Advanced Treatment System
Technical Manual

Manufactured By:

QUANICS®, Inc.

Fixed Film Media
Wastewater Treatment Systems
Quanics® Advanced Wastewater Treatment System Layout and Flow

1 **Primary Treatment Tank** - Raw wastewater enters a primary settling tank sized at a minimum of 2 times the daily design flow. If primary treatment/STEP collection is utilized at each building served this primary tank may not be required.

2 **Effluent Filter** - The primary treatment tank outlet should be equipped with a properly sized commercial effluent filter.

3 **Recirculation/Dosing Tank** - The partially treated wastewater flows via gravity into a recirculation/dosing tank sized at a minimum of 1 times the daily design flow.

4 **S.T.E.P System** - The outlet of the recirculation/dosing tank is equipped with one or more pumping packages. The packages will normally consist of a filtered pump vault, pumps and controls. These pumps are used to micro dose the wastewater on a timed basis to the treatment modules.

5 **Advanced Treatment Module** - One or more treatment modules containing proprietary AeroCell® or Bio-COIR® media are utilized for treatment of the wastewater. The wastewater is sprayed over the top of the media via helical spray nozzles where it comes into contact with beneficial organisms. The wastewater flows through the porous media and flows via gravity out of the advanced treatment module.

6 **Recirculation Device** - Upon passing through the full depth of media the treated wastewater flows via gravity to a recirculation device typically mounted on the recirculation/dosing tank. This device splits the flow at a 4:1 ratio. The 80% split is directed either into the recirculation/dosing tank or it may be directed back to the head of the primary settling for further treatment. The remaining 20% split flows via gravity final discharge or disposal through a variety of methods including surface discharge, drip irrigation disposal, leaching chamber beds or other approved methods.
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Chapter 1: Introduction

QUANICS® is committed to becoming the best water solutions problem solver in the world. We promise to provide complete engineered water solutions using the latest technology and best products. We will provide the best technical assistance and customer service available and we will always deliver more than we promise.

In our quest to serve our market, we do not view a single technology as the one and only option, but rather look to develop a wide variety of technologies that the engineer and/or end user can tailor to their individual application. Along this line, we are proud to provide two advanced wastewater treatment systems, AeroCell® and Bio-COIR®.

Both systems operate as fixed-film media filters to treat wastewater. The patented delivery system is the same for each system only the media is different. Each media type has its own unique properties and both have been tested and listed under NSF International Standard 40 Class 1 requirements. Both systems have also been demonstrated to significantly reduce total nitrogen and fecal coliforms. The following manual will explain the differences and similarities of each system. Before reading this manual determine which system you are currently utilizing. Each system will be identified by name “AeroCell” or “Bio-COIR”.

We are eager to assist you with any questions or issues. Please contact QUANICS at 877-QUANICS to request assistance.

Chapter 2: Process Description

The QUANICS AeroCell & Bio-COIR are individual wastewater treatment systems utilizing fixed film media. The module(s) consist of a fiberglass tank(s) containing a pre-determined amount of media. The pre-engineered modules are currently available to treat flows from 200-5000 gpd. Grouping the modules together allows for larger flows. Effluent is sprayed over the media utilizing specialized spray nozzles. This patented delivery system evenly distributes wastewater to achieve the desired treatment levels.

The AeroCell system utilizes open cell foam media. The foam has a high porosity, large surface area and ease of microbial attachment that allows for loading rates up to ten times that of sand. Open cell foam has a fifteen year track record of treating wastewater to the highest quality treatment levels. The application rates for the AeroCell system have been carefully selected to provide optimal treatment and performance with a long lasting media.

The Bio-COIR system utilizes a patented Bio-COIR media for treatment. The Bio-COIR media is composed of fibers that constitute the thick mesocarp, or husk, of the coconut fruit. The long fibers are used for ropes, door mats etc., leaving pith tissue and short to medium length fibers as a waste which has accumulated in heaps in many third world countries. The short to medium length fibers used in Bio-COIR are a lignocellulosic material. The high lignin content of these fibers results in a more durable material than other natural medias such as peat. The high lignin content of 45.84% also results in a slower degradation of the media and assures that excellent water/air ratio is maintained over a longer period of time.

In both AeroCell & Bio-COIR systems, pretreatment of the wastewater occurs through the use of a septic tank equipped with an effluent filter on the outlet.
The pretreated wastewater then moves into a recirculation tank where a pump doses the wastewater to the treatment module(s). The dosing of effluent occurs in short frequent doses over a 24-hour period utilizing a timed dosed control panel. Effluent is sprayed over the media through the use of specially designed helical spray nozzles that provide uniform distribution of the effluent over the entire surface area. Once sprayed, the effluent moves via gravity down though the media where it is allowed to come into contact with beneficial microorganisms that serve to treat the effluent to Secondary and Tertiary levels. After passing through the full depth of media the effluent travels to the QUANICS recirculation device. The recirculation device splits the flow and discharges 80% back into the treatment stream and 20% to the final disposal point. In periods of low flow, 100% of the treated effluent may be discharged back into the treatment stream.
Chapter 3: Performance Summary

The AeroCell® and Bio-COIR® have been extensively tested and sampled through Third-party verification programs; field sampling and EPA funded Demonstration projects. Both systems have demonstrated their effective treatment of residential, commercial and process wastewater. The flexibility of the system allows the design engineer to achieve the mandated discharge requirements by applying the appropriate loading rate per cubic foot of media based upon the anticipated influent wastewater strength. The systems have been sampled and tested in a variety of climates from Florida to Alaska and in varying seasons of the year. All systems have consistently met or exceeded the discharge parameters as established by the approving authority or Certification Standard. The following charts outlines some of the results of the respective systems.

AeroCell ATS Performance Summaries

NSF Standard 40 Testing

Testing Overview: The AeroCell system was tested under the provisions of NSF/ANSI Standard 40 for Residential Wastewater Treatment Systems. Composite sampling was conducted over a 6-month period of time and included various stress tests including vacation stress, wash day stress and others. Although not part of the testing protocol, TN samples were also taken during the entire test and included in the final report.

Provider: NSF Wastewater Technology Center Test Center (Third Party)
Location: Waco, Texas
Date: February - August 2005
Daily Flow: 500 gpd
Loading Rate: 5.88 gpd per ft³ of media

Notes: Although a three week start-up period is allowed. The AeroCell effluent averaged 2.25 mg/L CBOD5 and 4.75 mg/L TSS during the first week of testing.

Results:

<table>
<thead>
<tr>
<th></th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
<th>TN (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Median</td>
<td>&lt;2</td>
<td>&lt;2</td>
<td>8</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td># of Samples</td>
<td>116</td>
<td>116</td>
<td>24</td>
</tr>
</tbody>
</table>

NSF Fecal Testing with Ultraviolet Disinfection

Testing Overview: The AeroCell system was tested following the State of Washington Testing protocol and was conducted under the provisions of NSF/ANSI Standard 40 for Residential Wastewater Treatment Systems. Composite sampling was conducted over a 6-month period of time.

Provider: NSF Wastewater Technology Center Test Center (Third Party)
Location: Waco, Texas
Date: August 2007 - January 2008
Daily Flow: 500 gpd
Loading Rate: 5.88 gpd per ft³ of media

Notes: The testing was conducted for the sole purpose of obtaining fecal coliform reductions therefore no effluent BOD or TSS numbers were also obtained. Effluent samples were collected after the AeroCell system but before the UV Disinfection unit. These samples revealed the AeroCell alone significantly reduced fecal coliform concentrations.

Results:

<table>
<thead>
<tr>
<th></th>
<th>Influent</th>
<th>Without Disinfection</th>
<th>With UV Disinfection</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 Day Geometric Mean (cfu/100 mL)</td>
<td>2,837,266</td>
<td>34</td>
<td>16</td>
</tr>
<tr>
<td>30 day Geometric Mean Range (cfu/100 mL)</td>
<td>2.7 x 10^5 to 5.8 x 10^6</td>
<td>4 to 5800</td>
<td>4 - 71</td>
</tr>
<tr>
<td># of Samples</td>
<td>64</td>
<td>64</td>
<td>64</td>
</tr>
</tbody>
</table>

Alaska Category II Approval Sampling

Testing Overview: Single-family residential AeroCell systems were sampled to determine compliance with Category II treatment levels as required by the Municipality of Anchorage. The sampling was conducted on two separate residences following a weekly sampling regime followed by 3 additional monthly samples on each site. Category II requires CBOD5 less than 30 mg/L and TSS less than 30 mg/L

Provider: Eagle River Engineering (Third Party)
Location: Anchorage, Alaska
Date: June - August 2005
Daily Flow: 650 gpd
Loading Rate: 12.5 gpd per ft³ of media

Results:

<table>
<thead>
<tr>
<th></th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>Median</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td># of Samples</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Alaska Category III with Nitrogen Reduction Winter Sampling

Testing Overview: Single-family residential AeroCell systems were sampled during the coldest months to determine compliance with Category III plus Nitrogen Reduction treatment levels as required by the Municipality of Anchorage.

Provider: Eruk Williamson - UAA Graduate Student (Third Party)
Location: Anchorage, Alaska
Date: December 2007 - February 2008
Daily Flow: 650 gpd
Loading Rate: 12.5 gpd per ft³ of media

Notes: This data was part of a Master Thesis study. The study evaluated the performance of the AeroCell system, proprietary textile filters, proprietary activated sludge units and intermittent sand filters. The AeroCell was the only proprietary system to meet the Category III requirements during the study. The study was conducted during the coldest period of the year to present the most challenging conditions.
AeroCell® Results:

<table>
<thead>
<tr>
<th></th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
<th>TN (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>10</td>
<td>6</td>
<td>29</td>
</tr>
<tr>
<td>Median</td>
<td>9</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>6</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td># of Samples</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

Proprietary System Averages

<table>
<thead>
<tr>
<th></th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
<th>TN (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AeroCell</td>
<td>10</td>
<td>6</td>
<td>29</td>
</tr>
<tr>
<td>Textile Filter</td>
<td>41</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>Activated Sludge</td>
<td>25</td>
<td>11</td>
<td>31</td>
</tr>
</tbody>
</table>

Skaneateles Lake Demonstration Project

Testing Overview: An AeroCell system was installed on a single-family residential structure as part of this EPA funded National Onsite Demonstration Project. The system was sampled monthly for a period of 12 months.

Provider: Certified Environmental Services, Inc. (Third Party)
Location: Syracuse, New York
Date: February 2006 - January 2007
Daily Flow: 500 gpd
Loading Rate: 5.88 gpd per ft$^3$ of media

Notes: Results are presented in two tables. Upon Initial start-up the system malfunctioned due to 1. Paint and chemical contamination of the wastewater by the owners. 2. Improper leveling of the media inside the treatment module caused short-circuiting with reduced media contact. Corrective actions were made to the system in May 2006. The first 4 months of sampling were affected by these malfunctions. The following tables represent the data as a whole and then with the first 4 sample points removed.

Whole Data Set Results:

<table>
<thead>
<tr>
<th></th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
<th>TN (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>45</td>
<td>36</td>
<td>49</td>
</tr>
<tr>
<td>Median</td>
<td>27</td>
<td>17</td>
<td>53</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>42</td>
<td>62</td>
<td>34</td>
</tr>
<tr>
<td># of Samples</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Modified Data Set Results:

<table>
<thead>
<tr>
<th></th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
<th>TN (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>21</td>
<td>12</td>
<td>31</td>
</tr>
<tr>
<td>Median</td>
<td>19</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>19</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td># of Samples</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Single-family Residential Systems

Testing Overview: Grab samples have been collected from various residential systems throughout the United States. The following information is a summary of all those samples. These data points represent all types of AeroCell system configurations, loading rates, recirculation rates, climate conditions, timed/demand dose and etc.

Provider: Various Parties. (First and Second Party)
Location: United States
Date: 1998 - 2007
Daily Flow: 300 - 1000 gpd
Loading Rate: 5 - 15 gpd per ft$^3$ of media

AeroCell Results:

<table>
<thead>
<tr>
<th></th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
<th>TN (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>27</td>
<td>11</td>
<td>30</td>
</tr>
<tr>
<td>Median</td>
<td>17</td>
<td>9</td>
<td>26</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>26</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td># of Samples</td>
<td>22</td>
<td>22</td>
<td>19</td>
</tr>
</tbody>
</table>

Remote Work Camp Facility

Testing Overview: An AeroCell system was installed to serve a remote work camp on a natural gas extraction facility in southwest Wyoming in 2009. The 40,000 gallon per day system was designed to treat the residential and kitchen waste generated by the camp workers. Eight ATS-16 AeroCell modules were utilized along with 120,000 gallons of primary treatment tanks. The treated effluent is super chlorinated and then stored for reuse in the drilling process at the site. The required effluent values before chlorination were secondary quality. The influent BOD averaged 374 mg/L and the influent TSS averaged 276 mg/L during the testing.

Provider: Precision Analysis (Third Party)
Location: Wyoming
Date: November 2009 - September 2010
Daily Flow: up to 40,000 gpd
Loading Rate: 12.5 gpd/ft$^3$ of media

AeroCell Results:

<table>
<thead>
<tr>
<th></th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>26</td>
<td>14</td>
</tr>
</tbody>
</table>
Commercial and Multi-family Residential Systems (Various Locations)

Testing Overview: Grab samples have been collected from various commercial and multi-family systems throughout the United States. The following information is a summary of all those samples. These data points represent all types of AeroCell® system configurations, loading rates, recirculation rates, climate conditions, timed/demand dose and etc. The systems samples included residential subdivision developments, mobile home parks, veterinary clinic, restaurants, convenience stores, office buildings and other commercial structures.

Provider: Various Parties. (First and Second Party)

Location: United States

Date: 1998 - 2008

Daily Flow: 500 - 24,000 gpd

Loading Rate: 3 - 12 gpd per ft³ of media

AeroCell Results:

<table>
<thead>
<tr>
<th>Mean</th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>1 - 105</td>
<td>1 - 74</td>
<td></td>
</tr>
</tbody>
</table>

| # of Samples | 111 | 43 |

Bio-COIR ATS Performance Summaries

Bio-COIR® Advanced Treatment System NSF Standard 40 Testing

Testing Overview: The Bio-COIR system was tested following the provisions of NSF/ANSI Standard 40 for Residential Wastewater Treatment Systems. Composite sampling was conducted over a 20-week period of time to verify and seek improvements over previous NSF Std. 40 testing.

Provider: NSF Wastewater Technology Center Test Center (Third Party)

Location: Waco, Texas

Date: March - July 2005

Daily Flow: 500 gpd

Loading Rate: 5.88 gpd per ft³ of media

Results:

<table>
<thead>
<tr>
<th>Mean</th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

NSF Standard 40 Verification Testing

Testing Overview: The Bio-COIR system was tested following the provisions of NSF/ANSI Standard 40 for Residential Wastewater Treatment Systems. Composite sampling was conducted over a 20-week period of time to verify and seek improvements over previous NSF Std. 40 testing.

Provider: NSF Wastewater Technology Center Test Center (Third Party)

Location: Waco, Texas

Date: March - July 2005

Daily Flow: 500 gpd

Loading Rate: 5.88 gpd per ft³ of media

Results:

<table>
<thead>
<tr>
<th>Mean</th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
<th>TN (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>9</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>8</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

High Loading Rate Testing

Testing Overview: The Bio-COIR system was tested following the NSF/ANSI Standard 40 Protocol to determine optimal loading rate levels for the Bio-COIR media. The goal of the testing was to determine at what loading rate would the Bio-COIR system produce effluent of at least 25 mg/L CBODs and 30 mg/L TSS, the necessary levels to pass Std. 40.

Provider: Massachusetts Alternative Septic System Test Center (Third Party)

Location: Bourne, Massachusetts

Date: November 2003 - March 2004

Daily Flow: 500 gpd

Loading Rate: 15.63 gpd per ft³ of media

Results:

<table>
<thead>
<tr>
<th>Mean</th>
<th>CBODs (mg/L)</th>
<th>TSS (mg/L)</th>
<th>TN (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>9</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>8</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Fiber Media Testing

Testing Overview: This initial testing of Bio-COIR media was conducted to determine the optimal type of Bio-COIR material for wastewater treatment. The testing consisted of using various types of coir fibers and a known control to determine which media produced the best results and at what loading rate. The individual systems were equally dosed with residential strength waste and samples were taken using a composite sampler. Various stress tests were also simulated during the testing.

Provider: Massachusetts Alternative Septic System Test Center (Third Party)
**Increased Loading Testing**

**Testing Overview:** After the completion of the NSF Std. 40 Verification Testing, the Bio-COIR® system was tested to see what effect increased loading would have on the system. The same system previously tested at 500 gpd was increasingly loaded up to a maximum of 1250 gpd. Bi-weekly composite samples were taken and each 250 gpd increase was dosed for a full month before increasing to the next level. The loading levels were 500, 750, 1000 and 1250 gpd respectively. The system was consistently producing 2 mg/L CBOD5 and 2 mg/L TSS for the twenty weeks prior to the initiation of the loading increases.

**Provider:** NSF Wastewater Technology Center Test Center (Third Party)

**Location:** Waco, Texas

**Date:** July - October 2005

**Daily Flow:** 500 - 1250 gpd

**Loading Rate:** 5.88 - 14.70 gpd per ft³ of media

**Results:**

<table>
<thead>
<tr>
<th></th>
<th>CBOD5 (mg/L)</th>
<th>TSS (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Median</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td># of Samples</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

**Virginia Residential System Field Verification**

**Testing Overview:** Twenty permanently-occupied single-family residential BioCOIR® systems (ATS 4 and ATS 6 modules) were sampled in four consecutive quarters. Estimated sewage flows is based on number of bedrooms and ranged from 300 gpd to 600 gpd. Project will be completed in second quarter of 2011. Influent and effluent were sampled by certified laboratories for BOD₅, TSS, TN and e.coli under the supervision of Quanics Inc.

**Providers:** USB and EMS laboratories (Second Party)

**Location:** Virginia

**Date:** July 2009 – present (expected April, 2011)

**Daily Flow:** 300 gpd – 600 gpd

**Loading rate:** 11.3 - 8.5 gal/ft³ of media per day

**Results**

<table>
<thead>
<tr>
<th>Eff BOD*</th>
<th>Eff TSS*</th>
<th>Eff TN</th>
<th>Eff e.coli**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>9.06</td>
<td>3.94</td>
<td>13.0</td>
</tr>
<tr>
<td>Median</td>
<td>7.4</td>
<td>3.7</td>
<td>7.73</td>
</tr>
<tr>
<td>St. Dev.</td>
<td>2.04</td>
<td>2.21</td>
<td>9.97</td>
</tr>
<tr>
<td>Range</td>
<td>2.6-30.8</td>
<td>1.6-23</td>
<td>3.64-44.61</td>
</tr>
<tr>
<td># of samples</td>
<td>77 (16 homes)</td>
<td>77 (16 homes)</td>
<td>77 (16 homes)</td>
</tr>
</tbody>
</table>

* log transformed data returned to original units for mean & standard deviation

**Habitat for Humanity Demonstration Project**

**Testing Overview:** Habitat for Humanity reclaimed an old abandon military housing compound. Each individual residential structure was equipped with a different advanced waster treatment technology including the Bio-COIR, peat media filter, a textile filter and a fixed activated sludge system. After one year of use, all four systems were grab sampled to determine effluent quality. The Bio-COIR system was the only technology that met the discharge requirements.

**Provider:** Bremer County, IOWA (Third Party)

**Location:** Waverly, Iowa

**Date:** August 2007

**Results:**

<table>
<thead>
<tr>
<th></th>
<th>CBOD5 (mg/L)</th>
<th>TSS (mg/L)</th>
<th>TN (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio-COIR</td>
<td>21</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Textile Filter</td>
<td>48</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Peat Filter</td>
<td>97</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>Fixed Activated Sludge</td>
<td>64</td>
<td>22</td>
<td>25</td>
</tr>
</tbody>
</table>
Chapter 4: System Design

The AeroCell® and Bio-COIR® Systems are pre-engineered fixed film media filters housed in a single fiberglass container. While the two systems utilize different media types, the criteria used to design the system are the same. The criteria critical to the proper design of the systems include; influent strength, required effluent quality, tank sizing, treatment sizing, dosing, pump selection, timer settings and recirculation. The following information provides guidelines for each application.

Section 4.01: Single Family Residential

Influent Strength
These guidelines should be utilized on single-family residential AeroCell and Bio-COIR Systems. Single Family Residential Systems are defined here as those systems serving a single residential structure that produces typical “Residential Strength Waste”. The influent characteristics of this typical waste shall fall under the following parameters.

<table>
<thead>
<tr>
<th>Influent Characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBODs</td>
<td>30 day average between 100 and 300 mg/L</td>
</tr>
<tr>
<td>TSS</td>
<td>30 day average between 100 and 350 mg/L</td>
</tr>
<tr>
<td>TN</td>
<td>30 day average between 50 and 70 mg/L</td>
</tr>
<tr>
<td>GPD</td>
<td>Daily average between 100 and 1500 gallons</td>
</tr>
</tbody>
</table>

Effluent Quality
The receiving environment or the required effluent concentrations that is established by a regulatory authority will dictate the system configuration. The AeroCell and Bio-COIR systems are very flexible in terms of meeting a wide range of effluent parameters. This flexibility affords the design engineer the ability to tailor the system to the application and allows the system to be adequately sized. Effluent qualities ranging from secondary (30/25) down to better than tertiary (2/2) have been achieved using the following sizing criteria. In situations where nutrient reductions are required, the proper sizing and configuring of the system to recirculate back through the primary pretreatment tank are essential.

Pretreatment and Recirculation Tank Sizing Criteria
The AeroCell and Bio-COIR systems require two standard tanks or a single dual compartment tank sized according to the total daily design flow of the system or as dictated by local regulation.

1. The primary pretreatment compartment or tank should be equipped with an effluent filter. This pretreatment tank should be sized to hold a minimum of two times the total design flow of the system or as dictated by local regulations.
2. The recirculation compartment or tank shall be sized at a minimum of one time the total design flow of the system or as dictated by local regulations. The recirculation tank should be equipped with an appropriately sized Quanics filtered pump vault, pumps, risers, discharge assemblies, float tree, recirculation device, junction box, pressure filter and other equipment.

Treatment Sizing Criteria
Currently there are four different treatment modules available for single family residential applications. The modules may be used alone or installed in parallel. If local jurisdiction requires Certification under NSF Standard 40 Class 1 Treatment please refer to the Quanics Certified System Manuals for appropriate sizing criteria. To correctly select the AeroCell and Bio-COIR module use the following steps and tables.

Step 1: Determine the total daily design flow (100-1500 gpd).

Step 2: Identify the required effluent discharge parameters on Tables 2 or 3.

Step 3: Select the appropriate loading rate in gpd/ft³ (12.5 - 5.5 gpd/ft³) that corresponds to the required effluent parameter.

Step 4: Divide the total daily design flow by the selected loading rate from Step 3 to determine the total cubic feet of media required.

Step 5: Using Table 4, identify the appropriate treatment module(s) that contain the total cubic feet of media identified in Step 4.
Table 2: AeroCell® Loading Rates

<table>
<thead>
<tr>
<th>Required Effluent</th>
<th>Loading Rate in gpd per ft³</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS 30 mg/L</td>
<td>12.5</td>
</tr>
<tr>
<td>CBOD5 25 mg/L</td>
<td></td>
</tr>
<tr>
<td>TN N/A</td>
<td></td>
</tr>
<tr>
<td>15 mg/L 15 mg/L</td>
<td>9</td>
</tr>
<tr>
<td>15 mg/L 15 mg/L</td>
<td>8</td>
</tr>
<tr>
<td>10 mg/L 10 mg/L</td>
<td>7</td>
</tr>
<tr>
<td>10 mg/L 10 mg/L</td>
<td>6.5</td>
</tr>
<tr>
<td>5 mg/L 5 mg/L</td>
<td>6</td>
</tr>
<tr>
<td>2 mg/L 2 mg/L</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Note: TN reductions are dependent upon recirculating back to the primary tank

Table 3: Bio-COIR® Loading Rates

<table>
<thead>
<tr>
<th>Required Effluent</th>
<th>Loading Rate in gpd per ft³</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS 30 mg/L</td>
<td>12.5</td>
</tr>
<tr>
<td>CBOD5 25 mg/L</td>
<td></td>
</tr>
<tr>
<td>TN N/A</td>
<td></td>
</tr>
<tr>
<td>15 mg/L 15 mg/L</td>
<td>9</td>
</tr>
<tr>
<td>15 mg/L 15 mg/L</td>
<td>8</td>
</tr>
<tr>
<td>10 mg/L 10 mg/L</td>
<td>7</td>
</tr>
<tr>
<td>10 mg/L 10 mg/L</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Note: TN reductions are dependent upon recirculating back to the primary tank

Table 4: Modules Specifications

<table>
<thead>
<tr>
<th>Treatment Module</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Ft³ of Media</th>
<th>Access Lid Qty.</th>
<th>Spray Nozzle Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATS-3</td>
<td>36”</td>
<td>36”</td>
<td>44.5”</td>
<td>16</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ATS-4</td>
<td>48”</td>
<td>48”</td>
<td>44.5”</td>
<td>32</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ATS-6</td>
<td>75”</td>
<td>48”</td>
<td>44.5”</td>
<td>53</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>ATS-8</td>
<td>98”</td>
<td>56”</td>
<td>44.5”</td>
<td>85</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>ATS-16</td>
<td>192”</td>
<td>96”</td>
<td>54”</td>
<td>400</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Treatment System Dosing
Pressure dosing of the effluent from the recirculation tank to the treatment module(s) is essential to the proper operation of the AeroCell and Bio-COIR systems. Each treatment module contains specially designed helical spray nozzles that distribute effluent evenly across the treatment media. Effluent should be delivered to the treatment media in short frequent doses to allow the proper contact time with beneficial organisms attached to the media. The information contained in Table 5 outlines the typical dosing volumes in residential systems.

Table 5: Dosing Volumes

<table>
<thead>
<tr>
<th>Treatment Module</th>
<th>Sample Design Flow</th>
<th>Individual Dose Volume</th>
<th>Discharge Volume Per Dose Based on 80% Recirculation</th>
<th>Total Number of Doses Per 24 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATS-3</td>
<td>200 gpd</td>
<td>8 gal</td>
<td>1.6 gal</td>
<td>125</td>
</tr>
<tr>
<td>ATS-4</td>
<td>400 gpd</td>
<td>16 gal</td>
<td>3.2 gal</td>
<td>125</td>
</tr>
<tr>
<td>ATS-6</td>
<td>650 gpd</td>
<td>27 gal</td>
<td>5.4 gal</td>
<td>120</td>
</tr>
<tr>
<td>ATS-8</td>
<td>1000 gpd</td>
<td>44 gal</td>
<td>8.8 gal</td>
<td>114</td>
</tr>
</tbody>
</table>

Discharge volume is the quantity of effluent sent to the final discharge or disposal area. Individual dose discharge volume and total doses per 24 hours are based on a recirculation rate of 80%.

Pump Selection
Proper pump selection is dependent upon the number of spray nozzles present. Refer to Table 4 to determine the total number of spray nozzles for the application. Each nozzle is designed to deliver 3 gpm at 5-8 psi. A pressure gauge and ball valve installed inside the treatment module allows for field adjustment to the proper pressure setting. To determine the minimum flow performance for the required pump, multiply the number of spay nozzles by 3 gpm.

Example: ATS-8 contains 4 nozzles x 3 gpm = 12 gpm minimum flow.
Section 4.02: Commercial or Multi-Family Residential

Influent Strength
These guidelines should be utilized on multi-family residential AeroCell® and Bio-COIR® Systems. Commercial and Multi-family Residential Systems are defined here as those systems serving multiple structures that produce typical "Residential Strength Waste". The influent characteristics of this typical waste shall fall under the following parameters.

<table>
<thead>
<tr>
<th>Influent Characteristic</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBODs</td>
<td>30 day average between 100 and 300 mg/L</td>
</tr>
<tr>
<td>TSS</td>
<td>30 day average between 100 and 350 mg/L</td>
</tr>
<tr>
<td>TN</td>
<td>30 day average between 50 and 70 mg/L</td>
</tr>
<tr>
<td>FOG</td>
<td>Daily average between 100 and 1500 mg/L</td>
</tr>
</tbody>
</table>

Commercial applications with High Strength Waste should be designed based on the criteria listed in Section 4.03 of this manual.

Effluent Quality
The receiving environment or the required effluent concentration that is established by a regulatory authority will dictate the system configuration. The AeroCell and Bio-COIR systems are very flexible in terms of meeting a wide range of effluent parameters. This flexibility affords the design engineer the ability to tailor the system to the application and allows the system to be adequately sized. Effluent qualities ranging from secondary (30/25) down to better than tertiary (2/2) have been achieved using the following sizing criteria. In situations where nutrient reductions are required, the proper sizing and configuring of the system to recirculate back through the primary pretreatment tank are essential.

Pretreatment and Recirculation Tank Sizing Criteria
The AeroCell and Bio-COIR systems require two standard tanks or a single dual compartment tank sized according to the total daily design flow of the system or as dictated by local regulation. Depending on the configuration chosen, these tanks may be sized for the individual structures or sized for a single tank to handle the collective design.

1. If the tank is to be located at the individual structures and serve only that structure, the tank should be sized as the single family system pretreatment (septic) tanks are sized (see Section 4.01).
2. If there is to be a single tank for the collective design, this tank should be located appropriately so that all waste can be effectively directed to the pretreatment tank via sewers. This tank should be a minimum of 1.5 to 2 times the design flow or as dictated by local regulations.
3. The recirculation tank should be located appropriately so that the pretreated wastewater can be effectively directed to the recirculation tank via the collective primary tank or the small diameter pressure sewers from the individual primary tanks or other means such as gravity collection. This tank should be equal to the minimum daily design flow. The recirculation tank should be equipped with appropriately sized Quanics filtered pump vaults, pumps, risers, discharge assemblies, float trees, recirculation devices, junction boxes, pressure filters and other equipment.

Treatment Sizing Criteria
Currently there are two different treatment modules available for multi-family residential applications. The modules may be used alone or installed in parallel. Commercial or Multi-Family Systems that are between 1500 and 5000 gallons per day should be designed using multiple ATS-8 modules and follow the design information as found in Section 4.01 of this manual. To correctly select the AeroCell and Bio-COIR module for systems 5000 gpd or greater use the following steps and tables.

Sizing for Commercial or Multi-Family Systems for flows of 5,000 gallons per day or greater should follow these steps.
Step 1: Determine the total daily design flow (5000+).
Step 2: Identify the required effluent discharge parameters on Tables 6 or 7.
Step 3: Select the appropriate loading rate in gpd/ft³ (12.5 - 5.5 gpd/ft³) that corresponds to the required effluent parameter.
Step 4: Divide the total daily design flow by the selected loading rate from Step 3 to determine the total cubic feet of media required.
Step 5: Using Table 8, identify the appropriate number of treatment module(s) that contain the total cubic feet of media identified in Step 4.
Table 6: AeroCell® Loading Rates

<table>
<thead>
<tr>
<th>Required Effluent</th>
<th>Loading Rate in gpd per ft³</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS</td>
<td>CBODs</td>
</tr>
<tr>
<td>30 mg/L</td>
<td>25 mg/L</td>
</tr>
<tr>
<td>15 mg/L</td>
<td>15 mg/L</td>
</tr>
<tr>
<td>15 mg/L</td>
<td>15 mg/L</td>
</tr>
<tr>
<td>10 mg/L</td>
<td>10 mg/L</td>
</tr>
<tr>
<td>10 mg/L</td>
<td>10 mg/L</td>
</tr>
<tr>
<td>5 mg/L</td>
<td>5 mg/L</td>
</tr>
<tr>
<td>2 mg/L</td>
<td>2 mg/L</td>
</tr>
</tbody>
</table>

Note: TN reductions are dependent upon recirculating back to the primary tank

Table 7: Bio-COIR® Loading Rates

<table>
<thead>
<tr>
<th>Required Effluent</th>
<th>Loading Rate in gpd per ft³</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS</td>
<td>CBODs</td>
</tr>
<tr>
<td>30 mg/L</td>
<td>25 mg/L</td>
</tr>
<tr>
<td>15 mg/L</td>
<td>15 mg/L</td>
</tr>
<tr>
<td>15 mg/L</td>
<td>15 mg/L</td>
</tr>
<tr>
<td>10 mg/L</td>
<td>10 mg/L</td>
</tr>
<tr>
<td>10 mg/L</td>
<td>10 mg/L</td>
</tr>
</tbody>
</table>

Note: TN reductions are dependent upon recirculating back to the primary tank

Table 8: Module Specifications

<table>
<thead>
<tr>
<th>Treatment Module</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Ft³ of Media</th>
<th>Access Lid Qty.</th>
<th>Spray Nozzle Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATS-16</td>
<td>198&quot;</td>
<td>96&quot;</td>
<td>54&quot;</td>
<td>400</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

Treatment System Dosing

Pressure dosing of the effluent from the recirculation tank to the treatment module(s) is essential to the proper operation of the AeroCell and Bio-COIR systems. Each treatment module contains specially designed helical spray nozzles that distribute effluent evenly across the treatment media. Effluent should be delivered to the treatment media in short frequent doses to allow the proper contact time with beneficial organisms attached to the media. The information contained in Table 9 outlines the typical dosing volumes in multi-family systems.

Table 9: Dosing Volumes

<table>
<thead>
<tr>
<th>Treatment Module</th>
<th>Sample Design Flow</th>
<th>Individual Dose Volume</th>
<th>Discharge Volume Per Dose Based on 80% Recirculation</th>
<th>Total Number of Doses Per 24 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATS-16</td>
<td>5000 gpd</td>
<td>250 gal</td>
<td>50 gal</td>
<td>100</td>
</tr>
</tbody>
</table>

Discharge volume is the quantity of effluent sent to the final discharge or disposal area. Individual dose discharge volume and total doses per 24 hours are based on a recirculation rate of 80%.

Pump Selection

Proper pump selection is dependent upon the number of spray nozzles present. Refer to Table 8 to determine the total number of spray nozzles for the application. Each nozzle is designed to deliver 8 gpm at 5-8 psi. A pressure gauge and ball valve installed inside the treatment module allows for field adjustment to the proper pressure setting. To determine the minimum flow performance for the required pump, multiply the number of spray nozzles by 8 gpm.

Example: ATS-16 contains 6 nozzles x 8 gpm = 48 gpm minimum flow.

To determine Total Dynamic Head (TDH) for the pump follow these steps:

Step 1: Calculate Static Head (elevation change).
Step 2: Calculate Friction Loss for pipe (refer to common friction loss charts).
Step 3: The spray nozzles require a minimum head pressure of 5 psi or 11.55’ of head for proper operation.
Step 4: Add Static Head, Friction Loss and 11.55’ to determine pump Total Dynamic Head.
Plot the minimum gpm flow and TDH on the pump curve to assure it falls within the designated pump performance. Due to the high flow in gpm, multiple pumps cycling in pairs may be required when grouping more than two ATS-16 modules. Contact Quanics for more assistance.

**Timer Settings**

The AeroCell® and Bio-COIR® systems are designed to be timed dosed. Time dosing allows for short frequent dosing of the effluent optimizing the system performance. To calculate the recommended timer settings follow these simple steps.

1. Determine total daily design flow.
2. Determine recommended individual dose for the treatment module selected. Refer to Table 9.
3. Calculate the gpm flow by multiplying the total number of spray nozzles by 8 gpm.
4. Determine the Timer ON time by dividing the recommended individual dose volume from STEP 2 by the gpm flow.
5. Determine the Discharge Volume per Dose for the selected treatment module from Table 9.
6. Determine the total number of pump cycles per day by dividing the Total Daily Design Flow by the Discharge Volume per Dose in Step 5.
7. Determine the length of each pump cycle by dividing 1440 (minutes/24hrs) by the number of cycles from Step 6.
8. Determine the Timer Off setting by subtracting the Timer On setting from Step 4 from the total pump cycle in Step 7.

**Example:**

1. Determine total daily design flow: 5000 gpd
2. Determine recommended individual dose for the treatment module selected: 250 gallon individual dose (ATS-16)
3. Calculate the gpm flow: 6 spray nozzles x 8 gpm = 48 gpm
4. Determine the Timer ON time: 250 gallon / 48 gpm = 5.20 min. ON
5. Determine the Discharge Volume per Dose: 50 gallons (Table 9)
6. Determine the total number of pump cycles per day: 5000 gpd / 50 gallons = 100 cycles per day
7. Determine the length of each pump cycle: 1440 min. / 100 cycles = 14.40 min. cycle
8. Determine the Timer Off setting: 14.40 min. cycle - 5.20 min. ON = 9.20 min. OFF

Timer Settings: 5.20 min. ON - 9.20 min. OFF

For the purposes of this example numbers have not been rounded. In practical application please round all numbers accordingly.

**Recirculation**

The AeroCell and Bio-COIR systems are designed to be recirculated at a 4:1 or an 80% rate. This level of recirculation assures proper treatment will occur and allows for the reduced footprint size of the system. The sizing information and treatment levels presented in the preceding sections is entirely based upon this level of recirculation.

Quanics currently has two methods and products to achieve this level of recirculation. The ATS-GRD-4/1-4 and the entire ATS-GRD-100/80/20-4 series of devices may be utilized. The ATS-GRD-100/80/20-4 products are designed to provide 100% re-circulation in times of low or no new flow into the system. The patented devices contain a ball float that converts the device to 100% automatically. This arrangement is the ideal configuration for recirculation and should be utilized whenever possible. The 100/80/20-4 series of recirculation devices must be installed on the recirculation tank so that the ball float is contained within the same chamber as the treatment system dose pump. A nitrogen reducing recirculation device configuration is also available.
Section 4.03: High Strength Waste

Influent Strength
These guidelines should be utilized on applications that will produce “High Strength Wastes”. These systems may include restaurants, dog kennels, process wastewater, or other structures that produce wastes higher in strength than typical residential applications. The influent characteristics of this typical waste shall fall under the following parameters.

<table>
<thead>
<tr>
<th>Influent Characteristic</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBODs</td>
<td>30 day average between 300 and 600 mg/L</td>
</tr>
<tr>
<td>TSS</td>
<td>30 day average between 350 and 650 mg/L</td>
</tr>
<tr>
<td>TN</td>
<td>30 day average between 70 and 100 mg/L</td>
</tr>
<tr>
<td>GPD</td>
<td>Daily average between 30 and 150 gallons</td>
</tr>
</tbody>
</table>

High strength applications with influent characteristics greater than the above or that require nutrient reductions will be sized on a case by case basis. Contact Quanics for additional assistance.

Effluent Quality
The receiving environment or the required effluent concentration that is established by a regulatory authority will dictate the system configuration. The AeroCell® and Bio-COIR® systems are very flexible in terms of meeting a wide range of effluent parameters. This flexibility affords the design engineer the ability to tailor the system to the application and allows the system to be adequately sized. Effluent qualities ranging from residential (300/350), secondary (30/25) or tertiary (10/10) have been achieved using the following sizing criteria. In situations where nutrient reductions are required, the proper sizing and configuring the system to recirculate back through the primary pretreatment tank are essential.

Pretreatment and Recirculation Tank Sizing Criteria
The AeroCell and Bio-COIR Treatment systems require three standard tanks, sized according to the total daily design flow of the system or as dictated by local regulation.

1. An appropriately sized grease trap based on a minimum of 3 days retention time of the kitchen or food processing wastes. The outlet of the grease trap should be equipped with an effluent filter and filter alarm. Compartmentalization of the tank is highly recommended.

2. A primary pretreatment (septic) tank equipped with an effluent filter is required to manage solids daily. This pretreatment tank should be sized to hold a minimum of three times the total design flow of the system or as dictated by local regulations. Compartmentalization of the tank is highly recommended.

3. A recirculation tank shall be sized at a minimum of two times the total design flow of the system or as dictated by local regulations. The recirculation tank should be equipped with an appropriately sized Quanics filtered pump vault, pumps, risers, discharge assemblies, float tree, recirculation device, junction box, pressure filter and other equipment.

All high strength applications are unique. The information above is a general guideline. Contact Quanics for additional guidance.

Treatment Sizing Criteria
Currently there are five different treatment modules available for high strength applications. The modules may be used alone or installed in parallel. To correctly select the AeroCell and Bio-COIR module use the following steps and tables.

Step 1: Determine the total daily design flow.
Step 2: Identify the required effluent discharge parameters on Tables 10.
Step 3: Select the appropriate loading rate in gpd/ft³ (12 - 3 gpd/ft³) that corresponds to the required effluent parameter.
Step 4: Divide the total daily design flow by the selected loading rate from Step 3 to determine the total cubic feet of media required.
Step 5: Using Table 11, identify the appropriate treatment module(s) that contain the total cubic feet of media identified in Step 4.
Table 10: AeroCell® or Bio-COIR® Loading Rates

<table>
<thead>
<tr>
<th>Required Effluent</th>
<th>Loading Rate in gpd per ft³</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS 350 mg/L</td>
<td>300 mg/L</td>
</tr>
<tr>
<td>CBOD 30 mg/L</td>
<td>25 mg/L</td>
</tr>
<tr>
<td>CBOD 10 mg/L</td>
<td>10 mg/L</td>
</tr>
</tbody>
</table>

Table 11: Modules Specifications

<table>
<thead>
<tr>
<th>Treatment Module</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Ft³ of Media</th>
<th>Access Lid Qty.</th>
<th>Spray Nozzle Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATS-3</td>
<td>36”</td>
<td>36”</td>
<td>38.5”</td>
<td>16</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ATS-4</td>
<td>48”</td>
<td>48”</td>
<td>38.5”</td>
<td>32</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ATS-6</td>
<td>75”</td>
<td>48”</td>
<td>38.5”</td>
<td>53</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>ATS-8</td>
<td>98”</td>
<td>56”</td>
<td>38.5”</td>
<td>85</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>ATS-16</td>
<td>198”</td>
<td>96”</td>
<td>54”</td>
<td>400</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

**Treatment System Dosing, Pump Selection, Timer Settings, Recirculation**

The mechanics of dosing and etc for high strength applications are similar to those for Single Family Residential, Commercial or Multi-family systems. This information may be found in Sections 4.01 and 4.02 of this manual. After determining which treatment module(s) are best suited for the high strength application please refer to the appropriate section for additional design criteria.

**Chapter 5: System Installation**

The AeroCell and Bio-COIR systems must be installed according to these instructions. Any modifications to the system may result in loss of warranty. Every application and system is somewhat unique in terms of its layout and installation. Always follow sound construction principles and contact Quanics for additional information.

**Section 5.01: Single Family Residential**

The following information provides an overview of the necessary steps to successfully install a Residential AeroCell or Bio-COIR System. If local jurisdiction requires Certification under NSF STD 40, Class 1 Treatment Systems please refer to the separate NSF approved manuals from Quanics.

**Septic/Dosing Tank**

The tanks should be installed level and on a stable base to reduce the possibility of settling. It shall be constructed so as to not allow infiltration or exfiltration. It shall be installed to allow gravity flow into the tank. The inlet and outlet shall be sealed and rendered watertight. Please follow the guidelines and practices as required by the local regulatory authority.

QUANICS’ twenty-six (26) inch diameter extension riser(s) must be used to bring access above grade (figure 1). The riser must be above grade to provide system access. Under no circumstances shall the QUANICS access cover be buried.

Backfill the excavation using a material that will settle well around the tanks. Do not use large rocks or heavy clay. Place the material around the tanks in layers, tamping and watering each layer.

Before the installation is complete, the QUANICS access cover must be in place and the tamper-resistant screws (figure 2), provided by QUANICS, must be installed and properly tightened to prevent unauthorized personnel from gaining entry inside the tank.

Note: The tank must be filled to the outlet/overflow with water after installation to prevent hydrostatic displacement (floating of tanks).
Effluent Filter
1. Before installation, dry fit the filter case (figure 3) on the outlet pipe of the primary septic tank to make sure it will be centered under the access opening. If not, solvent weld (glue) additional pipe to the outlet pipe so that the filter case will be centered.
2. Solvent weld the filter case onto the SCH 40 outlet pipe.
3. Solvent weld the filter handle to the top plate of the filter cartridge. Extend the handle, as required, to make it accessible from surface grade (figure 4).
4. Insert the filter cartridge into the case, making sure the filter cartridge is properly aligned and completely inserted into the case (figure 5).

Filtered Pump Vault
1. Insert 1-1/2” SCH 40 PVC though the handles to bridge the access opening in the dosing tank (figure 6).
2. Lower the pump vault though the outlet access opening in the dosing tank and allow it to rest on the tank or access riser (figure 7).
3. Remove the white maintenance plate from the inside of the filtered pump vault. Do not discard. The maintenance plate may be stored inside the access riser.
4. Add additional access risers as needed to bring to surface grade (figure 8).

Effluent Discharge
1. Do NOT glue any fittings until the discharge assembly has been dry fitted together for proper alignment. First thread the SCH 40 PVC male adapter into the discharge of the pump (figure 9). Use Teflon tape or plumbers putty on the threads to insure leak-proof fit. Insert hard PVC pipe into the male adapter (figure 10). This section of PVC pipe may be adjusted to desired height.
2. Attach the elbow on the union side of the discharge assembly to the vertical pipe (figure 11).
3. Drill the appropriate sized hole in the riser (2” hole for 1.25” grommet, 2.5” hole for 1.5” grommet, and 3” hole for the 2” grommet) (figure 12).
4. Insert the grommet into the drilled hole. The grommet must be inserted from the outside of the riser on the 22” and 26” diameter risers and on the inside of the 30” and 36” risers (figure 13). Then, insert the outlet pipe into the grommet in the riser (figure 14). Attach the other elbow on the discharge assembly to the outlet pipe in the riser. Once all parts are in the proper place glue all loose fittings.

Optional - If a check valve is used, drill a 1/8” hole in the discharge above the waterline and below the check valve.
**Control Panel/Junction Box**

**Installation of Floats**
1. Use the float labels included to identify each float as per (figure 15).
2. Determine your normal operating level and float configuration as illustrated in (figure 17) on the installation sheet in the panel box. (Note: QUANICS recommends the three float system with timer override and no redundant off.) (figure 15)
3. Mount the floats at appropriate levels on the float tree using the strain relief cable connectors to set the tether length. Be sure that the floats have free-range of motion without touching each other or other equipment.

**Mounting the Control Panel and Junction Box**
1. Determine the mounting location for the panel. If the distance exceeds the length of the float switch cables or pump power cables, use the junction box with liquid-tight connectors to splice the cables. You must use conduit sealant to prevent moisture or gases from entering the panel. (figure 16)
2. Mount the control panel with the mounting devices furnished.
3. Determine conduit entrance locations on the control panel. (Check codes and schematic for the number of power circuits required).
4. Drill the proper size holes for the type of connections being used. (Note: Be sure that the conduit is of adequate size to pull the pump and switch cables through).
5. Attach the cable connectors and/or conduit connectors to the control panel.
6. Connect the pump wires and float switch cables to the proper terminals according to the accompanying installation instructions with the control panel.
7. Connect the pump/control and alarm incoming power conductors to the proper position on the terminals. See the schematic and wiring diagram for terminal connections.
8. If using a junction box, determine the mounting location according to local code requirements.
9. If mounting the junction box on the inside of the riser, cut a 2-1/2 inch hole in the riser. Insert a 1-1/2 inch grommet (PDS-GT-1.5) in the hole and a 1-1/2 inch conduit through the grommet. Glue the junction box to the pipe.
10. Identify each wire before pulling them through the conduit to the junction box. Make wire splice connections in the junction box.

**Setting the Timer**
Refer to the separate instructions included with the Quanics Control Panel.

**Recirculation Device**
1. The ATS-GRD-100/80/20 recirculation device comes partially assembled:
   a. The 18-inch tall 26-inch diameter polyethylene QUANICS riser containing the recirculation assembly must be attached to the tank by using a QUANICS retrofit adapter (RB-RTA-26x2), QUANICS cast-in adapter (RB-CTA-26x2) or QUANICS riser already in place.
   b. Apply the neoprene gasket according to package instructions on the receiving riser.
   c. Lower the recirculation riser down on the tank riser and twist to secure it.
2. There are two 1-1/4 inch PVC pipes going through the riser. To reassemble the device, do the following:
   a. Align the arrows from the float rod assembly to the down flow assembly and glue together.
   b. Lower the entire recirculation assembly into the riser and line up the upper and lower pipes with the corresponding pipes on the assembly. The float goes down.
   c. Reattach the assembly with the threaded unions and level the device (two crosses/four outfalls). Secure hand tight.
   d. Adjust the float on the steel rod by sliding it up or down. When the float is at its lowest position, it should be located equal to or just above the on position of the timer enable float. Adjust the collars holding the float in place top and bottom. (figure 27)
3. Attach the pipes:
   a. Attach 1-1/4 inch PVC pipe coming from the bottom (discharge) of the treatment module to the upper pipe going into the recirculation device. Note: The module must be set so that gravity fall can be achieved from the bottom to the upper pipe in the recirculation device.
   b. Attach 1-1/4 inch PVC pipe to the lower pipe in the recirculation device and run it to the discharge point (drainfield, dosing tank for pressure distribution, etc.).
c. Apply the neoprene gasket to the top of the recirculation riser and place the lid on it.
d. Secure the lid with the security screws supplied.

**Treatment Module**
Each module arrives pre-plumbed on the inside with only a few simple connections required for installation. General guidelines for installing the module include the following:

1. Locate the module in an area that provides good ventilation and rainwater run-off. It may be placed directly on the pretreatment tank or it may be located in another area. Prepare an excavation with a width and depth that will allow any and all inlet/outlet connections. Ensure there is positive flow from the outlet of the module into the gravity recirculation device and then back into the primary tank. The access covers should extend above the final surface grade in such a way to prevent surface water from entering the module.
2. Using a transit-leveling instrument ensure the module is placed level and on a stable base. Remove any sharp objects or rocks from the bottom of the excavation or place four (4) inches of sand or fine-grained gradable material in the bottom of the excavation.
3. When the bottom of the excavation is graded, smooth, tamped and level, gently lower the module into the excavation (figure 18).
4. Connect the pump discharge line to the 1-1/4" module inlet hub (figure 19). All piping is SCH 40 and should be primed and glued using the proper PVC products.
5. The nozzle is attached to the discharge assembly via a clamp. Align the opening in the nozzle with the hole in the discharge assembly. Pull the clamp up and over the discharge assembly pipe locking it into place (figure 20).
6. Connect the recirculation line to the 1-1/4" module outlet hub. Attach the 1-1/4" vent pipe to the module venting hub. The included carbon filter vent may then be placed at any elevation. Ensure the carbon filter vent is above grade and protected.

**Section 5.02 Commercial or Multi-Family Residential**

The following information provides an overview of the necessary steps to successfully install a Commercial or Multi-family AeroCell® or Bio-COIR® System.

**Septic/Dosing Tank**
The tanks should be installed level and on a stable base to reduce the possibility of settling. It shall be constructed so as to not allow infiltration or exfiltration. It shall be installed to allow gravity flow into the tank. The inlet and outlet shall be sealed and rendered watertight. Please follow the guidelines and practices as required by the local regulatory authority and the tank manufacturer.

QUANICS’ 30-inch diameter extension riser(s) must be used to bring access above grade (figure 21). The riser must be above grade to provide system access. Attach the riser to the tank by either cast-in place or by using the supplied Methacrylate adhesive (figure 22). Under no circumstances shall the QUANICS access cover be buried.

Backfill the excavation using a material that will settle well around the tanks. Do not use large rocks or heavy clay. Place the material around the tanks in layers, tamping and watering each layer. Follow the backfilling procedures as outlined by the tank manufacturer.

Before the installation is complete, the QUANICS access covers must be in place and the tamper-resistant screws (figure 23), provided by QUANICS, must be installed and properly tightened to prevent unauthorized personnel from gaining entry inside the tank.
Note: The tank must be filled to the outlet/overflow with water after installation to prevent hydrostatic displacement (floating of tanks).

**Effluent Filter**

1. Before installation, dry fit the filter case (figure 24) on the outlet pipe of the primary septic tank to make sure it will be centered under the access opening. If not, solvent weld (glue) additional pipe to the outlet pipe so that the filter case will be centered.
2. Solvent weld the filter case onto the SCH 40 outlet pipe.
3. Solvent weld the filter handle to the top plate of the filter cartridge. Extend the handle, as required, to make it accessible from surface grade (figure 25).
4. Insert the filter cartridge into the case, making sure the filter cartridge is properly aligned and completely inserted into the case (figure 26). Note: if multiple filters are needed for larger flows, additional support may be required see (figure 27) or refer to filter manufacturers installation instructions.

**Filtered Pump Vault**

1. Install 1-1/2” SCH 40 PVC though the handles to bridge the access opening in the dosing tank (figure 28).
2. Lower the pump vault though the outlet access opening in the dosing tank and allow it to rest on the tank or access riser (figure 29).
3. Remove the white maintenance plate from the inside of the filtered pump vault. Do not discard. The maintenance plate may be stored inside the access riser.

**Effluent Discharge**

1. Do NOT glue any fittings until the discharge assembly has been dry fitted together for proper alignment. First thread the SCH 40 PVC male adapter into the discharge of the pump (figure 30). Use Teflon tape or plumbers putty on the threads to insure leak-proof fit. Insert hard PVC pipe into the male adapter (figure 31). This section of PVC pipe may be adjusted to desired height.
2. Attach the elbow on the union side of the discharge assembly to the vertical pipe (figure 32).
3. Drill the appropriate sized hole in the riser (2” hole for 1.25” grommet, 2.5” hole for 1.5” grommet, and 3” hole for the 2” grommet) (figure 33).
4. Insert the grommet into the drilled hole. The grommet must be inserted from the outside of the riser on the 22” and 26” diameter risers and on the inside of the 30” and 36” risers (figure 34). Then, insert the outlet pipe into the grommet in the riser (figure 35). Attach the other elbow on the discharge assembly to the outlet pipe in the riser. Once all parts are in the proper place glue all loose fittings.

Optional - If a check valve is used, drill a 1/8” hole in the discharge above the waterline and below the check valve.
Control Panel/Junction Box

Installation of Floats
1. Use the float labels included to identify each float as per (figure 36).
2. Determine your normal operating level and float configuration as illustrated in Figures 32-35 on the installation sheet in the panel box. (Note: QUANICS recommends the three float system with timer override and no redundant off.) (figure 36)
3. Mount the floats at appropriate levels on the float tree using the strain relief cable connectors to set the tether length. Be sure that the floats have free-range motion without touching each other or other equipment.

Mounting the Control Panel and Junction Box
1. Determine the mounting location for the panel. If the distance exceeds the length of the float switch cables or pump power cables, use the junction box with liquid-tight connectors to splice the cables. You must use conduit sealant to prevent moisture or gases from entering the panel (figure 37).
2. Determine conduit entrance locations on the control panel. (Check codes and schematic for the number of power circuits required).
3. Drill the proper size holes for the type of connections being used. (Note: Be sure that the conduit is of adequate size to pull the pump and switch cables through).
4. Attach the cable connectors and/or conduit connectors to the control panel.
5. Attach the pump wires and float switch cables to the proper terminals according to the accompanying installation instructions with the control panel.
6. Connect the pump/control and alarm incoming power conductors to the proper position on the terminals. See the schematic and wiring diagram for terminal connections.
7. If using a junction box, determine the mounting location according to local code requirements.
8. If mounting the junction box on the inside of the riser, cut a 2-1/2 inch hole in the riser. Insert a 1-1/2 inch grommet (PDS-GT-1.5) in the hole and a 1-1/2 inch conduit through the grommet. Glue the junction box to the pipe.
9. Identify each wire before pulling them through the pipe to the junction box. Make wire splice connections in the junction box.

Setting the Timer
Refer to the separate instructions included with the Quanics Control Panel.

Recirculation Device
1. The ATS-GRD-100/80/20-4 recirculation device comes partially assembled:
   a. The QUANICS 30-inch diameter PVC riser containing the recirculation assembly must be attached to the tank by using a QUANICS retrofit adapter (RB-RTA-30), or fit to the riser already in place. Note the direction of flow on the assembly - inlet toward treatment module.
   b. Apply the sealant and adhesive according to package instructions on the adapter.
2. There are two 4-inch PVC pipes going through the riser. To reassemble the device, do the following:
   a. Lower the float rod assembly into the riser and line up the 2-inch threaded union with the corresponding pipe on the assembly. Secure hand tight. The float goes down.
   b. Level the device with the 4-inch threaded unions (four outfalls).
   c. Adjust the float on the steel rod by sliding it up or down. When the float is at its lowest position, it should be located equal to or just above the on position of the timer enable float. Adjust the collars holding the float in place top and bottom. (figure 50)
3. Attach the pipes:
   a. Attach 4-inch PVC pipe coming from the bottom (discharge) of the treatment module to the inlet pipe going into the recirculation device.
   b. Set so that gravity fall can be achieved from the bottom to the upper pipe in the recirculation device.
b. Attach 4-inch PVC pipe from the outlet pipe in the recirculation device and run it to the discharge point (drainfield, dosing tank for pressure distribution, etc.)
c. Apply the neoprene gasket to the top of the recirculation riser and place the lid on it.
d. Secure the lid with the security screws supplied.

**Treatment Module**

Each module arrives pre-plumbed on the inside with only a few simple connections required for installation. General guidelines for installing the module include the following:

1. Locate the module in an area that provides good ventilation and rainwater run-off. It may be placed directly on the pretreatment tank or it may be located in another area. Prepare an excavation with a width and depth that will allow any and all inlet/outlet connections. Ensure there is positive flow from the outlet of the module into the gravity recirculation device and then back into the primary tank. The access covers should extend above the final surface grade in such a way to prevent surface water from entering the module.

2. Using a transit-leveling instrument ensure the module is placed level and on a stable base. Remove any sharp objects or rocks from the bottom of the excavation and place twelve (12) inches of sand or fine-grained material in the bottom of the excavation.

3. When the bottom of the excavation is graded, smooth, tamped and level, gently lower the module into the excavation.

4. Connect the pump discharge line to the 2” module inlet hub (figure 38). All piping is SCH 40 and should be primed and glued using the proper PVC products.

5. The nozzle is attached to the discharge assembly via a clamp. Align the opening in the nozzle with the hole in the discharge assembly. Pull the clamp up and over the discharge assembly pipe locking it into place (figure 39).

6. Connect the recirculation line to the 4” module outlet hub. The included carbon filter vent may then be placed at any location. Ensure the carbon filter vent is above grade and protected.

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**Proper tank Install**

Note: Caution do not use perforated pipe in high water table installations. In that case the use of concrete deadmen is suggested for anchoring.
Chapter 6: System Start-up

After installation of the system is complete, follow the steps below to accomplish start-up of the system.

Step 1. Fill the ATS Recirculation Tank with fresh water so that the Timer Enable float switch is in the up or On position.

Step 2. Check to ensure that the media is evenly distributed and not blocking the spray nozzles.

Step 3. Remove the spray nozzles by unclamping them from the discharge assembly. Set the HOA switch to Hand to turn on the pump and flush any debris from inside the discharge assembly.

Step 4. After flushing, turn off the pump and reinstall the nozzles by locating the nozzle over the discharge hole and sliding the nozzle clamp over the top of the discharge assembly.

Step 5. Turn the pump back on to pressurize the system to check for leaks and set the pressure gauge, mounted on the nozzle discharge assembly, to 5-8 psi using the ball valve attached to the assembly. Observe the spray pattern to be sure that it is evenly spraying over the entire surface of the media.

Step 6. Set the timer in the panel to the required settings and set the HOA switch to Auto. Observe the system until the panel cycles ON and OFF automatically.

Step 7. Lift the high water alarm float to check for proper operation. The horn and light should activate.

Step 8. Observe the recirculation device to ensure that positive flow is occurring and that the 80/20 split is being achieved.

If the system is to remain idle for a period of time, please inform the owner that the system is operational. If any mechanical or electrical problems are experienced when attempting start-up, the owner should call the dealer for service and assistance in start-up of the system.

Chapter 7: Operation and Maintenance

Regular and routine maintenance of the AeroCell® and Bio-COIR® systems is essential to its long-term performance. Single-family residential systems require a maintenance visit every 6 months. All other system applications may require more frequent visits due to their higher flows or increased waste strength. Maintenance checklists and forms may be found in the Appendix of this manual.

Inspection Sequence

All onsite wastewater treatment and dispersal systems should be inspected and maintained periodically in order to provide years of trouble free operation. The AeroCell & Bio-COIR systems require an inspection and minimal maintenance every 6 months. Most onsite professionals are familiar with all of the system components because they are used routinely in other systems. The following inspection sequence is recommended to determine the current operating condition of the system and what service items must be completed.

Step 1. Locate all the system components and access openings.

Step 2. Remove or open all the access lids.

Step 3. Note the water level in the septic tank and its relationship to the top of the effluent filter.

Step 4. Note the water level in the dosing tank and its relationship to the floats.

Step 5. If the timer enable float is up, wait for the control panel to activate on its own time, settings. Ensure the pump run time is as per design parameters. If the timer enable float is down, the pump will need to be activated manually by switching the HOA switch in the control panel to HAND.

Step 6. While the pump is running, observe the spray nozzles in the treatment module for flow and pressure.

Step 7. While the pump is running, observe the recirculation device for proper flow.

Step 8. Once the current operating condition of the system is established, turn the HOA switch to the OFF position in the control panel.

Step 9. Perform service as described in this manual.

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Service Instructions

Septic Tank
The septic tank should be inspected for excessive scum and solids build up. There are several commercial devices that can be used to measure the sludge layer and determine the pumping frequency of the tank. Homemade devices can also be used to check the sludge level. No matter what you use to check these levels, the tank should be pumped when the sludge level in the bottom of the tank reaches within 18 inches of the bottom of the outlet tee of the septic tank.

Homeowners should be encouraged not to use excessive amounts of cleaners and bleach, which upset the digestive process in the tank. However, normal amounts of these and other common household products do not cause problems. Non-biodegradable materials such as greases, garbage disposal by-products, personal hygiene products, cigarettes, paint, chemicals and diapers should not be disposed of in the tank.

Effluent Filter
Inspect the septic tank filter and clean it as needed. The length of the maintenance interval for effluent filters will vary with each individual homeowner. Once a filter is inspected a few times, you should be able to predict the length of the service interval. Installation and maintenance instructions are included with each product.

To clean the filter:
1. Firmly pull the filter handle and slide the cartridge out of the case.
2. While holding the cartridge over the access opening, rinse off the cartridge with fresh water, being careful to rinse all septage material back into the tank.
3. Insert the filter cartridge back in the case making sure the cartridge is properly aligned and completely inserted in the case.

Dosing Tank
The dosing tank should be inspected for excessive scum and solids build up. There are several commercial devices that can be used to measure the sludge layer and determine the pumping frequency of the tank. Homemade devices can also be used to check the sludge level. No matter what you use to check these levels, the tank should be pumped when the sludge level in the bottom of the tank reaches the bottom of the filtered pump vault.

Filtered Pump Vault
The filter panels on the pump vault should be inspected and cleaned during routine maintenance visits. However, the filter plates are virtually self-cleaning. The continued action of the anaerobic organisms on the filter plates causes lodged particle to disintegrate and fall to the bottom of the tank.

To clean the filter plates:
1. Completely insert the white maintenance plate behind the filter panel that is to be cleaned.
2. Remove the filter panel. Rinse the filter plates with fresh water making sure all septage is rinsed back into the tank. The filter plates should be cleaned until all slots are open and free of debris.
3. Replace the filter panel and remove the white maintenance plate. Repeat steps 1 and 2 for the second filter panel.

Controls/Pump/Floats
1. Inspect the floats for proper placement and make certain they are not tangled.
2. Lift the high water alarm float to activate the alarm system to verify proper operation.
3. Open the control panel outer door.
4. Activate the pump through the panel manually by moving the HOA switch to Hand.
5. The pump should begin the run and deliver effluent to the treatment module.
6. Place the panel in auto mode and manually trip the floats to test for proper pump operation.

AeroCell® & Bio-COIR® Modules
1. A gray/brown biomat on the surfaces of the media may be present and is normal. An excessive accumulation of solids on the media may indicate that the septic tank is functioning poorly due to excessive household chemicals or a lack of maintenance. Check with the homeowner about what types of materials have been discharged. As previously mentioned, excessive bleach, cleaning materials and other chemicals can upset the septic tank. Advise the owner to restrict the use of such materials.
2. If necessary, rake or stir the upper layer(s) of treatment media. It is normal for the media to settle. It may be necessary to redistribute the treatment media to allow proper air flow. Coir media is a biodegradable material and may require replacement every 7 to 10 years. When the Bio-COIR media has reduced in volume...
by 50%, and the effluent quality fails to meet minimum regulatory requirements, it needs to be replaced or have additional media added. The open cell foam media is warranted to be free from defect for 10 years.

3. Remove the spray nozzle by unsnapping the stainless steel spring from the pipe. Clean any debris and replace them. The spray nozzle piping can be removed at the unions and cleaned with a bottle brush or water pressure if needed.

NOTE: If effluent samples are needed, a grab sample can be taken by placing the sample bottle below the outfall of the recirculation device, being careful not to touch the bottle to any contaminated surface. The effluent sample should be collected and transported according to the testing facility requirements. Effluent should be clear with a slight yellow tint and should be free from odor.

Recirculation Device

1. Check to see if the stainless steel rod is moving up and down freely. Also, check to see if the ball float is located at the proper level. When the ball float is at its lowest position, it should be located equal to or just above the on position of the timer enable float. (figure 40)

2. Check that the design recirculation rates are maintained by observing the discharge through all five outfalls of the recirculation assembly. Adjust as needed by loosening the unions and leveling.

Chapter 8: Troubleshooting Guide

The AeroCell® & Bio-COIR systems have proven to be very effective and reliable in the treatment of domestic wastewater. The problems outlined here occur only in a very small percent of total installations. They can all be corrected and most can be prevented.

When calling for service, describe the problem in detail and determine the system age and service history from your records. You will need to provide the service technician with the model numbers of the treatment system. A Certified Service provider should provide service within 48 hours of request.

If routine servicing does not solve the problem, additional steps/maintenance, repair and/or replacement of defective parts may be required. Your service representative should perform these system inspections to assure adequate and proper operation of the wastewater treatment system.

1. Proper Installation Check
   Inspect system to verify that the treatment system is installed properly and is not damaged. The system should be level and internal components should be in their proper place and working order. High water level in the system can adversely affect performance.

2. Proper Treatment Check
   After determining that the system is installed properly and is not damaged, inspect the operation and maintenance status to determine if the system is performing correctly.

   To do this a technician takes a grab sample of the effluent. This is tested for Total Suspended Solids (TSS) and Biochemical Oxygen Demand (BOD). Adjustment and repairs to the system will be made as required by following factory recommended guidelines. Corrections to the system by a qualified service technician can keep the system operating properly.

3. Alarm System Check
   The alarm supplied with this system provides the owner with a secure, reliable, dependable, and economical means of notification for high water levels. This alarm needs to be inspected and tested during each system operation and maintenance site visit.

   The outside face of the control panel enclosure is equipped with visible and audible alarms to alert you of high-level conditions. If the alarms are activated on the control panel, a service technician should be called to determine the cause and make corrections. To silence the horn alarm while waiting for the service technician to arrive, locate the switch on the outside face of the control panel enclosure labeled “normal/silence” and push it into the “silence” (right) position. The alarm beacon will remain illuminated until alarm condition is solved.

   If you exceed the systems designed daily flow rate (due to having house guests, doing multiple loads of laundry, etc.) the storage capacity of the pump/holding tank can be exceeded, activating audible and visible alarms. This system is equipped with a timer override function that should allow the system to run longer and alleviate any alarm condition. If the alarms are activated, silence the horn alarm by locating the switch on outside face of the control panel enclosure labeled “normal/silence” and pushing it to the “silence” (right) position. The alarm beacon will remain illuminated until alarm condition is solved. If excess water use continues, this problem could occur repeatedly.
4. Check to Determine Other Tanks Need Pumping

High solids level in other tanks can cause improper functioning of the treatment system. Inspection and service, as needed, should be performed a minimum of every 6 months.

**Chapter 9: Safety**

As raw wastewater may and usually does contain some level of unsafe microorganisms, proper respect and care must be given to safety. When coming into contact with raw sewage, do not fear the contact, but do take proper precautions to avoid potential danger.

Follow these safety precautions whenever exposed to wastewater:

* Always wash with soap and water after handling any contaminated item. The use of good bactericide soap is strongly recommended.
* Wear disposable rubber gloves when handling wastewater-contaminated items or chlorine tablets.
* Always dispose of scum, rags, trash, debris, or soiled material in a proper waste container.
* If a wastewater spill or leak occurs in a yard, flush area with plenty of clean water and disinfect. If a spill or leak occurs in the house, clean with a dilute solution of bleach.
* Protect any injury, wound, open cut, etc. from exposure to wastewater.
* If an illness or disease is suspected of coming from exposure to sewage, get proper medical attention immediately.
* Report all accidents relating to sewage exposure to the proper supervisory personnel.

Follow these safety precautions when performing any excavation or construction work:

* Follow all construction safety procedures during installation.
* Follow electrical safety procedures during installation.
* Fill all holes and depressions in and around the installation area; remove and dispose of all debris from construction/installation.

**Chapter 10: Warranty**

QUANICS warrants each AeroCell® & Bio-COIR® wastewater treatment system to be free from defects in material and workmanship as follows: AeroCell and Bio-COIR treatment modules, controls, filters, risers & basins for a period of two (2) years from the date of installation; pumps for a period of three years from the date of installation date; AeroCell foam media for a period of ten years from installation date; Bio-COIR media for a period of two years from installation date by an authorized Dealer for the end user when properly registered with QUANICS. The sole obligation under this warranty is as follows: QUANICS shall fulfill this warranty by replacing or exchanging any component part, FOB factory that in QUANICS judgment shows evidence of defects, provided said component part has been paid for and is returned through an authorized Dealer, transportation prepaid. The Limited Warranty does not make any provision for an informal dispute settlement arrangement.

The warranty does not cover QUANICS wastewater treatment systems and related components that have flooded, by external means, or that have been disassembled by unauthorized person, improperly installed, subjected to external damage or damage due to altered or improper wiring or overload protection.

Recommendations for special applications will be based upon the best available expertise of QUANICS and published industry information. Such recommendations do not constitute a warranty of satisfactory performance.

No warranty is made as to the field performance of any systems. The Limited Warranty applies to the systems and does not include any portion of the plumbing, drainage, house wiring or installation of the treatment systems. Accessories supplied by QUANICS, but manufactured by others, are warranted for a period of two (2) years. In no event shall QUANICS be responsible for delay or damages of any kind or character resulting from, or caused directly or indirectly by, defective components or materials manufactured by others.

The Limited Warranty extends to the end user of this product. The end user is defined as the purchaser who first has the system installed, or in the case of the system designed for non-permanent installation, the purchaser who first uses the system. It is the end user’s obligation to make known to any other consumer the terms and conditions of this Limited Warranty.

QUANICS reserves the right to revise, change, or modify the construction and design of the QUANICS aerobic wastewater treatment system, or any component part or parts thereof, without incurring any obligations to make such changes or modifications in previously sold equipment. QUANICS also reserves the right, in making replacements of component parts under this warranty, to furnish a component part, which, in its judgment, is equivalent to the part replaced. This warranty is a Limited Warranty. No claim of any nature shall be made against QUANICS unless and until the end user, or their legal representative, notifies QUANICS, in writing of the defect complained of and delivers the product and /or defective part(s), freight prepaid, to QUANICS or an authorized QUANICS dealer.

**Appendix**

- Warranty Form
- Design Worksheet
- Sample System Drawings
- Maintenance Checklist
- Sample Service Agreement
- System References
<table>
<thead>
<tr>
<th>Owner/User</th>
<th>Physical Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>City/County/ State/ZIP</td>
<td></td>
</tr>
<tr>
<td>Mailing Address (if different)</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>Best time to be reached</td>
</tr>
<tr>
<td>Dealer/Installer</td>
<td>Address</td>
</tr>
<tr>
<td>City/County/ State/ZIP</td>
<td>Telephone</td>
</tr>
<tr>
<td>Distributor (if applicable)</td>
<td></td>
</tr>
</tbody>
</table>

Service Will Be Performed BY:

- Name
- Address
- City/County/ State/ZIP
- Telephone

Type of Installation:  Residential [ ]  Commercial [ ]

Number of residents or occupants __________   Garbage Disposal?  Yes [ ]  NO [ ]

Date Installed __________

Model # ____________________________  Serial # ____________________________

Control Panel Model # ____________________________  Serial # ____________________________

Effluent Disposal Method & Equipment Used __________________________________________

Regulatory Agency: ________________________________________________________________

Regulatory Representative’s Name _________________________________________________

Address _________________________________________________________________

City/County/ State/ZIP __________________________________________________________

Telephone (______) ____________________________  Cell phone (______) ____________________________

I attest this information to be true and accurate.

Dealer’s Signature ____________________________________________________________

Witness ____________________________  Date ____________________________
**Design Worksheet**

**Date:**

<table>
<thead>
<tr>
<th>Contact</th>
<th>Customer/Contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td>Project Name:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>E-mail:</td>
<td></td>
</tr>
<tr>
<td>Tel:</td>
<td>Fax:</td>
</tr>
</tbody>
</table>

**Application/Description:**
- ☐ Development
- ☐ Commercial
- ☐ Industrial
- ☐ Residential

**Advanced Treatment Type:**
- ☐ AeroCell
- ☐ Bio-COIR™
- ☐ Sand Filter
- ☐ Wetlands

**Collection System Type:**
- ☐ Gravity
- ☐ Grinder Pumps
- ☐ S.T.E.P.
- ☐ Pump Station
- ☐ Pump Stations
- ☐ S.T.E.G.
- ☐ Other

### Wastewater Flow Calculations:

(Please show calculations that are basis of the design)

- **Design Flow:**
- **Actual Daily Flow:**
- **Maximum Daily Flow:**
- **Peak hourly flow or peaking factor (please specify):**

### INFLUENT DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Raw</th>
<th>Settled</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOD₅:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COD₅:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alkalinity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonia-N:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil &amp; Grease (are traps included):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphorus:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SITE DATA

**Wastewater Temperature (50°F assumed unless specified):**
-  
**Site Elevation (feet above sea level):**
-  

### EFFLUENT REQUIREMENTS

- **Please specify location of effluent requirements:** e.g. System effluent pipe; groundwater interface; property line
- **Please specify CBOD₅ for organic load when allowed**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>pH</th>
<th>CBOD₅</th>
<th>BOD₅</th>
<th>COD₅</th>
<th>TSS</th>
<th>Ammonia-N</th>
<th>Oil &amp; Grease</th>
<th>Phosphorus</th>
<th>Fecal Coliform</th>
<th>Dissolved Oxygen</th>
<th>Turbidity</th>
<th>Other</th>
</tr>
</thead>
</table>

### AutoCad Drawing Specifications

- **Setbacks:** Property Line ________  Existing Well _______  Foundation _______  Waterway _______  Other:  
- **CAD Land Survey .dwg file available:** ☐ Y ☐ N, Drawing contact:_________________________ Phone:_________________________  
- **Developer information:** Company_________________________ Contact:_________________________ Phone:_________________________

**Please email AutoCad dwg files to tjenkins@quanics.net**

**Other:**

**Quanics Dealer/Provider:**

**Engineer Signature:**

**Date:**

---

**Please print, sign and fax to Quanics for submission Fax: 502-992-8249**

Important: The information provided by you on this form will be relied upon by Quanics Incorporated in determining project specifications and pricing. Accordingly, all such information must be complete and accurate and any fact or circumstance that comes to your attention after the date hereof that may in any way render any information contained herein incomplete or inaccurate must be brought to the attention of Quanics Inc. immediately.
Sample System Drawings - 40,000 gallon typical wastewater treatment system layout
System Specifications

A. Primary, Recirculation and Dosing Tanks
B. Primary Tank Gravity Effluent Filter Assembly
C. Septic Tank Effluent Pump (STEP) Assembly
D. Fixed Film Media Filter

Throughout this document you may find the term “or approved equal”. For this project this term “approved equal” shall mean equal in the judgment of the engineer of record for the project.

Should the bidder seek approval of a product other than the brand or brands named in this specification, they shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. Where the specified requirements involve conformance to recognized codes or standards the bidder shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and bearing an authorized signature.

A. Primary, Recirculation and Dosing Tanks

The manufacturer shall provide the structural design and certification to the engineer for review. The design shall be in accordance with accepted engineering practice.

1. General Guidelines:
   a. All tanks must be structurally sound and watertight. The tanks shall be warranted from the manufacturer for defects in material and workmanship for a period of one year from date of installation. Manufacturer’s warranty statement must be submitted prior to approval.
   b. The tanks shall be manufactured and furnished with minimum access openings as determined by the design engineer for the installation of and access to required components. Access openings shall be manufactured and installed in the tanks during the time of tank construction.
   c. The tanks shall be equipped with the required inlet and outlet piping as specified by the design engineer. Inlet and outlet tees as required shall penetrate to a distance below the bottom of the maximum scum level of the tank. The inlet tees shall allow for the proper ventilation of the tank back through the structure served.
   d. All tanks shall be capable of and undergo a static hydraulic test upon installation to determine water-tightness. Test shall be conducted by completely filling the tanks with water for a 24 hour period then examining the tank for differential. Tanks failing to maintain the static level shall be disqualified.
   e. All tanks shall be installed per the manufacturer’s written instructions.
   f. Tanks shall be sized in accordance with the sizing criteria found in the published Quanics, Inc. ATS Technical Manual. These minimum sizing criteria must be met but may be enlarged as desired.

2. Concrete Tanks:
   a. The tank manufacturer shall submit written documentation to the design engineer regarding all manufacturing processes including material used and dimensional drawings of the proposed tank.
   b. All tanks shall be allowed to properly cure before transport.
   c. Manufacturer is responsible for delivering tanks in sound condition.

3. Fiberglass Tanks:
   a. The tank manufacturer shall submit written documentation to the design engineer regarding all manufacturing processes including material used and dimensional drawings of the proposed tank.
   b. Manufacturer is responsible for delivering tanks in sound condition.

4. Risers and Lids:
   a. Access openings in all tanks shall be equipped with appropriately sized Quanics, Inc. Series RB-R Risers.
   b. Risers shall be constructed of ribbed PVC or Polyethylene material. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2 inch for each foot of riser.
   c. Risers shall be attached to the tanks following the manufacturer’s written instructions. The riser to tank attachment shall render the joint watertight and structurally sound.
   d. Risers shall extend above finished grade to allow for easy access and ensure positive drainage away from the access point.
   e. Each access point or riser shall be covered using a Quanics, Inc. Series RB-L lid. Lids shall have a green surface and be constructed...
of fiberglass, polyethylene, PVC or other thermoplastic material. Lids shall be waterproof, corrosion resistant and UV resistant. Lids shall be securely fastened to access points and risers utilizing tamper resistant stainless steel fasteners. Fasteners shall not be easily removed through the use of standard commonly found tools.

f. All risers and lids shall be installed according the manufacturer’s instructions and shall carry a minimum 1 year manufacturer’s warranty.

B. Primary Tank Gravity Effluent Filter Assembly:

Systems incorporating a gravity effluent filter into the design shall utilize the following guidelines.

1. Risers and Lids:

a. Access openings in the tanks shall be equipped with appropriately sized Quanics, Inc. Series RB-R Risers.

b. Risers shall be constructed of ribbed PVC or Polyethylene material. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2 inch.

c. Risers shall be attached to the tanks following the manufacturer’s written instructions. The riser to tank attachment shall render the joint watertight and structurally sound.

d. Risers shall extend above finished grade to allow for easy access and ensure positive drainage away from the access point.

e. Each access point or riser shall be covered using a Quanics, Inc. Series RB-L lid. Lids shall have a green surface and be constructed of fiberglass, polyethylene, PVC or other thermoplastic material. Lids shall be waterproof, corrosion resistant and UV resistant. Lids shall be securely fastened to access points and risers utilizing tamper resistant stainless steel fasteners. Fasteners shall not be easily removed through the use of standard commonly found tools.

f. All risers and lids shall be installed according the manufacturer’s instructions and shall carry a minimum 1 year manufacturer’s warranty.

2. Effluent Filter:

a. Effluent filter shall be installed on the outlet of the tank.

b. Filter shall provide filtration down to a level not greater than 1/16”.

c. Filter shall be constructed so that by-pass of the filter during high water is not possible

d. Filter shall be sized based on the manufacturer’s recommendations for the proposed daily design flow. Multiple filters may be installed in series to meet the design flow requirement.

e. Effluent filter shall have a handle installed and brought close to grade for ease of servicing.

f. Filter shall be constructed of non-corrosive materials.

g. Filters utilizing a stacked disc design or slots shall be preferred.

h. Filters shall be sized and installed so that the entrance into the filtering device can be placed at the optimum clear zone level of the tank.

3. Effluent Filter Alarm:

a. High water alarms connected to the effluent filter shall be a Quanics, Inc. AC-A-O-VRS, AC-A-I-VRS or AC-VRS.

b. The alarm float shall install directly into the filter assembly through a twist lock action.

c. The alarm float shall be a vertical reed type switch specifically designed for use with effluent filters.

d. Standard alarm type floats attached to the filter case shall not be permitted.

e. Filter alarm may be installed as a standalone device or the alarm float may be wired directly through other existing control panel structures, provided the control panel has been so designed.

f. Filter alarm shall be UL listed and meet all local requirements with regard to audible and visual requirements.

C. Septic Tank Effluent Pump (STEP) Assembly:

Systems incorporating a STEP system into the design shall utilize the following guidelines. The STEP Assembly Specification may be utilized in Recirculation and/or Dosing Tanks.
1. Risers and Lids:

a. Access openings in the tanks shall be equipped with appropriately sized Quanics, Inc. Series RB-R Risers.

b. Risers shall be constructed of ribbed PVC or Polyethylene material. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2 inch.

c. Risers shall be attached to the tanks following the manufacturer’s written instructions. The riser to tank attachment shall render the joint watertight and structurally sound.

d. Risers shall extend above finished grade to allow for easy access and ensure positive drainage away from the access point.

e. Each access point or riser shall be covered using a Quanics, Inc. Series RB-L lid. Lids shall have a green surface and be constructed of fiberglass, polyethylene, PVC or other thermoplastic material. Lids shall be waterproof, corrosion resistant and UV resistant. Lids shall be securely fastened to access points and risers utilizing tamper resistant stainless steel fasteners. Fasteners shall not be easily removed through the use of standard commonly found tools.

f. All risers and lids shall be installed according the manufacturer’s instructions and shall carry a minimum 1 year manufacturer’s warranty.

2. Filtered Pump Vault:

a. One or more Quanics, Inc. Series FPV-H filtered pump vaults shall be sized and installed into the outlet side of the tank in accordance to the design plans.

b. Filtered pump vault shall have a minimum effective screen area of 146 linear feet.

c. Filtered pump vault shall be manufactured of polyethylene and be a minimum of 14” in diameter.

d. Vault shall hang suspended in the access opening and extend into the tank the appropriate length to place the filter panels in the clear zone or at a sufficient depth to draw the tank down to the maximum level. In no event shall the bottom of the vault be closer than within 6” of the tank bottom.

e. Vault shall incorporate removable filter panels for ease of servicing. Filtering device must be removable without disturbing other components contained inside the vault.

f. Vault shall be rated and certified to not materially disturb the solids in the tank up to a flow of 90 gpm.

3. Pumps:

a. One or more Quanics, Inc. Series P-TE, P-SE, or P-SS pumps shall be installed inside the filtered pump sized according to the design plans.

b. Pumps shall be manufactured by a reputable manufacture having at least 10 years experience.

c. Pumps shall be UL and CSA listed.

d. Pump performance, horsepower and electrical requirements shall be according to the design plans and shall be verified for compatibility with the manufacturer.

e. Pumps shall include a minimum of 10 feet of power cord.

f. Pumps shall be provided with a 3 year non-prorated warranty.

4. Float Tree:

a. Each filtered pump vault housing one or more pumps shall be equipped with a Quanics, Inc. Series AC-FT float tree to facilitate the placement and adjustment of control floats.

b. The float tree shall be attached to the filtered vault sidewall and shall be provided by the vault manufacturer.

c. The float tree length shall match the length of the designed filtered vault.

d. The number and exact location of float attachment devices shall be in accordance with the design plans.

e. The floats must be adjustable and adjustments should be accomplished without the need for removing the filtered vault.

f. The float tree shall be constructed of PVC or other non-corrosive materials.
5. Junction/Splice Box:
   a. A Quanics, Inc. Series AC-JSB splice box shall be installed inside the riser(s) of any and all access openings containing electrical equipment.
   b. All splice boxes shall be UL listed and approved for use in wet conditions.
   c. The splice box shall be sized based upon the total number of pumps and floats contained in the particular access opening or filtered vault.
   d. One cord grip shall be installed in the box for each pump or float wire. Cord grips shall incorporate a twist lock mechanism to secure the cord into the box and prevent the entrance of gases and/or liquid into the box itself.
   e. The splice shall be mounted to the side of the riser and solvent welded to the appropriate sized electrical conduit.
   f. The conduit penetration through the riser should be sealed utilizing an appropriately sized Quanics, Inc. Series PDS-GT grommet.

6. Pump Discharge Assembly:
   a. One or more Quanics, Inc. Series PDS-EDS or PDS-EDF discharge assemblies shall be connected to the pumps. The discharge assemblies shall be configured and sized according to the design plans.
   b. Discharge assembly shall include true unions for disconnecting and removable of the pump.
   c. Discharge assembly may include a check valve as per design plans.
   d. Discharge assembly shall be constructed of PVC material.
   e. Discharge assembly shall include all fittings and piping required to successfully install the pumps with the exception of straight pipe lengths.
   f. The discharge penetration through the riser should be sealed utilizing an appropriately sized Quanics, Inc. Series PDS-GT grommet.

7. Control Panel:
   a. A Quanics, Inc. Series AC-CP control panel shall be installed according to the design plans.
   b. Control panels shall be sized and follow the theory of operation as specified on the design plans based on the number of pumps and pumping sequence.
   c. Control Panels shall be listed per UL 508.
   d. Controls Panels shall be warranted to be free from defects in material and workmanship for period of not less than three years. Panels shall be field repairable without the use of soldering irons.
   e. Panels shall be installed per the manufacturer’s instructions.
   f. Panels shall be located near the pump system if possible and shall be securely attached to an exterior wall or post. Panels shall be installed at a height that provides ease of access. Panel shall be installed so that line of sight is achieved for the visual alarm or within audible distance for the alarm sound.
   g. Panels should include the following minimum requirements.
      1. Motor-Start Contactors
      2. Separate control and pump circuits.
      3. HOA toggle switches for all pumps and or electrical valves
      4. Audible alarms of not less than 80 dB with silence switch...
      5. Visual alarm beacon.
      6. NEMA 4x rated panel enclosure.
      7. Elapsed time meters for each pump.
      8. Event counter
      9. Timed or Demand Dose control settings per design plans.
   h. Optional components may include intrinsically safe relays, heaters, remote telemetry, generator plugs, auto-dialers, pump run lights, pressure transducers, current sensors and other equipment as per the design plan.
**D. Fixed Film Media Filter:**

Systems incorporating a Quanics, Inc. Fixed Film media Filter into the design shall utilize the following guidelines.

1. **Media Filter Module:**

   a. Module shall be constructed of Polyester Resin reinforced with chopped strand fiberglass.

   b. The module shall have a minimum of 10 mil polyester gel coat on the exterior surface.

   c. Modules shall be tested for structural soundness and water tightness by being subjected to a vacuum of 3 inches of mercury for a minimum of 5 minutes. Maximum volume change of 5% from original volume allowed. A pass notation for water tightness is achieved by filling tanks with water and no observable leaks after vacuum test has been completed.

   d. Modules shall arrive pre-plumbed with minimal field connections required.

   e. Modules shall arrive pre-filled with the appropriate media.

   f. Each module shall incorporate a passive air vent into the unit. Forced air ventilation may also be incorporated into the design.

   g. Even distribution of the wastewater over the top of the media shall be accomplished through the use helical spray nozzles.

   h. Access openings into the module shall be fitted with manufactured supplied lids and tamper resistant fasteners.

   i. Each module shall incorporate a distribution shut off device enabling the individual module to be taken off line during periods of required servicing.

   j. Module shall be installed as per the published Quanics, Inc. installation instructions.

   k. The number and size of the modules shall be determined as outlined in the Quanics, Inc. ATS Technical manual based on influent strength and required effluent parameters. Sites not falling into one of the described categories shall be sized through consultation with Quanics, Inc.

2. **AeroCell System:**

   Designs incorporating a Quanics, Inc. Series ATS-AC System shall meet the before-mentioned requirements for the treatment module and the following guidelines in respect to the media.

   a. The patented AeroCell media shall be open cell urethane foam material.

   b. Media shall be a nominal size of 2” cubes and packed inside the module.

   c. Media shall contain a minimum of 80% void space.

   d. Media shall be loaded at a maximum rate of 12.5 gpd/ft³ without further consultation with Quanics, Inc. Lower loading rates as outlined in the Quanics, Inc. ATS Technical Manual may also be utilized.

   e. System shall be set-up as a recirculating media filter with a minimum recirculation ratio of 4:1. Other configurations or ratios may be utilized for specific applications after consultation with Quanics, Inc.

   f. Media shall carry a 10 year warranty to be free from degradation.

   g. Proper operation and maintenance of the system shall be conducted as outlined in all published Quanics, Inc. O&M Manuals.

3. **Bio-COIR System:**

   Designs incorporating a Quanics, Inc. Series ATS-BC System shall meet the before-mentioned requirements for the treatment module and the following guidelines in respect to the media.

   a. The patented Bio-COIR media shall be 100% Coir fiber.

   b. Media shall be shredded and packed inside the module.

   c. Media shall be loaded at a maximum rate of 12.5 gpd/ft³ without further consultation with Quanics, Inc.. Lower loading rates as outlined in the Quanics, Inc. ATS Technical Manual may also be utilized.

   d. System shall be set-up as a recirculating media filter with a minimum recirculation ratio of 4:1. Other configurations or ratios may be utilized for specific applications after consultation with Quanics, Inc.

   e. Media shall carry a 2 year warranty to be free from degradation.

   f. Proper operation and maintenance of the system shall be conducted as outlined in all published Quanics, Inc. O&M Manuals.
### Maintenance Checklist: Advanced Treatment System

**Operational Checklist: Advanced Treatment System**

- **Service provided on:** Date: ____________  Time: ____________  Reference #: ____________________________________________

- **Service provided by:** Company: _____________________________________ Employee: _______________________________________

- **Date of last service:** ____________________  By: □ You  □ Other:  **Date of last inspection:** ________________

### 1. Type of media filter: □ Acceptable  □ Unacceptable

- **Fixed Film:** □ AeroCell  □ Bio-COIR
- **Sand Filter:** □ Intermittent  □ Recirculating
- **Wetlands:** □ Lined  □ Unlined
  - a. Manufacturer: __________________________________________  Model #: __________________________________
  - b. Distribution method: □ Pressure distribution  □ Gravity distribution

### 2. Conditions at media filter □ Acceptable  □ Unacceptable

- a. Evaluate presence of odor within 10 ft of perimeter of system:
  - □ None  □ Mild  □ Strong  □ Chemical  □ Sour
- b. Source of odor, if present: __________________________________________

### 3. Cover □ Acceptable  □ Unacceptable

- a. Type of cover: □ Free access  □ Buried  □ Lid
- b. Filter cover intact  □ Yes  □ No
- c. Method of securing cover: __________________________________________
  - d. Distribution component accessible  □ Yes  □ No
  - e. Surface water/infiltration into components. □ Yes  □ No

### 4. Venting/Air supply: □ Acceptable  □ Unacceptable  □ Passive  □ Active

- a. Supply: □ Blower  □ Free air
- b. Operation: □ Continuous  □ Timed (On _______ min., Off _______ min.)
- c. Air supply unit operating properly. □ Yes  □ No
- d. Venting appears operable. □ Yes  □ No

### 5. Media surface □ Acceptable  □ Unacceptable

- a. Biomat on surface. □ Yes  □ No
- b. Uniform spray pattern. □ Yes  □ No
- d. Ponding in/on media. □ Yes  □ No
- e. Plugging/clogging of nozzles. □ Yes  □ No
- f. Media appears to be settling. □ Yes  □ No
- g. Appropriate maintenance performed. □ Yes  □ No
- h. Pest activity at surface. □ Yes  □ No

### 6. Effluent quality □ Acceptable  □ Unacceptable

- a. Turbidity: ____________ NTU
- b. Oily film on the surface of effluent. □ Yes  □ No
- c. DO at outlet: ____________ mg/L
- d. pH at outlet: ____________
- e. Temperature at outlet: ____________
- f. Bypass or overflow noticed. □ Yes  □ No
- g. Effluent odor after passing through media filter: □ None  □ Mild  □ Strong
- h. Effluent color after passing through media filter: □ Clear  □ Brown  □ Black
7. Additional tasks for recirculating filters
   □ Acceptable  □ Unacceptable
   a. DO in recirculation tank: _________ mg/L
   b. Inspected recirculating device. □ Yes □ No
   c. Cleaned recirculating device. □ Yes □ No
   d. Design recirculation ratio: :
   e. Actual recirculation ratio: :
   f. Recirculation changed to: :

8. Pump System
   □ Acceptable  □ Unacceptable
   a. Control panel in Auto. □ Yes □ No
   b. Current timer settings □ Yes □ No
   c. Floats in correct placement □ Yes □ No
   d. High water alarm operational □ Yes □ No
   e. Elapsed time reading: _________
   f. Cycle counter reading: _________
   g. Filtered pump vault serviced □ Yes □ No
   h. Tank lids secured after inspection □ Yes □ No

9. Primary Tank
   □ Acceptable  □ Unacceptable
   a. Sludge and scum level checked □ Yes □ No
   b. Tank needs to be pumped □ Yes □ No
   c. Effluent filter serviced □ Yes □ No
   d. Tank lids secured after inspection □ Yes □ No

10. Manufacturer’s required maintenance performed. □ Yes □ No

11. Lab samples collected for monitoring. □ Yes □ No
   Types of analysis:
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________

Other Comments:

Service Provider: _____________________________ Date: _____________________
Home Owners Limited Warranty and Service Agreement

THIS AGREEMENT is made by and between:

(Name)______________________________________ (Street address) __________________________________________ (City/state/zip code) _________________

(Name)______________________________________ (Street address) __________________________________________ (City/state/zip code) _________________

Hereinafter SERVICE PROVIDER/INSTALLER; for the purpose of providing maintenance service for an AeroCell or Bio-COIR Advanced Treatment System, Hereinafter AeroCell/Bio-COIR; Installed at

(Name)______________________________________ (Street address) __________________________________________ (City/state/zip code) _________________

Service Period: The service period begins on the date of Final Inspection and approval by the governing regulatory authority or date of HOMEOWNER use, whichever comes first. This agreement is for a service period of two (2) years.

Service Charge: This initial two (2) year service agreement is included in the initial system purchase price. The manufacturer or authorized representative shall make available for purchase by the owner an extended service policy with terms comparable to those in the initial service policy. The cost of the extended service agreement is ($__________________).

Additional Charges: This contract price does not include the cost of the following items, a) pumping the septic tank or pump basin(s), b) repair or replacement of parts that are furnished or manufactured by parties other than QUANICS, or c) repair or replacement of parts manufactured by QUANICS for which the warranty has expired.

AeroCell/Bio-COIR Systems: The AeroCell/Bio-COIR Systems includes the septic tank(s), septic tank filter or filter plates, pump basin(s), pump(s) and controls, recirculation device, final dispersal system, AeroCell/Bio-COIR Modules/ and all miscellaneous parts attached to and required for the operation and service of the system.

HOMEOWNER Responsibilities: The HOMEOWNER confirms that he has read and understands the AeroCell/Bio-COIR Operation Manual and agrees to operate the QUANICS AeroCell/Bio-COIR Advanced Treatment System in accordance with QUANICS’s operating instructions. Failure to use the system in accordance with the Operation Manual will void all warranties. All repairs required to restore the system to normal operation will be at the HOMEOWNER’s expense.

Service Provided: Under this agreement, normal service means minor adjustments and repairs required to keep the system in proper operation and does not include repairs required by improper installation or misuse of the system by others. Service also does not include repair or replacement of any components that may be required due to normal use and wear that are not covered by QUANICS’s warranty. QUANICS or QUANICS’s Certified SERVICE PROVIDER shall inspect the AeroCell/Bio-COIR systems once each six (6) months for a period of two (2) years, and service the components as outlined below:

General Service:
1. Waste Flow Usage: Determine the daily waste flow by reading the water meter or, if so equipped, the system flow meter.
2. Collect Effluent Sample: Sample should be clear with a slight yellow tint, free from suspended solids and free from septic odor. Samples not meeting this criteria should be analyzed for BOD and TSS levels.
3. HOMEOWNER Notification: Send a copy of the service report to the HOMEOWNER. Advise the HOMEOWNER in writing of any problems or corrections including excessive water use. Notify the owner in writing about improper system operations that cannot be remedied at the time of inspection.
4. Regulatory Notification: Send a copy of the service report to the applicable regulatory agency, if required.
5. Manufacturer Notification: Send a copy of the service report to QUANICS as required to continue the AeroCell Limited Warranty.

QUANICS Components:
1. AeroCell/Bio-COIR: Remove and clean the spray nozzles. Inspect the pipe orifice and clean as needed. Inspect the foam media and clean as needed.
2. Pump(s) and Controls: Inspect the pumps(s) and controls for proper operation and settings. Activate the components and observe for proper function. Adjust settings as needed.
3. Septic Tank Filter/Filtered Pump Vault: Inspect the filter or filter plates and clean as needed.
4. Pump Basin(s): Inspect for excessive solids buildup and notify the HOMEOWNER to have the Basin pumped or upon HOMEOWNER’s request pump the tank at the HOMEOWNER’s expense.
5. Miscellaneous QUANICS Components: Check any other QUANICS components and adjust as necessary.
NON-QUANICS Components:
1. Septic Tank & Pump Tank: Inspect for excessive solids buildup and notify the HOMEOWNER to have the tank(s) pumped or upon HOMEOWNER’s request pump the tank at the HOMEOWNER’s expense.
2. Final Dispersal System: Inspect the system for signs of improper effluent discharge. Inspect the system for proper surface diversions. Advise the system HOMEOWNER of any corrections they should make.
3. Miscellaneous Components: Check any other components and adjust as necessary. Advise the HOMEOWNER if repairs are required.

Emergency Service: In the event the AeroCell/Bio-COIR unit(s) stops operating, service shall be provided within 48 hours of notification to the authorized SERVICE PROVIDER/INSTALLER. Emergency Service required because of HOMEOWNER abuse or misuse, or because of repairs or service to the AeroCell/Bio-COIR unit(s) by an unauthorized third party shall be at the HOMEOWNER’S expense.

QUANICS Limited Warranty:
QUANICS warrants each AeroCell® & Bio-COIR® wastewater treatment system to be free from defects in material and workmanship as follows: AeroCell and Bio-COIR treatment modules, controls, filters, risers & basins for a period of two (2) years from the date of installation; pumps for a period of three years from the date of installation date; AeroCell foam media for a period of ten years from installation date; Bio-COIR media for a period of two years from installation date. Discontinued parts will be replaced with the closest current QUANICS equivalent. In no event shall QUANICS be liable for any incidental or consequential damages or any labor, material, freight or any other expense required to replace, correct or reinstall the product. QUANICS’s liability is limited to repair or replacement of the part. Except as stated herein, there are no warranties express or implied, including the warranty of merchantability or warranty of fitness for a specific purpose. All warranties are void if the product has been improperly modified, applied or installed, subjected to misuse or abuse. All warranties are void if this Service Contract is terminated for lack of payment or is not renewed at the end of the contract period.

SERVICE PROVIDER/INSTALLER Limited Warranty
The SERVICE PROVIDER/INSTALLER extends to the HOMEOWNER all limited warranties as provided by any manufacturers. Any parts not specifically warranted by any manufacturer shall be warranted by the SERVICE PROVIDER/INSTALLER for material and workmanship including labor to repair or replace any defective parts for a period of two years beginning on the date of final inspection and approval by the governing regulatory authority or date of HOMEOWNER use whichever comes first.

This agreement contains all warranties, representations and conditions made by and between the parties hereto. No modification, amendment, discharge or supplement to this agreement or waiver or release of any term hereof shall be valid or binding unless in writing and signed by all of the parties hereto. This agreement shall be governed, construed and interpreted in accordance with the laws of the Commonwealth of Kentucky.

Accepted by: Accepted by:

HOMEOWNER SIGNATURE INSTALLER/SERVICE PROVIDER SIGNATURE

_____________________________________________ _______________________________________________

Date _____________________ Date _____________________
System References

Quanics is a multidisciplinary organization focused on providing appropriate decentralized solutions rather than supplying a single product type or option. We focus our efforts on matching the best available technology to the application resulting in the optimal outcome. Providing multiple technologies and solutions is our goal and distinguishes our organization from others in the decentralized market. Quanics and its Dealers are highly qualified to implement decentralized wastewater systems in varying size developments treating both domestic and commercial wastewater. A brief overview of the various projects and systems that Quanics has utilized or has available for the effective treatment of wastewater follows.

Quanics is experienced in the development and implementation of long term institutional programs, mechanisms and strategies for the management of decentralized wastewater treatment and dispersal systems. A brief description of relevant projects follows. This list is by no means complete but provides a generous sampling of the range, scope and capability of Quanics, Inc.

Title of Project
Big Point/Wade, MS Community Systems

Brief Description of Work
Quanics, Inc was awarded the contract to supply the equipment for the development of two large scale decentralized systems in Southern Mississippi. The systems are designed to treat 100,000 to 120,000 gallons of wastewater per day. The system utilized AeroCell treatment modules followed by drip irrigation for final disposal.

Client’s name
Jackson County Utility Authority

Reference from Client
Bo Wigley
Jackson, MS
(601) 932-2060

Title of Project
Grand Bay Community

Brief Description of Work
Quanics provided an addition to an existing textile filter system to accommodate an additional 30,000 gpd flow. Six AeroCell treatment pods were installed in 2008 for the additional treatment capacity.

Client’s name
Grand Bay Utility Authority

Reference from Client
Buddy McGregor
(251) 591-7050

Title of Project
Bok Homa Casino

Brief Description of Work
Quanics provided a complete wastewater treatment system and spray irrigation field for a new casino in Laurel, Mississippi. An AeroCell system designed to handle up to 20,000 gpd was installed and started up in 2011.

Client’s name
MS Band of Choctaw Indians

Reference from Client
Bill McGee
(601) 656-5411

Title of Project
Virginia Bio-COIR Research Project

Brief Description of Work
Twenty permanently-occupied single-family residential Bio-COIR® systems (ATS 4 and ATS 6 modules) were sampled in four consecutive quarters. Estimated sewage flows is based on number of bedrooms and ranged from 300 gpd to 600 gpd. Project will be completed in second quarter of 2011. Influent and effluent were sampled by certified laboratories for BOD$_5$, TSS, TN and e.coli under the supervision of Quanics Inc.

Client’s name
Virginia Department of Health

Reference from Client
Bob Savage
(757) 787-1191

Title of Project
Coppersmith Cove Development

Brief Description of Work
A lakefront development on Lake Barkley in Western Kentucky required the installation of a decentralized treatment system due to steep slopes and shallow soils. The developer chose to install a central drip field for final disposal with individual residential Bio-COIR systems to be installed at each home.

Client’s name
Coppersmith Cove

Reference from Client
Scott Logan
(270) 963-1770

Title of Project
Nikolski Island

Brief Description of Work
16 permanent residences on Nikolski Island off the coast of Alaska were in need of wastewater system upgrades. The engineer and tribal leaders selected the AeroCell from Quanics as the system of choice. The systems were shipped early in 2011 and will be installed in the spring.
Title of Project
Harrison County Emergency Shelters
Brief Description of Work
Counties along the coast of Mississippi were provided funding after Hurricane Katrina to construct multiple Emergency Shelters. Many of these shelters were located in rural areas without access to wastewater treatment services. Three shelters in Harrison County, MS selected a Quanics AeroCell system followed by drip irrigation for final disposal.

Title of Project
MAWWS Hutchens Project
Brief Description of Work
A failed sand filter system in Hutchens, AL was in need of replacing. The system served a school and other mixed residential and commercial establishments. The system was designed to handle up to 30,000 gpd with subsurface disposal of the treated effluent. A Quanics AeroCell system was selected and installed in 2009.

Title of Project
Pearlington, MS STEP Project
Brief Description of Work
Due to the destruction of hurricane Katrina the city of Pearlington, MS chose to upgrade the residents’ wastewater treatment system. A decentralized treatment system was selected with STEP collection. Quanics was chosen to provide approximately 600 individual STEP system packages. Installation of the STEP systems began in 2010 and will be completed mid 2011.

Title of Project
Cornerstone Health Care Facility
Brief Description of Work
The construction of a new nursing home facility in Palmyra, TN required the installation of a new advanced treatment system. A Quanics AeroCell system with UV disinfection and surface discharge was installed in 2009. The system was designed to handle up to 10,000 gpd.

Title of Project
Black’s Island, Florida.
Brief Description of Work
Twenty-six single-family residences, restaurant and bar on a seven-acre island in the Gulf of Mexico (St. Joe Bay, FL). Small clusters of advanced treatment systems, utilizing BioCoir system from Quanics followed by drip irrigation to the many palm trees located on the island. Quanics Director of Engineering, Kevin Sherman Ph.D., P.E., D. WRE., provided design, regulatory consultation and installation/inspection oversight. Installation completed October 2007.

Title of Project
Lighthouse Shores Development
Brief Description of Work
A Quanics Bio-COIR system followed by drip irrigation was selected by the engineer and developer of a 20+ lot development on Lake Barkley in Kentucky. The system was started up and is now managed through the Lyon county Water District.

Title of Project
Cornerstone Health Care
Brief Description of Work
"Developing an environmentally sensitive island in the gulf off the Florida coast was becoming a regulatory nightmare. As soon as Quanics took over, the outlook of the undertaking went from negative to positive. Quanics took their drawings, met with my local regulators, and even a variance board. We are now in the process of installing a Quanics wastewater treatment system and making a dream come to life"

Bill Koran, Black’s Island LLC 850-527-8142
Title of Project
Voyager Lakes, Nova Scotia, Canada.

Brief Description of Work
Quanics supplied a large-scale sand filter to serve this upscale mixed-use development. The sand filter was designed to treat approximately 28,000 gallons per day. Quanics supplied all the sand filter components, pumps, alarms and controls for the project. System start-up began in April 2007.

Client's name
Doug MacKinnon

Reference from Client
Sansom Equipment
100 Upham Drive
Truro, Nova Scotia, Canada
902-895-2885

Title of Project
Arrington Vineyards, Williamson County, Tennessee.

Brief Description of Work
In the spring of 2006, Quanics was presented with the task of treating process wastewater from a winery proposed in Middle Tennessee. Anticipating BOD numbers of 1000-4000 ppm, the issue was to bring the organic load down to a point that the effluent could be successfully dispersed in a conventional soil dispersal field. The 1250 gpd process wastewater flow is treated using 2 1000 gpd BioCoir fixed film media filters. The natural media was chosen to provide the necessary chemical components to accomplish the clean up of the wastewater.

Client's name
Jason Carter
615-394-7585

Reference from Client
"When the first-ever winery was proposed in Williamson County, Tennessee, we were faced with the unique challenges in dealing with the process wastewater. We toured winery operations in California several years ago and knew this wastewater was considered high strength and had to be dealt with differently. That's where the folks at Quanics came in. They helped research the wastewater characteristics and devised a unique solution for our project. With their help, the first bottles of wine from Williamson County will soon be ready for market."

Brian Corwin, Interim Director
Williamson County Sewage Disposal Management
Franklin, TN
615-790-5751

Title of Project
Hancock Bank, Harrison County, MS

Brief Description of Work
The Hancock Bank data processing center was built in Harrison County, MS in an area with poor soils and high water tables. The system was designed for 3000-gpd flow and consisted of a 3000-gallon fiberglass septic tank and a 1000-gallon ATS dosing tank. Treatment was accomplished in 3 1000 gpd Aerocell modules and dispersal was done in a 4-zone drip field consisting of a total 4800 linear feet of drip tubing.

Client's name
Bill Miller
Reference from Client
Miller Environmental
Montgomery, AL
334-284-4910

Title of Project
Captiva Cantina Restaurant, Captiva Island, FL

Brief Description of Work
This small local eatery had previously experienced failure with their onsite wastewater treatment system disposal field. In 2001, an AeroCell treatment system was installed to treat approximately 700 gallons per day of high strength waste. The system consistently performed by producing effluent results well below secondary quality.

Client's name
Captiva Cantina
Reference from Client
Restaurant is open

Title of Project
Atlantis Night Club, Chicago, IL

Brief Description of Work
The Atlantis Night Club is a commercial facility in southern Cook County, IL. The issue here was high water table for the dispersal system. Treatment was done in 5 1000 gpd Aerocell modules. Dispersal was done in two large mounds constructed above the original surface to keep the discharge out of the water table.

Client's name
Kevin Dominick
Reference from Client
Carl's Septic Service
20 West 335
South Frontage Road
Lemont, IL
630-878-2688
<table>
<thead>
<tr>
<th>Title of Project</th>
<th>Big Rob’s Loose Moose, Land-O-Lakes, WI</th>
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</thead>
<tbody>
<tr>
<td>Glen Arbour, Halifax, Nova Scotia</td>
<td>Brief Description of Work</td>
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<tr>
<td>Glen Arbour is a high-end residential development located in Halifax, Nova Scotia. Originally design for a sand filter the contractor and developer eventually decided upon a Quanics AeroCell system. The 38,000-gallon per day system was shipped to the site in early 2007.</td>
<td>The existing septic system for this facility was failing and had to be replaced. The requirements for this large restaurant and tavern were that it needed attention paid to the grease management system as well as accommodate a daily flow of 2500 gpd with high strength wastes. Quanics placed 4 1000 gpd Aerocell modules here with design assistance concerning the grease trap and dispersal field.</td>
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<tr>
<td>Client's name</td>
<td>Nels Anderson</td>
</tr>
<tr>
<td>Doug MacKinnon</td>
<td>Reference from Client</td>
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<tr>
<td>Sansom Equipment</td>
<td>Water &amp; Waste Equipment</td>
</tr>
<tr>
<td>100 Upham Drive</td>
<td>2335 Shady Lane</td>
</tr>
<tr>
<td>Truro, Nova Scotia, Canada</td>
<td>Cleveland, TN 37312</td>
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<td>902-895-2885</td>
<td>423-479-2084</td>
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<tr>
<th>Title of Project</th>
<th>Post Lake Inn</th>
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<tr>
<td>Manchester STEP Project, TN</td>
<td>Brief Description of Work</td>
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<tr>
<td>Quanics provided 53 STEP systems to retrofit existing septic tanks. Effluent was lifted from the individual residence to a central sewer line. Each individual STEP package included a filtered vault, high head turbine pump and the required alarms and controls.</td>
<td>This small restaurant and bar in northeast Wisconsin was experiencing problems with their existing wastewater treatment system. The regulatory authority required effluent monitoring and the Inn consistently produced effluent BOD in the 300 mg/L range. In 2006, a Quanics AeroCell system was installed to provide a higher level of treatment. Testing of the effluent after the AeroCell installation has revealed effluent quality below 30 mg/L.</td>
</tr>
<tr>
<td>Client's name</td>
<td>Post Lake Inn</td>
</tr>
<tr>
<td>Carey Davis</td>
<td>Reference from Client</td>
</tr>
<tr>
<td>Water &amp; Waste Equipment</td>
<td>Dave Tomski</td>
</tr>
<tr>
<td>2335 Shady Lane</td>
<td>Deerbrook, WI</td>
</tr>
<tr>
<td>Cleveland, TN 37312</td>
<td>(715) 627-2076</td>
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<tr>
<th>Title of Project</th>
<th>Middleton Island FAA Post</th>
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<tr>
<td>Camp Marantha, Scottsboro, AL</td>
<td>Brief Description of Work</td>
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<tr>
<td>This project is a small church camp located near Scottsboro, AL on the shores of Lake Guntersville. The septic system supporting the mess hall was failing and the concern was that untreated water would get to the lake. Quanics provided a 1000 gpd Aerocell treatment system with final dispersal into a conventional disposal system.</td>
<td>This remote Federal Aviation Administration outpost is located off the coast of Alaska on Middleton Island. In 2007, Quanics supplied a wastewater treatment system to serve the facility. Due to varying occupancy, the engineer designed the AeroCell System to be reduced or enlarged by shutting off modules.</td>
</tr>
<tr>
<td>Client's name</td>
<td>Garness Engineering</td>
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<tr>
<td>Andrew Crawford</td>
<td>Reference from Client</td>
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<tr>
<td>J H Wright</td>
<td>Jody Maus</td>
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<tr>
<td>Cullman, AL</td>
<td>Anchorage, AK</td>
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<tr>
<td>256-734-7948</td>
<td>(907) 337-6179</td>
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CRESTWOOD, KY 40014
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