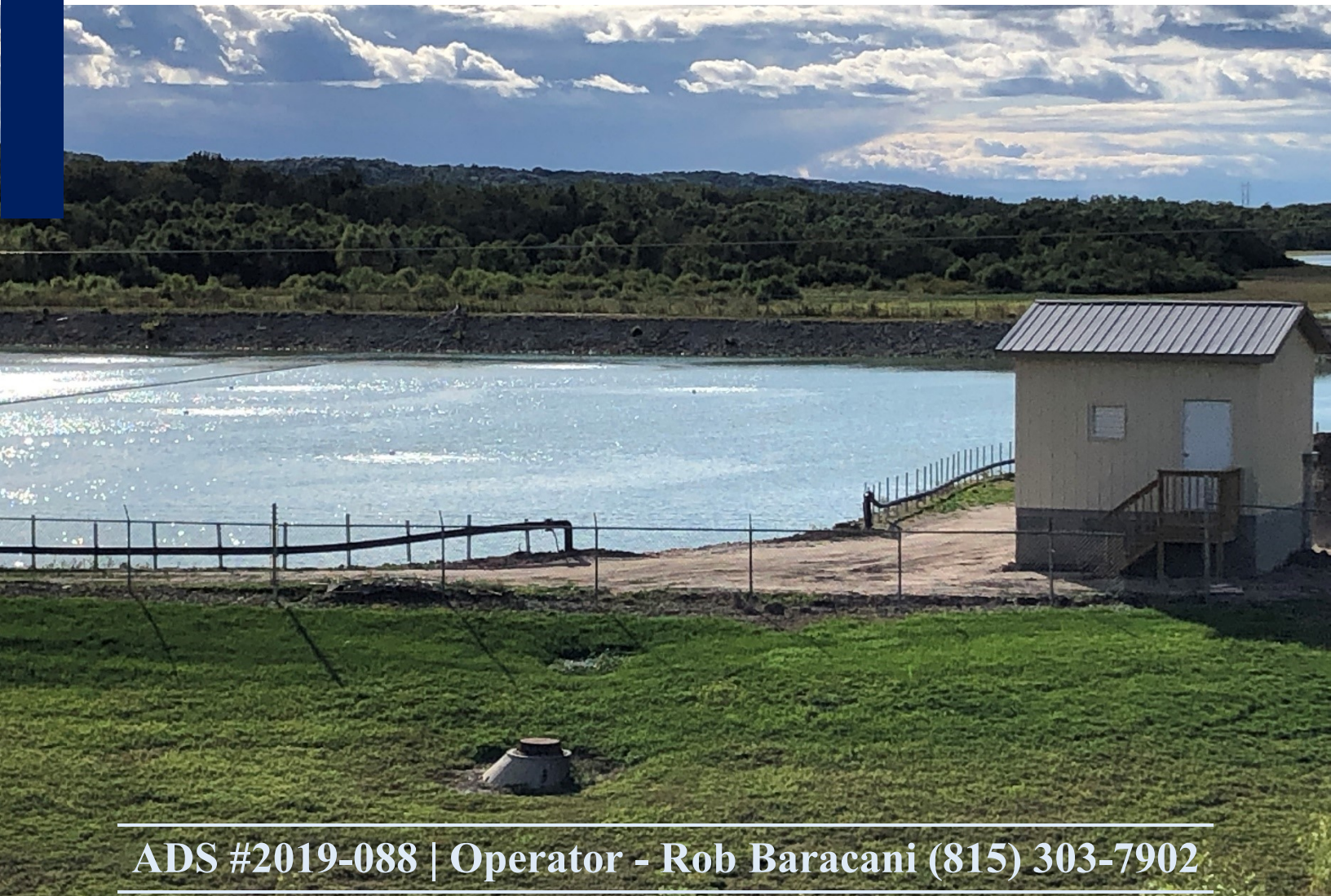







Town awarded \$70,800 energy incentive for lagoon system's power savings

AIR DIFFUSION SYSTEMS:

Spring Valley, IL - Case Study



ADS #2019-088 | Operator - Rob Baracani (815) 303-7902

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Lagoon History

Spring Valley, Illinois, a town whose population first “boomed” during the early coal mining days, lies along the Illinois River and has a population of approximately 6,000 people today. Founded in 1884, Spring Valley’s earliest drinking water supply was the springs from which the city gets its name. The original wastewater treatment plant at the City of Spring Valley was built in 1958. After massive floods caused the breach of the plant’s protective levee in Spring of 2013, Spring Valley City Officials had no choice but to update and redesign their wastewater treatment plant.

Energy Savings and Incentives

Before the ADS installation, the lagoon was struggling to meet effluent permit limits. The system relied on three 30 HP rotor surface aerators, 90 HP total, which were not providing adequate oxygenation or mixing to the entire water column. The city laid out new wastewater treatment goals including designing an activated sludge plant with a smaller footprint and providing excess storm flow storage.

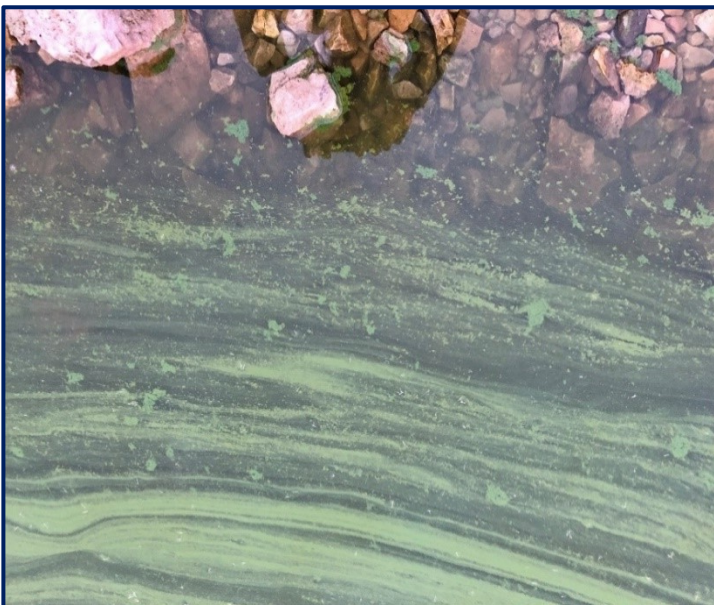
During the system redesign, the town applied for an Ameren Illinois Energy Efficiency Program to provide funding for their upgrades. The power provider, Ameren, provides incentives based on the energy, or kWh saved. The old brush aerators operated using 67 kW of power, while the new ADS system relies on only 19 kW to operate. This 48 kW power reduction provides the town with approximately 424,772 kWh of energy savings each year. These savings earned the town funding of **\$70,800** from the Ameren Illinois Energy Efficiency Program. Additionally, the cost to run the system has decreased by \$33,000 annually, providing long term savings for the town.

Influent Design Load

| | |
|---------------------------------|----------|
| Biological Oxygen Demand (BOD) | 200 mg/L |
| Total Suspended Solids (TSS) | 200 mg/L |
| Ammonia (NH ₃ , TKN) | 30 mg/L |

Monthly Effluent Treatment Goals

| | |
|---------------------------------|---------|
| Biological Oxygen Demand (BOD) | 30 mg/L |
| Total Suspended Solids (TSS) | 30 mg/L |
| Ammonia (NH ₃ , TKN) | 15 mg/L |



Cyanobacteria in the lagoon before ADS treatment



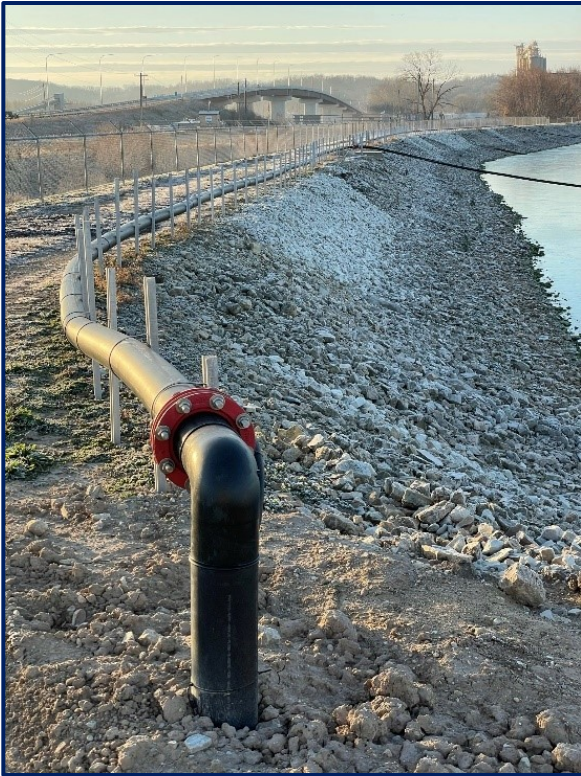
Lagoon with three surface aerators – not meeting oxygen or mixing requirements



Equipment and Installation

ADS Equipment

- ④ 34 ADS Fine Bubble Diffuser Modules
- ④ 2,700' Reinforced Self-Sink Feeder Tube
- ④ 2,660' HDPE Pipe
- ④ 13 Weeks Initial ADS SRB Program
- ④ 2 HeliFlow blowers with
 - 275 SCFM
 - 14.4 Brake Horsepower



Feeder pipe supported by galvanized posts feeds air to the system

ADS engineers designed and assisted City staff with the installed treatment solution of 34 “LTC” diffusers into the aerated facultative lagoon in October 2020 at a maximum water depth of 15'. The fine bubble aeration was supplemented with sludge reducing bacteria (SRB) every week for thirteen weeks (approximately 3 months). The in-water equipment installation at Spring Valley's Lagoon was completed in four days by four workers. Every ADS installation is supervised by an ADS technician, who guides the installation team through the proper assembly of air supply, HDPE feeder and header pipe and aeration equipment.



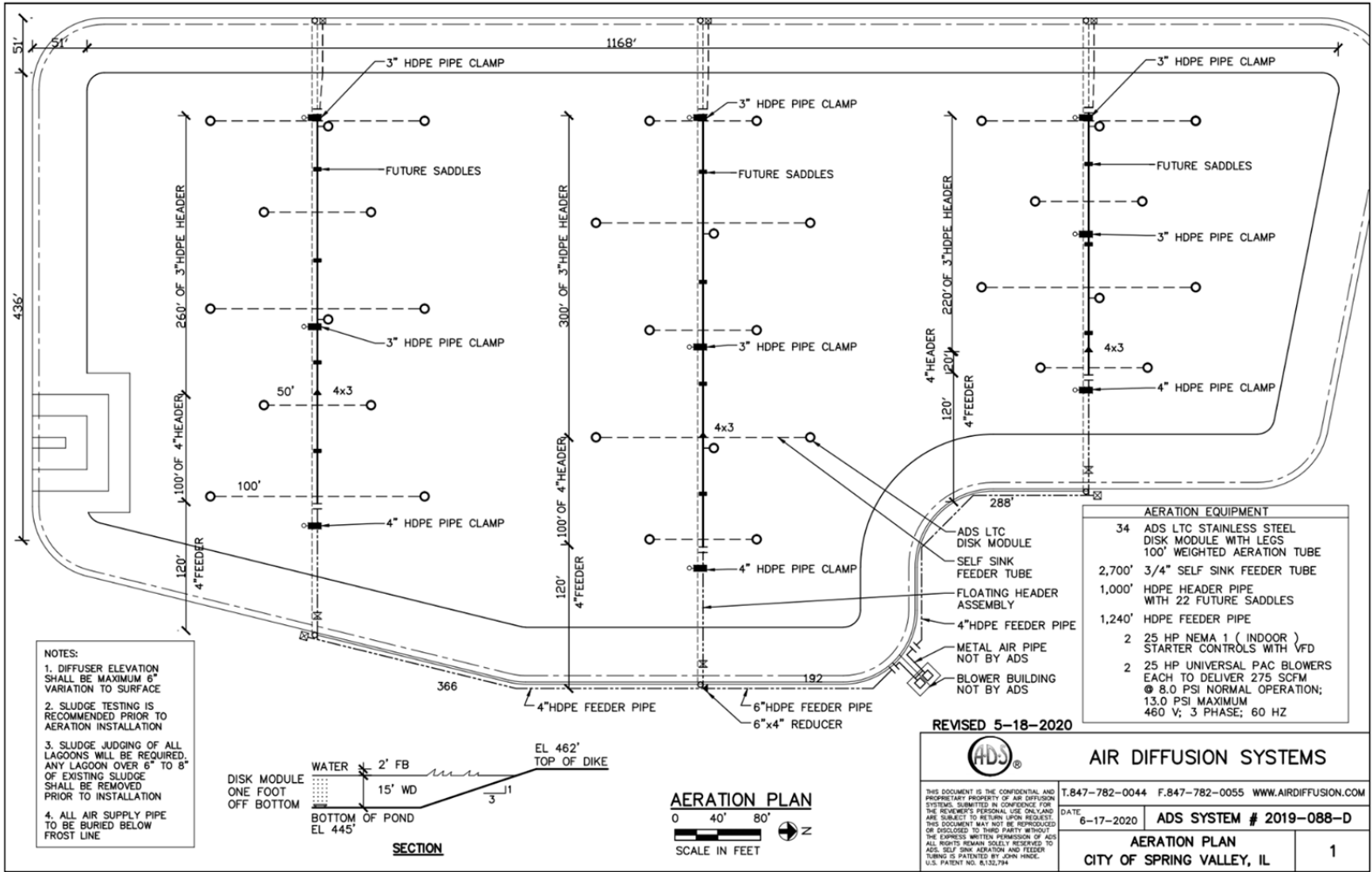
Disks along shore during ADS system installation



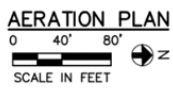
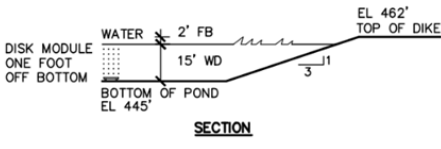
Feeder pipe connects to a tee and floating header pipe with saddles for each diffuser



Spring Valley, IL Lagoon Plan View



- NOTES:**
1. DIFFUSER ELEVATION SHALL BE MAXIMUM 6\"/>



- AERATION EQUIPMENT**
- 34 ADS LTC STAINLESS STEEL DISK MODULE WITH LEGS
 - 100' WEIGHTED AERATION TUBE
 - 2,700' 3/4\"/>

REVISED 5-18-2020

ADS AIR DIFFUSION SYSTEMS

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DATE: 6-17-2020 ADS SYSTEM # 2019-088-D

AERATION PLAN
CITY OF SPRING VALLEY, IL

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Aerial view of lagoon with surface aerators before ADS fine bubble treatment

| <i>Lagoon Design Conditions</i> | |
|---------------------------------|-------------------------------|
| <i>Number of Lagoons</i> | 1 |
| <i>Maximum Water Height</i> | 15 ft |
| <i>Freeboard</i> | 2 ft |
| <i>Total Volume</i> | 37 MG |
| <i>Flow</i> | Draw and Fill for excess flow |



Aeration Treatment

Treatment Delivered to Lagoons

| | |
|----------------------|-----------|
| Airflow | 275 SCFM |
| Mixing Each Diffuser | 13.76 MGD |
| Turnover time | ~2 hours |

Two HeliFlow 25 Horsepower blowers are paired with the aeration equipment at Spring Valley, IL wastewater treatment plant. Like most ADS installations, the system will always run with one blower in operation and the other blower as a standby unit. The blower will operate at 14.4 brake horsepower (BHP) during normal operation. A variable frequency drive (VFD) control panel can turn down the power supplied to each blower's motor to match the exact air supply specifications required for the aeration system.



Blower with Variable Frequency Drive Control Panels



Blowers connect to underground metal piping to dissipate heat



Blower building at Spring Valley Lagoon



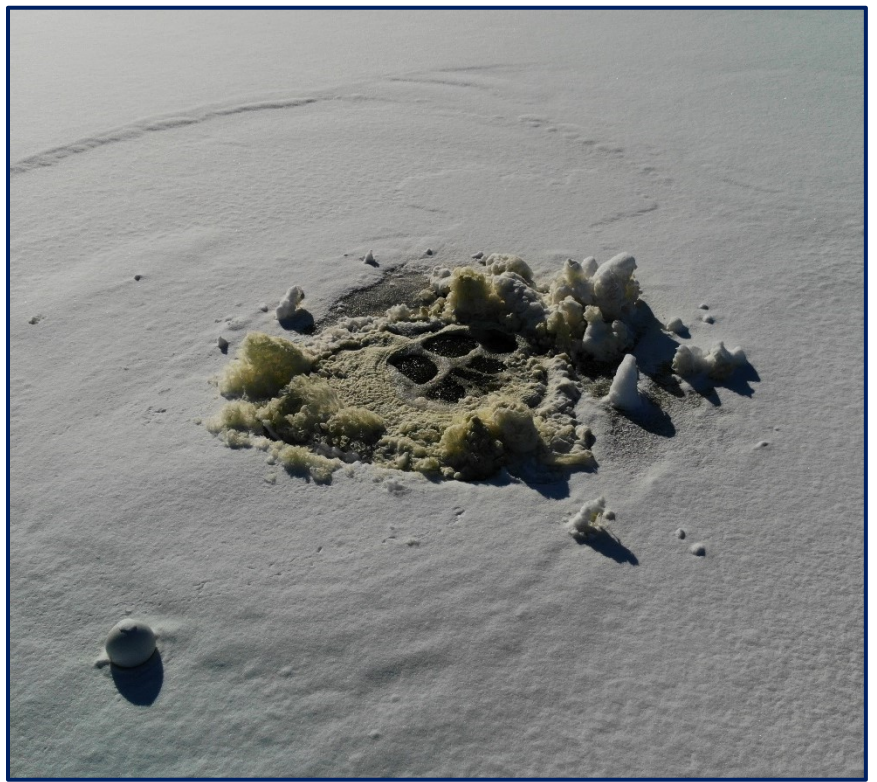
Floating HDPE connects to HDPE feeder pipe supported by galvanized posts



S.S. wire rope and hand crank anchor each floating header to shore



Winter operation with open water above the diffusers and stalagmite growth



Below zero air temperatures with reduced airflow and power costs



Sludge Reducing Bacteria

ADS' Sludge Reducing Bacteria (SRB) is a non-pathogenic formulation of microorganisms selected for their ability to digest organic matter. The proper application doses of SRB varies for each lagoon system and depends on the age, volume, and flows into the system. At Spring Valley lagoon, SRB is seeded into the bottom areas of thick sludge with an ADS liquid air delivery system. Spring Valley operator Rob Baracani applies the application dose out of a 55- gallon drum weekly during treatment periods. SRB is a highly cost effective and efficient way to reduce unwanted organic matter buildup in lagoon systems. This treatment provided substantial cost savings compared to hauling it away or land application. Additionally, with proper safety data sheets, SRB applications do not require permitting.



55-gallon drum and liquid air delivery system



ADS non-pathogenic SRB and workboat



SRB is mixed to homogenize the solution

After the first month of sludge reducing bacteria treatment, Spring Valley operator, Rob Baracani, had noticed a change in the water quality of his lagoon. "I wasn't sure how sludge treatment would work with cold temperatures, but we've had no problems." ADS supplies special cold water SRB for lagoon systems where the water temperature dips below 45°F during bacteria treatment.

The liquid bacteria application process only requires one person and a motorized workboat. ADS recommends at least 1 hour of mixing prior to application. At the Spring Valley lagoon system, the operator applies 30-40 gallons of SRB weekly from a 55- gallon drum using a liquid air delivery system. Through many applications, we have found the best method to apply the bacteria is directly into the deepest sludge.






There have been no odors reported by plant staff since the ADS fine bubble diffusion installation. Baracani commented, “We couldn’t be happier with the aeration. We have to do very little to maintain the lagoon system, which is important because I have many other responsibilities operating the activated sludge plant and collection system in our city”. In addition to being a low-maintenance system, the aeration and mixing keeps open water above the diffusers. When air temperature is below zero, stalagmites can form above the diffusers.



Workboat and bucket that SRB is supplied from

With ADS’ superior oxygenation and mixing, this system has proven to be a low energy solution to treat Spring Valley’s Lagoon. During normal operation, the energy use to aerate Spring Valley’s lagoon has been cut by over 65%. ADS can do the same for your lagoons and wastewater systems. Fill out a design worksheet on our website to begin your proposal.

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