FAMU-FSU College of Engineering
Project Hazard Assessment Policy and Procedures

INTRODUCTION

University laboratories are not without safety hazards. Those circumstances or conditions that might go wrong must be predicted and reasonable control methods must be determined to prevent incident and injury. The FAMU-FSU College of Engineering is committed to achieving and maintaining safety in all levels of work activities.

PROJECT HAZARD ASSESSMENT POLICY

Principal investigator (PI)/instructor are responsible and accountable for safety in the research and teaching laboratory. Prior to starting an experiment, laboratory workers must conduct a project hazard assessment (PHA) to identify health, environmental and property hazards and the proper control methods to eliminate, reduce or control those hazards. PI/instructor must review, approve, and sign the written PHA and provide the identified hazard control measures. PI/instructor continually monitor projects to ensure proper controls and safety measures are available, implemented, and followed. PI/instructor are required to reevaluate a project anytime there is a change in scope or scale of a project and at least annually after the initial review.

PROJECT HAZARD ASSESSMENT PROCEDURES

It is FAMU-FSU College of Engineering policy to implement followings:

1. Laboratory workers (i.e. graduate students, undergraduate students, postdoctoral, volunteers, etc.) performing a research in FAMU-FSU College of Engineering are required to conduct PHA prior to commencement of an experiment or any project change in order to identify existing or potential hazards and to determine proper measures to control those hazards.
2. PI/instructor must review, approve and sign the written PHA.
3. PI/instructor must ensure all the control methods identified in PHA are available and implemented in the laboratory.
4. In the event laboratory personnel are not following the safety precautions, PI/instructor must take firm actions (e.g. stop the work, set a meeting to discuss potential hazards and consequences, ask personnel to review the safety rules, etc.) to clarify the safety expectations.
5. PI/instructor must document all the incidents/accidents happened in the laboratory along with the PHA document to ensure that PHA is reviewed/modified to prevent reoccurrence. In the event of PHA modification a revision number should be given to the PHA, so project members know the latest PHA revision they should follow.
6. PI/instructor must ensure that those findings in PHA are communicated with other students working in the same laboratory (affected users).
7. PI/instructor must ensure that approved methods and precautions are being followed by :
    a. Performing periodic laboratory visits to prevent the development of unsafe practice.
    b. Quick reviewing of the safety rules and precautions in the laboratory members meetings.
    c. Assigning a safety representative to assist in implementing the expectations.
    d. Etc.
8. A copy of this PHA must be kept in a binder inside the laboratory or PI/instructor’s office (if experiment steps are confidential).

Project Hazard Assessment Worksheet				
PI/instructor: Dr. Shayne McConomy	Phone #: 850-410-6624	Dept.: Mechanical	Start Date: 3/8/22	Revision number: 2
Project: Team 515 Nuclear Canister for Space			Location(s): FAMU FSU College of Engineering (COE), FSU Innovation Hub, Idaho National Laboratory Idaho National Laboratory, 1955 N Fremont Ave, Idaho Falls, ID 83415	
Team member(s): Brian McGough, Braden Dukes, McAnarney Borngesser, Jaxon Stadelnikas			Phone #: 904-535-1464	Email: bem17@my.fsu.edu

Experiment Steps	**Location**	**Person assigned**	**Identify hazards or potential failure points**	**Control method**	**PPE**	**List proper method of hazardous waste disposal, if any.**	**Residual Risk**	**Specific rules based on the residual risk**
Simulation and CAD	Remote/COE	Brian McGough	Eye Strain	Take breaks every 20 to 30 minutes to prevent unnecessary strain	N/A	N/A	HAZARD: 1 CONSEQ: Negligible Residual: Low	Safety is planned by the worker and the supervisor. Proceed with supervisor authorization.
Cutting / Drilling Plywood / Aluminum	COE Machine Shop	McAnarney Borngesser	Cuts, Splinters, Dust Inhalation, Ear Damage	Most metal work will be done out of house. For smaller projects the senior design lab will be used. When using power tools, the appropriate protection measures will be taken.	Work Gloves, Safety Glasses, Respirator, Ear Protection	N/A	HAZARD: 3 CONSEQ: Significant Residual: Medium	After approval a written hazard control must be approved before continuing. Limit the number of people working in the hazard zone. Have at least 2 people present when performing any work in the event of an injury.
3D Printing	Innovation Hub	Braden Dukes	Hazardous Fumes, Burning	Innovation hub policies will be followed	N/A	N/A	HAZARD: 1 CONSEQ: Negligible Residual: Low	Safety is planned by the worker and the supervisor. Proceed with supervisor authorization
Laser Cutting	Innovation Hub	Jaxon Stadelnikas	Eye Hazzard, Skin Hazzard, Fire Hazzard,	Innovation hub policies will be followed	Eye Protection	N/A	HAZARD: 3 CONSEQ: Significant Residual:	After approval a written hazard control must be approved before continuing. Limit the number of

							Med High	people working in the hazard zone. Have at least 2 people present when performing any work in the event of an injury.
Uranium Handling	Idaho National Laboratory	Idaho National Laboratory	Radiation Exposure, Radiation Burns	The Idaho National Laboratory policies will be followed	N/A	N/A	HAZARD: 4 CONSEQ: Severe Residual: High	The Idaho National Laboratory will use the procedures that they have put in place when handling radioactive elements.
High Temperatures	COE	Brian McGough	Burns, Skin Irritation	During the use of high temperatures, every person in the vicinity should be alerted that a hot object is in use. Limit exposure and wait until cooled until handling.	Protective Gloves	N/A	HAZARD: 1 CONSEQ: Minor Residual: Low Med	After approval a written hazard control must be approved before continuing. Limit the number of people working in the hazard zone. Have at least 2 people present when performing any work in the event of an injury.
Argon Usage	COE	McAnarney Borngesser	Mental Impairment, Breathing Problems	During the use of argon, alert people in the room that the gas will be used.	Regulator	Venting to outside	HAZARD: 2 CONSEQ: Minor Residual: Low Med	After approval a written hazard control must be approved before continuing. Limit the number of people working in the hazard zone. Have at least 2 people present when performing any work in the event of an injury.

Principal investigator(s)/ instructor PHA: I have reviewed and approved the PHA worksheet.

Name	**Signature**	**Date**	**Name**	**Signature**	**Date**

Team members: I certify that I have reviewed the PHA worksheet, am aware of the hazards, and will ensure the control measures are followed.

Name	**Signature**	**Date**	**Name**	**Signature**	**Date**
Brian McGough	Brian McGough	03/08/22	McAnarney Borngesser	McAnarney Borngesser	03/08/22

Name	Signature	Date	Name	Signature	Date
Braden Dukes		03/08/22	Jaxon Stadelnikas		03/08/22

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DEFINITIONS:

Hazard: Any situation, object, or behavior that exists, or that can potentially cause ill health, injury, loss or property damage e.g. electricity, chemicals, biohazard materials, sharp objects, noise, wet floor, etc. OSHA defines hazards as "*any source of potential damage, harm or adverse health effects on something or someone"*. A list of hazard types and examples are provided in appendix A.

Hazard control: Hazard control refers to workplace measures to eliminate/minimize adverse health effects, injury, loss, and property damage. Hazard control practices are often categorized into following three groups (priority as listed):

1. **Engineering control:** physical modifications to a process, equipment, or installation of a barrier into a system to minimize worker exposure to a hazard. Examples are ventilation (fume hood, biological safety cabinet), containment (glove box, sealed containers, barriers), substitution/elimination (consider less hazardous alternative materials), process controls (safety valves, gauges, temperature sensor, regulators, alarms, monitors, electrical grounding and bonding), etc.
2. **Administrative control:** changes in work procedures to reduce exposure and mitigate hazards. Examples are reducing scale of process (micro-scale experiments), reducing time of personal exposure to process, providing training on proper techniques, writing safety policies, supervision, requesting experts to perform the task, etc.
3. **Personal protective equipment (PPE):** equipment worn to minimize exposure to hazards. Examples are gloves, safety glasses, goggles, steel toe shoes, earplugs or muffs, hard hats, respirators, vests, full body suits, laboratory coats, etc.

Team member(s): Everyone who works on the project (i.e. grads, undergrads, postdocs, etc.). The primary contact must be listed first and provide phone number and email for contact.

Safety representative: Each laboratory is encouraged to have a safety representative, preferably a graduate student, in order to facilitate the implementation of the safety expectations in the laboratory. Duties include (but are not limited to):

- Act as a point of contact between the laboratory members and the college safety committee members.
- Ensure laboratory members are following the safety rules.
- Conduct periodic safety inspection of the laboratory.
- Schedule laboratory clean up dates with the laboratory members.
- Request for hazardous waste pick up.

Residual risk: Residual Risk Assessment Matrix are used to determine project's risk level. The hazard assessment matrix (table 1) and the residual risk assessment matrix (table2) are used to identify the residual risk category.

The instructions to use hazard assessment matrix (table 1) are listed below:

1. Define the workers familiarity level to perform the task and the complexity of the task.
2. Find the value associated with familiarity/complexity (1 – 5) and enter value next to: HAZARD on the PHA worksheet.

Table 1. Hazard assessment matrix.

		Complexity		
		Simple	Moderate	Difficult
Familiarity Level	Very Familiar	1	2	3
	Somewhat Familiar	2	3	4
	Unfamiliar	3	4	5

The instructions to use residual risk assessment matrix (table 2) are listed below:

1. Identify the row associated with the familiarity/complexity value (1 – 5).
2. Identify the consequences and enter value next to: CONSEQ on the PHA worksheet. Consequences are determined by defining what would happen in a worst case scenario if controls fail.
    a. Negligible: minor injury resulting in basic first aid treatment that can be provided on site.
    b. Minor: minor injury resulting in advanced first aid treatment administered by a physician.
    c. Moderate: injuries that require treatment above first aid but do not require hospitalization.
    d. Significant: severe injuries requiring hospitalization.
    e. Severe: death or permanent disability.
3. Find the residual risk value associated with assessed hazard/consequences: Low –Low Med – Med– Med High – High.
4. Enter value next to: RESIDUAL on the PHA worksheet.

Table 2. Residual risk assessment matrix.

Assessed Hazard Level	**Consequences**				
	Negligible	Minor	Moderate	Significant	Severe
5	Low Med	Medium	Med High	High	High
4	Low	Low Med	Medium	Med High	High
3	Low	Low Med	Medium	Med High	Med High
2	Low	Low Med	Low Med	Medium	Medium
1	Low	Low	Low Med	Low Med	Medium

Specific rules for each category of the residual risk:

Low:

- Safety controls are planned by both the worker and supervisor.
- Proceed with supervisor authorization.

Low Med:

- Safety controls are planned by both the worker and supervisor.
- A second worker must be in place before work can proceed (buddy system).
- Proceed with supervisor authorization.

Med:

- After approval by the PI, a copy must be sent to the Safety Committee.
- A written Project Hazard Control is required and must be approved by the PI before proceeding. A copy must be sent to the Safety Committee.
- A second worker must be in place before work can proceed (buddy system).
- Limit the number of authorized workers in the hazard area.

Med High:

- After approval by the PI, the Safety Committee and/or EHS must review and approve the completed PHA.
- A written Project Hazard Control is required and must be approved by the PI and the Safety Committee before proceeding.
- Two qualified workers must be in place before work can proceed.
- Limit the number of authorized workers in the hazard area.

High:

- The activity will not be performed. The activity must be redesigned to fall in a lower hazard category.

Appendix A: Hazard types and examples

Types of Hazard	**Example**
Physical hazards	Wet floors, loose electrical cables objects protruding in walkways or doorways
Ergonomic hazards	Lifting heavy objects Stretching the body Twisting the body Poor desk seating
Psychological hazards	Heights, loud sounds, tunnels, bright lights
Environmental hazards	Room temperature, ventilation contaminated air, photocopiers, some office plants acids
Hazardous substances	Alkalis solvents
Biological hazards	Hepatitis B, new strain influenza
Radiation hazards	Electric welding flashes Sunburn
Chemical hazards	Effects on central nervous system, lungs, digestive system, circulatory system, skin, reproductive system. Short term (acute) effects such as burns, rashes, irritation, feeling unwell, coma and death. Long term (chronic) effects such as mutagenic (affects cell structure), carcinogenic (cancer), teratogenic (reproductive effect), dermatitis of the skin, and occupational asthma and lung damage.
Noise	High levels of industrial noise will cause irritation in the short term, and industrial deafness in the long term.
Temperature	Personal comfort is best between temperatures of 16°C and 30°C, better between 21°C and 26°C. Working outside these temperature ranges: may lead to becoming chilled, even hypothermia (deep body cooling) in the colder temperatures, and may lead to dehydration, cramps, heat exhaustion, and hyperthermia (heat stroke) in the warmer temperatures.
Being struck by	This hazard could be a projectile, moving object or material. The health effect could be lacerations, bruising, breaks, eye injuries, and possibly death.
Crushed by	A typical example of this hazard is tractor rollover. Death is usually the result
Entangled by	Becoming entangled in machinery. Effects could be crushing, lacerations, bruising, breaks amputation and death.
High energy sources	Explosions, high pressure gases, liquids and dusts, fires, electricity and sources such as lasers can all have serious effects on the body, even death.
Vibration	Vibration can affect the human body in the hand arm with `white-finger' or Raynaud's Syndrome, and the whole body with motion sickness, giddiness, damage to bones and audits, blood pressure and nervous system problems.

Slips, trips and falls	A very common workplace hazard from tripping on floors, falling off structures or down stairs, and slipping on spills.
Radiation	Radiation can have serious health effects. Skin cancer, other cancers, sterility, birth deformities, blood changes, skin burns and eye damage are examples.
Physical	Excessive effort, poor posture and repetition can all lead to muscular pain, tendon damage and deterioration to bones and related structures
Psychological	Stress, anxiety, tiredness, poor concentration, headaches, back pain and heart disease can be the health effects
Biological	More common in the health, food and agricultural industries. Effects such as infectious disease, rashes and allergic response.

Project Hazard Control- For Projects with Medium and Higher Risks

Name of Project: NASA Nuclear Canister		**Date of submission: 11/16/21**
Team member	**Phone number**	**e-mail**
Brian McGough	**904-535-1464**	**Bem17@my.fsu.edu**
Braden Dukes	**239-272-8475**	**Bsd18b@my.fsu.edu**
Jaxon Stadelnikas	**941-650-3572**	**js18e@my.fsu.edu**
McAnarney Borngesser	**904-347-5636**	**msb18e@my.fsu.edu**
Faculty mentor	**Phone number**	**e-mail**
Dr. Eric Hellstrom	**850-645-7489**	**hellstrom@asc.magnet.fsu.edu**
Dr. Shayne McConomy	**850-645-7489**	**smcconomy@eng.famu.fsu.edu**

Rewrite the project steps to include all safety measures taken for each step or combination of steps. Be specific (don't just state "be careful").

Cutting and drilling aluminum and plywood are necessary for prototyping and running real life simulations of our canister. This was determined to be a medium risk due to the use of power tools, splinters, and dusk inhalation. Proper safety measures for this will involve proper training before the use of any power tools, appropriate PPE, and having at least 2 people present during any work in case of an injury.

Laser cutting smaller, precise components will be required for our canister. This will be performed at the innovation hub. This is labeled a medium/high risk due to the lasers having the ability to cause permanent eye damage. The innovation hub will monitor all laser cutting and proper training is required before use. Eye protection should be worn to prevent eye damage. At least 2 people should be present during any work in case of an injury.

High temperatures due to heating elements will be an integral part of testing components of the canister. This was determined a low/medium risk due to the heating element having the ability to cause burns and skin irritation. Proper safety measure for this will involve alerting all members that a heating element is in use. The heating element should be allowed ample time to cool after use. Protective gloves should be used when handling the heating element after use. At least 2 people should be present during any work in case of an injury.

The use of argon is required for testing components of our canister. This is determined to be a low/medium risk due to inhalation of pure argon causing mental impairment and breathing problems. Proper safety measure for this will involve using a regulator and alerting all members in the vicinity that argon will be in use. At least 2 people should be present during any work in case of an injury.

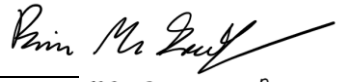
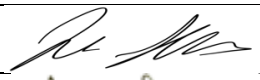
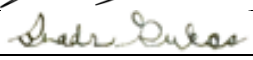
Thinking about the accidents that have occurred or that you have identified as a risk, describe emergency response procedures to use.

- **Remove the injured person from the scene**
- **Contact appropriate authority (911, Supervisor, FSUPD)**
- **Shut down the cause of the injury**
- **Secure the area to prevent other injuries**
- **Create an accident report will all the information about the accident and how to prevent future accidents.**
- **Share accident report with supervisor or PI**

List emergency response contact information:

- Call 911 for injuries, fires or other emergency situations
- Call your department representative to report a facility concern

Name	Phone number	Member Name	Faculty or other COE emergency contact	Phone number
Ed McGough	**904-748-6832**	**Brian McGough**	**Dr. Shayne McConomy**	**850-410-6624**
Diana Stadelnikas	**941-321-6633**	**Jaxon Stadelnikas**	**Dr. Rajan Kumar**	**850-645-0149**
Todd Dukes	**239-293-3145**	**Braden Dukes**	**Dr. Dorr Campbell**	**850-410-6610**
Anne Bean	**904-392-9236**	**McAnarney Borngesser**	**Dr. Shayne McConomy**	**850-410-6624**

Safety review signatures				
Team member	Signature	Date	Faculty mentor	Date
Brian McGough		**3/8/22**		
McAnarney Borngesser		**3/8/22**		
Jaxon Stadelnikas		**3/8/22**		
Braden Dukes		**3/8/22**		

Report all accidents and near misses to the faculty mentor.