Office of Vice President for Research
Environmental Science Center (ESC)

ESC- EOR-QA003-Rev05
ESC/057

Standard Operating Procedure for Analysis Request Form for External QU Academic Students and Service Clients

5/9/2023	05	Updated				
7/5/2023	04	Issued	-	-	-	-
16/4/2014	01	Issued	-	-	-	-
16/6/2013	00	Draft For Comments	Dr. Hassan H.	Dr. Hassan H.	Thoraya Alyafei	Prof. Hamad Al-Kuwari
Issue Date	Revision	Revision Description	Prepared By	Reviewed By Quality Coordinator	Approved By Technical Manager	Authorized By Director

CHECKLIST- Read carefully before submitting samples to the ESC via the Technical Manager

1. ALL SAMPLES MUST BE SCHEDULED WITH THE ESC PRIOR TO DEEIVERY. Please ensure that samples arrive by the appointment date.

Samples arriving after their appointment date will be returned to the researcher and will need to be rescheduled before they will be analyzed.

2. PLAN AHEAD. There is typically a 4 to 6 days delay between the date a Sample Analysis Request Form is received and the date the samples will be scheduled to arrive. We strongly suggest that you complete and submit your Sample Analysis Request Forms during the planning stages of your research or teaching project. Contacting us after your samples have been collected, extracted, or digested may resnlt in sample analysis delays. If you need to complete a sample set by an imposed deadline.

3. Please provide the ESC with your best estimate of the number of samples you would like to submit. It is best to over-estimate rather than under-estimate on this number. Once a sample set is scheduled, it is easy to decrease the number of samples scheduled while increasing the number requires cancellation of the original appointment date and rescheduling of the samples again leading to delays in analysis. Please DO NOT deliver more samples to the ESC than are indicated on your Sample Analysis Request Form.

4. The ESC is using direct invoicing of QCWP/Client research account numbers for payment of services. Please expect to budget as per requested items (a complete analysis cost sheet is available on request). Samples with unusual matrices or other problems may be subject to additional charges. Be sure to provide your sample matrix on this form. Please contact the ESC with any questions concerning unusual matrices or special analyses.

5. Currently the ESC only accepts samples provided in containers as per the Sample Control and Management SOP (ESC-SOP-QA00l-Rev0l). Please refer the SOP for sample labeling other forms of labelling are unacceptable and the ESC reserves the right to refuse samples that are not provided in the correct sample containers or that are improperly labeled or prepared.

6. If possible, please estimate the concentration range you expect your samples to contain and note that range to the side of the analyses you select.

7. Please critically evaluate your report as soon as possible after receipt. The ESC holds analyzed samples for approximately 4weeks after the final report is mailed to the researcher. Samples will be discarded after that date unless otherwise instructed. The completed hard-copy data package including all supporting documentation is maintained on file at the ESC for five (5) years after the end of the project.

8. A properly completed chain of custody must accompany this form.

Revision History:

Date	Revision #	Revision Description
5/9/2023	05	Updated.
7/5/2023	04	A standardized and consolidated request form has been developed to accommodate both external QU academic students and service clients. Additionally, an additional comment was included in the request for client feedback, if applicable.
14/5/2019	03	Inserted BSC number, removed risk assessment & Issued for Implementation.
2/12/2015	02	Inserted risk assessment form.
16/4/2014	01	Issued for Implantation.
16/6/2013	00	Draft.

GENERAL GUIDELINES WHILE IN ESC LABORATORIES

1. Conduct yourself in a responsible manner at all times in the laboratory.

2. Follow all written and verbal instructions carefully. If you do not understand a direction or part of a procedure, ASK YOUR INSTRUCTOR BEFORE PROCEEDING WITH THE ACTIVITY.

3. Never work alone in the laboratory. No student may work in the science classroom without the presence of the instructor.

4. When first entering a laboratory, **do not touch any equipment, chemicals, or other materials in the laboratory area until you are instructed to do so.**

5. Perform only those experiments authorized by your instructor. Carefully follow all instructions, both written and oral. Unauthorized experiments are not allowed.

6. **Do not eat food, drink beverages, or chew gum in the laboratory**. Do not use laboratory glassware as containers for food or beverages.

7. Be prepared for your work in the laboratory. Read all procedures thoroughly before entering the laboratory. Never fool around in the laboratory. **Horseplay, practical jokes, and pranks are dangerous and prohibited.**

8. Always work in a well-ventilated area.

9. Observe good housekeeping practices. **Work areas should be kept clean and tidy at all times.**

10. Be alert and proceed with caution at all times in the laboratory. Notify the instructor immediately of any unsafe conditions you observe.

11. Dispose of all chemical waste properly. Never mix chemicals in sink drains. Sinks are to be used only for water. Check with instructor for disposal of chemicals and solutions.

12. Labels and equipment instructions must be read carefully before use. Set up and use the equipment as directed by instructor.

13. Keep hands away from face, eyes, mouth, and body while using chemicals or lab equipment. Wash your hands with soap and water after performing all experiments.

14. Experiments must be personally monitored at all times. Do not wander around the room, distract other students, startle other students or interfere with the laboratory experiments of others.

15. Know the locations and operating procedures of all safety equipment including: first aid kit(s), and fire extinguisher. Know where the fire alarm and the exits are located.

16. Know what to do if there is a fire drill during a laboratory period; containers must be closed, and any electrical equipment turned off.

CLOTHING

17. Any time chemicals, heat, or glassware are used, students will wear safety goggles. NO EXCEPTIONS TO THIS RULE!

18. Contact lenses may not be worn in the laboratory.

19. Dress properly during a laboratory activity. Long hair, dangling jewelry, and loose or baggy clothing are a hazard in the laboratory. Long hair must be tied back, and dangling jewelry and baggy clothing must be secured. Shoes must completely cover the foot. No sandals allowed on lab days.

20. A lab coat should be worn during laboratory experiments.

ACCIDENTS AND INJURIES

21. Report any accident (spill, breakage, etc.) or injury (cut, burn, etc.) to immediately, no matter how trivial it seems. Do not panic.

22. If you or your lab partner is hurt, immediately (and loudly) yell out the instructor's name to get the instructor's attention. Do not panic.

23. If a chemical should splash in your eye(s) or on your skin, immediately flush with running water for at least 20 minutes. Immediately (and loudly) yell out the instructor's name to get the instructor's attention.

HANDLING CHEMICALS

24. All chemicals in the laboratory are to be considered dangerous. Avoid handling chemicals with fingers. Always use a tweezer. When making an observation, keep at least 1 foot away from the specimen. **Do not taste, or smell any chemicals**.

25. Check the label on all chemical bottles twice before removing any of the contents. Take only as much chemical as you need.

26. **Never** return unused chemicals to their original container.

27. **Never** remove chemicals or other materials from the laboratory area.

HANDLING GLASSWARE AND EQUIPMENT

28. **Never** handle broken glass with your bare hands. Use a brush and dustpan to clean up broken glass. Place broken glass in the designated glass disposal container.

29. Examine glassware before each use. Never use chipped, cracked, or dirty glassware.

30. If you do not understand how to use a piece of equipment, **ASK**.

HEATING SUBSTANCES

32. Do not operate a hot plate by yourself. Take care that hair, clothing, and hands are a safe distance from the hot plate at all times. Use of hot plate is only allowed in the presence of Instructor.

33. Heated glassware remains very hot for a long time. They should be set aside in a designated place to cool, and picked up with caution. Use tongs or heat protective gloves if necessary.

34. **Never** look into a container that is being heated.

35. Do not place hot apparatus directly on the laboratory desk. Always use an insulated pad. Allow plenty of time for hot apparatus to cool before touching it.

Signatures

I have read the above laboratory rules and regulations, and I agree to follow them during any activity. I acknowledge that these rules are necessary to prevent accidents and to ensure my own safety and the safety of others around me.

I understand that I may ask my instructor at any time about the rules and regulations if they are not clear to me. My failure to follow these laboratory rules and regulations may result in discipline action taken against me.
Science Laboratory

Student Signature: Date:

Supervisor/ Director Signature: Date:

6. Laboratory Clearance Form (Filled at the end of the tenure)

The laboratory, fume hood and facilities used by the student / visitor must be left clean, tidy and safe on completion of lab work. Please allow lab technician to view your workspace and declare the following:

Laboratory room number/s used: _____

PLEASE TICK RELEVANT BOX BELOW:

	LAB CLEARANCECHECKLIST	Y	N
1	Is the bench space clean and left in a safe manner?		
2	Have the under bench units been cleared of material and left in a safe manner?		
3	Have the drawer units been cleared of material and left in a safe manner?		
4	Have you removed and disposed of your chemical and / or biohazard waste in the correct manner?		
5	Have you cleared the fume hood workspace of any used equip0ment or chemical?		
6	Have you cleaned equipment used in these areas?		

_____ _____

Student / Visitor Signature: Date:

Lab analyst Signature: Date:

Laboratory Risk Assessment Tool

The Environemntal Science Center Risk Assessment Tool provides a framework for risk assessment that maps onto the scientific method, melding with the process researchers already use to answer scientific questions.
This tool allows researchers to systematically identify and control hazards to reduce risk of injuries and incidents. Conduct a risk assessment prior to conducting an experiment for the first time.

The risk assessment process involves rating the risk of the experiment, from "low" to "unacceptable" risk. Consult with your PI/supervisor and EH&S if your risk rating is "high" or "unacceptable" to redesign the experiment and/or implement additional controls to reduce risk.

Procedure:			
Lab Group:			
Completed By:		**Date:**	

EXPLORE

Identify your research question and approach. What question are you trying to answer? What are you trying to measure or learn? What is your hypothesis? What approach or method will you use to answer your question? Are there alternative approaches?

Research Question(s)
Approach(s) or Method

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Identify the general hazards (check all that apply). Perform background research to identify known risks of the reagents, reactions, or processes. Review protocols, Safety Data Sheets (SDSs), and safety information for hazardous chemicals, agents, or processes. Review accident histories within your laboratory/department and Lessons Learned at ESC or other institutions.

Hazardous Agents

Physical Hazards of Chemicals
- ☐ Compressed gases
- ☐ Cryogens
- ☐ Explosives
- ☐ Flammables
- ☐ Organic peroxides
- ☐ Oxidizers
- ☐ Peroxide formers
- ☐ Pyrophorics
- ☐ Self-heating substances
- ☐ Self-reactive substances
- ☐ Substances which, in contact with water, emit flammable gases

Health Hazards of Chemicals
- ☐ Acute toxicity
- ☐ Carcinogens
- ☐ Eye damage/irritation
- ☐ Germ cell mutagens
- ☐ Nanomaterials
- ☐ Reproductive toxins
- ☐ Respiratory or skin sensitization
- ☐ Simple asphyxiant
- ☐ Skin corrosion/irritation
- ☐ Specific target organ toxicity
- ☐ Hazards not otherwise classified

Ionizing Radiation
- ☐ Irradiator
- ☐ Radionuclide
- ☐ Radionuclide sealed source
- ☐ X-ray machine

Non-Ionizing Radiation
- ☐ Lasers, Class 3 or 4
- ☐ Lasers, Class 2
- ☐ Magnetic fields (e.g., NMR, MRI)
- ☐ RF/microwaves
- ☐ UV lamps

Biohazards
- ☐ BSL-2 Biological agents
- ☐ BSL-3 Biological agents
- ☐ Human cells, blood, BBP
- ☐ NHPs/cells/blood
- ☐ Non-exempt rDNA
- ☐ Animal work
- ☐ High risk animals (RC1)

- ☐ Other (list):

Hazardous Conditions or Processes

Reaction Hazards
- ☐ Explosive
- ☐ Exothermic, with potential for fire, excessive heat, or runaway reaction
- ☐ Endothermic, with potential for freezing solvents decreased solubility or heterogeneous mixtures
- ☐ Gases produced
- ☐ Hazardous reaction intermediates/products
- ☐ Hazardous side reactions

Hazardous Processes
- ☐ Generation of air contaminants (gases, aerosols, or particulates)
- ☐ Heating chemicals
- ☐ Large mass or volume
- ☐ Pressure > atmospheric
- ☐ Pressure < atmospheric
- ☐ Scale-up of reaction

Other Hazards
- ☐ Hand/power tools
- ☐ Moving equipment/parts
- ☐ Electrical
- ☐ Noise > 80 dBA
- ☐ Heat/hot surfaces
- ☐ Ergonomic hazards
- ☐ Needles/sharps

- ☐ Other (list):

Field Hazards

Environmental Hazards
- ☐ Foul weather
- ☐ Temperature extremes
- ☐ Intense sunlight
- ☐ Darkness/low light
- ☐ Altitude
- ☐ Smoke/dust
- ☐ Fire
- ☐ Animals/insects
- ☐ Plants/allergens
- ☐ Hygiene/water-borne and food-borne illness
- ☐ Vector-borne or other endemic diseases (list):

Site Hazards
- ☐ Uneven/slippery surfaces
- ☐ Heights/drop-offs
- ☐ Falling objects
- ☐ Tight spaces/overhangs
- ☐ Boating/swimming/water hazards (waves, tides, current, depth)
- ☐ Navigation challenges
- ☐ Limited communication
- ☐ Remote area/limited medical services
- ☐ Personal security issues, risk of harassment or violence, US State Department active travel alert

Task/Equipment Hazards
- ☐ Driving/vehicle operation/traffic
- ☐ Lifting/carrying
- ☐ Digging/trenching
- ☐ Hand tools/power tools
- ☐ Sharp objects
- ☐ Strenuous physical activity
- ☐ Mental demands (e.g. long days, high stress environment, language barriers)

- ☐ Other (list):

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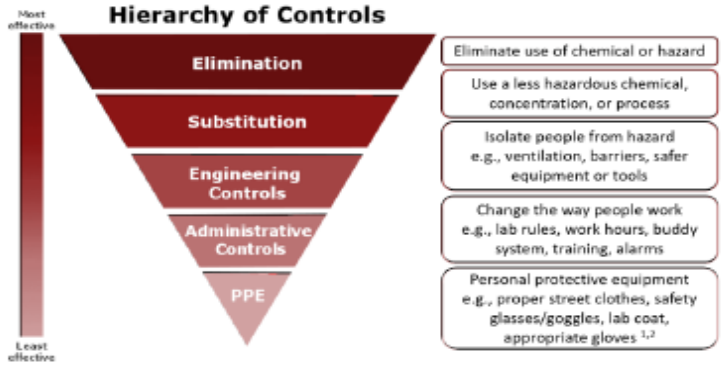
PLAN

Outline the Procedure. List the steps or tasks for your procedure and the hazard/potential consequences of each. Include set-up and clean-up steps or tasks. Define the hazard controls to minimize the risk of each step using the hierarchy of controls starting with the most effective (i.e., elimination, substitution, engineering controls, administrative controls, and personal protective equipment). List the hazard control measure you would use for each step or task (e.g., run at a micro scale, work in a fume hood, wear face shield and goggles).

Steps or Tasks	Hazard	Hazard Control Measure(s)



A hierarchy of controls should be applied starting with the most effective controls (i.e., elimination and substitution) at the top of the graphic and moving down. While personal protective equipment (PPE) should always be used, it should be considered the last line of defense from potential hazards.

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Select the appropriate PPE and safety supplies for the procedure (check all that apply).

Laboratory PPE/Safety Supplies	
☒ Appropriate street clothing (long pants, closed-toed shoes)	☐ Fire extinguisher
☐ Gloves; indicate type: _____	☐ Eyewash/safety shower
☐ Safety glasses	☐ First aid kit
☐ Safety goggles	☐ Spill kit
☐ Face shield and googles	☐ Specialized medical supplies (e.g. calcium gluconate for hydrofluoric acid and amyl nitrite for cyanides)
☐ Lab coat	
☐ Flame-resistant lab coat	
☐ Other (list):	

Field PPE/Safety Supplies	
☒ Proper clothing (long pants, long sleeve shirt, warm layers, rain/wind protection, sun protection, hat etc.)	☐ Sunscreen
☒ Proper footwear (list): _____	☐ Anti-animal devices (e.g. bear bell, whistle, bear canister)
☒ Communication device	☐ Personal floatation device
☐ Eye protection (safety glasses and/or sunglasses)	☐ Fall protection
☐ Work gloves	☐ Road flares
☐ Hardhat	☐ Safety vests
☐ Hearing protection	☐ Extra food, water/water treatment method
☐ First aid kit	☐ Personal medications
☐ Map (and GPS)	
	☐ Other (list all):

Identify the appropriate training (check all that apply). Identify the general safety and procedure based/specific training appropriate for your procedure.

General Safety Training		
General/Chemical Safety		**Field Safety**
☒ General Safety & Emergency Preparedness		☐ CPR
☐ Chemical Safety for Laboratories		☐ Wilderness First Aid
☐ Compressed Gas Safety		☐ SCUBA certification/diving safety
☐ Cryogenic Liquids and Dry Ice Safety		☐ Driving safety
		☐ Other (list):

Job Specific Training		
☒ Lab/job-specific training	☐ Emergency plans or field evacuation plans	☐ Other (list):
☐ Lab SOP(s) to review (list):	☐ Equipment SOP(s) to review (list):	

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CHALLENGE

Question your methods. What have you missed and who can advise you? Challenge your hazard control measures by asking "What if…?" questions. "What if" questions should challenge you to find the gaps in your knowledge or logic. Factors to consider are human error, equipment failures, and deviations from the planned/expected parameters (e.g., temperature, pressure, time, flow rate, and scale/concentration).

What If Analysis
What if…? Examples: there is a loss of cooling? …valves/stopcocks are left open/closed? …there is unexpected over-pressurization? …a spill occurs? …the laser is misaligned? …weather conditions change?
Then… …there may be a runaway reaction. …there may be an unexpected splash potential. …the reaction vessel may fail. …there may be a dermal exposure. …there may be an eye injury. …routes may be inaccessible.
What if…?
Then…
What if…?
Then…
What if…?
Then…

Assign a risk rating to the experiment. Based on your procedure outline and the what if analysis, determine the risk rating for the experiment or procedure.

Risk Rating: _____

Risk Rating Table[1]

Likelihood of Occurrence	Severity of Consequences - Personnel Safety: No Injuries	Minor	Moderate to life impacting	Life threatening from single exposure
(Almost) Certain	Low	High*	Unacceptable*	Unacceptable*
Likely	Low	Medium	High*	Unacceptable*
Possible	Low	Medium	High*	High*
Rare	Low	Low	Medium	High*

[1]The Risk Rating is subjective. The primary goal is for researchers to pause, think about risk, and differentiate unacceptable and high-level risk steps from those with a lower level risk. This will help drive additional consultation and control measures where needed.

Revise plan if the risk rating is too high. Are these risks acceptable? Use the table below to determine the action to take based on the risk rating. What are the highest risk steps? What more can you do to control the risks? Return to planning and use the hierarchy of controls to design a safer experiment.

Risk Rating Action Table

Hazard Risk Rating	Action
Unacceptable*	STOP! Additional controls needed to reduce risk. **Consult with PI and EH&S** (650-723-0448).
High*	Additional controls recommended to reduce risk. **Consult with PI and EH&S** (650-723-0448).
Medium	Ensure you are following best practices. Consult with peers, PI, or EH&S, as needed.
Low	Perform work within controls.

PI/Supervisor Approval: _____

*Signature required for High risk ratings.

NOTE: Unacceptable risk rating experiments **may not proceed.** Introduce further controls to reduce risk.

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ASSESS

Perform a trial run. How you can test your experimental design? Can you do a dry run of the procedure without hazardous chemicals/reagents/gases to familiarize yourself with equipment and demonstrate your ability to manipulate the experimental apparatus? Can you run the procedure with a less hazardous material? Can you test your experimental design at a smaller scale? If your procedure requires multiple people, would a table top exercise be useful?

Trial Run
Trial Run Procedure:
Did the trial go as expected? Yes ☐ No ☐
Experimental design changes needed (if any):

Perform and evaluate. Run your procedure using the appropriate controls you've identified. Evaluate controls and hazards as you work. Critique the controls and process you used by answering the following questions. If changes to controls are needed, update your risk assessment tool and re-evaluate any time you revise your process (e.g. changes in scale, reagent, equipment, or conditions that might increase the hazard/risk). Share your assessment with your PI/colleagues for the next iteration of the experiment.

Evaluate Your Procedure
What went well?
Did the controls perform as expected?
Did anything unexpected occur?
Did a hazard manifest itself that was not previously identified?
Were there any close-calls or near misses that indicate areas of needed improvement?
Did something go exceptionally well that others could learn from?
I plan to evolve my procedure by...