

CLAIMS

The invention claimed is:

1. A treatment process comprising:
directing a feed stream (14) comprising spent carbon and an amount of a scale forming contaminant therein through a heat exchanger (18) and to a wet air oxidation unit (16) for regeneration of the spent carbon therein;
adding an oxygen-containing gas to the feed stream (14);
performing a wet air oxidation process on at least a portion of the feed stream (14) in the wet air oxidation unit (16) to produce a treated material (20) comprising a regenerated carbon material and an offgas (24) comprising a residual oxygen concentration of 5% to 15% by volume; and
directing the treated material from the wet air oxidation unit (16) through the heat exchanger (18), wherein heat from the treated material (20) is utilized to heat the feed stream (14) in the heat exchanger (18);
wherein the wet air oxidation process is carried out at a temperature of 200° C or less with a residence time of at least 1 hour.
2. The process of claim 1, wherein the wet air oxidation process is carried out at a temperature of from 150° C to 200° C.
3. The process of claim 1, wherein the wet air oxidation process is carried out at a pressure of from 150 - 900 psig (1034 kPa - 6205 kPa).
4. The process of claim 1, wherein the wet air oxidation process is carried out at a pressure of from 150-500 psig (1034 kPa - 3447 kPa).
5. The process of claim 1, wherein the wet air oxidation process is carried out at a residence time of 3 hours to 8 hours.

6. The process of claim 1, wherein the wet air oxidation process produces an offgas (24) with a residual oxygen concentration of 10 % by volume to 12 % by volume.

7. The process of claim 1, wherein the treated stream (20) comprises a temperature less than a solubility temperature limit of the scale-forming contaminant at a given concentration of the scale forming contaminant.

8. The process of claim 1, wherein the scale-forming contaminant comprises a member selected from the group consisting of aluminum, calcium, carbonate, iron, magnesium, phosphorus, sulfate, and combinations thereof.

9. The process of claim 8, wherein the scale-forming contaminant comprises calcium.

10. The process of claim 9, wherein the scale-forming contaminant comprises calcium sulfate.

11. The process of claim 1, wherein the feed stream (14) is derived from at least one of a powdered activated carbon treatment (PACT) system or a granular activated carbon (GAC) system.

12. The process of claim 1, wherein the spent carbon comprises spent powdered activated carbon.

13. The process of claim 1, wherein the feed stream (14) comprises an amount of biological solids.

14. The process of claim 1, wherein the oxygen-containing gas added to the feed stream (14) comprises an oxygen concentration of at least 20% by volume.