FLUSH’N’CLLEEN™

Solution for Septage or Sewage Treatment

by CLLEEN™ Water and Power
Septage and Sewage

“As much as 850 BILLION gallons of sewage that has yet to be treated is being spilt into 770 cities yearly.”

This is not happening in a Third World Country. This is in the USA according to the 2011 water pollution facts and statistics from the National Defense Council.

FLUSH’N’CLLEEN™ solution – recycles sewage for reuse including:

- Irrigation
- Industrial
- Other grey water uses
- Potable water (to approved drinking water standards)
SEWAGE/SEPTAGE Recycle is very advantageous for a number of reasons:

- Sewage recycle costs are generally favorable compared to new seawater or brackish water desalination costs
- Raw water costs are projected to rise substantially in the future
- The new reuse supply reduces an area’s reliance on imported water/other water sources
- It increases local water supply reliability
- The reuse solutions can provide additional water quality benefits such as significant regional salinity reductions
- Sewage recycle solutions are supported by environmental stakeholders.
Why you are ready to Recycle Sewage/Septage now:

- Freshwater withdrawals have tripled over the last 50 years. Demand for freshwater is increasing by 64 billion cubic meters a year (1 cubic meter = 1,000 liters).

- The world’s population is growing by roughly 80 million people each year.

- Changes in lifestyles and eating habits in recent years are requiring more water consumption per capita.

- The production of biofuels has also increased sharply in recent years, with significant impact on water demand. Between 1,000 and 5,000 liters of water are needed to produce a single liter of biofuel.

- Energy demand is also accelerating, with corresponding implications for water demand.

- Almost 80% of diseases in so called ‘developing’ countries are associated with water, causing some 3 million early deaths. For example, 5,000 children die every day from diarrhea, or one every 17 seconds. [http://www.worldometers.info/water/](http://www.worldometers.info/water/)
WHY FLUSH’N’CLLEEN is YOUR ‘Toilet to Tap’ solution

• Design, Build, Own, Operate, Transfer (DBOOT) systems available
  or
• Complementary services to existing municipal or industrial septage treatment plants.

• Customizable packaged systems for installation and operation on a sale or lease basis

• Minimal footprint

• Minimal CAPEX
How does the FLUSH’N’CLLEEN™ 5 step process from ‘toilet to tap’ work?
1. **Screening**

For non-dissolvables to be landfilled or recycled for compost or fertilizer

2. **Electrocoagulation (EC)**

Non-chemical coagulation process that kills 99.999% of bacteria and pathogens, including:

- Cryptosporidium
- E.Coli
- Giardia
- Fecal Coliform
- And associated pathogens

2. **Vacuum Filtration (VF)**

Separation of solids from the water to be recycled
4. **CLLEEN™ Multi-stage Flash Distillation (MSF)**

- Distills the water to less than 5ppm TDS (100 times better than drinking water standards) and ammonia.

5. **CLLEEN™ DA – Deaeration**

- To remove the ammonia from the distilled water stream to produce
  * pure H2O in one stream
  * and liquid ammonia in another
- The liquid ammonia is reintroduced to the solids from the clarifier to produce a nitrogen-rich fertilizer for resale, reuse or recycle.

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At the time of this writing, 4,930,887 billions of liters of water were consumed in 2011.²

²http://www.worldometers.info/water/

In the last century, world population has tripled, while world water usage has increased sixfold.³

³World water and food to 2025: Dealing with Scarcity / Mark W. Rosegrant, Ximing Cai, Sarah A. Cline.
The EC Process in Practice

Twin train 500-gpm EC coupled with UF and RO

Vacuum Clarifier - Secondary Separation

Untreated  |  EC Treated 5 Min  |  Settling 10 Min  |  Settling  |  Final Waste Sludge
Electrocoagulation (EC):

- Metal anode dissolution
- Coupled to complementary cathode reaction that generates OH-
- Metal hydroxides form
- Dissolved contaminants adsorbed

EC process:

- Is salt-free, pH-neutral
- It avoids counterions of standard coagulating agents eg: Fe(Cl)_3 and Al2(SO_4)_3

Is particularly effective in removal of wide range of:

- Natural organic matter
- Dissolved solids
- Particulates & micro-organisms from drinking water

Metal hydroxide precipitates have large surface area (~500m²/g):

- Contaminants are physically or chemically adsorbed
Vacuum Clarification

- Pulls or ‘stretches’ water inside tower
- Results in bursting of small bubbles supporting coagulated contaminants

Output

- Sludge accumulates bottom of VC
- Automatic removal in 23-25% solids consistency state
- Water recaptured for further use
CLLEEN™ Multi-stage Flash Distillation (MSF)

- Majority of desalination in world is MSF
- Proven technology
- Handles much higher concentrations of TDS than any RO

CLLEEN™ MSF system removes

- Short carbon chain contaminants
- Solubles such as sodium chloride
BENEFITS FOR YOU!

• Our bio-friendly sludge passes US EPA TCLP (leachate analysis). It
  • is considered non-hazardous
  • and can be land-applied
  • or used as clean fill

• No expensive disposal of sludge in a hazardous landfill

• No trucking or expensive deep-well injection

• The most cost-effective, environmentally friendly & community friendly Zero Liquid Discharge (ZLD) & Zero Solids Discharge solution
FLUSH’N’CLLEEN™ Results

Recovery of 70% of water

- Ultra pure distilled form of water
- Ecologically friendly sludge
- Clean fill or fertilizer
- 100% recycle
Who to contact:

Your authorised CLLEEN™ Water and Power reseller

or

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