**CLAIMS**

1. A method for improved oil recovery, comprising:

introducing seawater to an electrically-driven separation system comprising a first electrodialysis apparatus including monovalent selective membranes and a second electrodialysis apparatus including divalent selective membranes;

measuring at least one parameter of the seawater selected from the group consisting of composition, total dissolved solids concentration, sulfate concentration, and hardness, at an inlet of the electrically-driven separation system;

selectively passing a first portion of the seawater through the first electrodialysis apparatus and a second portion of the seawater through the second electrodialysis apparatus for treatment based on the measured parameter to produce first and second product streams, respectively, such that the first product stream has a greater concentration of hardness than the second product stream;

blending the first and second product streams to produce treated water including less than about 200 mg/l of sulfate, having a total dissolved solids (TDS) content in the range of about 1000 mg/l to about 5000 mg/l, and having a hardness level in the range of about 100 ppm to about 1000 ppm without blending or remineralizing the treated water with a source of hardness; and

flooding at least a portion of an oil reservoir with the treated water.

2. The method of claim 1, wherein the treated water includes less than about 100 mg/l of sulfate.

3. The method of claim 2, wherein the treated water includes less than about 40 mg/l sulfate.

4. The method of claim 1, further comprising heating the seawater prior to introducing the seawater to the electrically-driven separation system.

5. The method of claim 4, wherein heating the seawater comprises transferring waste heat from a generator to the seawater.

6. The method of claim 4, wherein the seawater is heated to a temperature above about 45°C.

7. The method of claim 1, wherein passing the first portion of seawater through the first electrodialysis apparatus comprises passing about 90% of the seawater to be treated through the first electrodialysis apparatus.

8. The method of claim 1, wherein flooding at least a portion of the oil reservoir with the treated water

comprises removing about 10% to about 15% of oil left in place following a primary oil recovery operation.

9. The method of claim 1, further comprising performing a tertiary oil recovery operation.

10. The method of claim 1, further comprising adjusting a flow rate or a current density associated with the electrically-driven separation system to control energy consumption or at least one property of the treated water.

11. The method of claim 1, comprising introducing seawater having a concentration of TDS of about 35,000 ppm, a sulfate concentration of about 2700 ppm as $SO_4$, and a hardness of about 6500 ppm as $CaCO_3$ to the electrically-driven separation system.

12. The method of claim 1, comprising introducing seawater to an electrically-driven separation system comprising a first electrodialysis apparatus and a second electrodialysis apparatus fluidly connected in parallel.

13. A secondary oil recovery system, comprising:
an oil reservoir;
a source of seawater;
an electrically-driven separation subsystem installed on an offshore platform, having:
an inlet fluidly connected to the source of seawater;
an outlet fluidly connected to the oil reservoir;
a first electrodialysis unit including monovalent selective membranes; and
a second electrodialysis unit including divalent selective membranes,
the electrically-driven separation subsystem constructed and arranged to produce treated water having predetermined properties of less than about 200 mg/l of sulfate, a total dissolved solids (TDS) content in the range of about 1000 mg/l to about 5000 mg/l, and a hardness level in the range of about 100 ppm to about 1000 ppm without blending or remineralizing the treated water with a source of hardness;
a sensor configured to measure at least one parameter of the seawater selected from the group consisting of composition, total dissolved solids concentration, sulfate concentration, and hardness, at the inlet of the electrically-driven separation subsystem; and
a controller, in communication with the sensor and the electrically-driven separation subsystem, configured to:
selectively direct a first portion of the seawater to the first electrodialysis unit and a second portion of the seawater to the second electrodialysis unit based on the measured parameter to produce

first and second product streams, respectively, such that the first product stream has a greater concentration of hardness than the second product stream; and

blend the first and second product streams to produce the treated water having the predetermined properties.

14. The system of claim 13, wherein the electrically-driven separation subsystem is constructed and arranged to produce water having less than about 100 mg/l of sulfate.

15. The system of claim 14, wherein the electrically-driven separation subsystem is constructed and arranged to produce water having less than about 40 mg/l of sulfate.

16. The system of claim 13, wherein the first electrodialysis unit and the second electrodialysis unit are fluidly connected in parallel.

17. The system of claim 13, wherein about 5% of ion exchange membranes in the electrically-driven separation subsystem are monovalent selective cation exchange membranes.

18. The system of claim 13, further comprising a source of waste heat thermally coupled to the source of seawater.

19. The system of claim 13, wherein the controller is configured to adjust at least one of a flow rate or a current density associated with the electrically-driven separation subsystem.

20. The system of claim 13, wherein the first electrodialysis apparatus and the second electrodialysis apparatus are fluidly connected in parallel.