Additional References on Galvanic Corrosion Provided by Marc Edwards

Below are references examining the release of Pb from pipes or solder over a period of at least several weeks. By far, the Triantafyllidou paper is the best- please realize it is a worst case. However, the Cartier poster (our pilot study) is now over 1 year in a non-corrosive water under realistic flow regimes. That is showing very persistent galvanic corrosion and particulate lead spikes at normal flow rates. That poster can also be cited.

Edwards, M., and S. Triantafyllidou, S. Chloride to Sulfate Mass Ratio and Lead Leaching to Water. ***JAWWA*** 99(7): 96-109 (2007).

Nguyen, C.K., Stone, K.R., Dudi, A., Edwards, M. Corrosive Microenvironments at Lead Solder Surfaces Arising from Galvanic Corrosion with Copper Pipe. *Environmental Science and Technology* 44(18) 7076-7081 (2010).

Stone, K.R., Nguyen, C.K., and M. Edwards. Chloride Sulfate Mass Ratio and Case Studies of Lead Solder Corrosion. ***J. AWWA*** 1:103 81-92 (2011).

Nguyen, C.K., Stone, K.R., and M. Edwards. Nitrate Accelerated Corrosion of Lead Solder in Potable Water Systems. ***Corrosion Science*** 53(3), 1044-1049 (2011).

Nguyen, C.K., Clarke, B.N., Stone, K.R., and M. Edwards. Acceleration of galvanic lead solder corrosion due to phosphate. ***Corrosion Science*** 53(4), 1515-1521 (2011).

Nguyen, C.K., Clarke, B.N., Stone, K.R., and M. Edwards. Role of chloride, sulfate, and alkalinity on galvanic lead corrosion. Accepted for publication in ***Corrosion***.

Triantafyllidou, S., and M. Edwards. Galvanic Corrosion and Partial Lead Pipe Replacements. Accepted for publication in ***J.AWWA***

This is another reference, from the Water Research Foundation final report on 4088. If you look at p 140 or so, the HDR part of that work is described. These rigs were run for several years in a recirculating mode on the prior WRF project with Steve and Gregory and Glen. The galvanic current for the loop with passivated lead stayed very high throughout the duration of our study. We put it in the appendix because of all the obvious problems trying to recover metals from sorption in the rig, as we could never do reasonable mass balances until the very end of the study when we figured out strong acidification was necessary every water change. However, the galvanic data from the rig is very compelling and long term. Galvanic current was even worse for the passivated lead pipe with scale that was decades old.

Nguyen, C., Stone, K., Clark, B., Edwards, M., Gagnon, G., Knowles, A. Impact Of Chloride:Sulfate Mass Ratio (CSMR) Changes On Lead Leaching In Potable Water. Prepared for the Water Research Foundation, Report 4008, (2010). Avalaible at: http://www.waterrf.org/ProjectsReports/PublicReportLibrary/4088.pdf