5. COMMENTS ON TOPIC AREA 3: GENERAL QUESTIONS

This section summarizes the panelists' responses to charge questions 7–10 and 12. Responses to charge question 11 are included in Section 6, because this charge question sought the panelists' overall impressions of the proposed risk assessment methodology, rather than focusing on any one specific issue.

5.1 Responses to Charge Question 7

This charge question asks: "The proposed risk assessment approach assigns carcinogenic potency to individual fibers and to cleavage fragments (or 'bundles that are components of more complex structures'). Please comment on whether cleavage fragments of asbestos are as toxicologically significant as fibers of the same size range." The panelists raised the following points when responding:

- ***Terminology used in the charge question.*** One panelist took strong exception to the wording in this question (see pages 30–33 in Appendix B) and strongly recommended that the panelists use correct terminology during their discussions. This panelist noted, for instance, that cleavage fragments are not equivalent to bundles, nor do cleavage fragments meet the regulatory definition of asbestos, as the charge question implies. He clarified that he defines cleavage fragments as non-asbestiform amphiboles that are derived from massive amphibole structures. This panelist was concerned that none of the panelists at the workshop has the mineralogical expertise needed to address issues pertaining to cleavage fragments. Another panelist echoed these concerns and agreed that this charge question raises complex issues.

- ***Significance of cleavage fragments with respect to human health effects.*** The previous concerns notwithstanding, several panelists commented on the role of cleavage fragments in the proposed risk assessment methodology. One panelist, for example, indicated that there is no reason to believe that cleavage fragments would behave any differently in the human lung than asbestiform fibers of the same dimensions and durability; he added that this conclusion was also reached by the American Thoracic Society Committee in 1990 (Weill et al. 1990). This panelist acknowledged, however, that expert mineralogists have differing opinions on the role of cleavage fragments. Several other panelists agreed that it is reasonable to assume that cleavage fragments and asbestos fibers of the same dimension and durability would elicit similar toxic responses.

Review of selected epidemiological and toxicological studies. The panelists briefly discussed what information has been published on the toxicity of cleavage fragments. One panelist indicated that Appendix B in the proposed protocol (see pages B-3 through B-10) interprets results from an animal study (Davis et al. 1991) that evaluated exposures to six tremolite samples, including some that were primarily cleavage fragments. This panelist noted that the study provides evidence that cleavage fragments can cause mesothelioma in animals.

  Another panelist, however, cautioned against inferring too much from this animal study for several reasons: the study was not peer reviewed; the fiber measurements in the study reportedly suffered from poor reproducibility; and the mesotheliomas observed in the study might have reflected use of intra-peritoneal injection model as the dose administration method. This panelist recommended that EPA conduct a more detailed review on the few studies that have examined the toxicity of cleavage fragments, possibly considering epidemiological studies of taconite miners from Minnesota (Higgins et al. 1983) and cummingtonite-grunerite miners from South Dakota (McDonald et al. 1978); he noted that a pending publication presents updated risks among the taconite miners.

Practical implications of measuring cleavage fragments in environmental samples. One panelist added, and another agreed, that measuring cleavage fragments in environmental samples presents some challenges, because microscopists cannot consistently distinguish cleavage fragments from asbestiform fibers, even when using TEM.

5.2 Responses to Charge Question 8

Charge question 8 asks: "Please comment on whether the proposed cancer assessment approach is relevant to all amphibole fibers or only to the five types of amphibole fibers (actinolite, amosite, anthophyllite, crocidolite, tremolite) designated in federal regulations." The panelists made the following general comments in response:

Review of evidence from toxicological and epidemiological studies. The panelists identified few studies that address the toxicity of amphibole fibers other than actinolite, amosite, anthophyllite, crocidolite, and tremolite. One panelist indicated that animal toxicology studies have demonstrated that synthetic vitreous fibers with differing chemistry, but having similar durability and dimensions, generally exhibit similar potency for fibrosis, lung cancer, and mesothelioma. Another panelist added that lung cancer and mesothelioma exposure-response