WHAT IS CLAIMED

1. A method to vaporize a process stream, the method comprising:

routing the process stream into a liquid pool zone of a vessel, the liquid pool zone including a heating medium, the heating medium being less volatile than the process stream and maintained at an operating temperature determined by vaporization requirements;

pre-mixing the process stream and the heating medium outside of the liquid pool zone of the vessel;

vaporizing volatile components of the process stream due to contact with the heating medium in the liquid pool zone;

removing a vaporized portion of the process stream from a vapor separation zone of the vessel as a vaporized process stream; and

removing solids from the liquid pool zone of the vessel.

2. A method according to claim 1 wherein during pre-mixing no vaporization of the volatile components of the process stream occurs.

3. A method according to claim 1 wherein during pre-mixing no more than about 90% of the volatile components of the process stream vaporize.

4. A method according to claim 1 further comprising separating and removing at least some of the solids from the vessel directly as blowdown containing the at least some of the solids.

5. A method according to claim 1 further comprising:

removing a portion of the heating medium residing in the liquid pool zone of the vessel;

raising a temperature of the removed portion to produce a heated recycle stream; and

routing the heated recycle stream back to the liquid pool zone.

6. A method according to claim 5 wherein the removed portion of the heating medium is a mixture of the heating medium and at least some of the solids of the process stream.

7. A method according to claim 6 further comprising separating and removing at least some of the solids prior to raising the temperature.

8. A method according to claim 1 further comprising condensing at least a portion of the vaporized process stream.

9. A method according to claim 1 further comprising compressing at least a portion of the vaporized process stream.

10. A method according to claim 1 further comprising raising a temperature of at least a portion of the process stream prior to the process stream directly entering the liquid pool zone of the vessel.

11. A method according to claim 1 wherein the process stream is homogenously dispersed in the heating medium.

12. A method according to claim 1 wherein a density of the heating medium is greater than that of the process stream.

13. A method according to claim 1 wherein the process stream includes water.

14. A system to vaporize a process stream, the system comprising:

a vessel arranged to contact the process stream and route the process stream into a liquid pool zone of the vessel, the liquid pool zone including a heating medium less volatile than the process stream and maintained at an operating temperature determined by vaporization requirements;

a mixer located outside of the liquid pool zone of the vessel and arranged to mix the process stream and the portion of the heating medium being returned to the vessel; and

a pump-around loop arranged to receive a portion of the heating medium residing in the liquid pool zone and return the portion back to the liquid pool zone;

wherein when the process stream is contacted by the heating medium in the liquid pool zone volatile components of the process stream vaporize and migrate to a vapor separation zone of the vessel for removal and solids form in the liquid pool zone of the vessel for removal.

15. A system according to claim 14 wherein the mixer is arranged so no vaporization of the volatile components of the process stream occurs in the mixer.

16. A system according to claim 14 wherein the mixer is arranged so no more than about 90% of the volatile components of the process stream vaporize in the mixer.

17. A system according to claim 14 wherein the vessel includes internals arranged to separate at least a portion of nonvolatile components of the process stream from the heating medium.

18. A system according to claim 14 further comprising the pump-around loop including a heater.

19. A system according to claim 14 further comprising the pump-around loop including a separation device.

20. A system according to claim 14 further comprising a condenser arranged to receive at least a portion of a vaporized process stream exiting the vapor separation zone of the vessel.

21. A system according to claim 14 further comprising a compressor arranged to receive at least a portion of a vaporized process stream exiting the vapor separation zone of the vessel and produce a pressurized vaporized process stream.

22. A system according to claim 14 further comprising a pre-heater arranged to raise a temperature of the process stream prior to the process stream entering the liquid pool zone of the vessel.

23. A system according to claim 22 wherein the pre-heater is arranged to recover heat from a condenser arranged to receive at least a portion of the vaporized process stream.