CLAIMS

We claim:

1. A process for combusting a high-moisture fuel to generate steam, the process comprising:

contacting a high-moisture solid fuel with an oxygen-depleted gas stream while heating the high-moisture solid fuel by indirect heat exchange with a recirculating thermal fluid to produce a dried solid fuel and a moist oxygen-depleted gas stream; wherein the temperature of the moist oxygen-depleted gas stream is greater than 80°C;

combusting the dried solid fuel with a combustion air stream to produce a combustion products stream having an amount of heat;

transferring a first portion of the amount of heat to generate steam by indirect heat exchange with the combustion products stream;

transferring a second portion of the amount of heat to preheat the combustion air by indirect heat exchange with the combustion products stream;

transferring a third portion of the amount of heat to the recirculating thermal fluid by indirect heat exchange with the combustion products stream; and

bypassing one or both of a portion of the combustion air stream to avoid the indirect heat exchange with the combustion products stream and a portion of the combustion products stream to avoid the indirect heat exchange with the combustion air stream.

2. The process of claim 1, wherein the high-moisture solid fuel flows counter-current to the recirculating thermal fluid and co-current to the oxygen-depleted gas stream.

3. The process of claim 1 or 2, further comprising adding an oxygen-enriched stream to the combustion air stream prior to combusting the dried solid fuel; and

controlling one or both of a flow rate of the oxygen-enriched stream and a location of adding the oxygen-enriched stream to control one or more of the following properties: steam temperature, steam pressure, steam drum level, stoker grate temperature, temperature of the combustion products stream prior to transferring the first portion of the amount of heat to generate steam, temperature of the combustion products stream after transferring the first

portion of the amount of heat to generate steam, temperature of the combustion products stream after transferring the second portion of the amount of heat to the preheat the combustion air, temperature of the combustion products stream after transferring the third portion of the amount of heat to the recirculating thermal fluid, temperature of the moist oxygen-depleted gas stream, temperature of the dried solid fuel, moisture level of the high-moisture solid fuel, and moisture level of the dried solid fuel.

4. The process of claim 3, wherein the oxygen-enriched stream and the oxygen-depleted stream are both produced by the same air separation unit.

5. The process of any of claims 1 to 4,

wherein when bypassing a portion of the combustion air stream, increasing or decreasing the amount of the portion of the combustion air stream bypassing indirect heat exchange with the combustion products stream to control one or more of the following properties: temperature of the combustion products stream prior to transferring the second portion of the amount of heat to the recirculating thermal fluid, temperature of the combustion products stream after transferring the second portion of the amount of heat to the recirculating thermal fluid, moisture content of the dried solid fuel, or moisture content of the oxygen-depleted gas stream after contacting with the high-moisture solid fuel; and

wherein when bypassing a portion of the combustion products stream, increasing or decreasing the amount of the portion of the combustion products stream bypassing indirect heat exchange with the combustion air stream to control one or more of the following properties: temperature of the combustion product stream prior to transferring the second portion of the amount of heat to the recirculating thermal fluid, temperature of the combustion product stream after transferring the second portion of the amount of heat to the recirculating thermal fluid, moisture content of the dried solid fuel, or moisture content of the oxygen-depleted stream after contacting with the high-moisture solid fuel.