## CLAIMS

*What is claimed is:*

1. A laboratory water generation and distribution system capable of distributing laboratory water at different temperatures, wherein the system comprises:

(A) a laboratory water generation section configured to treat potable water to generate laboratory water;

(B) a laboratory water distribution section comprising:

(1) a laboratory water storage tank,

(2) a main distribution loop in fluid communication with the laboratory water storage tank and configured to receive the laboratory water therefrom to distribute through at least one outlet laboratory water at a first temperature range, and

(3) a sub distribution loop operatively connected to the main distribution loop via a valve and configured to receive the laboratory water therefrom to distribute through at least one outlet laboratory water at a second temperature range, wherein the sub distribution loop also can return the laboratory water to the main distribution loop;

(C) an Operator Interface Terminal (OIT); and

(D) one or more processors.

2. The system of claim 1, wherein the laboratory water generation section comprises a multimedia filter, a cartridge filter, a water softening medium, an activated carbon bed, a reverse osmosis unit, a UV light, an ion exchange bed vessel and a mixed bed ion exchange vessel.

3. The system of claim 1, wherein the laboratory water in the main distribution loop is maintained at a temperature between about 18°C to about 25°C.

4. The system of claim 1, wherein the sub distribution loop is configured to heat and maintain the laboratory water in the sub distribution loop to a temperature between about 53°C to about 57°C.

5. The system of claim 4, wherein the sub distribution loop is configured to cool the laboratory water in the sub distribution loop to a temperature between about 18°C to about 25°C prior to dispensing the laboratory water to the main distribution loop.

6. A method of generating laboratory water and distributing laboratory water at different temperatures, the method comprising the steps of:

(A) treating potable water using laboratory water generation section to generate laboratory water; and

(B) distributing laboratory water using a laboratory water distribution section comprising:

(1) a laboratory water storage tank,

(2) a main distribution loop in fluid communication with the laboratory water storage tank and receiving the laboratory water therefrom to distribute laboratory water through at least one outlet at a first temperature range, and

(3) a sub distribution loop operatively connected to the main distribution loop via a valve and receiving the laboratory water therefrom to distribute laboratory water through at least one outlet at a second temperature range, wherein the sub distribution loop also can return laboratory water to the main distribution loop,

wherein the distributing is controlled by a at least one processor

7. The method of claim 6, further comprising steps that are controlled by a processor:

receiving heating input related to a set point temperature for water;

heating a first quantity of water within the sub distribution loop from a baseline temperature to the set point temperature;

maintaining the first quantity of water at the set point temperature for a period of time;

preserving a second quantity of water within the main distribution loop at the baseline temperature for the period of time; and

cooling the first quantity of water from the set point temperature to the baseline temperature in response to a trigger.

8. The method of claim 6, wherein the heating input comprises a request for heated water at the set point temperature.

9. The method of claim 6, wherein the trigger comprises a notification that the period of time has reached a predetermined time limit.

10. The method of claim 6, wherein the heating input comprises a time limit, wherein the trigger comprises a notification that the period of time has reached the time limit.

11. The method of claim 6, wherein the laboratory water generation section comprises a multimedia filter, a cartridge filter, a water softening medium, an activated carbon bed, a reverse osmosis unit, a UV light, an ion exchange bed vessel and a mixed bed ion exchange vessel.

12. The method according to claim 6, wherein the laboratory water in the main distribution loop is maintained at a temperature between about 18°C to about 25°C.

13. The method of claim 6, wherein laboratory water in the sub distribution loop is heated to and maintained at a temperature between about 53°C to about 57°C.

14. The method of claim 13 wherein the laboratory water in the sub distribution loop is re-cooled to a temperature between about 18°C to about 25°C prior to dispensing the laboratory water to the main distribution loop.

15. A laboratory water generation and distribution system capable of distributing laboratory water at different temperatures, wherein the system comprises:

(A) a laboratory water generation section configured to treat potable water to generate laboratory water;

(B) a laboratory water storage section comprising a laboratory water storage tank in fluid communication with the laboratory water generation section and configured to receive the laboratory water therefrom;

(C) a laboratory water distribution section comprising:

(1) at least one cooled water distribution loop in fluid communication with the laboratory water storage tank, the cooled water distribution loop configured to receive the laboratory water from the storage tank and to distribute the laboratory water at a first temperature range through one or more outlets, and

(2) at least one heated water distribution loop in fluid communication with the laboratory water storage tank, the heated water distribution loop configured to receive the laboratory water from the storage tank and to distribute the laboratory water at a second temperature range through one or more outlets, the second temperature range exceeding the first temperature range;

(D) an Operator Interface Terminal (OIT); and

(E) a processor operatively coupled to one or more of the laboratory water generation section, the laboratory water storage section, the laboratory water distribution section, and the OIT;

wherein the heated water distribution loop is configured to recycle a quantity of the laboratory water therein by returning same to the storage tank.

16. The system of claim 15, wherein the laboratory water distribution section comprises a first cooled water distribution loop and a second cooled water distribution loop in fluid communication with the laboratory water storage tank.

17. The system of claim 15, wherein the laboratory water generation section is configured to generate reverse osmosis de-ionized (RODI) water.

18. The system of claim 17, wherein the cooled water distribution loop is configured to distribute cooled reverse osmosis de-ionized (CRODI) water.

19. The system of claim 18, wherein the heated water distribution loop is configured to distribute heated reverse osmosis de-ionized (HRODI) water.

20. The system of claim 15, wherein the laboratory water in the cool water distribution loop is maintained at a temperature between about 18°C to about 25°C.

21. The system of claim 15, wherein the heated water distribution loop is configured to heat and maintain the laboratory water therein to a temperature between about 53°C to about 57°C.

22. The system of claim 21, wherein the heated water distribution loop is configured to cool the laboratory water therein to a temperature between about 18°C to about 25°C prior to returning the laboratory water to the storage tank.

23. The system of claim 15, wherein the system comprises two cooled water distribution loops.

24. A method of generating laboratory water and distributing laboratory water at different temperatures, the method comprising the steps of :

(A) treating potable water in laboratory water generation section to generate laboratory water; and

(B) transferring the laboratory water from the water generation section to a laboratory water storage tank of a laboratory water storage section;

(C) distributing the laboratory water using a laboratory water distribution section comprising:

(1) at least one cooled water distribution loop in fluid communication with the laboratory water storage tank, the cooled water distribution loop configured to receive the laboratory water from the storage tank and to distribute the laboratory water at a first temperature range through one or more outlets, and

(2) at least one heated water distribution loop in fluid communication with the laboratory water storage tank, the heated water distribution loop configured to receive the laboratory water from the storage tank and to distribute the laboratory water at a second temperature range through one or more outlets, the second temperature range exceeding the first temperature range; and

(D) recycling a quantity of water in the heated water distribution loop by returning same to the storage tank;

wherein the step of distributing is controlled by a at least one processor operatively coupled to one or more of the laboratory water generation section, the laboratory water storage section, and the laboratory water distribution section.

25. The method of claim 24, wherein the laboratory water distribution section comprises a first cooled water distribution loop and a second cooled water distribution loop in fluid communication with the laboratory water storage tank.

26. The method of claim 24, wherein the laboratory water generation section is configured to generate reverse osmosis de-ionized (RODI) water.

27. The method of claim 24, wherein the cooled water distribution loop is configured to distribute cooled reverse osmosis de-ionized (CRODI) water.

28. The method of claim 26, wherein the heated water distribution loop is configured to distribute heated reverse osmosis de-ionized (HRODI) water.

29. The method of claim 24, further comprising steps that are controlled by the processor:

receiving a heating input related to a set point temperature for water;

heating a first quantity of water within the heated water distribution loop from a baseline temperature to the set point temperature;

maintaining the first quantity of water at the set point temperature for a period of time;

preserving a second quantity of water within the cooled water distribution loop at the baseline temperature for the period of time;

cooling the first quantity of water from the set point temperature to the baseline temperature in response to a trigger; and

recycling the first quantity of water by transferring same to the storage tank when the first quantity of water is cooled to the baseline temperature.

30. The method of claim 29, wherein the heating input comprises a request for heated water at the set point temperature.

31. The method of claim 29, wherein the trigger comprises a notification that the period of time has reached a predetermined time limit.

32. The method of claim 29, wherein the heating input comprises a time limit, wherein the trigger comprises a notification that the period of time has reached the time limit.

33. The method of claim 24, wherein the laboratory water generation section comprises a multimedia filter, a cartridge filter, a water softening medium, an activated carbon bed, a reverse osmosis unit, a UV light, an ion exchange bed vessel and a mixed bed ion exchange vessel.

34. The method according to claim 24, wherein the laboratory water in the cooled water distribution loop is maintained at a temperature between about 18°C to about 25°C.

35. The method of claim 24, wherein laboratory water in the heated water distribution loop is heated to and maintained at a temperature between about 53°C to about 57°C.

36. The method of claim 24, further comprising one or more cooled water distribution outlets connected to the cooled water distribution loop and one or more heated water distribution outlets connected to the heated water distribution loop.

37. The method of claim 36, wherein the cooled water distribution loop dispenses laboratory water to the one or more cooled water distribution outlets, and wherein the one or more cooled water distribution outlets comprise one or more laboratory faucets.

38. The method of claim 37, wherein the heated water distribution loop dispenses laboratory water to the one or more heated water distribution outlets, where the one or more heated water distribution outlets comprise one or more faucets for mixing buffers or media.

39. The method of claim 24, further comprising the step of recycling a quantity of water in the cooled water distribution loop by returning same to the storage tank.