As disclosed, there is provided a system for remediation of dredged soil contaminated by pollutants, which includes: a heat-treatment unit removing pollutants by heating dredged soil to volatilize the pollutants; a pretreatment unit physically removing pollutants adhered to a surface of the dredged soil; a screening unit separating coarse soil having a larger particle size and fine soil having a smaller particle size from the dredged soil; and an extraction unit chemically treating pollutants remaining in the fine soil separated by the screening unit.

In the system for remediation of dredged soil according to the present invention, contaminated dredged soil may be subjected to heat treatment in the heat-treatment unit, supplied to the pretreatment unit to be physically treated, and supplied to the screening unit to be separated according to soil particle size, and the separated fine soil may be chemically treated by the extraction unit.

The heat-treatment unit may heat the dredged soil to a temperature of 300°C to 400°C from 20 to 40 minutes.

The pretreatment unit may include a drum washer mixing the dredged soil with process water while causing friction therebetween to facilitate removal of pollutants from the dredged soil, and an air turbulencing pipe separating agglomerated particles of the dredged soil to facilitate screening while separating pollutants by applying physical impact to the dredged soil using compressed air.

The screening unit may include a vibrational dehydration screen removing foreign substances and primarily separating coarse soil particles and the fine soil having pollutants accumulated thereon from the dredged soil treated by the pretreatment unit. When finer screening is required based on contamination characteristics according to the particle size of the dredged soil, the screening unit may include a multi-stage cyclone.

The screening unit may include at least one cyclone and at least one screen depending on the desired number of particle size fractions. When the screening unit includes a plurality of cyclones, the cyclones are disposed in a serial multi-stage fashion, and, when the screening unit includes a plurality of screens, the screens are disposed in a vertical multi-stage fashion (for example, double-decker).

The system for remediation of dredged soil may further include a solid-liquid

separator separating a solid substance and a liquid substance from a slurry composed of washing water and the fine soil separated by the screening unit through coagulation and precipitation.

The extraction unit may include: an extraction agent tank containing an extraction agent for extracting heavy metals; and at least one extraction tank mixing the fine soil with process water and the extraction agent and stirring the mixture to extract pollutants from the fine soil.

The extraction agent may be sulfuric acid.

The extraction tank may include a primary extraction tank and a secondary extraction tank based on the degree of contamination, wherein the extraction agent used in the primary extraction tank may be collected so as to be reused in the secondary extraction tank.

A ratio of the fine soil to washing water containing the extraction agent may be 1:3.

The system for remediation of dredged soil may further include a neutralization unit neutralizing the fine soil chemically treated by the extraction unit using a neutralizer.

The neutralizer may be caustic soda (sodium hydroxide) or fly ash.

The system may further include a dewatering unit reducing a moisture content of the neutralized fine soil and finally discharging the fine soil.

The dewatering unit may be a filter press.

The system may further include a wastewater treatment unit treating wastewater discharged from the solid-liquid separator and the extraction unit.

The wastewater treatment unit may include a neutralization tank, a dissolved air flotation tank, and an activated carbon adsorption tower, and water purified by the wastewater treatment unit may be stored in a process water storage tank so as to be reused.

In accordance with another aspect of the present invention, there is provided a contaminated dredged soil remediation method using the system for remediation of dredged soil as set forth above.

In accordance with a further aspect of the present invention, there is provided a system for remediation of dredged soil for remediating dredged soil contaminated by organic pollutants and heavy

metals, which includes: a heat-treatment unit removing pollutants by heating dredged soil to a temperature of 300°C to 400°C for 20 to 40 minutes to volatilize the pollutants; a pretreatment unit including a drum washer mixing the dredged soil with process water while causing friction therebetween to facilitate removal of pollutants from the dredged soil and an air turbulencing pipe separating agglomerated particles of the dredged soil to facilitate screening while separating pollutants by applying physical impact to the dredged soil using turbulence generated by compressed air so as to physically remove pollutants adhered to a surface of the dredged soil; a screening unit separating coarse soil having a larger particle size and fine soil having a smaller particle size from the dredged soil; an extraction unit chemically treating pollutants remaining in the fine soil separated by the screening unit using sulfuric acid, as an extraction agent, wherein the extraction agent used in primary extraction is reused in secondary extraction; and a neutralization unit neutralizing the fine soil chemically treated by the extraction unit using fly ash, as a neutralizer, wherein the contaminated dredged soil is subjected to heat treatment in the heat-treatment unit, supplied to the pretreatment unit to be physically treated, and supplied to the screening unit to be separated according to soil particle size, and the separated fine soil is chemically treated by the extraction unit.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other aspects, features, and advantages of the present invention will become apparent from the detailed description of the following embodiments in conjunction with the accompanying drawings, in which;

FIG. 1 is a schematic block diagram of a system for remediation of dredged soil according to one embodiment of the present invention;

FIG. 2 is a schematic block diagram of an exemplary screening unit of the system for remediation of dredged soil according to the embodiment of the present invention;

FIG. 3 is a schematic block diagram of an exemplary extraction unit of the system for remediation of dredged soil according to the embodiment of the present invention; and

FIG. 4 is a schematic block diagram of an exemplary wastewater treatment unit of

CLAIMS

1. A system for remediation of dredged soil for remediating dredged soil contaminated by organic pollutants and heavy metals, comprising:

a heat-treatment unit removing pollutants by heating dredged soil to a temperature of 300°C to 400°C for 20 to 40 minutes to volatilize the pollutants;

a pretreatment unit comprising a drum washer mixing the dredged soil with process water while causing friction therebetween to facilitate removal of pollutants from the dredged soil and an air turbulencing pipe separating agglomerated particles of the dredged soil to facilitate screening while separating pollutants by applying physical impact to the dredged soil using turbulence generated by compressed air so as to physically remove pollutants adhered to a surface of the dredged soil;

a screening unit separating coarse soil having a larger particle size and fine soil having a smaller particle size from the dredged soil;

an extraction unit chemically treating pollutants remaining in the fine soil separated by the screening unit using sulfuric acid, as an extraction agent, wherein the extraction agent used in primary extraction is reused in secondary extraction; and

a neutralization unit neutralizing the fine soil chemically treated by the extraction unit using fly ash, as a neutralizer,

wherein the contaminated dredged soil is subjected to heat treatment in the heat-treatment unit, supplied to the pretreatment unit to be physically treated, and supplied to the screening unit to be separated according to soil particle size, and the separated fine soil is chemically treated by the extraction unit.

2. The system for remediation of dredged soil according to claim 1, wherein the screening unit comprises a vibrational dehydration screen removing foreign substances and primarily separating coarse soil particles and the fine soil having pollutants accumulated therein from the dredged soil treated by the pretreatment unit.

3. The system for remediation of dredged soil according to claim 2, wherein the screening unit comprises at least one screen, and, when the screening unit comprises a plurality of screens,

the screens are disposed in a vertical multi-stage fashion.

4. The system for remediation of dredged soil according to claim 2, wherein the screening unit further comprises a cyclone for finer screening.

5. The system for remediation of dredged soil according to claim 4, wherein the screening unit comprises at least one cyclone, and, when the screening unit comprises a plurality of cyclones, the cyclones are disposed in a serial multi-stage fashion.

6. The system for remediation of dredged soil according to claim 1, further comprising:

a solid-liquid separator separating a solid substance and a liquid substance from a fine soil slurry separated by the screening unit through coagulation and precipitation.

7. The system for remediation of dredged soil according to claim 1, wherein the extraction unit comprises: an extraction agent tank containing an extraction agent for removing heavy metals; and at least one extraction tank mixing the fine soil with water and the extraction agent to extract pollutants from the fine soil.

8. The system for remediation of dredged soil according to claim 7, wherein a ratio of the fine soil to washing water containing the extraction agent is 1:3.

9. The system for remediation of dredged soil according to claim 6, further comprising:

a wastewater treatment unit treating wastewater discharged from the solid-liquid separator and the extraction unit.

10. The system for remediation of dredged soil according to claim 9, wherein the wastewater treatment unit comprises a neutralization tank, a dissolved air flotation tank, and an activated carbon adsorption tower, and wherein water purified by the wastewater treatment unit is stored in a process water storage tank so as to be reused.

11. A dredged soil remediation method using the system for remediation of dredged soil according to any one of claims 1, 2 to 7, 8, 9 and 10.