



# Virtual Field Work

February 26, 2018

## Scene List – Mechanical Space

1. Notice
2. Overview (See also the Cooling Tower model)
3. Overview - Roof off
4. Overview – Different perspective
5. Overview – Walls removed
6. Standing in the mechanical space
7. Looking up at the control valve
8. Looking at the plan table
9. Level control panel opened up
10. Terminal strip – Closer look
11. Terminal strip – Closer look
12. Hi level alarm relay – Closer look
13. Control panel cover



## Scenes List – Cooling Tower

1. Notice
2. Overview
3. Overview – Piping only
4. CW supply (to chiller) piping only
5. CW return (from chiller) piping only
6. Equalizer pipe only
7. Overview near access door
8. Inside a tower cell
9. Water Level - Cold Basin 2
10. Water Level – Cold Basin 2 Detail
11. Water Level - Cold Basin 1
12. Water Level – Cold Basin 1 Detail
13. Overview from above
14. Hot basin covers open
15. Sides and fill removed
16. Hot basin detail
17. Nozzle detail
18. Nozzle detail with fill in place
19. Settling well
20. Electrode holder



## Scenes List – Cooling Tower (Continued)

- 21. Electrode holder
- 22. Electrode holder – Cover off
- 23. Electrode holder conduit connection
- 24. Electrode holder – Cut away
- 25. Cut away – Closer
- 26. Cut away – Even closer
- 27. Overflow and dry basin levels
- 28. Cold basin 2 level
- 29. Cold basin 2 level – different perspective
- 30. Cold basin 2 level



# A Few Things to Contemplate

1. What is the nominal chiller tonnage?
2. What is the blue box on the cooling tower and why is it required?
3. What type of drive system does the cooling tower have?
4. What type of cooling tower is this (forced draft, counter flow, etc.)?
5. Is there a reason the control system input wiring is segregated from the level control wiring?
6. Does the piping configuration for the cooling tower cells have the potential to impact their performance?
7. Is the system off or is the system running but the tower fans are off because they are cycling due to the system being at low load?
8. Is there a minimum speed you would not allow the tower fans to drop below?
9. Is it better to run one fan up and then the other or run both fans up together?





# How Well is Water Being Distributed

1. There is an important but subtle detail about how the settling well is fabricated; what is it?
2. What is the potential problem with different cold basin water levels?
3. What specific physical mechanisms are involved to uniformly distribute flow over the cooling tower fill?
4. What happens to tower performance if the fill is not uniformly wet?
5. Are there other issues associated with not getting the fill uniformly wet?
6. From a tower fan energy standpoint, what would be the best way to stage the tower fans?







# How Does the Level Control System Work

1. What are the functions of the different terminal types in the control panel?
2. How much does the Warrick control relay cost?
3. Why did Ellis seal the electrode fitting conduit entry with caulk?
4. How would you figure out the maximum fuse rating you could safely install in the fuse holders?





# Why Bother Fixing the High Level Alarm

1. Givens:
  - a. Leakage rate = 1 to 2 oz per second
  - b. Water cost - \$.0028 per gallon
  - c. Sewer cost - \$.0048 per gallon
2. Why do float valves fail so frequently?
3. How much does a bronze float valve cost?
4. How much does a Warrick level control system cost?
5. Does the Warrick (or similar) approach represent a value compared to the bronze float valve?





# Why Bother Fixing the Low Level Alarm?





# What is the Design Make-up Rate for the Tower?

1. Assume the chiller is a nominal 0.6 kW per ton machine?
2. What is the value of a meter in the tower blow-down line (aside from the potential need for it as an input to the water treatment controller)?
3. How can you come up with a load profile for the system?







# Are There Things You Are Learning that will Influence How you Procure a Cooling Tower





# Will the Pumps Interact?

1. Is there an energy savings opportunity associated with pump interaction?
2. Is there an energy savings opportunity associated with the Griswold valve?





# What is the Purpose of the Control Valve Associated with the Condenser Water Piping?

1. Do you think the valve is properly sized?
2. Is there a difference between locating the valve where it is vs.:
  - a. Outside at the tower basin
  - b. Down by the chiller
  - c. Across the pipes but above the level of the cold basin and directly tied to the CW supply line

