

PROJECT UPDATE - AMPHIDROME® COLDNITE™ LAGOON TREATMENT SYSTEM



Lagoon Ammonia Limits Impose Technical and Funding Challenges on PA Township

ColdNite™ Highlights

- **Lagoon Nitrification Upgrade**
- **Cold Temperature Nitrification**
- **Small Footprint**
- **Backwashable Biological Active Filter**

Waverly Township, PA

Since 1986 the Township of Waverly, Lackawanna County, has operated a wastewater treatment plant (WWTP) that consists of two aerated-facultative lagoons in series and discharges into an unnamed tributary of Ackerly Creek within the Susquehanna River basin. It is operated by a staff of two whose duties also include maintaining the collection system, storm water retention ponds and drains, as well as winter plowing and salting. The facility has an ammonia-nitrogen monthly average limit of 12 mg/l

November through April and 4mg/l May through October. Cold temperatures impacted nitrification during the winter months and even during warm weather conditions periodic non-compliance issues occurred.

The Township was faced with the challenge of replacing the lagoon system entirely or adding a process that would consistently nitrify during the cold winter temperatures and weather transition periods. A review of DMR data from 2009 to 2012 showed violation of effluent permit re-

quirements for ammonia-nitrogen about 15 percent of the time.

The township engineer, Milnes Engineering, Inc., with the assistance of the Township Maintenance Superintendent Tommy James and the Certified Plant Operator Steve Bray, evaluated several alternative systems for cold temperature nitrification and recommended the Amphidrome® system.

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Project Scope — Lagoon Cold Temperature Nitrification

After a yearlong pilot study that demonstrated fractional ammonia with an influent temperature as low as 38°F, the Waverly Township supervisors selected and installed an **Amphidrome® ColdNite™** process to upgrade their 0.5 MGD lagoon in lieu of designing a new WWTP. The constructed for the additional process was approximately

\$1,680,000. However, it was estimated that if the lagoon system were to be abandoned and a new WWTP constructed the cost could be in excess of \$5,500,000 and also increase the staffing requirements.

The process is designed for an average daily flow (ADF)

of 360,000 gpd and has successfully treated peak flows over 3X of design.*

The overall facility footprint is 30 ft. x 41 ft. and consists three (3) 9.4 x 24 ft. **ColdNite™** reactors each with an 11 ft. bed depth, a backwash clearwell, and mudwell. Backwash blowers and controls are housed in a small building.

* See data page 2

Amphidrome® ColdNite™ Process Description

Polishing the lagoon effluent with this system uncouples the solids residence time (SRT) from the hydraulic residence time (HRT) providing a large population of volatile solids (VS) in a small footprint.

The process utilizes a biologically active filter (BAF), also referred to as a submerged attached growth bioreactor (SAGB) because the media is always submerged in the process flow. The two primary advantages of SAGBs are the high biomass concentrations, equivalent to **7,000 – 18,000 mg-VS/l**, that may be achieved and the short hydraulic retention time (HRT), which result when media with a high specific surface area is used. The media also provides physical filtration and therefore the need for solids separation after the biological treatment process is eliminated. Solids associated with biological growth and algae are backwashed out of the filter and sent back to the lagoon.

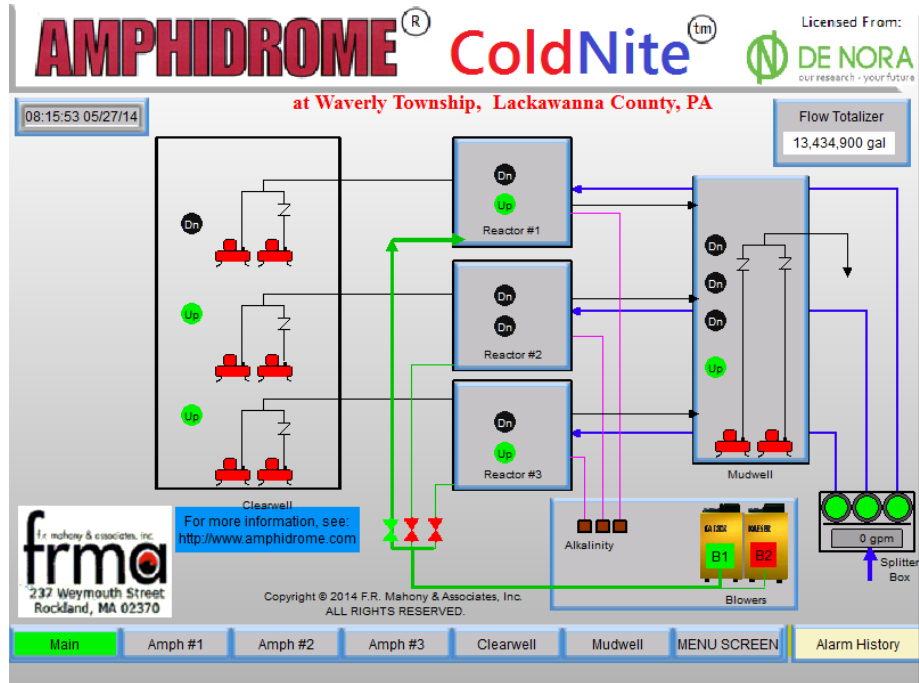
The ColdNite™ filter is intermittently aerated to achieve both the aerobic environment required for the oxidation of organics and nitrification and alkalinity recovery.

The system includes the ColdNite™ Filter reactor and a clear well. The

ColdNite™ system is installed underground. The only structure required is a small building for the blowers and control panel.

The control system is PLC based with a user friendly operator touch screen interface that allows real time control and observation of the system remotely via the internet.

Remote access to stored system trending data, alarm history etc. provides valuable insight on system operation and any adjustments that may need to be made to optimize performance. These adjustments can be made remotely in real time.



Winter 2015-2016 Operational Data

Month	Flow Max	Flow Average	Wastewater T (F°) Average	Influent Ammonia Average	Effluent Ammonia Average
November	577,143	341,990	45	2.78	0.30
December	616,335	402,100	42.8	10.85	1.23
January	641,304	376,670	33.2	12.45	2.44
February	1,342,710	565,690	33.0	12.77	3.72
March	575,961	408,490	41.3	7.93	0.14

The Amphidrome® ColdNite™ system has proven to be a cost effective addition to the Township's existing treatment facilities for nitrification during cold temperature, weather transition periods and high peak flows.