CLAIMS

1. In an ion exchange water treatment system using a mixed bed separator with cation and anion resins, a method for regeneration of the cation and anion resins with minimal cross-contamination, comprising:

transporting the mixed resins from a working vessel to a separation/regeneration column,

separating the anion resins from the cation resins using an upflow of backflush water, thus to divide the bed into two well stratified cation and anion layers, with the anion layer above,

regenerating the anion resin layer by flowing a regenerating alkaline liquid down through the anion layer, and regenerating the cation resin layer by flowing a regenerating acid liquid up through the cation resin layer, while withdrawing the regenerating acid and alkaline liquids from the column essentially at an interface between the anion and cation layers,

rinsing the respective regenerated layers with water,

withdrawing a majority of the anion resin layer from the column, leaving a remaining layer of anion resin in the column, on top of the cation resin layer,

withdrawing a majority of the cation resin layer from the column, from a withdrawal level essentially at the bottom of the column, leaving a remaining layer of cation resin in the column, below the remaining anion portion, and

leaving the remaining layers of the anion resin and the cation resin in the separation/regeneration column, to be mixed a bed of cation and anion resins in a succeeding cycle of resin regeneration,

whereby the resins are regenerated with minimal cross contamination in a single separation/regeneration column.

2. The method of claim 1, wherein the anion resin and the cation resin are transported directly back to the working vessel on being

withdrawn from the column.

3. The method of claim 1, wherein the regenerating of the anion resin layer and the regeneration of the cation resin layer are performed simultaneously.

4. The method of claim 1, wherein fluidization water is introduced up through the bottom of the column and through the cation layer during withdrawal of the anion resin layer, helping prevent contamination of the cation resin layer.

5. The method of claim 1, wherein fluidization water is directed from the bottom of the column up through the cation resin layer during withdrawal of the cation resin layer.

6. The method of claim 1, wherein transport water is introduced in the column from above the anion resin layer during anion resin withdrawal.

7. The method of claim 1, wherein the withdrawal level for the cation resin layer is about 5 cm above the bottom of the column, to allow fluidization by an upflow of fluidization water during cation resin withdrawal.

8. The method of claim 1, wherein each of the remaining layers of anion resin and cation resin in the separation/regeneration column is about 15 to 20 cm deep.

9. The method of claim 1, including measuring withdrawal of the cation resin layer so as to leave a 15 to 20 cm depth of the remaining layer of cation resin.