Claims

[Claim 1]

A geothermal heat utilization system comprising:

a pumping well;

a water injection well;

piping extending from the pumping well to the water injection well;

a pump configured to feed groundwater from the pumping well to the water injection well via the piping;

a heat exchanger provided at the piping;

a control valve provided at the piping and configured to adjust a flow rate of the groundwater in the piping;

a control device configured to, when an operation frequency of inverter control of the pump reaches a minimum frequency, adjust a flow rate of the groundwater injected into the water injection well by controlling the control valve to reduce the flow rate in the piping; and

a cooling tower on a side of a load facility that uses a medium, the medium being configured to exchange heat with the groundwater in the piping in the heat exchanger, wherein

when an opening degree of the control valve reaches a minimum set opening degree, the geothermal heat utilization system injects, into the water injection well, the groundwater that has exchanged heat with the medium cooled by the cooling tower in the heat exchanger.

[Claim 2]

The geothermal heat utilization system according to claim 1, wherein

the control device includes a pump operation control unit configured to adjust the operation frequency of inverter control of the pump according to a temperature of groundwater pumped up from the pumping well, passed through the heat exchanger, and injected into the water injection well.

[Claim 3]

The geothermal heat utilization system according to claim 2, wherein

the control device further includes a control valve opening/closing control unit configured to adjust, when the operation frequency reaches the minimum frequency, the opening degree of the control valve according to the temperature.

[Claim 4]

The geothermal heat utilization system according to any one of claims 1 to 3, wherein

the control valve is provided on a side of the water injection well of the heat exchanger.

[Claim 5]

The geothermal heat utilization system according to any one of claims 1 to 4, wherein

when the control device adjusts the flow rate of the groundwater in the piping by throttling the control valve, the operation frequency is kept at the minimum frequency.

[Claim 6]

A control device comprising:

a pump operation control unit configured to adjust an operation frequency of inverter control of a pump being configured to feed groundwater from a pumping well to a water injection well, via piping extending from the pumping well to the water injection well, and the piping provided with a heat exchanger which exchanges heat between the groundwater and a medium used by a load facility; and

a control valve opening/closing control unit configured to adjust, when the operation frequency reaches a minimum frequency, an opening degree of a control valve, the control valve being provided at the piping configured to feed the groundwater to the water injection well, wherein

when the opening degree of the control valve reaches a minimum set opening degree, the pump injects, into the water injection well, the groundwater that has exchanged heat with the medium cooled by a cooling

tower provided on a side of the load facility in the heat exchanger.

[Claim 7]

A control method comprising:

adjusting an operation frequency of inverter control of a pump being configured to feed the groundwater from a pumping well to a water injection well, via piping extending from the pumping well to the water injection well, and the piping provided with a heat exchanger which exchanges heat between the groundwater and a medium used by a load facility; and

adjusting, when the operation frequency reaches a minimum frequency, an opening degree of a control valve, the control valve being provided at the piping being configured to feed the groundwater to the water injection well, wherein

when the opening degree of the control valve reaches a minimum set opening degree, injecting, into the water injection well, the groundwater that has exchanged heat with the medium cooled by a cooling tower provided on a side of the load facility in the heat exchanger.

[Claim 8]

A program configured to cause a computer to perform a method, the method comprising:

adjusting an operation frequency of inverter control of a pump being configured to feed the groundwater from a pumping well to a water injection well, via piping extending from the pumping well to the water injection well, and the piping provided with a heat exchanger which exchanges heat between the groundwater and a medium used by a load facility; and

adjusting, when the operation frequency reaches a minimum frequency, an opening degree of a control valve, the control valve being provided at the piping configured to feed the groundwater to the water injection well, wherein

when the opening degree of the control valve reaches a minimum set opening degree, injecting, into the water injection well, the groundwater that has exchanged heat with the medium cooled by a cooling tower provided on a side of the load facility in the heat exchanger.