

Letters of Intent: EPR
Target Date: August 15, 2003

Total and Methylmercury in Hydrothermal Systems of the East Pacific Rise 9°N

William F. Fitzgerald (wfitzger@uconnvm.uconn.edu) and Carl H. Lamborg
(carl.lamborg@uconn.edu)

The University of Connecticut
Dept. of Marine Science
1080 Shennecossett Rd.
Groton, CT 06340

Mercury (Hg) is a toxic metal present in the ocean in trace amounts. Largely through the action of bacteria, some of this Hg is converted to the more toxic and bioaccumulative monomethylHg (MMHg) form. As part of our on-going interest in the biogeochemical cycling of Hg, we propose to conduct exploratory measurements of Hg and MMHg in vent fluids from the ISS EPR sites. By doing so, we seek to constrain the fluxes of Hg and MMHg from hydrothermal systems to the global ocean.

It has been suggested that these fluxes could be large and globally significant (e.g., Rasmussen, 1994; Stoffers et al., 1999). Water column profiles, however, indicate that this is not the case for total Hg (Fitzgerald et al., 1998). However, the budget of MMHg in the ocean is poorly constrained and vents remain a potentially important source. In collaboration with Dr. Karen Von Damm (Univ. of New Hampshire), we have made preliminary measurements of Hg and MMHg in some vent fluid samples. These results confirm that both total Hg and MMHg were detectable in the samples and that the unusual matrix properties of vent fluid/seawater mixtures would not inhibit a more in-depth campaign of sampling and analysis. Our preliminary findings hinted at a negative correlation between MMHg and Mg and that in many samples, all Hg was methylated. These tantalizing findings suggest that vents are a source of MMHg, but more samples are needed. These results are not unexpected because of the many commonalities between vent microbes and those inhabiting sedimentary redox boundaries known to be effective at methylating Hg.

We are proposing to continue our collaboration with Dr. Von Damm by accompanying her and other scientists on 1 or 2 cruises to the EPR, contributing additional dive time, and analyzing Hg and MMHg on board during the cruises. We require coordination with ISS-R2K scientists like Dr. Von Damm and others who make possible the collection of samples and the interpretation of the site characteristics and vent chemistry.

If logistically possible, we will also collect and analyze biological and geological samples for Hg and MMHg. Previous work in shallow hydrothermal systems suggests that many vent organisms are surprisingly low in Hg, implying they can detoxify themselves more effectively than other similar organisms.