uncertainty regarding the experiences of individual sailors on those ships (for example, whether they were on a ship when it was near the Vietnamese coast, whether they went swimming, and whether they ate local food from Vietnam or Vietnamese waters).

The committee concludes that, qualitatively, ground troops and Brown Water Navy personnel had more pathways of exposure to Agent Orange–associated TCDD than did Blue Water Navy personnel (see Figure 5-1). One exposure mechanism is specific to Blue Water Navy ships: possible TCDD contamination of potable water from shipboard distillation plants. The committee's assessment corroborates the Australian finding that in experiments simulating the water-distillation system used on Navy ships the system had the potential to enrich TCDD concentrations from the feed water to the distilled potable water. However, without information on the TCDD concentrations in the marine feed water, it is impossible to determine whether Blue Water Navy personnel were exposed to TCDD via ingestion, dermal contact, or inhalation of potable water.

After examining a wealth of information on possible routes of exposure, the committee concluded that it would not be possible to determine Agent Orange-associated TCDD concentrations in the Vietnamese environment. This lack of information makes it impossible to quantify exposures for Blue Water and Brown Water Navy sailors and, so far, for ground troops as well. Thus, the committee was unable to state with certainty whether Blue Water Navy personnel were or were not exposed to Agent Orange and its associated TCDD. Moreover, the committee concluded that it could not state with certainty that exposures to Blue Water Navy personnel, taken as a group, were qualitatively different from their Brown Water Navy and ground troop counterparts. Indeed, the committee felt that the paucity of scientific data makes it impossible to determine whether or not Blue Water Navy veterans were exposed to Agent Orange–associated TCDD during the Vietnam War.

REFERENCES

Ginevan, M. E., J. H. Ross, and D. K. Watkins. 2009a. Assessing exposure to allied ground troops in the Vietnam War: A comparison of AgDRIFT and Exposure Opportunity Index models. *Journal of Exposure Science and Environmental Epidemiology* 19(2):187-200.

Ginevan, M. E., D. K. Watkins, J. H. Ross, and R. A. O'Boyle. 2009b. Assessing exposure to allied ground troops in the Vietnam war: A quantitative evaluation of the Stellman Exposure Opportunity Index model. *Chemosphere* 75(11):1512-1518.

IOM (Institute of Medicine). 1994. *Veterans and Agent Orange: Health effects of herbicides used in Vietnam*. Washington, DC: National Academy Press.

IOM. 2003. *Characterizing exposure of veterans to Agent Orange and other herbicides used in Vietnam*. Washington, DC: The National Academies Press.

IOM. 2008. *The utility of proximity-based herbicide exposure assessment in epidemiologic studies of Vietnam veterans.* Washington, DC: The National Academies Press.

IOM. 2009. *Veterans and Agent Orange: Update 2008*. Washington, DC: The National Academies Press.