***Resumption of Research and Creative Work at the University of Colorado Boulder: Guidelines for a Careful, Safe, and Effective Transition Back to a Productive University Environment***

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**Summary**

Research and creative work are critical to the success of the university, making it imperative that policies and guidelines be developed to enable a safe and orderly resumption of this work on the CU Boulder campus. The return to full-capacity research and creative work will occur in three phases (see Table 1), with Phase 1 (limited) focused on tight controls and low-density on campus, buildings, and work spaces. Phase 2 (expanded) will be a gradual transition to more robust activity with increasingly relaxed criteria for returning to work. Finally, Phase 3 (full) will be a resumption of nearly normal research and creative work, while still protecting the safety of all involved. Each phase will involve a set of criteria for determining what work resumes and when it will resume. A hierarchical decision-making process will be used with the unit head (department chair or institute/center director) being the primary decision-maker, but approvals required by relevant deans and the VCRI. Practices will be followed by those returning to work that are designed to minimize risks, taking into account the types of research or creative work, the locations and environments in which this work takes place, and the individuals or groups involved.

**Phased Approach for return to work.**

Resumption of research and creative activities will occur in three phases beyond the current most restrictive phase (referred to in Table 1 as Phase 0 (remote)). Phase 1 (limited) will be restricted to the number of personnel that can be safely accommodated in each research and work space, and involve only individuals considered to be in the lowest risk categories. Phase 1 (limited) will also be limited to research in which a robust execution plan is developed and approved and that manages risk (interactions, exposure, etc.) very effectively. A key consideration in Phase 1 (limited) is continuing to maintain a low density of people working within buildings and campus wide. Additionally, Phase 1 (limited) does not permit the congregation of two or more people in common spaces. In-person interaction will be avoided unless necessary, and only then carried out using approved physical distancing standards.

Phase 2 (expanded) will represent a gradual transition from highly restricted work and capacity (Phase 1 (limited)) to more extensive research efforts that continue to manage risks and involve robust safety practices. Accordingly, the presence of researchers and related personnel, along

with subjects and participants, will gradually increase. There will continue to be no congregation in common space but use of such spaces will be permissible within appropriate safety guidelines. Similarly, in-person interaction will continue to be minimized and, when necessary, it will be carried out with appropriate physical distancing.

The final phase, Phase 3 (full), will be a return to a state in which all types of research and creative work activities that were under way prior to the COVID-19 situation can be carried out on campus. It will likely be at a reduced capacity and with operational restrictions to ensure safety and well-being, but it will be as close to normal as we can reasonably expect.

The transition to each phase of operation will be determined by the University, taking into account multiple factors, including state and local guidelines and directives. We recommend that these decisions be made in consultation with a small body comprised of individuals who, in the aggregate, understand the needs associated with each of the different categories of research and creative work (described in Appendix A) and have expertise in the spread of the disease and associated risks.

**Decision-making**

A hierarchical structure for deciding who meets the criteria for return to work under Phase 1 (limited) and the phasing in of return to work under Phase 2 (expanded) is necessary. Because there are unique needs, criticalities, and risks associated with each type of research (see Appendix A), even at the PI level, a structure must be in place that can adequately consider those risks as well as the broader context within which that research falls.

The specific aspects of each project are best understood by the project head (e.g., the PI), who will initiate a return-to-work plan and request. The department chair or institute director will consider those aspects and the request in the context of the broader landscape within a department or institute. In particular, the chair or director will be in a position to weigh the project requests, needs, and urgency against those of others and weigh these against the limited space and resources of the unit; thus, they will be in a position to make informed decisions that take into account the local interests (at the project level) and the broader interests (at the unit level and beyond). The unit head is in the best position to assess the full spectrum of considerations associated with a return to work. The criteria for such decisions will include:

- Criticality of the research or creative work: importance to the success of the lab, group, center, department, institute, and university.
- Implications of further delay (including implications to time-to-degree for graduate students, fellowship requirements for postdoctoral researchers, etc.)
- The risks associated with returning to the research or creative activities. These risks include: risks to the individuals, risks to others in the work environment, and risks to others in the personal environment (e.g. family members).
- Target occupancy densities at campus, building, floor, and room or lab levels. This will be informed by state guidelines and determined ultimately by the VCRI.

These criteria will always be subjective, which is why the hierarchical approach that vests the greatest responsibility on the unit head is needed to appropriately consider specific needs with a level of understanding that can't be centralized, in conjunction with the big-picture perspective

The approval process for returning to research and creative work must include a formal request, by the individuals responsible for the activities, using the campus provided template. The request must succinctly articulate:

- the research or creative work to be done
- the reason the work is critical (addressing the points raised in the first bullet above)
- the consequences of not resuming that work at the time requested (in accordance with the second bullet above)
- the risks associated with execution of the work, both to those involved and others, including a vulnerability assessment for those involved
- A well-developed plan for managing those risks and minimizing vulnerability
- how the request, including the risk mitigation plan, is consistent with state and local guidelines

Should a unit wish to develop its own supplemental form to facilitate assessment by the unit head, they would be encouraged, but not required, to do so as appropriate.

When considering vulnerability, the state of Colorado defines the vulnerable population as:

> *"Individuals who are 65 years and older; individuals with chronic lung disease or moderate to severe asthma; individuals who have serious heart conditions; individuals who are immunocompromised; pregnant women; and individuals determined to be high risk by a licensed healthcare provider"* (Executive Order D 2020 044*).*

In addition to considerations about the work environment, decision-makers and approvers are expected to take these vulnerability factors into account, to the extent that they are known or knowable. Moreover, individuals' home circumstances and environments may impact their ability to return to work. Such considerations include caretaking responsibilities (often tied to daycare availability), vulnerability of others in the home, safe transportation options, etc. *Any individual with challenges on the home front should be able to express their concerns and not be pressured to return to work.* As restrictions are relaxed, members of households with vulnerable residents should continue to be aware that by returning to work or other environments where distancing is not practical, they could carry the virus back home. Precautions should be taken to isolate from vulnerable residents.

As was done with Phase 0 (remote), during Phase 1 (limited) and Phase 2 (expanded), the unit head will then review each request, paying careful attention to the risk management plan, consider it in the context of other requests and the needs of the unit and campus, and make a determination as to whether the effort is appropriate for the current phase of the return-to-work program. If the unit head determines that the activity is permissible and a priority, within the constraints of the current phase, the request will then advance to the College Associate

Dean for Research or Dean of the Institutes for another level of approval. As with the unit head, they should carefully consider the risk management plans, as this is critical to the successful resumption of work. Once their review is complete, the final approval will be the Vice Chancellor for Research and Innovation. The deans and the VCRI will be in communication with one another so there is an appropriate understanding of what research and creative work is being done and where it is being performed, across the campus.

We recommend that an advisory body be identified to:

- Collect information on what activities are being carried out where on campus
- The successes and challenges associated with the implementation.
- Evaluate capacity and how well functions take advantage of capacity, and.
- Identify best practices and assess the challenges that emerge as we work through the phases.

The group would serve as a resource for the chairs, directors, deans, the VCRI, the emergency operations team, and the provost,

**Workplace density considerations associated with each phase**

- Some general considerations in accordance with public health guidelines (e.g., 6-ft. distancing) will be applied campus-wide.`
- Details assessed at local level by unit head, with input from appropriate offices (e.g., building ventilation, emergency operations, etc.)
- Tracked at campus level to manage inter-unit exposure, interaction.

**Requirements for Returning to Research and Creative Work**

The risks associated with returning to research and creative work depend critically on the conditions of the work environment. Because the nature of those environments varies with type of research, the unit head is the key figure in prioritizing what work is resumed and when. These considerations and requirements are summarized below and in Table 1. The experience gained during Phase 1 (limited) will help determine how requirements will be modified for subsequent phases of returning to research and creative activities. Paramount to all these requirements is maximizing the health and safety of the individuals involved.

*Who will be allowed to return in Phase 1 (limited), and how many at a time?*

- The initial cohort of individuals involved in research and creative work should be chosen from among volunteers (paid or unpaid). Supervisors should work to find equitable accommodations for individuals who feel uncomfortable or unable to work on campus in this initial phase.
- Given that it can be subjective and contentious to define “essential” or “critical” research, we avoid such determinations on a campus-wide basis; prioritization and classification of research and creative work are delegated to the unit-level approvers. In such determinations, it is imperative that Phase 1 (limited) be carried out with a density of personnel low enough to ensure social distancing as defined by CDC guidelines and

only by personnel considered to be in the lowest risk categories. Risk determination will take into account the vulnerability considerations described above in the *Decision-Making* section and will further take into account self-identification of vulnerabilities by individuals who choose to express concerns, keeping such information confidential. The ability to account for and mitigate against risks, while preserving confidential information, will be taken into account as part of the approval process.

- The project lead (PI, lab director, core facility director, group leader, etc.) or their designee is responsible for scheduling and safety planning. Coordination (e.g., written schedules or signup sheets) must occur for utilization of individual work areas and common areas to ensure safety.
- Project heads may choose to implement two or more shifts per day to maximize productivity (e.g., 2 shifts/day x 2 people/shift = 4 people/day). It is recommended that the same personnel be consistently assigned to each shift, so they can coordinate. This will also help contact tracing if an infection occurs. Other arrangements would also be acceptable (e.g., different personnel on alternate days, alternate weeks, etc.) to minimize contact.
- Project leads are strongly encouraged to have their group continue remote work during Phase 1 (limited), if at all possible. Applicants for Phase 1 (limited) should only be those who must be on campus to continue their work. Research and creative work permitted on campus should be completed as quickly and efficiently as possible, and those individuals should not linger on campus.

*Table 1: Considerations and Criteria for Returning to Work*

| PHASE | EXTERNAL CONDITIONS | SUMMARY & METRICS | CRITERIA |
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| **0 Remote** | Initial Stay Home/Stay Healthy directive may or may not be in place | **Only research deemed critical is allowed**<br><br>Researchers must be designated as Essential to critical work be on site<br><br>On-campus access allowed for approved personnel to maintain research capability or prevent catastrophic disruption<br><br>COVID-19 related research encouraged<br><br>On site research activity driven by distancing/density guidelines; ***estimated*** at 5-10% of capacity at one time | *Research facilities and field stations are closed, except where personnel are required to protect life safety and critical research infrastructure/capability*<br>• Minimum staffing.<br>• Authorization for one-time access to faculty work areas to pick up books and materials, shut down instrumentation, etc.<br>• Occasional visits by critical personnel to maintain critical equipment to avoid failure or enable remote work<br>• "Critical Research", where a delay would have significant impacts or catastrophically disrupt the project or protocol. Finish up critical projects - no "new" projects can be initiated on campus. |
| 1 Limited | CU Boulder campus determination, | **Phasing in of time-sensitive research** and creative work | *Critical Research activities identified in Phase-0 (remote) continue to be permitted.* |

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| | subject to state and city restrictions | All work that can be done remotely should continue<br><br>On site research and creative activity to the extent consistent with safety guidelines; transition to an ***estimated*** 10-25% of capacity at one time<br><br>*Plans for sudden return to Phase 0 (remote) in place* | *Expansion of prioritized research and creative activities only to the extent consistent with low density guidance, PPE availability, and other safety considerations. Social distancing, face mask, cleaning measures understood and in place.* |
| | *Preparations for next phase* | | • *Core campus functions are staffed and operational to handle increased load*<br>• *More core facilities are staffed and operational*<br>• *Labs are able to purchase necessary supplies* |
| **2**<br>Expanded | CU Boulder campus determination.<br><br>This will be an evolutionary approach whereby over time, access and activity will increase. | **Gradual expansion of research and creative activities on campus** while maintaining social distancing and continuing protective measures<br><br>On site activity driven by safety guidelines (distancing/density, PPE availability, etc.).<br><br>All work that can be done remotely should continue to be, including all seminars, group meetings, etc.<br><br>On site research and creative activity ***estimated*** to initially be ~25% of capacity at one time and evolving over time, as conditions warrant to up to 75% total personnel capacity at one time, with social distancing. Amount and rate will depend on space and nature of research or creative work)<br><br>***Plans for sudden return to Phase 1 (limited) or Phase 0 (remote) in place*** | *Critical Research activities identified in Phase-0 continue to be permitted.*<br><br>*Expansion of prioritized research and creative activities to the extent consistent with updated density guidance (that takes into account relaxed requirements). PPE availability, and other safety considerations. Social distancing, face mask, cleaning measures understood and in place.*<br><br>Occasional access (e.g. one day per week) to desk spaces allowed for faculty, graduate students and other university personnel involved in research and creative activities upon request on a non-interference basis with respect to above activities, as long as density guidance can be adhered to. Must maintain social distancing and be within maximum occupancy per building, floor or other spaces per campus requirements, which will evolve with circumstances |
| 3<br>Full | CU Boulder campus | **All types of on-site research and creative work are allowed** | • Return to normal operations as much as possible. |

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| | determination.<br><br>No or minimal state, county, or local restrictions | Incorporate appropriate safety measures<br><br>On site research and creative activity ***estimated*** to be 85-100% of capacity at any given time<br><br>***Plans for sudden return to Phase 2 (expanded), Phase 1 (limited), or Phase 0 (remote) in place*** | • Continued practice of social distancing per state, local, and university guidance. |

**Behaviors and practices upon returning to work.**

*Under what conditions can one return to research?*

- All returning researchers must certify they have completed the required Skillsoft CU Boulder: COVID-19 Safety and Awareness training.
- Each building must have a building plan addressing which entrances have card access and therefore can be used, use of elevators, stairs, etc.
- Before entering the building or beginning field work each day, individuals must complete the health assessment to self-attest to their own wellness.
- The self-attestation of wellness and wearing masks also apply to custodians, maintenance, contractors, visitors, and anyone else entering building.
- Masks are required at all times, with only rare exceptions approved in writing.
- Other PPE required according to specific research shall be used.
- Disposable masks, disposable gloves for cleaning, hand-sanitizer, and cleaning supplies will be provided to each facility or group. Thermometers may be provided in specified entrances/areas in buildings, however individuals are encouraged to take their temperature at home to avoid crowding at thermometer check zones . Individuals will be responsible for supplying their own masks.
- The absence of these centrally provided materials (i.e. if supplies run out) does not alter their mandatory use. In the event of a lack of such materials, departments, institutes, research groups, and individuals might need to maintain them or keep supplies replenished, or work will not be permitted.
- Decontamination of personal workspace, shared areas, door handles, microwave ovens, coffee makers, shared computer keyboards, refrigerator handles, etc. must be done after each shift (i.e. after each exchange of individuals).
- Avoid congregating; Lab meetings, journal clubs, etc. must continue to be remote.

*Testing and Contact tracing*

- As testing for the virus and for antibodies to the virus become more widely available, the campus may announce testing requirements for individuals who are returning to work. Contact tracing will be coordinated by CU Boulder Medical Services.

*Individual responsibilities of researchers returning to work*

- Never come to work at a facility if you are experiencing any of these symptoms of infection:
    - Fever
    - Cough
    - Shortness of breath or difficulty breathing
    - Respiratory symptoms
- If you come to work and start showing any possible symptoms of illness, you must leave the building and inform your PI or supervisor and healthcare provider; **you will indicate the existence of these symptoms on your health assessment.**
- If you have had close contact with anyone who is COVID-19 positive (e.g., household member), stay home for 14 days to monitor symptoms per public health guidance.
- Plan your research and creative activities in advance; work that can be done remotely should be done remotely. Be present in the workspace and on campus only as long as necessary for your work. Minimize time around other people not in your restricted group.
- Develop a personal transportation plan that minimizes proximity to other people. Consider cycling, walking, or driving instead of public transit.
- Consider footwear as a possible transmission medium. You should have a pair of shoes dedicated for external use including the on campus building, and then not wear them into your residence. Clothing worn in the workplace should be immediately removed upon return to your residence.
- Assume everyone you see could be infected, including yourself, and use appropriate precautions, including not touching your face and washing your hands often. Some transmission occurs from people with no symptoms.
- Think ahead about your food needs. Cafés and other on-campus food sources likely to be closed. Some lunchrooms may be closed. But EH&S rules still apply, including prohibitions on eating in laboratory facilities. Consider bringing food that doesn't require further preparation, and use your own utensils.

*Accountability*

If anyone observes gross neglect or noncompliance with safety requirements or policies, they should report the situation to their supervisor; if their supervisor is unresponsive, then report to their supervisor's supervisor. Chairs and directors have the responsibility to act, and their actions can include suspending access to the laboratory and/or building for the individual or research group that fails to comply with policies. It is essential that there is a mechanism in place that can address circumstances in which individuals or groups put themselves or others at risk. The hierarchical reporting described here is intended to provide such a mechanism with the unit head being accountable; however, groups that share space (such as floors, buildings, or common areas) can designate an individual with an awareness of the space and facilities to whom such reports of non-compliance can be directly made. Whether the actual tracking of noncompliance is reported up to the unit head through the supervisory chain or it is reported

to some other individual responsible for an area and then to the unit head is up to the chair or director to determine, depending on the nature of the work space and co-location with other units. It is ultimately the unit head, however, who is responsible for ensuring compliance.

**Conclusion**

The safe and effective return to research and creative work is critical to our success as a university and it is fundamental to our recovery from the challenges imposed by COVID-19. The phased approach, coupled with the decision-making structure that appropriately factors in unit-specific and research-specific functions, needs, and environments (primarily determined by the unit head), positions CU Boulder for a successful return to a healthy, safe, and robust environment that supports and facilitates research, development, creative work, and education. Our success will be instrumental to resuming the vibrant academic environment that so richly serves the CU community, the state of Colorado, the Nation, and society as a whole.

**See Appendix A below for specific considerations for each type of research.**

***Resumption of Research Activities at the University of Colorado Boulder: Guidelines for a Careful, Safe, and Effective Transition Back to a Productive Research Environment***

## Appendix A

While the return to research and creative activities requires effective overall health and safety guidelines, there are specific types of research that carry their own risks and challenges and involve considerations unique to these areas. These areas are identified in the following table and are elaborated on in Sections A.1 – A.9.

*Table A.1: Risks, Challenges, and Risk Management for Different Research Categories*

| Type of Research | Nature and Role of Contact | Risks | Challenges Unique to that Research | Management Options |
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| **Direct Contact with Human Subjects** | • Researcher-to-researcher<br>• Researcher-to-subject<br>• Subject-to-subject<br><br>*Time of contact and number of people vary*<br>*Location is either a campus-based laboratory or setting away from campus* | • Direct Health Risks for researchers/staff, study subjects, and those in proximity<br>• Risk in increasing the range of contacts between university personnel and other populations | • large diversity of types of human research and variability across teams, facilities, and studies in terms of the risks involved<br>• HRC/IRB needs to be involved in determining when new approvals are required for changes in protocols | • Disposable Masks<br>• Hand sanitizer<br>• Surface cleaning supplies<br>• Coordination with campus for supplies<br>• Coordination of building density or even "sectioning off" building facilities<br>• Online interactions when possible |
| **Direct Contact with Human Partici-pants** | • Shared workspace<br>• increased respiration and perspiration (e.g. theater and dance)<br>• Meetings, production activities<br>• Required physical contact or close proximity | • Health risks to faculty, students, crew members (technical and creative crews), actors, guest artists, Performance staff (Box office, house managers, etc.) | • Many varying roles that require close proximity, touch<br>• Many people involved in activities | • Zoom and online meetings and other related technologies<br>• Cleaning/disinfecting<br>• Limiting use of the unique technology to assigned individuals<br>• Reducing/Eliminating sharing of common tools<br>• Access to adequate space for specific activities<br>• Improved ventilation<br>• Space entry/departure Protocols<br>• PPE availability and use |
| **Hands-on Experi-mentation** | • Required close proximity through interactions at lab bench or use of shared lab equipment<br>• Shared lab spaces<br>• Access to other labs<br>• Group meetings, seminars, etc. | • all members of the lab and anyone they come in contact with<br>• non-virus-related hazards in physical science labs (high voltage, powerful lasers, etc)<br>• jeopardy of funding, loss of competitiveness, | • Access to shipping and receiving.<br>• Access to shared research facilities.<br>• sudden shutdowns can jeopardize data for long-running experiments.<br>• Rare reagents are shared by many researchers within a lab, requiring access | • A "virtual buddy system."<br>• Limited access, continuing remote work when possible.<br>• Privilege revocation for violations<br>• Social Distancing in the lab<br>• PPE availability and use<br>• Regular hand washing and use of hand sanitizer following contact with any public surface |

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| | | inability to complete degrees or produce during postdoctoral phase | to a single container by many.<br>• Equipment within a lab is used by many members of the lab. | • Unique sets of frequently used tools<br>• Disinfection of frequently contacted surfaces before and after use<br>• Lab members reporting a "health check" to their PI before entering the physical lab for the first time each day<br>• 14-day self-quarantine for Individuals who travel outside of CO<br>• Ready availability of cleaning and disinfection supplies and enhanced custodial sanitation of public spaces<br>• Limiting contact to only those that need to occur in person for research purposes. |
| **Hardware Develop-ment** | • Direct contact among individuals working on the same piece of equipment<br>• Common workspaces<br>• interactions with external organizations and personnel<br>• Interactions to collaboratively design, develop, build, test, integrate, and operate instruments, equipment, hardware, and space missions | • Hardware developers (e.g.machinists)<br>• Those with whom they are in contact<br><br>Risks depend on:<br>• Job function<br>• Working environment | Hardware development requires presence and interactions are critical to success<br>• Collaborations<br>• Iteration between developers and end-users<br>• Team building<br>• Efficient use of time | • Video conferencing<br>• controlling and orchestrating interactions with precision and purpose<br>• limiting access to the fewest and least vulnerable people<br>• putting control measures in place<br>• adherence to strict processes and procedures<br>• monitoring the health status of members throughout and afterwards<br>• adapting rapidly to environmental changes as they occur |
| **Animal Research** | • Most procedures are conducted by individual researchers<br>• some cases where close contact/ interactions may be required | • animal care staff and anyone with whom these individuals come in close contact<br>• student success and experiences<br>• PI's being uncompetitive for grants due to lack of publications and preliminary data | • Time limits on procedures due to light cycle and circadian variations in behavior and physiology.<br>• Animals require daily monitoring<br>• Long delays put animals at risk and breeding/replacement could take years and be costly | • maintaining social distancing<br>• good hygiene<br>• frequent and thorough cleaning of facilities and equipment<br>• ensuring that anyone who is sick does not come to work<br>• procedure and surgical rooms for all labs and OAR staff<br>• PPE availability and use |

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| | | • Protection of animals and facility<br>• Other common health risks with animal research: bites, needle sticks and allergy development. | • Significant advanced lead time required to re-populate animal colonies<br>• Several levels of interactive training are required prior to initiating research. | • Animal research staff must coordinate schedules with OAR staff to minimize the potential for interaction. |
| **Field Research** | • Landowners, public officials, members of local agencies, and the public<br>• Other researchers<br>• Contaminated field equipment and transported items<br>• Use of multi-user facilities such as laboratories, camp sites, hotels | • Limited or no access to emergency services, difficulty in reaching such services, and few people available to help | • accessing remote areas, use of equipment in the field, exposure to extreme weather, hazardous terrain, harmful wildlife and lack of access to emergency services<br>• Permissions for work on public or private lands may be required before field research can be undertaken | • Development of a field research/field safety plan<br>• PPE availability and use<br>• Sanitization of hands and equipment<br>• Minimize encounters; maximize distancing |
| **Shared infra-structure** | • 1:1 or small-group interactions<br>• Training side-by-side<br>• May have human subject research (see above)<br>• Many people making multiple visits per day to the facility | • Limited space and multiple users at same time<br>• Health and safety of the Core Facility staff and users due to personal interactions<br>• Absence leads to negative impacts to the University's overall research capabilities. | • platform in which multiple users utilize shared instrumentation, equipment and research space<br>• coordination of overlap hard to manage | • Installing proper health and safety protocols<br>• Limiting number of people in facility<br>• PPE availability and use<br>• frequent disinfection of communal areas<br>• Occupancy management plan<br>• Sufficient remote access tools and capabilities made available |
| **Ongoing Remote Research** | • Occasional visits to campus or field sites<br>• Contact with others is minimal | • individual doing the occasional on-site activity and anyone they come in contact with | none | • timing the visit such that others are not present (which requires knowledge of who is present and when)<br>• avoiding contact with surfaces that others may have come in contact with or may at a later time<br>• wiping down any surfaces within which one has come in contact. |
| **Research in Education Settings** | • Researchers to students or other learners (individuals, small groups, and whole class) | • Direct Health Risks for researchers, educators, and students<br>• Risk in increasing the range of | • Research access to education sites will be decided by the site officials and relevant policies. This will vary | • Some research with educators can be moved online<br>• Masks and gloves as appropriate |

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| | • Researchers to educators<br>• Researchers to family members<br>• Educators to Educators | contacts between university personnel and populations of involved educators and students | according to school or district, university, community-based education organization, family or home.<br>• Professional development and community-based research often involves long-term and close work with a cohort of educators and/or community members, with an emphasis on building trust and relationships | • Depending upon the phase at CU and the organization, municipal, or state regulations in place at educational research sites visited, researchers may need to self-isolate at home for 14 days after completing data collection at a school, university, community-based organization, home, or other educational site. |

### *A.1. Research involving direct contact with human subjects*

Much human subjects work at CU is critically health focused and has important implications for public health and responding to this pandemic. Contact is sometimes incidental but necessary (e.g., completing consent forms or receiving payment), and other times central to the goal of the research (e.g., a researcher attaching electrodes to a subject). The nature of contact between individuals varies greatly they include:

- contact between researcher and researcher (e.g., sharing equipment, working in close proximity, traveling together to a research site)
- contact between researcher and subject (e.g., from passing materials and touching the same equipment to attaching electrodes to skin)
- contact between subjects (e.g., waiting together, group interaction, or close partner interaction)

The amount of time people are in contact may also vary from a few minutes to several hours, and from a one-time session to multiple sessions across days, weeks, or months. The size of groups is often small (e.g., 1:1), but can be larger in certain situations (e.g., 1:10 for studying group collaboration, up to 1:35 for observational research in classrooms).

Those at risk from such contact include: researchers/staff, study subjects, and those in the same areas (e.g., common hallways, or contact with others while traveling between sites)

The health risks from such contact will vary depending on the researcher and subject population, and the amount of control possible at a particular site. Much of human subjects research takes place away from main campus and at low density sites where access can be carefully controlled (e.g., CINC). Subjects participate on a voluntary basis – anyone who feels unsafe does not have to participate. It would be helpful if the HRC/IRB (Claire Dunn) would prepare a one page document to be given to each human subject on potential covid-19 risks and best-practices in mitigation, so each subject could determine their own vulnerability, assess the risks of the study setting, and better understand why they might be asked to wear a mask, sanitize their hands, etc.

Challenges unique to or characteristic of this type of research have to do with the large diversity of types of human research and variability across teams, facilities, and studies in terms of the risks involved; there is also the risk of increasing the range of contacts between university personnel and other populations (i.e., community subjects); the HRC/IRB (Claire Dunne's office) needs to be involved in determining when new approvals are required for general changes in protocols (e.g., all subjects must wear masks during Phase 1).

Mitigation of these risks requires central campus coordination of procurement of disposable masks and plenty of hand sanitizer, and surface cleaning supplies, etc. Labs should not compete for scarce resources; lack of coordination will undermine the safety of everyone. Some buildings have only a few well-coordinated labs, whereas other buildings have over 30 individual, independent labs. Coordination of building density or even "sectioning off" building facilities will be important.

In addition to general campus guidelines (e.g., those adapted from other universities), we suggest the following:

**Phase 1**: Following Colorado state guidelines of "safer at home":

- All work that can be performed remotely, should be performed remotely.
- For the aspects of research that must include human interactions, individual lab and group specific plans need to be developed by teams/PIs and approved by Department/Institute Leadership. Phase I would prioritize mission critical work that can be completed while everyone is masked, adhere to sanitizing rules, and minimize interactions closer than 6 ft. Suggested guidelines/framework for developing a lab/group specific plan:
- **Remain as small as possible, with the total of** research personnel + subjects less than 10 (follow density guidelines on space)
- **no in-person interaction with vulnerable populations**, as self-identified by participants (age>60 or saying that they are immune-compromised or otherwise at risk)
- **participant specific mitigation measures** e.g. schedule participants to arrive staggered (i.e., not congregate in hallway or waiting area); face-masks put on at arrival (provide disposable for participants); sanitize hands upon entry (wash 20-sec *in the lab* or use hand sanitizer); all surfaces – chair, tabletop, computer keyboard, screen, etc. -- contacted by participants must be sanitized before and after use, or use disposables.
- **staff specific mitigation measures**, e.g. researchers must sanitize hands before and after each session; researchers must wear face mask in lab at all times (e.g., can't have coughing on surfaces even if no one is in there at the time); buddy system for checking and ensuring protocol is followed
- **consideration of research materials that cannot be sanitized** e.g. non-disposable materials that can't be sanitized (e.g., paper survey) should be placed in an envelope and not touched by other bare hands for 24 hrs; if gloves are used instead, they should be removed inside-out and disposed before touching other surfaces
- **assume hallways and common areas (e.g., bathrooms) are "dirty zones"**; sanitizing must be done within the lab
- **consider unique risks of different locations** (e.g., lab vs. subject's home) and potential cross-contamination across sites and populations

**Phase 2:** Work can be done without masks, and while minimizing interactions that are closer than 6' distance.

- continue phase 1 participant and staff specific mitigation measures as appropriate
- in-person interactions with vulnerable populations allowed but with phase 1 rules in using masks.

**Phase 3:** Large group work can be done.

- continue phase 1 participant and staff specific mitigation measures as appropriate
- vulnerable populations continue to be given special consideration with masks, etc.

### *A.2. Activities involving direct contact with human participants*

For research not carried out directly on human subjects but that may involve encountering human subjects in the process (primarily through shared work space, and proximity to others.), all of the above precautions apply.

In addition, there are other activities on campus that involve interaction with people and substantial interpersonal interaction, for example, theater and dance. In these areas, the nature of the interactions are through collaboration, mentoring, instruction that requires physical interactions, and instruction that requires verbal interactions.

Research in Theatre & Dance requires being together, which necessitates proximity and touch. This occurs in rehearsals, coaching sessions, classes, public performances, staged readings/informal showings, production meetings, and production work sessions for designing and building costumes and sets. These practices often induce increased respiration and perspiration; therefore, extra care needs to be given to reduce the risk of transmission.

Narrative and documentary filmmaking involves working with actors/subjects or interviewees, as well as technical crews. Crew may vary in size (in student films) from 5 to 15 individuals on set or soundstage. Pre-production meetings between writers, producers and directors are often required but these could resume remotely. Production activities (as in rehearsing actors, setting up lights and electric, blocking a scene, actual filming) can only be done in person and in various stages of close contact.

Few of our research imperatives can be achieved without contact/interaction. Kinesthetic understanding and embodied-discovery are foundational to knowledge-generation in nearly every aspect of what we do, and these require proximity and feedback from physical contact.

For instance, in classroom settings and rehearsals, physically demonstrating a technique in close proximity is needed (often multiple times) until the student can begin to reflect back the proper technique themselves. In movement and voice training practices for the stage, the use of hands-on work is a vital component in helping the performer gain greater awareness, understanding and acceptance of their physical instrument (voice and body). Trained voice and movement instructors use touch as a means to guide students to more efficient use and greater

awareness.  In dance, there is subtle, critical somatic information that can only be observed and conveyed in close physical contact or via touch.

Research/rehearsal periods, which last for weeks or months depending on the project, require performers to be in close physical proximity in a shared space. Also during that time, the technical and production crews are working together to design and build the sets, costumes, lighting and sound plans, etc. Once productions open to the public, audiences are typically separated from the performers but in close proximity to one another. However, in immersive performance events, audiences interact directly with performers and are therefore also sharing physical space with the cast.

Similarly, in filmmaking units granting BA and BFA degrees, students are actively engaged in the learning of narrative and documentary media. They are evaluated by the challenge, the sophistication, and the originality of their film works. Many students, though not all, are interested in narrative modes of filmmaking which require filming/photographing human subjects (known as “actors” or "performers”) in front of cameras, and in either studio-built sets or suitable locations. Without actors, sets, sound, electric, and cinematography crews, students interested in narrative live-action films are unable to complete their projects.

In CINE, those at risk include supervising faculty, as well as student filmmakers, crew members (technical and creative crews), actors, and miscellaneous crew (for instance, craft and catering services, set builders and set dressers to lesser extents) may be required to meet in spaces such as sound stages or locations.

Likewise, in Theatre & Dance, risks are borne by students, faculty, staff, and guest artists, all of whom are necessary to the research, rehearsal, production and performance phases. They serve as teachers, mentors, learners, cast/ensemble, crew, directors, voice and movement coaches, conductors, choreographers, and musicians. During performances, the additional roles of Box Office staff, House Managers, volunteer student ushers and patrons are also at risk.

The risk to all of these individuals and groups is a direct result of proximity, necessary touch, or shared use of equipment/spaces.

For instance, scene and costume shops share technical equipment with productions that are being built at the same time, as well as ongoing classes and curricular needs (i.e. scene shop hand/power tools, sewing machines & costumes shop tools, technical equipment, lighting fixtures, sound/projection equipment, lighting, sound consoles in each dedicated venue).

In both CINE and THDN, directors, actors, and dancers must come in close contact with each other as well as their personnel. Costumers, hair and makeup artists, prosthetics or special effects crews may be required to be in close contact, occasionally in small quarters, and, as required touch each other (make up, costume, wiring for sound, etc.) Other members of the crew could possibly work within social distancing expectations (set dressers, light and electric crews), but close contact between categories above may be inevitable.

Furthermore, in THDN, we have four busy multi-purpose venues that function as both performance spaces, rehearsal spaces and academic classrooms. These spaces are busy classrooms during the day with full rehearsal periods/performances underway every night and on weekends. Therefore, these spaces see lots of traffic. And classroom resources in these rooms are shared across many other spaces in the building (tables, chairs, ballet barres, AV equipment, yoga mats, etc.)

The key challenges arise because any student (or faculty member, though these are less) interested in creating narrative filmmaking projects (drama, comedy, etc.) or documentary involving interviews or location shooting, cannot properly complete their creative projects without at least a minimum personal contact in circumstances as described above.

In Theatre & Dance, knowledge is created through embodiment, proximity and touch; collaboration within shared physical space is very often fundamental to innovation and knowledge-generation in our fields. Research in live performance/production methods require close physical human contact whether onstage between performers, behind the scenes rigging a piece of scenery or hanging a light, or coordinating all moving pieces during a technical rehearsal/performance.

In CINE, the Department has already instituted many safety and social distancing measures to minimize risks (script and pre-production conferences are conducted via Zoom or Google Chats, online digital post-production has been made available via Adobe Creative Cloud services, for which the Department pays, and alternate distribution methods (Vimeo, YouTube, etc.) have been adopted. But in person contact is inevitable in a number of situations, particularly rehearsing, blocking, and actual filming of projects involving actors and minimum ("bare bones") crews.

Dancers are inherently resilient problem-solvers. They literally train in flexibility and many are interested in adapting through the use of motion capture, VR, and other technologies. Though digital technologies can be a temporary proxy to the technologies of the body and serve as generative research threads, they are not foundational (as of yet) to our disciplines. In the short and present terms, dance could both create and approximate touch, collision, and contact, thus creating new forms of bodily engagement and kinesthetic feedback that will serve in the absence of human to human touch. In order to access these new portals of engagement, we would need access to MOCAP systems, collaborations (B2 in Atlas and CS programmers).

Restrictions could be placed on the type of research that can be done right now. For instance, research could be limited to solo projects or to small group research in rooms with adequate space to enable those involved to maintain appropriate distance. Forms that require touch (like contact improvisation) could be transformed to use other "collaborators," objects for weight-bearing, not humans, etc. These measures would substantially inhibit the kind of work that can be made/explored right now but might be necessary in order to mitigate transmission risks. Protective masks and eye protection could be worn by those who are sharing space.

Improvements to room ventilation could be made. Antibacterial stations and protocols for entering and exiting a space could be mandated. Additionally, extra care should be given to sanitizing spaces after every use, to include:

- Cleaning and disinfecting the unique technologies, particularly those with keypads, mice, computers, and the like
- Limiting the use of the unique technology to assigned individuals during a given work session
- Clean in / Clean Out protocols when changing over individuals
- Reducing or Eliminating the sharing of common tools by various means, either with check-out / check-in procedures that include cleaning, or requiring students to own more of their own personal tools

Adequate space is needed whether it be in a rehearsal setting, studio course (acting, voice and movement), coaching session.

### *A.3. Research involving hands-on experimentation (e.g. chemistry, biology, etc.)*

Hands-on experimentation is typically done in contiguous, designated areas by a research lab comprised of undergraduate, graduate, postdoctoral and staff scientists under the supervision of a PI. These groups vary widely in size and per capita lab space available to an individual.

Individuals come into contact primarily with other members of their research group within the lab space, through interactions at the lab bench and utilization of shared laboratory equipment. Further interactions occur when lab members need to access equipment contained within other labs, as well as through interactions in groups at group meetings, seminars, etc.

Many extramurally funded projects include components that cannot be executed remotely and there are no easy, readily acceptable criteria to prioritize one lab's research over another's. As a result, the direct occupation of research lab space is essential to conduct research. Access to shared laboratory equipment (freezers, centrifuges, PCR machines, clean room, machine shop, etc.) is required to conduct research. Many research projects require access to research facilities (addressed in a separate section of this report).

Contact with other labs is generally less central, though in some cases also required. Interactions in larger groups, while beneficial, is not considered essential to research under these circumstances and can be done remotely.

Each researcher makes a unique contribution using their own specialized skills and qualifications. One researcher cannot perform experiments for another researchers.

Under these conditions, all members of the lab and anyone they come in contact with are at risk of exposure to the novel coronavirus by returning to the campus research facilities. In addition, there can be non-virus-related hazards in physical science labs (high voltage, powerful lasers, etc.) and pre-COVID-19, the recommendation was often to mitigate these hazards by

never working alone in a lab. For certain lab tasks, there may be a need to develop a "virtual buddy system."

For lab research in particular, additional challenges include:

- Access to shipping and receiving.
- Access to shared research facilities.
- Experiments can be multi-day and take time to ramp up and ramp down, thus
- sudden shutdowns can jeopardize all the data.
- Rare reagents are shared by many researchers within a lab, requiring access to a single container by many.
- Equipment within a lab is used by many members of the lab.

In addition, there are risks to requiring bench researchers to remain at home. These include on the health front, physical and mental well-being from prolonged isolation and inability to productively work. On the professional front, these include jeopardy of funding, loss of competitiveness, inability to complete degree. Pauses in research activity jeopardizes the short- and long-term careers of undergraduate, graduate, postdoctoral and faculty by impeding their ability to complete and publish studies as well as compete effectively for funding.

Many of the risks inherent to the lab research situation can be mitigated using strict social distancing, hygienic practice and limiting contacts to personnel in other labs. This can be achieved by enacting the following restrictions: (a) Only research active personnel are to be allowed in the labs. (b) All activities that can be done remotely should continue in the same mode. (c) The privilege of returning to research activities will be revoked for any personnel who violate these procedures.

<u>Social Distancing:</u>
Lab spaces must accommodate minimum 6' working distance between researchers. As space within CU labs is highly varied, this can be achieved in a variety of ways, including, but not limited to, enhanced spacing in the lab to reduce density and working in lab in staggered shifts. The PI must provide the Chair/Director of the unit a plan for how safe distances can be achieved. If shift work is required, the schedule must be set in advance and strict adherence to the agreed upon schedule is necessary. Any data work up or analysis that can be conducted remotely must be conducted remotely.

<u>Appropriate Hygiene:</u>
Lab personnel will wear state-recommended face coverings at all times. Regular hand washing and use of hand sanitizer following contact with any public surface (if contact is unavoidable, such as doors, elevators, sinks, etc.) is required. Effort should be made to modify lab doors, and exterior doors, to allow for touchless entry and exit. Enhanced cleaning and disinfection of all spaces is necessary.

Each researcher will have their own set of tools that are used frequently, including pipets, frequently used reagent bottles, laboratory notebooks, screw drivers, keyboards, mouses, protective eyeware, and pens.

All lab surfaces routinely touched by more than one individual will be regularly disinfected (*e.g.*, refrigerators, freezers, centrifuges, shakers, computer keyboards etc.) both before AND after use. The use of Bluetooth or individual-specific keyboards should be implemented if possible.

All lab members will report a "health check" to their PI before entering the physical lab for the first time in a given day. This should be done by email, text or similar. Personnel who are feeling unwell or who have an elevated temperature are required to stay home. If you begin to feel unwell at work, you must leave immediately and inform your PI.

Note that execution of these hygiene criteria will require making cleaning and disinfection supplies readily available to everyone as well as enhancing custodial sanitation of public spaces (doors, elevators, bathrooms).

Individuals who travel outside of CO for any reason will be required to self-quarantine for 14 days before returning to CU. Individuals are expected to adhere to social distancing and hygienic protocols outside of their research activities.

<u>Limiting and tracking contacts to other personnel:</u>

Contact with other personnel is strictly limited to interactions that need to occur in person for research purposes. All other contact is strictly forbidden.

- All meetings (including group meetings) will continue to be held by zoom (or other online forum)
- No in-person gatherings of any type will be allowed. This includes group meetings, seminars, thesis defenses, communal meals in break room areas, etc. All food service areas used by more than one lab will remain closed.
- Generally, individuals will limit themselves to their assigned lab space and not enter any other lab spaces. Contact with other labs should be made by phone or electronic means. Exceptions require permission of the PI. Use of shared facilities and other labs' equipment should be pre-arranged in order to avoid accidental contact. Social distancing and hygiene rules apply for these situations as well.

The driving principle is personnel will enter the research workspace and interact minimally with any other personnel- optimally only the people within their research lab. In the event an individual does contract COVID-19, these strict limitations will facilitate contact tracing. Any personnel who have come in contact with an infected individual will need to self-quarantine for 14 days.

### *A.4. Research involving hardware development*

Hardware and instrument development on campus is carried out in many forms. From small shops that develop instrumentation, mounting hardware and analytical tools, to the large-scale spacecraft and space instrumentation development done at LASP. There is a scale dependence associated with the returning to work strategy, but there are common elements as well. For the largest-scale activities, LASP has its own return-to-work plan that focuses on LASP-specific considerations and incorporates guidelines that are specifically targeted toward the execution of the LASP mission. The more general and overarching considerations, which do include many of those identified in the LASP return-to-work strategy are as follows:

*Contact/interactions*

Each type of project or activity has its own type of interaction among personnel that includes personnel working on a common project and personnel working on other projects that use the same facilities. Direct contact among individuals working on the same piece of equipment may occur if the work done at any given time requires more than one individual's attention. Direct contact among individuals working on the same project, but not the same piece of equipment occurs through communication of needs, requirements, and capabilities, data analysis, hardware exchanges, training in the use of instrumentation, transition to operations, equipment repair etc. These are often best done face-to-face, where those developing and those using the hardware can directly engage with one another. Often these interactions are intense and a critical component of project or mission success.

The nature of contact is twofold: for larger efforts there is project-oriented contact which creates and supports project teams and the activities associated with the conduct of a project over its life cycle. For both larger and smaller types of projects, there is contact of the physical nature and dynamics of the actual work spaces, in which people work side by side, and how those spaces are used by personnel.

There is an additional type of contact necessary for consideration in assessing returning to on-site operations, and that is the significant requirement for interactions with external organizations and personnel to include; research sponsors, research collaborators, inspectors, vendors, suppliers, and sub-contractors. External interactions, with a few exceptions are assumed to occur after normal internal operations are reinstated.

The role of these contacts is to collaboratively design, develop, build, test, integrate, and operate instruments, equipment, hardware, and space missions as effectively and efficiently as possible ultimately accomplishing the intended research required by the scientific goals and objectives for which such hardware is being developed.

In the case of LASP, being able to conduct these activities in person on a prescribed schedule and on demand from a total mission perspective with encompassing functional expertise concurrently has served to elevate LASP above its peers in academia and compete at the private sector and international levels. Degrading and/or inhibiting the fundamental role that this contact serves LASP will impact research continuity.

While the implications for other hardware development capabilities are not necessarily as detrimental to the success of the institute as a whole, they are often critical to the success of individual activities, and should be considered in the context of implications of little or no contact for the overall success of an institute, program, project, or other activity.

*Risks*

Those at risk include the machinists and others involved in the hardware development, and those with whom they come in contact (for the reasons described in the previous section). The degree of risk to any individual in any work situation depends on three major factors: demographic vulnerability, work-environment, and activity. While demographic vulnerability is a characteristic of the individuals doing the work itself (and will factor into the return-to-work strategy), the location and activities are specific to the jobs and are what the university and home unit determine. In the area of hardware development, again, there is a great diversity of function, form the individual working in a small shop alone, to a multi-building activity, with many rooms and many thousands of square feet dedicated to the development of hardware. As a result, in the area of hardware development the environmental risk exposure is determined by job function and working environment, while the individual risk exposure is driven by these two factors, plus the demographic vulnerability.

The single most significant risk factor in space research hardware development is the necessity for direct interaction, either one-on-one or in larger groups. These interactions arise from the needs for:

- collaboration
- iteration among hardware developers, those guiding the development of that hardware (e.g. designers), and end-users, these could be one-on-one or in large groups, such as in a system design review
- Team building
- Efficient use of time

For large complex systems, LASP has proven that project teams who effectively communicate complete projects in a quicker and more efficient amount of time and are more accurate in their work. In the case of LASP, the research growth, particularly hardware development, is a direct result of the project team environment and its necessity to successfully accomplish its research mission.

For smaller types of instrument/equipment development projects direct interaction among the designers, the developers, and the users similarly produces the most effective outcomes. The degree to which these efficiencies and quality of final products are preserved or compromised will depend on measures taken to manage the risks in the various phased approaches.

*Risk Mitigation/Management*

Video-conferencing and other means used for maintaining the continuity of research activities, specifically at the project level, have degraded efficiency and effectiveness. The ability to maintain contractual cost, schedule, and performance requirements has proved more difficult. If the current environment continues, risk of completing projects on time and within cost will increase with the potential of jeopardizing the awarding of future research opportunities.

Mitigation is a matter of controlling and orchestrating interactions with precision and purpose. In the area of hardware development, often the work simply cannot be done without the direct access to tools, infrastructure, people, etc. As a result, the only means of mitigating risk are limiting access to the fewest and least vulnerable people possible in order to conduct the work, and adopting safety measures, as directed by the medical community, to minimize risk while in the presence of others. Returning to an on-site collaborative environment requires a transition plan that limits exposure, putting control measures in place, adherence to strict processes and procedures, monitoring the health status of members throughout and afterwards, and adapting rapidly to environmental changes as they occur.

***A.5. Animal research***

Most animal research is/can be conducted with minimal contact between lab staff and between lab staff and OAR staff. Most procedures are conducted by individual researchers. However, there are some cases where close contact/interactions may be required. This can involve procedures requiring two or more researchers working with the animals to perform behavioral experiments or other procedures that cannot be done by a single person as described in question ii.

During some behavioral procedures, there can be a person handling the animal and another recording the data. For others, several researchers may work together to test animals when several procedures that cannot be completed by a single individual need to be done in a sequential, time sensitive manner. Also, tissue extractions sometimes require two or more individuals to extract tissues efficiently to preserve the quality of the tissue. Close interactions may also occur during training of new procedures between lab staff and occasionally between OAR and lab staff.

Everyone doing the research, animal care staff and anyone with whom these individuals come in close contact is at risk although this can be minimized by maintaining social distancing, proper PPE, good hygiene and frequent and thorough cleaning of facilities and equipment.

The obvious health risk is contracting COVID-19 and the concern that should a researcher or OAR employee test positive for COVID-19, how will that impact access to animal rooms where daily access is absolutely necessary. Other common health risks with animal research are bites, needle sticks and allergy development.

Non-health-related risks of NOT conducting research include 1) the delay in graduate students completing their training and/or reduced publications which will decrease their

competitiveness for post-doctoral positions 2) undergraduates unable to gain research experience and/or unable to complete Honor's theses or independent study 3) PI's being uncompetitive for grants due to lack of publications and preliminary data which would mean the inability to sponsor and train graduate and undergraduate students.

Challenges unique to this type of research are:

- Procedures are generally limited to between 7 AM and 7 PM-the "lights-on" period of the light cycle
- Some procedures require that the experiments be performed at a specific time within the 7AM-7PM window due to circadian variations in behavior and physiology.
- Animals require daily monitoring
- If research is delayed too long, existing rare or unique animals will be too old for the designed procedures and/or breeding and may not be replaceable. Those that are replaceable can take several months to a year as well as considerable expense to replace.
- It can take months to repopulate animal colonies before experiments can resume. Therefore, a critical step in resuming animal research is to allow investigators to begin purchasing animals from vendors and/or ramp up their breeding beyond minimal maintenance levels.
- Even without COVID-19, animal research requires PPE so the availability of PPE is essential to engage in animal research.
- Several levels of training are required prior to initiating animal research. This training requires interaction with OAR staff and lab staff. Therefore, the ability to train new staff for animal research will be limited while social distancing is in place.
- Animal research staff must coordinate schedules with OAR staff to minimize the potential for interaction.

COVID risk can be largely mitigated by ensuring that anyone who is sick does not come to work, instituting a daily schedule for access to all animal housing, procedure and surgical rooms for all labs and OAR staff, ensuring that proper PPE is available and worn at all times in animal facilities and regular cleaning of equipment and facilities, especially surfaces in which lab and OAR staff are likely to come in contact.

***A.6. Field research***

***A.6. Field research***

Field work activities are an essential component of many projects in the natural and social sciences. These can involve work in isolated or remote locations with unreliable infrastructure, uncertain access to resources such a food, clean water, power for instruments and other supplies, exposure to extreme weather, hazardous terrain, harmful wildlife and lack of access to or even absence of local emergency services. In addition, some field work occurs on countries other than the U.S. and protocols for personal safety may differ from those in the U.S. Field research may also involve contact with vulnerable populations (any group with inadequate

access to medical care and therefore particularly vulnerable to the pandemic). Preventing the spread of the virus to such communities is critical. Developing a safe research plan for field work will involve considering many different components of the work and its associated challenges. These components include:

- location of the research: whether it is local, in state, out of state or international;
- how field sites are accessed and whether access is restricted due to Covid-19: travel to reach the site, how site is accessed (vehicle, on foot, bicycle, etc.);
- potential risks at the field site: Is the site isolated or far from medical assistance? How is personal safety guarded?
- number of researchers involved at a particular site: can research be done by individuals or does safety require at least 2 people? In general a minimum of two people should be involved in university-sponsored field work.
- interaction with local land-owners, law enforcement, policy makers, the public, or in the case of social science field research, with the subjects directly.
- housing, food, fresh water availability, power and communication for researchers
- development of a field research safety plan

With the advent of Covid-19, additional precautions are needed (see below). Because precautions, risks, and issues faced during field work may vary from one group to another and by differences in location, it is important that each research group develop specific guidelines for their projects.

*Contact/Interactions*

The nature of field work requires numerous kinds of contact/interactions. These include landowners, law enforcement, public officials, members of local agencies, and the public. Contact with these and other individuals can be a critical part of conducting field research. Permissions for work on public or private lands may be required before field research can be undertaken. Such permissions need to be obtained before conducting any field research. Any new requirements pertinent to Covid-19 should be noted and incorporated into field plans.

Field researchers are at risk from a) contact with the public, b) contact with other researchers, c) contact with contaminated field equipment, d) contact with contaminated items in the course of transportation to and from field sites (e.g., gas pumps), e) use of multi-user facilities such as laboratories, camp sites, hotels f) contact with domesticated and wild animals. Other people with whom researchers come in contact are also at risk, if appropriate precautions are not taken.

Below are some guidelines for minimizing such contact.

- Take steps to ensure that such encounters are minimized and include social distancing as part of your field protocol. Such efforts include accessing field sites during times of least activity, such as on weekdays, during regular business hours and using less-used trailheads and travel routes. When accessing sites by car, park in the most remote

parking space to avoid contact in parking lots. While at field sites, try to avoid paved trails if possible. If more than one member of a field crew is at a site, keep at least 6 feet between them. Try to stay at least 10 – 12 feet from other individuals and avoid unnecessary interactions. If approached by others, maintain 10 feet of distance, explain you are working, and try to keep interactions brief.

- Note that international field research may also involve cultural differences and language barriers. Be prepared to communicate effectively. Be aware of both U.S. and international rules if going overseas.
- You may want to refer people to your lab website for more information and consider posting information about your field work there. Consider including signage on vehicles used to transport field crew. This can include fliers posted on dashboards, with links to lab websites
- All field-workers should wear appropriate PPE (wearing masks and gloves) when in the field and take additional steps to sanitize field equipment. This is especially important if you will be encountering other people during field work. Before beginning fieldwork, sanitize hands with hand sanitizer. Sanitize all field equipment with 70% ethyl alcohol or sanitizing wipes. While sampling in the field, wear nitrile gloves and face masks. Regularly re-sanitize gloves and avoid touching your face. When finished sampling for the day, re-sterilize all collection equipment with ethyl alcohol, dispose of used gloves/masks, and re-sanitize hands with hand sanitizer or washing.
- While in traveling to or between field sites, wipe down any gas pump handles with 70% ethyl alcohol before filling tanks and after returning the nozzle to the pump. Wear gloves when using gas pumps and treat gloves with hand sanitizer or alcohol after using pumps. Try to bring your own food and water during field work and will keep them in sealed containers within research vehicle. If you must purchase food, wear masks and gloves and use recommended sanitization protocols (wipe down with 70% alcohol or use hand sanitizer). If you must purchase supplied and mail samples, follow similar protocols.

If field researchers do not take the appropriate precautions, then anyone with whom they come in contact could be at risk. Thus, taking appropriate measures to limit possible contact with Covid-19 (via people, equipment, gas pumps, supplies, etc.) is extremely important.

*Risks*

Field research has additional inherent risks, independent of viral contact. These include accessing remote areas, use of equipment in the field, exposure to extreme weather, hazardous terrain, harmful wildlife and lack of access to emergency services. With the advent of Covid-19, additional risks include contact of field researchers with individuals, equipment or facilities that have been contaminated with Covid-19. In addition, if field researchers fall ill, there may be limited or no access to emergency services, difficulty in reaching such services, and few people available to help.

Field work activities can involve isolated or remote locations, exposure to extreme weather, hazardous terrain, harmful wildlife and lack of access to emergency services. Developing a safe research plan for field will involve considering many different components of field research. These components include:

1) location of the research: whether it is local, in state, out of state or international and adherence to appropriate guidelines for travel needs to be a priority (see below);
2) how field sites are accessed: travel to reach the site, how site is accessed (vehicle, on foot, bicycle, etc.);
3) potential risks at the field site: is the site isolated or far from medical assistance; how is personal safety guarded; exposure to dangerous wildlife, extreme weather, hazardous terrain, isolation;
4) number of researchers involved at a particular site;
5) interaction with local land-owners, law enforcement, policy makers, the public;
6) housing, food, fresh water availability, power and communication for researchers;
7) development of a field research safety plan
8) availability of supplies, including sanitizer, and shipping of supplies

*Risk Mitigation/Management*

In the area of travel, which is essential to field work, effective March 10, 2020, all non-essential University-related travel has been suspended; essential travel requires more cumbersome travel planning and requests, as well as approval at a higher level than before (VC-RIO and Provost). In short, the bar is much higher now than it was previously for travel to field sites, and approval will be directly tied to the criticality of the work, the consequences of not carrying it out, the plans for managing risks and the health and safety conditions at the site, all of which must be demonstrated prior to travel approval. These requirements have been in place for the last six weeks, and should continue at least through Phase 1 of the return-to-work program.

If you or anyone on your research team are feeling ill, have fever, cough, sniffles, fatigue or any other symptoms of illness, or if a person they are in close contact with has any of these symptoms, do not conduct field work. If your temperature is elevated (> 37C or 100F), stay at home. Have a back-up plan in case you become sick or need to self-isolate and stop critical field work, and call in for evacuation.

If at any time anyone feels that any part of their research becomes unsafe, please immediately discontinue work, communicate the issue to your advisor or other person who can help, and only continue research if and after a safe solution is found. A chain of command should be established within a field research group to ensure the safety of the participants. Field safety precautions should be taken as usual: your safety plan needs to consider risks from various field hazards inherent to the field environment and activities in addition to risks associated with COVID-19. For more remote or potentially dangerous locations, all field teams should develop a communication plan that includes primary contacts for each person on the team (at least two) and contacts for emergency services (search and rescue). A daily check in plan should be developed.

Extra precautions need to be taken during the Covid19 pandemic so that we do not create additional burdens upon our healthcare system through a field injury. Identify high risk activities, and consider additional mitigation or discontinue these activities if risk cannot be adequately mitigated.

### *A.7. Shared Infrastructure and Facilities*

Cutting edge research is enabled by access to advanced scientific equipment housed and maintained by experts in the Core Facilities. A Core Facility can be broadly defined as a research facility that provides services that are too expensive, complex or specialized for investigators to provide and sustain by themselves. Core Facilities are actively managed by scientific experts whose roles include, but are not limited to, (a) training, (b) teaching, (c) experimental design, (d) advising and (e) data collection, processing, and analysis. These roles require a broad range of interactions with users of Core Facilities and as such, the health and safety of the Core Facility personnel need special consideration. By properly developing and implementing health and safety protocols, the Core Facilities can be safely opened, operated, and utilized by our investigators in pursuant of and supporting the research and educational missions of CU, as well as sustaining the University's investments in critical research infrastructure.

*Interactions and Contact*

CU's shared infrastructure and core research facilities represent unique locations on campus where individuals from across campus and the broader community share common physical spaces. Research facilities tend to feature in-person, 1:1 or small-group interactions relative to larger shared facilities such as libraries, which may afford more hands-off or virtual interactions. Shared facilities are essential to the campus research and education missions, and their diverse functions, operations, equipment, and interactions will require custom approaches as we restart campus research operations.

Many CU research groups need the support of the Core Facilities to complete sponsored research objectives. Core Facilities personnel are experts in their respective fields who train or work alongside CU faculty, post-docs, and students to perform specialized and resource-intensive research not possible in individual research labs, as well as to operate and maintain the research instruments. Core Facilities support and augment the research capabilities at CU Boulder and offer technical support to users from inside the university as well as external and industry users. They may engage participants in research protocols in human subject research. Depending on the nature of the Core Facilities, the extent of contact between staff and users may vary from no contact with another person, contact with few persons per day or many people making multiple visits per day to the facility.

*Risks*

Core Facility staff may need to interact closely with users from different labs, departments, and institutes. This interaction creates a potential for infection of staff and users (faculty, postdocs, RAs, students, and human research participants). Core Facility staff often consist of one or two people who need to be on site for support, teaching, maintenance, and cleaning. Given the unique expertise of Core Facility staff, many facilities do not have sufficient staff to work from home or in shifts. Small staff size may lead to a closure or limiting of facility use if staff gets infected, temporarily impacting research in many labs/departments. Interacting and working in Core Facilities with limited space and multiple users and personnel at the same time puts the facility users at risk for infection and for loss of research. Strong protocols must be created and implemented to mitigate the risks.

The risks to the cores are two-fold: 1. General health and safety of the Core Facility staff and users due to personal interactions and 2. Negatively impacting the University's overall research capabilities. Cores provide essential services, training, and access to specialized equipment and technologies critical to the successful pursuit of tens of millions of dollars in research grants each year, making them central hubs that broadly impact CU research and funding on multiple levels. In addition, they provide equipment used for education and training of graduate students and postdocs. Their broad use from multiple investigators, labs and departments and their centrality to CU's research and teaching missions makes health and safety the central component to maintaining properly functioning Core Facilities.

*Risk Management and Mitigation*

Because Core Facilities provide a platform in which multiple users utilize shared instrumentation, equipment and research space, maintaining proper health and safety protocols ensuring the safety of Core Facility staff and users is critical. In addition to personal protective equipment and frequent disinfection of communal areas, limiting the number of users allowed in the same space and balancing on-site and remote support are essential.

PPE requirements and individually established cleaning protocols that meet the unique needs of each Core Facility will be essential to mitigating and managing risk in Core Facilities. Core Facilities would benefit from overall guidance from University experts regarding cleaning protocols as well as a coordinated effort to secure adequate cleaning supplies and PPE. A clear chain of command should be established and may include contact information for whom to refer to when specific questions or conflicts arise about protocols and PPE requirements. Training of building support staff (e.g., Facilities Management) should be similar to training of Core Facility personnel to ensure everyone in the Core Facility spaces is following the same guidelines and protocols. Protocols should include specific details, such as allowing no food or drinks (including water) into research areas. Proper and sufficient PPE and cleaning supplies (e.g., masks, gloves, lab coats, goggles) will need to be made available to core personnel. Sufficient remote access tools and capabilities will also need to be made available to support staff working from home as much as possible to continue to minimize the number of people who are on campus.

*Additional Considerations*

Multiple phases of access may be prudent to gradually increase Core Facility usage and ensure protocols are working as intended. A gradual phasing in of access might follow a plan such as (1) Staggered 25%, with 25% of researchers/staff allowed back on campus, divided into two groups that can access the facilities from different times (e.g., 8am-12pm and 1pm-5pm), for potentially four weeks, while utilizing PPE and other cleaning protocols; (2) Staggered 50%, with 50% of researchers/staff allowed back on campus for the following four weeks, with recommended PPE; (3) Full-time 50%, with 50% of researchers/staff allowed back on campus, working full-time, for the following four weeks, with recommended PPE; (4) Full-time 100%, with 100% of researchers/staff allowed back on campus, with recommended PPE.

### *A.8. Research that has and can continue remotely*

Some work can continue remotely until we resume normal operations. Examples include, but are not limited to:

- Work that only requires access to on-line resources,
- Work that can be performed on remotely accessible computers
- Work that can be done on personal computers
- Analysis of data from field stations that transmit remotely

Such activities may require occasional visits to campus or field sites for the purpose of hardware or equipment maintenance or repair, but do not require extended on-site presence. In these cases, the contact with others is minimal, and is usually not necessary for the fulfillment of the execution. Those at risk would include the individual doing the occasional on-site activity and anyone they come in contact with. Any risks are easily mitigated by timing the visit such that others are not present (which requires knowledge of who is present and when), avoiding contact with surfaces that others may have come in contact with or may at a later time, and wiping down any surfaces within which one has come in contact.

### *A.9. Research in Educational Settings*

Many units across campus conduct research in educational settings, which can include working with teachers and students in both formal and informal learning settings and activities. Additionally, there is significant active research on how to support educator professional development and learning. These lines of research have been significantly impacted with the closure of schools and community-based educational sites, and the elimination of group activities.

*Interactions and Contact*

K-12 and university classrooms represent unique and challenging locations for post covid-19 research, as contemporary classrooms often contain 20-35 youth and an adult in a small and confined classroom space consisting of many shared surfaces and instruments, including

computers. Research in other educational sites such as community-based education organizations (museums, boys and girls clubs, summer programs) as well as homes also often occurs with groups in confined spaces consisting of shared surfaces and instruments. Research in these contexts can involve whole group observations or activities, 1:1 or small-group interactions, and often all three interleaved in the same session. Research with educators typically involves groups of adults, ranging from small groups to large cohorts (50-60), that convene for multi-day periods in focused, joint activities. The amount of time people are in contact may also vary from one hour (a class session), to multiple sessions across days, weeks, or months. Research with professionals in district offices follow some of these same patterns.

*Risks*

Researchers may need to interact closely with learners and educators, creating potential for infection and spread of the virus across university and populations in the education setting, which can then spread throughout local communities. Furthermore, K-12 classrooms and informal learning environments include many shared surfaces and instruments, such as desks and computers, which may or may not be disinfected between class sessions.

Research with educators involves the typical risks associated with any gathering of adults, compounded by the potential of educators bringing the virus back into their school or informal learning settings.

*Risk Management and Mitigation*

To the degree possible, researchers should consider how their research with educators can be moved into online settings.

For research in K-12 and university classrooms in formal settings, researchers should wear masks and gloves (if permissible at the site).

For research with children and youth in informal settings, some activities may be able to be moved online, or moved to lower risks environments, such as moving outside where youth can be socially-distanced and have better ventilation (fresh air).

Depending upon the Phase at CU and the organization, municipal, or state regulations in place at educational research sites visited, the researcher may be required to self-isolate for 14 days after completing data collection at a school, university, community-based organization, home, or other educational site.

*Additional Considerations*

By and large, research in educational settings and with learners will be dictated by the policies of individual schools, school districts, universities, community-based organizations, or other educational providers. Researchers will need to work closely with school districts and local community organizations to determine access to the sites.

# Addendum for Fieldwork Guidelines Under Phase 1 and Phase 2 Research at the University of Colorado

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*This committee acknowledges that the University of Colorado Boulder sits upon land within the territories of the Ute, Cheyenne, and Arapaho peoples. Further, we acknowledge that 48 contemporary tribal nations are historically tied to the lands that make up the state of Colorado. The guiding principles outlined in this document attempt to do justice to this land acknowledgement.*

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## Goal of this Addendum

This addendum expands on the field research portion of Appendix A of the "*Resumption of Research and Creative Work at the University of Boulder Colorado*" document. Specific cases of field research, such as research in educational settings, are addressed in Appendix A. Elements of this supplemental document may be informative with respect to questions regarding travel to sites, steps to mitigate risk, and engagement with community partners. This addendum is not meant to contradict any information outlined in the main document.

Our primary goals in field-based research are to 1) keep personnel safe, 2) slow the spread of COVID-19, and 3) minimize risk to local populations. Phase 1 and Phase 2 research plans will allow us to gradually ease into research as long as these stated goals are not compromised.

Field research inherently involves risks and this is particularly true today. The best way to reduce these risks is to stay at home. The goal of this addendum is not to set thresholds for risk tolerance related to COVID-19. Rather, the goal of this addendum is to guide a process where program leads can better evaluate and potentially mitigate risks as they consider a return to field research activities.

## Guiding Principles:

1) Field research involves diverse activities and risks, so safety requires bespoke plans. Because field research represents a diverse set of working conditions and subjects, there is no "one size fits all" set of regulations to guide responsible CU field research during the COVID-19 pandemic. Instead of rigid protocols, we base this document on a

series of guiding principles that should be central to any Phase 1 or Phase 2 field research plan.

2) The only way to eliminate the risks associated with field research is to postpone/cancel the research and stay home. By considering Phase 1 or Phase 2 field research, we are inherently engaging in a process that balances different risks (for example, the risks associated with COVID versus the risks of not completing the research activities). It is imperative that project leads actively work on strategies that mitigate the exposure of personnel to these risks as well as communities in which the research is taking place (**Figure 1**). It also is imperative that all field-based personnel approved under Phase 1 or Phase 2 activities take ownership over their own health and safety, consider how their actions and decisions may impact others, and be active participants in this risk mitigation process. Project leads must create an environment in which field personnel are encouraged and expected to discuss and evaluate risks to health and safety on a daily basis.

3) Field research occurs in diverse and remote locations. It is thus imperative that project leads actively consult with local authorities and regulations.

4) Field research affects local populations. CU researchers will take all steps possible to ensure that activities are in full cooperation with local stakeholders, where the term "stakeholder" is used broadly and could include individual landowners, Indigenous communities, conservation or management groups, or any vulnerable community that lack adequate access to medical facilities. This includes stakeholders impacted by the field research or by transit of researchers to/from field sites.

5) Field activities have the potential to have cumulative impacts on health that must be coordinated. It is imperative that project leads evaluate the cumulative effects of field activities. Field work plans often claim that measurements can be collected by solo researchers or low density crews. However, field researchers rely on systems such as public washrooms, health care systems, gas stations, etc. This totality of social and built infrastructure supporting field research must be considered in COVID-19 safety mitigation plans.

6) Field activities often involve risks ranging from remote working conditions, wildlife encounters, to dangerous weather that could be exacerbated by COVID-19. The focus on COVID-19 may amplify the vulnerability of field researchers to non-COVID-19 threats. Under Phase 1 research, it is important to place even higher priority on health and safety training. These guidelines begin with the assumption that field safety SOPs are in place and being followed. The importance of this addendum is to encourage project and unit leads to identify situations and places where field safety SOPs are affected by COVID-19 risk mitigation plans. Project leads must make all attempts to avoid risky situations that would increase the probability of requiring first responders. If

opportunities for necessary safety training including first aid training are limited due to the COVID-19 pandemic, the field research should be delayed.

7) All field operations must be conducted under the assumption that any member of the operation is currently asymptomatic, infected, and contagious.

8) Each field project personnel must communicate their understanding and acceptance of risks associated with field research, and be offered the opportunity to not participate without any undue pressure or concern for reprisal.

## Planning Safe Phase 1 Field Research *(this addendum will be modified to address a potential transition to Phase 2 in June 2020)*

**Step 1: Carefully consider whether the field research fits within the philosophy of Phase 1 research.**

Phase 1 Research as outlined by the "*Resumption of Research and Creative Work* at the University of Colorado Boulder" has set density targets of no more than 10-25%. Phase 1 is a transitional phase during which we may choose to ease slowly into more field research if appropriate health and safety measures can be met. Density targets may be difficult to consider with regards to field research, particularly research being conducted outdoors. There is more to this than just the risk to field personnel. There are also risks to the rest of the CU research community and the risk to local populations with whom our researchers interact. Project leads will need to keep the guiding principles (highlighted below and explained in more detail in the main document) in mind when considering whether and how to seek approval for a field project under Phase 1.

***Guiding Principles Defining Phase 1 from the Resumption of Research and Creative Work Document***
*Phase 1 will be restricted to the number of personnel that can be safely accommodated in each research and work space, and involve only individuals considered to be in the lowest risk categories. Phase 1 will also be limited to research in which a robust execution plan is developed and approved and that manages risk (interactions, exposure, etc.) very effectively. A key consideration in Phase 1 is continuing to maintain a low density of people working within buildings and campus wide. Additionally, Phase 1 does not permit the congregation of two or more people in common spaces. In-person interaction will be avoided unless necessary, and only then carried out using approved physical distancing standards.*

Additional criteria for making decisions about Phase 1 research are provided on page two of the "*Resumption of Research and Creative Work at the University of Colorado Boulder"* document. Field research approved for Phase 1 work should demonstrate

how it meets the health and safety criteria above, as well as the critical-function or time-sensitive criteria as explained in the main document.

**Step 2: Prior to developing a field safety and risk mitigation plan, start with consultation with local communities**

Project leaders must regularly consult with campus, state, and federal travel restrictions and policies. Under these novel times, we also recommend that project leaders consult as soon as possible with county, First Nation, land-owner, law enforcement, field station, and management agency policies on COVID-19 wherever appropriate. Special consideration should be paid to any interactions - even if indirect via transiting – with vulnerable populations that are at high risk or have sporadic access to health care systems. This includes Indigenous, rural and mountain communities that are either nearby, provide support to many field research projects, or serve as research collaborators or participants.

The International Arctic Social Sciences Association (IASSA) Council recommends "avoiding travel to Arctic communities to prevent the spread of COVID-19 until all risks are eliminated" (https://iassa.org/news-archive/82-covid-19-statement). Field researchers at the University of Colorado Boulder have a responsibility to ensure their field research plans are in keeping with recommendations of government, health officials, and appropriate professional societies.

Project leaders are encouraged to consult with local stakeholders prior to submitting risk mitigation plans. However, we acknowledge that local approval may not be granted until university-approved plans can be reviewed by stakeholders themselves. All project leaders must be able to provide evidence that these local stakeholders are in support of the field work activities and plans by the time the research is commencing.

Even if not in direct violation of campus, state, or federal travel regulations, field research should be suspended if it requires transit-related interactions with people or communities in areas identified as hotspots or where a shelter in place order in response to COVID-19 has been declared. Alternative travel routes to and from field locations should be developed to either avoid these areas or to eliminate interactions with people in these areas.

Researchers should strongly consider delaying all field research activities involving contacts with multiple people, even if CDC and university guidance related to PPE and social distancing can be met. This might include field work in towns, cities and other high population density areas, visits to archives, public libraries, museums, public exhibits, art galleries, etc.

**Step 3: Developing a field research/field safety plan that addresses risk mitigation**

Program leads must develop a comprehensive field safety plan focused on risk mitigation (**Figure 1**). Risks are inherent to all field research – the only way to eliminate these risks is to stay home. The goals of each project's safety and risk mitigation plan are to 1) identify what risks will be faced by field personnel, including COVID-19 risks, but also how COVID-19 affects risks associated with terrain, wildlife, weather, or other dangerous conditions, 2) identify what measures will be taken to mitigate these risks, and 3) explain how these risk mitigation measures will be enforced. A check-list of key elements that all field safety plans should include is provided in **Table 1**.

Field safety and risk mitigation plans must consider the following elements:

- Strategies for maintaining appropriate social distancing in the field following current CDC and campus guidelines. For example, see https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html
- Strategies for maintaining appropriate social distancing during transport. The safest decision in terms of minimizing potential spread of COVID-19 during transport is to limit travel to one person per vehicle. However, there may be situations in which field safety and risk mitigation plans propose more than one person traveling in a vehicle, for example to achieve a balance with other safety risks. Field safety plans must follow up-to-date campus guidelines regarding travel. If field safety plans propose more than one person traveling in a vehicle, modes of risk mitigation must be articulated, possibly including spreading out in a large vehicle, use of more stringent PPE, maintaining good air flow and circulation, thorough vehicle disinfection prior to and after each use.
- Use of PPE in all field research activities. Factors to be considered should include what PPE is required, how PPE will be obtained, how frequently PPE will be cleaned or changed.
- First aid training and equipment. Plans must address how first aid kits will be augmented due to special considerations of administering first aid during this period of COVID-19 (i.e., hand sanitizer, face masks, eye protection, disposable gloves).
- How non-COVID-19 safety issues will be affected by COVID-19 or safety measures to mitigate COVID-19. Projects should avoid risky situations that would increase the probability of needing first responders. For example, research teams could consider determining thresholds for work in inclement weather or other risks using the best available information.
- Nearby medical facilities, address, and other relevant information should be identified.

- Procedures if someone gets sick, including how they will be cared for, quarantined, and what team members should do if a project member starts to display COVID symptoms. For example, https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/steps-when-sick.html. These plans should be addressed in the daily communication strategy (see below).
- The minimum safe crew size. That is, if two people get sick, is the remaining crew sufficient to perform the work safely?
- Pieces of shared equipment or consumables that will be touched by more than one person. If shared equipment is necessary, how will these be cleaned between users? If items cannot be cleaned, this would preclude them being touched by more than one person.
- Required communication devices. What modes of communication are required, for example satellite phone, RF radio, or personal locater beacon?
- Communication strategies, including any information on check-in/check-out and protocols that would be triggered if someone failed to check-out. We recommend required daily discussions of the safety plan where COVID-19 and non-COVID related risks and protocols to minimize those risks are shared and discussed.
- Whether the field research involves overnight stays. Risk mitigation strategies must consider individual sleeping quarters and bathroom facilities (individual rooms or tents if camping). For any shared spaces, personnel must clean and disinfect on the way in and out. Food and water should not be shared. For example, see *https://www.cdc.gov/coronavirus/2019-ncov/travelers/travel-in-the-us.html*. If field team members need to be housed together (shared eating, sleeping, or bathroom facilities), plans must address risk mitigation including two week-quarantines or other measures.

**Step 4: Workflow and Compliance**

As outlined in the *"Resumption of Research and Creative Work"* document, a hierarchical approach to research project management and approval is required and this is true also for field research. Field safety and risk mitigation plans should be designed by project leaders with intimate awareness of safety and training needs. These also must be approved by department or institute heads who provide a layer of unit-level accountability and quality control across projects. Similar to lab-based research, information on field research needs to be collected in a standard format so that campus can provide oversight and collect information potentially useful for contact tracing.

All field workers approved for Phase 1 research must comply with the behaviors and best practices for returning to work as outlined in the "*Resumption of Research and Creative Work"* document. This includes the required Skillsoft CU COVID-19 Safety and Awareness training, self-wellness checks, and illness reporting as required by the University of Colorado Boulder. Finally, we recommend that field researchers comply

with the other best practices outlined in the "*Individual responsibilities of researchers returning to work" section of the Resumption of Research* document, including avoidance of public transit whenever possible.

A flowchart describing key aspects of Phase 1 field research decision making is provided in **Figure 2**. Project leads may choose to supplement this flowchart with specific project needs.

***Table 1. Checklist to be used by project leaders before submitting approval for Phase 1 field research projects.***

| | |
|---|---|
| Is the project in keeping with the philosophy of Phase 1 research? | |
| Does the project meet all travel regulations as per campus, county, state, and federal regulations? | |
| If applicable, do local stakeholders support the field research activities? Will project leaders be able to produce evidence of this support prior to the research commencing? | |
| Can sufficient research training be provided for the field activities while maintaining appropriate social distancing? | |
| Can sufficient health and safety training be provided for the field activities while maintaining appropriate social distancing? | |
| Does the field research risk mitigation plan meet the health and safety guidelines of partner organizations, including standards set by collaborators or field stations? | |
| Do the field researcher(s) have adequate health and safety training to cope with the potential for amplified non-COVID-19 safety risks? | |
| Can the measurements or observations be collected while maintaining appropriate social distancing?<br>● If no, then the submitted plan needs to outline risk mitigation such as use of more stringent PPE during data collection | |
| Can the field sites or locations be accessed while maintaining appropriate social distancing and following campus guidelines on use of vehicles?<br>● If no, then the submitted plan needs to outline risk mitigation | |

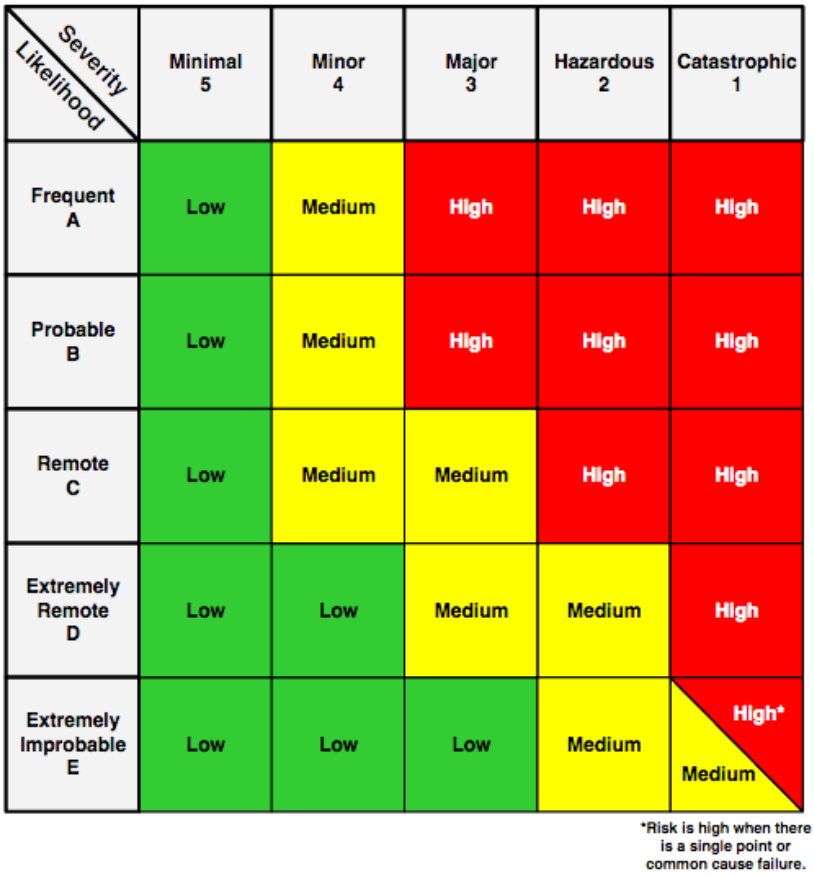


***Figure 1. Field safety plans should assess both COVID-19 and non-COVID-19 risks utilizing a risk matrix framework, where the goal is to manage and minimize risks to acceptable levels. Figure taken from https://www.faa.gov/air_traffic/publications/media/ATO-SMS-Manual.pdf***


***Figure 2. Flowchart to help guide decision making related to Phase 1 field research.***