



# Wastewater Recycling at a Resort Hotel

In 2004, Mitsubishi Rayon was awarded "The Nikkan Kogyo Shimbun Prize".

## • Name of System

ANA Hotel and Resort, and  
Club Med Kabira (Ishigaki  
Island, Okinawa Prefecture)

## • Start of Operation

ANA Hotel and Resort: June  
1998  
Club Med Kabira: June 1999

## • Outline of System

Water discharged from hotel is  
treated with membrane  
bioreactors, and reused for  
washing, as general-purpose  
water, and in cooling and  
sprinkler systems.

## • Throughput

ANA Hotel and Resort: 1,200  
m<sup>3</sup>/day for entire facility, of  
which 450 m<sup>3</sup>/day is recovered  
for reuse.  
Club Med Kabira: 390 m<sup>3</sup>/day  
for entire facility, all of which is  
recovered for reuse.

## • Influent BOD

200 mg/L

## • Membrane Modules

ANA Hotel and Resort: 1340  
pieces of "SUR234" element  
(2,010 m<sup>2</sup>).  
Membrane cutoff 0.4 μm  
Club Med Kabira: 160 pieces of  
"UMF 834 LF" element  
arranged in 8 modules, each  
equipped with 2 tiers of 10  
elements (1,280 m<sup>2</sup>).  
Membrane cutoff 0.4 μm

## • Permits/Approval

Passed general technical  
appraisal for sewage  
treatment systems by the  
Building Center of Japan  
Approved by the Japanese  
Ministry of Construction  
(Permit No. 18)

## System Features

At this resort hotel located on an isolated island surrounded by turquoise seas and coral reefs, wastewater treatment is essential for protecting and preserving the natural environment, as well as conserving fresh-water resources. By using membrane bioreactor technology to collect, combine, and treat wastewater arising from such diverse sources as kitchens, baths, toilets, as well as others, and recycling the treated water, not a drop is wasted. The treated recycled water may be used for virtually any non-potable purpose, including irrigation, cooling, and sprinkler systems.



ANA Hotel and Resort



Club Med Kabira



Raw water



Membrane bioreactor



Treated water

## Remarks

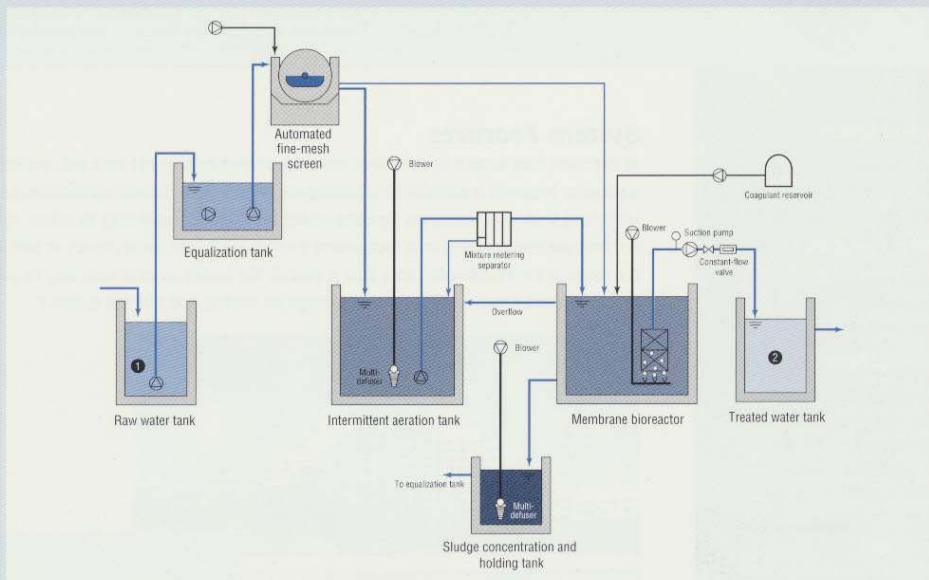
In many cases a membrane filtration system offers a much more cost effective solution for the recovery of fresh water than sea water desalination. For example, assuming the total amount of recovered water to be 450 m<sup>3</sup> per day, the relative costs of using this system and using municipal water produced on Ishigaki Island by seawater desalination would be as follows.

Cost of municipal water	¥39,400,000/year
Cost of membrane bioreactor wastewater recovery system (including membrane replacement costs)	¥9,800,000/year
<b>Savings</b>	<b>¥29,600,000/year</b>

## ● Advantages of Membrane Use

- Significantly lowers installation costs and space requirements.
- Allows major savings in operating costs by recycling water resources.
- Prevents excessive sludge generation.
- Assures the availability of safe water.

• **Flow Sheet**



• **Water Quality Analysis**

Test	Raw water ①	Effluent regulation	Membrane-treated water ②
pH (—)	5.8–8.6	5.8–8.6	7
BOD (mg/L)	200	≤5	1
COD (mg/L)	150	≤10	4.8
SS (mg/L)	260	≤5	<1
T-N (mg/L)	50	≤10	9
T-P (mg/L)	6	≤0.5	2.5
n-Hex (mg/L)	30	≤3	0.5
<i>E. coli</i> (CFU/mL)	10 <sup>6</sup> –10 <sup>8</sup>	<1×10 <sup>3</sup>	ND

• **Operating Conditions**

MLSS: 8,000–10,000 mg/L

Suction Pump Operation:  
 13 minutes on (operating)  
 3 minutes off (at rest)

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This sheet presents one example of a membrane bioreactor/purification system that has been evaluated and approved by the Building Center of Japan, and the Japanese Minister of Construction. Each system must be individually designed for the water quality of the influent and the target wastewater standards.



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