Standards and Codes Update

Brent Mecham—Irrigation Association
Brian Vinchesi—Irrigation Consulting, Inc.
Chairman, IA Standards and Codes Committee
Chair, IA SWAT Imitative

Irrigation BMPs

- Just finalized and released.
- Collaborative effort between ASIC and IA.
- ***Special thanks*** from Brent Mecham to those who contributed in the development and review.
- Very timely, being promoted widely and is already influencing codes and other initiatives.
  - Design
  - Installation
  - Management

ASABE/ICC

- Landscape Irrigation Sprinkler and Emitter Standard (3rd draft being released soon for 30 day review.)
  - Dual designated between ASABE and ICC.
  - Voluntary standard.
  - Spray sprinklers shall have integral pressure regulation.
    - Optional: missing nozzle flow reduction
    - Optional: integral check valves (7 feet of head or more)
  - Breaking News: EPA trying to add flush stops

ASABE/ICC

- Landscape Irrigation Sprinkler and Emitter Standard Definitions:
  - Drip emitters
    - Maximum flow: 6.2 gph at 30 psi after flushing
  - Bubbler (fills the gap)
    - Flow greater than 6.3 gph at 30 psi
  - Micro-sprays
    - Maximum flow: 30 gph at 30 psi after flushing
  - EPA is considering this standard for WaterSense labeling of sprinklers (NOI).

ASABE/ICC

- Labeling/marking
  - Sprinklers:
    - Flow rate (publically available)
    - Coverage (performance)
    - DU_{LQ} (based on modeling)
  - Emitters:
    - Flow rate (Deviation +/- 7%)
    - Coefficient of variation (7% maximum)
    - Emitter exponent (0.2 maximum)

ASABE

- X623 Determining Landscape Plant Water Requirements
  - Second draft coming for public comment
- Plant Factors for minimum acceptable appearance of established landscape plants.
- Recently presented at ASABE ET Symposium
- To be presented at American Society of Horticultural Science

Plant Factors

Plant Type	Recommended plant factor
Cool-season turfgrass	0.8
Warm-season turfgrass	0.6
Annual flowers	0.8
Woody plants & herbaceous perennials (wet climate or riparian)	0.7
Woody plants & herbaceous perennials (dry climate)	0.5
Desert plants	0.3

Wet environment is annual precipitation greater than 25 inches.
Dry environment is non-desert, non-riparian climate
Tropical plants: for tropical plants with precipitation every month, a plant factor of 0.7 applies. Where monsoonal climates are present, 0.7 applies for the wet season, and 0.5 during the dry season.

ASABE

- X626 Uniformity Test for Landscape Irrigation Systems
  - Second draft being prepared
    - Catch can tests
      - Requirements for catch can spacing and test times
    - Using portable soil moisture sensor
      - Requirements for collection spacing and set time
    - Auditing landscape drip irrigation systems

ASABE

- **X627 Environmentally Responsive Landscape Irrigation Control Systems**
- Follows SWAT testing procedure with modifications:
  - Hourly soil moisture balance calculation instead of daily.
  - 6 zones, root zone depths changed (shallower
  - 30 day test, but three zones must irrigate at least once.

ASABE

- **X627 Environmentally Responsive Landscape Irrigation Control Systems**
  - Frequency and length of run time reported compared to minimum number of watering days as dictated by soil moisture balance.
    - No more gaming
    - Looks at least frequent correct watering
    - Requires drawdown to close to filed capacity
    - What trying to do in the first place by leaving room for storage

ASABE

- **X633 Testing Soil Moisture Sensors for Landscape Irrigation**
- Will most likely replace SWAT testing procedure:
  - 1st draft
  - Beta testing of draft with 3 labs.
  - Once beta testing is done and draft modified will go out for public comment.
  - Testing for water content and water tension sensors.
  - Ability to enable/disable irrigation based on threshold setting.
- EPA considering for WaterSense labeling purposes with proposed Notice of Intent for early next month (May).

ASPE/ARCSA

- American Society of Plumbing Engineers and American Rainwater Catchment Systems Association
  - ASPE/ARCSA 63 Rainwater Catchment Systems (ANSI Standard)
  - ASPE/ARCSA 78 Storm water Harvesting System, Design for Direct and Indirect End-Use Applications
    - 2nd draft coming soon for public comment
    - Both of these are scary….

New Standards

- ICC Rain Sensors – to ASABE
- ICC/UL Controllers – dead in the water
- ICC/CSA Rainwater Collection System Standard.
  - Just getting started
  - Competing with existing IAPMP/ARCSA Standard

New Standards

- IAPMO creating a standard about containers/tanks for rain water harvesting
- ASABE also involved
- IAPMO creating a standard about gray water systems (under 400 gallons per day)

Green Codes

- What they have in common:
  - Reduce turfgrass areas.
  - More use of native plants.
  - Irrigation using non-potable water sources.
  - Reduce the number of inputs required for managing landscapes.
    - Water
    - Fertilizers/pesticides
    - Mowing

Green Codes

- Overlay existing codes, provide additional requirements for greener building and includes site development.
- Primary codes:
  - ASHRAE 189.1 (American Society of Heating, Refrigeration and Air-conditioning Engineers)
  - IgCC (International Code Council)
  - IAPMO Green Supplement

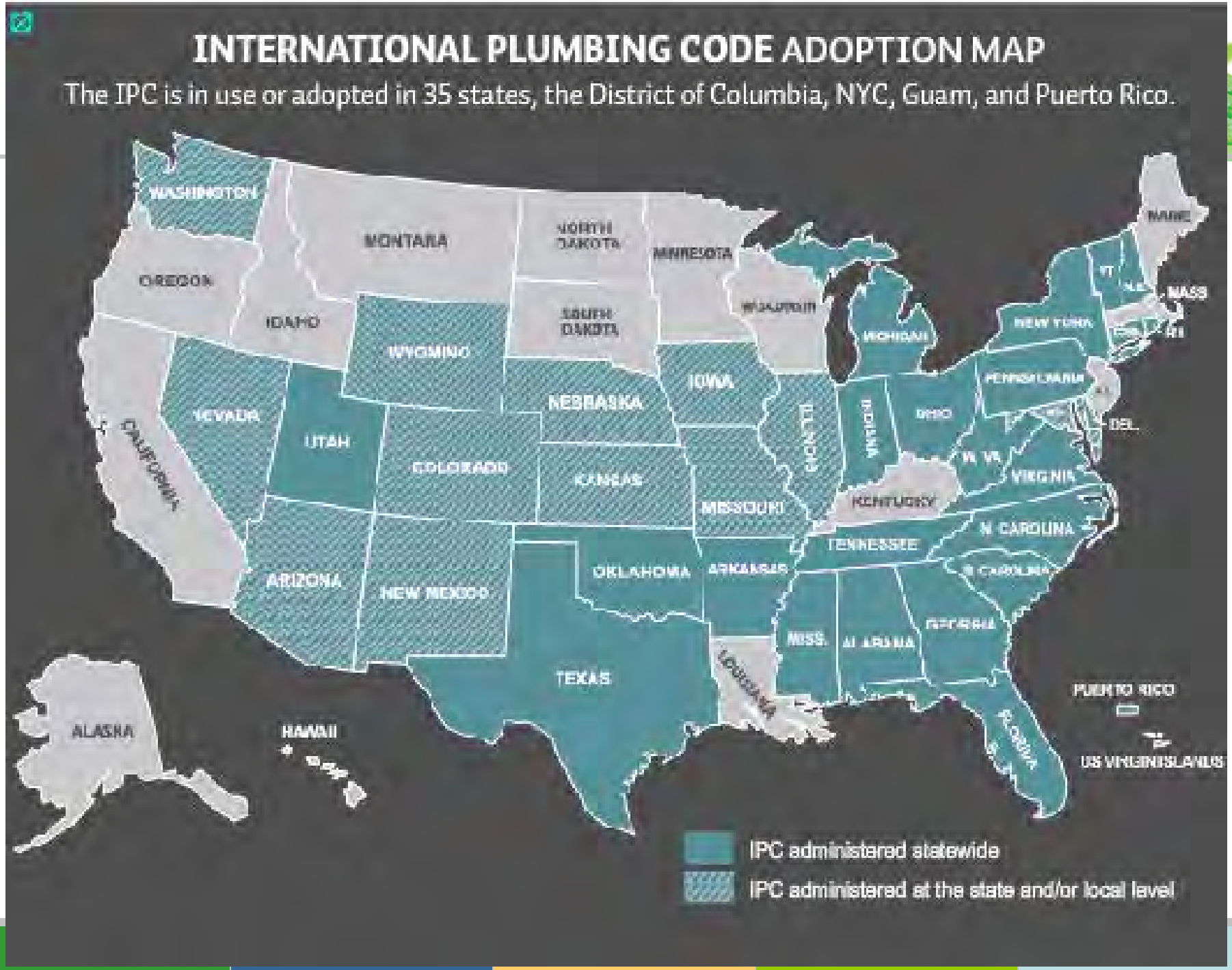
ASHRAE

- Voluntary standard that is written in code.
- Current version is 2011 working on 2014.
- Alternate compliance path for IgCC.
- Anticipate:
  - Heated battle about turf limitations.
    - it still has a 40% turf restriction
    - it is about more than just water
  - More irrigation requirements.
    - Similar to IgCC
    - BMPs will be useful as a reference

IgCC

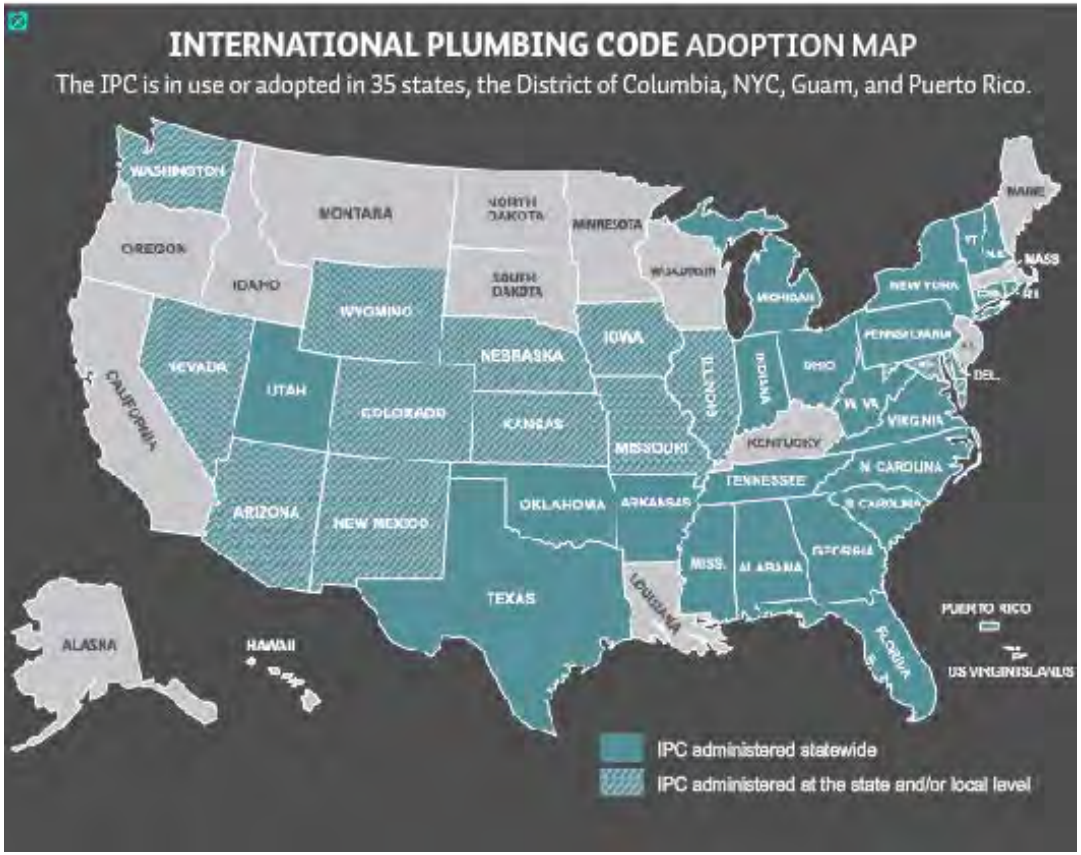
- IgCC committee meeting in Memphis (4/27-5/1)
  - Modify 2012 version for 2015 version
  - Proposal to include sprinkler (likely) and plant standards into code.
- Overlay code
  - Currently 10 states
  - International Plumbing Code is used in 35 states
- Gaining momentum and will end up in more states

ed: March 2014


INTERNATIONAL PLUMBING CODE ADOPTION MAP
The IPC is in use or adopted in 35 states, the District of Columbia, NYC, Guam, and Puerto Rico.
WASHINGTON
OREGON
CALIFORNIA
IDAHO
NEVADA
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISS.
ALABAMA
GEORGIA
FLORIDA
S CAROLINA
N CAROLINA
VIRGINIA
W VA
PENNSYLVANIA
NEW YORK
VT
NH
MAINE
MASS
RI
CT
DEL
ALASKA
HAWAII
PUERTO RICO
US VIRGIN ISLANDS
IPC administered statewide
IPC administered at the state and/or local level

Confusion

- Its not always straight forward, for example as you cane see by the map Oregon is an IAPMO State (Universal Plumbing Code) , but has adopted the IgCC for electrical and building but IAPMO for Green.
- Can pick and chose, so local input is good.



IAPMO

- **Green Supplement** to plumbing and mechanical codes.
- CalGreen plumbing code is based on Universal Plumbing Code.
  - Graywater provisions
  - Rainwater provisions
- Using BMPs to give guidance to changes
  - Maximum velocity for irrigation piping (per ASABE 376.2)
  - Minimum depth of pipe bury for irrigation
- Big discussion about marking of pipes including irrigation piping with type of water in the pipes.
- Good news slowly distinguishing irrigation as not plumbing in this code but not in rain/storm water.

Green Initiatives

- LEED
  - 2009 expires in 2015
  - LEED v4 in place
  - Projects choose which program to follow
  - LEED v4 uses WaterSense water budget tool
  - LEED varies whether new construction, core and shell, schools, homes, etc.
- GBI
  - Call for committee members to revise standard
  - Most points for non-irrigated landscapes

Green Globes 2010/2013	Prerequisites/Points	LEED 2013 v4	Prerequisites/Points
Prerequisites	None	Prerequisites	No Irrigation Required or Landscape Water Use Reduced by 30% or More • Construction Activity Pollution Prevention
Potential Points	1,000	Potential Points	110
Levels of Certification • 4 Green Globes • 3 Green Globes • 2 Green Globes • 1 Green Globe	 ≥850 700 – 849 550 – 699 350 – 549	Levels of Certification • Platinum • Gold • Silver • Certified	 ≥80 60 – 79 50 – 59 40 – 49
Irrigation Related Points	12	Irrigation Related Points (Water Efficiency)	3
Landscape Related Points	42	Landscape Related Points (Sustainable Sites)	8
TOTAL RELATED TO LANDSCAPE & IRRIGATION	54 (5% of total)	**TOTAL RELATED TO LANDSCAPE & IRRIGATION**	11 (10% of total)
Irrigation Related Points	**Potential Points**	**Irrigation Related Points**	**Potential Points**
Alternate Sources of Water	0 – 5	Outdoor Water Use • ≥50% Reduction • 100% Reduction (No Irrigation)	 1 2
Irrigation Meter on Potable Water	0 – 3	Water Meter for Irrigation & One Other Use	1
Directed Downspouts, Cisterns or Water Harvesting	1		
Drip Irrigation	1		
Smart Controller	1		
Pressure Regulation	0.5		
Swing Joints	0.5		
POTENTIAL TOTAL	12	**POTENTIAL TOTAL**	3

Landscape Related Points	Potential Points	Landscape Related Points	Potential Points
Landscape & Irrigation Plan	6	Site Assessment	1
Soil Type Identified	2	Protect/Restore Habitat	2
Structural Limitations	1	Rainwater Management	3
Drought Tolerant Plants	0 – 3	Heat Island Reduction	2
Native Plants	0 – 4		
% of Vegetation Not Requiring Irrigation • ≥75% • 50 – 74% • 25 – 49% • <25%	 14 11 8 0		
Minimal Turfgrass	3		
Soil Prep	1		
Organic Mulch	1		
Hydrozone Grouping	2		
Plants Spaced for Maturation at Five Years	1		
15% Pervious Materials	4		
POTENTIAL TOTAL	42	**POTENTIAL TOTAL**	8

Points awarded if turfgrass is minimal, meaning that it is limited to within 20 feet of buildings and does not extend beyond 5 feet from parking lots, driveways, walkways, rain gardens, swales and retention ponds.

Sites

- Sustainable Sites 2009
- Newest version (v2.0) was supposed to be released but there seems to be internal problems and currently there is litigation going on.
- Combines water use credits from 2009 in v2.0 so less points available.

New Normal

- Landscapes are evolving
  - More “sustainable”
  - Less turfgrass areas
  - Potable water is limited for irrigation.
  - Landscapes that minimize inputs.
    - Irrigation
    - Mowing
    - Fertilizers/pesticides

Get Involved!

- The codes are model codes, can be modified locally.
- Standards show signs of a maturing industry.
- Be pro-active or be acted upon.

American Society of
Irrigation Consultants

TAKING CHARGE OF CHANGE

EXPLORE | ENGAGE | EXECUTE

Portland, Oregon

2·0·1·4

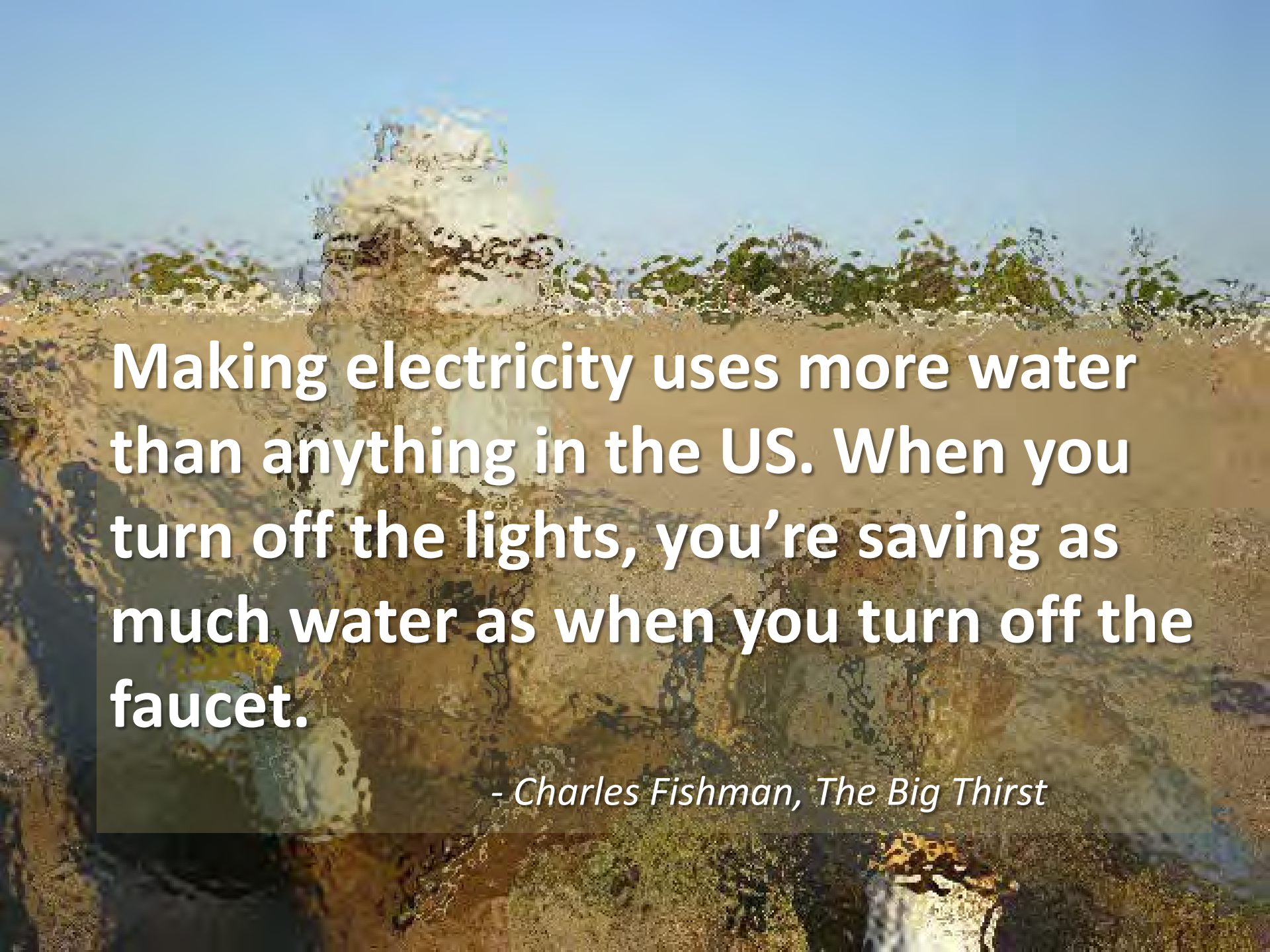
ASIC

20% of the World's Energy Demands Come From Pumping Water…

Are you paying attention?

ASIC


Folsom Lake - July 20, 2011



Making electricity uses more water than anything in the US. When you turn off the lights, you're saving as much water as when you turn off the faucet.

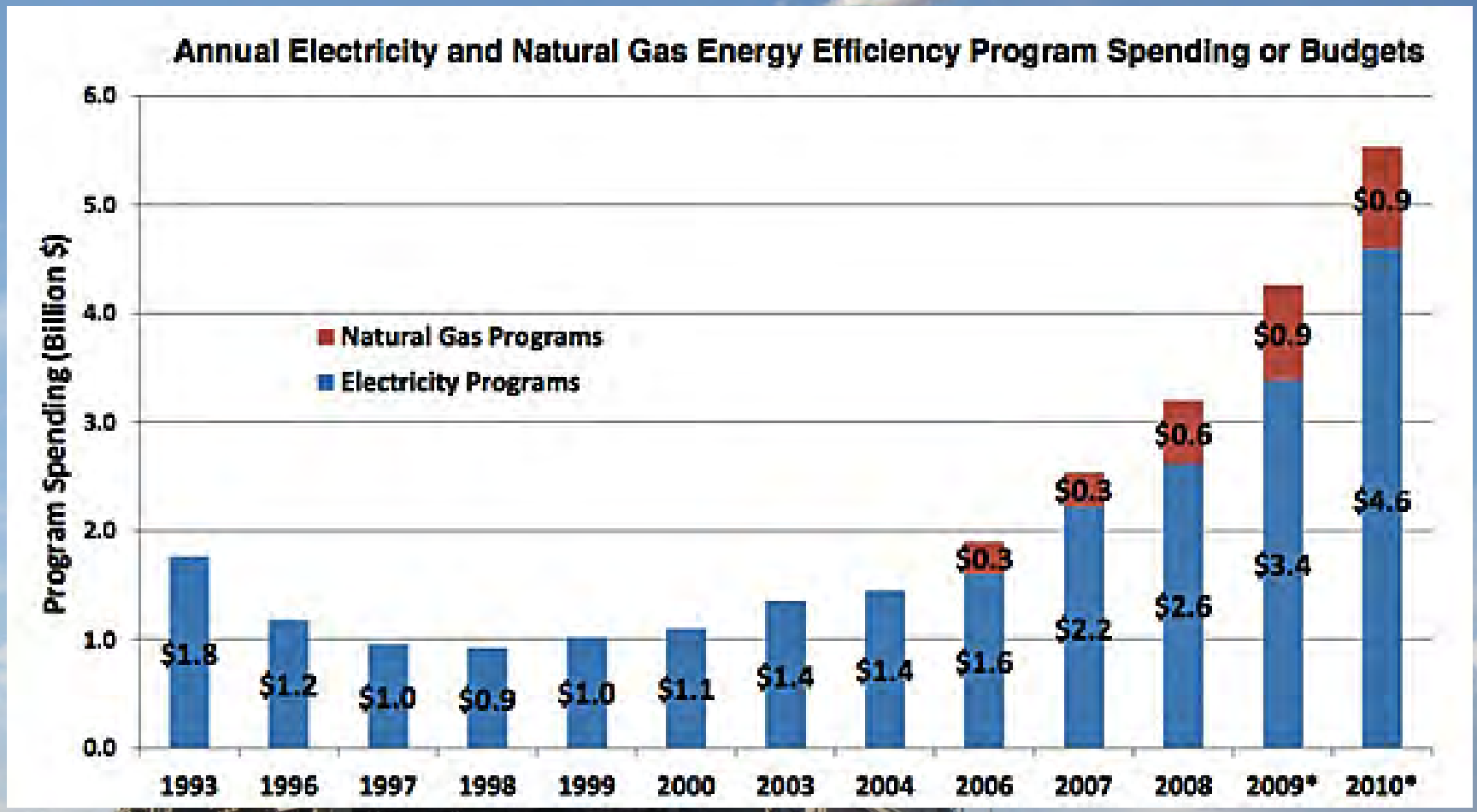
- Charles Fishman, The Big Thirst

What's the point?

- Water = Energy
- A delivery shift is occurring…
- It's a reality… and an opportunity!

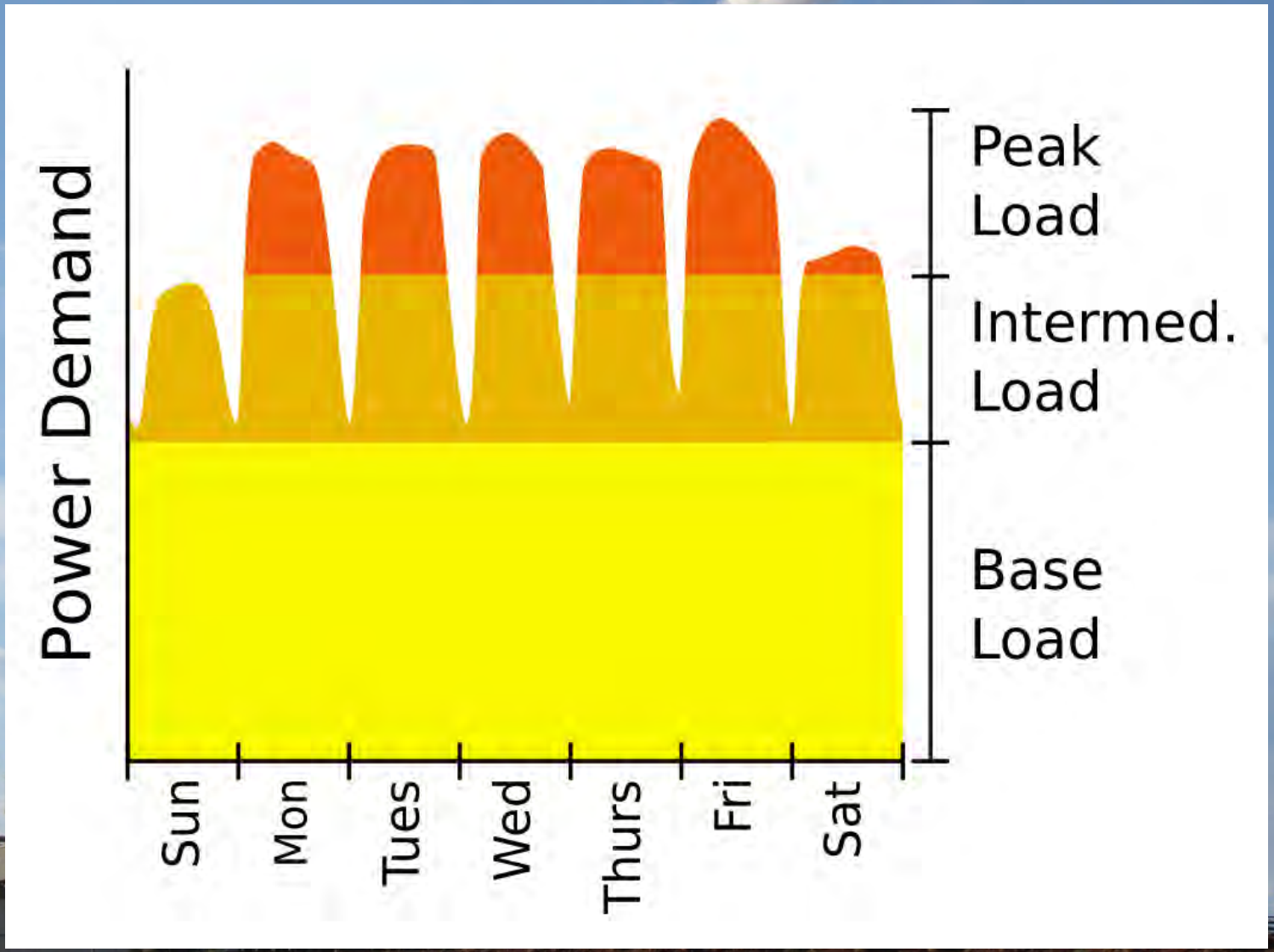
Per Capita Electricity Consumption: California vs. Rest of Nation

Source: U.S. Energy Information Administration

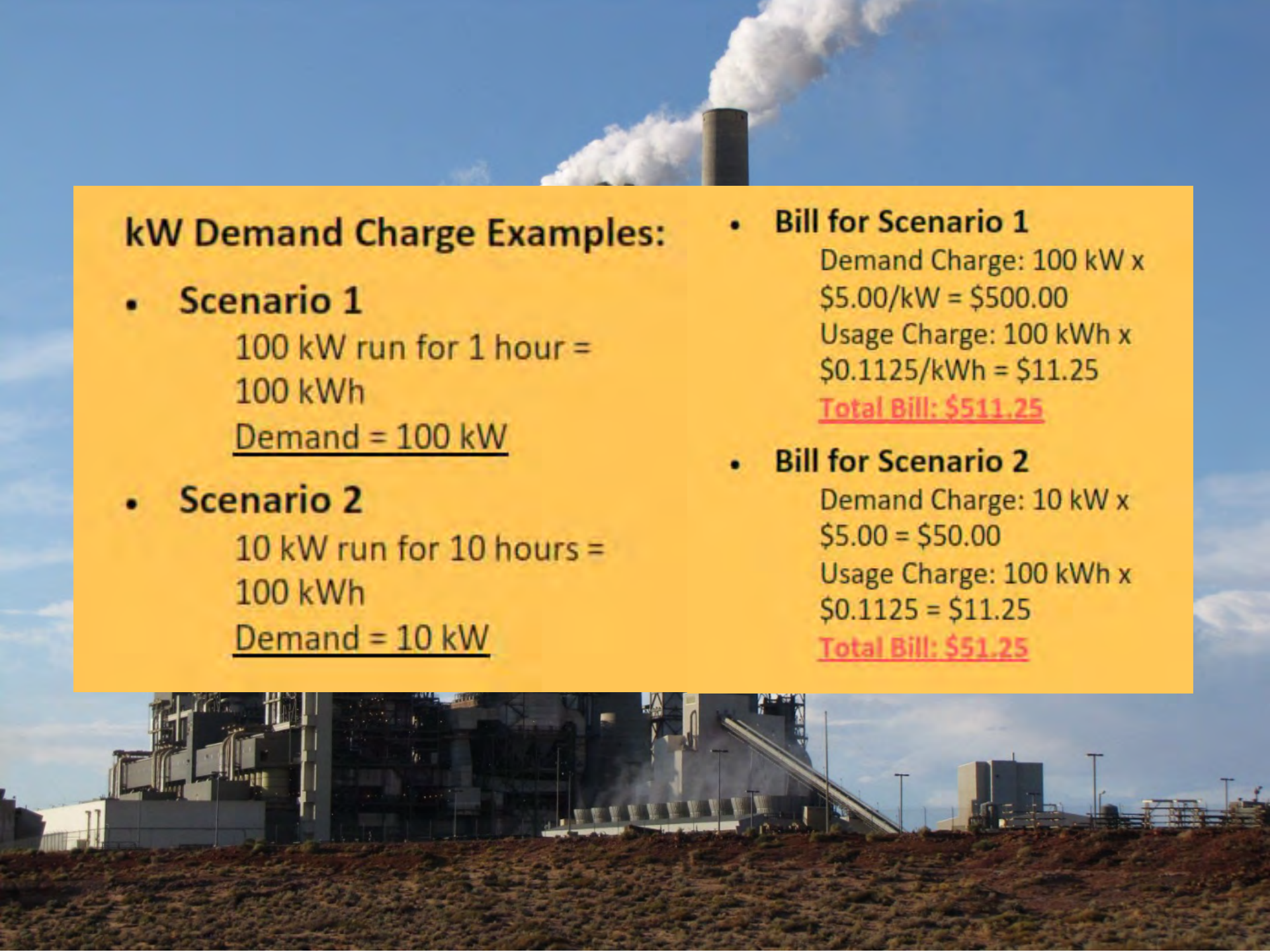


U.S. Energy Efficiency Spending

(in billions)


Power Demand
Peak Load
Intermed. Load
Base Load
Sun
Mon
Tues
Wed
Thurs
Fri
Sat


Silver Spring Networks
001350010OC1F390
FCC ID: OWS-NIC514, IC: 5975A-NIC514
I-210+
42 606 367
FM2S
CL 200
240V
3W
USA
0310
727X281089
60HZ TA30 Kh 10.0 Kt 1.0
1007150673
AR 60 MIN
DS
PG&E SmartMeter
1NG10071506730310
SUB PANEL



kW Demand Charge Examples:

- **Scenario 1**
  100 kW run for 1 hour = 100 kWh
  Demand = 100 kW
- **Scenario 2**
  10 kW run for 10 hours = 100 kWh
  Demand = 10 kW

- **Bill for Scenario 1**
  Demand Charge: 100 kW x $5.00/kW = $500.00
  Usage Charge: 100 kWh x $0.1125/kWh = $11.25
  Total Bill: $511.25
- **Bill for Scenario 2**
  Demand Charge: 10 kW x $5.00 = $50.00
  Usage Charge: 100 kWh x $0.1125 = $11.25
  Total Bill: $51.25

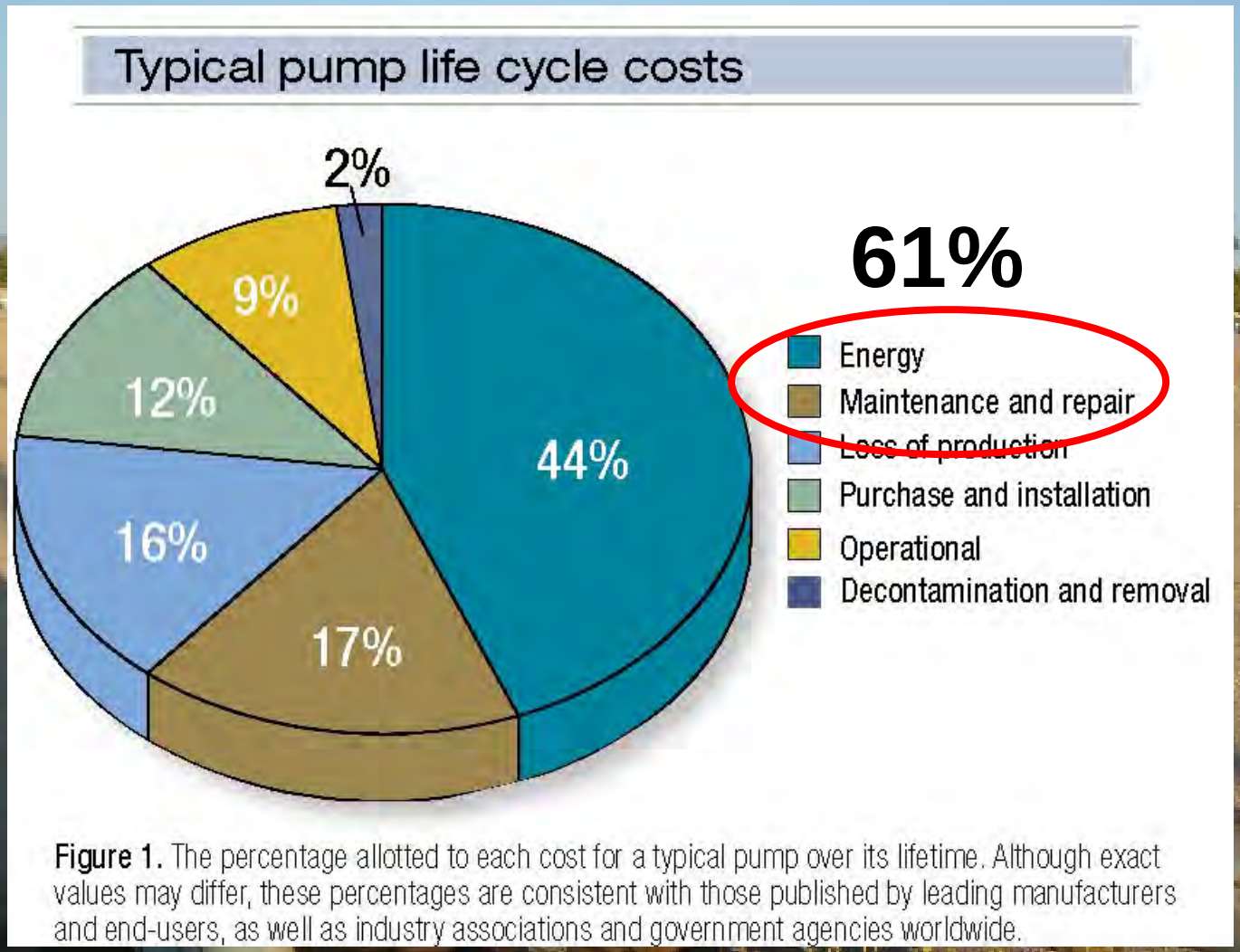
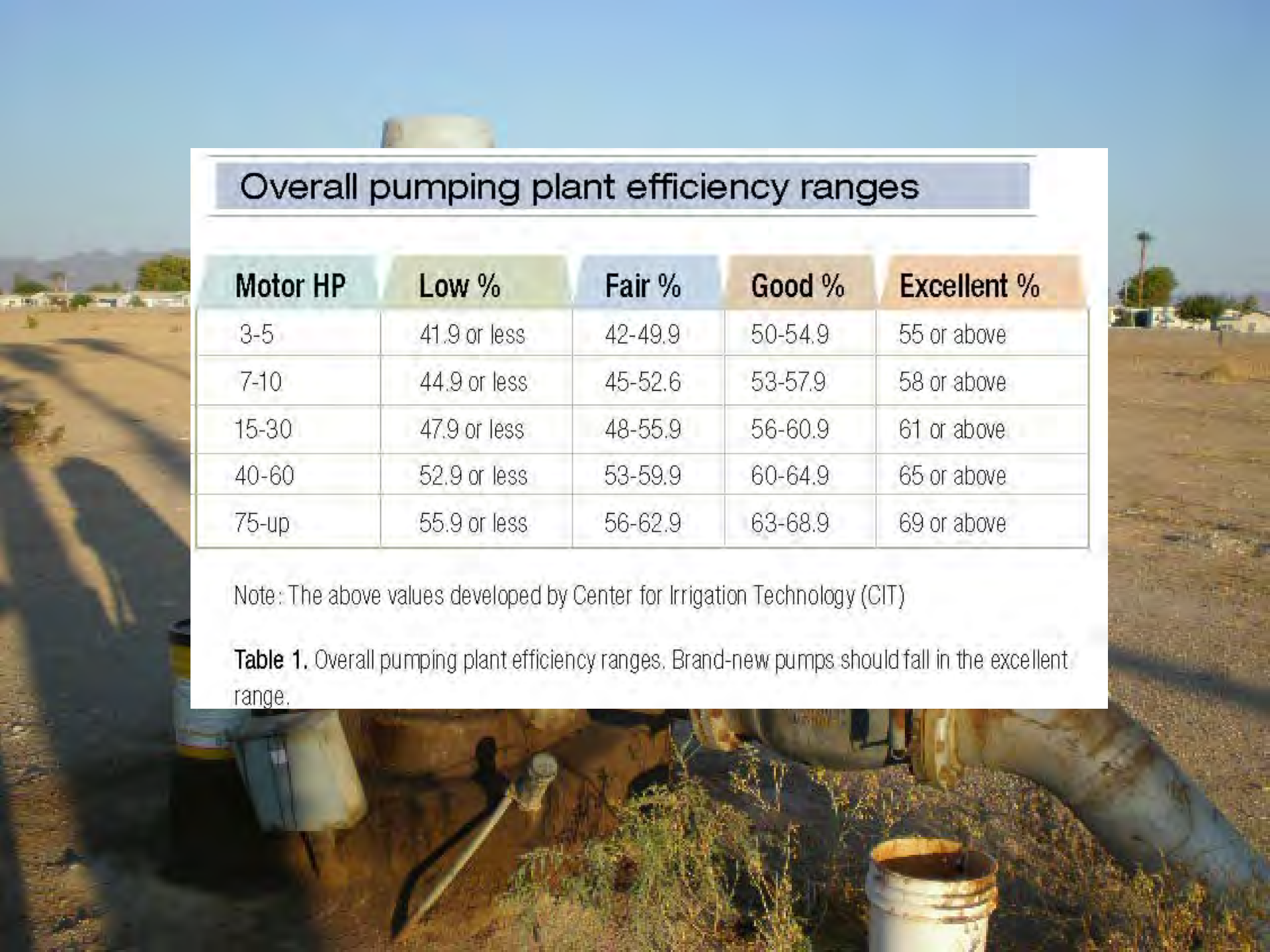


Figure 1. The percentage allotted to each cost for a typical pump over its lifetime. Although exact values may differ, these percentages are consistent with those published by leading manufacturers and end-users, as well as industry associations and government agencies worldwide.



Overall pumping plant efficiency ranges

Motor HP	Low %	Fair %	Good %	Excellent %
3-5	41.9 or less	42-49.9	50-54.9	55 or above
7-10	44.9 or less	45-52.6	53-57.9	58 or above
15-30	47.9 or less	48-55.9	56-60.9	61 or above
40-60	52.9 or less	53-59.9	60-64.9	65 or above
75-up	55.9 or less	56-62.9	63-68.9	69 or above

Note: The above values developed by Center for Irrigation Technology (CIT)

Table 1. Overall pumping plant efficiency ranges. Brand-new pumps should fall in the excellent range.


Lone Tree
Golf Club & Hotel
GRG
GOLF RESOURCE GROUP INC
6036 East Hollyhock Street
Phoenix Arizona 85018 USA
Tele. 480.206.1134 | eFax 240.597.5814
www.thegolfresourcegroup.com

Table 4.1.1c. Results of Pump Station Hydraulic Tests

Pumping System	Motor Efficiency	Pump Efficiency	System Efficiency
Hole 6 PS #1 (75 HP)	90.2%	67.7%	61.1%
Hole 6 PS #2 (75 HP)	90.2%	67.6%	61.0%
Hole 12 PS #1 (75 HP)	90.2%	69.1%	62.3%
Hole 12 PS #2 (75 HP)	90.2%	65.3%	58.9%

Table 4.1.3b. Results of Well Pumps Hydraulic Tests

Pumping System	Motor Efficiency	Pump Efficiency	System Efficiency	kWh/AcFt*
Arapahoe 5	N/A	49.7%	N/A	2,443.9
Denver 5	N/A	50.0%	N/A	667.2
Denver 12	N/A	55.0%	N/A	1,227.7

* kWh/AcFt numbers as identified in the pump efficiency tests.

Table 1.1: Potential Xcel Measure Savings, Incentive and Costs

ID	Electrical Savings (kWh/yr)	Peak Demand Savings (kW_{peak})	Natural Gas Savings (Therms/yr)	Cost Savings ($/yr)	Gross Measure Cost ($)	Xcel Incentive ($)	Net Measure Cost ($)	Simple Payback Period (years)
ECO-1	44,019	130.7	0	$20,637	$50,650	$26,990	$23,660	1.1
ECO-2	13,738	49.2	0	$6,409	$19,200	$6,000	$13,200	2.1
Total	57,757	180.0	0	27,045	69,850	32,990	36,860	1.4

* Please Note: The values noted above are estimates based on the information provided at the time this report was written. Exact Project Costs should be verified for their accuracy.

DESERT MOUNTAIN

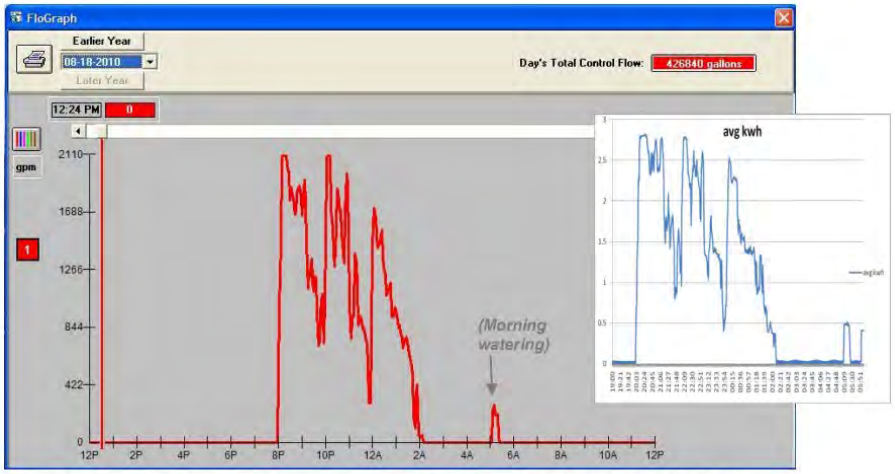
RENEGADE

Hole 12 Well Panel Interior

GRG
GOLF RESOURCE GROUP INC
6036 East Hollyhock Street
Phoenix Arizona 85018 USA
Tele 480.206.1134 | eFax 240.597.5814
www.thegolfresourcegroup.com

August 23, 2010

Desert Mountain Golf Club – Renegade Course
Scottsdale, AZ

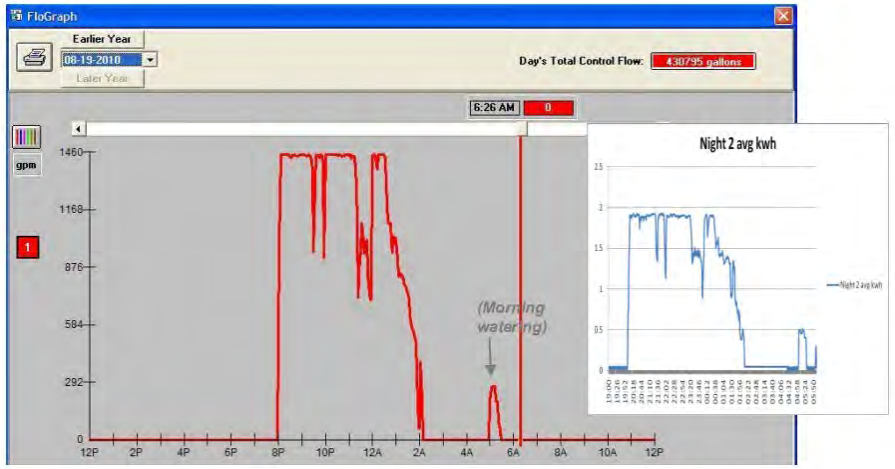


Flow Graph #1 (in red). Inset is the corresponding kWh use during the irrigation cycle of night #1.

Night #1 – No adjustment

(2,100 gpm)

- *426,840 gallons pumped*
- *634.53 kWh*
- *484.4 kWh/AcFt*



Flow Graph #2 (in red). Inset is the corresponding kWh use during the irrigation cycle of night #2.

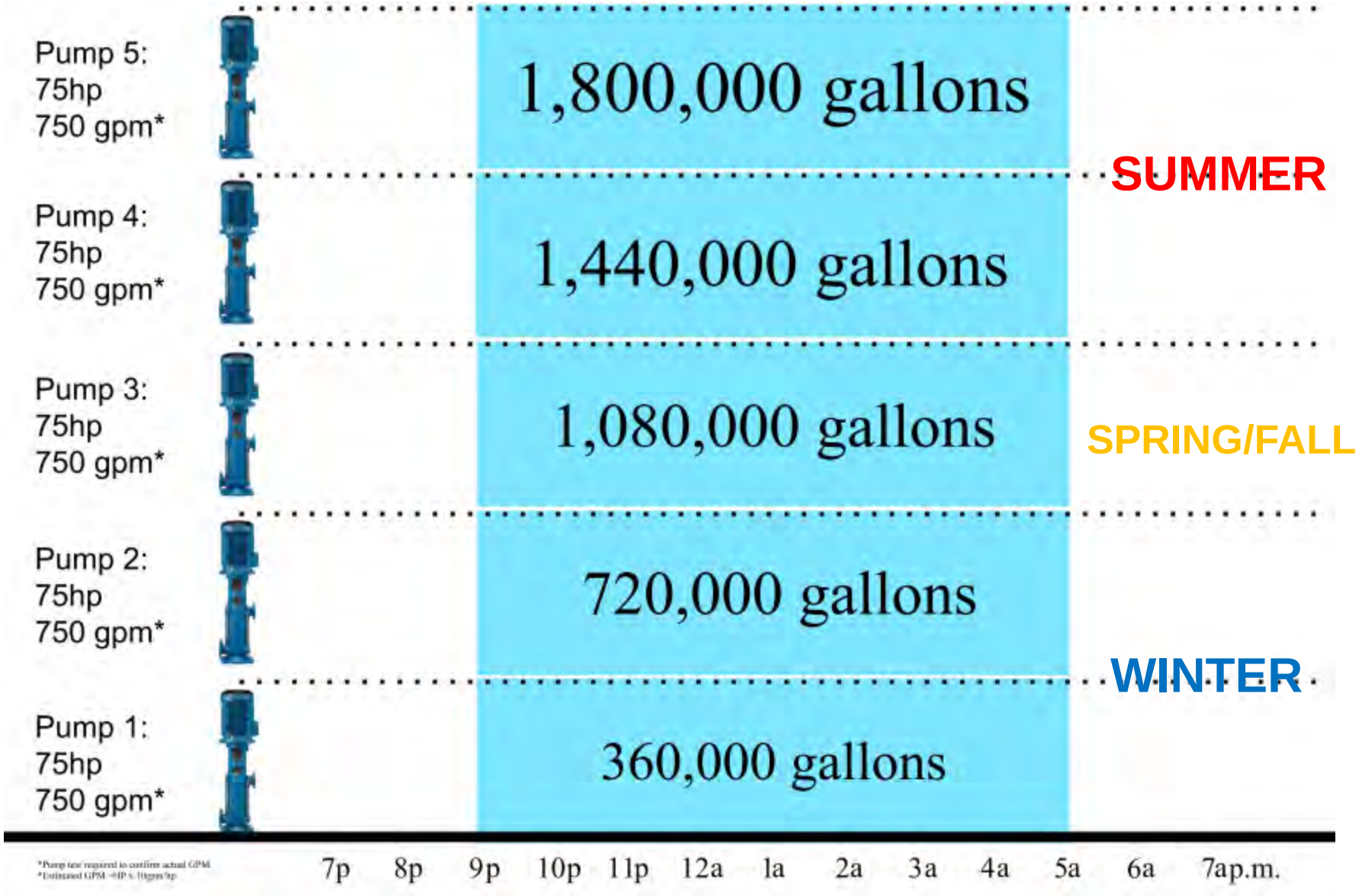
Night #2 – Reduced flow

(1,450 gpm)

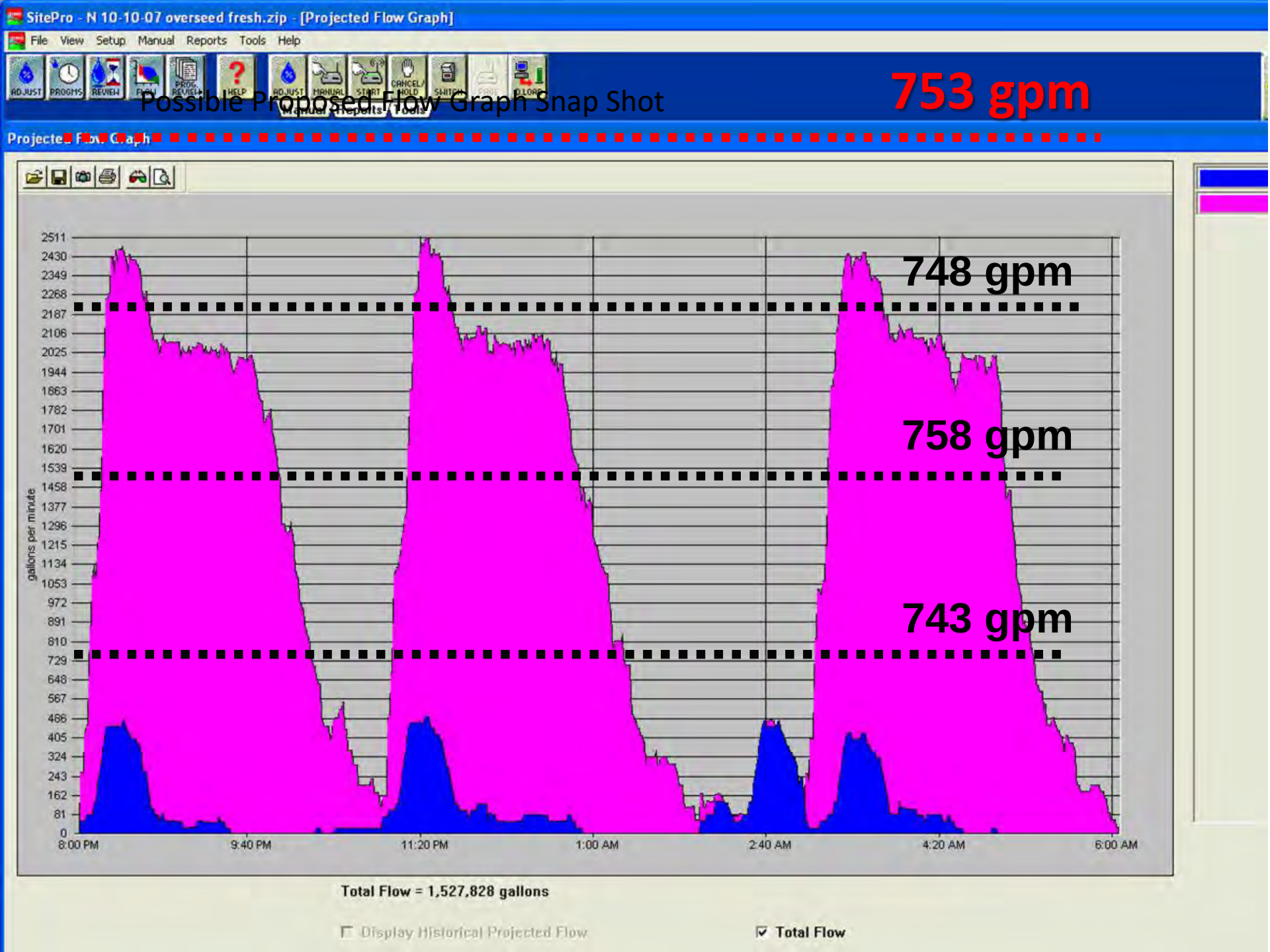
- *430,795 gallons pumped*
- *597.22 kWh*
- *451.7 kWh/AcFt*

Night #2 reduced use by 6.75%

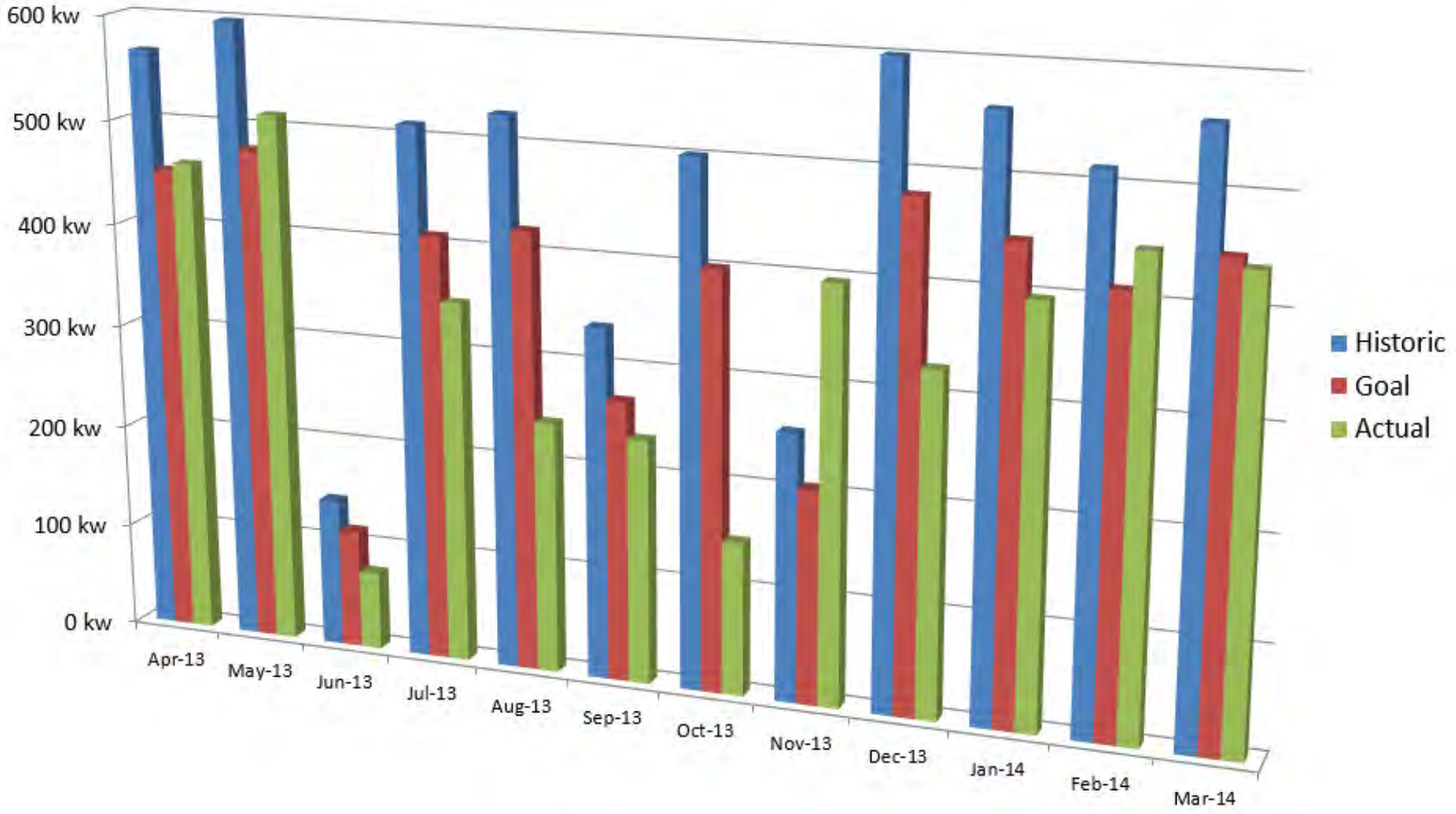

Desert Mountain Golf Club – Chiricahua Course
Scottsdale, AZ
??XXX



Programming concept


SitePro - N 10-10-07 overseed fresh.zip - [Projected Flow Graph]
File View Setup Manual Reports Tools Help
Possible Proposed Flow Graph Snap Shot
753 gpm
748 gpm
758 gpm
743 gpm
gallons per minute
2511
2430
2349
2268
2187
2106
2025
1944
1863
1782
1701
1620
1539
1458
1377
1296
1215
1134
1053
972
891
810
729
648
567
486
405
324
243
162
81
0
8:00 PM
9:40 PM
11:20 PM
1:00 AM
2:40 AM
4:20 AM
6:00 AM
Total Flow = 1,527,828 gallons
Display Historical Projected Flow
Total Flow

Silverstone Golf Club's Energy Savings Goal
20% Reduction - 2013-14



Sand Hollow RESORT

ILLUSTRATIVE MASTERPLAN

BLM

BLM

BLM

BLM

DSIRE™

Database of State Incentives for Renewables & Efficiency

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

IREC Interstate Renewable Energy Council

North Carolina Solar Center

DSIRE is a comprehensive source of information on state, federal, local, and utility incentives and policies that support renewable energy and energy efficiency. Established in 1995 and funded by the U.S. Department of Energy, DSIRE is an ongoing project of the North Carolina Solar Center and the Interstate Renewable Energy Council, Inc.

Search DSIRE

View Federal Incentives

Resources

RPS Data
Summary Maps
Summary Tables
Library
What's New?
Search


$25,137.16
rebate

Take aways…

1. Understand the local power co.
2. Understand your pumping
3. Programs to match pump output
4. Apply for rebates

Thanks!

QUESTIONS?

Andy Staples, ASGCA Assoc.
C. 480-206-1134
www.StaplesGolfDesign.com

American Society of
Irrigation Consultants

TAKING CHARGE OF CHANGE

EXPLORE | ENGAGE | EXECUTE

Portland, Oregon

2·0·1·4

ASIC

Sam Moore
Toro Irrigation
National/Northwest Field Service Manager

ASIC

Understanding your Automated Data Transfer Options

ASIC

How I Learned to Stop Wiring and Love the Radio

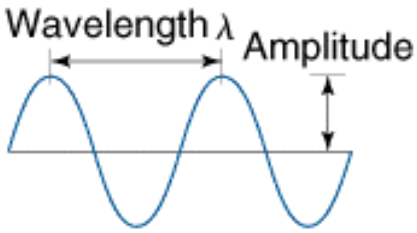
ASIC

Key Takeaways

- Understand Radio Type Differences
- Recommended Best Practices for Installation
- Common Questions
- Site Survey Importance
- Licensing
- Best Maintenance Practices

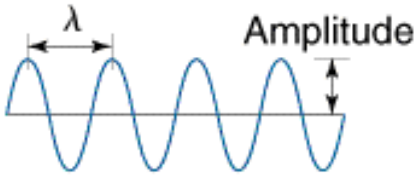
Radio Waves

- Waveforms
  - Frequency – Number of Wave/Second past a Point
  - Wavelength – Distance Between Points on a Wave
  - Amplitude – Size/Power



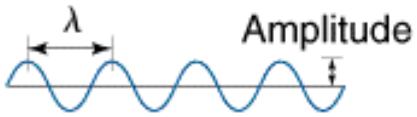
(a) Two complete cycles of wavelength λ

450 MHz



(b) Wavelength half of that in (a); frequency twice as great as in (a)

900 MHZ



(c) Same frequency as (b), smaller amplitude

Amplitude - Size

Analog/Digital

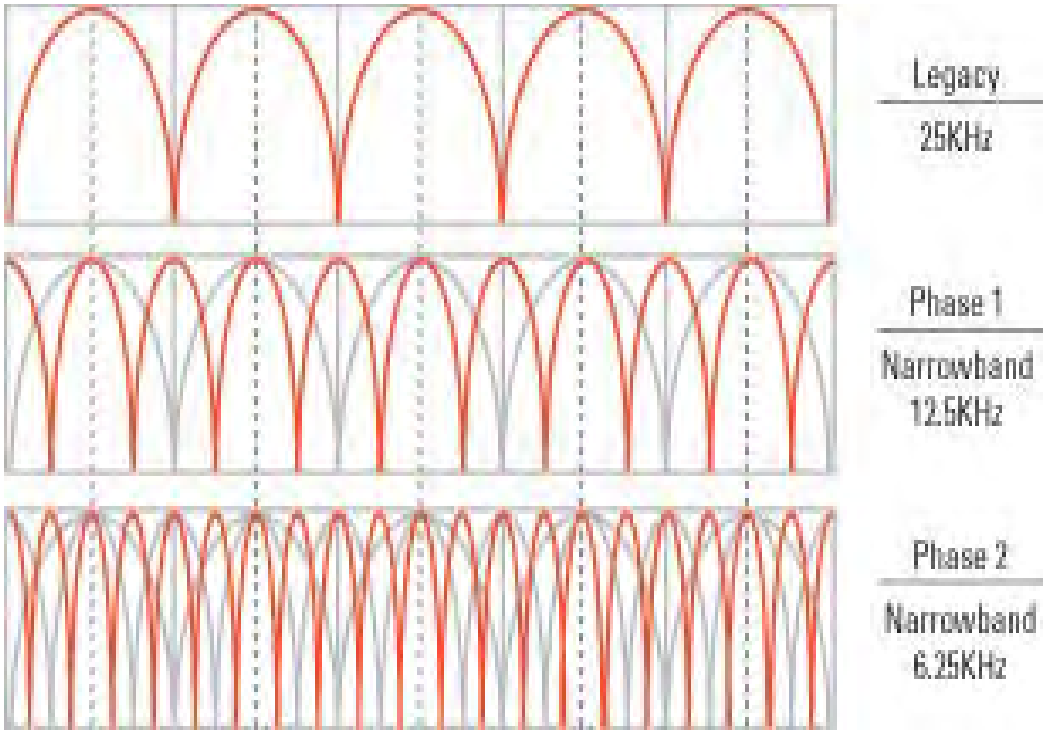
- Analog
  - Good Signal - Good Info
  - Marginal Signal – Okay Info
- Digital
  - Good Signal – Great Info
  - Marginal Signal – No Info
- More Digital Radios Coming – More Information in the Same Space

RF Communication Types

- UHF/VHF
  - 450-470Mhz
  - License by FCC Required
  - Mobile
  - Handheld
  - Data

Narrow Band

- FCC Mandated
- More Users same Bandwidth
- Narrow Band Signal is not as Robust
- May not apply to all the Americas
- Added 5 or 0 to Frequency (4 Decimal Places)



900 MHz

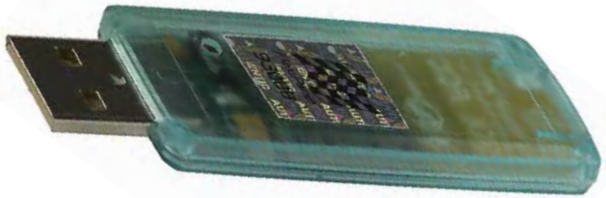
- 902-928 MHz - 33 centimeter band
- Very Local Communication - 1 Mile Direct Line of Site - or 60 Miles Direct Line of Site
- Very Line of Site
- Analog – Old Voice Phone
- Digital – DSS
  - Digital Spread Spectrum
  - Frequency Hopping

900 MHz

- No License Required
- Can Use Repeaters
- Most can set to specific Frequency Hopping Channels
- OMNI and Yagi Antennas Available

2.4GHz

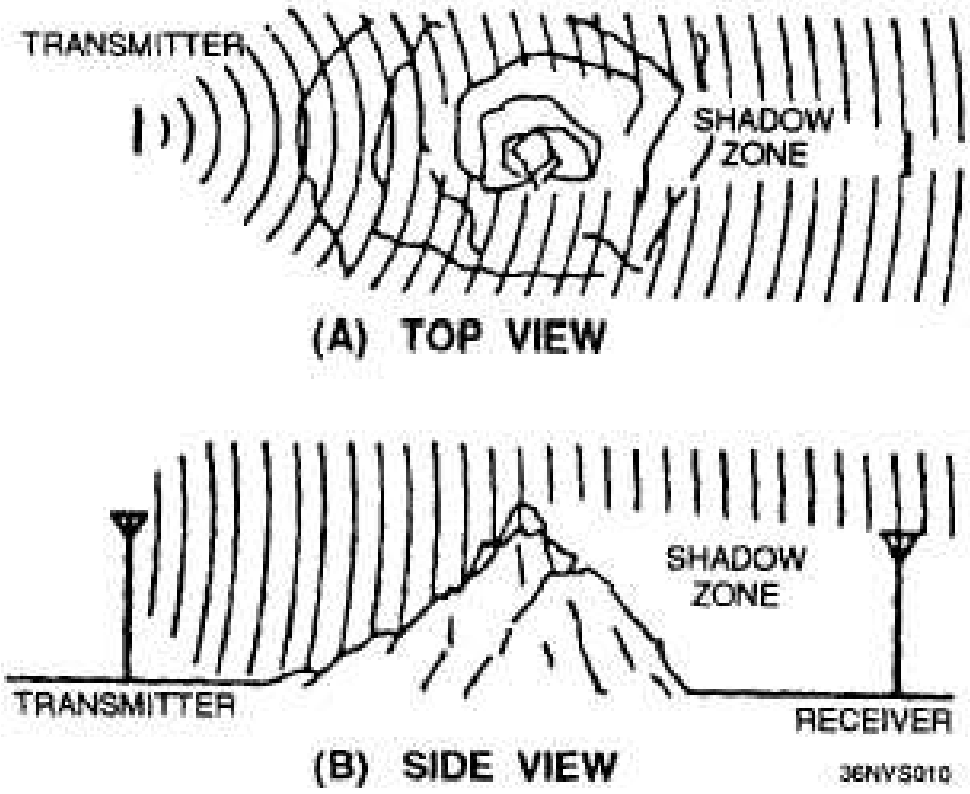
- Very Local Communication – Within Cabinet or Room
- Spread Spectrum
- Frequency Hopping
- 600 milli-Watts is “Extreme”



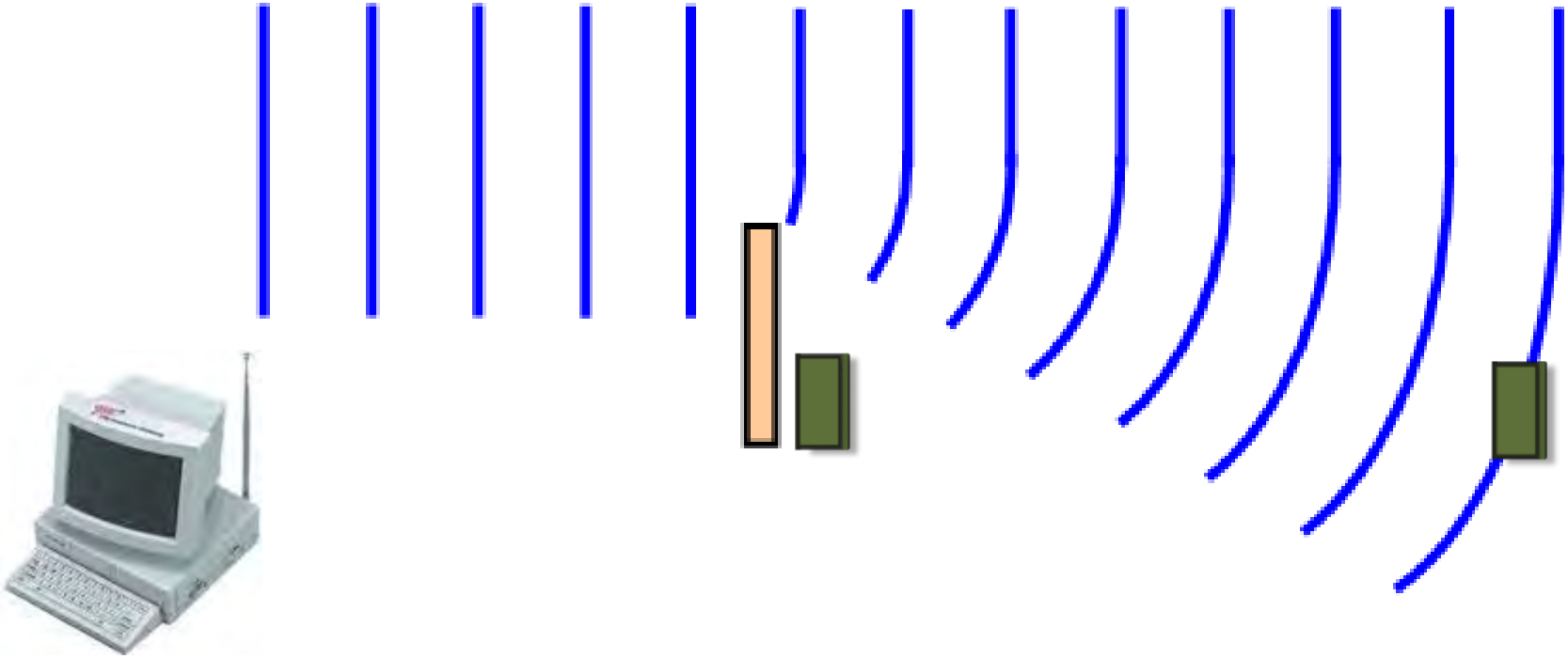
Cellular Modems

- IP Addressed
- Data Plans Coming Down in Cost
- Very Fast as Infrastructure Improves
- Serial or Ethernet
- Same Antenna Types and Issues

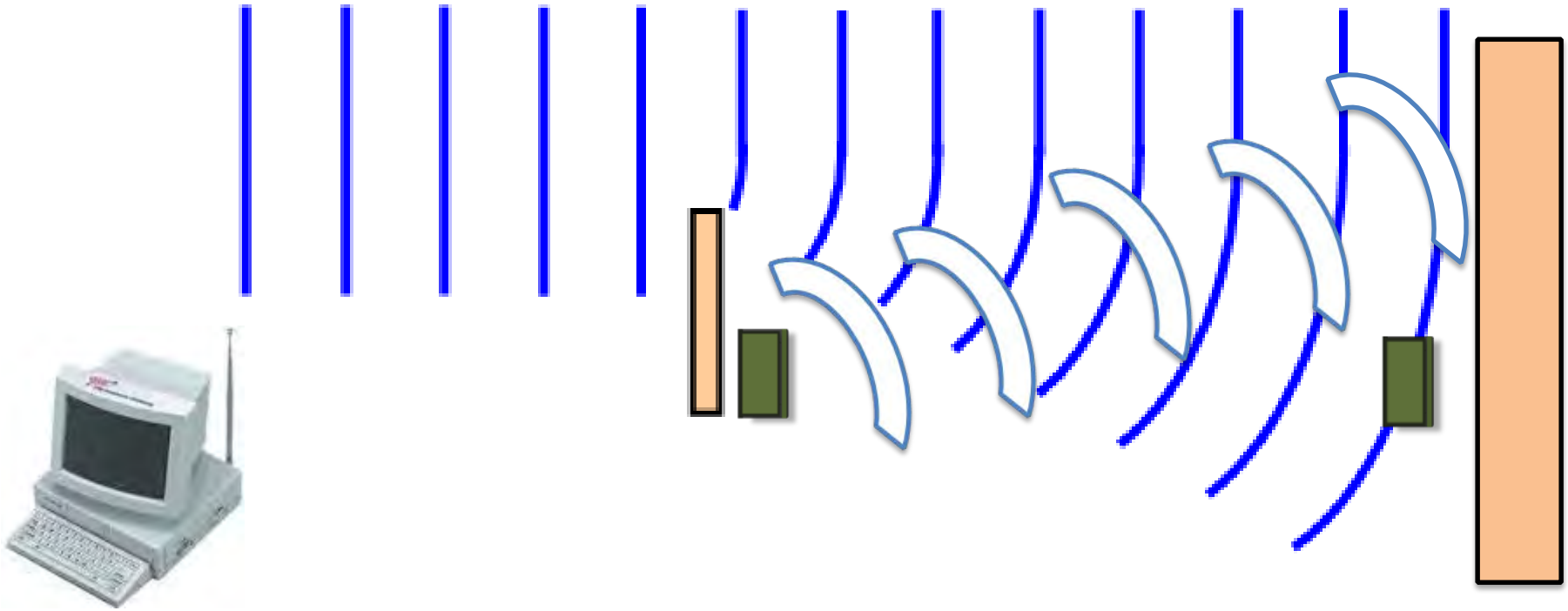
Radio Range


TRANSMITTER
SHADOW ZONE
(A) TOP VIEW
SHADOW ZONE
TRANSMITTER
RECEIVER
(B) SIDE VIEW
38NYS010

Radio Range

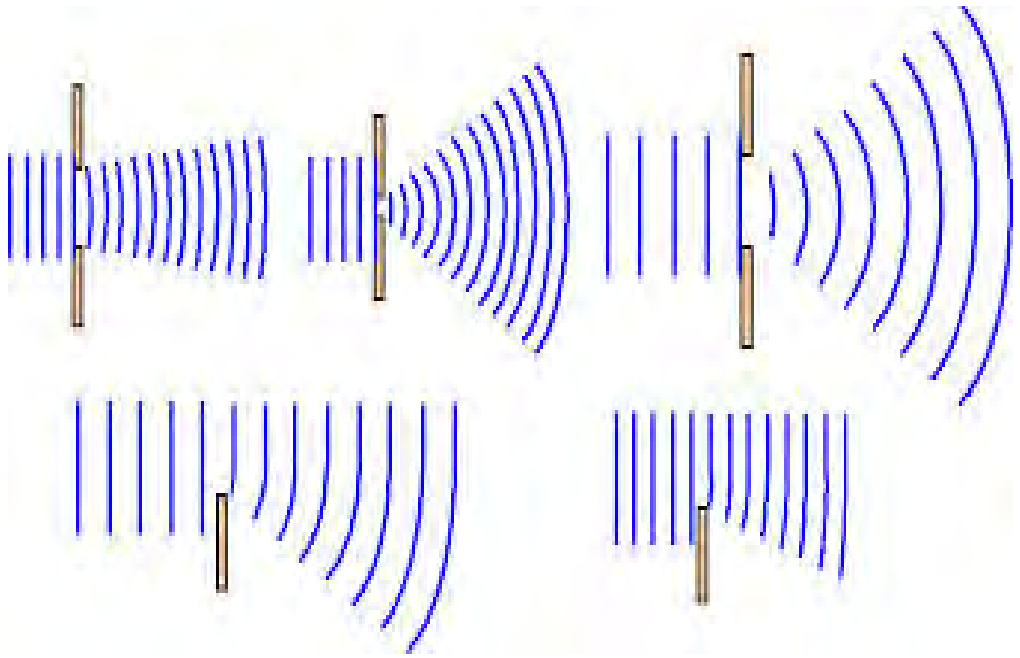


Radio Range – Bounce or Skip



Radio Range – Diffraction

- Diffraction effects are greater for long wavelength waves
- Diffraction effects are greater for small holes



Radio Range - Antennas

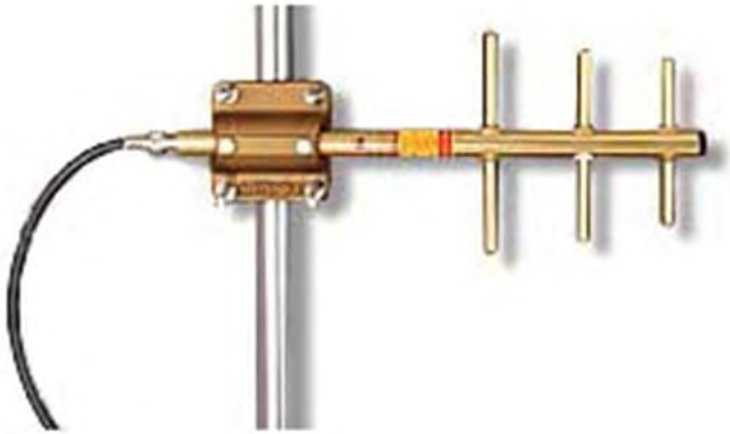
- OMNI Directional
  - 360 Degree of RF Emission Energy
  - Typically Used at Central or when Transmission is needed to several Areas

Radio Range - Antennas

- OMNI Directional
  - 360 Degree of RF Emission Energy
  - Vandal Resistant
  - 3dB Gain

Radio Range - Antennas

- Directional - YAGI
  - Focuses Energy
- 7.1 dB gain
- 72°H Beamwidth
- 57° V Beamwidth

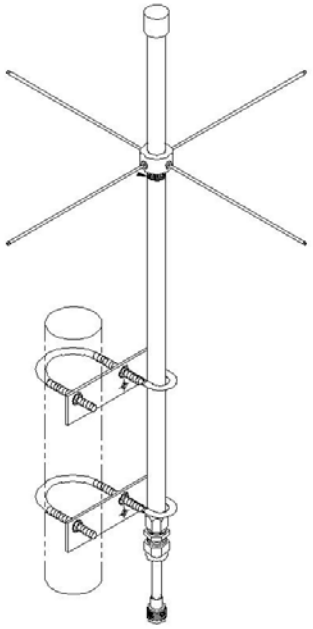


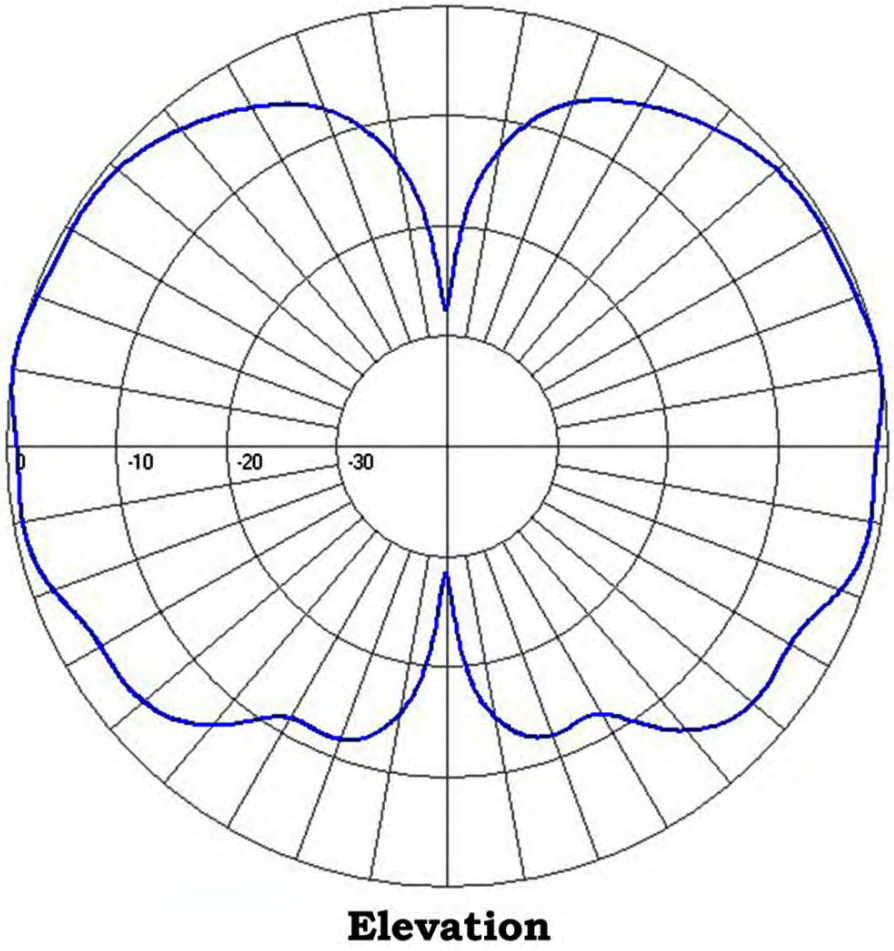
Radio Range - Antennas

- Directional - YAGI
  - Focuses Energy
- 11.5db Gain
- 42° H Beamwidth
- 37° V Beamwidth
- Alignment is Critical!

Radio Range - Antennas

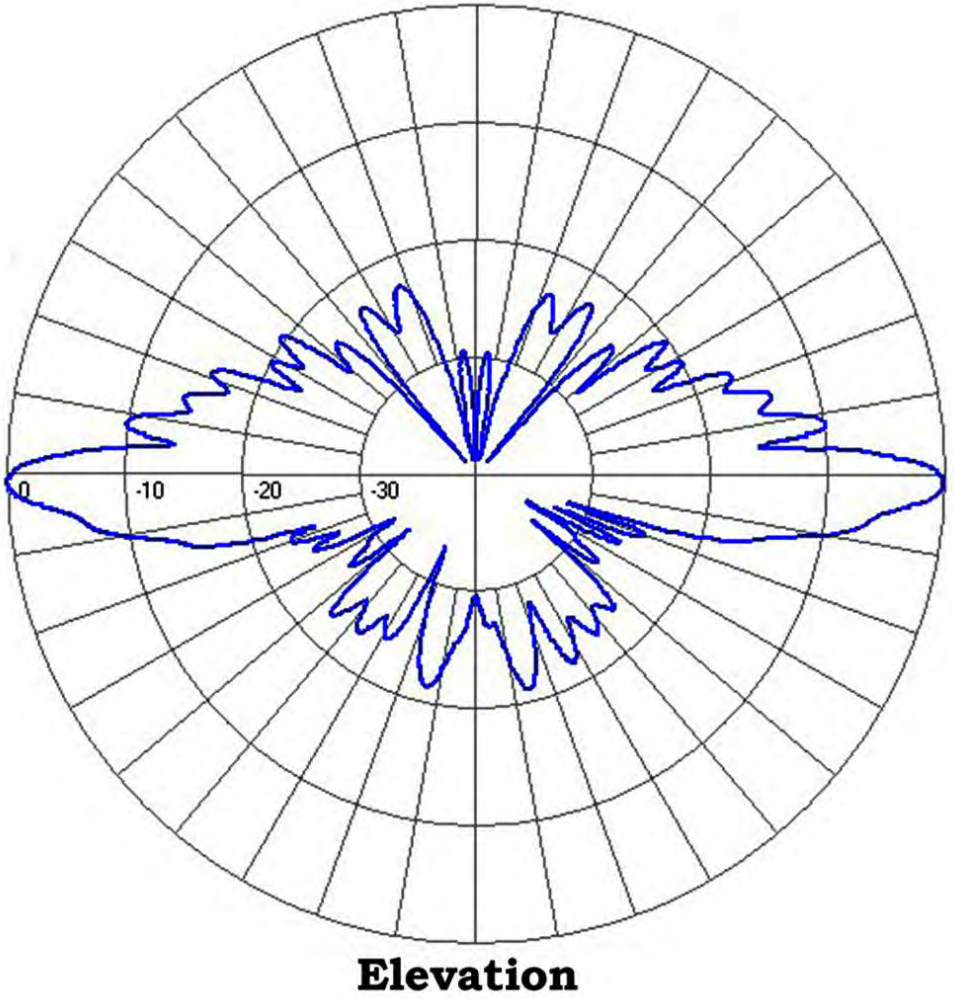
- OMNI Directional Pattern





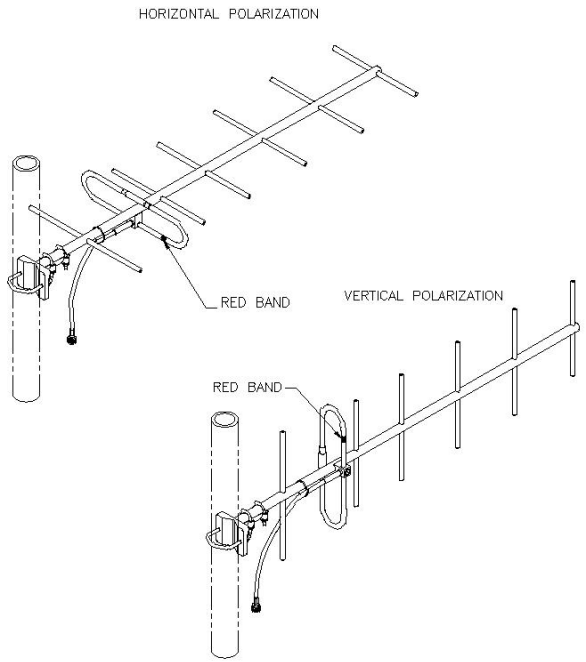
Radio Range - Antennas

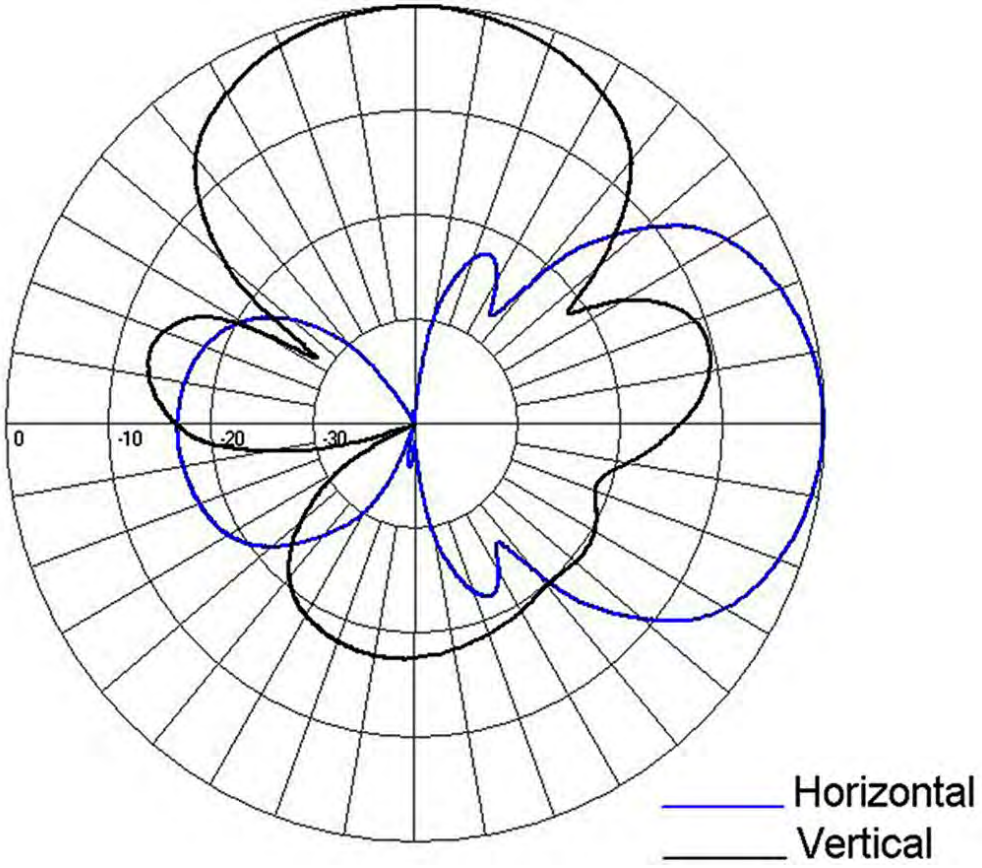
- OMNI Directional Pattern – 10 dB Gain



Radio Range - Antennas

- Yagi – 10dB Gain





Cables

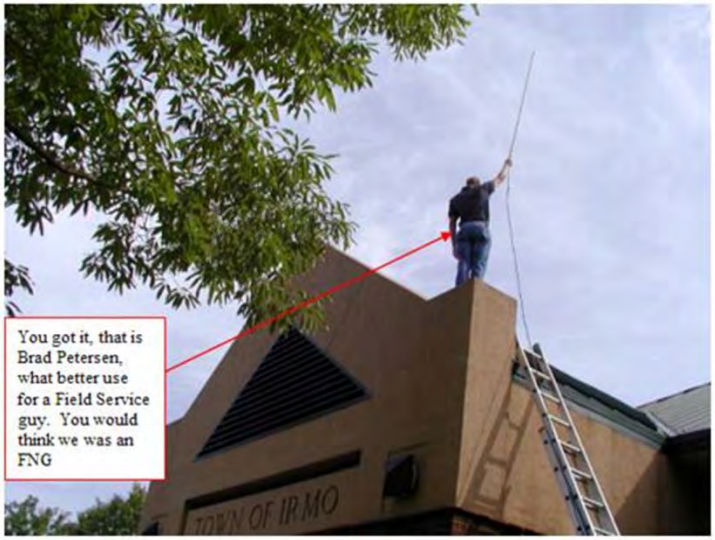
- Maximum length for RG/8U = 50’
- Over 50’ - use 1/2” Heliax
- Never kink the coax - #1 reason cited for failure
- Use extension or jumper cable into the Interface Module – 2’ - 3’ coax (1/4”) from end of antenna cable into radio
- Connectors replaced by knowledgeable RF technician - #1 Cause of Failure

Site Survey

- How far can you go
- I don’t know
- But I know how we can quantify it!

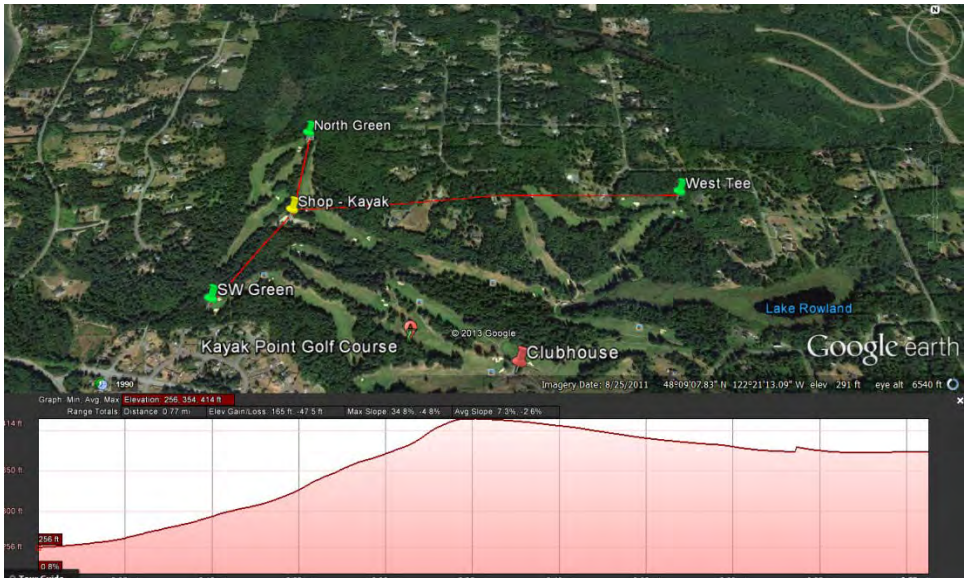
Site Survey Equipment

- RF Signal Strength Meter
- Antenna's
- Cables



Site Survey

- Insist on Documentation!



Oswego Lake Signal Strength Survey Revised 11/14/12					
Satellite Numbers or Location	From Maintenance		From Cart Barn		
	Receive -dB	Broadcast -dB	Receive -dB	st - dB	Comment
Maint. Bldg.			66		Using Omni w/BS set to low power.
Cart Barn	66				Using directional antenna & better location.
1,2	71	64			
3,4	66				
5	54				
6	71	72	71		
7	80	79	88		
8,9	66		90		
10	68				
11,12,60	59		70		
13	37		75		
14,58	50				
15,56	43	54			
16,55	46	69			
17,18	49				
19,20	59	60			
21,22,23	48		64		
24,25,27,28	61	70	63		
26	61	84	65		
29	56				
30	74	80			
31	72	80			
32,34	74				
33	77	82			
35,36	64	69			
37	57				
38	45				
39,59	48				
40	44		73		
41,57	52	61	73		
42,43	70	74	80		
44	58	69			
45,53,54	65	82			
46,47	70	84			
48	72	72			
49,50	70	85	89		
51	66				
52	77	80	76		Sensor input location.
61	62				
62,63	63				
64	62				
65	67	61			
66,67	65				
68	106	97+	81	72	Pump at lake used to fill reservoir.
69	82	89	52	70	
70	84	82			Cart barn, repeater location?

Green - FIU to Satellite, Yellow - Possible Yagi, Red - Repeater to Satellite

Tested Pump House to Cart Barn Repeater Location using Base Station Omni Antenna
Pump House Yagi antenna needs some TLC and possible realignment

900 MHz Site Survey

- Similar Documentation – Specify it gets Done

	A	B	C	D	E	F	G	H	I	J
1	Eugene Waste Water Plant – Site Survey 5/4/2012									
2	Building	Sentinel Number on Map	Base Antenna	Range Reading	WOB Number on Map	WOB Antenna	Retest with Improvement	Antenna/Comment	Other	Station Count
3	Primary	1	Screw On	97.8	1	Std.				WOB
4	Office	2	Screw On	16	2	Std.	95	Moved over top of concrete or External Antenna Needed	By Tanks	WOB
5			Screw On	99	2a	Std.			Cell Tower	
6			Screw On	99	2b	Std.		Might already by Wired	Outside Doors	
7	Storage	3	Screw On	98	3	Std.				WOB
8	Secondary Pre Treat	4	Screw On	85	4	Std.				
9	Secondary	5	Screw On	94.5	5	Std.				
10	Final	6	Screw On	98	6	Std.				
11	Maint	7	Screw On	98.9	7	Std.				
12	End of Property	8 - 2 Wire	N/A	Wired	N/A					
13	Maint 2	9 - 2Wire	N/A	Wired	N/A					
14	Incoming	10 - 2 Wire	Screw On	85	10	Std.	90	PCTEL		
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25	Range Reading >80 Acceptable; Cool and Rain Showers – Testing Done by Sam Moore, Bob Minster									

Radio Range – Repeaters

- Receives Signal
- Resend Signal
- Usually on a Different Frequency
- Transfer Signal around Obstacles

Best Practices

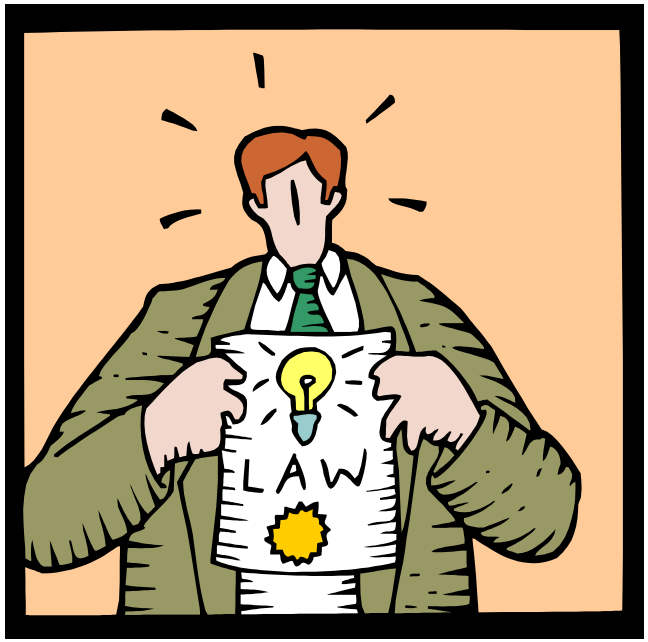
- Seal all Connections
- Surge Devices
  - Install
  - Ground

Test and Record

- Signal Strength
  - Tough Sites
  - External Antennas
- Watt Meter
  - Reflected Power
  - Should barely bounce the Ne
    - Base Antenna
    - External Antenna

Licensing

- Please make sure this gets done as appropriate
- Keep our Industry “Clean”
- FCC Coordinators
- Try to Educate Users



Thank you!

COMMUNICATE CLEARLY, IMPROVE YOUR BOTTOM LINE!

Dr. Patty Malone, Ph D.
Speaker, Trainer, Professor, Author

Clear Communication Increases Productivity and Profitability

Email: info@drpattymalone.com Phone: (949) 200-9064

Miscommunication Impact

- Damaged relationships
- Dissatisfied customers
- Alienated colleagues
- Unhappy employees
- Decreased job satisfaction
- Decreased productivity
- Absenteeism
- Turnover
- Impacts bottom line

Miscommunication & Conflict

- Snowball effect
- Culture
  - Dysfunctional communication
  - Gossip
  - Extreme competition
  - Harassment, sabotage
- Legal issues
- Brand, reputation & customer satisfaction

How to prevent this?

Email: info@drpattymalone.com Phone: (949) 200-9064

My Communication Connection

- TV/Fortune 500
- Masters/Ph.D.
- Professor/Trainer

Handout

Shift Perspective

- Avoid “I already know that.”
- Break old habits (ways of thinking & doing things)
- Blind spots

Costly Communication Mistake #1
Not Listening

- Tune out, pretending, waiting
- Why?
- Shouting

Email: info@drpattymalone.com Phone: (949) 200-9064

Costly Communication Mistake #1 Not Listening

- Rambling

  Don't:

  - Talk too much
  - Interrupt
  - Talk over them
  - Ignore what they say
- Judging
- Consciously listen

Costly Communication Mistake #2

Don’t Show Appreciation

- People leave people
- Include others
- Show appreciation and recognition
- Trickle up

Email: info@drpattymalone.com Phone: (949) 200-9064

Costly Communication Mistake #3

Misperceptions

- Conflicting messages
- Nonverbals: trap, inconsistent, instructions
  - Match nonverbal to verbal
  - Don’t assume meaning

Misperceptions continued

Ever explained something to someone, thought they understood, and they didn't?

- Paper Activity
- Check understanding
- Responsible for both sides
- Avoid ambiguous & technical words

Can't change others!

Danger Zones for Miscommunication

- Organizational Change
- Conflict & Difficult people
- Building Teams
- Business Presentations
- Communication across teams, departments, all levels, generations

Email: info@drpattymalone.com Phone: (949) 200-9064

OPPORTUNITYISNOWHERE

Email: info@drpattymalone.com Phone: (949) 200-9064

Create Culture Where We:
Communicate Clearly

- Are responsible for ALL communication
  - **Listen and connect**: Develop powerful listening habits
  - **Value others**: Show appreciation
  - **Check perceptions**: Ask questions

Email: info@drpattymalone.com Phone: (949) 200-9064

Questions?

Feedback Form

Patty Malone, PhD

Clear Communication Institute, Inc.

(949) 200-9064

info@drpattymalone.com

www.drpattymalone.com

facebook.com/drpattymalone

"Communicate Clearly. Get Results."

Thank You!

Patty Malone, PhD

Clear Communication Institute Inc.

(949) 200-9064

info@drpattymalone.com

www.drpattymalone.com

facebook.com/drpattymalone

"Communicate Clearly. Get Results."

COMMUNICATE CLEARLY, IMPROVE YOUR BOTTOM LINE!

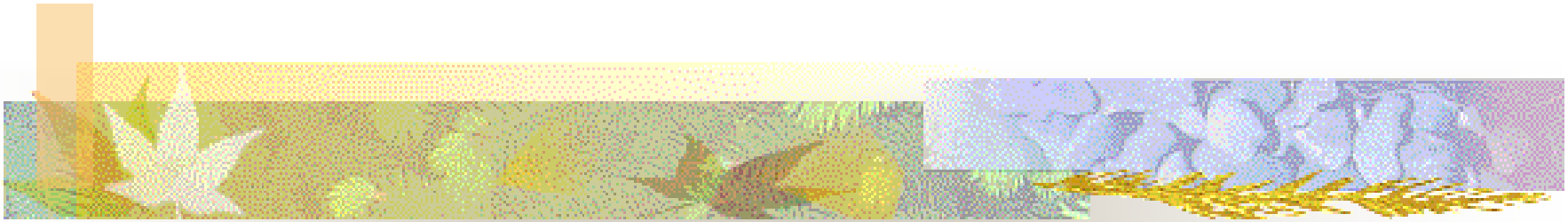
Dr. Patty Malone, Ph D.
Speaker, Trainer, Professor, Author

Clear Communication Increases Productivity and Profitability

Email: info@drpattymalone.com Phone: (949) 200-9064

CIT Update

ASIC 2014 NATIONAL CONFERENCE
Portland, Oregon
WATER: Taking Charge of Change



David F. Zoldoske, Director
Center for Irrigation Technology
California State University, Fresno

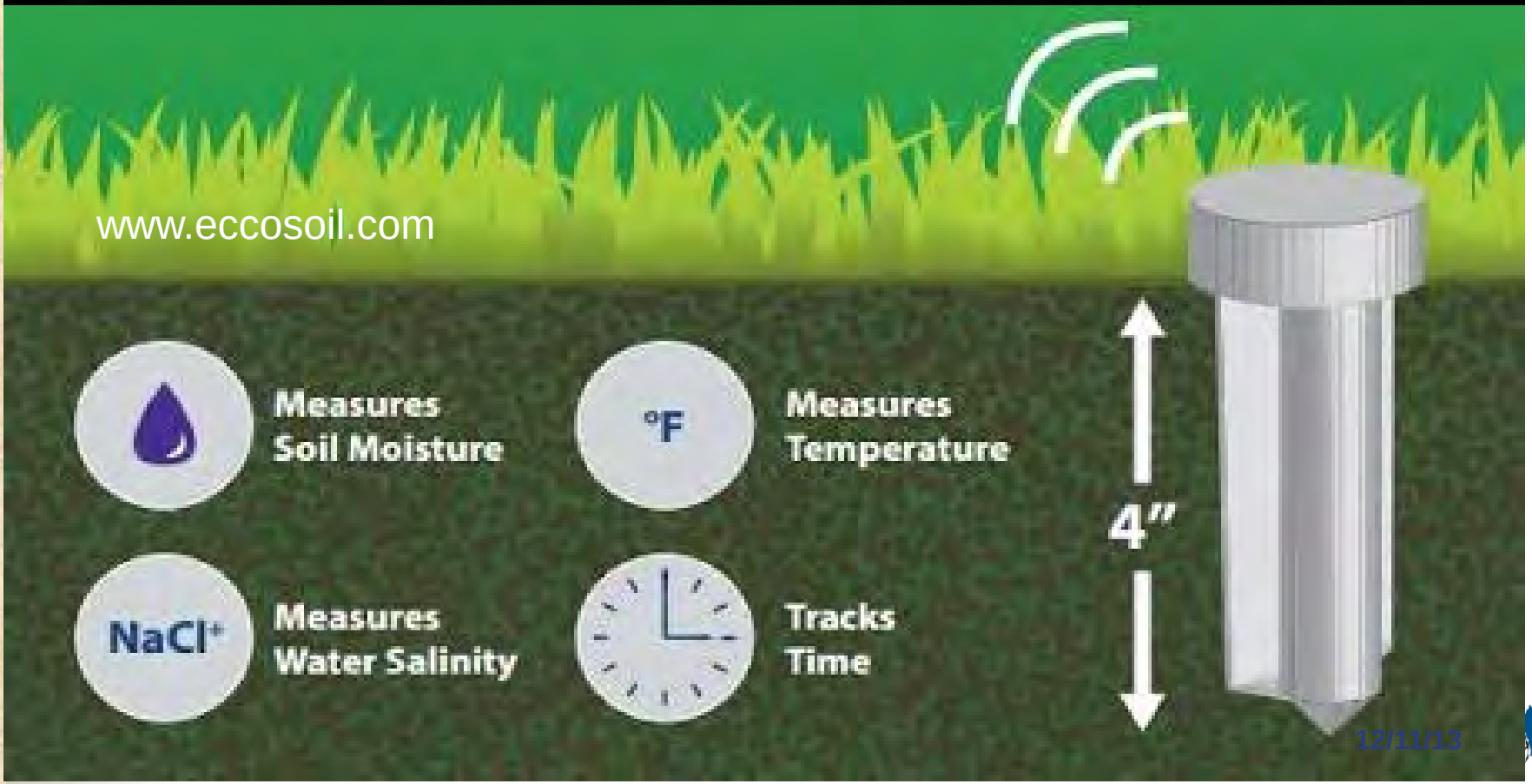
Three MWD funded Projects

1) ECCO Professional (wireless sensor)
2) Aqua Cents
3) High Performance Nozzle study

ecco

GIVE YOUR LAWN A **VOICE**

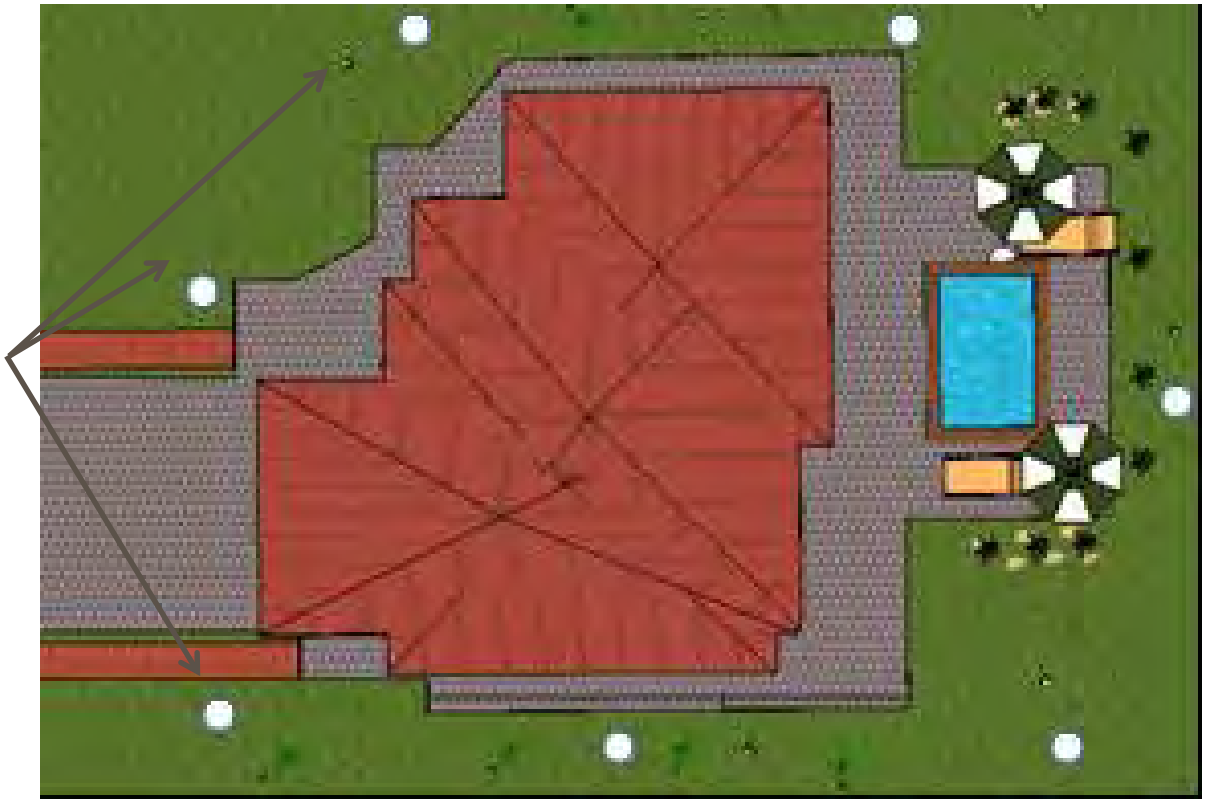
WIRELESS SOIL MOISTURE SENSORS AND SYSTEM

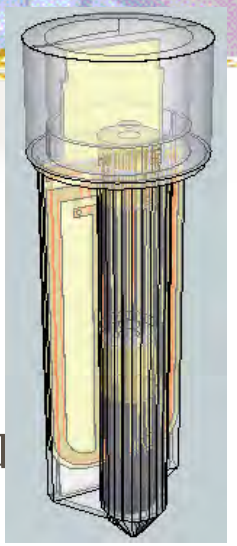


ECCO Sensor Installation

Digital Spring is developing smart sensors to be used to retrofit existing timer based sprinkler controllers to improve watering efficiency and help eliminate gross waste.

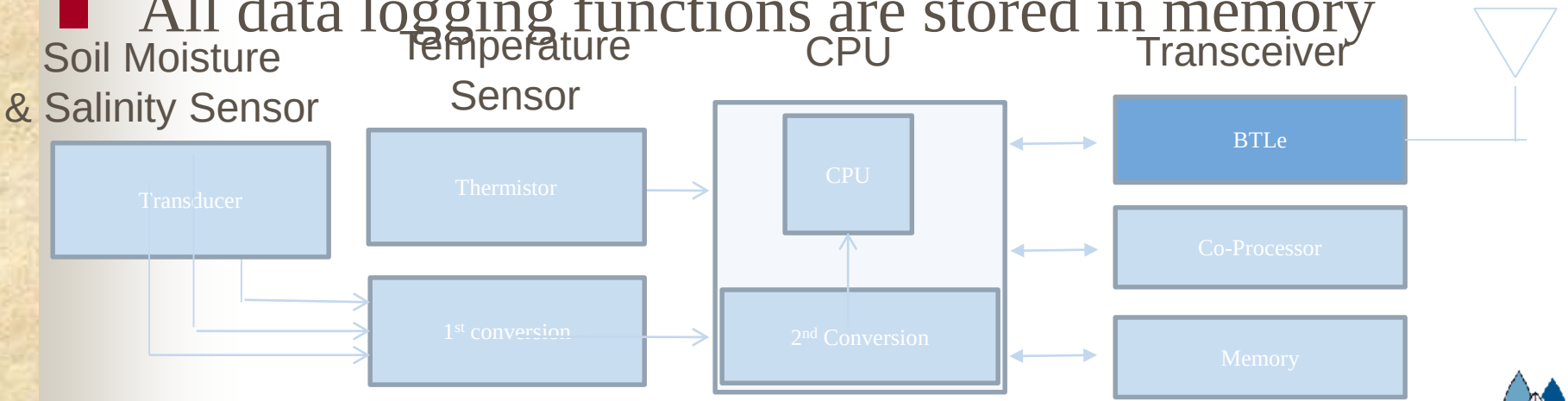
A typical installation in a residence would be to place one sensor in the ground per zone as shown on the right. Sensors cooperate with each other to enable daily communication with the sprinkler valve shutoff installed





ECCO sensor architecture

- ECCO soil moisture sensors measure salinity of irrigation water, soil water content, and temperatu
- A bluetooth low energy transceiver is used to communicate with other sensors in the area utilizing a low power proprietary networking scheme.
- All data logging functions are stored in memory



Polymer Study will be Replicated 3 Times

The study will be looking at both sprinkler and buried drip irrigation-

we will be evaluating for increased spacing and reduction in striping when using the drip method

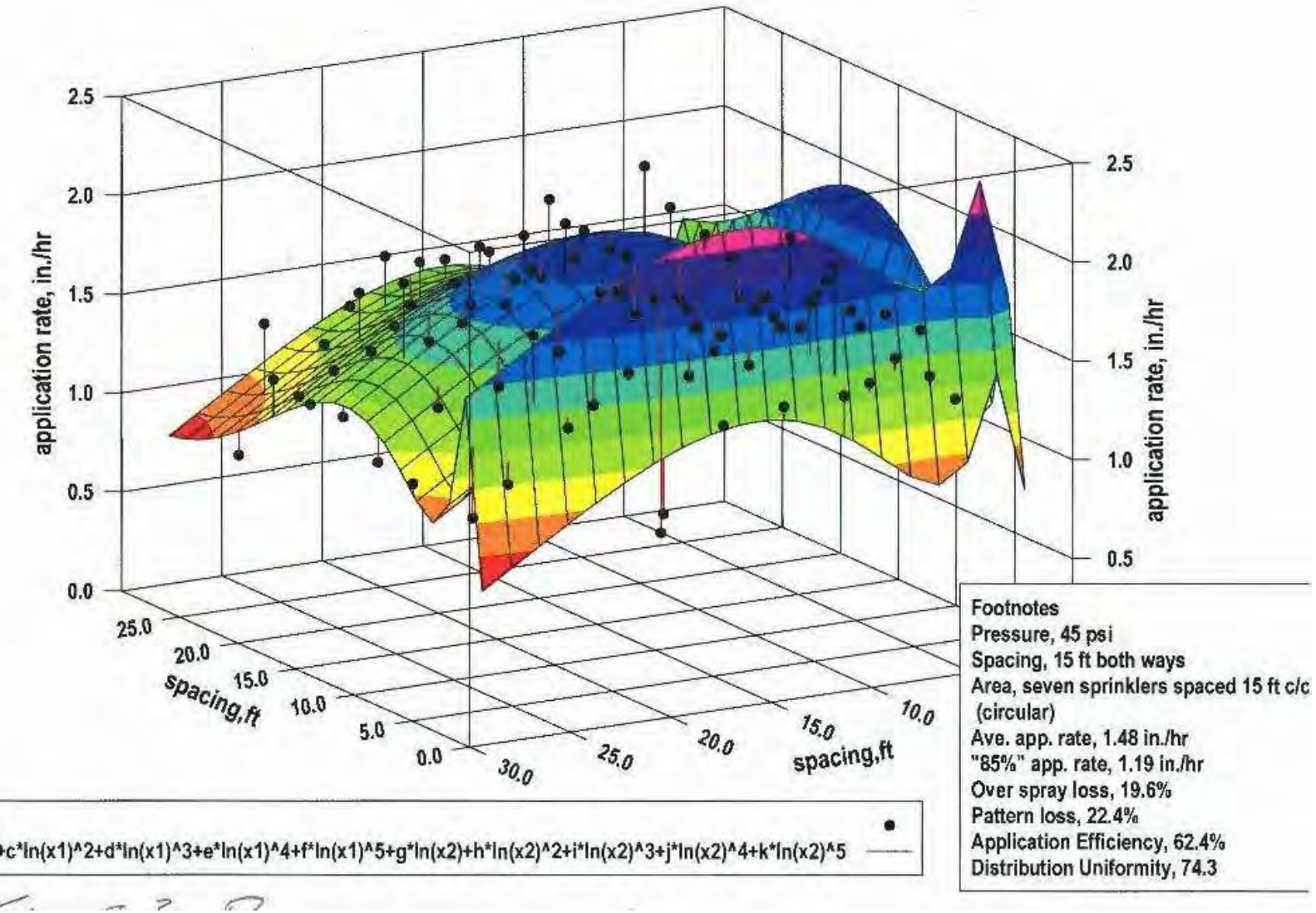
Rodent Repellent

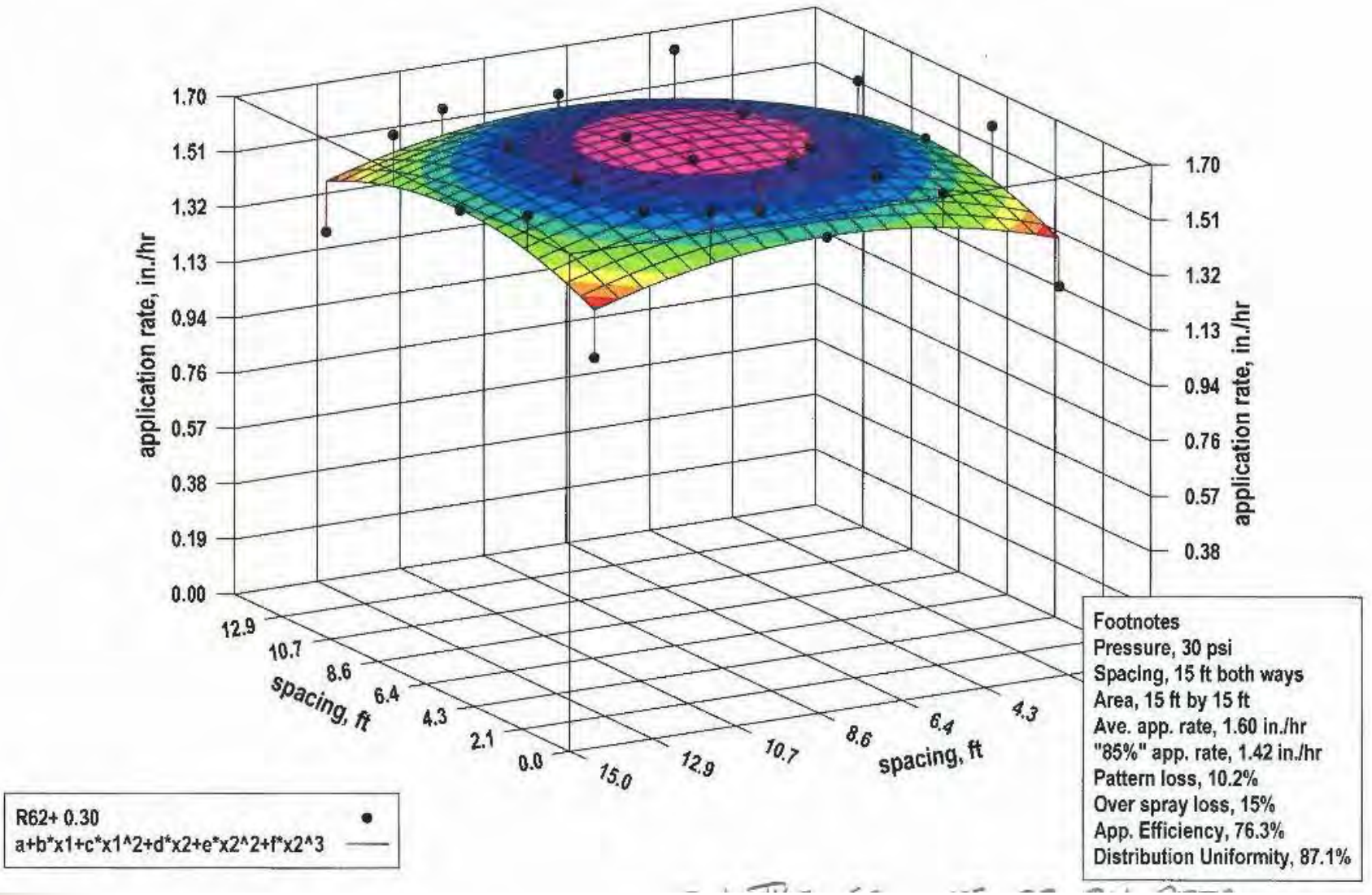
CIT will be evaluating a chemical treatment (injected) into buried drip lines that keeps rodents away from tubing- needs to re-applied every 6 months *(unrelated to polymer study)*

Injecting Polymers Horizontally Below the Root zone

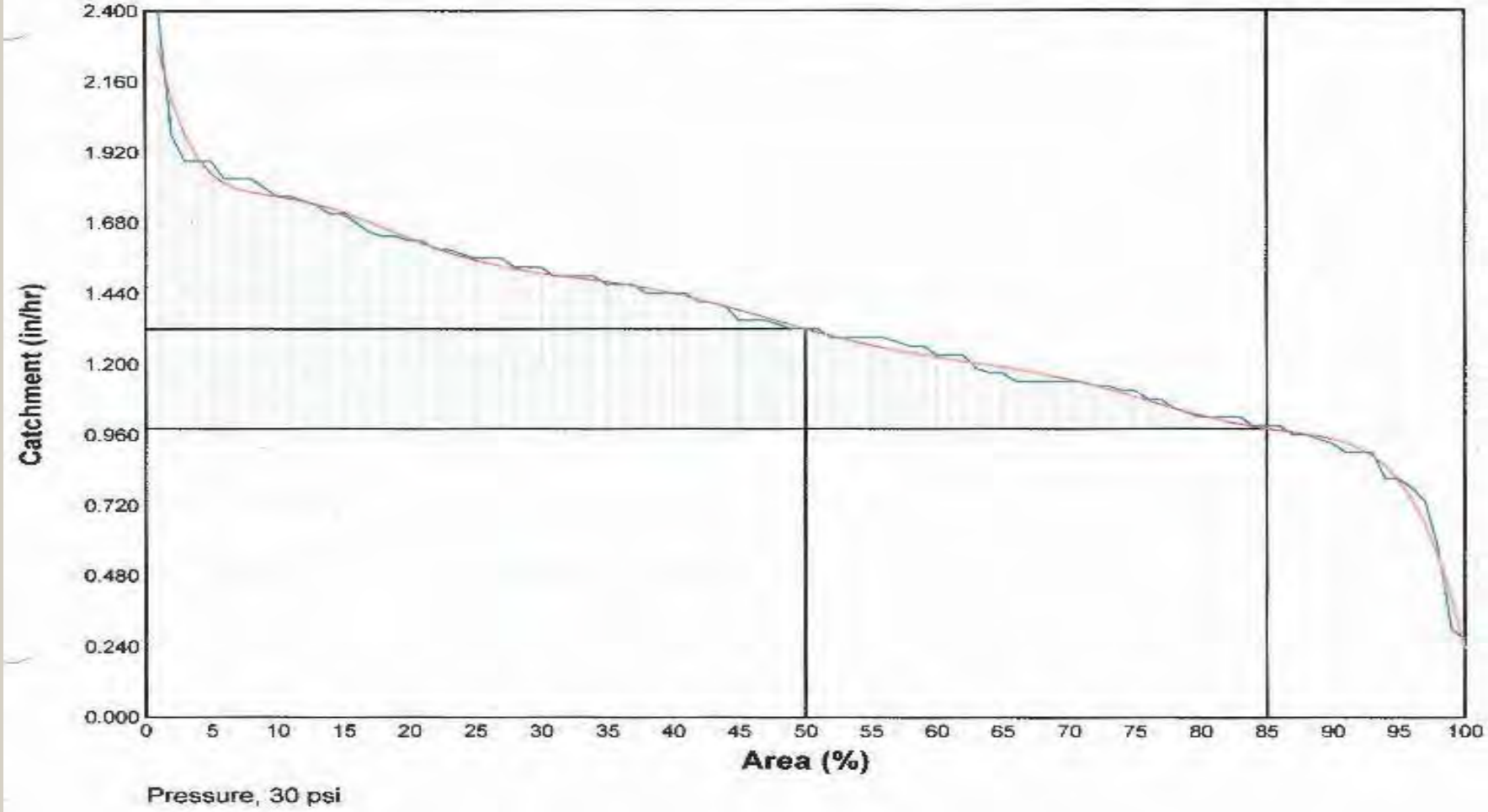
- Polymers are injected horizontally six (6) inches below the surface
- Forms both a barrier and reservoir of available water for the turf grass
- Initial studies suggest a significant savings for water (*and energy*) savings based on conventional practices
- Needs to be cost effective!

High Efficiency Nozzle Study


application rate, in./hr
2.5
2.0
1.5
1.0
0.5
0.0
25.0
20.0
15.0
10.0
5.0
0.0
spacing,ft
30.0
25.0
20.0
15.0
10.0
spacing,ft
application rate, in./hr
2.5
2.0
1.5
1.0
0.5
R^2= 0.56
a+b*ln(x1)+c*ln(x1)^2+d*ln(x1)^3+e*ln(x1)^4+f*ln(x1)^5+g*ln(x2)+h*ln(x2)^2+i*ln(x2)^3+j*ln(x2)^4+k*ln(x2)^5
Footnotes
Pressure, 45 psi
Spacing, 15 ft both ways
Area, seven sprinklers spaced 15 ft c/c (circular)
Ave. app. rate, 1.48 in./hr
"85%" app. rate, 1.19 in./hr
Over spray loss, 19.6%
Pattern loss, 22.4%
Application Efficiency, 62.4%
Distribution Uniformity, 74.3


1.70
1.51
1.32
1.13
0.94
0.76
0.57
0.38
0.19
0.00
application rate, in./hr
12.9
10.7
8.6
6.4
4.3
2.1
0.0
spacing, ft
15.0
12.9
10.7
8.6
6.4
4.3
spacing, ft
1.70
1.51
1.32
1.13
0.94
0.76
0.57
0.38
application rate, in./hr
R62+ 0.30
a+b*x1+c*x1^2+d*x2+e*x2^2+f*x2^3
Footnotes
Pressure, 30 psi
Spacing, 15 ft both ways
Area, 15 ft by 15 ft
Ave. app. rate, 1.60 in./hr
"85%" app. rate, 1.42 in./hr
Pattern loss, 10.2%
Over spray loss, 15%
App. Efficiency, 76.3%
Distribution Uniformity, 87.1%

Average: 1.321 in/hr **85.0%: 0.981 in/hr** **DU: 66.7%** **Pattern Loss: 28.0%**



Pressure, 30 psi

PRS SWAT testing

- One manufacturer completed
  - ✓ *Three different sprinkler models*

Pump Testing


Questions ?
Thank You !