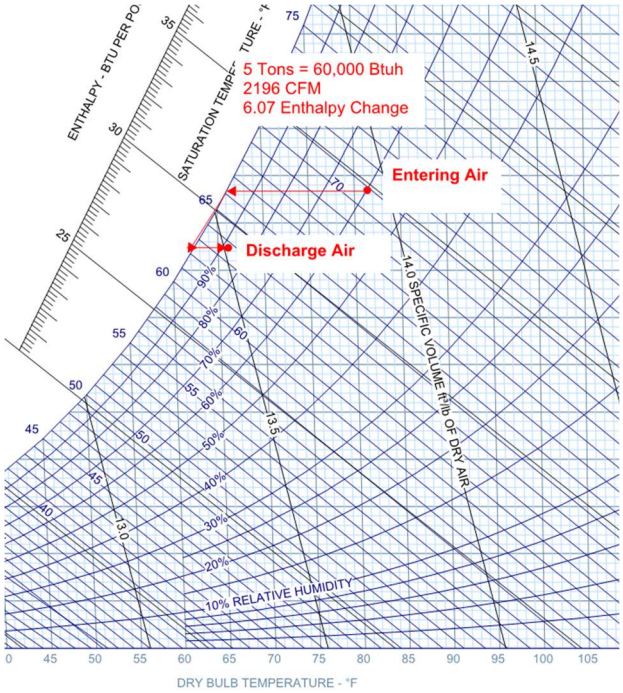
National TAB

Project Summary
The purpose of the testing was to evaluate cause of hot conditions at the cookline. Limited design information was provided so target airflows were made based on previous design documents, equipment size and application, and typical 5 Guys Designs.

Upon arrival found that the building pressure was negative. The space has five RTU's each of which are 5 ton units. It was identified that none of the RTU's had dehumidification. Two of the outside air intakes for the RTU's were closed and two were slightly cracked open. RTU-3 does not have an outside air intake installed. The building was approximately negative 600-700 CFM initially.

Airflow for RTU-4 on the cookline was initially 1704 CFM (341 CFM/ton) and was increased to 2196 CFM (439 CFM/ton) to increase airflow on the cookline. The temperature on the cookline was in the 70's in the morning but as the day progressed it increased to around 85 degrees. The measured temperature at the temp sensor matched what was being displayed on the thermostat which indicates it is sensing an accurate temperature. During peak cooking times entering and leaving temperatures on the evaporator coil were measured as 81 EAT and 66 LAT which is a 15 degree drop. A quick check was done on a psychrometric chart and it appears this is a reasonable discharge temperature, however it is recommended that the refrigeration of this unit be checked to ensure it is adequately charged and operating properly.



The MUA is a non-conditioned, non-tempered unit and discharges at the hood at a front PSP. A conditioned MUA would typically be highly recommended in this climate and it appears that this is the most significant issue related to the comfort on the cookline. This is also evident by observing that the temperature on the cookline closely matched the temperature outdoors throughout the day. The airflow was initially measured as 3307 CFM and was reduced to 2452 CFM to limit as much as possible. We would prefer to decrease further but could not do so without causing a highly negative building pressure.

The hood exhaust airflow was balanced to 4705 CFM and only a small reduction from the initial flow could be made.

All other RTU's were measured to be slightly low and were increased slightly to get airflow closer to 400 CFM/ton.

The restroom exhaust fan was found to not be running (around 375 CFM)

Ideally the outside air for the RTU's would be balanced no higher than 20%, but we increased to maximum of 23% ratio which should be OK. IT is recommended that an outside air intake be installed on RTU-3.

The building was balanced slightly negative (-0.026" wc) to ensure the MUA could be left as low as possible. This is a slight improvement from where building was found (-0.03"). Cooking was observed and the hood is operating well.

Findings and Recommendations

- Major cause for the comfort issue on the uncomfortable temperatures on the cookline appear to be the non-conditioned MUA. Even with steps below a conditioned MUA will likely be required. Would recommend consulting an OEM to discuss how they would typically design in this climate. It might be possible to get away with installing an AC-PSP at the hood instead. These have been effective for other clients in similar clients but without knowledge of the load calculation for the space unable to give a definitive answer if this would work. If preferring not to install conditioning, the following steps could be attempted:

1. Ensure that refrigeration for RTU-4 on the cookline is adequately charged and operating properly. Appears that it is based on the entering air conditions even though the discharge temp was measured as 66 degrees.
2. Change pulleys on the hood exhaust fan to lower airflow as much as possible so that the MUA could be further reduced. Could potentially get the hood exhaust airflow at least to 4000 CFM which would allow a reduction of MUA to 2000 CFM. Installing full vertical end panels on both sides of the hood would allow for even more reduction.
3. Install OA intake on RTU-3 and balance to ~450 CFM. This would allow MUA to be reduced to 1500 CFM.
4. Balance new EF for restroom (if installed) as low as possible. If this is installed it will impact how low the MUA can be reduced.
5. Balance the building slightly negative