Project Profile Information Form

(Please provide the following on a 3.5” disk)

Project Title: Role of Phosphate Inhibitors in Mitigating Pb and Cu Corrosion
Project Number: 387
Principal Investigators: Marc Edwards and Tom Holm

Objectives:
(State the relevant objectives of the project; 75 words or less.)
To determine the effects of orthophosphate and polyphosphate on lead and copper corrosion

Background:
(Provide background information; 75 words or less.)
Though many utilities use phosphate inhibitors, very little fundamental research has ever been done on the subject.

Highlights:
(Provide “at a glance” the main findings of the research [minimum of three]; 100 words or less.)
Orthophosphate decreased concentrations of soluble lead and copper.
Polyphosphate increases concentrations of soluble lead and copper through complexation reactions, as would be expected based on complexation models.
Particulate corrosion by-products are very important, especially when considering control of lead from pure pipe materials.

Approach:
(Describe the research approach for this project. May use subject subheads; 125 words or less.)
Well controlled laboratory experiment with no inhibitors, orthophosphate or polyphosphate were conducted for 4 years with pure lead and copper pipes. Five different levels of pH and alkalinity were tested.

Results/Findings:
(Describe the results/findings of the research. May use subject subheads; 200 words or less.)
Orthophosphate decreased concentrations of soluble lead and copper, whereas polyphosphate increases concentrations of soluble lead and copper through complexation reactions. The latter is consistent with expectations based on solubility models. In the case of copper, simple solubility models were formulated.
that could predict the relative impact of mixed systems, in which detriments of polyphosphate are countered by benefits of orthophosphate. For lead, extremely strong complexes were formed with polyphosphate, such that the concentration of complexed lead is directly proportional to the concentration of polyphosphate remaining in the water (as a first approximation). Particulate corrosion by-products are very important, especially when considering control of lead from pure pipe materials. This was confirmed in a sampling of tap water collected at several utilities.

Impact:
(Describe the relevant impacts that the research results may have on the water industry. Use general subheads such as recommendations or benefits. Subheads more specific to the project may also be used, such as treatment, analytical development, regulatory implications, and so forth; 100 words or less.)

The results call into question use of hexametaphosphate or Zn orthophosphates for corrosion control, especially for lead and copper. Use of these chemicals for these purposes cannot be recommended based on the results of this study.

Participating Utilities (if applicable; maximum of five): Cedar Rapids, Durham, Spartansburg, Charleston, Pinellas County