

## LABORATORY SAFETY PLAN

### *NMR Facility*

A Laboratory Safety Plan (LSP) is a collection of information that augments the campus Laboratory Safety Manual, Chemical Hygiene Plan, and laboratory-specific Standard Operating Procedures (see the [UC Davis Laboratory Safety Manual](#)). This plan provides a repository for laboratory-specific information on the structure of their safety program, personnel safety roles, and descriptions of specific laboratory practices and equipment. A LSP can act as an easy reference for a laboratory's safety information. The content of this LSP must be reviewed and approved by the Principal Investigator (PI), Laboratory Supervisor, or other designee and should be periodically reviewed and updated (as needed).

**Instructions and Guidance:** This template is intended as a means of making the creation of a LSP easier for each laboratory organization. The structure and content may be customized as appropriate and desired for laboratory management needs. This is **YOUR** LSP. Required fields are identified for required elements of a LSP. Optional fields are identified for elements which your laboratory may want to include dependent on laboratory applications and circumstances. You may want to include information that is already contained within your SOPs as points of emphasis. However if your SOPs adequately cover the information, it is not required in a LSP. Additional elements related to shop equipment and tools may be addressed separately in a Shop Safety Plan, or can be included here when applicable. (These instructions may be deleted if desired)

Date SOP Written: 10/21/19 Approval Date: 9/5/22

SOP Prepared by: Jeffrey Walton  
CLSC SOP Task Force

SOP Reviewed and Approved by (name/signature): James B. Ames

BUILDING	ROOM(S)	DEPARTMENT	
Med Sci D, Chem 93, Chem 55, NMR Trailer	All	NMR Facility	
NAME	SAFETY ROLE	CONTACT INFORMATION	
Derrick Kaseman	Laboratory Supervisor	530-752-7794	dckaseman@ucdavis.edu
Derrick Kaseman	Safety Coordinator	530-752-7794	dckaseman@ucdavis.edu
REQUIRED - Insert Name	Emergency Contact(s)	REQUIRED - Insert Phone Number	OPTIONAL - Insert Email Address
Ping Yu		<b>530 848-3596</b>	pyu@ucdavis.edu

James Ames	PI	530 752-6358	jbames@ucdavis.edu

**A. ROLES and RESPONSIBILITIES**

*Responsibility for the management of laboratory safety and adherence to safe laboratory practices rests with the PI/Laboratory Supervisor within individual workplace units and associated departments. While all laboratory personnel have a duty to fulfill their obligations to maintain a safe work environment and minimize the risks associated with their workplace hazards, additional responsibilities may be placed on select individuals for implementation of a safety program. This section defines the roles and responsibilities for this LSP [see the Rights and Responsibilities Section in the [UC Davis Laboratory Safety Manual](#) (UCD LSM) for reference].*

REQUIRED - Insert descriptions of the laboratory safety roles. Each role description should include the associated chemical/laboratory safety responsibilities. This shall include any PI/LabSupervisor responsibilities being formally delegated.

The NMR Facility Faculty Director – James Ames – is responsible for Approving all SOPs and other safety policies. The NMR Facility Technical Director – Derrick Kaseman – shall be the Safety Coordinator. He will be responsible for writing SOPs and other safety documentation and training on them. Ping Yu will be the Assistant Safety Coordinator and act as Safety Coordinator if the Safety Coordinator is absent, or if specific duties are delegated. Magnetic field safety training of users may be done by anyone employed by the NMR Facility including the TA’s.

OPTIONAL - LSP REVISION - Define the frequency of review/revision to the LSP and identify the responsible party for the review. Any revisions must be approved by the PI/Lab Supervisor, and all personnel trained on the revisions.

This document shall be reviewed annually before annual safety training.

OPTIONAL - LEAVE/ABSENCE POLICY - Describe who is responsible when designated responsible lab personnel are on leave or otherwise absent. This can also include the communication structure for extended absences.

The Assistant Safety Coordinator shall take over the Safety coordinator in the event of absence. If both are absent, the facility director shall take over.

REQUIRED - NEAR-MISS REPORTING - Describe the lab-specific process for reporting, documenting, and discussing near-misses. Documentation must be maintained for at least five years and be readily available.

The form “Incident Report Template.pdf”, found on the NMRF Google drive at Safety=>Documents=>Accident Reports will be filled out by the Safety Coordinator and the person(s) involved. It will be uploaded to the same folder on Google drive. The report will be discussed at the next safety meeting.

**B. HAZARD DETERMINATIONS AND HAZARD IDENTIFICATION**

*Information about hazardous substances and activities, the associated risks, and the measures to mitigate those risks is required for all work areas including laboratories. Specific hazards within laboratories should be identified using the [University of California Laboratory Hazard Assessment Tool \(LHAT\)](#). All laboratory hazards must be identified by the LHAT or other methods. REQUIRED IF APPLICABLE - If other methods were used for hazard assessment, insert a brief description of those methods. For laboratories within the scope of this LSP, hazard assessment documents are maintained:*

*Separate from this LSP.*

*As an attachment to this LSP.*

REQUIRED - CHEMICAL LABELING REQUIREMENTS - Describe as applicable the chemical labeling format and requirements for this laboratory. Definitions of used acronyms or abbreviations should be included as an attachment/appendix.

Chemicals should be labeled with standard names. No Acronyms or chemical formulas. This includes NMR Standard Samples.

REQUIRED IF APPLICABLE - SAMPLE LABELING REQUIREMENTS - Describe the sample identification/labeling system and requirements for this laboratory. This may include any archive structure, hazard statements, responsible parties, etc.

NA

REQUIRED IF APPLICABLE - ANIMAL HANDLING - Unique requirements including AALAS and AAALAC requirements and guidance apply to research animal handling. May be included as an attachment/appendix.

Animals are sometimes used in experiments by users. All users must have an approved animal use protocol and follow it.

REQUIRED IF APPLICABLE - SHOP EQUIPMENT - List commonly used equipment and detail hazards associated with their use. May be attached as an appendix. Alternatively a separate Shop Safety Plan can be developed, as outlined in the campus Shop Safety Manual, and maintained.

No Shop present

OPTIONAL - HAZARD & OTHER POSTINGS - Describe postings/signage to address specific or unique laboratory hazards, including work spaces. Postings/signage should be defined in SOPs, but those requirements may be consolidated here.

See High Magnetic Field SOP.

OPTIONAL - PYROPHORICS - Should already be addressed in SOPs, but may want to add detail (e.g., specific locations of extinguishing media within the laboratory on a schematic, responsible person for periodic inspections, etc.).

NA

OPTIONAL - PEROXIDE FORMERS - Describe lab management procedures of time-sensitive peroxide-forming, chemicals (e.g., expiration date protocol, responsible persons for checking/testing containers, max storage quantities, etc.). Alternatively can be a SOP.

Peroxide formers, isopropyl alcohol will be checked every 6 months from date of opening using peroxide strips.

OPTIONAL - ERGONOMICS - Lab-specific factors and/or activities may need ergonomic assessment/consultation to ensure safe practices. Fill in as applicable.

NA

### **C. ENGINEERING CONTROLS**

*Engineering controls are an effective means of protecting workers and are the preferred methods for personnel protection. Examples of engineering controls include, but are not limited to, general room ventilation, chemical fume hoods, glove boxes, biological safety cabinets, downdraft tables, "elephant trunks" (or "snorkels"), gas cabinets, ventilated balance enclosures, and guards on exposed machinery.*

REQUIRED - ENGINEERING CONTROLS - Consolidate SOP requirements and provide more detail in this LSP.

Chemical fume hoods are available in Med Sci 18C. They should be used as needed when working with chemicals.

REQUIRED IF APPLICABLE - If there are unique, lab-specific engineering controls not already described in the UCD LSM, provide written procedures for those engineering controls. Consult the Chemical Hygiene Officer for assistance.

- 1) Oxygen levels must be monitored before entering the pit and a second person must be present.
- 2) A way to scavenge isoflurane must be implemented if it is used as an anesthesia.

### **D. ADMINISTRATIVE CONTROLS**

*Administrative controls consist of policies and procedures to reduce or prevent exposures to laboratory hazards. These controls are generally not as reliable as engineering controls in that the user has to carefully follow the appropriate procedures and must be fully trained in order to do so. Training must be documented*

REQUIRED - WORKING ALONE - Labs without a dedicated working alone SOP must specify what is and what is not acceptable, restrictions, notifications, etc. Consolidate all working alone requirements into the LSP or attach your Working Alone SOP.

See SOP

REQUIRED - UNATTENDED OPERATIONS - Labs without a dedicated Unattended Operations SOP must specify what is not acceptable, restrictions, notifications, etc.

No chemical processes, including cryogen transfers should run unattended. Spectrometers taking data may be run unattended.

REQUIRED IF APPLICABLE - CLEAN ROOM CRITERIA - If this LSP applies to a clean room, specify requirements related to maintenance of clean room criteria, including proper gowning/PPE, equipment entry and exit, maintenance, pressure differentials, etc.

NA

REQUIRED IF APPLICABLE - SHOP EQUIPMENT - In lieu of a separate Shop Safety Plan describe policies and procedures in place to control access and use of shop equipment. Labs must specify use restrictions, training requirements, and what is and what is not acceptable in the use of this equipment. Training for each piece of shop equipment is required of all users and shall be documented.

NA

OPTIONAL - ADMINISTRATIVE CONTROLS - Should already be addressed in SOPs, however may want to consolidate or add detail in this LSP. Fill in as applicable/desired.

OPTIONAL - UNACCEPTABLE OR RESTRICTED ACTIVITIES - Should already be addressed in SOPs, however may want to consolidate/summarize in LSP including restrictions and quantities. Fill in as applicable.

NA

OPTIONAL - COMPUTER WORKSTATION REQUIREMENTS OR RESTRICTIONS - Describe any restrictions of using computer workstations within laboratory areas, particularly in shared use areas. Define any glove/chemical-free areas.

Contaminated gloves and lab coats should not be worn outside of chemical prep areas marked on the floors. Samples being removed from these areas should be sealed. No gloves or lab coats should be worn at the spectrometers or data stations.

OPTIONAL - DATA SECURITY - Describe lab-specific procedures and protocols to ensure reliable data storage and theft protection.

No data storage or theft protection is provided by the facility. Users a responsible for transferring their own data.

OPTIONAL - REGULATED/DESIGNATED AREAS - Should already be addressed in SOPs or Use Authorizations, but may need supplemental information or summary in your LSP. Fill in as applicable.

Designated areas: Inside magnet 5 Gauss line – users should keep magnetic objects outside the 5 Gauss line unless a specific exception has been obtained from NMR Facility personnel. Animal Surgery may be performed in room 18 C or 18 D of Med Sci D.

#### **E. PERSONAL PROTECTIVE EQUIPMENT (PPE)**

*Personal protective equipment serves as a researcher's last line of defense against chemical exposures. PPE augments the minimum attire required to enter a laboratory or storage area containing hazardous chemicals, kinetic hazards, or other hazards associated with equipment use.*

REQUIRED - PPE - Describe PPE requirements identified by hazard assessment and/or specified in SOPs. PPE requirements in the certified LHAT assessment may be inserted or the certified assessment attached for reference.

PPE is required when performing cryogen fills or working with chemicals See SOPs. PPE is not required when working with sealed (cap in place or a glass seal) NMR samples unless they are under pressure.

REQUIRED IF APPLICABLE - MINIMUM ATTIRE EXCEPTION - If your lab has been granted an exception to the PPE Policy for minimum attire, you must document in detail that exception within your LSP.

PPE not required when working with sealed NMR Samples.

#### **F. USE AUTHORIZATIONS**

*Laboratory operations that use lasers, radioactive materials, radiation producing machines, controlled substances, or include biological hazards must follow additional guidelines outlined in the associated hazard-specific UC Davis Safety Manuals and Programs (e.g., Radiation Safety Manual, Controlled Substance Program, Laser Safety Manual, Biosafety Program, etc.) and obtain Use Authorizations prior to work with these materials.*

REQUIRED IF APPLICABLE - RADIATION USE AUTHORIZATION- If the lab has an RUA, provide the RUA# and isotopes. Additional detail can be provided as desired, or the RUA documentation can be included as an attachment/appendix.

Users must obtain their own. They must include discuss such uses with NMR Facility personnel and amend their RUA to include at least one NMR Facility employee on the RUA. This will require Radiation safety training by NMR Facility personnel.

REQUIRED IF APPLICABLE - CONTROLLED SUBSTANCE AUTHORIZATION- If the lab has a Controlled Substance provide the approved drug(s) and location of the secured log. Additional detail can be provided as desired or included as an attachment/appendix.

Users must obtain their own. A locked drawer may be provided for storage.

REQUIRED IF APPLICABLE - LASER USE - If the lab has a registered laser, provide the registration number and laser class. Additional detail can be provided as desired or included as an attachment/appendix.

NA

REQUIRED IF APPLICABLE - BIOLOGICAL USE AUTHORIZATION- If the lab has a BUA, provide the BUA# and medical waste location (if applicable). Additional detail can be provided as desired, or the BUA documentation can be included as an attachment/appendix.

Users must obtain their own.

#### **G. CHEMICAL SECURITY**

*Implementation of a laboratory-specific security plan can help to minimize potential malicious actions.*

OPTIONAL - CHEMICAL PROCUREMENT - Describe lab-specific chemical procurement process, personnel allowed to order chemicals, approval requirements, restrictions, shipping requirements/restrictions, etc.

OPTIONAL - CHEMICAL INVENTORY - Describe lab-specific chemical inventory process, particularly if a separate chemical inventory is kept outside of the campus CIS. Describe inventory responsibilities and frequencies.

Chemical inventory is stored in the campus system and is updated annually by the Safety Coordinator. All chemicals have been barcoded

OPTIONAL - CHEMICAL STORAGE - Describe lab-specific chemical storage details such as designated locations and segregation. Should already be addressed in SOPs but may want to consolidate and summarize in this LSP.

Chemicals are typically stored in separate locations to maintain chemical compatibility. Chemicals stored in the same drawer, but of different compatible hazard classes are stored in secondary containers and physically separated in the same area.

OPTIONAL - CHEMICAL ACCESS RESTRICTIONS - Describe lab-specific restrictions on chemical access, methods to prevent chemical diversion, etc.

## **H. EQUIPMENT AND INSTRUMENTATION**

*Specific equipment and instrumentation have unique hazards that must be understood and addressed by administrative controls, engineering controls, and/or by the use of personal protective equipment. Specialized procedures may be required prior to using or performing work on equipment or instrumentation.*

REQUIRED - SHUTDOWN PROCEDURES - Describe lab-specific equipment shutdown procedures for planned utility outages.

Cryoprobes are warmed via software command within the acquisition software TopSpin. Spectrometers are turned off via the power buttons. (note that for the 400 and 500 in Med Sci, the electronic must cool off over night before turning back on). Then computers are shutdown.

REQUIRED IF APPLICABLE - LOCKOUT-TAGOUT (LOTO)- Describe lab-specific equipment that have LOTO requirements. Equipment (e.g. instrumentation, shop equipment) that may release hazardous energy must have a LOTO procedure. Note that only qualified employees and personnel are authorized to test, troubleshoot, repair, or modify equipment.

NA

REQUIRED IF APPLICABLE - SPECIALIZED EQUIPMENT- Specialized equipment (such as gloveboxes, isolators, etc.) may need written operational procedures to optimize the function of this equipment and delineate important safety features.

NA



REQUIRED IF APPLICABLE - EQUIPMENT/TOOLS - Describe or reference lab-specific equipment and tool safety procedures. Examples include lab equipment, shop tools, walk-in freezer, furnace, etc.

Keep Magnetic objects away from magnets. Do not work alone in 600 Pit. Check oxygen level before entering pit and do not do so alone.

REQUIRED IF APPLICABLE - MACHINE GUARDING - Describe lab-specific guarding on machines or tools.

All magnets have the 5 gauss line marked.

OPTIONAL - ROTARY EVAPORATORS- Describe or reference procedures for use of rotary evaporators in lab to address acceptable use locations (e.g. in or out of a chemical hood), and safe use precautions. Can be stand alone SOP. Fill in as appropriate.

NA

#### **I. EMERGENCY AND SPILL PROCEDURES**

*Laboratory emergencies may result from a variety of factors, including: serious injuries, fires and explosions, spills and exposures, and natural disasters. All laboratory-specific factors must be addressed for proper response to emergencies, as well as any scheduled utility outages.*

OPTIONAL - EMERGENCY SAFETY EQUIPMENT - Describe or list lab-specific equipment, locations, etc.

The 7T has an emergency run down unit. If someone is trapped to the magnet, hit the red button to induce a quench.

OPTIONAL - EMERGENCY PLANS - Describe lab-specific emergency plans above and beyond the Departmental Emergency Action Plan and posted egress route and contact names and numbers as applicable.

#### **J. INSPECTIONS AND COMPLIANCE**

*Laboratory inspections are required on a routine basis, **at least annually**. While inspections are a snapshot in time and cannot identify every accident-causing condition, they do provide important information on the overall operation of a particular laboratory. Laboratory personnel may use the [EH&S self-inspection checklist](#), or use an alternate inspection checklist at the discretion and preference of laboratory personnel that best meets the needs of the laboratory.*

REQUIRED IF APPLICABLE - LAB INSPECTION FORM - If a lab-specific inspection form has been developed to address unique circumstances, equipment, processes, etc., please describe or attach that form.

Lab inspections shall be done annually and use the EH&S self-inspection checklist.

*Follow-up and documentation related to any identified corrective actions is very important. Inspection documentation for recent inspections and follow-up actions for laboratories within the scope of this LSP must be maintained for at least five years and be readily available.*

REQUIRED - Indicate how and where the documentation is maintained



Documentation is maintained on the NMRFAC Google Drive at  
UCDNMRF=>Safety=>Documents

**K. TRAINING**

*Effective training is critical to facilitate a safe and healthy work environment and prevent laboratory accidents. All laboratory personnel must complete the online [UC Laboratory Safety Fundamentals](#) training course before beginning work in a laboratory. Additionally, before being granted unescorted access to a laboratory, personnel must complete and document site-specific safety orientation and training. Guidance on materials that need to be covered in the site-specific safety orientation and training is provided in the Site-Specific Safety Orientation & Training Checklist for New Laboratory Personnel found on the [Chemical Safety](#) webpage, which includes documentation of training on the campus Chemical Hygiene Plan (CHP) and this LSP. Equivalent checklists and documentation are also acceptable.*

*All laboratory personnel shall have annual refresher training to include review of the Department IIPP and EAP, the LSP and any additional laboratory-specific safety information at the discretion of the PI/Lab Manager or designated laboratory safety person. All training records for laboratory personnel shall be maintained in perpetuity.*

OPTIONAL - TRAINING - Describe lab-specific training requirements and due dates.  
Attached or reference any lab-specific training checklists and documentation as applicable.

**L. HAZARDOUS WASTE**

*Each laboratory must comply with the campus Hazardous Waste Management Program requirements and all applicable regulations.*

REQUIRED IF APPLICABLE - ENVIRONMENTAL - Describe any lab-specific drain disposal processes and protocols.

NA

OPTIONAL - HAZARDOUS WASTE - Summarize lab-specific hazardous waste requirements including details such as waste container locations, frequency of disposal, labeling, etc.

Contact Hazardous Waste for disposal and follow the documented procedure.

**M. HAZARD ASSESSMENTS AND CHEMICAL EXPOSURE MONITORING (HACEM)**

*Cal/OSHA requires that all employers “measure an employee’s exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance may exceed the action level (or in the absence of an action level, the exposure limit).” Repeated monitoring may be appropriate for different reasons. If you have questions on existing HACEM results or have activities that may be a candidate for HACEM please contact [heathandsafety@ucdavis.edu](mailto:heathandsafety@ucdavis.edu).*

OPTIONAL - HACEM - If desired, compile or otherwise summarize industrial hygiene monitoring results specific to your labs or representative results. May provide a good training tool for new lab personnel.

NA



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