CLAIMS

What is claimed is:

1. A system, comprising:

at least two water analyzers, wherein at least one of the at least two water analyzers is positioned upstream of a purification apparatus and wherein at least another of the at least two water analyzers is positioned downstream of the purification apparatus, wherein one of the at least one upstream water analyzer and one of the at least one downstream water analyzer are time-synchronized based upon a time for a sample to travel from an upstream location to a downstream location;

at least one processor; and

a memory device that stores instructions executable by the processor to:

receive water analysis data from the at least two water analyzers, wherein the water analysis data comprises information related to membrane integrity;

use an algorithm for calculating membrane integrity based upon received data corresponding to system attributes;

calculate, using the algorithm, the membrane integrity based upon the received water analysis data;

identify, based upon the calculated membrane integrity, degradation of the purification apparatus; and

perform an action in response to the identified degradation, wherein the action comprises at least one of: shunting flow, notifying a user of the degradation, and shutting down the system.

2. The system of claim 1, wherein at least one of the at least two water analyzers comprises a high-sensitivity turbidimeter.

3. The system of claim 1, wherein the water analysis data comprises data selected from the group consisting of: turbidity, sensitive particle counting, total carbon, pH, conductivity, light-treatment, pathogens, ions, sediment, silt, and heavy metals.

4. The system of claim 1, wherein the purification apparatus comprises a membrane and wherein the degradation comprises a membrane breach.

5. The system of claim 1, further comprising predicting, based upon the membrane integrity, a possible degradation of the purification apparatus.

6. The system of claim 1, wherein the water analysis data is time-synced between the at least two water analyzers.

7. The system of claim 1, wherein the system attributes comprise at least one of: sample frequency, flow rate, purification apparatus type, upstream water attributes, and desired membrane integrity.

8. The system of claim 1, wherein the algorithm comprises identifying a relationship of the water analysis data from the at least two water analyzers.

9. A method, comprising:

receiving water analysis data from the at least two water analyzers, wherein the water analysis data comprises information related to membrane integrity, wherein at least one of the at least two water analyzers is positioned upstream of the at least one water purification apparatus and wherein at least another of the at least two water analyzers is positioned downstream of the at least one water purification apparatus, wherein one of the at least one upstream water analyzer and one of the at least one downstream water analyzer are time-synchronized based upon a time for a sample to travel from an upstream location to a downstream location;

using an algorithm for calculating membrane integrity based upon received data corresponding to system attributes;

calculating, using the algorithm, the membrane integrity based upon the received water analysis data, wherein at least one of the at least two water analyzers is positioned upstream of a purification apparatus and wherein at least another of the at least two water analyzers is positioned downstream of the purification apparatus;

identifying, based upon the calculated membrane integrity, degradation of the purification apparatus; and

performing an action in response to the identified degradation, wherein the action comprises at least one of: shunting flow, notifying a user of the degradation, and shutting down the system.

10. The method of claim 9, wherein at least one of the at least two water analyzers comprises a high-sensitivity turbidimeter.

11. The method of claim 9, wherein the water analysis data comprises data selected from the group consisting of: turbidity, sensitive particle counting, total carbon, pH, conductivity, light-treatment, pathogens, ions, sediment, silt, and heavy metals.

12. The method of claim 9, wherein the purification apparatus comprises a membrane and wherein the degradation comprises a membrane breach.

13. The method of claim 9, further comprising predicting, based upon the membrane integrity, a possible degradation of the purification apparatus.

14. The method of claim 9, wherein the water analysis data is time-synced between the at least two water analyzers.

15. The method of claim 9, wherein the algorithm comprises identifying a relationship of the water analysis data from the at least two water analyzers.

16. An apparatus, comprising:

at least one water purification apparatus;

at least two water analyzers, wherein at least one of the at least two water analyzers is positioned upstream of the at least one water purification apparatus and wherein at least another of the at least two water analyzers is positioned downstream of the at least one water purification apparatus, wherein one of the at least one upstream water analyzer and one of the at least one downstream water analyzer are time-synchronized based upon a time for a sample to travel from an upstream location to a downstream location;

at least one processor; and

a memory device that stores instructions executable by the processor to:

receive water analysis data from the at least two water analyzers, wherein the water analysis data comprises information related to membrane integrity;

use an algorithm for calculating membrane integrity based upon received data corresponding to system attributes; and

calculate, using the algorithm, the membrane integrity based upon the received water analysis data;

identify, based upon the calculated membrane integrity, degradation of the purification apparatus; and

perform an action in response to the identified degradation, wherein the action comprises at least one of: shunting flow, notifying a user of the degradation, and shutting down the system.