The Dynatec Difference

**Significant Savings**
- Discharge quality improvement reduces permitting costs
- Future water reuse reduces costs and overall water consumption
- Low operating costs reduce overall costs
- Automated system requires limited attention, reducing labor costs
- Lower sludge production than conventional systems reduces operating costs

**Technology Benefits**
- Membrane separation does not allow system upsets
- Consistently high quality water production.
- Ability to reuse purified water
- Low operating costs
- Low operator attention required

**Dynatec Services Provided**
- Process design
- System design
- Controls design
- System build
- System installation

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HIGH QUALITY DISCHARGE FROM MBR

Dynatec provides Membrane Bio-Reactor System for Retirement Home

The retirement community consists of independent living homes and apartment homes in 438 acres in rural Maryland. The facility is in horse country, in a valley among rolling hills, and shares the area with high-end homes.

Previously, the facility had two septic tanks, and a recirculated sand bed filtration systems. This created odors, and caused mosquito infestations in summer. The facility chronically missed discharge limits, and thus was paying frequent fines. The sand bed filtration system was high maintenance, constantly flooding and requiring maintenance.

**Replacement Criteria**

In deciding on a replacement system, several criteria were important to the facility and to state regulators. The plant has to be aesthetically pleasing. Odors must be minimized and if possible eliminated. The plant has to achieve high levels of treatment in order to meet present and future discharge requirements. Future use of the treated water for irrigation is planned. The plant has to be operator friendly, and be capable of being monitored remotely, since full-time staff would not be available. The plant must be cost effective, from both capital and operating standpoints. Finally, the plant must be modular, in that future expansion of the facility must be accommodated in the design.

The initial plant sizing was nominally for 50,000 gallons per day of treatment capacity and has been expanded to 100,000 gallons per day.

**System Design**

After a review of the available treatment options, the owners of the facility settled on the (MBR) Membrane Bioreactor option. Due to the modular design of the system, they also decided on the out-of-basin membrane module concept provided by the Dynatec DynaLift™ system. This process combines ease of use with all of the requirements of both the owners and the regulators.

**Odor control** is achieved by using closed tanks vented to atmosphere. Air from the screening room is used to provide aeration to the reactors and the membranes, using the biomass as a bio-filter. The negative pressure in the screen room ensures that there are no fugitive odors from the area. Mixing and aeration of the EQ tanks (the existing septic tanks) ensures no odors from that area.

**Design Compatibility** with the area: due to the nature of the area, the plant was designed to be installed in a “horse barn”, or at least a building that looks like a horse barn, but in fact, contains both the treatment plant and space for landscaping and other equipment.

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DynaLift™ out-of-basin membrane

The Dynalift™ process has been certified under Title 22 of the California code of regulations, achieving 5-log removal of bacterial and 4-log removal of viruses.
**High Levels of Treatment** has been achieved since the plant’s inception in early 2007. Performance has been maintained since that time. Future plans include treatment for Total-N and Total-P to comply with Maryland’s “flush tax” requirements.

*No treatment is taking place for these constituents at present—the existing permit allows these levels.*

**Cost Effective Installation** was achieved using standard above-ground HDPE tanks, rather than the more common concrete tanks.

**Cost effective Operations** have been achieved:

<table>
<thead>
<tr>
<th>Power Costs</th>
<th>Total HP</th>
<th>Annual kWh (Actual)</th>
<th>Cost/kWh</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Costs</strong></td>
<td>55</td>
<td>149,000</td>
<td>$0.09</td>
<td>$13,500.00</td>
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</table>

<table>
<thead>
<tr>
<th>CIP Costs</th>
<th>Cost/Unit (Av)</th>
<th>No of CIP's</th>
<th>Annually</th>
<th>Total Cost</th>
</tr>
</thead>
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<tr>
<td></td>
<td>$8.60</td>
<td>9</td>
<td>35 gals</td>
<td>$300.00</td>
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</tbody>
</table>

**Plant Expandability** has been achieved by the installation of one half of the plant, and the addition of a second membrane rack. No modifications to tanks or other work was required in 2009.

**Conclusions:**

Since completion and startup in early 2007, the plant has performed reliably, producing high quality water at all times.

The DynaLift™ concept provides economic advantages due to the modular design and the use of standard tanks. The cost of operation is modest when compared to alternatives.