Last Updated: 10/8/20

COVID-19 Risk Assessment

Please contact the ARC Director (manuel.garcia@ucsb.edu) or the ARC Manager (veronica.wynn@ucsb.edu) if you have any concerns or questions about this risk assessment.

Purpose:
The ARC has been safely operating during the COVID-19 pandemic with a very limited user population (i.e., only critical research activities since 3/20/20). Beginning June 16th, the campus will ramp up research methodically in several stages to assure that we have a strong COVID-mitigation plan to minimize risks. Beginning with stage 3, the definition of "critical" will be relaxed to include time-sensitive research, which is expected to result in an increase (ramp-up) in the number of individuals performing research activities in the ARC. This risk assessment establishes the user population that the ARC can safely accommodate in stage 3, and later stages, and the engineering or administrative changes needed to mitigate the risks associated with an increase in the current user population.

HVAC Performance

- The HVAC Test and Air Balance report from November 2019 established that there are at least 10 fresh (non-recirculating) air changes per hour (ACH) in nearly all areas of the ARC, and definitely in all animal housing and procedure rooms. There is no recirculation of air in any of the vivarium spaces. All fresh air is filtered (MERV 13) and in one animal procedure room all incoming air is also HEPA-filtered.

Maximum Occupancy

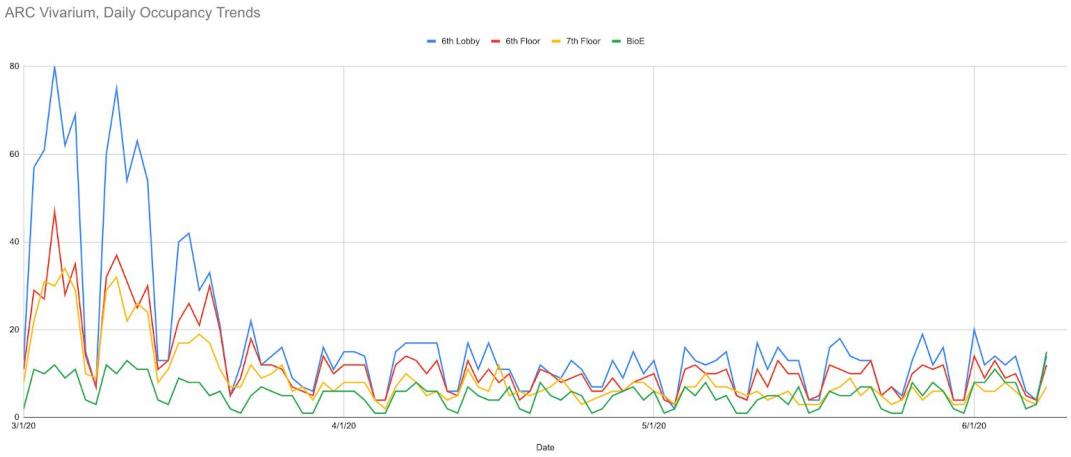
- We calculated the maximum occupancy levels for each room in each facility that is expected to see an increase in activity during stage 3. We used a 250 sq. ft. per user physical distancing metric, because this is the metric recommended by EH&S and OR in the document "Guidelines for Establishing Safe Research Practices." Exemptions from this physical distancing metric are listed below, and we may also consider alternative physical distancing metrics (175 sq. ft. or even 150 sq. ft. per user) for later stages (stay tuned). For each room we also considered ventilation rates (ACH; air changes per hour) and verified the availability of engineering controls to protect users and animals. Specifically, in the animal holding rooms, all users must use the animal transfer station when handling animals. There is usually only one animal transfer station per animal housing room, except in rooms 0216 and 6163 (2 hoods). For the animal procedure rooms, we also verified the availability of necessary engineering controls (e.g., down-draft tables or WAG scavenging system).

- We deviated from the 250 sq. ft. per user physical distancing metric in the following rooms.
    - In animal procedure room 6157 we have 2 downdraft tables, the air supply in this room is HEPA-filtered and the air exchange rate is 41 ACH. The physical distancing metric for this room was 125 sq. ft. per user. In this room we allowed a maximum of two individuals at the same time, one per downdraft table.
    - In the following exclusive-use procedure spaces on the 7th floor of Bio2, 7167, 7168A and 7173, the PIs responsible for the safety of the research personnel working in those spaces have submitted alternative and specific mitigation measures to their respective Building Committees for approval, instead of the 250 sq. ft. per user metric. In these rooms, the density is one user per ~100 or ~200 sq. ft. No ARC staff will be working in these exclusive-use rooms.
- In the floor plans at the end of this document, the maximum occupancy for each room is represented by an orange circle (i.e., if you count the number of circles, you get the maximum number of users for that vivarium area). Each circle represents an area of approximately 250 sq. ft., except for the floor plan for the 7th floor of Bio2 where the circles are approximately 60 sq. ft. The green arrows represent the vivarium ingress traffic flow, and the red arrows represent the vivarium egress traffic flow.

Daily Access Trends

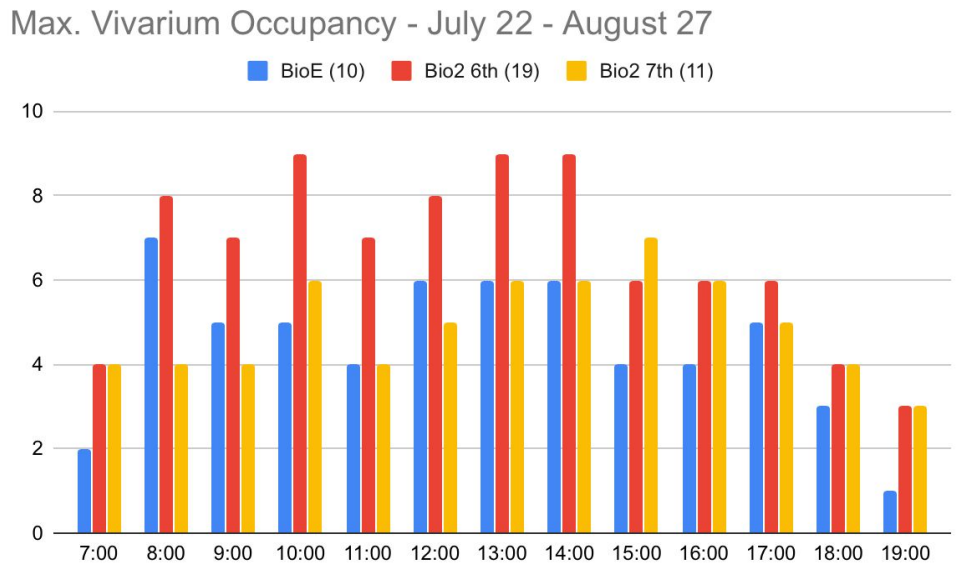
- Daily access trends were determined from a review of the access card reader reports for the readers at the ingress points to the 6th floor Bio2 vivarium, 7th floor Bio2 vivarium, and BioE vivarium.
- On the weekdays between March 20, 2020 and June 5, 2020, the min and max access for the Bio2 vivarium was between 3-18 individuals, and the average was 11 individuals on the 6th floor, and 7 individuals on the 7th floor. In the BioE vivarium, the daily range was between 1-8 individuals per weekday, with an average of 6 individuals per weekday.
- Before the shutdown (3/20/2020), daily access in Bio2 was essentially the same for the 6th and 7th floors of the vivarium. The stage 3 research personnel population will not reach this level; however, we'll need to be careful how many users access the 7th floor at any one time, since the size of the vivarium on this floor is 2.5x smaller than the 6th floor vivarium.
- In terms of space/user, and defining space as the cumulative space in the vivarium (per floor in Bio2), the average weekday occupancies correspond to 828 sq. ft. per individual on the 6th floor, and 488 sq. ft. per individual on the 7th floor. REMEMBER, THESE ARE CUMULATIVE SPACE PER DAY RESULTS, NOT OCCUPANCY DENSITY LEVELS FOR INDIVIDUAL ROOMS.
- We identified an average of 14 individuals per weekday (min/max = 5/22) accessing the shared NRI/ARC space on the 6th floor, or 185 - 295 sq. ft. per

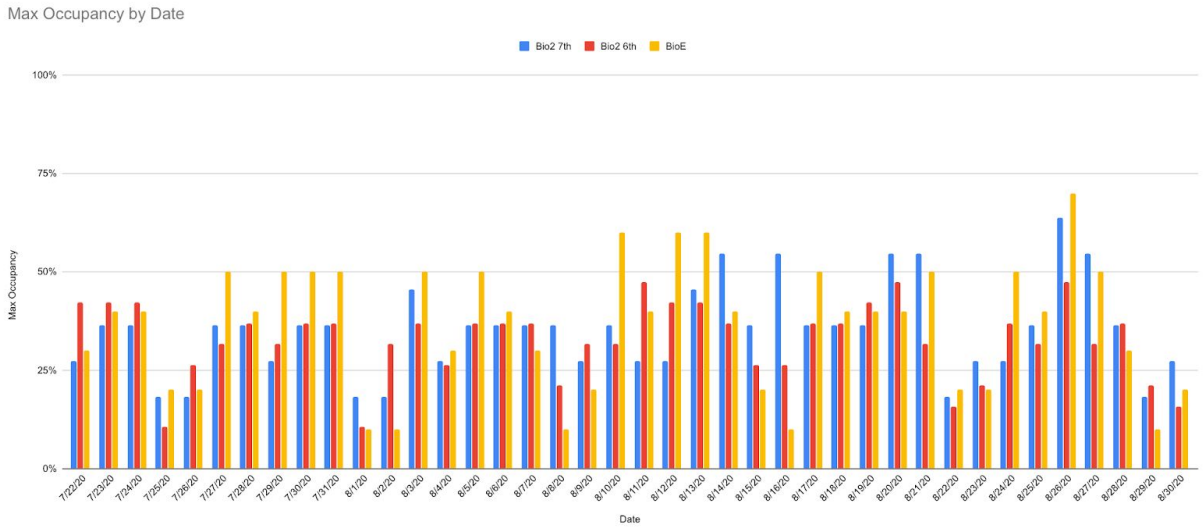
individual. AGAIN, THESE ARE CUMULATIVE SPACE PER DAY RESULTS, NOT OCCUPANCY DENSITY LEVELS FOR INDIVIDUAL ROOMS.



Daily Occupancy Trends

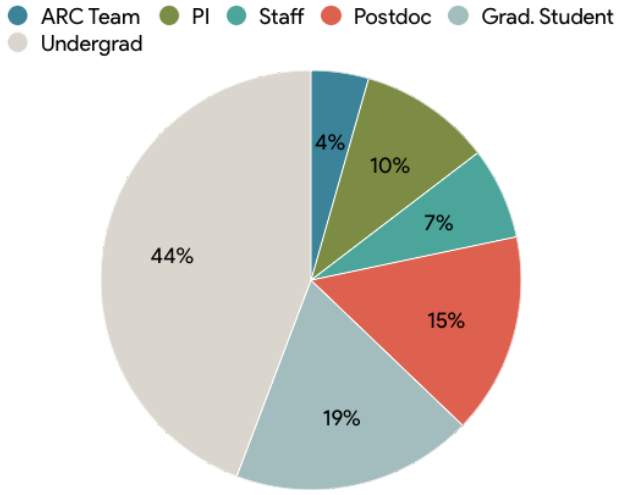
- Beginning in mid-July, daily occupancy was monitored using the access card readers. One reader in each area (6th floor Bio2 vivarium, 7th floor Bio2 vivarium, and BioE vivarium) was designated as the ingress reader, and all users working in this area had to use this reader to gain access to the area. One reader in each area was designated as the egress reader, and all users had to present their card to this reader upon exiting the area. Access to the area was not controlled by the egress reader; however, because of the one-way traffic pattern, by presenting a user's card to the egress reader we were able to document when the user exited by the vivarium.
- The data presented in the figures below represent hourly occupancy and the % of the maximum daily occupancy for each area. Maximum occupancy at any one time (one hour blocks) was established in the safety plan, and is as follows: 6th floor Bio2 vivarium = 19, 7th floor Bio2 vivarium = 11, BioE vivarium = 10.





Normal Research Personnel Population

- We calculated the normal animal user population with data from the IACUC's personnel database, which identifies personnel approved by the IACUC to work with animals housed in the ARC. We also included data on non-IACUC users; research personnel that completed a facility orientation and were trained to work in the Mosquito lab (7th floor Bio2) and personnel that had keycard access to the Anthropology lab (BioE) in the Lenel Access Control system.
- As shown in the pie chart below, undergrads represent the largest user class in the normal user population (44%). Only 8 undergrads are working in the ARC during stage 2 (14% of the population). The number of undergrads is expected to decrease by 2 individuals in stage 3.



- The busy table below represents the breakdown of all ARC users (research personnel and ARC staff), where they are coming from (what building houses their lab), and where they are working with animals (which vivarium). It shows that:
    - *The number of individuals with access to the ARC during stage 2, exceeds 15% of the normal research population for every vivarium area. In stage 3, more users are expected to have access to the vivarium; therefore, users will be expected to work in shifts to ensure that not more than the maximum number of users are working in the vivarium at the same time. Maximum occupancy at any one time and user shifts are described in the Safety Plan.*
    - Even though the two vivaria (Bio2 and BioE) are roughly comparable in size (Bio2 has slightly more space and is divided on two floors), the BioE vivarium has fewer users, and therefore more capacity to accommodate users in stage 3. Between 6/8/20 and 6/10/20, we relocated animals (mice and rats) from the Bio2 vivarium to the BioE vivarium. This animal relocation resulted in the relocation of research personnel working with those animals from Bio2 to BioE. This change is accounted for by the number in parentheses in the "From LSB" and "Totals" rows of the "Stage 3 – 15% Target" column.

Labs Working in ARC	# Users pre-COVID	# Users in Stage 2	Stage 3 - 15% Target
From Psych	Bio2 ARC 6th = 26 Bio2 ARC 7th = 39 BioE ARC = 0	Bio2 ARC 6th = 3 Bio2 ARC 7th = 5 BioE ARC = 0	Bio2 ARC 6th = 4 Bio2 ARC 7th = 6
From Bio2	Bio2 ARC 6th = 55 Bio2 ARC 7th = 3 BioE ARC = 1	Bio2 ARC 6th = 9 Bio2 ARC 7th = 1 BioE ARC = 0	Bio2 ARC 6th = 8 Bio2 ARC 7th = 1 BioE ARC = 1
From Mosquito Lab	Bio2 ARC 7th = 26 BioE ARC = 0	Bio2 ARC 7th = 11 BioE ARC = 0	Bio2 ARC 7th = 4

From LSB	Bio2 ARC 6th = 24 BioE ARC = 6	Bio2 ARC 6th = 5 BioE ARC = 4	Bio2 ARC 6th = 4 (1) BioE ARC = 1 (4)
From BioE	Bio2 ARC 6th = 9 BioE ARC = 11	Bio2 ARC 6th = 5 BioE ARC = 5	Bio2 ARC 6th = 1 BioE ARC = 2
From ARC	Bio 2 ARC 6th = 3 Bio 2 ARC 7th = 2 Bio E ARC = 3	Bio2 ARC 6th = 3 Bio2 ARC 7th = 2 BioE ARC = 3	Bio2 ARC 6th = 3 Bio2 ARC 7th = 2 BioE ARC = 3
From HSSB	Bio2 ARC = 0 BioE ARC = 7	Bio2 ARC = 0 BioE ARC = 3	BioE ARC = 1
From ENGR II	Bio2 ARC 6th = 5 BioE ARC = 0	Bio2 ARC 6th = 0 BioE ARC = 0	Bio2 ARC 6th = 1
From Marine Biotech Lab	Bio2 ARC 6th = 4 BioE ARC = 0	Bio2 ARC 6th = 0 BioE ARC= 0	Bio2 ARC 6th = 1
Totals	Bio2 ARC 6th = 128 Bio2 ARC 7th = 68 BioE ARC = 28	Bio2 ARC 6th = 25 Bio2 ARC 7th = 19 BioE ARC = 15	Bio2 ARC 6th= 22 (19) Bio2 ARC 7th = 13 BioE ARC = 8 (10)

Note: The totals in the bottom row of the "Stage 3 - 15% Target" column represent the sum of the data in that column. These totals don't equal 15% of the totals (bottom row) because of rounding decisions (whole numbers are used) and because ARC staff populations are not included in the 15% target (their numbers are unchanged in all three columns).

Risk Assessment Findings

- Room 6164, on the 6th floor of the Bio2 vivarium, was identified as a potential high-traffic area (see red dot on the floor plan for the 6th floor). Eleven individuals will need to work in this small room (167 sq. ft.), but not more than one individual at a time.
- The vestibule (7000A) at the entrance to the 7th floor of the Bio2 vivarium is also the PPE changing area for the individuals working on the 7th floor (see red dot on the floor plan for the 7th floor). A one-way traffic pattern for this changing area is not possible; this is the only vivarium ingress and non-emergency egress point on the 7th floor.
- The anteroom (7165) on the 7th floor of the Bio2 vivarium that leads to the Mosquito lab (7167), an exclusive-use animal procedure room (7165A), the animal biohazard level-2 (ABSL2) holding room (7165B), and the animal quarantine room (7165C) is also the PPE changing area for three of these rooms (users of 7165A don't use the changing area in this anteroom). A one-way traffic pattern for this area is not possible; this is the only ingress and non-emergency egress point for the four rooms (7165A-C, and 7167).

Risk Mitigations

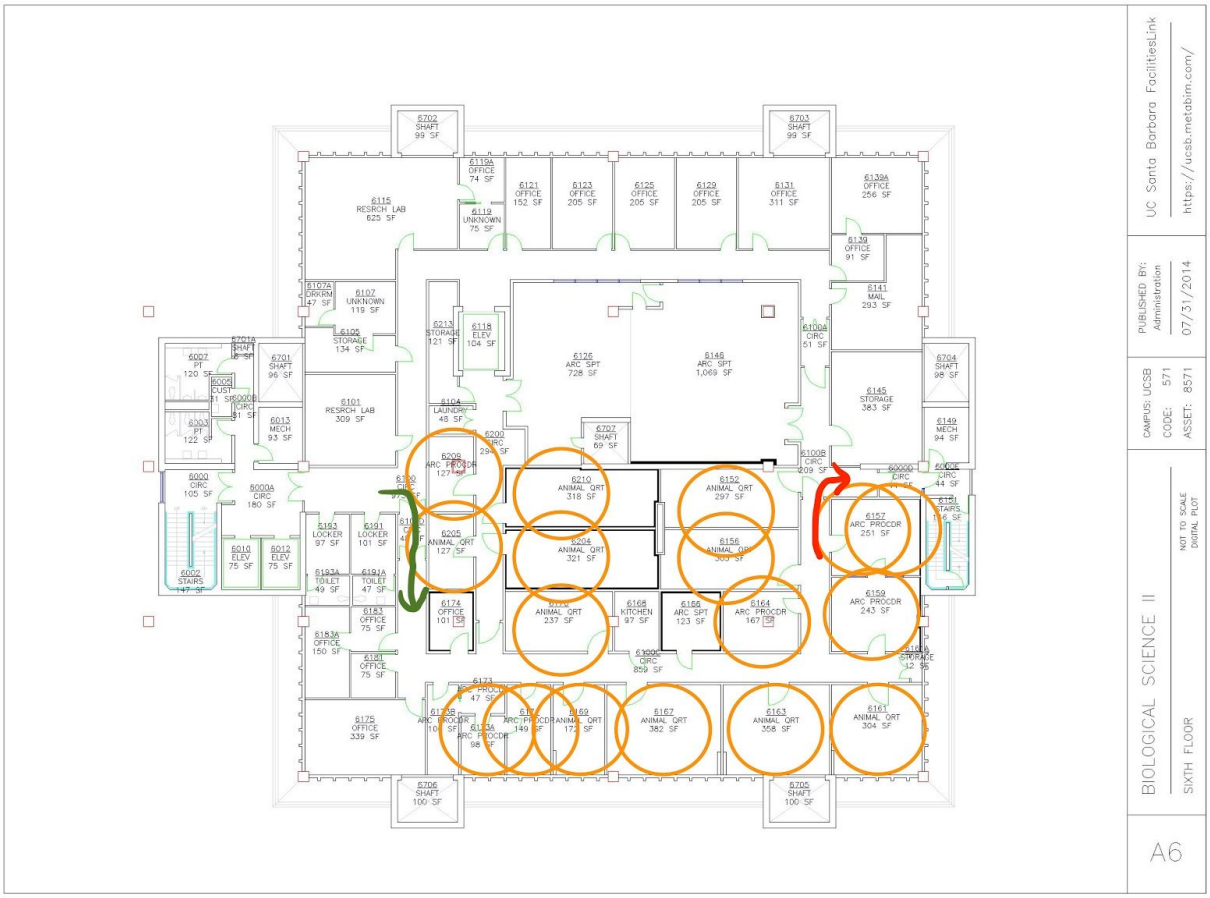
We instituted the following engineering controls and work process changes to prevent coronavirus transmission (fomite or airborne) in these high-traffic areas.

- We submitted a Work Request to FM asking that they increase the ACH in these areas to 15 ACH.
- We submitted a Work Request to FM to replace the ceiling lights in the 7000A vestibule and the 7165 anteroom with lights that are controlled by a

programmable motion sensor. This change improves energy efficiency, but more importantly having the lights in room 7165 on a motion sensor that times out after 5 minutes will signal to any user looking through the windows in the doors that open into this room if someone has just been in the area, because if they see that the lights are on, then they will know that someone was in the anteroom just before them. Waiting until the lights are off, will ensure that there has been enough time for the exhaust ventilation to change over the volume of air in the room at least once.

- We moved the lab coats that were in the 7000A vestibule to the main hallway, which is a large space with better ventilation.
- We held a meeting (zoom) with the PIs whose labs work in the spaces on the 7th floor to make them aware of the increased risks in these areas and mitigation measures, and to review the use of the ARC's shared Google calendar so that they and their research teams are aware of when ARC staff will be working on the 7th floor.
- We communicated with the PI and users that have access to room 6164 in order to make them aware of the increased risks in this room, and to review the use of the ARC's shared Google calendar so that they are aware of when ARC staff will be working on this room.
- Arrangements were made with FM to provide frequent cleaning and sanitation in the PPE changing areas.
- All users will be expected to maintain the PPE changing areas clean and uncluttered.

Floor Plan - Bio2 6th Floor



Floor Plan - Bio2 7th Floor

Floor Plan - BioE Basement Floor