AWT
ASSOCIATION OF WATER TECHNOLOGIES

Training Seminars

AWT Fundamentals and Applications

Writing the Service Report.

	Water Test							
	Make-up:							
	pH	9.67	9.47	9.99	8.7	9.7	9.82	
	TH	90	90	80	100	90	110	
	CA	80	70	50	80	70	80	
	M-Alk	50	50	60	60	70	60	
	Chloride	25	35	40	30	30	40	
	Cond	270	258	260	275	260	264	
	Tower:							
	pH	8.99	8.63	9.07	8.87	8.9	9.03	
	TH	440	300	400	430	420	450	
	TH CR	4.89	3.33	5.00	4.30	4.67	4.09	
	CA	440	500	390	350	400	450	
	CA CR	5.50	7.14	7.80	4.38	5.71	5.63	
	M-Alk	270	240	250	260	240	250	
	M-Alk CR	5.40	4.80	4.17	4.33	3.43	4.17	
	Chloride	120	130	130	120	120	120	
	CHl CR	4.80	3.71	3.25	4.00	4.00	3.00	
	Cond	1411	1414	1353	1437	1410	1378	
	Cond CR	5.23	5.48	5.20	5.23	5.42	5.22	

ASSOCIATION OF WATER TECHNOLOGIES

- Who
- What
- When
- Where
- Why
- How
- **Most Importantly the Why and How**

The Service Report

English 101

- Who
  - Person discussed with
  - Persons in charge of making decisions
- What
  - Properly Identify the Building or Account name
  - Spell it out, This is your Report on the Condition of the Equipment
- When
  - Time of Day, and Day of Week
  - Reoccurring problems

English 101

Where

- Systems under treatment
- List systems by their proper name

Why and How

- List the Problems
- Describe the Expected Problems
- How to Fix Them
- Underline the Problems
- Bold The Problems

Webster's Definition

Noun

- Something Reported
- Periodic Statement of Condition

Verb

- To give Information
- Write an Account
- A Formal Statement

We are the Reporter!!

Service Reports:

5 Steps for better report writing:

1. Think about the intended reader. When writing anything for anyone to read, you must first consider who that audience is going to be...
2. Identify the key takeaways...
3. Outline the entire report before you actually write it...
4. Keep it concise...
5. Make it digestible...

Tips for Writing Successful Reports

- Maintain Objectivity Your report should present data and facts as objectively as possible. ...
- Stay Focused Each report should have a single, clear purpose. ...
- Think About Your Audience Tailor your language, tone, and level of detail to the needs and understanding of your audience. ...
- Validate Your Points Support every assertion you make with evidence or data. ...
- Format consistently ...

Two Types of Service

- Check-ins
  - More Visits in a Day
  - Checks the **Operation** of the **Control** Equipment
- Comprehensive Service
  - Takes more time
  - Checks the **Condition** of the **System** being treated

Check-ins

- Make-up Water
  - pH
  - Conductivity
- Softener
  - Conductivity
  - Hardness
- Feedwater/Deaerator
  - Conductivity
  - Hardness
  - pH
  - Sulfite

Check-ins

Tower

- Conductivity
- pH
- Inhibitor
- Chlorine (Free and Total)

Boiler

- Conductivity (Un-Neutralized)
- pH
- Sulfite

Condensate

- pH
- Conductivity

Inventory

Checks-ins

Notice:

- No Closed Water Testing
- No Scaling Indices
- Short brief Comments

Why are Spot Checks necessary:

- Needed with fewer plant/facility staff
- Ensures the control equipment is working properly

Should not be used as your primary monthly service visit

The Service Report

- States the current condition of your HVAC/Steam Generation equipment
- States the condition of your water cooling your HVAC/Steam Generating equipment
- Points out any potential problems
- Serves as a form of communication
- Can be used to protect you in the event of a Failure
- Can be used to protect you in a Court of Law

How, How, How, How

How to Service…

- Begins with the Beginning…
  - Water analysis
  - Determining current pressures/temperatures/approaches and operating conditions
  - Controller/Bleed valve installation
  - Chemical Injection points
  - Condition of basin of cooling tower
  - Attention given by plant personnel
  - Understand the Conditions
  - Failure to Plan is a Plan for Failure
  - You won't receive the Black Eye

Getting Started…

- Starting your Service Visit
  - Before you open your kit
  - Use your senses
    - Blowdown/Bleed Valves
    - Alarms
    - Chemical Feed Pumps
    - Funny/Odd Noises
  - You are an extension of your customer's service team

What will I need…

Knowledge

- How things work
- What to look for

PPE

- Safety Glasses
- Ear Protection
- Gloves

Test Kit

- Complete
- Calibrated Meters
- Note Pad

Tools

- Pair of Tongs
- Towel
- Screwdrivers
  - Small Instrument
  - Regular
- Channel Lock Pliers
- Small Crescent Wrench
- Flashlight
- Laser Temperature Gun

Setting up to get started…

Before starting your test…

- Well Lit Area
- Know which tests are going to perform
- Think about the expected ranges
- Use Appropriate Sample Size and Multiplier
- Collect Representative Samples

What to Tests…

Cooling Towers:

Make-up

- pH
- Hardness (Total and Calcium)
- Total Alkalinity
- Conductivity
- Chloride
- Iron
- Copper
- Phosphate
- Silica

What to Tests…

Towers

- Hardness
- Total Alkalinity
- Conductivity
- pH
- Chloride
- Inhibitor

- Chlorine (Free or Total)
- Bacteria/Fungi/Algae
- Iron – (if an issue)
- Copper– (if an issue)
- Phosphate – (if an issue)
- Silica – (if an issue)

Service Report

AWT Training Annapolis
Thursday, March 28, 2019 8:00 AM PDT

East Coast Customer
Annapolis Facility
1234 Main St.
Annapolis MD 55555
(888) 555-1234

Recorded By: Mark Lewis
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Main Plant - Cooling System

Test	Make-Up Water	Cooling Tower		
pH	8.59	8.61		
Hardness, total (ppm as $CaCO_3$)	90	420		
Hardness, calcium (ppm as $CaCO_3$)	70	320		
Alkalinity, total (ppm as $CaCO_3$)	40	210		
Chlorides (ppm as Cl)	60	320		
Conductivity (as mmhos)	330	1438		
Hardness Cycles (Calculated)		4.7		
Calcium Cycles (Calculated)		4.6		
Alkalinity Cycles (Calculated)		5.3		
Chloride Cycles (Calculated)		5.3		
Conductivity Cycles (Calculated)		4.4		
Temperature (deg. F)		135		
LSI (Calculated)		2.1		
RSI (Calculated)		4.5		

Opening Comments

This report was discussed with Angela Pike.

What else do I record…

- Record the results
- Log the Chiller or Heat Exchanger
  - Discharge Temperature
  - Saturation Temperature
  - Condenser and Evaporator Pressures
  - Chilled and Condenser Water Temperatures
  - Amps
  - Hours

- Calculate LSI/RSI
- Calculate CaPO4 Index
- Calculate Concentration Ratios
- Biological Growth needs
- Periodic Corrosion Coupons
- Water Meter Readings
- Inventory

Chilled Water Out			45 Record		
Chilled Water In			57 Record		
Evaporator Saturation			45 Record		
Evaporator Approach			0 Record		
Tower Water In			83 Record		
Tower Water Out			90 Record		
Condenser Saturation			95 Record		
Condenser Approach			5 Record		
Amps			270 Amps		
Hours			42731 Hours		

Test	City Water	#1 Chiller	#2 Chiller	Building Chilled	Building Closed
SELtect 450		20 Record			
Pump Setting Inhibitor		40/40/25			
SELcide 921		10 Record			
Pump Setting Biocide 1		40/60/T TS			
SELtrol 112				5 Record	
Water Meter Current Reading	35 DBV	3825896 Record	879452 Bleed		
Water Meter Previous Reading		3595364 Gallons	866484 Bleed		
Average Daily Water Consumption		6586.6 Gallons	370.5 Bleed		

What to Tests…
Closed Systems

- Conductivity
- pH
- Inhibitor
- Iron
- Copper
- Bacteria Tests
- Water Meter Readings

- These Systems should have less than 5% Annual water loss

Summing up the Cooling System…

- State what you did
- Report any Scaling Problems
- Report if you have a Corrosive Environment
- Report any uncontrolled water Loss
- Report the operation of the Control Equipment
- Report Problems with their Equipment
  - Weird noises
  - Flows
  - Pressure Drops Problems
- Inventory Situations

What to Tests… Boiler Systems

Make-up

- pH
- Hardness (Total)
- Total Alkalinity
- Chloride
- Phosphate
- Silica
- Conductivity
- Iron
- Copper

What to Tests…
Boiler Systems

Softener

- Conductivity
- Hardness
- pH
- Unit on Line
- Remaining Capacity
- Periodic Resin Analysis
- Sodium Elution Studies

What to Tests…
Boiler Systems

Feedwater/Deaerator

- Hardness
- Conductivity
- Chloride
- pH
- Sulfite
- Iron
- Record Pressure
- Record Temperature
- Calculate Percent Return Condensate
- Observe the vent plume
- Periodic Dissolved Oxygen Studies
- Periodic Feed water Composite Sampling

What to Tests…
Boiler Systems

- Know your program
- Alkalinities (P, M and OH)
- Oxygen Scavengers
- Scale Control Agents
- Polymers
- pH
- Conductivity (Un-Neutralized and Neutralized)
- Calculate
- Concentration Ratios
- Percent Blowdown

What to Record…

Record

- Steam Pressure
- Stack Temperature

Steam Temperature PSIG	Water Temperature °F
10	239
25	267
50	297
75	320
100	337
150	365

What to record?

Condensate

- Conductivity
- Hardness
- pH
- Periodically test multiple sample locations
- Periodic Tests iron and Copper

Inventory

- Know what you should be using
- Know what you have used
- Know that customer will not run out before you get back

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Summing up the Boiler System…

- State what you did
- Report any Scaling Problems
- Report the Environment You’ve found
- Report any Potential Energy Wasters
- Report on the Operation of the Control Equipment
- Report Problems with their Equipment
  - Leaking Valves
- Inventory Conditions

Common Phrases To Do:

- For Reference Only
- Your control equipment is working properly
- I have reprimed you Chemical Feed Pump
- I have cleaned your bleed valve
- I have calibrated the Conductivity Controller
- I have inspected your tower basin
- I have logged your chiller/boiler
- Your chiller/boiler is operating efficiently
- You have sufficient Inventory on hand

Common Phrases Not to Do:

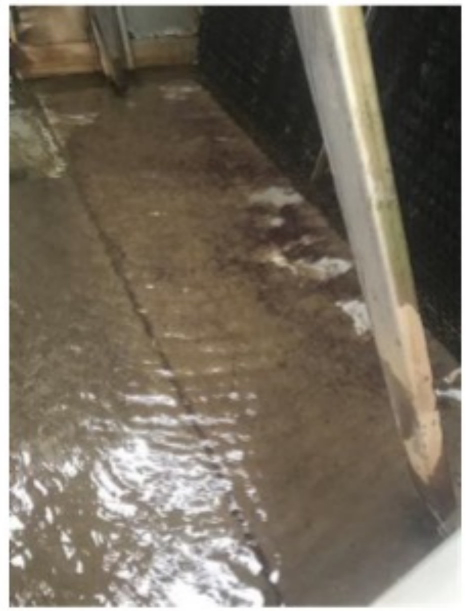
- You need to Fix the Chemical Pump
- Everything looks good
- No Problems were found
- Your Tower has no algae
- No Problems are expected

Cooling Tower

Online

The cooling tower testing was performed to determine the current condition of the program. While the chiller is off line, it was determined that the water balance is within acceptable limits. The Saturation (LSI) and Stability (RSI) indices indicate the program is properly treated as I have inputted the normal operating skin temperature of the system,.

I have inspected the cooling tower basin and we are in need of a cleaning before the upcoming cooling season. The dirt and debris will cause increased biological loading as it provides an excellent food source. The current biological control is excellent. Please call me so I can retreat the system after the cleaning is complete.



Closing Signature

Thank you for your business.
Mark T. Lewis, CWT

City	#1	#2	#3
pH	7.9	7.94	8.14
TH	200	180	200
CA	150	120	190
M	120	100	100
CHL	45	50	70
Cond	596	604	590

Tower			
pH	8.6	8.62	8.68
TH	750	470	520
CA	680	590	580
M	220	200	200
CHL	170	140	180
Cond	1512	1538	1514

Cycles			
TH	3.8	2.6	2.6
CA	4.35	2.8	3.1
M	1.8	2	2
CHL	3.8	2.8	2.6
Cond	2.5	2.5	2.6

Reminders

- Separate Line covering all Systems Tested
- List recommended Control Ranges
- Highlight, **Bold**, <u>Underline</u> Area's of Concern
- Provide Corrective Action
- Report Water Losses with potential costs
- Follow-up unaddressed Problem Areas with a separate letter

- Explain the Why

Team