An Experiment Safety Plan (ESP) is required for every experiment conducted and performed by students in the WERC Design Contest. The purpose of the ESP is to assure the safety of all by identifying the safest possible methods to conduct an experiment. By signing below the individual(s) conducting the experiment, College of Engineering Safety Specialist (COE Safety), and the faculty advisor acknowledge responsibility for the following requirements.

1. Appropriate Personal Protective Equipment (PPE) ***must always*** be worn while in the lab (as described in the ESP). **The minimum required PPE to enter a research/teaching lab is (1) long pants, (2) closed toe shoes, (3) lab coat or long sleeve shirt, and (4) safety glasses with side shields.**
2. For safety reasons, no researcher is permitted to work alone in the lab at any time. Because the labs are open 24/7, there may be occasions (such as a late night or over weekends) when there are no other people working in the lab. If you plan to work during a time when the lab might be expected to be empty, please plan ahead and coordinate your work schedule with another lab member.

|  |  |  |
| --- | --- | --- |
|  |  | Date |
| ESP Phase I approval:  **COE Safety** |  |  |
| ESP Phase II approval  **COE Safety** |  |  |

1. By signing below, both faculty advisor and researchers(s) understand that the CHO can approve/disapprove any part of the ESP. The CHO can further assemble a committee of individuals with appropriate technical or EH&S background to assist in reviewing the ESP. It is the goal of the CHO to help the researcher(s) find the safest method(s) of conducting an experiment. The CHO, or any faculty member, may stop lab activity of individuals not following good lab practices.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Name | Signature | Date |
| School and Team |  | NA | NA |
| Faculty Advisor |  |  |  |
| Researcher |  |  |  |
| Researcher |  |  |  |
| Researcher |  |  |  |
| Researcher |  |  |  |
| Researcher |  |  |  |
| Researcher |  |  |  |
| EH&S (at request of COE Safety) |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Task # (as given on WERC Website)** |  | |
| **Name/Title of Experiment:** |  | |
| **Booth Number:** |  | |
| **Location Inside/Outside** |  | |
| **Emergency Contacts (Required):** | EMERGENCY | 911 |
| Function | Name | Contact Phone (at Event) |
| Experiment Coordinator | Stefan Perez | 915-731-5710 |
| Safety Coordinator | Juanita Miller | 575-415-7999 |
| Compliance Officer/Samples | Jalal Rastegary | 915-540-5391 |
| Faculty Advisor |  |  |
| Responsible Researcher |  |  |
| Responsible Researcher |  |  |

**Required attachments to the ESP:**

Attachment 1: Experiment Scope

Attachment 2: Drawing of the Experimental Layout including P&ID

Attachment 3: Normal Operations, Startup and Shutdown Procedures

Attachment 4: Emergency Shutdown Procedure and medical emergency instructions.

Attachment 5: Waste Management Procedure

Attachment 6: Hazard Identification and Mitigation

Attachment 7: Material Safety Data Sheets

*Provide a concise description of the laboratory experiment to be undertaken.*

1. *Explain why the work is being performed, the goal(s) of the experimental program*
   1. *If this is an update/revision of previous ESP describe all changes*
2. *Provide the stoichiometry of any chemical reactions and their heats of reaction*
3. *Demonstrate the inherent thermal safety of your experiment through calculation or through the use of accelerating rate calorimetry data.*<https://chme.nmsu.edu/research/ehs/experimental-safety-plan-esp/esp-energetics-calculation/> *)*
4. *Include a complete list of all chemicals (reactants and products) involved in the work.*
5. *Include a complete list of all equipment (e.g. autoclave, centrifuge, pump, heat bath etc.) involved in this work*
6. *Include a timeline for this experiment including setup, sample runtime(s)and teardown*

*Provide a detailed drawing of the experiment including P&ID’s showing all inputs and outputs for equipment..*

*Provide a* ***step-wise*** *procedure that describes* ***in detail*** *how the work will be performed. The procedure should begin and end with the equipment in the normal idle (inoperative) state.*

*Include a statement of the required PPE* ***at the beginning*** *of the procedure, and at every location in the procedure where the PPE requirements change.*

*Include details of how you will meet the required elements of your chosen task (e.g. run time, run rate, sample rate etc.)*

*Indicate where hazardous feedstock chemicals will be stored, how they will be transported to the location of the experimental work, how they will be transferred from storage vial into the experimental apparatus, and how they will be returned to storage.*

*Fill out the Take into account those items for which you indicate “yes” on the NMSU Lab Hazard Assessment Checklist, which is found at the end of this document..*

*Provide a* ***step-wise*** *procedure that describes how the equipment will be brought to a safe state in the event of an emergency. The description should include a detailed explanation of how to attend to potential medical emergencies that may result.*

*Prepare a Waste Management Procedure that provides the exact nature and estimated volumes of all wastes to be generated in performing these experiments. NMSU will provide containers and forms to be filled out by the researcher for proper disposal of materials. An example Waste tracking form is attached for reference.*

*Identify ALL HIGH hazards associated with the experiment. The analysis must consider*

* *all sources of energy (electric, chemical, hydraulics, mechanical, compressed gases),*
* *extreme conditions of pressure or temperature (from flame or steam to cryogenics),*
* *chemical storage,*
* *housekeeping,*
* *fire, and/or*
* *biological hazards.*

*Examples of High hazards to include (list not exhaustive):*

* *substances that are highly reactive, radioactive, highly flammable, pyrophoric, highly toxic, mutagenic, teratogenic, carcinogenic, or have very low exposure limits,*
* *high voltage, high RF, x-ray, laser (class 3b or 4),*
* *high temperatures, and*
* *high pressure or pressurizing vessels.*

*When in doubt about whether a substance represents a HIGH HAZARD, ask for assistance.*

***For each HIGH hazard (use the*** [***checklist***](http://chme.nmsu.edu/files/2013/11/Lab-PPE-selection1.pdf) ***as a guide to identifying these hazards, chme.nmsu.edu/files/2013/11/Lab-PPE-selection1.pdf), provide the following information:***

1. *description of the HIGH hazard;*
2. *operational and engineering controls that will be used   
   (based on identified industry best-practices used in addressing this safety hazard);*
3. *required PPE (beyond minimum) when this HIGH hazard is present; and*
4. *special training (beyond minimum) that is necessary.*









