Uncertainties Driving Work on the South River, Va Work

At the end of 2010, the South River Science Team (SRST) has completed 10 years of study and analyses of the South River watershed. It is believed that 2011 will begin the end of the investigation phase as the SRST moves into a remedial options pilot testing phase. However some areas of uncertainty remain, listed below, that will continue to drive investigation for an additional limited period of time. Much of the work conducted over the past 7 years has been driven under 3 regulatory frameworks: 1. RCRA (for plant-site Corrective Action, and for NRDC / Sierra Club engagement). 2. CERCLA (for natural resource damage assessment); and, 3. Clean Water Act (Total Maximum Daily Load). Two large investigation efforts, the Ecological Study, under NRDC / Sierra Club, and the natural resource damage assessment, are expected to be completed by early 2012.

Overarching Questions and Uncertainties

a. How is mercury getting into the aquatic and terrestrial ecosystems? – low uncertainty

It is now believed that mercury enters the aquatic ecosystem through bank erosion / particulate transport and via flux from historically –contaminated bed sediment. Mercury entered the terrestrial ecosystem from the aquatic compartment predominantly through flooding during the 21 year period when mercury was used at the facility.

b. Why has mercury remained higher than previously predicted in fish tissue in certain areas? – low uncertainty

SRST studies suggest that earlier predictions of mercury reduction in fish tissue were based on assumptions that did not have strong technical support, mainly owing to the limited understanding of mercury fate and transport within aquatic ecosystems in the 1980's. Newer data support the hypothesis that mercury enters the South River via bank erosion and particulate transport, and as flux from historically-contaminated bed sediment. This slow, steady process provides sufficient mercury to support methylation, primarily in the spring season, and ultimately resulting in methylmercury movement into the aquatic food web.

c. Are there specific mercury pathways that significantly contribute to mercury levels in aquatic and terrestrial species? – medium uncertainty

SRST-sponsored studies indicate that the major process whereby mercury enters the aquatic ecosystem is via bank erosion and particulate transport. Flux from historically-contaminated bed sediment comparably is less significant. SRST studies suggest that mercury enters terrestrial species primarily through the diet, whether for songbirds, reptiles, amphibians, or other related terrestrial species.

d. Have aquatic and terrestrial species been impacted as a result of exposure to mercury? – medium uncertainty

SRST-sponsored studies indicate limited impacts on aquatic receptors in the South River and South Fork Shenandoah Rivers. In the terrestrial ecosystem however, studies suggest potential impacts to songbirds and amphibians at the population scale resulting from exposure to mercury-contaminated soils and food items.

e. Are there potential remedial or mitigation options that might reduce or eliminate entry of mercury into the aquatic and terrestrial ecosystems? – high uncertainty

The SRST has sponsored a host of studies to investigate potential mitigation options for addressing mercury in both the aquatic and terrestrial ecosystems. Promising results have been obtained from a pilot-scale effort to reduce bank erosion and particulate mercury movement into the South River. Recent work with amendments continues to provide some indications that mercury in soils and sediments may be bound in a sufficiently refractory matrix that will prevent future leaching and flux into the surrounding media. More work is needed to further evaluate these early observations.