

**Project Hazard Control- For Projects with Medium and Higher Risks**

<b>Name of Project: NASA-JSC &amp; Jacobs Space Exploration Group Lunar Dust Glovebox</b>		<b>Date of submission: November 8<sup>th</sup>, 2024</b>
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**Project Steps/Experimental Procedure:**

1. Ensure area preparation
  - Have all necessary materials including PPE, camera, UV light, box equipment, fans, funnel, cleaning supplies, simulant, sharpies, and utensils for notes
  - Make sure the fans, light, and other equipment work properly first to prevent hazards
2. Enter and inspect the experiment area
  - Check that area is clear of spills, hazards, or individuals not associated with the project
  - Turn fume hood on
3. Put on PPE
  - Make sure all members have long pants, closed toes shoes, lab coats, and safety goggles
  - Ensure N95 masks are fitted to form the face
  - Locate eye wash station and safety shower in the room and ensure they work
4. Check ventilation
  - Verify the ventilation system is operational before starting testing
  - Ensure fume hood is active by putting a paper towel inside
5. Gather all materials inside the room
  - Bring in all necessary materials and equipment to the experimental area if they are not already there (easy access during testing)
  - Use carts or secure carriers for heavy/fragile/sensitive objects and materials (avoid strain, spills or drops).
6. Turn on UV lights
  - Ensure the lights are functioning properly and there are no unwanted reflections
  - Avoid looking directly at UV lights
7. Set up and start recording
  - Set up the recording equipment (camera), ensuring it has a clear view of the experiment area
  - Start recording to capture the entire process.
  - Ensure cables or equipment don't pose a tripping hazard
8. Mark all materials
  - Clearly label and mark all materials involved in the experiment
  - Be mindful of how the micro particles will directly affect environment upon unsealing

9. Open the funnel top and insert simulant
  - Open the top of the funnel enclosure
  - Handle carefully to prevent spills
    - Keep hands steady
    - Insert material (pour, scoop, etc) into funnel with measurement amounts in mind
    - Insert slowly to prevent dust clouds or clumping, masks will protect from inhalation
11. Allow dust to settle
  - Allow a brief period for any dust generated during the simulant insertion to settle before turning on any fans; helps ensure a controlled environment
  - Stand back from funnel area to decrease inhalation risks and allow ventilation systems to clear area
12. Turn on fans
  - Turn on the fans within the experimental setup. these fans (inside of the glovebox) will move and loft the lunar dust simulant
  - Check for any be aware of any noticed leaks when the fans begin operating.
13. Observe the experiment for a set time
  - Observe and monitor the experiment for a specified time frame
  - Record any necessary observations, paying attention to the simulant's movement, dust dispersion, or other critical data.
  - Keep a safe distance from the setup
14. Turn off fans and wait for dust to settle
  - After the observation period, turn off the fans to stop the airflow.
  - Allow the dust or simulant particles to settle (ensuring a stable environment before disassembling or moving any components)
    - will help decrease potential risk and exposure to residual particles
16. Turn off the camera
  - Stop the recording on the camera, capturing the experiment's final state.
  - Handle the camera with clean gloves to avoid contaminating the recording device.
17. Remove the camera from the room
  - Take the camera out of the experimental area to ensure it doesn't get exposed to any simulant while unprotected
  - Keep the camera steady and ensure no accidental contact with other materials or equipment.
18. Take apart the box setup
  - Begin disassembling the glovebox and wet the inside to minimize aerosol hazard from the simulant
  - Ensure proper PPE worn during disassembly
19. Remove the fans
  - Slowly and carefully remove the fans from the setup
  - Handle fans gently to prevent scattering any remaining particles
  - Wear gloves to avoid contact with the simulant
  - If any of the simulant is not wet, wet it to prevent aerosol hazard
20. Clean the fans with isopropyl alcohol

- Using isopropyl alcohol and a clean cloth or wipe, thoroughly clean each fan blade and part to remove any remaining lunar dust simulant particles
- Avoid skin contact and use gloves
- Discard used wipes safely in a marked flammable hazard trash bin

21. Wipe down the box with isopropyl wipes

- Use isopropyl wipes to clean the inner walls of glovebox
- Avoid skin contact and use gloves
- Discard used wipes safely in a marked flammable hazard trash bin

22. Dispose of simulant

- Pour any remaining simulant into the glass petri dish to be disposed of outside away from aquatic ecosystems

23. Clean room

- Clean the room of any debris and gather all materials

23. Remove PPE

- Take off all personal protective equipment carefully, dispose or store equipment as necessary
- Follow proper procedures for removing PPE to avoid accidental contamination
- Wash hands thoroughly after removing gloves

24. Exit the room

**Possible Accidents, Risks, and Emergency Response Procedures:**

Risk of equipment malfunction: fans or UV lights are not functioning correctly, overheating for example

- Immediately turn off the malfunctioning equipment and unplug it if safe to do so
- Evacuate the immediate area if overheating could pose a fire risk. Alert lab supervisors, and report the malfunction for maintenance or repair
- Use fire extinguishers if a small fire starts
- Allow the equipment to cool down before attempting to inspect it

Risk of slips or trips from undetected hazards: spills, clutter, or unsecured equipment or cables

- Remove or secure any clutter or cables causing tripping hazards
- Report the hazard if it cannot be quickly resolved
- Document any corrective actions taken

Risk of exposure due to improper PPE

- Halt the experiment and adjust or replace any improper PPE
- Wash any exposed skin if simulant or other substances were contacted
- Use eye wash station or shower if needed
- If exposure has occurred, follow safety data sheet (SDS) guidelines for decontamination and medical assessment if needed

Risk of inadequate room airflow: if ventilation fails

- Stop the experiment and vacate the room if ventilation cannot be restored promptly
- Report the ventilation failure immediately to facility management

Risk of simulant spill on floor

- Fume hood is being used and will minimize aerosol hazard

- Contain and clean up the spill, using approved cleaning agents and/or materials
- Follow SDS recommendations for spills
- Dispose of materials per lab protocols
- Report the spill

**Emergency Response Contact Information:**

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

<i>Name</i>	<i>Phone number</i>	<i>Title (dept rep, faculty, COE emergency contact?)</i>
Rebecca Sweat	(850) 645-8992	HPMI Principal Investigator
Andrew Davis	(850) 644-8916	EHS Chemical Safety Officer
Shayne Mcconomy	(850) 410-6624	Course Instructor
Tallahassee Police Dept.	(850) 891-4200	Emergency Services

**Safety review signatures**

<i>Printed Name</i>	<i>Signature</i>	<i>Title</i>	<i>Date</i>
Rebekah Sweat	 <p>Signed by: 16FB0A82B0954F9...</p>	Assistant Professor	11/8/2024

**Report all accidents and near misses to the faculty mentor.**

- Call your department representative to report a facility concern

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Andrew Davis		Lab safety officer	11/9/21

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