Research Safety – Chemical & Laboratory Safety Assessments

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UNIVERSITY OF GEORGIA
Office of Research
Research Integrity and Safety

I. Purpose & Scope

This SOP describes the internal policies and procedures guiding the frequency and scope of chemical laboratory safety assessments at the University of Georgia (UGA). These assessments, along with assessments conducted by other safety groups, ensure that laboratory users are kept safe, improve regulatory compliance, and further the development of initiatives to improve the efficiency and effectiveness of the program.

These risk based assessments are intended to be comprehensive chemical and laboratory safety assessments. They are conducted by a team of safety professionals and fundamental aspects of biosafety, radiation safety, and laser safety will be informally evaluated simultaneously. Formal evaluations of these areas are performed by separate compliance groups.

II. Responsibilities

A. Research Safety Committee

The Research Safety Committee (RSC) is a faculty-led committee charged with reviewing safety trends regarding chemical and laboratory safety and definitively addressing and mitigating issues of non-compliance.

B. Associate Vice President for Research Integrity & Safety

The Associate Vice President for Research Integrity and Safety (AVP-ORIS) is responsible for reviewing the laboratory risk assignments prepared by the Office of Research Safety (ORS) to ensure resource adequacy. The AVP-ORIS is also responsible for facilitating communication between ORS and the Environmental Safety Division (ESD).

C. Director of Office of Research Safety

The Director of the Office of Research Safety (DORS) is responsible for managing laboratory specific Chemical Safety Plans for all laboratories and overseeing the safety assessments conducted by both the Chemical/Laboratory Safety and Radiation Safety groups.

D. Senior Safety & Compliance Officer

The Senior Safety & Compliance Officer (SSCO) oversees the team of chemical lab safety professionals, coordinates the scheduling of assessments, develops training

seminars to help researchers prepare for assessments, and serves as the RSC coordinator. The SSCO also analyzes assessment data providing periodic reports to the DORS, AVP-ORIS, department heads and center directors, and the RSC.

E. Laboratory Safety Professionals

The laboratory safety professionals (LSPs) are responsible for performing safety assessments within their assigned laboratories in accordance with the schedule provided by the SSCO in conformance with the procedures and requirements outlined in this SOP and in UGA's Chemical and Laboratory Safety Manual. LSPs also manage and monitor corrective actions submitted by laboratories to address their safety deficiencies.

F. Principal Investigator (PI)

The PI is charged with overseeing the safety of those guests, students, staff, and faculty working within their laboratory. The PI holds ultimate responsibility for ensuring that all federal, state, and university policies are followed and that any necessary corrective actions are completed within established time frames.

III. Chemical Safety Levels and Assessment Scoring

Chemical Safety Levels are assigned to each laboratory space listed as active in the Chematix database based upon their chemical inventory. Rooms are assigned a safety level based off the information provided in Table 1 below and are evaluated at the beginning of each fiscal year and more frequently as necessary.

Each lab area under a PI's jurisdiction receives its own safety level independently of chemical use in other areas. These safety levels, in conjunction with safety assessment scoring, determine the frequency and scope of visits as described in Table 1. Appendix A of this document lists each inspection item and the score assigned to each. A lower score on a routine safety assessment indicates a safer laboratory.

If laboratories document corrective actions for their deficiencies it is possible that they may be able to forego some of the annual requirements.

	Chemicals present	Annual requirements	Score 10 or less on routine assessment or document corrective actions	Score 30 or more on routine assessment
CSL-1	Combustible liquids and/or slightly corrosive or slightly toxic chemicals	One routine safety assessment conducted by ORS	No additional requirements	An in-person follow up conducted by ORS approximately 2-4 weeks after the original assessment.
CSL-2	Corrosive substances, flammable gases, liquids, or solids, weak oxidizers, carcinogens, mutagens, reproductive toxins, and/or moderately toxic chemicals	One routine safety assessment conducted by ORS plus one self-assessment conducted by lab personnel	Skip the self-assessment for that year	
CSL-3	Highly flammable gases, liquids, or solids, pyrophoric and water reactive materials, strong oxidizers, and/or highly toxic chemicals	Two routine safety assessments conducted by ORS approximately 6 months apart.	Skip the second safety assessment for that year	

Table 1: Chemical safety level information and scoring.

Please note: Chemical safety level is also determined based on quantity of hazardous chemicals present in lab. Labs may be able to reduce CSL based on quantity cutoff determined by the Office of Research Integrity and Safety.

IV. Scheduling Routine Assessments

All laboratories on campus are scheduled for a routine safety assessment based on the calendar put together by the SSCO. The inspection calendar begins on July 1st and ends on June 30th to coincide with the fiscal year. Additional assessments are required by other compliance groups.

- All buildings are scheduled to be completed within a certain month during the year. On average, the SSCO aims to allow enough time for each LSP to complete and report two assessments per day.
- Each month, the assigned building(s) are split between the team of LSPs equally (or as equally as possible). All assessments in the building will be completed and results reported to researchers within the month.
- The master schedule is placed on the ORS website and copies are provided to the Director of Biosafety (DOB), the Radiation Safety Officer (RSO), and the DORS as requested.
- Approximately one month prior to the beginning of the assessments for a particular building, the SSCO or their designee sends a courtesy notification to all PIs and laboratory supervisors currently listed as having spaces in that building according to Chematix.
    i. If the PI would like to schedule their assessment in order to be present, they may request a specific date and time and these will be accommodated if possible.
    ii. If no email is received, then it is assumed that the laboratory does not need to have someone present for the assessment and the assigned LSP will simply perform the assessment at some point within the month.

- The SSCO or their designee also offers to host training seminars either by department, building, or for individual laboratories. For those that are interested, these seminars are held typically 1-2 weeks prior to the beginning of routine assessments.

V. Conducting Assessments

A typical laboratory safety assessment will take anywhere from 30 minutes to a few hours depending upon the type of hazards present in the laboratory. This includes travel time to the lab, time to complete the assessment, and reporting of the assessment findings to the PI.

Reports are typically filled out via electronic tablet or on paper and then entered into Chematix upon returning to the office.

The following items are reviewed as part of a typical laboratory safety assessment:

- Immediately dangerous to life and health (IDLH) conditions – a safety violation that poses an immediate threat to life or would interfere with an individual's ability to escape from a dangerous situation. Labs with these types of deficiencies must either correct the issue or develop a detailed action plan for addressing the issue within 24-48 hours of receiving notice.

- Critical conditions – potentially dangerous conditions primarily resulting from physical hazards or blocked/inoperable safety equipment. Labs with these types of deficiencies are given 5-7 days to either correct the issue or develop a detailed action plan for addressing the issue.

- General laboratory conditions – includes ingress/egress concerns, safety postings, sink conditions, the presence of food/drink, personal protective equipment, and the use of appropriate lab attire.

- Chemical storage and documentation – includes chemical storage and labeling, including hazardous waste compliance

- Safety equipment – includes verifying the most recent assessment dates for safety showers, eyewashes, fume hoods, and fire extinguishers as well as the presence of first aid kits and spill kits, safety data sheets, and training documentation.

- Electrical safety – includes looking at all motors and oil-containing pumps to verify proper storage; LSPs also look for frayed wiring on equipment, proper use of extension cords, power strips, and ground fault circuit interrupters (GFCIs) on outlets near water sources.

- LSPs have also been cross-trained to notice obvious and/or immediately dangerous laboratory conditions that would typically fall under the purview of Biosafety or Radiation Safety. In the event that an unsatisfactory condition is found within either of these two subject areas, the respective office is notified by the LSP. The responsible office then follows up with the laboratory to verify compliance and develop a corrective action procedure for the lab.

Any items not meeting the safety standards as established by federal, state, and university policy are marked as "Unsatisfactory" on the report and explanatory information is provided within the report as necessary. This includes suggested corrective actions for the PI to take.

For those items that cannot be addressed by the PI (e.g., fume hood operation concerns, installation of GFCIs, safety shower or eye wash installation, etc.), the LSP will submit a work order to the Facilities Management Division (FMD). Work orders for these types of issues are typically resolved without laboratory funding.

Occasionally, a safety concern arises that falls within the jurisdiction of a program under ESD. These items include Fire Safety, Environmental Compliance, and Industrial Hygiene. During the assessment, if any concerns arise within these subject areas, the LSP notifies the appropriate ESD program.

Once the report has been entered into Chematix and any associated work orders have been accepted by FMD, the LSP and the SSCO each receive a copy of the report. The LSP forwards the report to the PI and laboratory supervisor within two business days and uses the email to provide any explanations and relevant attachments (including photos) to assist the lab with their corrective actions.

VI. Reporting and Managing Deficiencies

A. Deficiencies that are immediately dangerous to life and health (IDLH)

IDLH deficiencies are safety violations that pose an immediate threat to life and property or would interfere with an individual's ability to escape from a dangerous situation. Labs with these types of deficiencies must either correct the issue or develop a detailed action plan for addressing the issue within 24-48 hours of receiving notice. If no such action is documented within 24-48 hours, LSPs will notify the RSC of the situation and the RSC may take one of the approved institutional responses outlined in Section VI.D of this SOP.

B. Deficiencies that are critical

Critical deficiencies are potentially dangerous conditions primarily resulting from physical hazards or blocked/inoperable safety equipment. Labs with these types of deficiencies are given 5-7 days to either correct the issue or develop a detailed action

plan for addressing the issues. If no such action is documented within the 5-7 day window, LSPs will notify the RSC of the situation and the RSC may take one of the approved institutional responses outlined in Section VI.D of this SOP.

Additionally, a lab will be considered to be in a critical state if any combination of deficiencies causes it to score 30 or more on its safety assessment. For these situations the 5-7 day corrective action calendar be applied as well.

C. Other deficiencies

For non-IDLH and non-critical deficiencies, laboratories are provided approximately 30 days from the date of the assessment to document corrective actions within Chematix; additional time may be needed for corrective actions associated with an FMD work order.

Once corrective actions have been completed, the LSP can choose to either approve the corrective action within Chematix or they can follow up with the lab if there's a question regarding what has been done.

If no corrective actions have been documented for a deficiency after approximately 30 days, the LSP will send an email reminder to the lab. If, after approximately 60 days, no corrective actions have been entered, the LSP will document that no corrective action was taken for the deficiency and the lab may be referred to the RSC if the lab had an overall score greater than 10 on the safety assessment.

D. Possible institutional Responses of the RSC

The RSC utilizes three types of letters to communicate with laboratories. These can be used in escalating fashion or the Committee may decide that a situation is serious enough to warrant an immediate Letter of Warning or Reprimand.

Letters of Concern express a general sense of concern for the safety of lab occupants and are usually only meant as communication between the RSC and the PI.

Letters of Warning explicitly state a possible action by the Committee if corrective actions are not taken. They usually include a hard deadline and are copied to a department head or unit director as appropriate.

Letters of Reprimand are issued when the Committee has decided to take formal action. These will include a detailed description of the Committee's action, a hard deadline to complete the Committee's required corrective actions, and are also copied to a department head or unit director as appropriate. Additionally, the AVP-ORIS will inform the EHSMS Executive Committee of the RSC's decision to take official action.

Any of the decisions listed below may be taken by the RSC and would be communicated to the lab in the form of a letter.

- Require the completion of formal training courses
- Require changes in research procedures or laboratory practices
- Place conditions upon ongoing research or require enhanced monitoring
- Recommending to AVP-ORIS that the investigator not use the data collected for publication
- Issue a stop work order for the lab until deficiencies are corrected

VII. After Routine Assessments are Completed

Once reports from a building have all been entered, the SSCO uses the data to compile assessment summaries for department heads and center directors as requested. Assessment summaries are also provided to the RSC and the AVP-ORIS as requested.

The SSCO also utilizes the assessment data to develop training tools and to make recommendations regarding assessment frequency. Laboratories that score greater than 10 on their routine annual assessment may be subject to additional requirements and visits as described earlier in this document.

In addition, the SSCO sends out a link to all researchers within the building to gauge the perception amongst researchers of the process and to gather comments and suggestions to perhaps improve the relevance and helpfulness of the laboratory assessment program.

APPENDIX A: Inspection items with scores in parentheses

A. IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (4)

1. The primary means of egress out of the lab is at least 36 inches wide.
2. Gas cylinders (including lecture cylinders) are upright and secured with a chain, strap, or someother device specifically designed for securing of cylinders.
3. Pyrophoric gases and toxic gases (including carbon monoxide) present in the lab are kept in anNFPA compliant gas room, approved gas cabinet or exhausted enclosure.
4. No untended or unidentified spills on lab benches, floors, storage cabinets, or within fumehoods.

B. CRITICAL DEFICIENCIES (3)

1. Appropriate personal protective equipment is available and utilized when necessary.
2. No evidence of sink disposal of chemicals, unless the lab has written permission from theEnvironmental Safety Division.
3. Liquid corrosives are stored in appropriate secondary containment.
4. Chemicals are segregated and stored according to hazard class.
5. Peroxide forming chemicals are found with proper labels indicating a receipt date, opening date,and testing information if applicable.
6. Fire extinguishers, eyewashes and safety showers are unobstructed.
7. Electrical panels and gas shutoff valves in the lab are unobstructed.

C. LABORATORY CONDITIONS

1. Door windows to exterior corridors are uncovered (1).
2. Unless stored along walls, items are not stored within 18 inches of the ceiling in sprinkleredrooms or within two feet in non-sprinklered rooms (2).
3. The lab is free of slip, trip, and fall hazards in main areas of egress/ingress (2).
4. The laboratory caution sign is present on all main entrances into the lab or lab suite andaccurately reflects the current emergency contact information (2).
5. All Research Safety provided laboratory postings and labels are visible and legible (emergencyphone numbers, refrigerator stickers, eyewash/safety shower, spill kit, first aid kit, safety information sign). (0).
6. No evidence of food and/or beverage preparation or consumption (2).
7. Laboratory personnel are wearing appropriate laboratory attire (3).
8. Hand washing facilities with sufficient towels and soap are present in the lab or lab suite (1).
9. Furniture at the lab benches is made of or covered with non-porous materials (1).
10. Sharps, pointed plastics, and glass are being disposed of in appropriate containers (3).

D. CHEMICAL STORAGE

1. All chemical containers within the lab are clearly labeled with either the full chemical name or anacceptable abbreviation (3).
2. No hazardous liquids are stored above shoulder height (2).

3. The lab's chemical inventory accurately reflects the hazards present in the lab (2).
4. Unused cylinders have safety caps in place (3).
5. All cylinders are tagged as "Full", "In Use", or "Empty" (1).
6. Cylinders in storage containing incompatible gases are separated by the required distance (3).
7. There is no evidence of stockpiling gas cylinders within the lab (3).
8. The volume and density of flammable liquids being stored and used in the laboratory does notexceed the limits established by the National Fire Protection Agency (3).
9. Flammable liquids requiring refrigeration are being stored in an intrinsically safe or explosionproof unit (3).
10. Hazardous waste containers are labeled with the words "Hazardous Waste", the associatedhazard class or other indication of hazard (e.g., original container label), and a sufficient description of contents (4).
11. Hazardous waste containers are kept tightly closed unless adding waste (4).
12. Liquid hazardous waste is being stored either in secondary containment or in a container ratedfor transport on public roads (2).
13. Incompatible waste is separated by a physical barrier (4).
14. No inherently waste-like containers are being stored (3).

E. SAFETY EQUIPMENT AND DOCUMENTATION

1. Fire extinguishers, eyewashes, and safety showers are available and have been certified withinthe last 12 months (0).
2. A first aid kit and spill kit are present and appropriately stocked in the lab or lab suite (2).
3. Safety data sheets for all hazardous materials in the lab or lab suite are readily available to alllaboratory personnel either electronically or via hard copy (4).
4. Training records for all laboratory personnel are up to date (3).
5. Fume hoods are not being used for long term storage of hazardous chemicals or lab equipment unless storage isthe sole purpose of the hood (2).
6. Fume hoods have been certified within the last 12 months and appear to be operating within theparameters required for maximum protection (0).
7. Fume hood lights, alarms, sashes, sash locks, and vented cabinets are operating appropriately(0).

F. ELECTRICAL EQUIPMENT

1. Extension cords are not run under doors, through windows, or through ceiling panels (2).
2. Electrical cords are not frayed or damaged (4).
3. Electrical equipment is properly grounded (3).
4. Outlets within six feet of a water source are equipped with GFCI protection (0).
5. Only UL rated power strips are used to power electronic equipment (2).
6. Power strips and extension cords are plugged directly into a permanent wall receptacle and notplugged into one another (3).

7. Power strips and extension cords being used in the lab are not being overloaded (3).
8. Any motors and pumps with moving belts are equipped with belt guards (3).
9. All equipment containing oil is being stored within secondary containment or on a spill pad ifnear a floor drain or sink (3).

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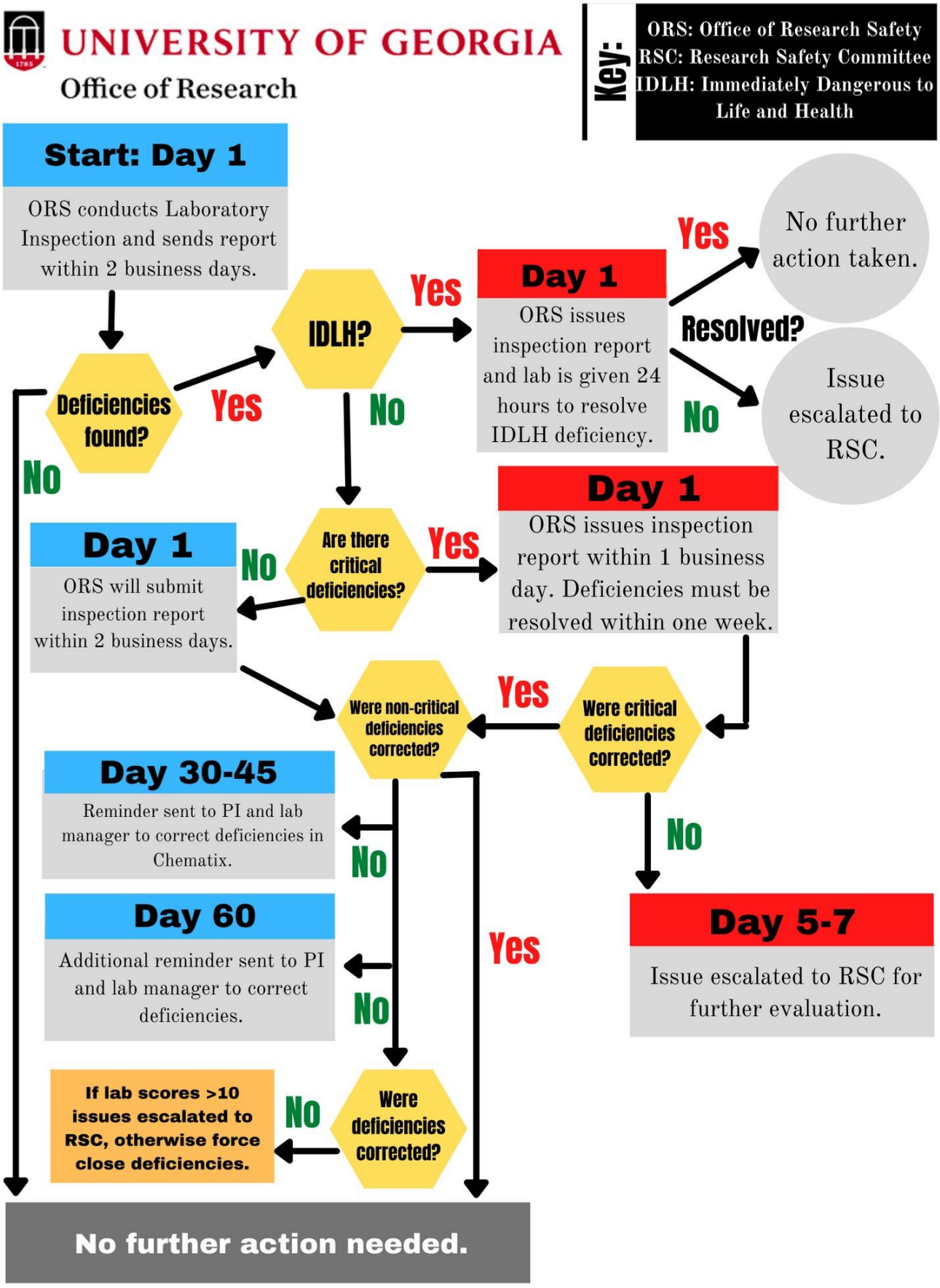
[i] Numbers in parentheses indicate the score given to each inspection item on a scale of 1-4 with 4 being the most severe and 1 being the least severe. All IDLH conditions are scored 4. All critical deficiencies are scored 3. Other items are scored 1-4 depending on compliance severity. Note that there are some non-IDLH and non-critical itemsthat are scored 4 or 3. These were kept at this score because some items (e.g., hazardous waste items) are considered a severe compliance issue but in most cases would not present an immediate threat or injury.


UNIVERSITY OF GEORGIA
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Key:
ORS: Office of Research Safety
RSC: Research Safety Committee
IDLH: Immediately Dangerous to Life and Health
Start: Day 1
ORS conducts Laboratory Inspection and sends report within 2 business days.
IDLH?
Yes
Day 1
ORS issues inspection report and lab is given 24 hours to resolve IDLH deficiency.
Resolved?
Yes
No further action taken.
No
Issue escalated to RSC.
Deficiencies found?
Yes
No
No
Are there critical deficiencies?
Yes
Day 1
ORS issues inspection report within 1 business day. Deficiencies must be resolved within one week.
Day 1
ORS will submit inspection report within 2 business days.
No
Were non-critical deficiencies corrected?
Yes
Were critical deficiencies corrected?
No
Day 30-45
Reminder sent to PI and lab manager to correct deficiencies in Chematix.
No
Day 60
Additional reminder sent to PI and lab manager to correct deficiencies.
No
Yes
Day 5-7
Issue escalated to RSC for further evaluation.
If lab scores >10 issues escalated to RSC, otherwise force close deficiencies.
No
Were deficiencies corrected?
No further action needed.