



# Membrane Life

## Membrane Life Study

In order to establish *actual* membrane life and replacement schedules for Kubota membranes, in 1995, Kubota and its partners initiated a program to monitor, in great detail, the rate of and reason for replacement of membranes in UK and US installations (over 50 installations to date are currently being monitored). Table 1 shows the number of membranes in service, number of years of service, number of membranes replaced. The reasons for replacement are all being continuously monitored and recorded to establish an actual membrane life and operating history for our product. This is truly unique in the MBR marketplace, as we are the only supplier to undertake this extensive and very revealing task.



<b>Table 1 - % of Membranes Replaced<sup>a</sup></b>						
<b>Age Year</b>	<b># of Panels Used in Study</b>	<b>Failures Excluding Repairs</b>	<b>Annual % Excluding Repairs</b>	<b>Cumulative % Excluding Repairs</b>	<b>Annual % Including Repairs</b>	<b>Cumulative % Including Repairs</b>
<b>1</b>	175796	0	0	<b>0.00</b>	0.00	0.00
<b>2</b>	152696	394	0.26	<b>0.26</b>	0.27	0.27
<b>3</b>	112221	530	0.47	<b>0.73</b>	0.58	0.85
<b>4</b>	79386	669	0.84	<b>1.57</b>	0.91	1.76
<b>5</b>	64486	1388	2.15	<b>3.73</b>	2.34	4.10
<b>6</b>	35636	33	0.09	<b>3.82</b>	0.32	4.42
<b>7</b>	15386	55	0.36	<b>4.18</b>	0.36	4.78
<b>8</b>	4286	20	0.47	<b>4.64</b>	0.47	5.25
<b>9</b>	686	0	0	<b>4.64</b>	0.00	5.25
<b>10</b>	386	0	0	<b>4.64</b>	0.00	5.25

<sup>a</sup>As of June 2005

Too often are new, unproven membrane systems with no history of long-term, full-scale installation performance, evaluated purely based on “estimated membrane life”. To establish a membrane life for a product that has only been utilized in applications for one or two years seems to be both risky and potentially overly optimistic.



## Life Cycle Calculations



**Membrane Panel**

We recommend that Owners budget for one full replacement of membranes within a 15-yr life cycle. This replacement may be calculated on the basis of a complete replacement of all membranes every fifteen years, or as we typically recommend, a very conservative estimated replacement schedule of 20% per year beyond the 10<sup>th</sup> year of service. Regardless of the approach, each results in one full replacement of membranes within a 15-yr life cycle.

The reason we recommend planning for a replacement schedule of 20% replacement per year after the 10<sup>th</sup> year, is that actual replacement during the first 10 years of our membrane life study has been only 0.09%. Therefore, assuming that ALL of the membranes would need to be replaced in the 10<sup>th</sup> year appears to be an overly conservative estimate.

## Membrane Average Life

Since we believe that no membrane replacements will be required for the first ten (10) years and all of the membranes will be replaced within fifteen (15) years, the average life will be 12.5 years (assuming half replacement before 12.5 years and half after).



**Membrane Module**