asked participants to determine the length of time certain levels of visibility impairment would be acceptable to them. Responses to this question reflected a similar trend as observed in the ranking questions: participants distinguished between better and worse visibility days and expressed a preference for days that are better. Seven respondents stated that the slide with $55 \mu\text{g}/\text{m}^3$ was never acceptable, while the other two respondents stated it was acceptable for one hour on a given day. For a slide with an air quality concentration of $10 \mu\text{g}/\text{m}^3$, 6 participants stated that this was acceptable for 8 hours on a given day and 3 stated all day.

The intermediate slides also provided interesting results. There was general agreement that the $32.5 \mu\text{g}/\text{m}^3$ slide was acceptable for only a portion of the day, with 6 respondents stating 4 hours was acceptable and 3 respondents stating 1 hour. The slide with $20 \mu\text{g}/\text{m}^3$ received a variety of responses: one participant stated 1 hour was acceptable, 5 stated 4 hours was acceptable, 2 believed 8 hours was acceptable, and 1 stated this level was acceptable all day. The fact that there was no clear consensus regarding the duration of acceptability for this slide is consistent with the responses received during the ranking of slide acceptability/unacceptability. Recall that for slides with an air quality concentration between 20 and $30 \mu\text{g}/\text{m}^3$, respondents were split between whether they rated the slides acceptable or unacceptable.

E. Acceptability and representativeness of view

The slides used during the focus group session were limited to one vista of Washington D.C. To test if this was a representative view of the area, we showed participants a slide at the beginning of the session to gather information on whether the portrayed vista was a typical view. Four participants replied that they saw a view like the one in the slide occasionally, three said infrequently, and one stated "several times per year."

To test if a participant's belief that the vista was more or less typical had any influence on whether or not slides viewed later in the focus group had acceptable or unacceptable levels of visual air quality, we examined participant responses to a number of slides. The first slide examined was the same slide presented during the representativeness of view question ($15 \mu\text{g}/\text{m}^3$). Eight of the 9 respondents agreed that the slide was acceptable. The participant that responded with an unacceptable answer stated that they saw a view like the one in the slide infrequently. We also examined other slides within the acceptable/unacceptable threshold (between 20 and $30 \mu\text{g}/\text{m}^3$) and observed no clear trend between acceptability and the representativeness of the view.

F. Demographic and strength of attitude comparisons for consistency

We chose two slides at the acceptability/unacceptability threshold (22.5 and $25 \mu\text{g}/\text{m}^3$) to examine how sensitive demographic and strength of attitude characteristics were to participant responses. Though we can make no statistically significant conclusions on the basis of this examination, it is useful to see if there were any noticeable trends linking this focus group's demographic characteristics to their strength of attitude rating. For the $22.5 \mu\text{g}/\text{m}^3$ slide, 6 participants rated the slide as acceptable and 3 rated the slide unacceptable. Their demographic and strength of attitude responses are presented in Exhibit 12.

Exhibit 12: Demographic and Strength of Attitude Comparison - $22.5 \mu\text{g}/\text{m}^3$ Slide							
Participant	Gender	Age	Region	Race^a	Education^b	Income	Strength of Attitude^c
Acceptable Respondents							
2	M	25	DC	B	B	\$25K-\$34K	I
3	F	27	VA	B	B	> \$100K	I
4	F	34	DC	B	C	\$40-\$59K	EI
7	M	42	MD	B	C	> \$100K	SI
8	M	34	MD	A	B	\$60K-\$99K	I
9	F	34	MD	B	C	\$40K-\$59K	EI
Unacceptable Respondents							
1	F	56	MD	A	A	\$25K-\$34K	I
5	F	58	DC	B	C	\$25K-\$34K	EI
6	F	39	MD	A	C	> \$100K	EI

a: A = Black or African American; B = White

b: A = Some college or trade school; B = College graduate; C = Graduate school or advanced degree

c: EI = Extremely important; I = Important; SI = Somewhat important

The other slide examined, the $25 \mu\text{g}/\text{m}^3$ slide, had 4 participants rate it as acceptable and 5 rate it as unacceptable. Their demographic and strength of attitude responses are presented in Exhibit 13.

Exhibit 13: Demographic and Strength of Attitude Comparison - 25 µg/m ³ Slide							
Participant	Gender	Age	Region	Race ^a	Education ^b	Income	Strength of Attitude ^c
Acceptable Respondents							
2	M	25	DC	B	B	\$25K-\$34K	I
3	F	27	VA	B	B	> \$100K	I
4	F	34	DC	B	C	\$40-\$59K	EI
9	F	34	MD	B	C	\$40K-\$59K	EI
Unacceptable Respondents							
1	F	56	MD	A	A	\$25K-\$34K	I
5	F	58	DC	B	C	\$25K-\$34K	EI
6	F	39	MD	A	C	> \$100K	EI
7	M	42	MD	B	C	> \$100K	SI
8	M	34	MD	A	B	\$60K-\$99K	I

a: A = Black or African American; B = White

b: A = Some college or trade school; B = College graduate; C = Graduate school or advanced degree

c: EI = Extremely important; I = Important; SI = Somewhat important

As one can see from Exhibits 12 and 13, we observed no discernible relationships between demographic characteristics and a participant's acceptability/unacceptability rating. It also appears that there was no relationship between a participant's strength of attitude and their acceptability/unacceptability preference. Because no identifiable relationship existed between a participant's response and their demographic and strength of attitude classifications, it is likely that focus group participants were a representative sample of the targeted population.

The presumption that this small pilot-focus group was a representative sample is supported by one trend we did identify. Participants 1, 5, and 6 had remarkably similar acceptability/unacceptability responses. Each of these respondents were female, in mixed age, race, education, income, region and strength of attitude categories, yet they agreed that both slides were unacceptable. In fact, all of their acceptability/unacceptability responses were nearly identical, despite the mix in these participant's demographic and strength of attitude characteristics (except for sex). Participants 5 and 6 disagreed once (17.5 µg/m³), participants 1 and 5 disagreed twice (15 and 35 µg/m³), and participants 1 and 6 disagreed

three times (15, 17.5, and 35 $\mu\text{g}/\text{m}^3$).

V. Limitations

A general limitation of focus groups is that they generate qualitative data. Qualitative data collecting can lead to inconsistent responses among participants. In our focus group session, we used words such as “typical” and “acceptable,” which are personally defined. Participants may interpret these terms differently, and therefore rate visibility conditions differently. This general limitation of focus groups is not a great concern for our study however, because we are looking to obtain public opinion, which varies between participants. Our results showed fairly consistent ratings of visibility conditions between respondents, although there were inconsistencies in some of the ratings.

The pilot focus group session was limited to nine participants in order to comply with the Office of Management and Budget rules on conducting a survey. This small sample does not constitute a statistical sample, therefore, no statistically significant interpretations or correlations can be made with the collected data. General interpretations, however, can be made with the data.

Future focus groups may be expanded to 10 or 12 participants to gather more responses. They will not, however, be expanded to include a large number of participants per session. This ensures that all participants have an opportunity to take part in the discussion. Even with a small group size, however, we can not ensure that participants will answer all questions. After encountering this limitation in the pilot group, we should be aware that future focus groups may also encounter participant non-responses.

Focus groups are also limited to a small number of people to minimize the likelihood that a dominant participant will emerge. Often, when a dominant participant emerges, they place pressure on other participants to agree with their opinions. The format of the focus group session for our study was designed to ensure that participants expressed their own opinions and were not influenced by others. All survey questions were asked prior to the focus group discussion, so that participants had already rated the slides, and could not change their responses to agree with others. This design appeared to be successful, and no dominant / submissive relationships were formed in the pilot focus group session.

An additional limitation to this study is that the participants will not all view the slides under the same conditions. Considerable efforts have been made to minimize this impact, such as the purchasing of all equipment used in the pilot focus group session, so that it can be reused for future focus groups. A list of all required viewing distances will also be used to ensure that participants in different cities view the slides under nearly the same conditions as other participants. However, physical variations in focus group facilities are likely to occur throughout the country.

As evidenced in reviewing the ratings of the slides, the order in which the slides are presented to participants influences the ratings given to them. The slides are presented in random order to ensure that slides are not selectively assigned, and to eliminate the chance that the results are biased. Other than the 5

“reliability” slides that are added to the end of each rating section, there is nothing more that can be done to account for this limitation.

One major limitation to our study is the ability of participants to separate visibility conditions with health concerns. Participants are instructed to only rate the slides on the “way they look” and to only consider visibility conditions. The focus group script does not discuss the health risks associated with the higher concentration levels shown in some of the slides. The omission of associated health risks was intentional in the designing of the focus group to ensure that participants were not influenced by our mentioning of it. During the evaluation of our pilot focus group session, we asked participants if they thought they were successful in separating the two issues. Responses were split, with some participants saying they could make the distinction, while others replied that health concerns were factored into their decision making.

VI. Pilot session evaluation results

Following the focus group session, we asked participants to give feedback on the pilot session and to give their opinions on several issues that were debated during session development. Each issue is discussed below.

A. Health effects

The purpose of this study is to obtain information about public opinion on the discernability and acceptability of visibility at different PM concentrations. When designing the focus group session, participants were given particular instruction to only focus on the VAQ shown in each slide. No specific mention was made about health effects, and participants were not instructed specifically not to consider health effects when rating the slides. When evaluating visibility issues however, the differentiation between visual air quality and associated health effects proves to be quite difficult. Many participants discussed that it was very difficult to separate the two, and many thought the two “go together”. One participant however, said he was very careful to rate the slides on visibility conditions alone. This participant was an asthmatic and discussed that if he would not have been told to only rate the visibility conditions, health effects would have factored into his decisions. Another participant discussed that her decisions were not based on adverse health effects, but instead her psychological reaction to the visibility conditions. She judged the slides based on how her mood would change if she was faced with visibility conditions like the ones in the slides. Participants strongly agreed with the decision to not mention that health effects are associated with visibility impairment. One participant offered that if he would have known that the level of visibility impairment would affect his health, he “definitely” would have rated the slides as “Very Poor” or “Unacceptable”.

B. Knowledge of EPA

Participants strongly agreed with the decision to not inform them that the sponsor of the focus group was the EPA until the end of the session. Participants expressed that this knowledge would have made them

immediately associate the visibility conditions with health effects. One participant said that if she would have known that EPA was sponsoring the session, her responses would have differed, because it was her “knee-jerk reaction to please the EPA.” Participants were asked if it would have been helpful if they were given more knowledge about the secondary standard before they were asked to rate the slides. Participants again did not think the additional knowledge would have been useful. They did not feel that they needed that information in order to answer the questions posed to them.

C. Weather

Many participants had difficulties differentiating between visibility conditions and weather conditions. Participants confused visibility impairment with humidity and fog. Many offered that their opinions would have been different if the conditions shown were a result of weather. One participant suggested that we mention weather conditions in each slide are constant before the rating process begins.

D. Duration

There was much discussion and debate surrounding the design of the duration question, in which participants were asked how long a level of visibility would be acceptable to them. In the end, the question posed to participants was:

For each of the slides presented, assume that the quality of visibility shown represents the highest level of haze in Washington, DC on a given day. Please indicate how long you would find this quality acceptable.

In the evaluation of the focus group session, participants were specifically asked if they understood the question. One participant said the question was “ambiguous”. She explained by saying that people “can stand anything for 4 hours, or even 8 hours” but “a better question is do we want to?” Another participant said the question was “tough to answer”. Both participants had difficulty answering the question because they did not know what day or what time of day the conditions would be present. All participants, with the exception of one, work and spend most of their time indoors, therefore it was difficult for them to answer that the visibility conditions presented would only be acceptable to them for 4 or 8 hours. A suggestion was made to reword the question so that it asked, “if this was a Saturday, and you were spending your day outdoors, how long would the visibility conditions be acceptable to you?” Participants believed this question would be easier to answer because they have a better measure to judge how long they could accept the conditions.

We asked participants if the question would have been easier to answer if they were told that EPA was setting a visibility standard and that compliance would be obligatory. One participant mentioned that the question might have been easier to answer if phrased this way, however, she suggested removing the reference to the EPA.

E. Valuation

Particular attention was paid to the design of the valuation question to ensure that participants would not associate the question with the EPA or with improvements in health conditions. During the discussion of this question, two participants explained that if they had not been told to focus only on visibility conditions, they would have responded to the question differently. Participant 8 is an asthmatic, and said that he would have chosen Option B in order to be able to breathe better. Instead, he chose Option A, because he was only concerned with visibility improvement. Participant 9 also choose Option A, because she was only focusing on visibility conditions. If she had been allowed to factor in environmental impacts, she said she would have chosen Option B.

An important component in evaluating participants responses to this question is how they view the visibility improvements. If participants only associate the different levels of visibility improvement with the vista in the slide, and not improvements in the area where they live, their opinions may not be as accurate. Two participants lived and worked very close to the vista shown. They discussed that they were thinking about how visibility conditions would be near their homes. These participants were able to evaluate how conditions at their home would be, if the Mall had the visibility conditions presented in the slide. Two participants who lived further from the vista shown, however, did not make this association. One participant said she only thought about whether she would want to be in Washington, DC when visibility conditions were like the ones in the slides.

F. Focus Group Modifications

The pilot focus group session was a trial run for future focus group sessions. The intent of the pilot focus group was to test the design of the session, and the survey questions, to ensure that accurate responses can be collected. After conducting the pilot session, some observations were made that may improve the design of future focus groups.

Prior to the facilitation of the pilot focus group, we asked that Shugoll Research ask each of the participants three screener questions. Unfortunately, we did not receive any screener responses. We had planned to use the screener questions to check the consistency of the strength of attitude questions asked later in the focus group. In future focus groups, responses to the screener questions should be collected prior to the beginning of the focus group.

We also recommend that prior to the facilitation of each focus group, the slide order be checked by two people. This simple check will catch any potential slide reversals like the one that occurred during the pilot focus group session.

The question on Representativeness of View did not generate the discussion that we anticipated. Instead of discussing how often they saw the vista portrayed in the slide, participants discussed how representative the visibility conditions were in the slide. This question should be reworded to emphasize the representativeness of the vista itself, not the visual air quality within the slide.

Participants had difficulty answering the question on how long visibility questions would be acceptable to

them. Participants thought the question was ambiguous because it was not specified which part of the day, or what day, the visibility conditions shown would be present. The designing of this question took much discussion and thought, however, modifications should be made before future focus group sessions. The suggestions made by participants can be a starting point for modifications to this question.


Due to time limitations, participants were not asked if they had difficulty interpreting the words “Acceptable” and “Unacceptable”. Participants were instructed to define the words using their own opinions of what was acceptable or unacceptable to them, and that there was no exact definition. Participants did not have any questions on the definitions of these words during the rating process, and participants did not mention any difficulties during the session evaluation.


Several logistical improvements can be made to ensure that future focus groups run efficiently. The focus group session was scheduled for two hours and in the future it may want to be increased to two and a half hours. The session began approximately 15 minutes late because a few participants arrived late. This amount of delay is probably typical for future focus group sessions, and should be factored into the timing of the session so that discussion time is not shortened. A couple of instances where timing could be improved are the tallying of participant responses during the break, and the length of time slides are shown for the rating of VAQ and acceptability. Many participants thought that a 15 minute break was too long. In order to shorten the amount of time it takes to tally participant responses, responses could be collected and the tallying process could begin prior to the break. Shortening the amount of time each slide is shown may also conserve time. Some participants thought that slides were shown for too long, however others had difficulty keeping up. A suggestion is to show slides for longer periods of time in the beginning of the rating process, and to gradually shorten the amount of time each is shown throughout the rating process.

For future focus group sessions, room set-up should be determined prior to the session. Obtaining floor plans from the facilities in advance of the session will ensure that the room is adequate in size to ensure that proper viewing conditions for the slides are met. U-shaped seating is the most appropriate for viewing the slides. It is also essential to determine, in advance, the lighting available in the focus group rooms. Rooms equipped with recessed lighting that can be dimmed is most appropriate. Some respondents had difficulty in reading the response booklets when the lights were out during the viewing of the slides. This problem can be solved by increasing the font size of the questions in the response booklet. It is also important that the facilitator has the requirements for distances, heights, and angles for the slide projector when setting up the focus group room.

VII. Appendices

Appendix A: Ratings of Visual Air Quality

Slide Number	PM _{2.5} Concentration	Number of Responses per Category							Cumulative Ranking
		Very Poor						Very Good	
Slide 1	65	4	5	0	0	0	0	0	14
Slide 3	55	8	1	0	0	0	0	0	10
Slide 5	50	5	2	1	0	0	0	1	19
Slide 7	45	4	3	2	0	0	0	0	16
Slide 9	40	1	6	2	0	0	0	0	19
Slide 11	35	1	4	3	1	0	0	0	22
Slide 12	32.5	2	3	2	2	0	0	0	22
Slide 13	30	0	2	4	3	0	0	0	28
Slide 14	27.5	0	1	4	3	1	0	0	31
Slide 15	25	0	3	1	3	2	0	0	31
Slide 16	22.5	0	0	3	1	1	3	0	36
Slide 17	20	0	0	3	4	2	0	0	35
Slide 18	17.5	0	0	0	1	6	2	0	46
Slide 19	15	0	0	1	2	4	1	1	44
Slide 20	12.5	0	0	1	0	3	4	1	49
Slide 21	10	0	0	0	2	2	4	1	49
Slide 22	7.5	0	0	0	0	1	3	5	58
Slide 23	5	0	0	0	0	1	5	3	56
Slide 24	2.5	0	0	0	0	0	1	8	62
Slide 25	2.32	0	0	0	0	0	0	9	63

Slide Number	PM _{2.5} Concentration	Number of Responses per Category							Cumulative Ranking
		Very Poor						Very Good	
Duplicate 1 (Slide 22)	7.5	0	0	0	0	1	7	1	54
Duplicate 2 (Slide 25)	2.32	0	0	0	0	0	1	8	62
Duplicate 3 (Slide 23)	5	0	0	1	0	3	5	0	48
Duplicate 4 (Slide 5)	50	8	1	0	0	0	0	0	10
Duplicate 5 (Slide 13)	30	0	5	4	0	0	0	0	22

Appendix B: Rating of Acceptability / Unacceptability

Slide Number	PM Concentration	Number of Responses per Category	
		Acceptable	Unacceptable
Slide 1	65	1	8
Slide 3	55	0	9
Slide 5	50	0	8
Slide 7	45	0	9
Slide 9	40	1	8
Slide 11	35	3	5
Slide 12	32.5	1	8
Slide 13	30	5	4
Slide 14	27.5	2	7
Slide 15	25	4	5
Slide 16	22.5	6	3
Slide 17	20	4	5
Slide 18	17.5	7	1
Slide 19	15	8	1
Slide 20	12.5	9	0
Slide 21	10	9	0
Slide 22	7.5	9	0
Slide 23	5	9	0
Slide 24	2.5	9	0
Slide 25	2.32	9	1
Duplicate 1 (Slide 22)	7.5	9	0
Duplicate 2 (Slide 25)	2.32	9	0

Slide Number	PM Concentration	Number of Responses per Category	
		Acceptable	Unacceptable
Duplicate 3 (Slide 23)	5	9	0
Duplicate 4 (Slide 5)	50	0	9
Duplicate 5 (Slide 13)	30	1	8

**Washington, DC
November 16, 2000**

Name _____

A. How often do you see a view like the one in this slide?
Please CHECK (✓) the appropriate response below.

- Never
- Rarely (once a year)
- Infrequently (once a month)
- Occasionally (once a week)
- Frequently (once a day)
- Other (Please fill in: _____)

2. Where are you / what are you doing when you see a view like the one in the slide?

Please CHECK (✓) the appropriate response below. You may check more than one.

- Commuting to/from work
- At home
- At work
- Performing day-to-day activities
- Outdoor leisure activities
- Other (Please fill in: _____)

Please wait for instructions before turning page.

C. Generally speaking, how often do you notice the quality of visibility on a given day?

Please CHECK (✓) the appropriate response below.

- Never
- Rarely (once a year)
- Infrequently (once a month)
- Occasionally (once a week)
- Frequently (once a day)
- Other (Please fill in: _____)

D. How important are visibility conditions in the Washington, DC area to you?


Please CHECK (✓) the appropriate response below.

- Not important at all
- Somewhat important
- Important
- Extremely important

Please wait for instructions before turning page.


E. Please rate the quality of visibility for each of the images you see using the scale below.

Please CHECK (✓) the response below that most closely reflects your opinion about the visibility conditions in the slide.

	Very						Very
Example	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Question 5 continued on next page.

Question 5 continued.

	Very						Very
13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please wait for instructions before turning page.

F. Please indicate whether you find the quality of visibility Acceptable or Unacceptable for each of the slides presented. Please CHECK (✓) the box below that most closely reflects your opinion about the slide.

Slide	Unacceptable	Acceptable	Comments
1	<input type="checkbox"/>	<input type="checkbox"/>	
2	<input type="checkbox"/>	<input type="checkbox"/>	
3	<input type="checkbox"/>	<input type="checkbox"/>	
4	<input type="checkbox"/>	<input type="checkbox"/>	
5	<input type="checkbox"/>	<input type="checkbox"/>	
6	<input type="checkbox"/>	<input type="checkbox"/>	
7	<input type="checkbox"/>	<input type="checkbox"/>	
8	<input type="checkbox"/>	<input type="checkbox"/>	
9	<input type="checkbox"/>	<input type="checkbox"/>	
10	<input type="checkbox"/>	<input type="checkbox"/>	
11	<input type="checkbox"/>	<input type="checkbox"/>	
12	<input type="checkbox"/>	<input type="checkbox"/>	

Question 6 continued on next page.

Question 6 continued.

Slide	Unacceptable	Acceptable	Comments
13	<input type="checkbox"/>	<input type="checkbox"/>	
14	<input type="checkbox"/>	<input type="checkbox"/>	
15	<input type="checkbox"/>	<input type="checkbox"/>	
16	<input type="checkbox"/>	<input type="checkbox"/>	
17	<input type="checkbox"/>	<input type="checkbox"/>	
18	<input type="checkbox"/>	<input type="checkbox"/>	
19	<input type="checkbox"/>	<input type="checkbox"/>	
20	<input type="checkbox"/>	<input type="checkbox"/>	
21	<input type="checkbox"/>	<input type="checkbox"/>	
22	<input type="checkbox"/>	<input type="checkbox"/>	
23	<input type="checkbox"/>	<input type="checkbox"/>	
24	<input type="checkbox"/>	<input type="checkbox"/>	
25	<input type="checkbox"/>	<input type="checkbox"/>	

Please wait for instructions before turning page.

- G. For each of the slides presented, assume that the quality of visibility shown represents the highest level of haze in Washington, DC on a given day. Please indicate how long you would find this quality acceptable. Please CHECK (✓) the box below that most closely reflects your opinion.

Slide	Never	1 Hour	4 Hours	8 Hours	All Day
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please wait for instructions before turning page.

8.

	No Change	Option A	Option B
Annual Cost of Living Increase	\$0	\$10	\$50

Imagine that you must choose between two pollution control options. Option A will give you visibility like that in the first slide, and it is associated with an annual cost of living increase of \$10. Option B will give you visibility like that in the second slide, and it is associated with an annual cost of living increase of \$50. You also have a choice of leaving things as they are: visibility conditions and your cost of living stay the same. You may also be equally satisfied with either of the two options. If you don't know, please indicate that. Which choice best reflects your preference?

Please CHECK (✓) the box below that reflects your choice.

- No Change
- Option A
- Option B
- I'm equally satisfied with either Option A or Option B
- I don't know

Appendix D: Slide Key Linking Booklet Number to Slide Number

Appendix A	
Booklet Number	Slide Number
1	Slide 1
2	Slide 16
3	Slide 3
4	Slide 5
5	Slide 22
6	Slide 18
7	Slide 25
8	Slide 11
9	Slide 9
10	Slide 7
11	Slide 13
12	Slide 20
13	Slide 24
14	Slide 12
15	Slide 15
16	Slide 21
17	Slide 14
18	Slide 19
19	Slide 23
20	Slide 17
21	Duplicate 1 / Slide 22
22	Duplicate 2 / Slide 25
23	Duplicate 3 / Slide 23
24	Duplicate 4 / Slide 5
25	Duplicate 5 / Slide 13

Appendix E: Facilitator Script

Focus Group Topic Guide: Assessing Public Opinions on Visibility Impairment due to Air Pollution

Focus Group Session Outline

- General introduction to focus group process
- Representativeness of View: slide, response booklet questions, discussion
- Introduction to Visibility
- “Warm Up” Reference slides
- Rating of Visibility Conditions: slides, response booklet questions
- Rating of Acceptability/Unacceptability: slides, response booklet questions
- Nature of Value: response booklet questions
- Break [responses are tallied, discussion slides selected based on responses (highest, lowest, close splits)]
- Discussion of slide rating process: response booklet questions, review rated slides, discussion
- Presentation of information about EPA, EPA’s use of information gathered in focus group
- Follow up questions [for pilot session only]: discussion
- Sociodemographic questions [collected by focus group vendor]

Facilitator's Notes

6:00

[*take off watch*]

General Intro - 10 minutes

Welcome, thank you for being here

Introduce Deborah and Christine

Length of session

Refreshments - help self

Break - when

Who has taken part in a focus group before?

Who we are -

consultants

gathering information about public opinions on an environmental issue

we are here to learn from you - we're not looking for any specific answers from anyone

Why we are here

gathering information about public opinions about visibility in DC area

will tell more about visibility in a moment

will have the opportunity to ask questions throughout the evening

once we are finished with the program, you'll hear about our research and how your opinions will be used

confidentiality

Plan for session

Part 1: show a series of slides, respond to questions about the slides in the booklet

break - about 10 to 15 mins

Part 2: talk about responses to the questions in the booklet

If any of you need glasses to see the slide well, please make sure you have them on.

Anyone not have their glasses with them?

Anyone color blind?

Feedback session

This is the first group to meet as part of the study

Will be holding many more sessions like this around the country

Once done with part 2, I'm going to ask you to stay a bit longer and provide some feedback about how things went tonight

What else need to know:

Session being recorded by audio and video tape - point to locations

Purpose of recording: a note taking system that helps me make sure that I report your opinions accurately

One way mirror: - other members of the research team are observing the session.

They are also here to help with taking notes and reporting our findings.

Why are you here?

You may be wondering why we selected you to attend tonight's session.

We're studying an environmental issue where the general public's judgements and opinions play an important role.

Your responses and opinions are very important for this study.

People in focus groups usually have something in common.

In this case, you were invited to participate because you live or work in the Washington, DC area.

When we invited you to come tonight, we wanted to bring together a group of people that have this one thing in common, but otherwise you are a diverse group.

Participant Introductions

have everyone introduce themselves.

tell us your name and where you live

Session rules

Rule #1: Please ask questions!

If at any point you do not understand something that I have said, please stop me and I will clarify.

For some questions, we may wait to discuss them after the break to keep things moving on schedule

Rule #2: During our discussions, one person at a time, no side conversations

Are there any questions before we begin?

Part I: Survey

Booklet

Booklet is in front of you.

Using it from time to time during session, but not for a little while.

Not ready to open that just yet - I'll let you know

Purpose of booklet: a place to record your opinions and answers to some of the questions

This is not a test, just a way to keep track of your answers and opinions

Showing Slides

A series of slides illustrating a variety of visibility conditions using a common picture of Washington, DC.

Based on the very same photograph of Washington.

Depict various levels of visibility conditions that have been added to the picture using a sophisticated computer program.

Get into more detail about what I mean by visibility in a moment.

[***TIME 6:10***]

Representativeness of View - 5 minutes

I first want to find out whether this common view of Washington, DC is one that you yourself typically see. Please open your booklets to question 1.

[turn on projector, lights off]

Can everyone see their booklet well enough to read?

Look at slide - this is a pretty typical view of Washington, DC on a day with good weather, and pretty scenic.

Some things are that are special about Washington:
River, bridges, monuments, mall, museums, the capitol, etc.

Now please go to questions 1 and 2 on page 1 of your booklet.

Here, we're asking how often do you see this view of Washington DC. Or something similar?

Then, what are you doing when you when you see this view - you can check off which ever answers apply or fill in your own.

Is everyone done?

[lights on]

Let's talk a bit about your responses.

How does the view in the slide compare to the view you see typically?

Is it more like a postcard than what you see normally?

What is the same about it?

What's different about it?

Examples:

things in the view
distance
elevation
from another place in the city?

Does anyone have any questions before we move on?

[**TIME 6:15**]

Introduction to Visibility - 5 minutes

Tonight: a series of exercises where you will be giving us your opinions about visibility.

Visibility in and around the Washington DC area.

First I'm going to tell you a bit about visibility and show you some examples of different visibility conditions.

When I say visibility, I'm talking about the visual quality of the air: how well you can see.

Basically, visibility has several characteristics.

[WORD SLIDE]

Visibility describes the visual quality of the view:

how far you can see,
how clear or crisp objects appear, and
how colors appear.

What affects visibility

[WORD SLIDE]

Air pollutants come from a number of sources, including cars and buses, industry, and so forth.

Air pollution forms smog (also called ground level ozone)

and soot (made up of very small airborne particles).

Smog and soot in the air cause visibility impairment, or haze.

Natural factors such as humidity and dust can also contribute to haze.

Visibility is affected by haze.

When it is hazy, you can't see as far, the objects in your view are not as clear and crisp, and colors don't show up as well.

Haze is caused when sunlight encounters these tiny particles in the air

Some of these tiny particles reduce visibility by absorbing and others reduce visibility by scattering light.

Questions 3 and 4

Now that we've talked about the nature of visibility,

I'd like you to turn to questions 3 and 4 in your response booklet and answer those questions.

These questions are on page 3.

[*TIME 6:20*]

Focus only on visibility - 5 minutes

You may also know that the same air pollutants that form haze and reduce visibility are of concern because they are harmful to people and the environment.

For this discussion, we want you to focus only on visibility:

how well you can see.

Our goal is to understand your opinions regarding visibility itself.

It is important that you focus on how things look to you in the slides you are going to see.

When you give us your opinion, consider only the visibility.

Just focus on how things look:

- how far you can see
- the clarity
- the crispness
- the colors

Does anyone have any questions before we move on?

[TIME 6:25]

“Warm Up” Reference slides - 5 minutes

[lights off]

Show you some examples of how visibility can vary.

Let's look again at the view of Washington we were just discussing.

These next few slides illustrate a wide range of visibility conditions that can exist.

I'm going to point out some of the aspects of visibility as they appear in this scene.

This slide shows what the visibility conditions are when there is very little haze.

[point out landmarks, colors, crispness, compare look of close and far landmarks]

Next I'm going to put up a slide of a time where there is little more haze so the visibility is somewhat worse than the slide we just looked at.

[compare to previous slide, point out landmarks, colors, crispness, compare look of close and far landmarks]

Now we're going to see what things look like when visibility is even worse. In this slide, the visibility is worse than the previous two slides.

[compare to previous slides, point out landmarks, colors, crispness, contrast, clarity, compare look of close and far landmarks]

In this slide, it is much more hazy, so the visibility is worse than all the previous slides.

[compare to previous slides, point out landmarks, colors, crispness, compare look of close and far landmarks]

I'm going to quickly review what we just saw.

[re-show all four slides, and review main comparison points]

Any questions about the slides?

[TIME 6:30]

Rating of Visibility Conditions - 10 minutes

Now, you will now be shown a series of slides with the same view of Washington we've been looking at.

These slides illustrate many different levels of visibility within the range of the slides we just saw

Here, I'm going to ask you to rate the visibility in each slide.

Again, just rate the slides according to the visibility conditions in the slides: how they look to you visually

Go to Question 5 of your response booklet on page 5.

The ratings run from very poor to very good.

Very poor is all the way to the left, and very good is all the way to the right

As I show you each slide, please rate the visibility in the slide by checking the box that best describes how the slide looks to you.

It may look very good, very poor, or something in between these.

Please give a response to every slide, and let me know if you need more time.

Remember, not a test, there are no right or wrong answers when ranking these images.

We want to know the how visibility these images looks to you, and

Since everyone has their own opinion, we don't expect that each of you will rank the visibility in these slides in the same way.

Just go ahead and rate each slide according to how it looks using your first impression.

**[let people know what to do if they've missed one
be ready for questions or people commenting]**

[*TIME 6:40*]

Acceptability/Unacceptability - 10 minutes

Now you will be shown the same set of slides that you just rated.

Again each image will illustrate the effect of a different level of visibility.

This time, rate the slides according to whether the visibility is acceptable or unacceptable to you.

What is acceptable or unacceptable may be different for each person here.

So, whether the visibility in a given slide is acceptable or unacceptable will vary from person to person.

Turn to Question 6 on page 8 of your response booklet,

As I show the slides, please put a check under the word that best reflects your opinion about the acceptability or unacceptability of the visibility in the slide on the screen.

Again, just respond according to your first impression, on how it looks to you visually

As we go along, pay attention to what goes through your mind as you make your rating,

Think about how you decided whether a slide was acceptable or unacceptable.

Or whether you had a problem deciding.

If it helps, please feel free to add some notes next to your answer in the margins of your booklet.

Let me know if you need more time on any of the slides.

Can I clarify anything for you before we start?

[**TIME 6:50**]

[lights on]

Duration - 5 minutes

We have just a few more slides and two more questions before we take a break.

Before we get to the next question, I'm going to tell you a few more things about visibility

[WORD SLIDE]

Visibility varies throughout the year.

Some times of year have more hazy days than others.

Visibility can also vary from one day to the next, or even from one point in the day to another.

[WORD SLIDE]

Sometimes hazy conditions only last for a few hours,

other times they can last for several days in a row.

The next question is number 7, on page 11 in your booklet

This question asks you to let us know a little more about what you think about the visibility conditions in the next four slides I'm about to show you.

The question is: how long would the level of visibility shown in the slide be acceptable to you?

As you answer this question, imagine that the slide shows the highest level of haze in the Washington DC area on any given day.

The question asks you: if level of haze in the slide is the highest it gets in a day, how long would that be acceptable to you?

I'll be happy to clarify anything about this question for you before we begin.

[show 4 slides representing various levels of visibility]

This shows you the point when visibility is worst over the course of a given day.

[lights off]

[*TIME 6:55*]

Nature of Value - 10 minutes

[lights on]

To wrap up the first half of the evening,

I'm going to ask you one more question about visibility in Washington, DC.

In this question, you are going to be asked to pick between two choices.

Before we get to the question itself, we'll walk through a simple example of the type of question, and then we'll move on to the question about visibility.

In our example, let's say that you plan to eat out and you have a choice of going to only one of two restaurants.

To pick between them, you can compare the type of restaurant and the cost of a meal.

Look at this table which describes two possible dinner choices and the prices of the dinners.

[show word slide]

	Dinner 1	Dinner 2
Type of Restaurant	Sit Down	Fast Food
Price	\$ 10	\$ 5

The choices for this example question are shown in columns.

Each column describes a dinner.

The first column describes Dinner 1, which would be eaten at a sit down restaurant and costs \$ 10.

The second column describes Dinner 2, which would be eaten at a fast food restaurant and costs \$5.

When you choose, you are making a tradeoff:

The first dinner is more expensive, but it is a nicer dining experience in a sit down restaurant.

The second dinner is less expensive, but eating in a fast food restaurant is generally not as nice of an experience.

You choice will depend on what matters more to you: having a nicer meal or saving \$5.

If you'd be happy either way, you have a third choice: no preference between the two dinners.

This would mean that you may like the choices offered equally well.

So now let's apply this trade off question to a situation about visibility.

I'm going to ask you a question similar to the one I just reviewed, based on some slides with different visibility conditions.

Turn to page 13 and look at question number 8.

This time, suppose that you get to choose between two pollution control options that will improve visibility conditions. Both of these options increase your cost of living, but one increases it more than the other.

You can also choose to leave things as they are in terms of visibility and your cost of living.

As you are making your choice among the options, I'm going to show you what the current level visibility level is, and the improvement in visibility that you get with the pollution control options.

Cost of Living

The cost of living is defined as the amount of money that your family spends each year for things like food, clothing, and rent or mortgage.

What happens when cost of living goes up?

For example, what does it mean for your cost of living to go up by say \$250 a year? That's about \$20 a month, or \$5 a week.

This would mean that the overall cost of the things you buy each year would cost \$250 more than they do now.

When we say the cost of living increases, we mean that each year you would have to spend more for these items overall.

In this situation, the options that result in better visibility means giving up some other things that you have been buying.

You should imagine that the annual cost of living increase is a permanent increase in your annual cost of living.

Take your time and review the question.

When I show you the slides please choose the option that you most prefer.

If you wish, you can also indicate that you have no preference between the two options that improve visibility or that you don't know which of the alternatives you prefer.

When you make your choice, you are trading off improvements in visibility with an increase in your cost of living.

[lights off]

First let's look at the slide that represents today's visibility conditions on a typical summer day.

Now here is the slide that shows you the visibility improvement that would happen under choice A.

The cost of living increase that comes with Choice A is \$10 a year.

Now I'll show you the slide that represents the visibility improvement under Choice B.

The cost of living increase that comes with Choice B is \$50 a year.

I will go through these slides once more.

In your response booklet, please indicate which choice best reflects your preference.

Once you are done, we'll have a break.

Please leave your booklets here.

[lights on]

[TIME 7:05]

H. Break - 10-15 minutes

[Tally responses in a computer database from the booklets and identify 1-2 slides that the majority of participants found acceptable and 1-2 slides where just over 50 percent of the participants found a given slide acceptable. Also pick 1-2 slides that the majority of participants found unacceptable and where just over 50 percent of the participants found a given slide unacceptable. Re-load those selected slides into the projector for showing during the discussion.]

Part II: Discussion

[*TIME 7:20*]

Discussion of slide rating process - 15-20 minutes

Welcome back.

Now that you have completed the slide rating process, we will begin the second part of the session.

This part includes a group discussion.

We're going to talk about just a few of the slides from that group that you've been looking at.

I'll put the slides we're going to discuss back up on the screen for our discussion.

Focus group

Some of you are already familiar with how focus groups work, but let me just summarize for the whole group.

A focus group is a group discussion about your opinions.

Just like when you were ranking the slides, there are no right or wrong answers.

What's more, there is no need for us to agree with each other or reach consensus.

If anybody says something you have a question about or want to comment on, please do so.

Don't feel you have to wait for me to ask you a question.

My job is to focus the discussion of the issues.

I encourage all of you to participate in the discussion -- everyone's ideas and opinions are important.

Finally, remember rule number 2:

In a focus group discussion, it is important to have only one person speak at a time.

We want to be able to hear each person's comments. So please speak one at a time.

[Re-show 4-5 selected slides that the majority of participants found acceptable/unacceptable and the “threshold” slides , etc. Start with slide that most found acceptable]

To begin, we would like to open up the floor for discussions of how you made your choice about whether the visibility in certain slides was acceptable to you or not.

We would like to know why you found the visibility acceptable or unacceptable, and what aspects of the slides influenced your decisions.

[lights off]

[example of introduction to discussion for each slide]

Here is a slide that ___ (some percentage) of you said was ____ (unacceptable). Let's talk about why you reacted to this slide in the way you did. Who would like to start?

How did you decide what time period it would take for a view to be unacceptable?

When you were giving your opinions about visibility, what were you thinking about?

What do the words acceptable/unacceptable mean to you?

Did you consider other environmental problems? Like what? Why or why not?

[TIME 7:35]

Project Sponsor and Purpose - 5 minutes

[lights on]

Thank you everyone for your participation in the discussion. At this point, I'm going to provide you with some background about the focus group session, including the who the sponsor is and how they are going to use the results of the session.

The U.S. EPA is the sponsor of this focus group session. The purpose of this project is to obtain information for EPA regarding public opinions on visibility impairment due to air pollution. EPA will use these findings to inform its review of the National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM).

The standard sets a limit on how much particulate matter can be in the air. These standards have two purposes. The primary standard serves to protect human health from the effects of particulate matter. The secondary NAAQS are established to protect against adverse effects of airborne PM on public welfare, including the welfare effects associated with visibility impairment.

In order to determine what constitutes adverse effects of impaired visibility, EPA is assessing public opinion on visibility impairment from air pollution. This focus group has provided important information on your views regarding the discernability and acceptability of differing levels of visibility impairment.

We simulated the visibility conditions in the various slides shown tonight using a program called WINHAZE visual air quality modeling program, developed by a company called Air Resource Specialists, which is used to simulate visibility conditions under different air quality conditions.

[TIME 7:40]

Follow up questions [for pilot session only] - 15 -20 minutes

We're now done with the official part of the focus group session. I mentioned when we started that this is the first of many focus groups that EPA plans to hold. We'd like to spend a bit more time with you to get some feedback from you about the session that we can use in the future. I'm going to ask the team from EPA to join us. They have been observing the session from another room.

-Do you have any questions about why EPA is collecting information from this focus group or how it is going to use it?

- Do you have any questions about how air quality standards relate to visibility?

-What were your general impressions of the focus group session?

-What about this process worked well? Did not work well? Was clear? Was confusing? Repetitive? Difficult?

-Were there any questions in particular that you found confusing or hard to answer?

-How about my instructions? What might be more helpful in the future?

-Was there anything about the response booklet you can tell us to make it more helpful?

-Do you have any comments about the question having to do with the length of time visibility conditions were acceptable?

-Do you have any comments about the question having to do with choosing between the two policies?

-If we were to hold another focus group session here, what pictures of Washington, DC would you have preferred to see?

-We had a choice of telling you about EPA's role in the study either at the beginning or at the end. Did this matter to you? At what point would it be best to tell future participants?

-Were you able to rate the slides based only on how they looked or were you thinking about anything else?

-When visibility is acceptable to you, do you think the air is healthy?

-When visibility is unacceptable to you, do the think the air is unhealthy?

-Is there anything else about the session you would like to comment on? Any other questions?