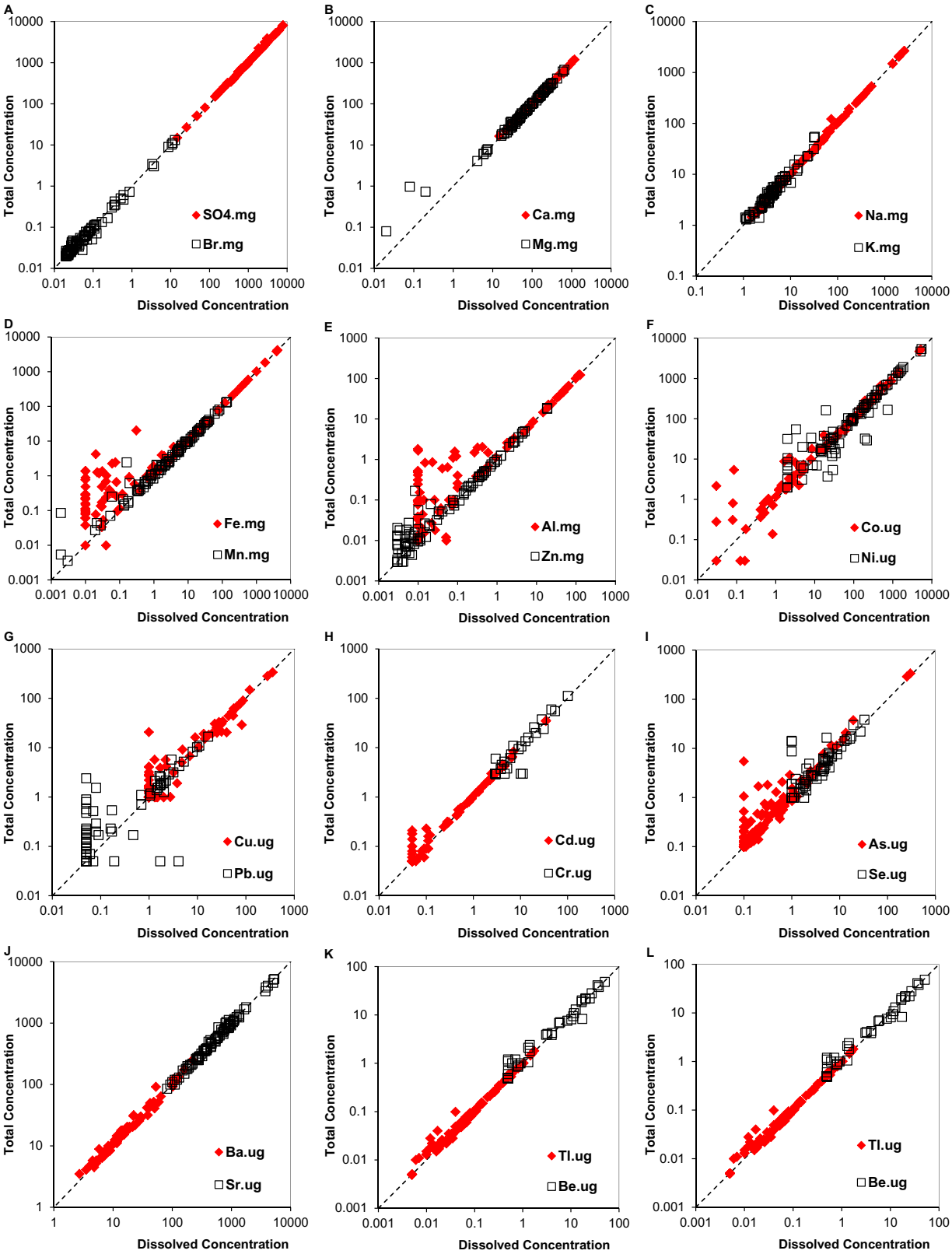

Fig. A.1. Comparison of dissolved (filtered) and total (unfiltered) concentrations for influent and treated effluent at coal mining and processing facilities, Pennsylvania, 2011.

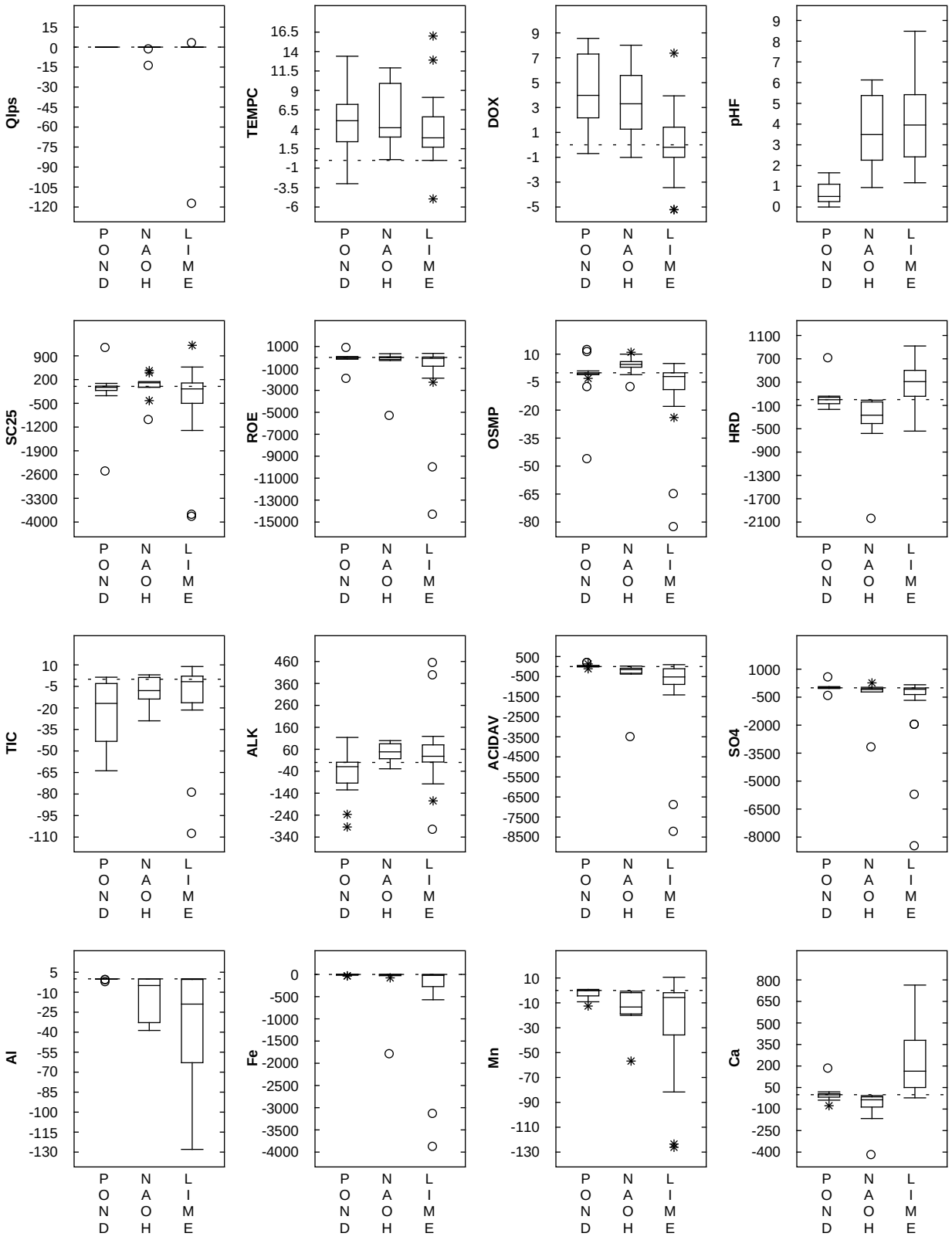

Fig. A.2. Boxplots showing difference in composition between untreated influent and treated effluent (effluent - influent) for three treatment categories: POND, wetlands and ponds with no caustic chemical additive (n = 14); NAOH, sodium hydroxide (n = 10); LIME, lime or hydrated lime or limestone (n = 22).

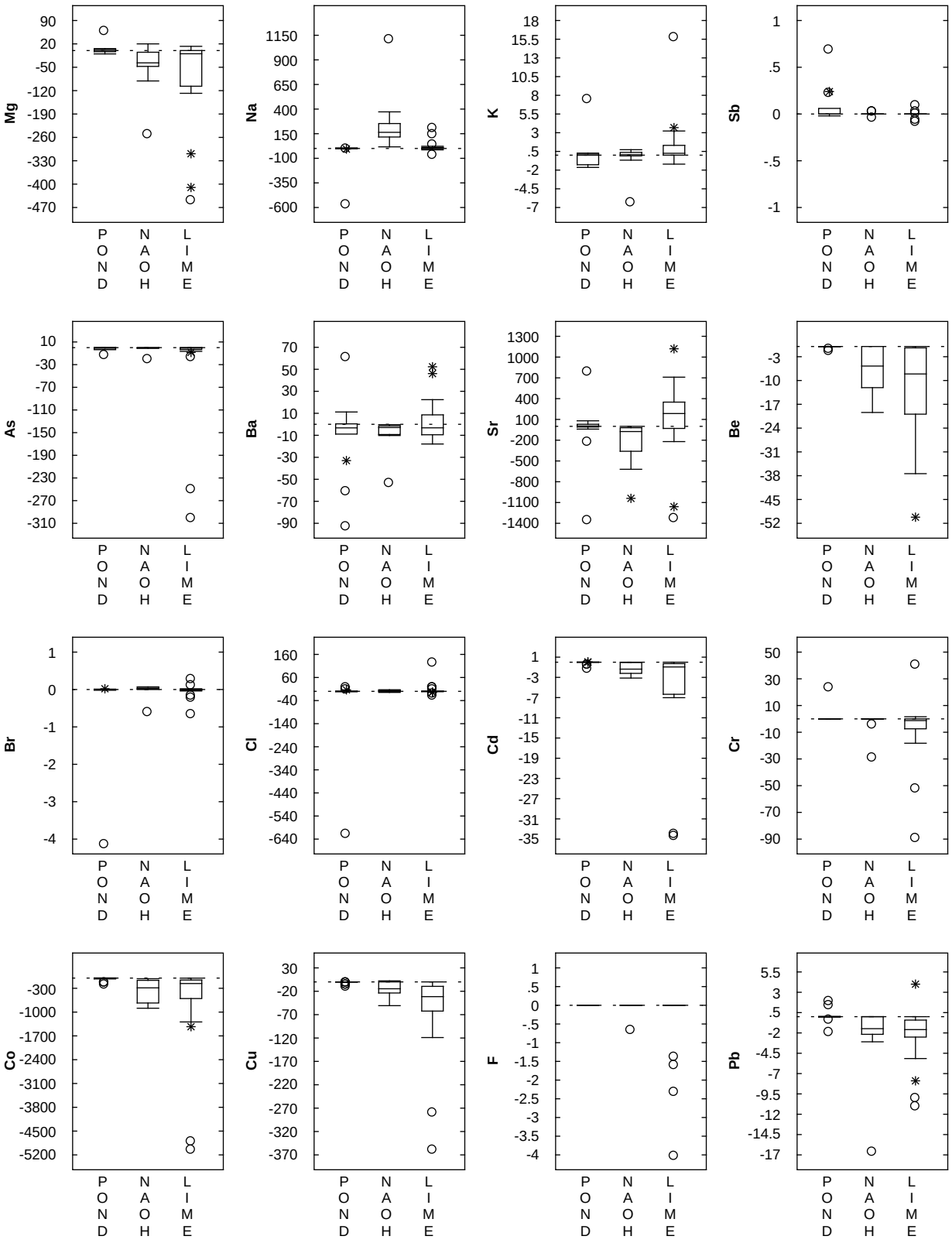

Fig. A.2 (continued). Boxplots showing difference in composition between untreated influent and treated effluent (effluent - influent) for three treatment categories: POND, wetlands and ponds with no caustic chemical additive (n = 14); NAOH, sodium hydroxide (n = 10); LIME, lime or hydrated lime or limestone (n = 22).

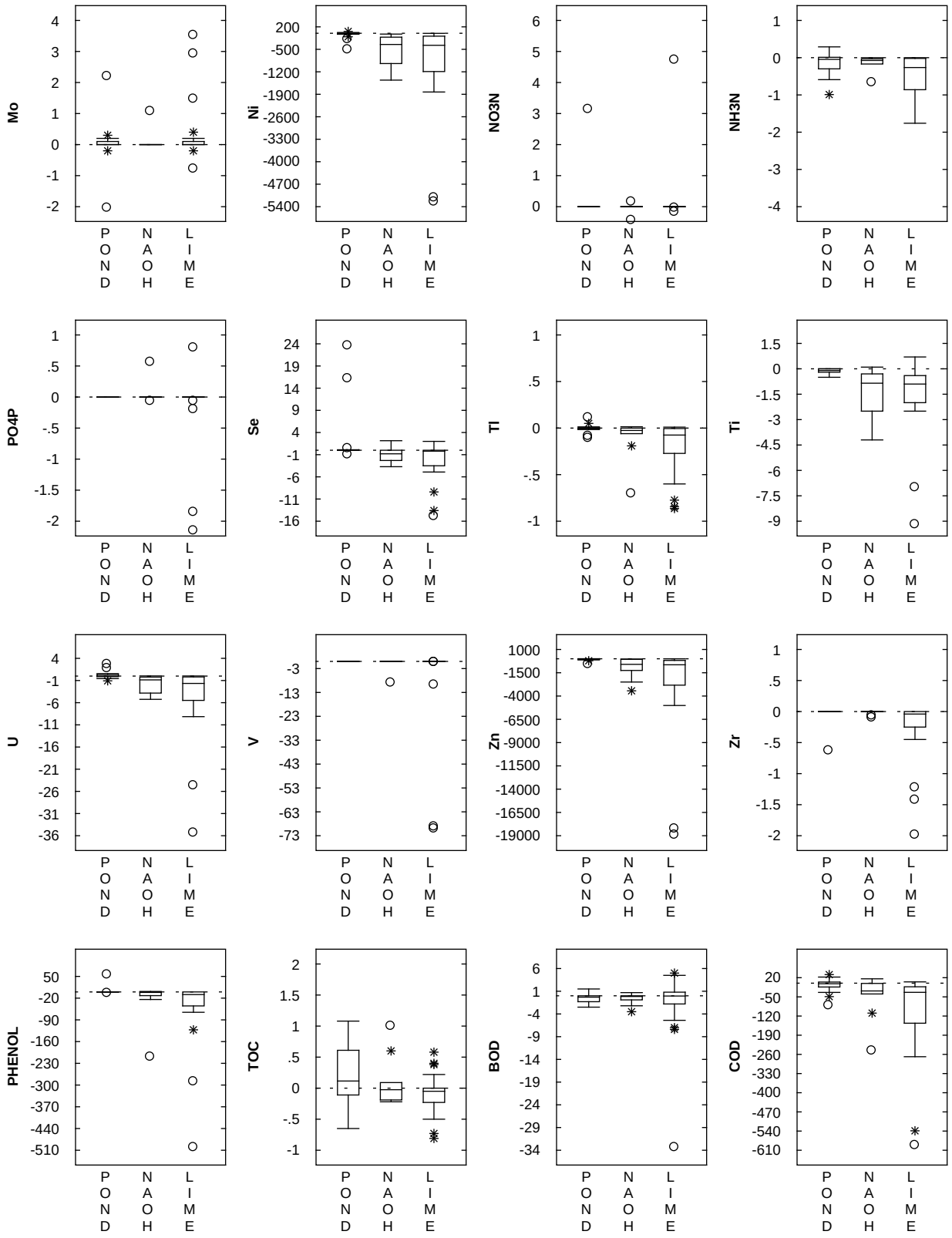

Fig. A.2 (continued). Boxplots showing difference in composition between untreated influent and treated effluent (effluent - influent) for three treatment categories: POND, wetlands and ponds with no caustic chemical additive (n = 14); NAOH, sodium hydroxide (n = 10); LIME, lime or hydrated lime or limestone (n = 22).

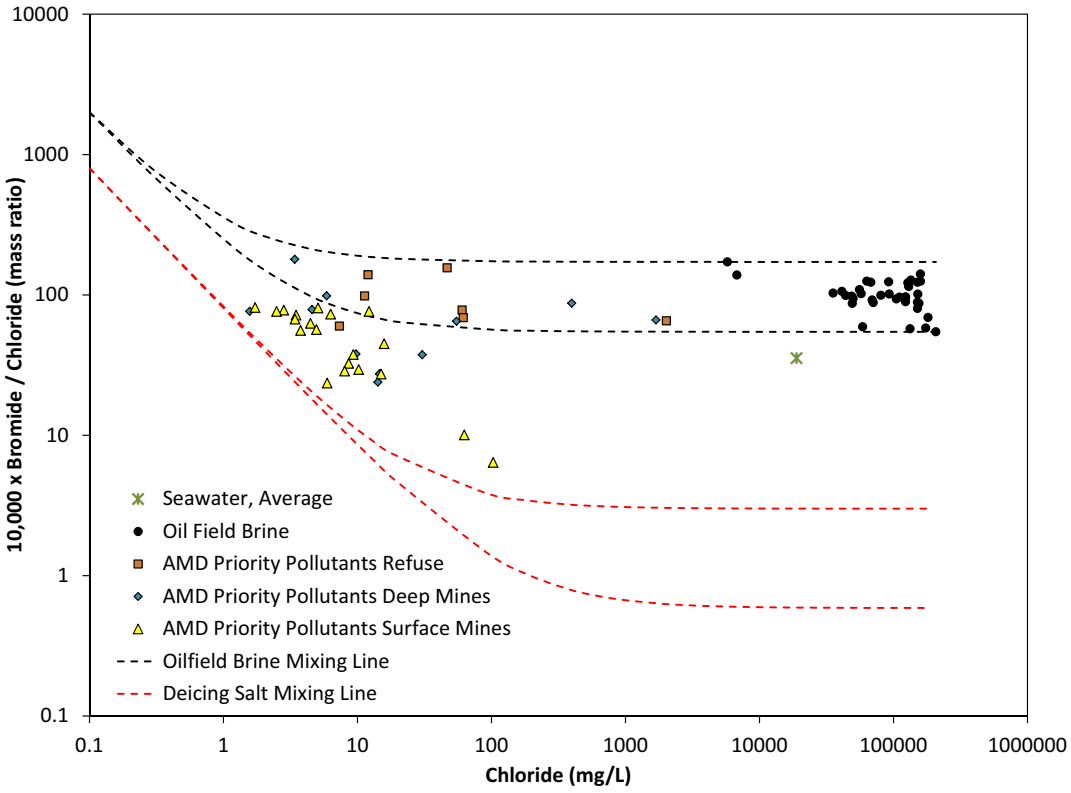

Fig. A.3. Bromide/chloride ratios and chloride concentrations for untreated coal-mine effluent samples (this study) and oilfield brines from Western Pennsylvania (Dresel and Rose, 2010).

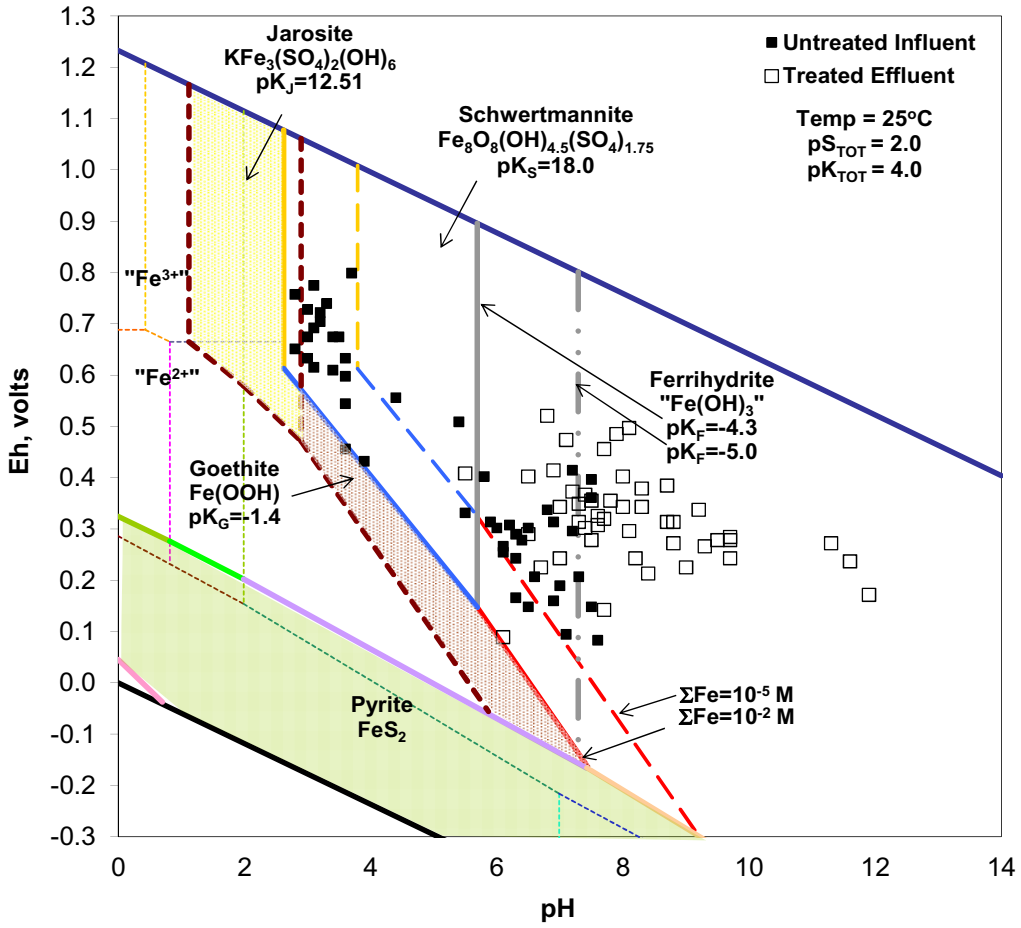

Fig. A.4. Measured pH and Eh of untreated influent and treated effluent at coal mining and processing facilities, Pennsylvania, 2011 and computed predominance areas of pyrite, jarosite, goethite, schwertmannite, and ferrihydrite. Thermodynamic stability fields for aqueous species and minerals were computed assuming activities of $10^{-2.0}$ for S_{TOT} (HSO_4^-, SO_4^{-2}, H_2S, or HS^-), $10^{-2.0}$ for K, and 10^{-2} or 10^{-5} for Fe_{TOT} (Fe^{+2}, $FeSO_4^+$, or $FeSO_4^o$). Equilibrium reactions and thermodynamic data are from Ball and Nordstrom (1991) with supplemental data from Bigham et al. (1996).