



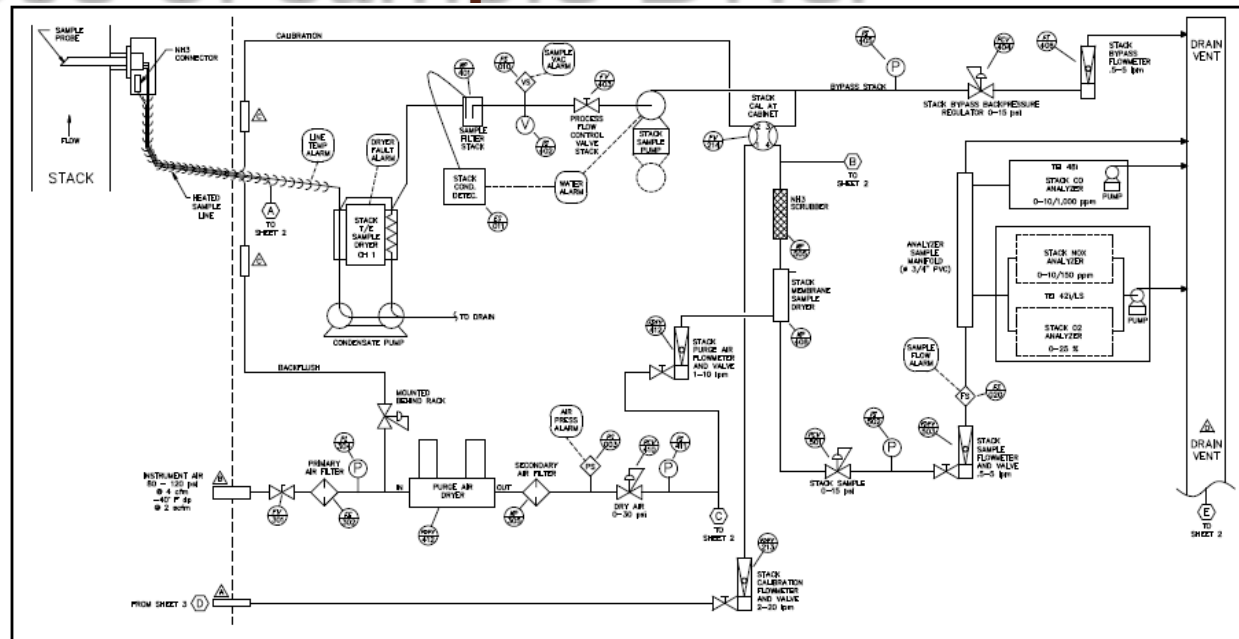
SAMPLE DRYING

**THERMO ELECTRIC COOLER VS REFRIGERATED
COOLED WATER BATH**

Why is the Sample Dried?

- Most analyzers can not make an accurate measurement if water is present.
- EPA pollution parameters are reported on a dry basis
- Prevents clogging of instrumentation, tubing, corrosion of sensitive analyzer components

Use of Sample Drier

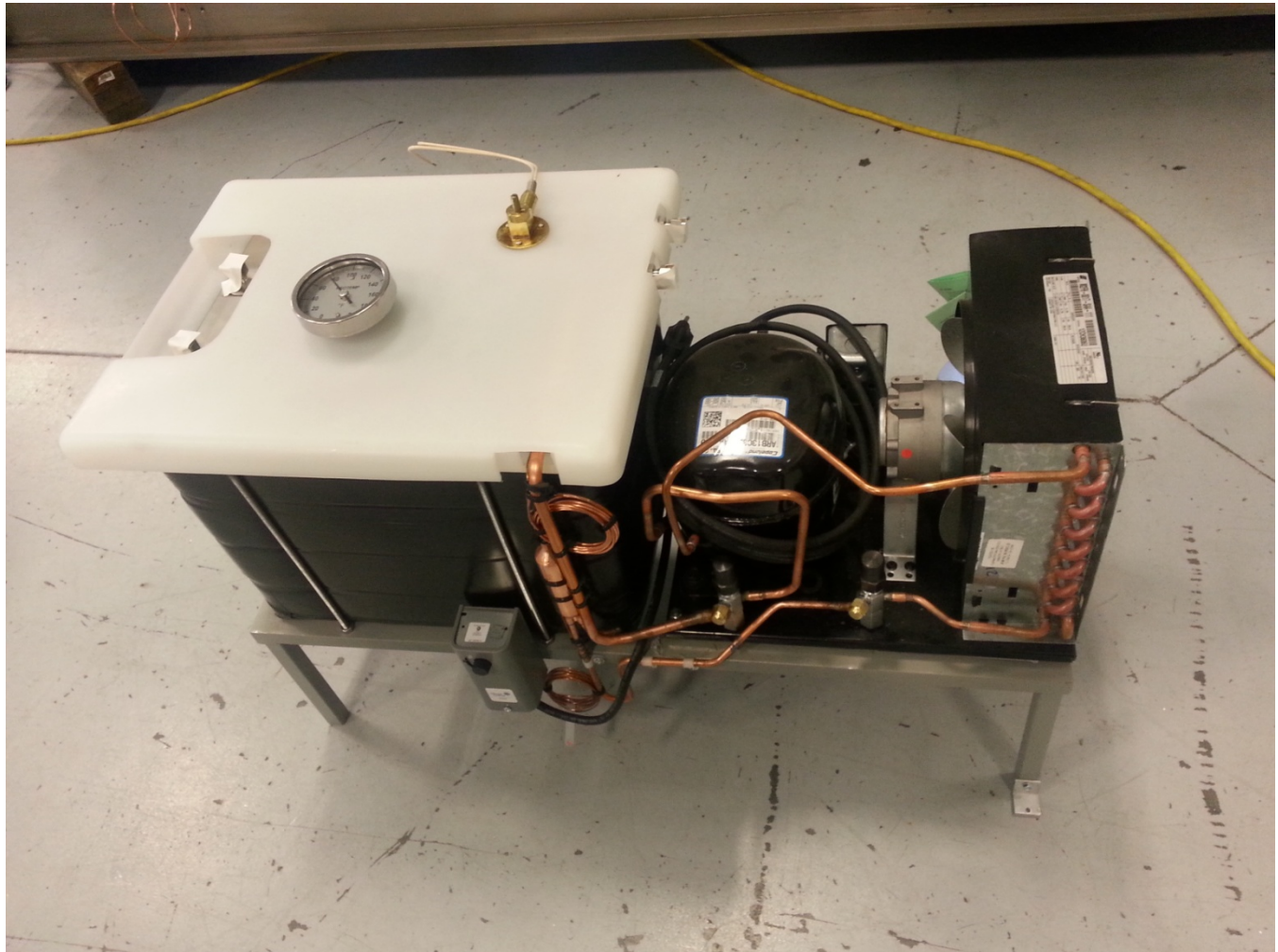


- Connected to HSL inside the shelter
- Uses Peristaltic Drain Pump to pump out Condensate without losing the sample vacuum.
- Lowers dew point of sample to approximately 38°F with either cooler type

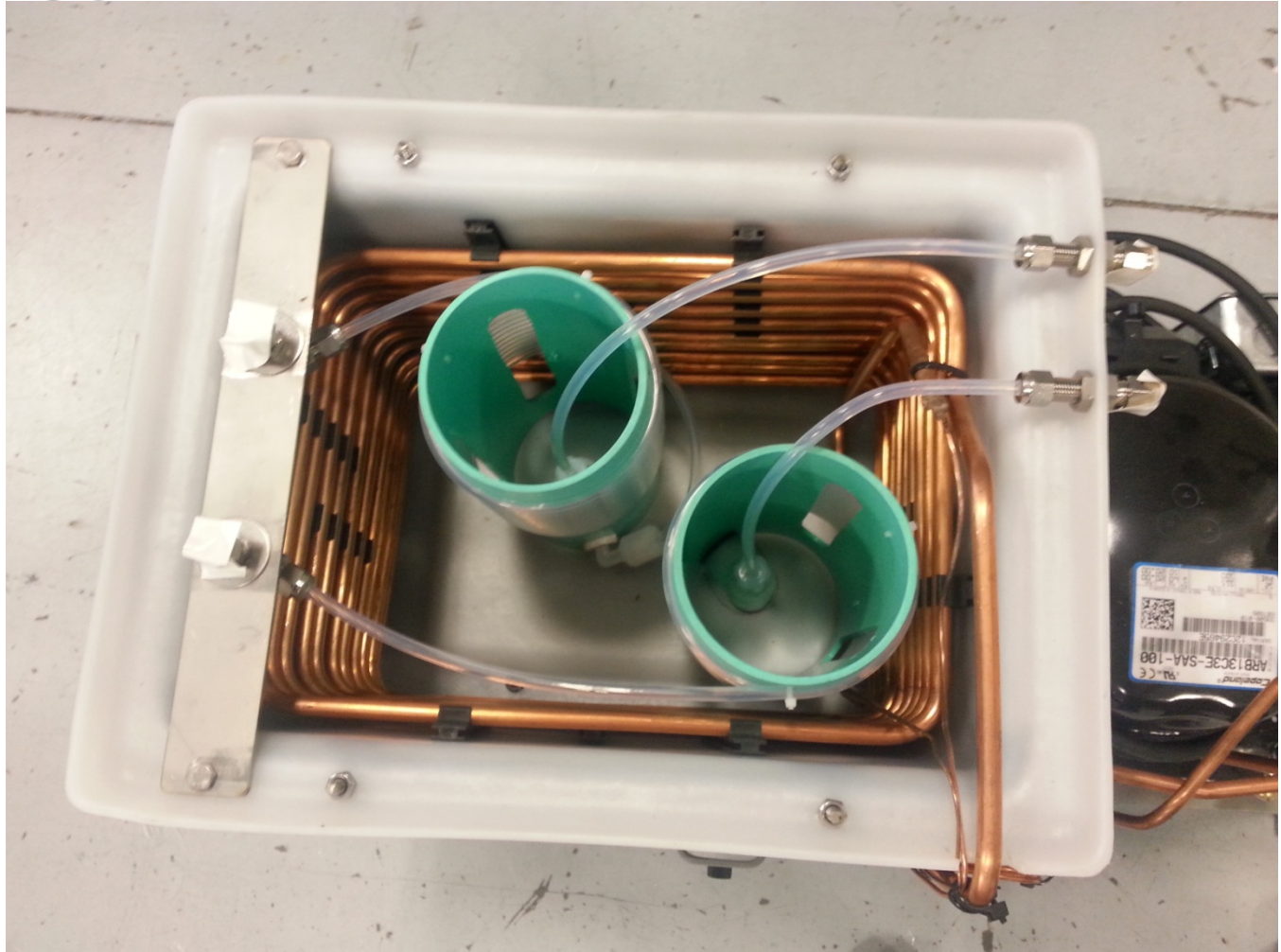
Water Cooled Baths

- Common refrigeration device using R-134a refrigerant, 1/6 HP compressor, condenser fan
- Large Cooling Capacity
- Teflon Tubes do not allow water to sheet surface
- Simple Design & Low Maintenance
 - Water Level Must be maintained
 - Use Tap Water, not demineralized

Dual Sample Point CiSCO Water Cooler



Inside CiSCO Water Bath (Two Trap)



Thermo Electric Coolers

- Uses Peltier Effect
 - Dissimilar materials are bonded together and electrical current is run through it. The junctions of the materials will become hot on one end and cold on the other.
- Stainless Steel or Kynar/Glass Coated
- Capacity:
 - Flow Rates
 - Single Active Impinger \leq 8 Liters Per Minute

Single Sample Universal Thermo Cooler



Refrigeration Unit (M & C)



REGULATORY CONSIDERATIONS

- No EPA mandate on either technology
- South Coast Air Quality Management District (Los Angeles Area) requires Peltier Cooler.

Similarities

- All units have a relay to indicate high temperature (above 41°F)
- Options to run using 110 VAC or 230 VAC
- General Purpose Electrical Applications

Main Differences

- Physical Dimensions
 - Water Cooler: 13" x 31" x 21" High
 - Thermocooler: 10" x 12" x 15" High (+10")
 - Refrigeration Cooler: 12" x 15" x 15" High
- Cooling Capacity for Single Unit
 - Water Cooler: 1190 BTU/HR
 - Thermocooler: 120 BTU/HR
 - Refrigeration: 492 BUT/HR
- Wetted Materials
 - Water Cooler: Teflon
 - Thermocooler: Glass, Stainless Steel or Kynar
 - Refrigeration: Glass, Stainless Steel, Thermoplastic

Pros / Cons

Water Bath	ThermoCooler	Refrigeration
PROS		
<i>Higher Cooling Capacity, can be used for 3 Sample points</i>	<i>No Routine Maintenance</i>	<i>Can be used for up to 4 Sample Streams</i>
<i>Lower Cost</i>	<i>Smaller, ideal for cabinet systems</i>	<i>Larger Capacity for smaller footprint</i>
CONS		
<i>Needs to be Filled/Drained</i>	<i>High Cost</i>	<i>Higher Cost</i>
<i>Large Footprint</i>	<i>Lower Capacity, Requires a Second Unit for three-sample points</i>	

Cost Considerations

- Single Sample Point Water Bath
 - \$2000.00
- Single Sample Point Thermo Cooler
 - \$5600.00
- Four Sample Point Refrigeration Cooler
 - \$7600.00

Replacement Water Bath (Spare unit without Thermoswitch, Thermometer etc... only \$1400.00)