

Tortosa H.O.A.  
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July 18, 2012

**Follow-up report**

July 10 data and visual observations determined leaching was needed for water to infiltrate the surface and penetrate to the sensor depth on the Treated area. On-site visit July 17, verified leaching had been accomplished by Mother Nature’s rainfall of .4” July 12-14. Sensor data from the Treated side, below, depicts the rain event. Soil moisture ‘spiked’ to well over 40%. The blue dots represent the irrigation event on the evening of July 10. Prior irrigations had not accurately reflected a moisture change. The Acclima system sensor on the Treated side now appears to be soundly working.



**Soil Laboratory Analyses**

Core samples were submitted to the laboratory for further analyses after determining EC or soluble salt was increasing in the Treated plot. The results below indicate sodium, the salt responsible for water penetration issues, increased significantly from April to July 10 on the Treated side while sodium decreased in the Control area.

		<u>Nitrate-N</u>	<u>Phosphate-P</u>	<u>Potassium</u>	<u>Sodium</u>	ESP (%)
<u>Treated</u>	April 19	1.3	23	210	480	7.6
	July 10	25	22	250	630	8.7
<u>Control</u>	April 19	1.4	18	230	580	9.3
	July 10	14	18	200	470	6.7

Additional irrigation water to leach high salts needs be added to the Solution equation when working with high EC waters. The photographs below are taken one week apart, before and after the rain event. The Treated side recovered after a natural leaching.



Figure 1-Treated side photo taken on 7-10



photo taken on 7-17



Figure 2- Control side photo taken on 7- 10



photo taken on 7-17

### Soil Fertility

The macronutrients, N (nitrogen), P (phosphate) and K (potassium), are shown in the laboratory data chart above. Nitrate-N is lower on the Control side. Nitrate is a soluble salt that moves with water; the higher nitrate-N concentration on the Treated plot is understandable. Four Peaks employs a continual feeding of nitrogen via injection system. Phosphorus and potassium are in adequate ranges for turf.

### Recommendation

Preferably, the trial area is left to operate in its current state for the next three weeks to complete the 2 month solution application study. The data will indicate if the ‘natural’, one-time leaching, will allow the turf to flourish with continued 50% reduction in irrigation. The life-span of the solution after a very heavy watering/leaching will also be tested.

Alternative moisture control settings and measurement for the third application of solution targeted for August 9 can be discussed. Suggestions are a) Set the system to a timed

irrigation schedule rather than sensor-based irrigation with the Treated side irrigating 30% less than the Control or b) Increase the lower threshold of the sensors. Both have pros and cons. A third option may be to continue the current sensor-based irrigation but include a 'leaching' or excessive, heavy irrigation every fourth week to flush excess salt. Other opinions and options are welcomed.

*(prior report)*

July 14, 2012

### Interim Update

A decision to apply GC50 at Tortosa HOA prompts this report. Special considerations are needed to ensure the trial area is not disrupted while solution is applied to all turf areas. Additionally, the transitioning Bermuda at Tortosa is currently struggling. Trial observations can be used as a guideline for application of GC50.

### Second Application

June 9 marked the completion of the second GC50 application. The Acclima system was set to irrigate both sides 'on-demand' via the sensors. A site visit on June 29 showed turf had not fully recovered from scalping, postponing soil and tissue sampling until July.

### Trial Data

Over the month period from June 10 to July 10, the Control side irrigated 180 minutes while the Treatment side received only 70 minutes. GC50 solution reduced water usage by more than 50%.

The thresholds set in May dictated when the system should irrigate; when soil moisture depletes to 22%, the system irrigates for ten minutes. After two hours if moisture is still below 22%, the system irrigates again for ten minutes.

The increase in water holding capacity on the Treated side that occurred after the first application and persisted for 9 weeks has not taken place. Five days after the second application was completed, soil moisture dropped below 25% and remained at or below this level nearly the entire month.

### Visual Observations

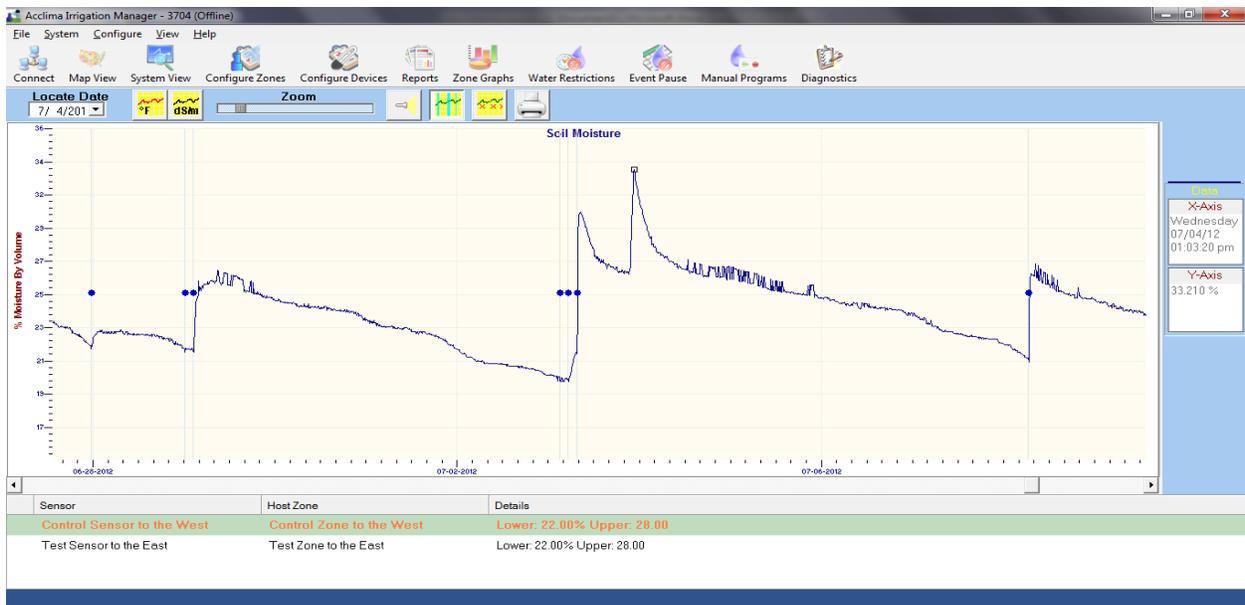
Soil cores were taken on July 10 for analyses. The turf was not healthy enough for the tissue to be properly sampled. Across the Treated area, a hardpan was encountered at 3-3 1/2". A hardpan is a layer within the soil profile that impedes water penetration. The Control side was easily sampled to a depth of 6-7".



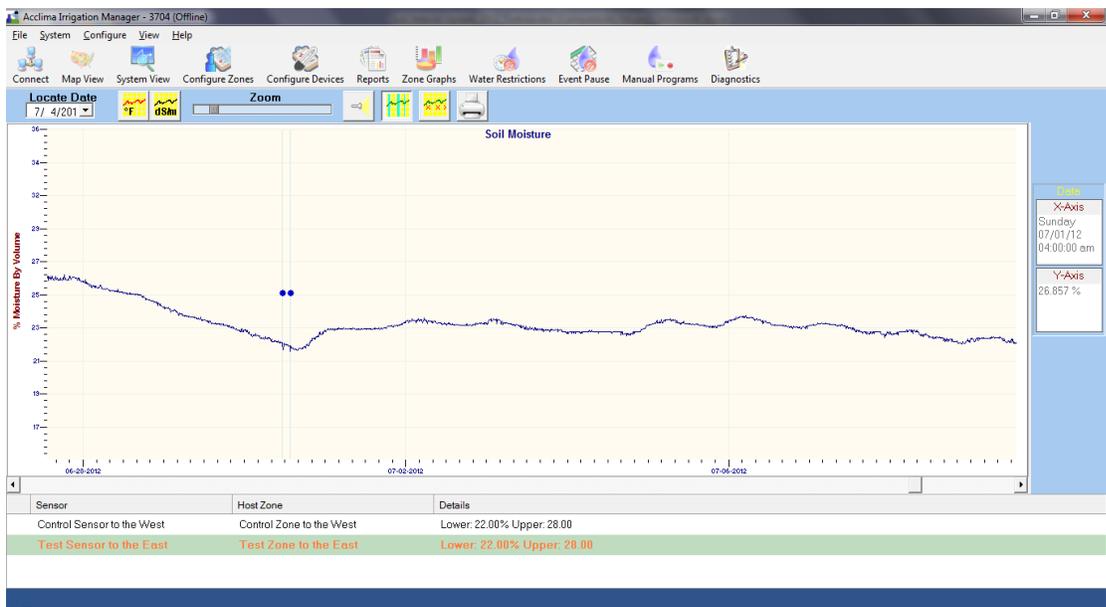
Hardpans can develop through physical means such as compaction from equipment or spreading soil of a different texture on top of existing or in-situ soil. Hardpans also are created by chemical processes, an example being an accumulation of salt from irrigation water forming below the surface. Often pans are a combination of both physical and chemical processes. The irrigation water at Tortosa is high in salt. Four Peaks consistently applies products (Absolute & sulfuric acid injected the water) to combat salt build up. However, by programming the Acclima system to irrigate ‘on-demand’, only enough water to meet the turf’s requirement is applied. An additional fraction of water is needed to leach or move salt below the root zone.

## Soil Data

The percent soil moisture in the top 3” soil cores of the Control side was 13.5%; the Treated side held 9.7% moisture. The difference in soil moisture in the top 3” can be attributed to reduced irrigation of the Treated side. However, an abnormality in the data recorded by the sensors on July 4 signals an alert that needs further examination. Maricopa received ~.25” of rain on July 4. The Control moisture sensor (remember, sensors are placed at 4” depth) recorded this event. The soil moisture graph increased from 26.5% at noon to 33.2% at 1:00 pm. A clip shot of the graph below shows the double spike in moisture on July fourth with the second peak due to the rain. The blue dots depict irrigation events with each blue dot representing a 10 minute watering interval.



Below is the graph of the Treatment side during the same time frame. The rain event on July 4th is barely visible with soil moisture rising only .5%. The 2 blue dots representing 20 minutes of irrigation on July 1 increased soil moisture above the 22% lower threshold, but is not seen as a normal ‘spike’ in moisture.



The above suggests a) water infiltration on the Treatment side is impeded relative to the Control side, or b) the sensor on the Treatment side is not recording soil moisture accurately. Note: Water infiltration problems can be seen on other turf sections surrounding the test plot, especially on sloped areas.

The Electrical Conductivity, EC, a measure of soluble salt in the soil in the 3” core samples on the Treatment and Control areas shows an increase from the April’s core sampling. Again, the irrigation water at Tortosa has a high amount of salt. A water analysis dated September 2010 indicates the irrigation water has an EC of 3.7 dSm.

Soil saturated paste EC (dS/m)

<u>April 19</u>		<u>July 10</u>	
Control	Treatment	Control	Treatment
2.1	2.0	2.3	2.5

**Recommendation**

Currently, the turf is not fully transitioned. Testing of any product should be postponed until Bermuda is actively growing in 90% of all areas. Furthermore, the Trial area is not strong enough to curtail irrigation for 5 days while product is applied to Tortosa grounds.

The Trial area, both Treated and Control, should be ‘leached’. This will basically involve manually irrigating the Trial area for 60 minutes. Moisture sensor data will be reviewed shortly after leaching and soil cores pulled to visually inspect depth of water penetration.

*Victoria Normandin*