[Sterapore Water Treatment — Case Report 2]

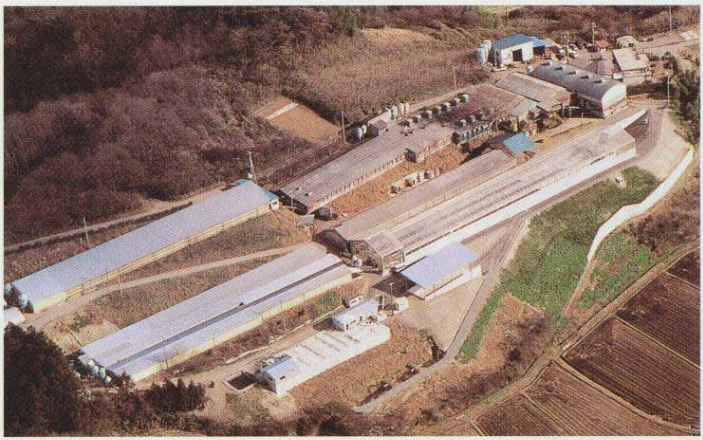
Livestock Wastewater Treatment and Reuse System

- **Name of System**
  S Hog Farm Livestock Wastewater Treatment and Reuse System (Miyagi Prefecture, Japan)
- **Start of Operation**
  May 1997
- **Outline of System**
  Effluent from hog houses is treated in a membrane bioreactor, then RO treated.
- **Throughput**
  60 m^3/day
- **Influent BOD**
  18,000 mg/L
- **Membrane Modules**
  · Product No.:
  UMF 6424 × 2 tiers × 5 units (640 m^2)
  · Particle cutoff: 0.1 µm
  · Membrane replacement:
  Membrane has not yet been replaced as of March 2003

- **Advantages of Membrane Use**
  - A high MLSS concentration can be maintained, making it possible to sustain high concentrations of nitrifying bacteria and denitrifying bacteria, which allows for a compact, high-performance system design.
  - With membrane separation, the level of suspended solids can be cut by essentially 100%, making it possible to carry out efficient tertiary treatment.

System Features

The aim of this system, which was designed for a hog farm being constructed in a valley surrounded by farm fields, is to keep the hog operation from polluting the environment by eliminating all external discharge of liquid wastes. First, very fine mesh screens remove the solids, then a membrane bioreactor removes BOD and nitrogen. In the final step, RO treatment is carried out and the resulting water is reused. The RO concentrate is used as compost. In this way, the system successfully achieves zero emission.



General view of hog farm

Raw water Activated sludge MF treated water RO treated water

Remarks

Liquid wastes from livestock operations generally have higher BOD and nitrogen concentrations than household wastewater. Denitrification is thus required, which calls for biological treatment of the livestock wastewater. This is usually done with a system that uses both an aerobic tank and an anaerobic tank.

SUR234L

The element shown here is a new model which differs from the membrane module used in the livestock wastewater treatment described on this page.

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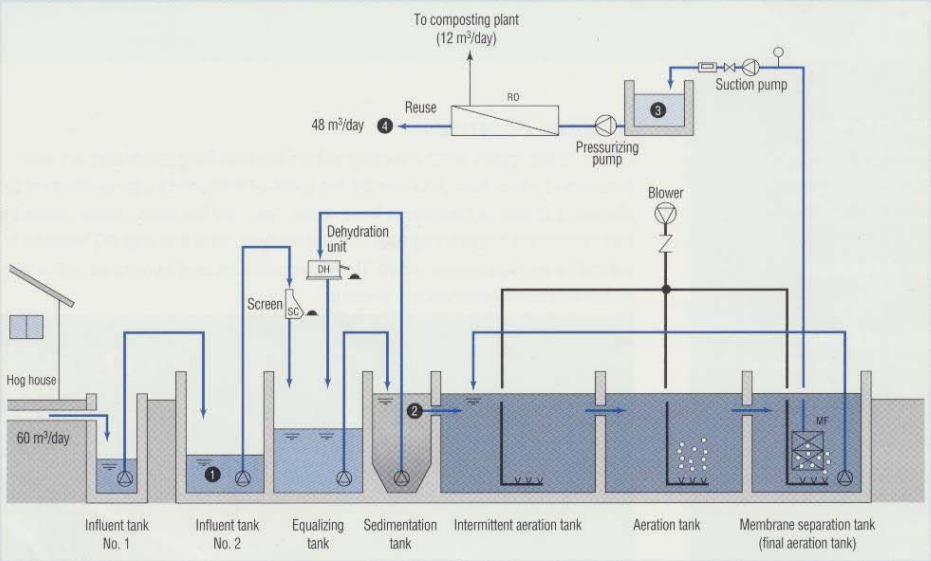
• *Flow Sheet*



• *Water Quality Analysis*

Test items		Influent ❶	Screened water ❷	MF-treated water ❸	RO-treated water ❹
pH		7.6	7.2	6.3	6.7
BOD	(mg/L)	18,000	13,000	2	1
COD_{Mn}	(mg/L)	4,800	3,000	130	1
SS	(mg/L)	12,000	1,300	<1	<1
T-N	(mg/L)	3,100	2,700	60	0.34
T-P	(mg/L)	370	150	120	0.05

• *Operating Conditions (activated sludge treatment)*

HRT:	20 days
MLSS:	8,000 – 12,000 mg/L
Differential pressure:	25 – 40 kPa
Chemical Wash for Membrane Modules	
Chemical:	Sodium hypochlorite (0.1%) + NaOH (4%)
Washing time:	Overnight immersion
Frequency:	Once every 8 months

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This flow sheet presents one example of a livestock wastewater treatment system. Each system must be designed according to the water quality of the influent and the target wastewater standards.

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