PROBLEM EXERCISE: MERCURY CONTAMINATION

For centuries, mercury, or quicksilver, has been known to be a nerve toxin. In the last several decades, scientists have gained greater awareness of how mercury enters the human body. Of particular concern, mercury emitted from smokestacks of coal-fired power plants and incinerators, or released by chlor-alkali plants, has been identified as a specific cause of mercury contamination. These mercury emissions eventually are deposited on land or water and then, either directly or through leaching of the soil, the mercury enters water bodies where it is consumed by living organisms. Mercury then bioaccumulates as larger organisms consume smaller ones, eventually becoming quite concentrated in a wide number of fish species.

EPA now recognizes fish consumption as the major source of human exposure to mercury. That exposure is considerable. A recent Centers for Disease Control study estimates that 6 percent of women of child-bearing age have blood levels of mercury higher than that considered safe by the EPA, with a consequence that around 630,000 children per year are born with elevated levels of mercury in their umbilical cord blood.

Based on a United States Department of Agriculture Continuing Survey of Food Intakes by Individuals conducted from 1994 through 1996, the EPA currently recommends that water quality standards for mercury be set based on the assumption that individuals consume 17.5 g of fish per day or two 8-oz. fish meals per month. This rate is far lower than what is actually consumed by many subsections of the population. In particular, "members of fishing tribes and indigenous peoples and members of other communities of color are among the highest consumers." Catherine A. O'Neill, Mercury, Risk, and Justice, 34 Envtl. L. Rep. 11070, 11077 (2004). For instance, members of Ojibwe tribes of the Great Lakes were consuming fish at rates raging from 115.8 g/day to 240.7 g/day in the fall and 189.6 g/day to 393.8 g/day in the spring. Id. One reason that fishing tribes, indigenous peoples, and members of other communities of color consume far more fish than the national average, of course, is that many of these communities rely upon a fish catch as part of their subsistence living patterns. Others who are sensitive to mercury may eat the recommended amount and still be adversely affected. Body weight and age can affect the amount of fish a person is able to eat safely.

Question One. Does the problem of reducing mercury contamination from fish raise environmental justice concerns? How ought EPA respond to them? Should the water quality standards be set based on an assumption of much higher levels of consumption than EPA currently employs, even though the current standards, if met, would protect the vast majority of Americans and even though achieving more stringent water quality standards will be very costly?

One strategy that federal and state agencies have employed in their attempts to reduce fish consumption and the mercury contamination that

can accompany it is to issue fish advisories that notify communities of the hazards of fish consumption and urge reductions in that consumption when tests reveal too much fish contamination in a watershed. While fish advisories can be given for a variety of reasons, in fact mercury accounts for 76 percent of all U.S. advisories, encompassing roughly 32 percent of the nation's lakes and 100 percent of Lakes Superior, Michigan, Huron, and Erie.

Question Two. Does the use of fish advisories as a strategy for lowering mercury contamination in human beings raise environmental justice concerns? How might those concerns be addressed?

In deliberating about strategies for reducing the man-made contribution to the mercury problem, the EPA has considered two different approaches. One would require each major source of mercury pollution to install maximum available control technology, thereby reducing each source's emissions by 90 percent or more. The other would employ a market system for mercury abatement, which would set a national cap on mercury emissions, assign an initial allocation of permissible mercury emissions to each source, and then let the sources trade permits to emit emissions with one another. Under such an approach, reductions would not be uniform, presumably, as one source might find it cheaper to purchase emissions permits from another source rather than abate. (See Chapter 5, pages 627-637, for a discussion of how such a system works.)

Question Three. Does the choice between these two approaches raise environmental justice concerns? The effect of a market approach on a particular source (or sources) emission is difficult to predict because it depends upon decisions made by firms after the market system is implemented. Nonetheless, one study has projected the impact of EPA's market alternative compared to the maximum available control technology approach. It predicts that "every source in the upper Great Lakes states of Michigan, Minnesota and Wisconsin but one" will emit more mercury under the market approach than under the technology approach, and that several sources there will actually emit more under the market approach than they do now. O'Neill, at 11100. Does this information affect your answer? How would you decide which approach to use?

(Mercury is also the subject of a Case Study in Chapter 3—pages 247-253. See that Case Study for more information on mercury as well as for further citations documenting the contents of this one.)

Question Four. In 1999, U.S. coal-fired power plants emitted approximately 120 tons of mercury into the air, while coal-fired power plants in China emitted 600 tons of mercury. Because of long-distance, atmospheric transport of these pollutants, it is estimated that 30 percent or more of the mercury found in the United States originates in China. Matt Pottinger, Steve Stecklow & John J. Fialka, Invisible Export—A Hidden Cost of China's Growth: Mercury Migration, Wall St. J., Dec. 20, 2004, at A1. By the year 2020, China is expected to double its electric power production, primarily by constructing new coal-fired power plants. Unless China acts to reduce mercury emissions from these new power plants, increases in mercury emissions from China that reach the United States will vastly offset any reductions from U.S. sources. What effect, if any, should mercury emissions from China have on U.S. mercury control policy? If China refuses to act to control these emissions, is it futile for the United States to try to reduce emissions from its own power plants? In February 2009, more

than 140 nations, including the United States, China, and India, agreed to begin negotiations on a treaty to establish binding limits on mercury emissions. The negotiations, conducted under the auspices of the United Nations Environment Programme, resulted in an agreement in January 2013 on the first legally binding treaty to control mercury pollution, known as the Minamata Convention on Mercury.