Dr. H. Christopher Frey, Comments on First Draft Integrated Science Assessment for Ozone.

Charge Question 3: Chapter 2 presents the integrative summary and conclusions from the O3 ISA with detailed discussion of evidence in subsequent chapters. Is this a useful and effective summary presentation? How does the Panel view the appropriateness of the causal determinations?

An integrative overview is important and necessary. The integrative review will be read by most persons who read the ISA and will serve as perhaps the sole point of contact between the reader and the ISA. Thus, careful consideration should be given as to the audience. A key shortcoming of this chapter is that each section is written for an expert audience in a narrow domain, and thus for most readers, most sections of the ISA become nearly unreadable.

Since there are detailed chapters on specific points in other parts of the document, it seems unnecessary to attempt to provide detailed technical information in the summary. A true "integrative overview" should not be highly detailed, but rather should present the key findings from other chapters. This draft misses the mark in attempting to provide detailed information from specific studies, but without proper citation, and inexcusably sending the reader on a wild goose chase for figures and tables in other chapters that are cited but not shown in Chapter 2.

Chapter 2 needs to be self-contained with respect to including whatever figures or tables are central to the integrative findings. Furthermore, it is not necessary for the figures and tables that could be included in Chapter 2 to be duplicative of figures and tables in other chapters. The figures and tables themselves should also be integrative and provide an overview, rather than details.

Section 2.1 seems to be of about the right length although I encourage attempts at shortening any and all sections of this chapter. I appreciated an upfront statement of the key point at the beginning of a section, which is not done consistently throughout the chapter. For example, in Section 2.1.1.1, the key point that the photochemical processes are well understood as of the 2006 ACQD was helpful in setting the tone for the review given in this brief section.

Section 2.1.5 and its subsections make a lot of references to specific figures in other chapters, which is frustrating for the reader. If the information in the other figures is important to the integrative summary, then create figures in Chapter 2 that subsume (but not simply copy) the information, and do so in an integrative manner.

Some sections seem to be data dumps with no particular effort at integrating the results to key findings. For example, Section 2.1.5.1 discusses a few examples of correlations among monitors, but no effort is made to generalize from the evidence regarding findings. For example, under what situations are high correlations expected? Under what situations do low correlations occur (e.g., titration of O3 near roadways by primary NO?).

As a matter of style, I dislike having consecutive headers with no introductory or transition text, as is the case in the cascade of Sections 2.2, 2.2.1, and 2.2.1.1. In an integrative summary, there should be some theses statements given in the introductions to a given level of a section before presenting supporting details.

As an example of reader difficulty in reading this chapter, Section 2.2.1.2 comes across as a bit of a data dump confounded by use of informal jargon that loses the reader. For example, the term "slopes" is

undefined. Slope of what versus what? It is also not very clear what the point is of this section. Is the goal here just to list a bunch of results without integrating or synthesized to some key points? Examples of possible findings here would be explaining conditions under which there are strong correlations with other pollutants, and conditions under which there are weak correlations.

Rather than including a lot of data from multiple studies in long paragraphs, please consider summarizing the studies in tables or graphics and using the text to infer/synthesize key trends or other supportable generalizations. If the data do not support (or falsify) a hypothesis, it is also useful and okay to explain that the data are inconclusive.

In Section 2.2.3, the term "exposure error" should be defined. Consider the audience. If this is an integrative overview chapter, it will be read by persons of varying expertise, and not all readers will have expertize in all areas.

The first sentence verges on being a run-on sentence, and is debatable. Ozone cannot possibly have "relatively low spatial variability across an urban area" if it is subject to titration from primary NOx emissions, especially from large roadways. Whether there is variability depends on the spatial resolution over which differences are being evaluated. Given that there is typically a significant population living, working, or going to school near such roadways, there is the potential for significant micro-scale variability.

I am not a fan of paragraphs that are 30+ lines long. In rewriting this chapter, I recommend that consideration be given, for each section, to what are the key points to be made, with at least one paragraph per key point, and with at least one paragraph that is truly integrative.

As the reader gets to pages 2-18 and 2-19, there is a sea of very dense text with few paragraph breaks. What are the key integrative overview points? Details are in the other chapters.

Some points are made but then dropped. For example, page 2-22, lines 23-24 raises what seems like a potentially important point of avoidance behavior in response to air quality advisories. However, there is no discussion of the implication of this statement. For example, if this behavior is occurring, then it would tend to reduce the strength of the concentration-response relationships inferred from epidemiological studies not because of absence of health effects, but because the air is so bad that people are avoiding it. This could lead to bias and mischaracterization.

Some specific comments:

Page 2-5, line 7 "condensed" mechanisms is not very clear. "simplified" mechanisms may be better.

Page 2-13, line 10: what is the averaging time upon which the correlation of 0.58 is based?
Page 2-13, line 39: what is meant by "central –site monitors are representative of day-to-day changes" The more specific finding appears to be that relative changes in central site monitor concentrations are correlated with relative changes in exposure concentrations. This could be made more clear.

Page 2-17, line 21: replace "challenged with" with "exposed to"

Charge Question 5: Chapter 4 describes human exposures to O3. Is the evidence relating human exposure to ambient O3 and errors associated with exposure assessment presented clearly, succinctly,

and accurately? Are the results of field studies evaluating indoor-outdoor and personal-ambient exposure relationships, and factors affecting those relationships, presented in a manner that is useful for interpretation of epidemiologic results? Is the information on modeling O3 concentration surfaces and population exposures appropriate for evaluating the utility of these modeling approaches? Do the characterizations of temporal and spatial variability of O3 in urban areas provide support for better understanding and interpreting epidemiologic studies discussed later?

Overall, this chapter was useful and contained appropriate and relevant material. I especially like Section 4.2 and the clear derivation of the relationship between exposure and ambient concentration.

In terms of technical issues, perhaps the key point in this chapter is a claim that there is "low spatial variability" in ozone concentrations at an urban scale, and that moderate correlations in ozone exposure and ambient concentration are strong enough, to support a conclusion that central cite monitors provide relevant time series data for health effects estimates in epidemiological studies. However, as mentioned in various places in the document, ozone is not spatially homogeneous in urban areas, such as because of titration with NOx near roadways. Furthermore, the temporal correlations are described as "moderate" but are relatively weak (if you plot data that have a 0.58 correlation, for example, the pattern will appear to be fairly random), and only become strong if the averaging time is increased to several days. Given that the current standard is based on 8-hour averaging, the relevance of daily average or four day average correlations is not established. The chapter should more critically address the adequacy of central site monitors for use in epidemiological studies and perhaps be a bit more forthcoming about potential biases that could result from assuming that they are representative of spatial homogeneity and temporal trends.

As with Chapter 2, there are some stylistic improvements needed that would enhance readability. For example, there is a paragraph that is 36 lines long starting on page 4-6. Surely, the authors can organize the thoughts better than this, by identifying some key points and writing shorter paragraphs to address each of the key points.

Section 4.3.3.2 has a horrible introductory sentence that gives the reader very little idea of the points to be made in this section. What follows appears to be a data dump of studies. Here again, organizing the idea into key points, with one paragraph per key point, would help. Putting data into summary table would be easier on the reader. Before diving into details, provide a thesis statement or some indication to the reader of the topic or point to be made.

The discussion of micro-environmental models is generally good, and section 4.4.2 appropriately identifies that one of the key limitations of these models are related to individual activity data.

The summary and conclusions section should be rewritten. There should be text between headers to introduce the purpose and content of each section and provide appropriate transitions. This section should be shorter, avoid repeating points, and more crisply state the key findings and conclusions. Thus, there should be less emphasis on summarizing and more emphasis on synthesizing.