Summary of Treatment/Removal Processes

Organics/xenobiotics - activated carbon (granulated or powdered charcoal)

Hardness ions (Ca^{2+}/Mg^{2+}) - ion exchange, electrodialysis, reverse osmosis

Iron/Manganesse (Fe^{2+}/Mn^{2+}) - aeration (oxidation to insoluble forms), settling/floc

Heavy Metals (Cd^{2+}, Pb^{2+}, …) - lime treatment (precipitate metal hydroxides)
- sulfide treatment (precipitate metal sulfides)
- activated carbon to remove chelators

Phosphorous reduction - biological (incorporated into biomass)
- chemical additives (precipitation)
  $Ca(OH)_2$
  $FeCl_3$
  $Al_2(SO_4)_3$

Nitrogen reduction - nitrification/denitrification

$NH_4^+ + O_2 \rightarrow NO_3^-$

$NO_3^- + CH_3OH \rightarrow N_2(g)$

Air stripping of $NH_3(g)$ at high pH

$NH_4^+ \rightarrow NH_3$