



EvapoRite Systems  
INCORPORATED

Oil & Gas – Mining – Power Production – Commercial Ponds  
Custom Designs-- Patented Technology – Green Solutions

## ***Commercial Wastewater Evaporation System***

### ***Results of Northeastern Utah Trial***

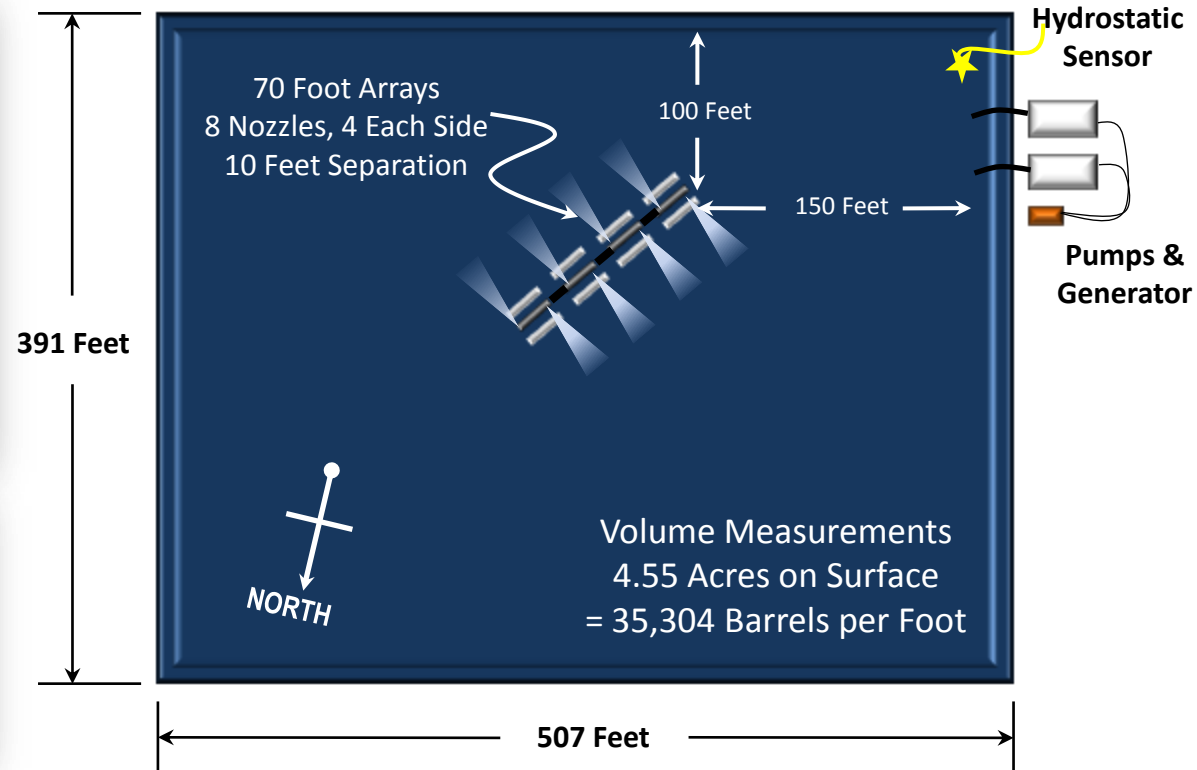
**May 24 - June 4, 2010**

**NOTE:** EvapoRite Systems conducted a demonstration of its patented wastewater evaporation equipment on a 4.55 acre commercial pond located south of Myton, UT. We made a deliberate decision to employ a system that was scaled to match the exact discharge volume (e.g. atomized droplets) of an Apex system. The Apex has been employed on these same commercial ponds in previous years, and the discharge parallels provided a direct comparisons of efficiency, elimination volume, and environmental containment. Hydrostatic sensors recorded measurements every five minutes (calibration = 0.0005 feet), and the readings were used to verify overall elimination performance. Every aspect of EvapoRite's operations were measured and recorded over a ten day period. These measurements included: 1) weather conditions; 2) energy consumption; 3) pump efficiency; 4) atomized volume; 5) drift; and 6) elimination volume. Systems were shut down on three different days to validate salinity factors influencing natural evaporation. The highest standards of environmental containment were employed – no overspray tolerated. The results were significant. We evaporated 34.2% of the total volume of wastewater atomized, and we operated through sustained winds in excess of 20 MPH with gusts in excess of 30 MPH – with zero overspray! A custom designed system for this location could achieve average elimination volumes in excess of 1,800 barrels per day the timeframe of this testing, while maintaining full environmental containment and an average elimination cost below 72 cents per barrel.

**Darrin Haslem, President  
EvapoRite Systems, Inc.  
Cell (Virginia): 757-593-8758  
Office (Utah): 435-789-3364  
Email: dnhaslem@evapsys.com**

**U.S. PATENTS: 7,604,710 and 7,722,739  
Patent Pending: 11/748591**

**www.evaporite.com  
www.evapsys.com**

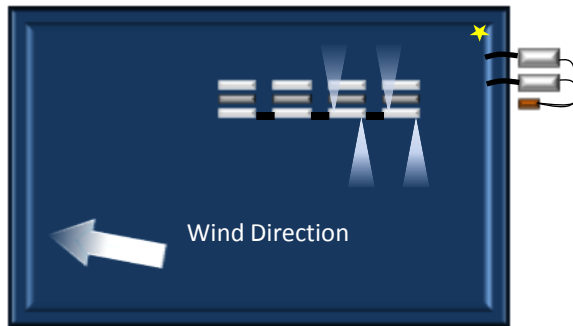


Our demonstration setup was designed to mimic the discharge flow rate of a single Apex system (60 GPM) so useful comparisons could be made. Two nozzles were placed on each float (as depicted). Nozzle arrays are floated on the pond's surface as far from shore as is necessary to control drift. This allows us to adjust the placement of the nozzle arrays to accommodate winds and mitigate overspray. Several additional features are integrated into the system itself to enhance environmental control (described on next slide). A hydrostatic sensor measured performance over a period of seven days, with an additional two days of measurements taken to confirm natural evaporation rates. Energy consumption (bottom left) was read directly from the generator panel during operations when both pump systems were operating at the nozzle pressure indicated.

PSI	GPM
150	5.0
200	5.8
250	6.5
300	7.1
350	7.6

**NOZZLE PRESSURE:** Our systems provide the capability to adjust operating pressure at the nozzles. This feature, in turn, controls the volume of wastewater being atomized per minute. This is a critical drift containment feature. As wind speed increases the operator decreases nozzle pressure. This results in a reduced volume of atomized water, which can be fully evaporated and contained prior to reaching the bank of the pond.

**NOZZLE ORIENTATION:** Our patented floating nozzle arrays were designed specifically to allow the rapid change of the orientation of the nozzles. This can be accomplished in less than ten minutes, and it results in exceptional benefits for the user. First, it allows nozzles to be aligned perpendicular to prevailing winds, which provides optimal evaporation efficiency. Second, it significantly enhances environmental containment by simply increasing the distance between the atomized spray and the nearest bank.

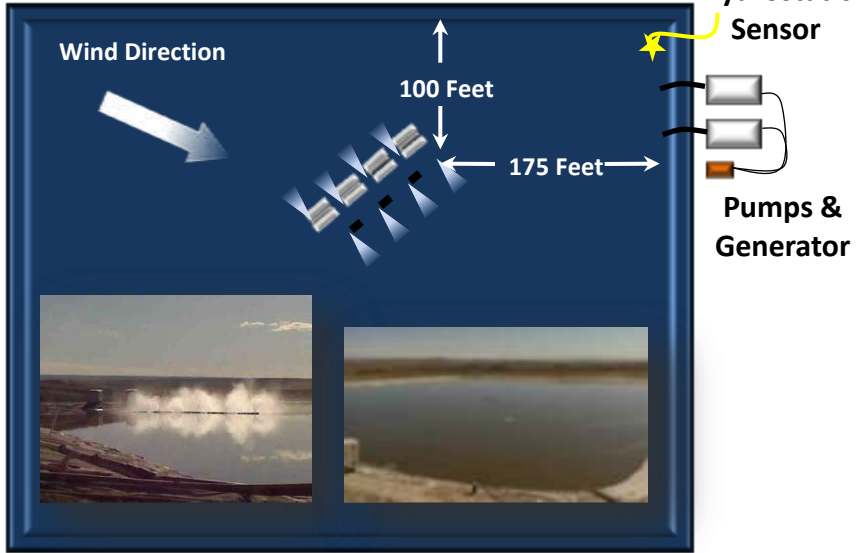


**INDEPENDENT NOZZLE CONTROLS:** Our systems are designed to allow selected portions of the nozzle arrays to be turned off at any given time. This allows additional controls for dealing with winds without having to shut the system down completely. The downwind nozzles can be shut down in order to reduce the atomized volume and allow more room for drift to settle in the pond.

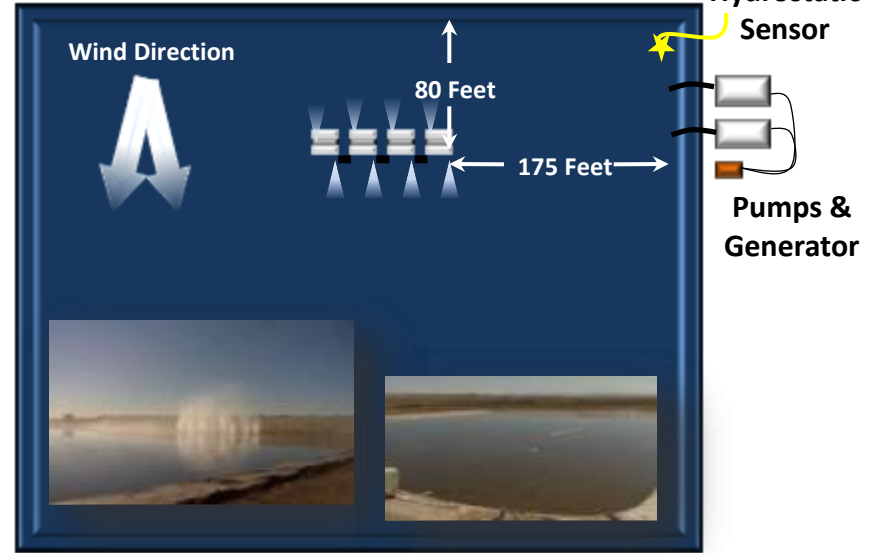
**CONTAINMENT SCREEN:** EvapoRite pioneered the use of mobile containment screens on reserve pit operations, and highly recommend their use in commercial pit applications. The screens are a cost-effective redundant containment measure. They are very effective at capturing minute traces of drifting salts that result from the evaporated spray, as well as small amounts of highly atomized droplets that occasionally get pushed by gusting winds.



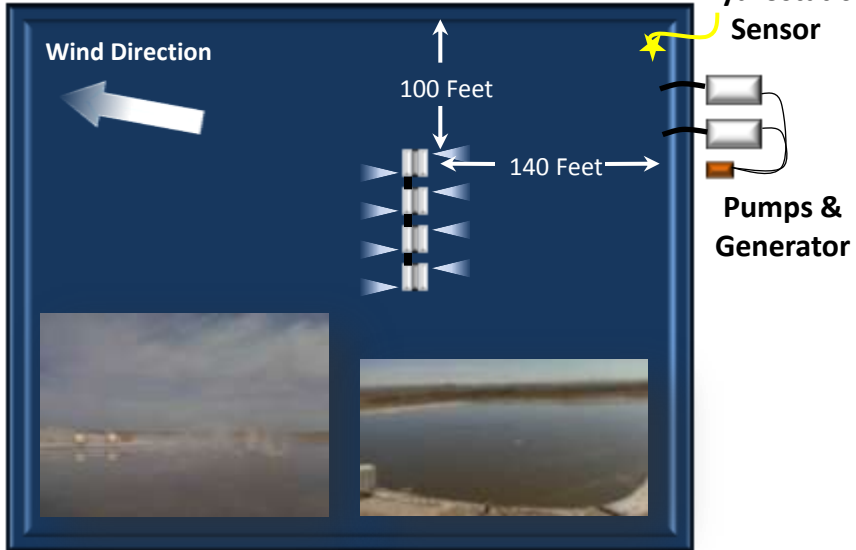
### Wednesday



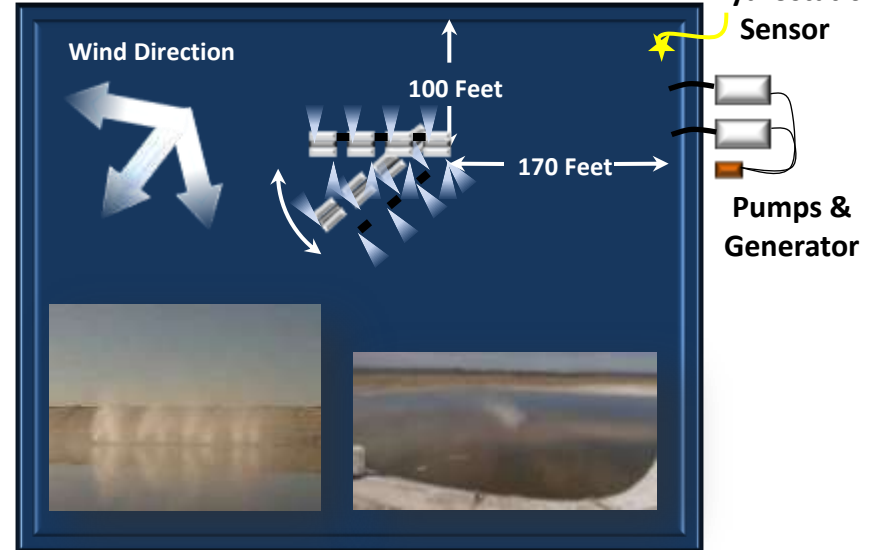
### Thursday - Friday

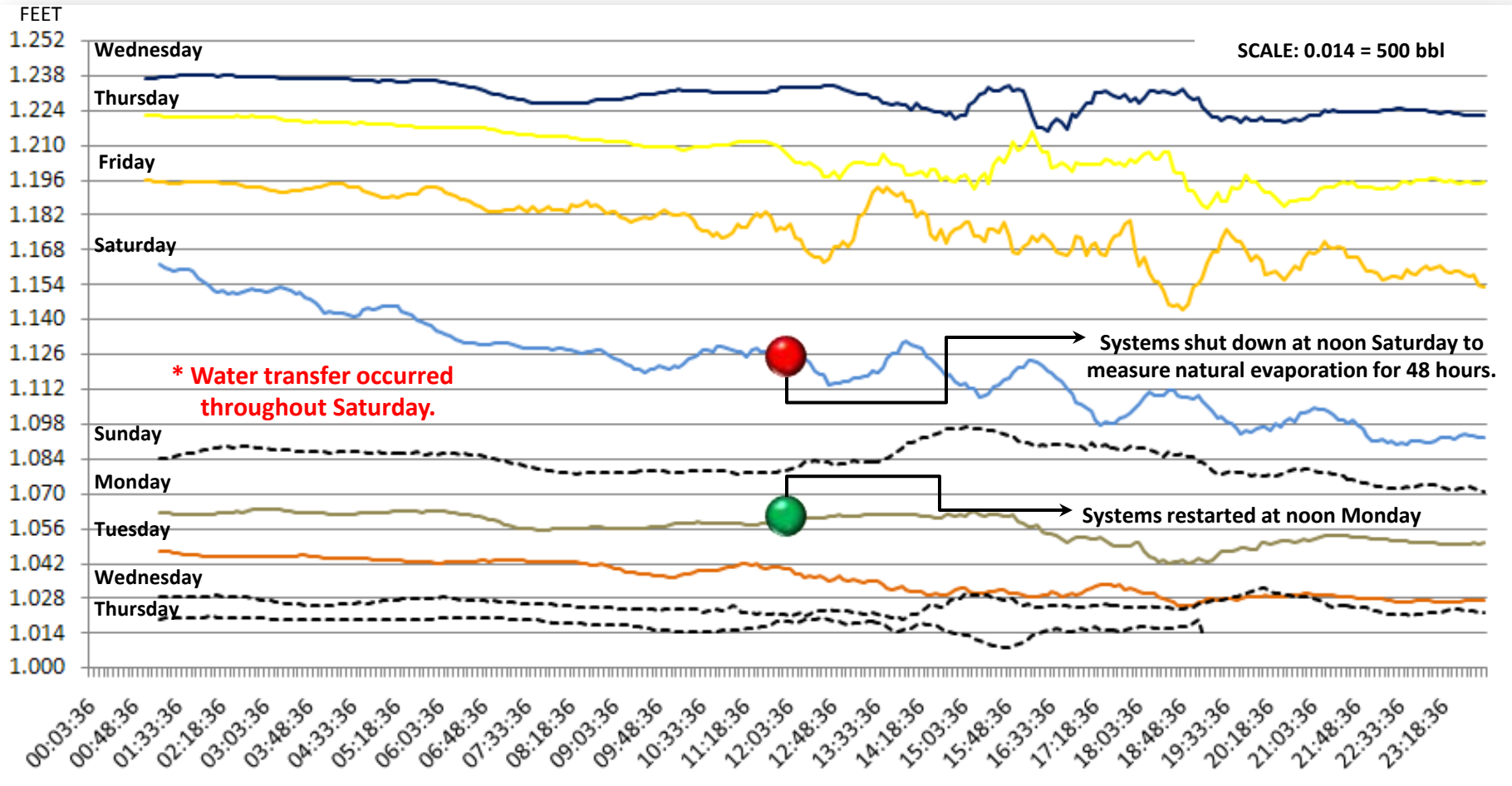


### Saturday



### Monday - Tuesday





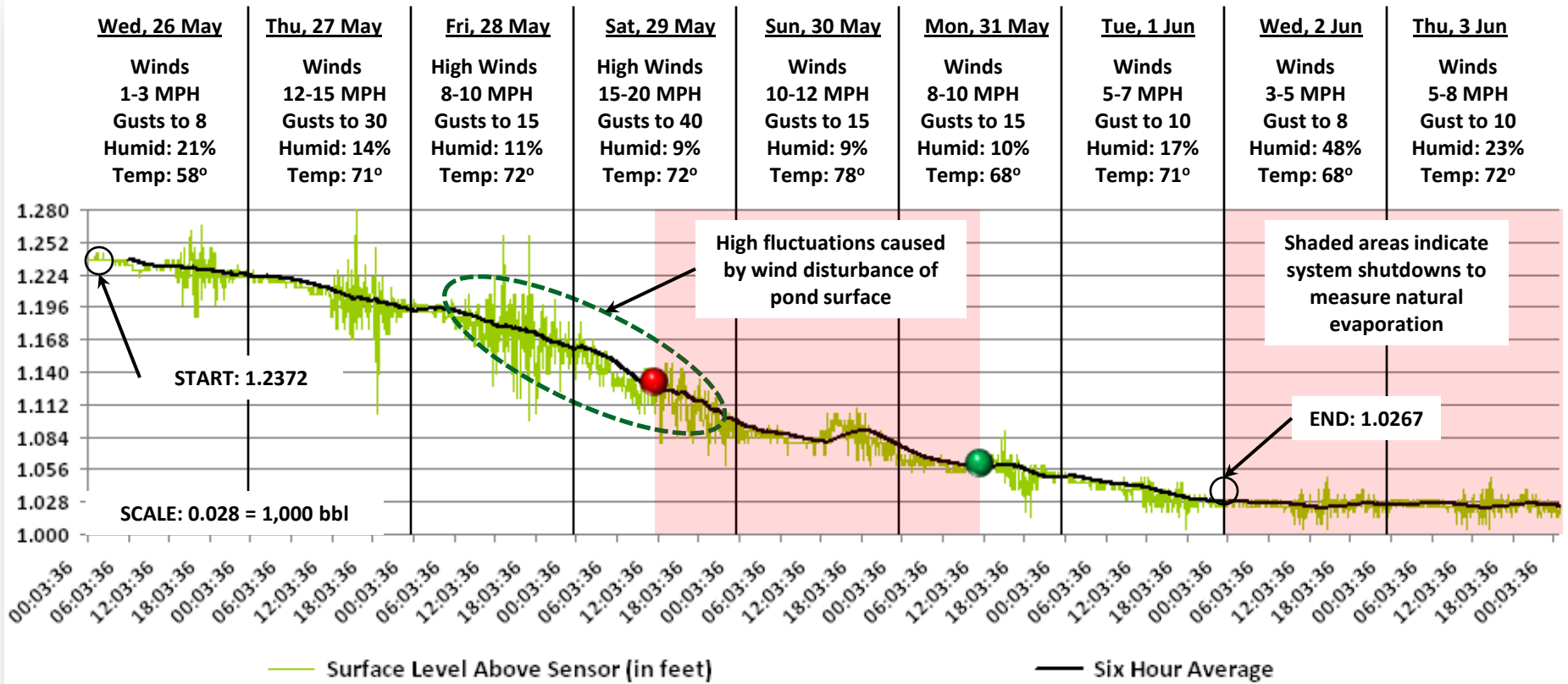
Shifting winds dominated operations from Wednesday through Saturday, with the highest sustained winds being observed on Thursday and Friday. Gusts were above 30 MPH Thursday, and exceeded 40 MPH Friday. The winds blew the surface toward the sensor all day Wednesday, and then shifted dramatically away from the sensor over the next three days. For this reason, longer term trending is used to calculate final measurements (next slide). Down time was taken on the three days indicated (dotted lines) to validate natural evaporation measurements.

	Hours of Operation Per Day	Total Volume Atomized (bbl)	Atomized Volume Eliminated (bbl)	Percent of Atomized Volume Eliminated	Average Operating PSI (at Nozzle)	Average Number of Nozzles Used	Total Volume Atomized Per Hour
Wednesday 26 May	20	1410.3	356	25.2%	260	8.0	70.5
Thursday 27 May	20	1158.9	522	45.2%	220	7.0	57.9
Friday 28 May	14	750.9	480	63.9%	175	7.4	53.6
Saturday 29 May	4	324.6	124	38.2%	300	8.0	81.1
Sunday 30 May	System down from midnight Saturday until noon Monday to verify natural evaporation rate.						
Monday 31 May	12	849.1	335	39.5%	230	8.0	70.8
Tuesday 1 June	17	1164.6	421	36.1%	240	8.0	68.5

PERFORMANCE: Our daily performance statistics is provided in the table (left). Friday's numbers were an anomaly due to extremely high winds (gusts above 40), and are therefore not included in the final averages. We operated more than 16 hours per day, and eliminated over 25.6 barrels per hour for an overall elimination efficiency (e.g. amount evaporated from atomized volume) of 34.2%.

ENERGY CONSUMPTION: The amount of electricity being provided to the systems by the 45kW (3-Phase) generator was recorded throughout the demonstration. The table (right) shows the consumption rate for each PSI setting when all nozzles are being employed. Diesel burn rates ranged from 0.9 gallons per hour at 150 PSI, to 1.4 gallons per hour at 350 PSI. Average fuel was 22.4 cents per barrel of wastewater eliminated over the seven days.

Energy Consumption Table				
PSI	Amps	kW	Power Factor	kVA
150	30	17	0.67	25
200	31	18	0.69	26
250	33	21	0.72	28
300	35	22	0.75	29
350	36	23	0.77	30



- 7,431\* barrels were eliminated from the pond over the seven day period; 5,796 from evaporation and 1,635 through Saturday transfers
- High winds dominated the first four days of the demonstration, but only limited shutdowns were required. Instead, other techniques were utilized to mitigate drift/overspray (i.e. nozzle orientation, PSI reductions, and partial nozzle shutdowns)
- Halted system operations on Sunday (30 May), Wednesday (2 Jun), and Thursday (3 Jun) to verify natural evaporation rates

Total Eliminated*:	5,796 Barrels	Starting Measurement:	1.2372 Feet
Natural Evaporation:	3,488 Barrels	Last Average Measurement:	1.0267 Feet
System Evaporation:	2,308 Barrels	Drop in Pond Surface Level:	0.2105 Feet
System Operating Time:	89 Hours	or:	2.5260 Inches
Elimination Per Hour:	25.9 Barrels		

\* Sensors revealed water transfer that occurred on Saturday and Sunday. These numbers were removed from elimination totals.