Department of Chemistry, Research Restoration Stage 1 Plan

The Department of Chemistry COOP team was tasked with the responsibility for developing a research restoration plan. This team is responsible for all emergency management processes in the department and consists of the following individuals (roles): Burstyn, J.N. (Chair); Blackwell, H. (Associate Chair, Grad. Prog.); Landis, C. (Associate Chair, Undergrad. Prog.); Nathanson, G. (Associate Chair, Research); Driscoll, K. (Administrative Support); Egan, P. (Department Manager); Hermans, I. (Safety Committee Chair); Lyles Flick, T. (Communications); McMahon, R. (Facilities Committee Chair); Nielsen, J. (Building Manager); Sanders, M.J. (Finance Manager / Executive Director); Silver, A.C. (IT Director).

The COOP team was tasked with responsibilities for developing different components of the department plan according to their specific roles and expertise. The sub-teams were tasked with the following responsibilities: ***Research priority setting and research protocol evaluation*** Judith Burstyn, Clark Landis, Gil Nathanson, Helen Blackwell; ***Physical plant / facilities operation*** Bob McMahon & Jeff Nielsen, with advice from Tim Bertram on air flow and aerosol exposure risk management; ***Research operations / departmental support systems*** Pat Egan, Matt Sanders, Kayla Driscoll, and Jeff Nielsen (deliveries / material distribution), Alan Silver (technology support); ***Chemical Safety*** Ive Hermans, Tilak Chandra (EH&S, Chemical Safety representative); ***Communications*** Tatum Lyles, Kayla Driscoll, Arianna Imperl; ***Technology team*** Alan Silver, Theresa Pesavento (Batch lead, Continuity of Instruction). Each sub-team was delegated to prepare and edit their drafts, and the entire team met weekly to review progress.

1. Priorities for research restoration in Stage 1 and processes for ensuring transparency and equity

The Chair and three Associate Chairs were tasked with the role of addressing items 1-3 of the department plan. They reviewed the guidelines provided by the College of Letters & Sciences, and the needs of our department faculty, staff and students, to establish priorities for research in Stage 1.

First priority will be given to research involving graduate students who are graduating or postdocs who need to complete their projects. Second priority will be to restore limited research activity to every group in the department, subject to the constraints imposed by their physical laboratory space and the need to distribute individuals evenly and at low-density across our physical facilities. Within all categories, students and postdocs in groups led by Assistant Professors will be prioritized to the extent that safety and facilities allow. Faculty members who are needed in the laboratory to supervise experiments will be allowed to do so, consistent with the established criteria for the number of occupants per laboratory. **An additional criterion is that, to return, each student or postdoc must work with a chemical safety buddy.** Depending on the nature of the experimentation being undertaken and the laboratory layout, these individuals may work in the same room or in different rooms.

In Stage 1, following L&S guidance, building occupancy will be limited to 6 individuals per building floor. The Chemistry complex consists of three buildings: Shain is 6 floors, Mathews is 7 floors, and Daniels is 11 floors, in total comprising 24 floors. Four floors of the Daniels building (B, 1, 2 & 9) are not appropriate for laboratory research, leaving 20 floors available for potential research use at low density. (See accompanying figure for facility layout and utilization summary.) All three buildings house research group laboratories on the upper floors: Shain has 4 floors of labs, Mathews has 4 floors of labs, and Daniels has 6 floors of labs. On these 14 floors, with 6 persons per floor, we can accommodate 84 researchers at low density. Our department research support facilities occupy other floors not occupied by research group laboratories. The 2nd floors of Shain and Mathews house the Chemistry

Floor	Shain	Mathews	Daniels
			mechanical penthouse
9	mechanical penthouse	x	support + mechanical
8	research	x	research
7	research	mechanical penthouse	research
6	research	research	research
5	research	research	research
4	mechanical	research	research
3		research	research
2	support	support	instructional labs
1	support	support	instructional labs
B	mechanical	support	instructional labs
SB	x	mechanical	support + mechanical

Physical layout of three buildings comprising the Department of Chemistry

Instrumentation Center, with the magnetic resonance facilities in Mathews and the X-ray and mass spectrometry facilities in Shain. The glass shop occupies the basement of Mathews. The maker space (machine & electronic shops) occupies the sub-basement of Daniels. The business services area occupies the first floor of Shain. The receiving and distribution facility occupies the first floor of Mathews. Together, these support service floors can accommodate 36 staff members at low density. **We anticipate allowing 84 researchers and a maximum of 19 supporting staff into the building in Stage 1.** Typically, staff will take turns overseeing support functions so that all 19 individuals will not be on site on any given day.

To ensure equity, the evaluation team consisting of the chair and three associate chairs will consult the list of current graduate students to identify those students who are in their 5th year in the program, and post-docs who are in their second or later year in the department. The mentors of many of these students have reached out to the chair to request such access for their specific mentees. Faculty will be encouraged to identify students and post-docs who fit these categories, and to identify a safety buddy for these individuals if there is only one student or postdoc who meets the urgent need criterion.

Students or postdocs who require physically close supervision or who must work close to each other are not allowed to return in Stage 1. If physical proximity is essential to the research, additional protective barriers, such as face shields, must be employed to protect researchers.

Selection Process

Faculty have been invited to think about their own research group, to identify those students and postdocs who qualify for Stage 1 priority, and also to consider how they would meet the need that each individual has a chemical safety buddy to work with. The chair will distribute the department/building limited operations plan, along with all associated university level guidance for research restoration. Faculty will identify the students who they prioritize for return and briefly justify their choice. Their requests will be reviewed by the chair and three associate chairs for consistency with the established priority, and by the facilities committee chair and chemical safety committee chair for compliance with building utilization and chemical safety. If the request is approved by department leadership and resulting building utilization detail is approved by L&S, the PI will be given permission to submit a formal request to the VCRGE through the submission portal. All submitted requests must be consistent with the overall department plan, and must adhere to the university level guidance.

Transparency and Equity

The chair, with help from Tatum Lyles from the communication team, sent weekly email messages to the entire department (our “everyone” email list) updating them on progress toward restoration. On May 19 and May 27, when specific details about how the plan was going to be implemented were established, the chair sent a message to all faculty and the CIC director, informing them of the priorities and processes for research restoration.

Students, postdocs, staff and PIs will all be apprised of the priorities listed above. The chair and associate chairs will host Town Hall meetings to describe the process, address questions and concerns, and train all chemistry personnel who will work on site in physical distance and safety procedures. Students and postdocs will be encouraged to discuss the priorities and concerns with their PIs. Graduate

students may also speak with their mentor committees. Anyone employed by the department, graduate students, postdocs, staff or faculty, may share concerns with the department HR specialist, Char Horsfall.

Anticipating Future Stages

Beyond Stage 1 we foresee no obstacles to increasing research productivity at low density in subsequent stages. It is important to our department constituency to know that such an arrangement may be possible in later stages of the research restoration process. The highest departmental priority will be to restore limited research activity to every group in the department, with an emphasis on ensuring that our junior faculty are able to progress in their research. The scale of activity will be limited by the number of people who can be safely accommodated within the laboratories available to each research group. Graduate students and post-docs will be allowed to return in shifts consistent with the best public health guidance, such that the largest number of individuals can be accommodated in non-overlapping and consistent groups. One approach is to deploy a one-week on, two-week off rotation strategy designed to control COVID risk in workplaces (see "Cyclic exit strategies to suppress COVID-19 and allow economic activity" medRxiv preprint, https://doi.org/10.1101/2020.04.04.20053579). With an increased weekly density in later stages, allowing up to 150 researchers per shift within safety guidelines, we anticipate that all chemistry researchers who require laboratory access may make progress in their research.

2. Processes to ensure that only that work requiring laboratory access is conducted on campus

The Work at Home Rule

All work that can be remotely must be done remotely. The PIs will be encouraged to devise plans with their students that facilitate remote work wherever possible. Data collection may be done in the lab; data analysis should be done remotely.

Only those students, postdocs and other researchers who need to complete in-laboratory experiments will be allowed to return in Stage 1. Top priority will be given to senior graduate students who are nearing completion of laboratory work and who will benefit most from immediate access to the lab. Highest priority will be given to those students defending this summer, who require minimal additional experimental work, and to postdoctoral associates nearing the end of their term who have jobs lined up for fall or who cannot extend their funding beyond the summer, and therefore need urgent access to the laboratory to complete their experiments.

3. Processes to ensure that no graduate student or postdoc feels pressured to return to work

The Chair and Associate Chair for the Graduate program, aided by Tatum Lyles (communications specialist) will prepare messaging specifically directed to graduate students and postdocs to promote maximum comfort and a "no-pressure to return to the laboratory" departmental approach. All graduate students and postdocs will receive these messages. Separate meetings will be held with the PIs to emphasize that students must feel comfortable in returning to work, with an utmost emphasis on no-pressure invitations.

The following ideas will be conveyed in the messages to students and postdocs: "The decision to accept an offer to return to work in Stage 1 is entirely up to you – we want you to feel comfortable about the

safety procedures that the department has implemented. There are no financial or healthcare penalties for preferring to wait for a later return. Students who do not return in Stage 1 will have opportunities in later months to return until all students who need to be in lab are in lab. Please confer as you choose about your comfort level and concerns. You may speak with your research advisor, members of your mentor committee, or with Char Horsfall, the department HR specialist. You are not obligated to share health concerns if you are uncomfortable doing so, and any discussions are confidential."

The importance of respecting each individual's right to choose whether they feel safe to return will be emphasized in the Town Hall meetings. These meetings will be held separately for students and postdocs (one or more meetings), and staff and faculty (one or more meetings) so that each group will feel comfortable expressing their concerns.

4. Chemistry Building Complex (Shain, Mathews, Daniels) Facilities Utilization Safety Plan

Note that this is a general plan for the utilization of the Department of Chemistry building complex, consisting of three buildings, Shain, Mathews and Daniels. A detailed plan for June Chemistry building complex occupancy will be presented separately, once the research groups have submitted their requests and plans.

Rules for building utilization are based upon the following conditions in the chemistry building complex:

1. **Department safety policy stipulates that no one is allowed to work alone at any time.** Medium- to high-risk experiments are performed regularly in our building. In synthetic chemistry laboratories, it is strongly preferred to have a lab mate who is familiar with the type of chemistry being performed. In all chemistry laboratories, a student needs to work with a chemical safety buddy who can check-in regularly (timescale depends on the tasks the student is performing) to make sure everything is safe.
2. The air supply in the chemistry complex is 100% outside air. In the vast majority of spaces, there is no recycling of air ('return air'). The only spaces that make use of 'return air' are the seminar hall (Rm. 1315) and the administrative suite (Rm. 1121).
3. The building complex maintains an exceptionally high volume of exhaust air. The ventilation is driven by exhaust from chemical fume hoods, instrumentation laboratories, chemical storage cabinets, and ancillary equipment.
4. As a consequence of the balance between 'supply air' and 'exhaust air', the entire volume of air in the chemistry complex is exchanged for fresh air every 10 minutes. In other words, the building undergoes 6 complete air changes per hour.
5. With the exception of the administrative suite (Rm. 1121), offices are unusually well ventilated when compared to typical standards for commercial buildings. In the chemistry complex, offices are an integral component of the 'supply air' balance for the complex. Fresh air is supplied to office spaces in approximately the same proportion as the labs. The air from offices is 'transferred' to labs and exhausted through the laboratory exhaust systems. Far from being stagnant, our student / staff / faculty offices are well ventilated.

Rules concerning lab utilization:

We require that 4-person, 4-hood synthetic chemistry laboratories and selected instrument laboratories > 650 square feet are allowed to accommodate two researchers. This requirement is justified based on the best practices concerning chemical safety, the building operating conditions described above, and the researcher's adherence to the following:

1. **Maintain 6' physical distance at all times.** In our typical 4-person synthetic chemistry laboratories, this means that researchers will utilize fume hoods on diagonally opposite sides of the laboratory, which are physically separated by a 6-foot wide laboratory bench. They will not be permitted to utilize fume hoods that are adjacent to one another, nor will they be permitted to use laboratory benches that are directly opposite from one another.
2. Best practice in **chemical safety mandates not working alone** and making sure a coworker is in general proximity.
3. **All researchers will wear a mask** while working in a laboratory with a coworker and strictly adhere to existing safety protocol regarding PPE.

This lab usage deviates from the campus recommendation of 350 ASF per coworker but is justified on the basis of the necessity for researchers to work in pairs for chemical safety. The high level of ventilation in the building complex provides significant protection of individuals. **When combined, rapid air turnover, physical distancing, and mask wearing will minimize COVID exposure risk of individuals in chemistry laboratories while maintaining best practices to ensure chemical safety.**

While we are limiting occupancy in Stage 1 per L&S and campus guidelines, we foresee no obstacles to significantly increasing research productivity in subsequent stages. With an increased weekly density of up to 150 researchers in the building within safety guidelines, and a one-week-on, two-week-off shift rotation designed to control COVID risk in workplaces (https://doi.org/10.1101/2020.04.04.20053579), we believe that we can safely allow all chemistry researchers who require laboratory access to do so.

Rules for labs with shared-use equipment:

We require that researchers are able to use labs with shared-use, low-chemical-safety-risk equipment. Users of these labs will adhere to these requirements:

1. Occupancy limited to one researcher, regardless of room size.
2. Following completion of lab use, equipment and room area should be sanitized before exit.
3. Each lab will remain vacant for at least 30 min between uses to permit air exchange in the lab.

Rules for lab-adjacent office utilization:

In many science laboratory buildings, researchers' desks are located directly in the laboratory. In the chemistry complex, they are not. Our configuration of locating researcher desks in an adjacent office provides an inherently higher measure of safety and is recommended practice for chemical safety. Note that the design and configuration of the chemistry complex places these offices in close proximity to the labs, and typically an individual researcher uses an office that is directly connected or adjacent to their lab. This configuration is important for chemical safety, so that a researcher may monitor a potentially dangerous reaction from their adjacent but safe location.

Chemistry researchers require a physical office space that is not directly in the laboratory for a variety of tasks. The reactions they run in the laboratory are often dangerous, and a safe location at a distance from the reaction in view of the set-up is considered a necessity for chemical safety. Our lab-adjacent offices are constructed to provide that clear view into the laboratory, while protecting the researchers from the dangers inherent in many chemical reactions. Furthermore, to prevent chemical contamination, good chemical safety practice recommends that certain tasks take place outside the laboratory, such as making entries in a lab notebook, entering information in a computer, etc.

We require that researchers are able to utilize lab offices, subject to these requirements:

1. Lab offices will only be used in support of laboratory work. All research that can be completed remotely will continue to be done outside of the chemistry complex. Researchers should leave the building following successful completion of their experiments.
2. Only one worker is permitted in an office at any time.
3. Offices are to be used for no more than 30 min at a time.
4. Following completion of office use, common areas should be sanitized before exit.
5. Each office will remain vacant for at least 30 min between uses to permit air exchange in the office.

This office usage deviates from the campus recommendation of not using offices but is justified on the basis of chemical safety to protect researchers from the dangers of the reactions that they run. Air flow in the chemistry complex sends fresh outside air into offices at a high flow rate. **When combined, rapid air turnover, temporal separation in the office, and mask wearing will minimize COVID exposure risk of individuals while maintaining best practices to ensure chemical safety.**

Rules for general building utilization:

General considerations for chemistry building use in Stage 1 are as follows. To maintain best chemical safety practice, while we are working at very low density the access to the building will be limited to those hours when a member of the department COOP (emergency operations) team is present. Since the custodial crew begins work at 5:00 pm, all chemistry researchers will vacate the building before 5 pm. Physical separation between the chemists and the custodians is necessary to minimize risk to both groups. The custodians must be unimpeded in their important work in cleaning the common areas of the building. Note that no custodial services will be provided in the labs. Researchers must clean their own spaces, and deliver their trash to the pickup locations identified by Jeff Nielsen.

The following rules will be followed by all building occupants:

1. If you feel unwell, do not come to the chemistry building.
2. Wear a cloth facemask in the building at all times. Cloth masks should be washed/changed daily.
3. Maintain 6’ physical distance from other persons at all times.
4. Building hours are 6:00 am - 5:00 pm, Monday through Friday. Building access is not permitted on the weekends.
5. Enter building complex at the Shain Tower, Charter St. entrance.
6. Depart the building complex at the Shain Tower Charter St. entrance before 5:00 pm.
7. ‘Racetrack’ corridors in Mathews and Daniels will be designated with a preferred direction of travel (counterclockwise). **In case of emergency, move to the nearest exit (regardless of direction).**
8. Stairwells in all wings will be designated with a preferred direction of travel (up/down). **In case of emergency, use any stairwell (regardless of direction).**
9. Elevator use is acceptable when moving large objects, but is not recommended at other times. **No more than one occupant per elevator cab. In case of emergency, do NOT use the elevators.**
10. Shain elevators are primarily for use of Shain building occupants (and construction crews, as needed). Mathews elevator and Daniels passenger elevators are for the exclusive use of Mathews/Daniels building occupants. The **Daniels freight elevator is primarily for use of construction crews.** For building occupants, access to Daniels sub-basement is via stair or Mathews elevator except when transporting materials that cannot be carried down the half-flight of stairs from Mathews elevator to Daniels sub-basement. **Use of the Daniels freight elevator by chemistry building occupants is limited to situations requiring movement of unusually large objects or movement into the sub-basement where stairs are not an option.**

Such use must be coordinated with Jeff Nielsen to ensure that there is no overlap with the construction crews.

It is critically important to minimize back-and-forth travel within the chemistry building complex. This condition is necessary to minimize exposure among occupants and to maximize the ability to perform contact tracing, should the need arise. **You should restrict your movement to the area immediately adjacent to your laboratory as much as possible.**

1. Protocol for use of restrooms:
    a. All restrooms in the building complex will be considered gender neutral. (No signs)
    b. No more than one occupant at a time (regardless of size / capacity of restroom)
    c. Signage will be provided as a means of designating 'in use'
    d. Facility must be sanitized on exit (surfaces touched, door handle, faucet and toilet handles)
    e. Restroom must remain vacant for 30 min after use (strongly recommended by Tim Bertram to allow room air exchange between uses; we have strategies for making this protocol work and we are committed to doing so for the safety of those in our building)
    f. **Use only the restroom on the same floor and in the wing of the building complex where your laboratory is located**. (All wings of the building have at least one restroom on each floor. You may not be familiar with it.)
2. Use of break rooms is not permitted. Use of shared refrigerators, microwave ovens, and other shared kitchen equipment is not permitted.
3. Use of drinking fountains is not permitted.

Scientific justification for the facilities utilization plan:

At this time, the mechanism of transmission of SARS-CoV-2 is not fully understood. There is growing evidence that SARS-CoV-2 can be spread through airborne transmission (similar to SARS-CoV-1), in addition to direct droplet spread and fomite transmission.[1-5] Measurements from hospitals in Wuhan, China have indicated that RNA from SARS-CoV-2 can be present in aerosol particles smaller than 1 micrometer in diameter.[4] Aerosol particles of this size are easily dispersed indoors, significantly extending the range that SARS-CoV-2 may be transmitted.[5] As a result, a combination of rapid air ventilation and the use of masks will be essential to mitigate the risk of airborne transmission of SARS-CoV-2 indoors. These efforts complement physical distancing, hand washing, and building sanitizing which alleviate the risk associated with droplet and fomite transmission.

While it is unlikely that the risk of airborne transmission of SARS-CoV-2 can be eliminated indoors, rapid ventilation of the chemistry complex combined with limited occupancy and face mask requirements will undoubtedly reduce the risk. It is important to note that these recommendations may not translate to other campus buildings at UW Madison that may be less well ventilated or utilize a much higher fraction of return air that would need to be filtered or decontaminated.

Regarding elevator / stairwell usage:

The response from experts in the field is inconclusive.[6] Single occupancy elevator rides are likely OK, as it is estimated that 50% of the volume of air in an elevator gets exchanged when the door opens. Nobody yet knows if multiple occupancy elevator rides carry more risk than walking up the flight of stairs. The epidemiological data from the Korean call center outbreak suggests that elevators and stairwells were not where people became infected. They were infected due to prolonged exposure to SARS-CoV-2 in the

aerosol phase that came from asymptomatic people breathing and talking. Following L&S guidelines, stairwells are recommended over elevators at the current time.

Regarding restroom usage:

Flushing toilets is a good way of making aerosol, SARS-CoV-2 is in fecal matter, and none of our toilets have lids. It is for this reason that bathroom usage will be separated by 30 minutes to allow air turnover in the room.

Literature cited:

[1]Morawska, L. & Cao, J. Airborne transmission of SARS-CoV-2 : The world should face the reality. *Environ. Int.* **139**, 105730 (2020).

[2]Booth, T. F. *et al.* Detection of Airborne Severe Acute Respiratory Syndrome (SARS) Coronavirus and Environmental Contamination in SARS Outbreak Units. *J. Infect. Dis.* **191**, 1472–1477 (2005).

[3]Guo, Z.-D. *et al.* Aerosol and Surface Distribution of Severe Acute Respiratory Syndrome Coronavirus 2 in Hospital Wards, Wuhan, China, 2020. *Emerg. Infect. Dis.* **26**, (2020).

[4]Liu, Y. *et al.* Aerodynamic analysis of SARS-CoV-2 in two Wuhan hospitals. *Nature* (2020). doi:10.1038/s41586-020-2271

[5]Prather, K. A. et al, Reducing Transmission of SARS-CoV-2, Science, 27 May (2020)

[6]Marr, L. & Corsi, R. Quoted in 'Can I get coronavirus from riding an elevator?' *New York Times*, May 15, 2020.

Coordination with construction and maintenance projects:

1. Construction activities that occur outside the existing chemistry building complex are conducted in accordance with State of Wisconsin and OSHA guidelines.
2. Contractors have been provided with detailed instructions concerning restrictions on their movement through the existing building complex.
3. Installation of fire sprinkler and fire alarm systems in the existing building will continue on a floor-by-floor basis.
    a. Building occupants are not allowed on the floor that is under construction.
    b. Contractors are not allowed on floors that are not under construction.
4. The chemistry building manager is responsible for coordinating all construction and maintenance activities to maintain physical distancing and to maximize the isolation of work crews.

5. Staff Present On Site During Chemistry Building Reopening to Support Research

As Campus moves towards a partial reopening of research, we have undertaken a careful study of the services that are essential to research and can and cannot be performed remotely. Remote services supporting research include library services, most computer services, and most Business Office services like purchasing and grants support.

Plans for reopening the Chemistry Department to even limited research necessitates the presence of some staff on site for support. To do any research, chemists require access to chemicals and to routine expendable laboratory supplies, which must be delivered to our facility. Many of these chemicals are not suited to storage; we order them and use them as needed. Chemists who make new molecules require daily access to expensive common-use analytical instruments that are used to characterize the products of their reactions. These instruments are located in the Chemistry Instrumentation Center. Chemists whose research involves designing and building new instruments require daily access to machine and electronic shop services in order to conduct their experiments. The chemistry Maker Space houses these shops. Chemists make routine use of complex glassware for their daily experiments; specialized glass equipment is made and all glassware is repaired in the glass shop. Chemists cannot carry out their research without access to these three basic support resources; therefore, we require a limited number of staff members to provide a limited scale of service in these facilities.

The Chemistry Instrumentation Center (a campus core facility comprising NMR, X-Ray, and mass spectrometry small molecule characterization resources), glass shop (the only facility of its type on campus), maker space, storeroom, receiving and building management will require some staff to be present in the building. Ensuring the safe delivery of these services is of paramount importance to being able to perform research in the Chemistry Department. On site requirements and safety plans have been developed for each of the areas. The plans and staff list are presented as Appendices.

I. <u>Building Management Services</u>

The Chemistry complex requires constant attention by our Building Manager, Jeff Nielsen. At this time, Jeff is fully occupied managing two major construction projects; the sprinkler installation project in Shain, Mathews and Daniels; and the construction of the new chemistry instructional tower. These projects are continuing at a rapid pace, and Jeff is the key conduit between the construction crews and the department. Jeff is also managing several smaller projects renovating laboratories for new faculty. Jeff has responsibility for taking care of small building-related problems as they arise, triaging larger problems, and alerting Physical Plant about needs for more extended services. We anticipate numerous plumbing related problems as we reoccupy old laboratories that sat with little attention for almost three months. Jeff has maintained a presence in the buildings over the last ten weeks, and has developed safe protocols for operations, including maintaining rigorous physical separation between the construction crews and chemists. Although he must of necessity sit in his office when he is not out and about in the building, he does not meet with other people in his office. Most information about problems is communicated using phone, email or texts. When in-person communication is necessary, discussions are moved into hall areas where proper physical distancing is maintained.

II. <u>Administrative Leadership Support</u>

Throughout the period during which only essential services have been allowed on campus, the Chemistry Department has found it to be essential to have an administrative member of the COOP team in the building during all hours when research is being conducted. Hours for the Building Manager are typically 6 AM to 3 PM. Executive Director Matt Sanders or Department Manager Pat Egan are in the building on alternate days from approximately noon to 5 PM. While we are working at very low density in the chemistry building complex, the chemical safety committee requires that a member of the COOP team is on premises during all hours when the building is in use to handle any chemical safety emergency. This role will be fulfilled by Jeff Nielsen (6 AM – 3

PM) and alternately by Matt and Pat (noon – 5 PM). Matt or Pat, whomever is in the building, will also help to oversee limited operations and continue their role of checking unused laboratories on a regular basis for leaks or unsafe conditions. They will also provide expert evacuation and continuity of operation support during the 3 PM to 5 PM time interval in case of an emergency.

III. Materials Receiving

As soon as any research activity is restored, we will need to have the Receiving Dock staffed some of the time. Orders must be checked in, verified, and delivered. Our Shipping/Receiving Agent (Mike Bradley) needs to maintain inventory of compressed gas cylinders that are essential for most chemistry research. A second staff member (Michelle Fitzgerald or Tom Ladell) will take packages to specified delivery areas for each active researcher so they may be collected. Drop off and pick up will be separated in time so that the individuals do not come in contact with one another.

IV. Research Storeroom Services

Most chemistry researchers rely on the department Research Storeroom to provide routine expendable supplies to allow them to perform their experiments. The manager of the research storeroom can do most work remotely, but he will need to be on site on a semi-regular basis to take inventory. Researchers will send requests for materiel to the manager, a staff member on-site (Michelle Fitzgerald, Tom Ladell, or Mike Bradley) will collect the required items and deliver them to the designated delivery spot for that researcher. All research materiel distribution, including receiving, storeroom functions and deliveries will be run out of the first floors of Mathews and Daniels to minimize overlap between staff and researchers.

V. Chemistry Instrumentation Center

See detailed facility operations plan in the Appendix.

VI. Glass Shop Services

Our researchers rely heavily on the expertise of the Master Glassblower (Tracy Drier) to create new experimental apparatuses and to fix broken glassware. Online technology and cameras will make it possible for the glassblower to work on and draw up projects in real time with clients virtually. Tracy will work in the glass shop only as needed to support priority research needs. Newly fabricated or repaired glassware is inherently sterile due to the high heat used. The Glass Shop is housed in a large room that will be occupied only by Tracy in accord with L&S stipulations.

VII. Maker Space Services

Electronics and machining services are required for many chemistry researchers to create instruments and devices which enable them to carry out their experiments. Entire research groups within our department rely on these services to design and build their experiments. Electronics Engineer (Blaise Thompson) and staff in the Machine Shop (Steve Myers, Mathew Martin, James Mullarkey, and Kendall Schneider) will work as needed to allow high priority research to continue. In addition, they will fabricate any necessary protective devices that are needed to maintain appropriate physical separation or protection between researchers in high priority labs. They will work on site in person only as the work requires. Submission of projects and refinement of design will be carried out over email and by video. No researchers will use equipment maintained in the shops; they will be operated only by shop staff. All surfaces will be sanitized by the first person to

arrive in the morning. Sharing of tools will be limited. The Maker Space Services are housed in very large rooms that will be occupied in accord with L&S stipulations.

6. Staff Human Resources Adjustments

No research-related staff are on furlough; therefore, no HR job status changes are needed.

7. Physical Plant Shops Support

Jeff Nielsen, Chemistry Building Manager, is in contact with FP&M to ensure that all lab start up needs are met. Jeff has been working with Master Plumber Melissa Marecek, from the FP&M plumbing shop, to ensure that the many water fixtures and valves within the chemistry complex are operative. Mel has prepared a guide for all laboratories to use in their start up to minimize the potential for floods and ensure that the water delivery systems function properly. Jeff is coordinating with Chemistry Building FP&M contact Eddie Kieler to ensure that all services are working properly, that custodial services are properly established, cleaning supplies are available, and that sanitizer stations are available as appropriate throughout the Chemistry complex. Eddie and Jeff will coordinate to schedule the work and traffic flow of all FP&M tradespeople within the building.

8. Building Access

All chemistry personnel who have keys to the building are able to enter. Building access and egress will be through the Shain Tower Charter St. entrance. Each individual will log the time of entry and departure using a custom WebApp, which will track occupants of the complex in real time.

Because the timing and need for supervision of experiments vary widely, we cannot predict the exact schedule of building use for the large number of research groups in our building. To allow us to track usage, and ensure that chemistry building occupancy conforms to the campus guidelines at all times, we are adopting the same approach used by the Departments of Physics and Astronomy for Chamberlin and Sterling Halls, and we are adapting their WebApp for our use.

Each individual entering the chemistry building complex will be required to register on the Chemistry Building access web page, using NetID login, specifying the room numbers where they will be working and the hours in the building for their experiment. The program checks if the person is authorized for the room and fits within the access restrictions for the lab. If the slot is already taken the request is automatically rejected and the person is not authorized. If the request passes, the calendar will be marked. Anyone with NetID access will be able to see who is using what room and when. Unauthorized people are prohibited from registering, and if an unauthorized person attempts to register, an email will be sent automatically to the Building Manager (Jeff Nielsen), Executive Director (Matt Sanders), Department Manager (Pat Egan) and Department Chair (Judith Burstyn). The individual who is in the building at the time, either Jeff, Matt or Pat, will respond to the request. We anticipate infrequent visits from unauthorized chemistry personnel who are working remotely but who require specific items from the building to carry out their job functions at home.

The WebApp will track usage of the chemistry building complex in real time, and will maintain a record of who is present and where they are working. In Stage 1, the limit is 6 people per floor at any given time. Occupancy will be consistent with the requirement that no one may work alone without a chemistry safety buddy, which in some labs necessitates that two individuals are present for safety.

Appendices to Department of Chemistry Research Restart Plan

Appendix 1: Chemistry Instrument Center Stage 1 Operations Plan

V. Chemistry Instrumentation Center (a Campus Research Core)

The Chemistry Instrumentation Center (CIC) provides access to Magnetic Resonance, Mass Spectrometry, X-ray Diffractometry, EPR, Mössbauer and SQUID instruments as well as expert advice in these areas, supporting a broad range of research. The CIC is an essential component of all areas of chemical research for separation, characterization, and identification of chemical compounds. The Facility houses highly specialized equipment: seven NMR spectrometers, ESR and Mössbauer spectrometers, a SQUID magnetometer, multiple small analytical laboratory devices, three X-ray diffractometers, and seven mass spectrometers used to analyze materials produced in the Chemistry Department and across campus. Each of the instruments has unique capabilities. Instruments of this type are not available anywhere else and are optimized for use by chemistry researchers. **Many individuals require expedient access to the results produced by these facilities to conduct their research.** During normal times the facility assists four hundred users total, including users from across campus. While the Center will not run at full capacity in Stage 1, it must provide support as needed for priority research in Stage I. The facility will be open 50 hours/week; in normal times, it is open and freely available to trained users for 168 hours/week. Roughly 50% of all chemistry researchers use the facility on a daily basis. Functioning with 84 researchers within the chemistry building complex in Stage 1, we anticipate that 40-45 of those individuals will require CIC support to conduct their priority research.

The CIC will maintain core functionalities essential for research in an environment that is as safe as possible, mitigating the risk of virus transmission for all groups involved. We will follow all CDC and Wisconsin guidelines, limiting the number of person-to-person interactions, maximizing the distance (350 sq ft/person, 6 ft apart while wearing a face covering, only one person/instrument) while wearing appropriate PPE for chemistry research. The more time that individuals spend in a shared space, the greater the chance of transmission, therefore time in the CIC will be restricted and all interaction with facility staff will be via email, phone or video conferencing, or by appointment. Commonly touched surfaces will be disinfected at least once per day and users will spray the provided 70% ethanol solutions on keyboards, mice and surfaces upon arrival at the instrument and prior to exiting. Keyboard and mouse covers will be changed between users. Training of new users will be temporarily suspended. Non-departmental users should contact facility personnel to discuss limited access to the building. Sample drop off will be scheduled with the CIC staff, who will control access to the building for external users.

In normal times, the CIC has major areas that function solely as open, self-service operations. Graduate students and postdocs enter the lab and run experiments themselves. Some CIC laboratories would host 30-40 individuals running experiments every day, with more than 100 samples being run on a single instrument. This mode of operation allows us to keep staffing lower than would otherwise be necessary, and enables our graduate students to attain proficiency in use of state-of-the-art chemistry instrumentation. To be safest during the COVID pandemic period, we will eliminate much of this user-access operation. Service operation by CIC staff will be implemented in those areas where student interactions were highest in normal times, most importantly in the area of routine NMR. As a consequence, all CIC staff must work on site to accommodate the new service-based data collection system, the higher level of maintenance and cleaning required in the facility, and to ensure minimum down time of the expensive instruments. All CIC staff have been conducting routine maintenance operations and weekly cryogen fills on their instruments throughout the shut-down, so work on site does not require any change in their HR status.

Magnetic Resonance Facility. Department chemical safety policy stipulates that no one is allowed to work alone at any time. Staff will operate on site during open hours in pairs of two, on staggered schedules in one-week rotations. In Stage I, walk-up services for our automated spectrometers and all training will be suspended. Staff will take over sample submission on automated instruments to minimize exposure in the facility, so that clients will be able to continue to acquire data promptly. This new staff-provided service component will require at least two staff per day; if this level of staffing is insufficient (there is the potential for a lot of samples per day even at low research density), all CIC MR staff will return to full-time on-site work. Sample drop off will be in a room adjacent to the facility that contains a handwashing station and disinfectants. Staff will pick up and analyze samples at 9 am and 3 pm on work days. Staff will wear PPE, as appropriate for chemistry research, and maintain a 6' physical distance from one another at all times. Selected instruments in laboratories that have been reconfigured to allow at least 350 sq ft per person, may be reserved for in-person client use through an online calendaring system. Equipment will be sanitized between each use, and 30 minutes will be allowed between each user to ensure exchange of room air. Traffic flow in hallways will be counterclockwise, easing the ability to maintain social distancing.

X-Ray Services. Many chemistry research groups submit samples to the Molecular Structure lab for analysis by staff experts. Select research groups, whose research is heavily dependent on X-Ray structure analysis methods, have expert trained users within their groups. Staff from the Molecular Structure lab will stagger their attendance to keep the instruments running and to collect data for priority researchers who require staff data collection and analysis support. Much data collection can be monitored remotely and does not necessarily require a person to be present. Some of the work (sample loading, cryogen replenishment, instrument calibration and maintenance) requires physical presence for about two hours each day. One CIC staff member will be present as needed on days when the facility is open to attend to these tasks. The small rooms of the facility will allow only one person at a time to use each X-Ray laboratory. Time on the instruments for staff and on-site research group expert users will be reserved ahead of time through an online calendaring system, with 30 min intervals between users to allow air exchange. Staff analyzed samples will be dropped off by researchers, per normal protocol, at a site within the CIC removed from the laboratories minimizing person-to-person contact. Shared equipment (microscope, goniometer heads, sample prep stations, desktops) will be wiped down with sanitizer/disinfectant before and after each use. Users will wear PPE, as appropriate for their chemistry research, and maintain a 6' physical distance from one another at all times.

Mass Spectrometry Services. The mass spectrometry laboratory is a large open room housing seven instruments that allow chemistry researchers to make mass measurements in seven different ways. The size of the facility (1862 sq ft) will allow up to four researchers at a time to use instruments, with supervision by one staff member, per campus guidelines. One staff member will be present when during fixed laboratory work hours to attend to maintenance and supervise use of these exceptionally delicate mass spectrometers. Care will be taken that only one person at a time enters or exits the facility, and separate ingress and egress doors will be used. The three services that the Mass Spec Lab offers are 1) providing exact mass measurements, 2) supervising users of walk-up mass spectrometers, and 3) training users to obtain the best possible data. Submission service for mass analysis by staff is an option for low usage chemistry researchers and external clients. In Stage 1, exact mass measurements will be made only by the two graduate student TAs and the mass spectrometry facility director; no expert user access to this instrument will be allowed. These measurements will be made four hours per day M-F, with each TA responsible for two four-hour shifts per week. Mass spectrometry samples to analyzed by facility staff will be dropped off per the standard protocol at a site removed from the mass spec lab to minimize person-to-person contact. Within the lab, PPE appropriate for the chemistry research will be

worn and instrument users will maintain 6’ physical distance at all times. Keyboards, mice and instrument controls will be sanitized after each use.

Appendix 2: Department Staff Spending All or Significant Portions of their Workday on Site

Name	Position	Role
NIELSEN,JEFFREY	Building Manager	On Site, Building Manager
EGAN,PATRICK	Department Administrator	Mostly Remote, Administration
SANDERS,MATTHEW	Executive Director	Mostly Remote, Administration
BRADLEY,MICHAEL	Shipping & Receiving Specialist	Mostly On Site, Materials Receiving
ZERNICKE,JAMES	Research Stockroom Manager	Mostly Remote, Research, Storeroom
FITZGERALD,MICHELLE	Lab Prep Tech	On Site, Helps With Materials Handling
LADELL,THOMAS	Lab Prep Tech	On Site, Helps With Materials Handling
CLEWETT, CATHERINE	Senior Instrument Technologist	On Site, Research, CIC
FRY,CHARLES	Dir NMR Lab - CIC	On Site, Research, CIC
HOFSTETTER,HEIKE	Asst Dir NMR Lab - CIC	On Site, Research, CIC
GUZEI,ILIA A	Dir XRay Lab - CIC	On Site, Research, CIC
SHANKS,ROBERT	Senior Instrument Technologist	On Site, Research, CIC
VESTLING,MARTHA	Dir Mass Spec Labs - CIC	On Site, Research, CIC
DRIER,TRACY	Master Glassblower	On Site, Research, Glass Shop
THOMPSON,BLAISE	Instrumentation Tech	On Site, Research, Electronics Shop
MARTIN,MATHEW	Instrument Maker - Advanced	On Site, Research, Machine Shop
MULLARKEY,JAMES	Instrument Maker - Advanced	On Site, Research, Machine Shop
MYERS,STEVEN	Instrument Shop Supervisor	On Site, Research, Machine Shop
SCHNEIDER,KENDALL	Instrument Maker - Advanced	On Site, Research, Machine Shop