Maintenance Considerations for Drip Tape

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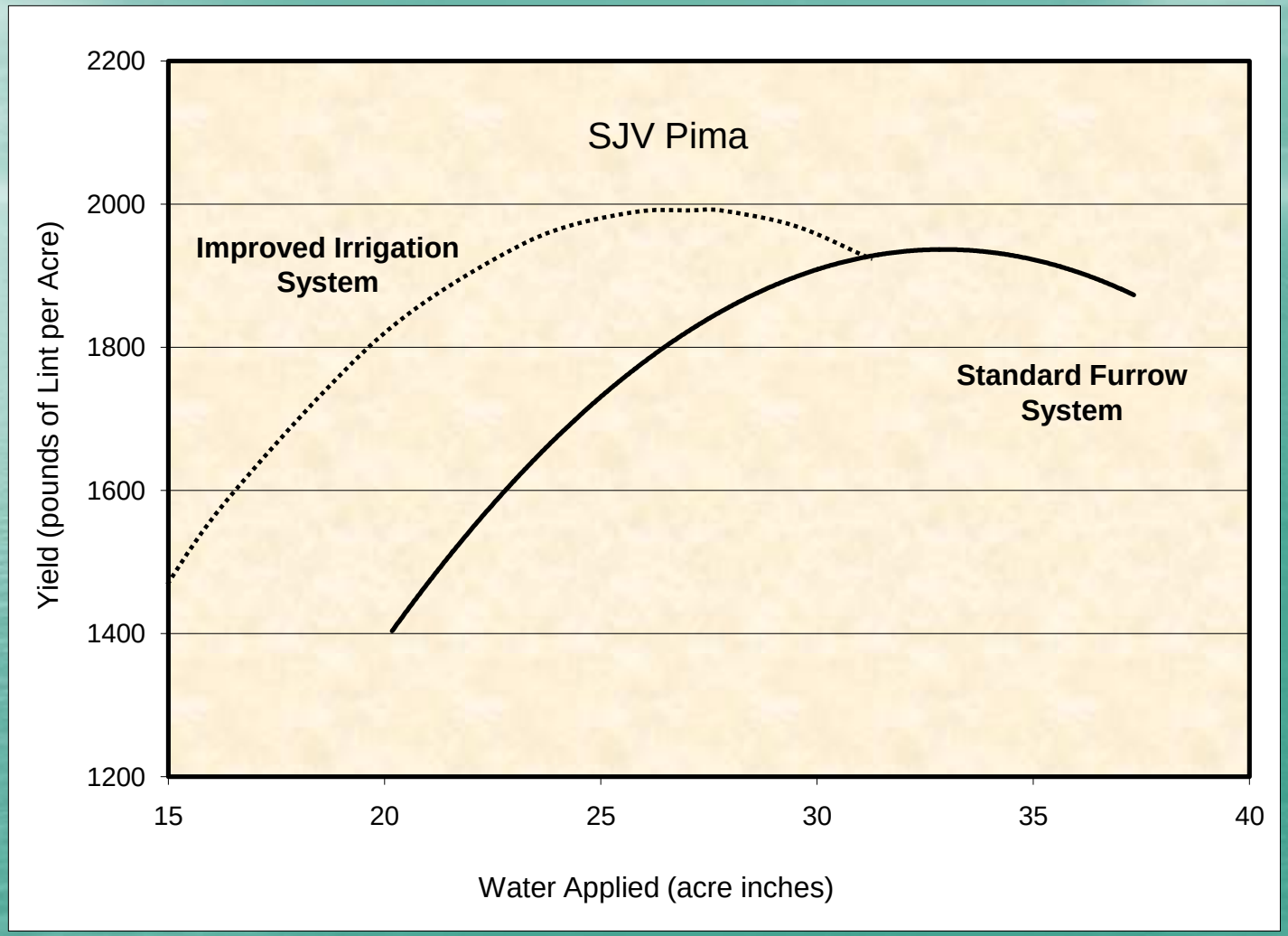
SJV Pima
Improved Irrigation System
Standard Furrow System
Yield (pounds of Lint per Acre)
2200
2000
1800
1600
1400
1200
15
20
25
30
35
40
Water Applied (acre inches)

Water Quality Issues

Reliability of Water Source:

- Contamination
  - Mineral (wells, surface)

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Reliability of Source:

- Contamination
  - Mineral (wells, surface)
  - Biological (algae, weeds)
  - Biological slimes (bacterial)

Contamination can occur:

- From improper or imperfect filtration
- From buildup of mineral or biological over time

2010 SDI Roundtable

- WSREC
- Agronomists
- Experienced growers
- Irrigation industry

Major Obstacles in Tape Management

- Design elements
- Crop characteristics
- Management elements
- Water quality
- Filtration
- Questionnaire

What is the Primary cause of SDI emitter plugging over time?

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1. Biological plugging from growth in tape
2. Mineral plugging from poorly filtered source
3. Biological contaminate plugging primarily caused by contaminated source water
4. Chemical precipitation from nutrients and fertilizers
5. Root intrusion

What do you consider to be the weakest treatment link regarding tape longevity?

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1. Poor tape system flushing
2. Improper pH balance
3. Improper biocide (eg. Chlorine) use
4. Poor filtration or filter maintenance
5. Improper use of fertilizer/chemicals

What are you least knowledgeable about regarding why drip tape plugs and how to manage plugging?

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1. Root intrusion issues (eg. Crop/water management/tape design)
2. Biocide application rates and timing
3. Regulating water pH
4. Filter Maintenance
5. Tape flushing needs

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How do you decide when it is time to abandon tape and re-tape a field?

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1. Meter reading changes
2. Visible stress areas in field
3. Response to treatments
4. Crop yield
5. Calendar year

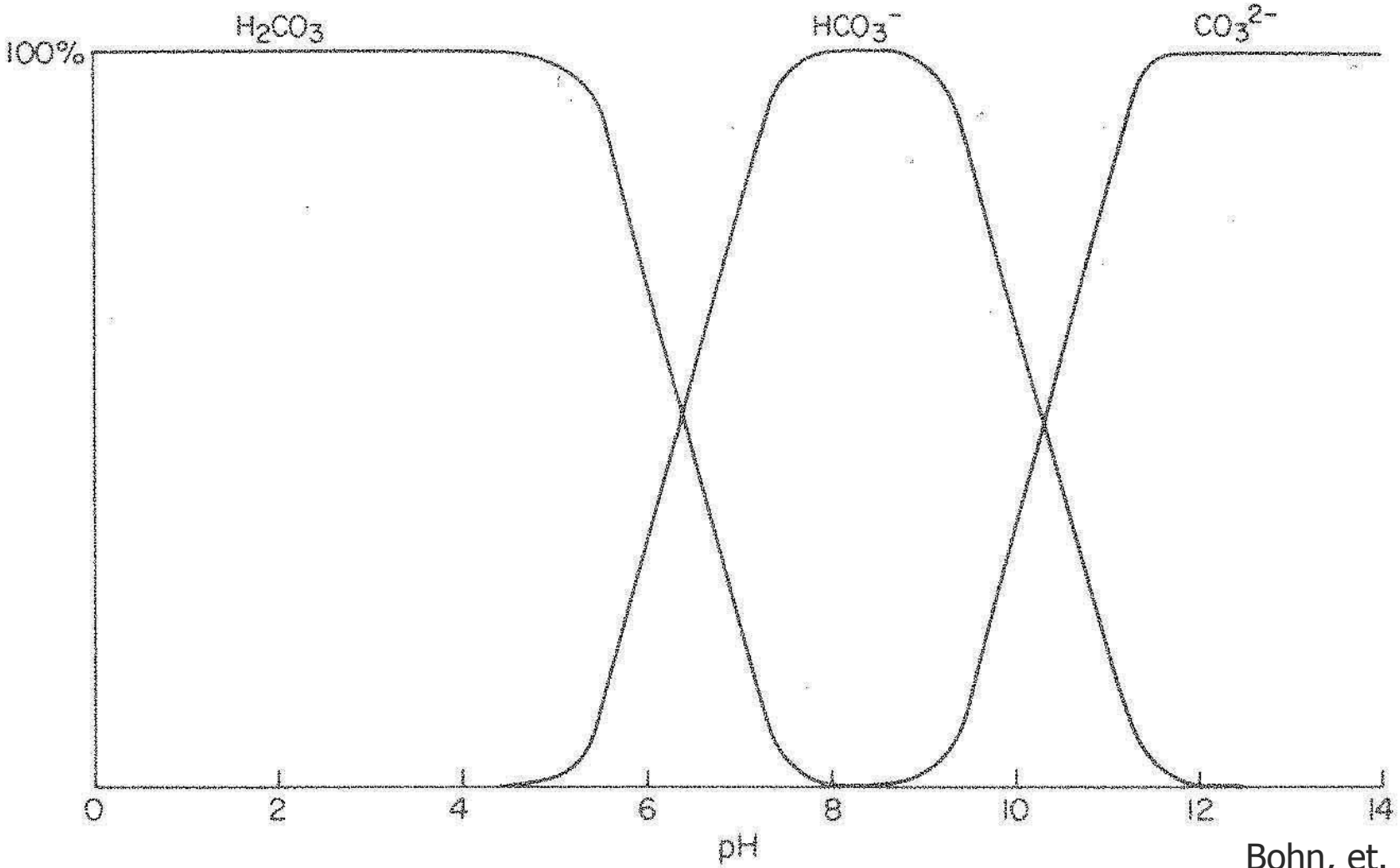
Analytical Groundwater Tests

Location	pH	Ecw	Ca+Mg	Na	SAR	Adj. SAR	CL	CO3+HCO3	B	NO3-N
1	8.1	1.3	1.0	11.8	16.7	17.0	3.5	4.0	1.2	10.0
2	8.6	0.8	0.6	8.3	15.2	13.6	2.0	4.0	1.1	8.0
3	8.7	0.6	0.4	5.6	12.5	10.0	1.5	2.3	0.9	8.0
4	7.3	0.4	0.5	3.1	6.2	4.1	1.0	1.1	0.2	8.0
5	7.9	1.7	4.6	4.1	10.9	-	N/A	1.5	0.98	-
6	7.8	0.54	1.9	0.4	1.8	-	0.4	3.1	0.1	-
7	8.4	1.6	0.6	0.2	16.9	-	2.6	7.2	2.7	-

EC: 1 **dS/m** = 640 ppm 0.4 = 250 ppm 1.7= 1100 ppm

Sodium: SAR 1.8 to 17 Carbonates: 1.1 to 7.2 meq/l

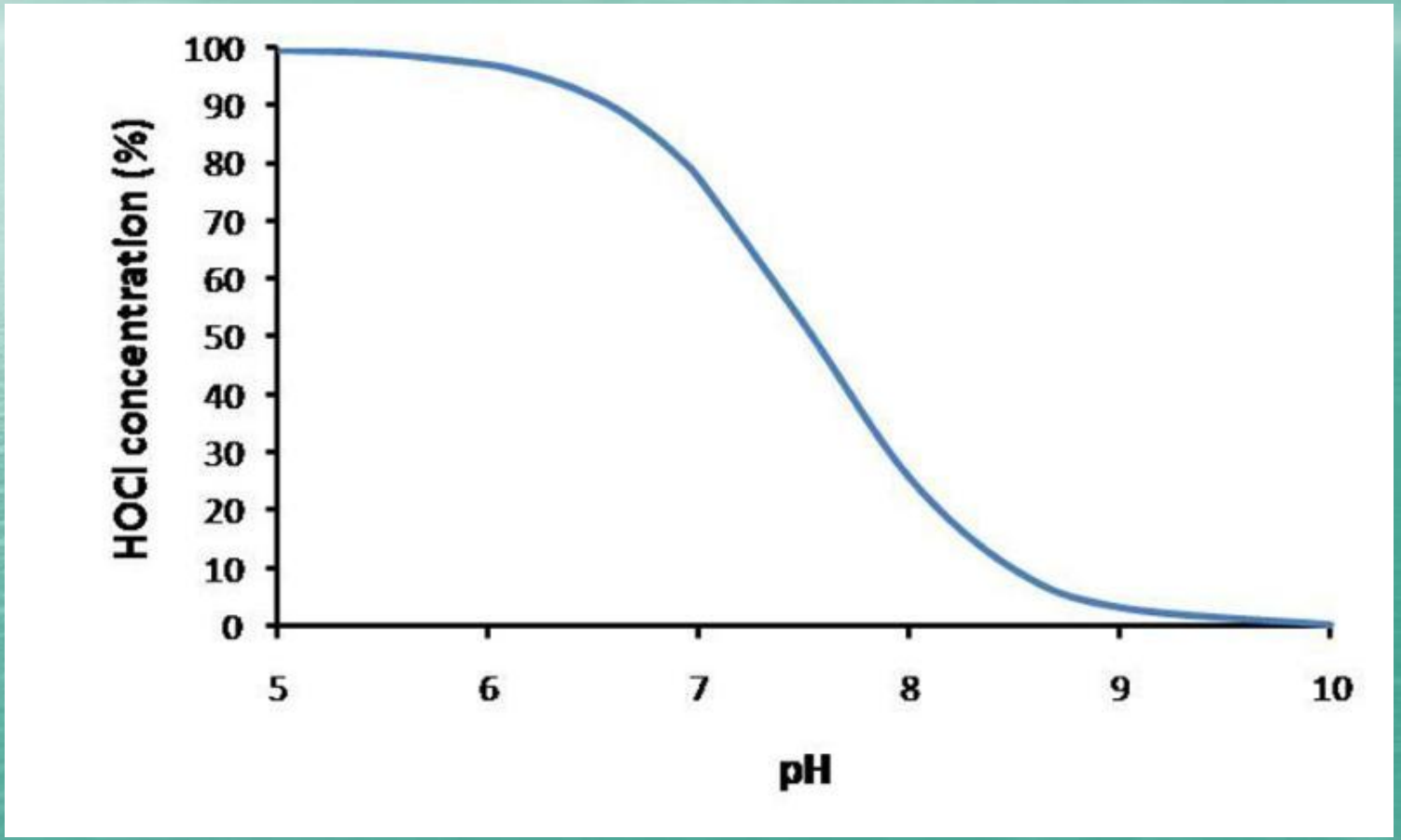
Boron: 0.1 to 2.7 Chloride: 0.4 to 3.5 Nitrate: 2 to 10 ppm



Bohn, et. al.

Distribution of aqueous CO_2 species with pH

Water pH vs HOCl Concentration at 25C



pH Management Issues

- Total Alkalinity
  - Representative sampling
  - Proper storage and Processing (CO_2)
- Corrective amendments to balance pH (Acids)
  - Material selection
  - Proper amount to apply

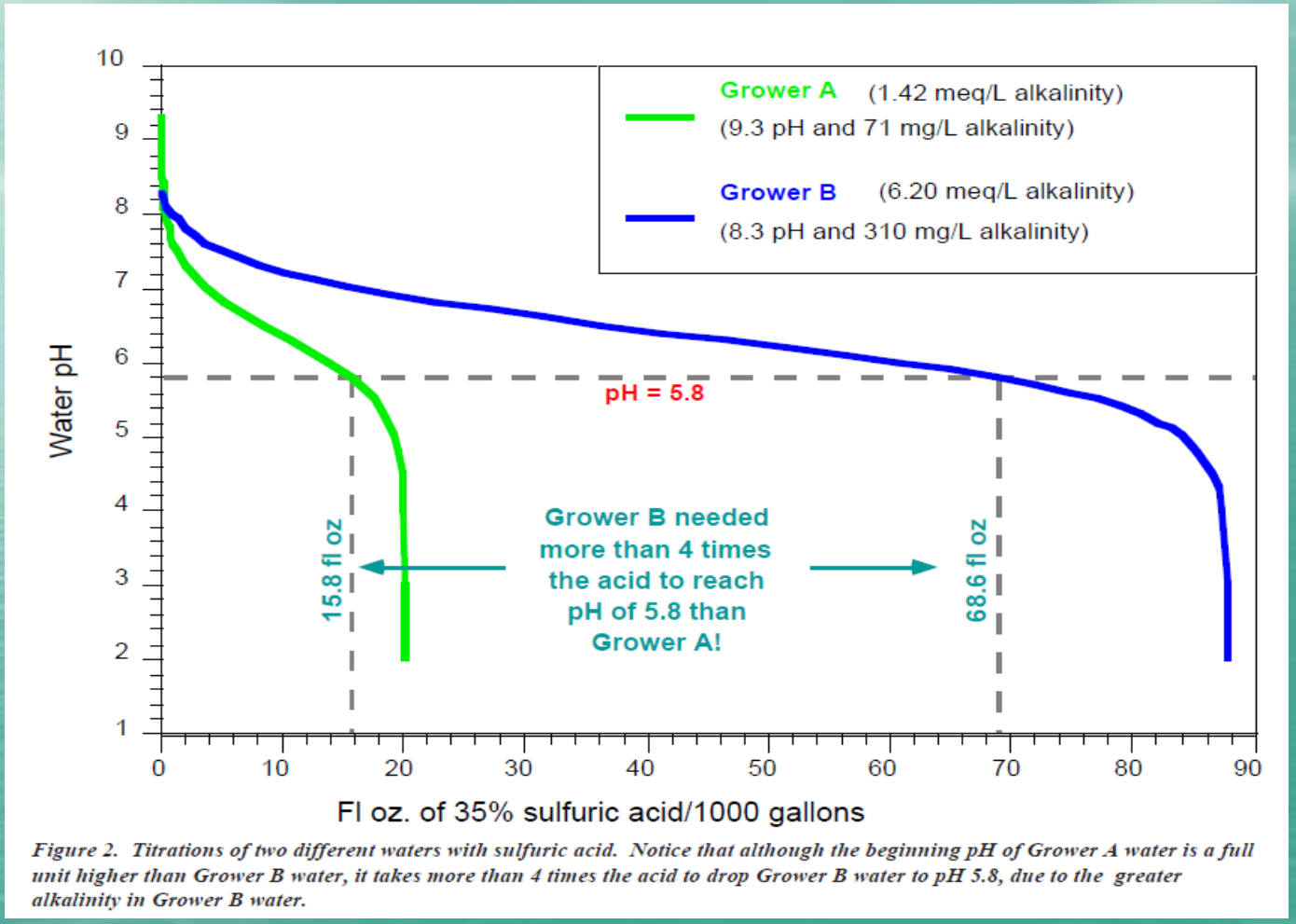


Figure 2. Titrations of two different waters with sulfuric acid. Notice that although the beginning pH of Grower A water is a full unit higher than Grower B water, it takes more than 4 times the acid to drop Grower B water to pH 5.8, due to the greater alkalinity in Grower B water.

Routine Evaluations

- Consult a quality lab
- Sample key constituents
- Frequently monitor changing system
- Periodically re-evaluate long term trends

Monday Apr. 26, 2010

Departments

Larger/Zoom

Total Alkalinity Test Strip Kit

Item No: RETS30

Qty	Price
1 - 3	$12.50
4 +	$11.25

Qty 1 Stock

Add To Cart | Add To Wish List

Product Information | **Product Support**

Get reliable results in 60 seconds for a wide variety of water quality measures. Simply dip the test strip in your water sample, and compare the color reaction to the chart provided. Instructions included. USA made. Total alkalinity (0-240 ppm) indicates potential for pipe scaling or corrosion. High alkalinity levels in irrigation water can affect the availability of micronutrients to your turf or plants. 50 tests.

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Total/Free Chlorine Test Strip Kit

Table 1. Acids commonly used to acidify irrigation water and their properties.

Acid	Formulation and density (d) or formula weight (FW)	Amount of acid to add for each meq/L of alkalinity to result in a water pH of approximately 5.8*	Concentration of nutrient provided by one fl oz. of acid per 1000 gallons water**	Cost per meq/L per 1000 gal***	Relative safety****
Citric acid (2-Hydroxy-1,2,3-propanetricarboxylic acid) $H_3C_6H_5O_7$	99.5% (w:w) granular FW = 192.1	9.1 oz/1000 gals	none	$0.59	can cause minor skin and eye irritation
	50% (w:w) liquid d = 1.21	14.5 fl. oz/1000 gals	none	$0.96	can cause minor skin and eye irritation
Nitric acid H_2NO_3	67% (w:w) liquid d = 1.42	6.6 fl oz/1000 gals	1.64 ppm N	$0.26	use extreme caution; very caustic and dangerous; avoid contact with fumes as well as acid
Phosphoric acid H_3PO_4	75% (w:w) liquid d = 1.58	8.1 fl oz/1000 gals	2.88 ppm P	$0.44	slightly caustic; can cause skin and eye irritation as well as damage clothing
Sulfuric acid H_2SO_4	35% (w:w) liquid d = 1.26	11.0 fl oz/1000 gals	1.14 ppm S	$0.16	slightly caustic; can cause skin and eye irritation as well as damage clothing

*Add this amount for each meq/L of alkalinity present. For example, if your water report indicates an alkanity of 3 meq/L and you choose to use sulfuric acid, you would add 33 fl oz. of 35% sulfuric acid per 1000 gallons of water (11 fl oz/meq/L × 3 meq/L = 33 fl oz). Calculations based on the following dissociation values: 2.07 meq H^+ per 3 meq $H_3C_6H_5O_7$, 1 meq H^+ per 1 meq H_2NO_3, 1.02 meq H^+ per 3 meq H_3PO_4, and 1 meq H^+ per 1 meq H_2SO_4.

**In the above example, the acid would supply 38 ppm S at each irrigation (33 fl oz × 1.14 ppm S/fl oz. = 33 ppm S).

***Acid cost to neutralize 1 meq/L alkalinity per 1000 gallons of water. Based on the following costs: $1.04/lb of 99.5% citric acid; $8.45/gal of 50% citric acid; $5.00/gal of 67% nitric acid; $7.00/gal of 75% phosphoric acid; $1.90/gal of 35% sulfuric acid.

****Use caution with ALL acids. Wear eye protection, acid-resistant gloves, and an acid-resistant apron when handling any acid.

Key Elements

- #1 issue- Bio plugging from growth in tape and mineral plugging (filtration). *PREVENTABLE*
- 2nd- Bio contamination from poor quality water and ppt of nutrients. *PREVENTABLE*
- Weakest link- Poor flushing, pH balance, improper biocide use. *PREVENTABLE*
- Need to better understand causes for root intrusion and biocide application rates/timing

Comments/ Questions?

Thank you Meeting Sponsors

- AquaSpy
- Agri-Valley Irrigation
- Eurodrip USA
- Netafim USA

Primary Constituents of Well Water

Cations

- Calcium (Ca^{2+})
- Magnesium (Mg^{2+})
- Sodium (Na^{+})

Anions

- Chloride (Cl)
- Carbonates (HCO_3^-, CO_3^{2-})
- Sulfate (SO_4^{2-})

Minor Constituents of Concern

- Iron (Fe)
- Manganese (Mn)
- Potassium (K+)
- Boron
- Nitrate
- Selenium