

SUMMER 2016
Data Collection Report
Soil & Water Consulting



— Est. 1947 —

Tucson Country Club



SOIL and WATER CONSULTING

Course Name: Tucson Country Club

Date of Visit: June 25, 2016

	<u>6/9/15</u>	<u>9/14/15</u>	<u>3/12/16</u>	<u>6/25/16</u>
Humidity/Air Temperature	62%/90°	52%/90°	46%/72°	22%/99°
Greens Temperature	76.4°	75.7°	51.6°	78°
Fairway Temperature	76.7°	75°	52.8°	78°

	Acceptable Range For Water Sample	Potable Lake <u>6/9/15</u>	Effluent Water <u>6/9/15</u>	Potable Lake <u>9/14/15</u>	Effluent Lake <u>9/14/15</u>	Potable Lake <u>3/12/16</u>	Effluent Lake <u>3/12/16</u>	Potable Lake <u>6/25/16</u>	Effluent Lake <u>6/25/16</u>
EC	<2.25 mmhos/cm	0.44	1.22	0.40	0.46	0.39	0.44	0.40	0.13
Sodium		51.20	126.90	49.96	73.45	30.79	55.70	45.59	91.06
Calcium	20 - 60 ppm	33.22	91.61	25.38	14.50	34.87	25.08	32.28	47.90
Magnesium	10 - 25 ppm	2.26	16.11	2.29	3.48	2.80	1.76	2.00	7.27
Potassium	5 - 20 ppm	2.50	8.50	2.50	3.24	2.28	1.93	2.55	4.56
Nitrate	10 - 25 ppm	1.60	6.27	0.34	<0.10	n/t	1.15	n/t	1.62
Phosphorus	5 - 20 ppm	<0.20	0.76	<0.20	0.22	n/t	<0.20	n/t	0.21
Sulfur	30 - 90 ppm	37.05	158.01	42.51	49.59	39.69	35.88	35.16	87.81
Bicarbonate	<120 ppm	137.94	279.52	102.61	84.90	125.99	143.98	146.66	206.92
Boron	<0.67 ppm	0.01	0.28	0.10	0.13	0.06	0.11	0.08	0.19
Chloride	<177 ppm	30.81	142.29	32.00	40.68	22.30	30.98	21.62	61.10



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TEE	Acceptable Range For Alkaline Soils Sample	1,8,14 (avg) 6/9/15	2 9/14/15	5 3/12/16	6 6/25/16
Organic Matter (Humus)	2 - 3%	2.78	2.13	2.92	2.60
Sulfur	12 - 16 ppm	23.00	27.00	18.00	30.00
Olsen - Phosphorus	13 - 20 ppm	13.33	13.00	14.00	13.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	2,468.00	4,890.00	5,064.00	4,178.00
Magnesium	>7% base saturation or at least 200 lbs/acre	8.06%/152.27	6.82%/250	7.13%/262	7.68%/242
Potassium - TEC of 0 - 35	100 ppm	83.00	217.00	150.00	136.00
Copper	>0.8 ppm	0.78	1.05	0.95	1.20
Manganese	>1 ppm	2.00	3.00	2.00	3.00
Zinc	>1 - 2 ppm	4.89	3.79	4.71	5.30

FAIRWAY	Acceptable Range For Alkaline Soils Sample	1,8,14 (avg) 6/9/15	2 9/14/15	5 3/12/16	6 6/25/16
Organic Matter (Humus)	2 - 3%	3.45	3.15	4.11	3.65
Sulfur	12 - 16 ppm	35.00	30.00	22.00	71.00
Olsen - Phosphorus	13 - 20 ppm	25.33	17.00	28.00	14.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	2,892.67	4,364.00	3,462.00	5,012.00
Magnesium	>7% base saturation or at least 200 lbs/acre	7.83%/176.67	8.26%/276	9.09%/246	8.62%/342
Potassium - TEC of 0 - 35	100 ppm	157.00	225.00	213.00	371.00
Copper	>0.8 ppm	1.12	1.06	1.72	1.37
Manganese	>1 ppm	2.33	3.00	3.00	5.00
Zinc	>1 - 2 ppm	4.12	3.49	6.15	5.36

GREENS	Acceptable Range For Alkaline Soils Sample	1,8,14 (avg) 6/9/15	2 9/14/15	5 3/12/16	6 6/25/16
Organic Matter (Humus)	2 - 3%	0.69	0.83	0.52	0.77
Sulfur	12 - 16 ppm	25.00	9.00	15.00	12.00
Olsen - Phosphorus	13 - 20 ppm	20.00	17.00	16.00	13.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	2,019.33	1,908.00	2,492.00	2,502.00
Magnesium	>7% base saturation or at least 200 lbs/acre	6.14%/105	7.94%/120	7.25%/148	6.76%/132
Potassium - TEC of 0 - 35	150 ppm	373.00	217.00	384.00	278.00
Copper	>0.8 ppm	1.11	1.37	1.32	1.06
Manganese	4 ppm or more	1.00	2.00	1.00	2.00
Zinc	>1 - 2 ppm	3.46	4.81	3.18	3.20



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TEE	Acceptable Range For Saturated Paste Sample	5,15 (avg) 3/12/16	6,15(avg) 6/25/16
Nitrate - Ryegrass	5 - 10 ppm	1.00	3.50
Nitrate - Bermudagrass	10 -15 ppm		
Phosphorus	2 - 10 ppm	1.45	1.54
Potassium	40 - 100 ppm	14.82	18.86
Calcium	60 - 200 ppm	79.94	97.30
Magnesium	20 - 70 ppm	9.78	11.24
Sodium	0 - 30 ppm	148.44	162.19
Soluble Salts	<1,920 ppm	696.25	797.50
Bicarbonate	<60 ppm	208.65	224.52
Chloride	<1,000 ppm	124.00	112.00
SAR	<4%	4.23	4.22

FAIRWAY	Acceptable Range For Saturated Paste Sample	5,15 (avg) 3/12/16	6,15(avg) 6/25/16
Nitrate - Ryegrass	5 - 10 ppm	1.00	10.50
Nitrate - Bermudagrass	10 -15 ppm		
Phosphorus	2 - 10 ppm	1.63	2.16
Potassium	40 - 100 ppm	51.96	47.09
Calcium	60 - 200 ppm	100.88	87.64
Magnesium	20 - 70 ppm	11.68	12.76
Sodium	0 - 30 ppm	181.44	169.99
Soluble Salts	<1,920 ppm	979.25	891.50
Bicarbonate	<60 ppm	229.40	212.32
Chloride	<1,000 ppm	121.75	134.50
SAR	<4%	4.53	4.54

GREENS	Acceptable Range For Saturated Paste Sample	5,15 (avg) 3/12/16	6,15(avg) 6/25/16
Nitrate - Bentgrass	1-3 ppm	<0.5	<1.4
Phosphorus	2 - 7 ppm	3.01	3.10
Potassium	25-40 ppm	21.31	22.19
Calcium	50- 75 ppm	25.97	24.55
Magnesium	15-30 ppm	3.04	3.02
Sodium	0 - 30 ppm	42.04	40.97
Soluble Salts	<1,000 ppm	260.50	260.00
Bicarbonate	<60 ppm	98.23	98.84
Chloride	<200 ppm	25.75	25.50
SAR	<4%	2.08	2.08



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TEE	Acceptable Range For Tissue Sample	6,15 (avg) 6/25/2016
Nitrogen	3.34%-5.10%	4.07
Phosphorus	0.35% - 0.55%	0.44
Potassium	2.0% - 3.42%	2.10
Calcium	0.25%-0.5%	0.60
Magnesium	0.16%-0.32%	0.17
Sulfur	0.27% - 0.56%	0.44
Boron	5-17 ppm	16.80
Iron	97-934 ppm	183.50
Manganese	30-73 ppm	38.70
Copper	6-38 ppm	27.05
Zinc	16-84ppm	59.80
Aluminum	52-92 ppm	112.20
Sodium	229-1107 ppm	2,425.00

FAIRWAY	Acceptable Range For Tissue Sample	6,15 (avg) 6/25/2016
Nitrogen	3.34%-5.10%	4.84
Phosphorus	0.35% - 0.55%	0.49
Potassium	2.0% - 3.42%	2.57
Calcium	0.25%-0.5%	0.49
Magnesium	0.16%-0.32%	0.18
Sulfur	0.27% - 0.56%	0.48
Boron	5-17 ppm	21.40
Iron	97-934 ppm	147.50
Manganese	30-73 ppm	36.50
Copper	6-38 ppm	15.35
Zinc	16-84ppm	64.10
Aluminum	52-92 ppm	73.20
Sodium	229-1107 ppm	2,295.00

GREENS	Acceptable Range For Tissue Sample	6,15 (avg) 6/25/2016
Nitrogen	3.0%-6.5%	4.10
Phosphorus	0.2%-0.55%	0.85
Potassium	0.86%-2.55%	2.48
Calcium	0.21%-0.50%	0.70
Magnesium	0.09%-0.22%	0.19
Sulfur	0.23%-0.39%	0.52
Boron	5-24 ppm	13.70
Iron	99-500 ppm	199.50
Manganese	30-160 ppm	101.00
Copper	9-40 ppm	135.95
Zinc	5-60 ppm	61.35
Aluminum	63- 408 ppm	89.80
Sodium	506- 2264 ppm	1,200.00



RECOMMENDATIONS



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Thoughts on the course visit

The data from this visit looked good. I can see a positive trend on almost every key nutrient that we have considered working on since last year. The recommendations for the greens fertility hasn't changed since last time. Hopefully you will have applied most of it after last Monday's solid tine aerification. Overall, the greens were doing well except for some Algae showing in some thinner areas. That is one main drawback of having to mow at lower heights to smooth out 3 grass types. The bentgrass can become thinner and then algae shows through.

The only fertility recommendations for longer grass is on the tees. I thought the fairways looked healthy and had a great color. It seems like the only issues you may be having on the fairways is irrigation coverage. (picture to the right) Your plans to insert some new heads and adjust some nozzles should help. As we have discussed before, the spacing from tee to green seems a little off and as you hang on to ryegrass as it is steadily hotter, that grass may melt away. Spots like what are shown in the picture could be aerified or sliced and then sprayed with Thunderstorm to loosen the soil and get better water penetration.



Focus of This Report

One thing I discussed with many Superintendents during my weeks in the west was major projects that their course needed. It ranged from new irrigation systems to renovation of the greens. When I started the business in 2005, many courses were still considered "new". That was over 10 years ago and things weren't really that new then- I think we all just lose track of time.

My point is, that since the 2008/2009 economic and housing market crash, there has been a lot of deferred maintenance on many courses. Even others, maybe like TCC, has had renovations within the past 15 years and not had the success that was hoped. Listening to the stories of the late 1990's and early 2000's greens issues, it is hard to believe the club went through all that in such a short period of time!

Your club certainly has a lot of history behind it. It is hard to believe in the very near future that any renovations to the course will be done. (even if some maybe needed) There are many good things you have already changed since you took over last year. You have new and better equipment. Specific tools that will make conditions better with very little disruption to the course and better cultural practices such as brushing the greens that turn a "gnarly" Dominant Plus bentgrass interspersed with bermudagrass into an upright and tightly mown surface. All these things will make for a smoother time when a Master plan is put into place.

Notes from the visit

- Greens mowed at 0.125".
- Brushing on mowers and Primo every two weeks made Dominant Plus more dense and upright.
- Monday 6/27 solid tine aerification.
- If you inter-seed on the greens, use Dominant Plus seed.
- All Ryegrass areas had gypsum, 0-0-50 and 12-8-16 applied.
- 19 total on staff. 2 from an outside landscape contractor.

Fertilizer and Product Recommendations

Tee ONLY (one time applications)

Magnesium/Potassium- 6-8 pounds of product per 1,000 square feet. (0-0-22; K-Mag)

Greens (Monthly applications)

Calcium- 5 pounds of product per 1,000 square feet. (Gypsum)
Magnesium- 3 pounds of product per 1,000 square feet. (Pro-mag)
Potassium- 2 pounds of product per 1,000 square feet (0-0-50)
Minor Nutrients- Spray 3 ounces per 1,000 square feet. (Tech-Magnum) **WATER IN!!!**

* **Synthetic acid spray and water in every two weeks**