CLAIMS

1. A lid-mounted water sampling system adapted to be fluidly coupled to a water line for obtaining water quality parameters corresponding to a sample of pressurized water from the water line and transmitting information associated with said water quality parameters to a remote location, the system comprising:

a water sampling apparatus;

a pit lid adapted to be positioned to cover an opening of a pit box such that during use an outer surface of the pit lid is substantially at ground level and adapted to be positioned upon the pit box located underground;

the pit lid further comprising an in-use underside portion coupled to ~~a~~ the water sampling apparatus, the water sampling apparatus adapted to be positioned in an internal volume defined by the pit box, the water sampling apparatus being fluidly coupled to the water line for obtaining water quality parameters corresponding to a sample of the pressurized water from the water line;

one or more connectors arranged relative to the underside portion of the pit lid for coupling the water sampling apparatus to the water line such that the lid-mounted water sampling system is adapted to be readily uncoupled from the water line;

a frame assembly for mounting the water sampling apparatus in the underside portion of the pit lid, the frame assembly being coupled to the underside portion of the pit lid; and

a data transmitter positioned adjacent said pit lid in electronic communication with the water sampling apparatus for transmitting the water quality parameters to the remote location.

2. A lid-mounted water sampling system in accordance with claim 1 ~~or claim 2~~ wherein the water sampling apparatus is adapted to measure one or more of the following parameters: (a) transient pressure;

(b) temperature of water;

(c) pH of water;

(d) oxidation reduction potential (ORP);

(e) Conductivity (E_C)

(f) Free Chlorine concentration;

3. A lid-mounted water sampling system in accordance with claim 1 or claim 2 further comprising: a first sampling line ~~for being~~ coupled to ~~with~~ the water line and a dynamic pressure detector ~~for~~ that allow~~ing~~ flow of water from the water line to ~~a~~ the dynamic pressure detector to measure the transient pressure in the water line; and a second sampling line ~~for being~~ coupled to ~~with~~ the water line and a plurality of sampling chambers with corresponding sampling probes ~~for~~ that allow~~ing~~ flow of water from the water line to ~~a~~ the plurality of sampling chambers with corresponding sampling probes, the sampling probes being adapted to sample water quality parameters of a sample of water flowing into said sampling chambers.

4. A lid-mounted water sampling system in accordance with claim ~~2~~ 3 further comprising: a receiver, a signal processor and a control unit, wherein the dynamic pressure sensor is arranged to conduct an initial water sampling step to identify transient pressure in the pipeline and transmitting transient pressure related information to ~~a~~ the receiver and ~~a~~ the signal processor, said signal processor being arranged to receive and process transient pressure related information to determine if transient pressure in the pipeline satisfies a pre-determined criteria, the signal processor being in communication with ~~a~~ the control unit to undertake one or more additional water sampling steps when the pre-determined criteria is satisfied.

5. A lid-mounted water sampling system in accordance with claim 4 wherein the control unit is arranged to operate the water sampling system in a low power consumption operating configuration when the pre-determined criteria is not satisfied.

6. A lid-mounted water sampling system in accordance with any one of claims 4 or 5 wherein the control unit is programmed or programmable to increase water sampling rates or data recording rates when the predetermined criteria is ~~not~~ satisfied.

7. A lid-mounted water sampling system in accordance with any one of claims 3 to 6 wherein the water sampling apparatus further comprises a sampling valve to control the flow of water from the water line into the first and second sampling lines.

8. A lid-mounted water sampling system in accordance with claim 7 wherein the sampling valve is in electrical communication with a data trans-receiver for allowing remote actuation of the sampling valve.

9. A lid-mounted water sampling system in accordance with claim 7 or claim 8 wherein the sampling valve is in electrical communication with a processor to execute

sampling instructions written onto a non-volatile memory device arranged in communication with a processor by actuating said sampling valve in accordance with said sampling instructions.

10. A lid-mounted water sampling system in accordance with any one of claims 3 to 9 wherein the water sampling apparatus further comprises a pressure reduction valve positioned in fluid communication with the second sampling line for reducing pressure of water flowing from the water line into the plurality of water sampling chambers.

11. A lid-mounted water sampling system in accordance with any one of the preceding claims wherein the transmitter further comprises an antenna element secured relative to the pit lid wherein a top portion of the antenna element is positioned adjacent to the underside of pit lid for transmitting information associated with said water quality parameters to the remote location.

12. A lid-mounted water sampling system in accordance with any one of the preceding claims wherein the data transmitter for transmitting the water quality parameters to a remotely located processing unit is configured to receive and process the water quality parameters for the one or more samples sampled by the sampling apparatus in accordance with one or more water quality parameters processing instructions written onto a remotely located non-volatile memory unit in communication with said remotely located processing unit.

13. A lid-mounted water sampling system in accordance with any one of the preceding claims wherein the data transmitter is adapted to be in wired or wireless communication with a remote server.

14. A lid-mounted water sampling system in accordance with any one of the preceding claims further comprising an on-board processing unit in communication with the water sampling apparatus and the data transmitter for processing and transmitting information associated with said water quality parameters to the remote location.

15. A lid-mounted water sampling system in accordance with any one of the preceding claims further comprising: an enclosure for enclosing at least a part of the water sampling apparatus with a sealing arrangement, the sealing arrangement being

provided to form a seal between the enclosure and the pit lid and/or the water sampling apparatus.

16. A lid-mounted water sampling system in accordance with claim 15 wherein the sealing arrangement is located at an in-use upper section of the enclosure that forms the seal between the enclosure and the pit lid and/or the water sampling apparatus.

17. A lid-mounted water sampling system ~~apparatus~~ in accordance with claim 15 or claim 16 wherein the enclosure in combination with the water sampling apparatus and/or the pit lid is negatively buoyant to prevent the combination of the pit lid, water sampling apparatus and the enclosure from becoming buoyant when submerged in water.

18. A lid-mounted water sampling system ~~apparatus~~ in accordance with any one of claims 15 to 17 wherein the enclosure further comprises an outlet opening to allow water from inside the enclosure to be discharged outside the enclosure.

19. A lid-mounted water sampling system ~~apparatus~~ in accordance with claim 18 wherein the outlet is positioned in an in-use lower section of the enclosure.

20. A lid-mounted water sampling system ~~apparatus~~ in accordance with claim 18 or 19 wherein the enclosure comprises a base forming the in-use lower section of the enclosure with upstanding walls extending from the base in a direction towards the pit lid, the outlet being positioned in the base of the enclosure.

21. A lid-mounted water sampling system ~~apparatus~~ in accordance with any one of the preceding claims further comprising a sampling pressure regulator to regulate the pressure of water flowing through the water sampling apparatus to be above 101 kilopascals and preferably in the range of 130 kilopascals and 210 kilopascals.

22. A water sampling system adapted to be fluidly coupled to a water line for obtaining water quality parameters corresponding to a sample of pressurized water from the water line and transmitting information associated with said water quality parameters to a remote location, the system comprising:

a water sampling apparatus adapted to be positioned below an underside portion of a pit lid within an internal volume defined by a pit box, said pit lid being adapted to be positioned to cover an opening of the pit box such that during use an

outer surface of the pit lid is substantially at ground level and adapted to be positioned upon the pit box located underground;

the water sampling apparatus being fluidly coupled to the water line for obtaining water quality parameters corresponding to a sample of the pressurized water from the water line;

one or more connectors arranged relative to the underside portion of the pit lid for coupling the water sampling apparatus to the water line such that the water sampling system is adapted to be readily uncoupled from the water line;

a frame assembly for mounting the water sampling apparatus in the underside portion of the pit lid, the frame assembly being adapted to be coupled to the underside portion of the pit lid and

a data transmitter positioned adjacent said pit lid in electronic communication with the water sampling apparatus for transmitting the water quality parameters to the remote location.

23. A water sampling system in accordance with claim 22 wherein the water sampling apparatus is adapted to measure one or more of the following parameters:
(a) transient pressure;
(b) temperature of water;
(c) pH of water;
(d) oxidation reduction potential (ORP);
(e) Conductivity (E_C)
(f) Free Chlorine concentration;

24. A ~~lid-mounted~~ water sampling system in accordance with claim 22 or claim 23 further comprising: a first sampling line ~~for being~~ coupled ~~with~~ to the water line and a dynamic pressure detector ~~for~~ that allow~~s~~ing flow of water from the water line to ~~a~~ the dynamic pressure detector to measure the transient pressure in the water line; and a second sampling line ~~for being~~ coupled ~~with~~ to the water line and a plurality of sampling chambers with corresponding sampling probes ~~for~~ that allow~~s~~ing flow of water from the water line to ~~a~~ the plurality of sampling chambers with the corresponding sampling probes, the sampling probes being adapted to sample water quality parameters of a sample of water flowing into said sampling chambers.

25. A water sampling system in accordance with claim ~~23 or~~ 24 further comprising: a receiver, a signal processor and a control unit, wherein the dynamic pressure sensor is arranged to conduct an initial water sampling step to identify transient pressure in the pipeline and transmitting transient pressure related information to ~~a~~ the receiver and ~~a~~ the signal processor, said signal processor being arranged to receive and process transient pressure related information to determine if transient pressure in the pipeline satisfies a pre-determined criteria, the signal processor being in communication with ~~a~~ the control unit to undertake one or more additional water sampling steps when the pre-determined criteria is satisfied.

26. A water sampling system in accordance with claim 25 wherein the control unit is arranged to operate the water sampling system in a low power consumption operating configuration when the pre-determined criteria is not satisfied.

27. A water sampling system in accordance with any one of claims 25 or 26 wherein the control unit is programmed or programmable to increase water sampling rates or data recording rates when the predetermined criteria is ~~not~~ satisfied.

28. A water sampling system in accordance with any one of claims 24 to 27 wherein the water sampling apparatus further comprises a sampling valve to control the flow of water from the water line into the first and second sampling lines.

29. A water sampling system in accordance with claim 28 wherein the sampling valve is in electrical communication with a data trans-receiver for allowing remote actuation of the sampling valve.

30. A water sampling system in accordance with claim 28 or claim 29 wherein the sampling valve is in electrical communication with a processor to execute sampling instructions written onto a non-volatile memory device arranged in communication with a processor by actuating said sampling valve in accordance with said sampling instructions.

31. A water sampling system in accordance with any one of claims 24 to 30 wherein the water sampling apparatus further comprises a pressure reduction valve positioned in fluid communication with the second sampling line for reducing pressure of water flowing from the water line into the plurality of water sampling chambers.

32. A water sampling system in accordance with any one of claims 21 to 31 wherein the transmitter further comprises an antenna element secured relative to the pit lid

wherein a top portion of the antenna element is positioned adjacent to the underside of the pit lid for transmitting information associated with said water quality parameters to the remote location.

33. A ~~lid-mounted~~ water sampling system in accordance with any one of claims 21 to 32 wherein the data transmitter for transmitting the water quality parameters to a remotely located processing unit is configured to receive and process the water quality parameters for the one or more samples sampled by the sampling apparatus in accordance with one or more water quality parameters processing instructions written onto a remotely located non-volatile memory unit in communication with said remotely located processing unit.

34. A water sampling system in accordance with any one of the preceding claims wherein the data transmitter is adapted to be in wired or wireless communication with a remote server.

35. A water sampling system in accordance with any one of claims 21 to 34 further comprising an on-board processing unit in communication with the water sampling apparatus and the data transmitter for processing and transmitting information associated with said water quality parameters to the remote location.

36. A method of sampling water, the method comprising the steps of:

positioning a water sampling apparatus below an underside portion of a pit lid, the pit lid being adapted to be positioned to cover n opening of a pit box such that during use an outer surface of the pit lid is substantially at ground level and adapted to be positioned upon the pit box located underground;

mounting the water sampling apparatus in a frame assembly and coupling said frame assembly to the underside portion of the pit lid,

fluidly coupling one or more connectors arranged relative to the underside portion of the pit lid to said water sampling apparatus to sample pressurised water from a water line for obtaining water quality parameters corresponding to a sample of the pressurized water from the water line;

transmitting the water quality parameters, by a data transmitter positioned adjacent said pit lid, to a remote location.

37. A method of sampling water in accordance with claim 38 further comprising the step of measuring one or more of the following parameters:

(a) transient pressure;

(b) temperature of water;

(c) pH of water;

(d) oxidation reduction potential (ORP);

(e) Conductivity (E_C)

(f) Free Chlorine concentration.

38. A method of sampling water in accordance with any one of claims 36 or 37 comprising the steps of:

coupling a first sampling line with the water line for line for allowing flow of water from the water line to a dynamic pressure detector and measuring the transient pressure in the water line;

coupling a second sampling line with the water line for allowing flow of water from the water line to a plurality of sampling chambers with corresponding sampling probes, sampling the water flowing into the sampling chambers to sample water quality parameters.

39. A method in accordance with claim 38 further comprising the step of activating a sampling valve arranged to be in fluid communication with the first and second sampling lines, the sampling valve being in electrical communication with a processor to execute sampling instructions written onto a non-volatile memory device by actuating said sampling valve in accordance with said sampling instructions.

40. A method in accordance with claim 38 or 39 further comprising the steps of transmitting the water quality parameters to a remotely located processing unit, by using the transmitter, processing the water quality parameters for the one or more samples sampled by the sampling apparatus, by using the processing unit, in accordance with one or more water quality parameters processing instructions written onto a non-volatile memory device in communication with said processing unit.

41. A method in accordance with any one of claims 38 to 40 wherein the method comprises conducting an initial water sampling step to identify transient pressure in the pipeline by using a dynamic pressure sensor and transmitting transient pressure related information to a receiver and a signal processor, said signal processor being arranged to receive and process transient pressure related information by determining

if transient pressure in the pipeline satisfies a pre-determined criteria and in response communicating signals to a control unit to undertake one or more additional water sampling steps when the pre-determined criteria is satisfied.

42. A method in accordance with claim 41 further comprising the step of operating the water sampling system in a low power consumption operating configuration when the pre-determined criteria is not satisfied.

43. A method in accordance with claim 42 further comprising the step of increasing water sampling rates or data recording rates when the predetermined criteria is ~~not~~ satisfied.