

STANDARD DEVIATIONS: The Way Things Work

Greetings,

Today we're opening the doors to the Utah Public Health Laboratory in order to give you a peek behind the curtain. UPHL is a big lab; we do a bunch of stuff that clinical labs just can't justify keeping in house and some things at volumes that require massive infrastructure.

COVID-19 testing is both of those.

Let's take a look at the COVID-19 assay and the UPHL setup.



{UPHL}

This is the lab. We're in Taylorsville, UT. The right side is all admin, office space, and training. The left side is testing. The first floor is Specimen Processing, warehousing, and sterilization/washroom. The second floor performs the Toxicology, Chemistry and Environmental testing. The third floor is the Sero/Viro, Bacteriology, Molecular, Newborn Screening, and Bioterrorism labs.

When samples arrive at the lab they don't drop in through a tube system, or come in carried by phlebotomy. No, they come by courier. Some days are worse than others and COVID-19 has had an impact on our Specimen Receiving.





{Yikes}

Everybody gets verified, accessioned, labeled, and placed in racks for testing upstairs. In secondary containment (transport bags) we're not too worried, but the primary containers pose a risk of exposure and handled in an S/R BSC for labelling and racking.





{About to get busy, every sample will go into this cabinet to be labeled.}

We test by PCR and use 96-well plates. Racks of samples are ordered in groups of 93 (3 controls), re-bagged, and the racks are delivered to the molecular department on the third floor. Let's go!

We have three rooms for molecular testing. The first area is the extraction area. Samples are brought here for storage and handling. The other rooms are kept clean. Four BSC's (UPHL has 16 six footers) are located in this room.

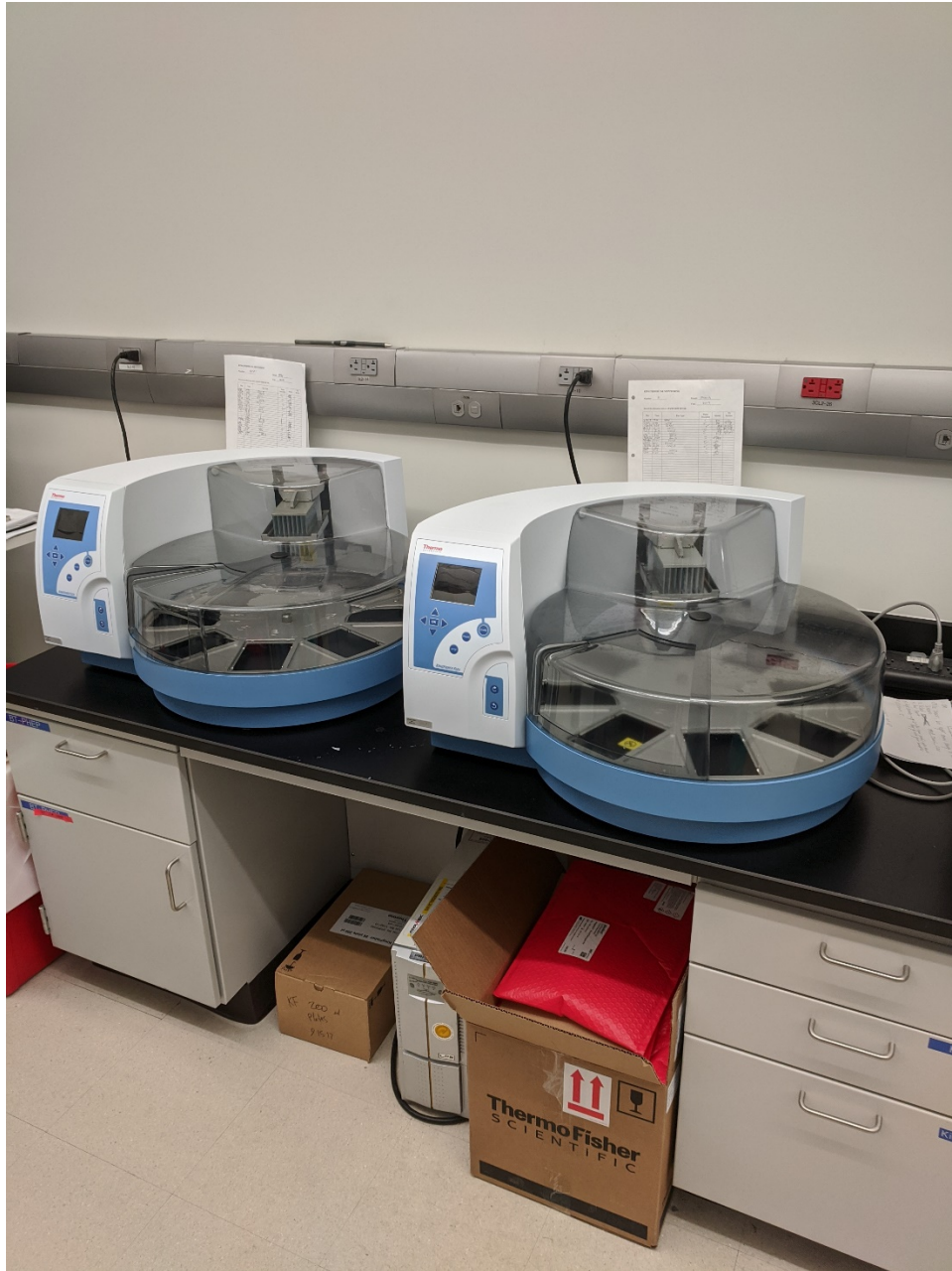




{Class II A2. Two more are back-to-back with these)

Now we can start. Samples are accessed in the BSC and aliquoted to deep-well plates (200 uL of VTM). This lysis step inactivates the virus and then the testing can be performed at BSL-2 on the open bench. Each tube (93) must be vortexed, accessed, and returned to the rack with sterile technique to prevent any cross-over.





{The Kingfisher workhorses}

During the wash and extraction step, another technologist is in the reagent prep area making up Master Mix and pipetting 20 uL of Primer/Probe & Polymerase into a 96-well plate. This room is kept RNA/DNA free.





{Air Clean hoods are not BSC! The reagent plate is passed through a window to the extraction room.}

Samples are pipetted (5 uL) into the master mix plate and passed into another clean room where we perform amplification. UPHL uses the ABI 7500 Fast Dx model of thermocycler and we run four at a time. PCR takes just over an hour once the machine is loaded.





{Window pass-through in background}

Once the run finishes, the data is uploaded to a software program that analyzes and evaluates the spectra. The data must be transferred to our LIMS software for review before a final report can be generated.





{QC, QA, order errors, repeats, inconclusive, specimen tracking, data analysis, result entry, etc.}

Okay, that's it, in a nutshell and pictures! I hope it makes sense to you and gives you some insight into the machinery behind the testing you send our way.

Have a great week and be safe,

Bryan

