CASE STUDY

RO | UF | MBR |

Drinking Water
Jakarta, Indonesia

TORAY

Toray's Integrated Membrane System (IMS) Alleviates Pressures of Indonesia's Rapid Urbanization

Table 1 — Quick Facts		
Feed source	Surface water	
Treatment scheme	DAF Submerged UF RO	
System capacity	14,000 m^3/day	
Membrane type	UF	RO
Model	HSU-1515	TM720D-400
Membrane material	PVDF	Polyamide
Active area [m^2 (ft^2)]	20 (215)	37 (400)
No. of skids	3	4
System design	152 modules per rack	20:11 (7M)
System recovery	90%	75%
End use	Potable use	
Commissioned	Aug 2018	

BACKGROUND

Jakarta is one of the fastest-growing metropolises in the world. The World Bank estimated that Indonesia's urban population increased at an average annual rate of 4.1 percent between 2000 and 2010, and the greater Jakarta region added 7 million people during this period (The World Bank 2016). As a result, about two-thirds of Jakarta's population is expected to migrate to suburbs like Pantai Indah Kapuk (PIK).

Situated in northern Jakarta, PIK has become a bustling region that is notable for gated communities, numerous tourist attractions, and businesses to support the thriving population. However, as Jakarta continues to grow, the environmental challenges arising from rapid urbanization often outweigh the solutions available to address them.

URBANIZATION & WATER QUALITY

A network of 13 rivers that pass through Jakarta serves as its primary water supply. However, as the city does not have an adequate drainage and sanitation system, these rivers have become a channel for domestic and industrial sewage. E. coli contamination was detected in more than 50 percent of shallow wells, and more than 10 percent of wells contained iron and manganese (Apip 2015). Turbidity and Total Suspended Solids (TSS) fluctuated anywhere between <100 ppm and as high as 1,000 ppm during the dry seasons. Furthermore, excessive land development has contributed to severe flooding, soil subsidence, and seawater intrusion, all factors that cause surface and groundwater contamination.

A conventional treatment scheme was in operation but would no longer be able to produce water quality sufficient to sustain healthy standards of living. PIK's water utility had previous installations using Toray's UF and RO technologies and would seek out the membrane manufacturer's expertise. The heightened deterioration of water quality and increased demand for clean water, PIK's private utility was forced to look for improved measures. PIK already had installations with Toray UF and RO products and once again sought out Toray's expertise.

SOLUTION

Technical evaluations revealed that two treatment objectives would be required to reduce the high levels of BOD (Biochemical Oxygen Demand) and TSS resulting from the sewage in the feed. Secondly, as PIK is situated close to the ocean, the second treatment line would reduce salinity (TDS). The solution to meet both objectives would be Toray's Integrated Membrane System (IMS) design incorporating Toray's submerged PVDF ultrafiltration (UF) membrane modules followed by high-rejection reverse osmosis (RO) membranes. The low-pressure UF modules provide:

- Ease of operation.
- High mechanical and chemical durability for effective separation of target contaminants.
- Protection of the downstream RO.

The RO elements would polish the UF filtrate and produce a quality acceptable for potable use. Table 2 shows the treated water quality.

Toray's Integrated Membrane System (IMS) Alleviates Pressures of Indonesia's Rapid Urbanization

Table 2 — Water Quality (temp. 29–32°C)		
Item	UF feed	RO permeate
TDS, mg/L	2,000–8,000	<500
TSS, mg/L	100	<0.1

REFERENCES

[1] "Indonesia's Urban Story." The World Bank Group. Jakarta, Indoneisa. June, 2016.

[2] Apip. Sagala, Saut AH. Pingping, Luo. "Overview of Jakarta Water-Related Environmental Challenges." Water and Urban Initiative Working Paper Series, Number 04. United Nations University. April 2015.

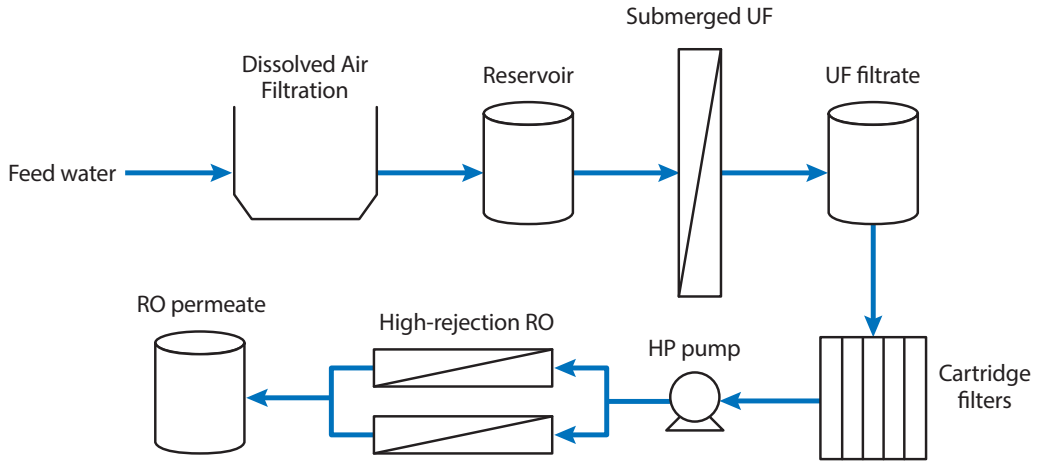

Figure 2 (left): Submerged PVDF UF skid
Figure 3 (above): RO skids

TORAY INDUSTRIES, INC.
Head Office: Nihonbashi Mitsui Tower 24th Floor, 1-1, Nihonbashi-Muromachi 2 chome, Chuo-ku, Tokyo, 103-8666, JAPAN

www.water.toray +81 3 3245-4540 LinkedIn YouTube

TORAY
Innovation by Chemistry