CLAIMS

1. A system for use in cleaning and flushing a section of a water supply system, the section including at least one water main and at least one valve, the system comprising:

a) a recirculating unit including at least one pump unit capable of generating a circulating flow of water in a flushing flow direction;

b) a first pig launch and recovery apparatus configured to couple to the recirculating unit and comprising:

i) a flow tube having a first flow end, a second flow end, and a main flow valve located between the first flow end and the second flow end, wherein the first flow end is configured to be fluidly connected with the recirculating unit, and wherein the second flow end is configured to be fluidly connected to a first point in the water supply system; and

ii) a launch and recovery tube having a first launch end and a second launch end, wherein the first launch end is fluidly connected to the flow tube between the first flow end and the main flow valve, and wherein the second launch end is removably mounted and fluidly connected to the flow tube between the main flow valve and the second flow end; and

c) a second pig launch and recovery apparatus configured to couple to the recirculating unit and comprising:

i) a flow tube having a first flow end, a second flow end, and a main flow valve located between the first flow end and the second flow end, wherein the first flow end is configured to be fluidly connected with the recirculating unit, and wherein the second flow end is configured to be fluidly connected to a second point in the water supply system; and

ii) a launch and recovery tube having a first launch end and a second launch end, wherein the first launch end is fluidly connected to the flow tube between the first flow end and the main flow valve, and wherein the second launch end is removably mounted and fluidly connected to the flow tube between the main flow valve and the second flow end,

wherein the section of the water supply system is defined between the first point in the water supply system and the second point in the water supply system, and

wherein the recirculating unit, the first pig launch and recovery apparatus, the

second pig launch and recovery apparatus are configured to couple with the section to form a recirculating fluid circuit.

2. The system of claim 1, further comprising:

d) a jetting unit including a jetting head coupled to a jetting hose, wherein the jetting unit is configured to enter the recirculating fluid circuit through the second pig launch and recovery apparatus and travel within the section whereby the jetting head is configured to emit a plurality of water jets to assist removal of material from an inner surface of the at least one water main defining at least a portion of the section.

3. The system of claim 2, wherein the jetting unit moves in a counter-current flow direction from the second point to the first point which is opposite to the flushing flow direction of the circulating flow of water from the first point to the second point.

4. The system of claim 3, further comprising:

e) a camera unit including a camera, wherein the camera is configured to enter the recirculating fluid circuit through the first pig launch and recovery apparatus, and wherein the camera is initially configured to travel in the flushing flow direction until the camera is proximate the jetting unit, whereby the camera then moves in conjunction with the jetting unit in the counter-current flow direction so as to provide a visual output of the removal of material from the inner surface of the at least one water main.

5. The system of claim 4, wherein the camera unit further includes a drogue chute to assist travel in the flushing flow direction until the camera reaches the second pig launch and recovery apparatus, whereby the drogue chute is configured to be removed from the camera and the camera is configured to be coupled to the jetting unit and move in conjunction with the jetting unit in the counter- current flow direction.

6. The system of claim 5, wherein the camera unit further includes a riser, wherein the riser removably couples the camera to the drogue chute when travelling in the flushing flow direction and removably couples the camera to the jetting head when travelling in the counter-current flow direction.

7. The system as in any one of claims 1-6, wherein the recirculating unit includes at least one filter unit, and wherein the removed material moves in the flushing flow direction to the at least one filter unit whereby the removed material is filtered out of the circulating flow of water before the water returns to the first pig launch and recovery apparatus.

8. The system of claim 7, wherein each of the at least one filter units comprising a fine filter element, and wherein one or more additional rough filter units are placed inline the recirculating fluid circuit between the second pig launch and recovery apparatus and the at least one filter unit.

9. The system as in any one of claims 2-6, wherein the water jets are emitted at an angle relative to the jetting hose.

10. The system of claim 9, wherein the angle is between 30 degrees and 60 degrees.

11. The system as in any one of claims 2-6, wherein the recirculating unit and jetting unit are mounted on a vehicle.

12. The system as in any one of claims 2-6, wherein the recirculating unit is mounted on a first vehicle and the jetting unit is mounted on a second vehicle.

13. The system as in any one of claims 4-6, wherein the recirculating unit, jetting unit and camera unit are mounted on one or more vehicles.

14. The system of claim 13, wherein the recirculating unit is mounted on a first vehicle, the jetting unit is mounted on a second vehicle and the camera unit is mounted on a third vehicle.

15. The system as in any one of claims 1-6, wherein the first point is a first hydrant and the second point is a second hydrant.

16. A method for pigging a section of a water supply system, the section including at least one water main and at least one valve, the method comprising:

connecting a first pig launch and recovery apparatus to the water supply system, wherein the first pig launch and recovery apparatus comprises:

i) a flow tube having a first flow end, a second flow end, and a main flow valve located between the first flow end and the second flow end, wherein the first flow end is configured to be fluidly connected with a recirculating unit, and wherein the second flow end is fluidly connected to a first point in the water supply system; and

ii) a launch and recovery tube having a first launch end and a second launch end, wherein the first launch end is fluidly coupled to the flow tube between the first flow end and the main flow valve, and wherein the second launch end is removably mounted and fluidly connected to the flow tube between the main flow valve and the second flow end;

connecting a second pig launch and recovery apparatus to the water supply system, wherein the second pig launch and recovery apparatus comprises:

i) a flow tube having a first flow end, a second flow end, and a main flow valve located between the first flow end and the second flow end, wherein the first flow end is configured to be fluidly connected with the recirculating unit, and wherein the second flow end is fluidly connected to a second point in the water supply system; and

ii) a launch and recovery tube having a first launch end and a second launch end, wherein the first launch end is fluidly coupled to the flow tube between the first flow end and the main flow valve, and wherein the second launch end is removably mounted and fluidly connected to the flow tube between the main flow valve and the second flow end;

connecting a recirculating unit to the first and second pig launch and recovery apparatuses to connect to the section of the water supply system between the first point and the second point thereby defining a circuit, wherein the recirculating unit includes at least one pump unit capable of generating a circulating flow of water having a flow direction from the first pig launch and recovery apparatus to the second pig launch and recovery apparatus;

loading a pig into a start pig launch and recovery apparatus; and

directing the pig from the start pig launch and recovery apparatus to an end pig launch and recovery apparatus,

wherein the start pig launch and recovery apparatus is either the first pig launch and recovery apparatus or the second pig launch and recovery apparatus and the end pig launch and recovery apparatus is the other of the first pig launch and recovery apparatus or the second pig launch and recovery apparatus.

17. The method of claim 16, wherein a first pig comprises a jetting unit and wherein the method further comprises:

loading the jetting unit into the second pig launch and recovery apparatus while the section remains under water supply system pressure; and

providing a high pressure fluid to the jetting unit to drive the jetting unit in a counter-current flow direction opposite to the flow direction from the first point to the second point,

wherein the high pressure fluid is emitted as a plurality of water jets from a jetting head to assist removal of material from an inner surface of at least a portion of the section, and

wherein the removed material is carried to the second pig launch and recovery

apparatus via the circulating flow of water.

18. The method of claim 17, wherein a second pig comprises a camera unit including a camera and wherein the method further includes the step of:

loading the camera unit into the first pig launch and recovery apparatus, wherein the camera is initially configured to travel in the flow direction until the camera is proximate the jetting unit, whereby the camera then moves in conjunction with the jetting unit in the counter-current flow direction so as to provide a visual output of the removal of material from the inner surface of the water mains and pipes.

19. The method of claim 18, wherein the camera unit further includes a drogue chute and wherein the method further includes the step of:

providing a flushing flow at the first pig launch and recovery apparatus to drive the camera and the drogue chute in the flow direction to the second pig launch and recovery apparatus;

removing the drogue chute from the camera at the second pig launch and recovery apparatus;

mounting the jetting unit to the camera;

loading the camera and jetting unit into the second pig launch and recovery apparatus;

providing the high pressure fluid to the jetting unit to drive the jetting unit in the counter-current flow direction from the second pig launch and recovery apparatus toward the first pig launch and recovery apparatus.

20. The method of claim 19, wherein the camera unit further includes a riser, wherein the riser removably couples the camera to the drogue chute when travelling in the flushing flow direction and removably couples the camera to the jetting head when travelling in the counter-current flow direction.

21. The method as in any one of claims 16-20, wherein the recirculating unit further includes at least one filter unit and wherein the removed material moves in the flow direction to the at least one filter unit, wherein the method further includes the step of:

filtering the removed material from the circulating flow of water before the water is recirculated to the first pig launch and recovery apparatus.

22. A pig launch and recovery apparatus independently mountable to and removable from a water supply system, the water supply system including at least one

water main and at least one valve, the pig launch and recovery apparatus comprising:

a linear flow tube having a first flow end, a second flow end, and a main flow valve located between the first flow end and the second flow end, wherein the first flow end is removably mounted and fluidly connected with a recirculating unit including a pump, wherein the second flow end is removably mounted and fluidly connected with a hydrant; and

a launch and recovery tube having a first launch end and a second launch end, wherein the first launch end is fluidly connected to the linear flow tube between the first flow end and the main flow valve, and wherein the second launch end is fluidly connected to the linear flow tube between the main flow valve and the second flow end.

23. The pig launch and recovery apparatus of claim 22, wherein the launch and recovery tube includes a first valve, a second valve, and a tube access apparatus, wherein the first valve is located proximate the first launch end, wherein the second valve is located proximate the second launch end, and wherein the tube access apparatus is located between the first valve and the second valve.

24. The pig launch and recovery apparatus of claim 23, wherein the linear flow tube includes a longitudinal axis, and wherein the second launch end is coupled to the linear flow tube at an angle relative to the longitudinal axis of the flow tube.

25. The pig launch and recovery apparatus of claim 24, wherein the angle is about 45 degrees.

26. The pig launch and recovery apparatus of claim 24, wherein the linear flow tube includes an angled screen mounted within the linear flow tube, wherein the angled screen is configured to form a secondary fluid pathway with the second launch end of the launch and recovery tube.

27. The pig launch and recovery apparatus of claim 23, wherein the launch and recovery tube further includes a bleed valve located between the first valve and the second valve.

28. The pig launch and recovery apparatus of claim 22, further comprising a pig including a pig load, wherein the pig load includes one or more of a camera, a drogue chute, a jetting head, a global positioning sensor, a scrubber, a battery and a light.

29. The pig launch and recovery apparatus of claim 28, the pig apparatus further comprising:

a riser including a first end and a second end; and

a drogue chute including a webbing canopy connected to the first end of the riser through at least two suspension lines, wherein

the pig load is coupled to the second end of the riser.

30. The pig launch and recovery apparatus of claim 29, further comprising a plurality of stabilizer guides coupled with the pig load.

31. The pig launch and recovery apparatus of claim 30, further comprising at least one pivoting mount connected to the pig load, and wherein the plurality of stabilizer guides are coupled to the pig load using the at least one pivoting mount.

32. The pig launch and recovery apparatus of claim 30, wherein the scrubber includes a scrubber body having an outer surface, and wherein a plurality of spring wire brushes extend radially outwardly from the outer surface of the scrubber body.

33. The pig launch and recovery apparatus of claim 32, wherein the plurality of spring wire brushes collectively define a scrubbing unit having a first diameter, and wherein a water main has a second diameter, wherein the first diameter is greater than a second diameter.