

WERC 2022 – Safety Introduction

Welcome to the 32th Annual WERC Design Contest. We are very glad you have decided to enter a team in this year's event and look forward to meeting you.

My name is Juanita Miller, the Safety Coordinator for this year's contest. As part of our efforts to keep you, our staff, and the people at NM Farm and Ranch Museum safe, we require each team to submit an Experimental Safety Plan (ESP) for your chosen Task/Experiment. Your document will be developed, reviewed and approved, online, through our WERC website. Many of the sections are freeform, so you can type up your information in a text document and paste it into the fields. I will review your documents and ask questions regarding your process operation and safety requirements. If you are confused or have questions, you may contact me directly at miljgh@nmsu.edu. I have degrees in Chemical and Civil Engineering and have many years of industry and research experience. I regularly review ESPs for researcher projects here at NMSU, using this same process, and teach CHME 448, Industrial Safety.

Here is a brief summary of how to access and submit your ESP:

Click the "Submit Experimental Safety" button from the team screen.

The screenshot shows the top navigation bar with the NMSU logo and the text "BE BOLD. Shape the Future. New Mexico State University Engineering New Mexico Resource Network". On the right, there is a "Log out" button and the text "Welcome mgscarbrou.gh". Below the navigation bar, there are links for "HOME", "TEAM", "PROFILE", "EXTRA MEMBERS PAYMENT", and "PAYMENT". The main content area is divided into two columns. The left column is titled "Team Activities" and shows "Team Name: 13-ACU-1" and "TASK 1" with buttons for "Edit Selected Task" and "Delete This Team". The right column is titled "Team Submissions" and contains a warning: "Once a report has been submitted, it may be replaced by clicking the 'Submit' button again. Caution! Re-submitting will change the time stamp. Note the substantial point penalties for late submissions." Below this warning is a table with three rows of submission options:

Submit Preliminary Report	Only for Tasks 1 and 3. Due 1/27/2020 11:59:00 AM
Submit Written Report	May be submitted late with substantial point penalty. Due for all teams on: 3/23/2020 11:59:00 AM
Submit Experimental Safety	Initiate the multi-step process by Feb. 17. Complete all steps prior to due date: 3/9/2020 11:59:00 AM

At the bottom of the team screen, there is a note: "To add a new team member, click the gray 'Add Member' box. Double-click on the grid row to update team member."

Once that screen opens you will see a button for General Instructions and several items with a + sign. Please read the General Instructions because it explains the ESP approval process.

The screenshot shows the "Experimental Safety Plan" page. The top navigation bar is the same as in the previous screenshot. Below the navigation bar, there are links for "HOME", "TEAM", "PROFILE", "EXTRA MEMBERS PAYMENT", and "PAYMENT". The main content area has a title "Experimental Safety Plan" and a "References" button. Below the title, there is a note: "Please submit the ESP after modifying and saving your changes" and a "General Instructions" button. A list of required items is shown, each with a plus sign icon and a status: "Experimental Scope (New Comment)", "Drawing of Experimental Layout including P&ID (Approved)", "Normal Operation, Startup and Shut-down Procedures (New Comment)", "Emergency Shutdown Procedures (New Comment)", "Waste Management Procedure (New Comment)", "Hazard Identification and Mitigation (New Comment)", "Other Equipment and Chemical Needs (New Comment)", and "Safety Data Sheets (Approved)". At the bottom of the page, there is a "Submit" button.

Please submit the ESP after modifying and saving your changes

General Instructions

Experimental Scope (New Comment)

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

Upload attached file

- + Experiment Summary
- + Balanced Chemical Reaction(s)
- + Thermal Safety of Chemical Reaction(s)
- + List of All Chemicals, Materials and Equipment
- + Tethering of liquid hoses
- + Experiment Timeline

Drawing of Experimental Layout including P&ID (Approved)

- Normal Operation, Startup and Shut-down Procedures (New Comment)
- Emergency Shutdown Procedures (New Comment)
- Waste Management Procedure (New Comment)
- Hazard Identification and Mitigation (New Comment)
- Other Equipment and Chemical Needs (New Comment)

Each of those contains specific questions that you need to answer.

- + Balanced Chemical Reaction(s)
- + Thermal Safety of Chemical Reaction(s)
- List of All Chemicals, Materials and Equipment

Include a complete list of all chemicals and materials involved in this experiment.

Include household chemicals such as bleach, vinegar, ammonia, table salt, baking soda etc. If you are using glue, silicone, paint etc. be sure to include those.

Materials used for construction of your experiment such as wood, PVC pipe, metal or plastic tubing, insulation etc. need to be listed here.

Equipment list must include items such as pumps, heat baths, stirring mechanisms, filters, reservoirs, centrifuge, solar panels, computers, antennas, meters, sensors, etc.

Content *

+ List of All Chemicals, Materials and Equipment

Be sure to open and fill out the WERC Bench-scale Lab Checklist by clicking in the dropdown box. The default is “Nothing Selected”. In most situations, you will check something on this list. You will be asked to address anything that you checked in the next +sign item.

Identify and discuss ALL HIGH hazards associated with the experiment. Fill out the WERC Benchscale Lab Hazard Assessment Checklist.

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 use and storage,
- housekeeping,
- fire potential
- biological hazards
- light and sound frequency and level

WERC Benchscale Lab Checklist

Nothing selected

Upload attached file

Attached File: 20200127044838SCORING GUIDE SHEET.pdf

+ Items marked Yes

Once you have provided information into all of the +sign items, you will press the “Submit” button at the bottom of the screen. That will send your ESP to me for review.

NM STATE BE BOLD. Shape the Future.
New Mexico State University
Engineering New Mexico Resource Network

Log out
Welcome mgscarbrou.gh

HOME TEAM PROFILE EXTRA MEMBERS PAYMENT PAYMENT

Experimental Safety Plan **References**

*! Means Required Item

Please submit the ESP after modifying and saving your changes

General Instructions

- Experimental Scope (New Comment)
- Drawing of Experimental Layout including P&ID (Approved)
- Normal Operation, Startup and Shut-down Procedures (New Comment)
- Emergency Shutdown Procedures (New Comment)
- Waste Management Procedure (New Comment)
- Hazard Identification and Mitigation (New Comment)
- Other Equipment and Chemical Needs (New Comment)
- Safety Data Sheets (Approved)

Submit

I will review all of the ESP items and “Approve” some or all of them. Please notice the title text color of the approved items will change from blue to green. (See the screenshot above)

You will see my comments on the items that I do not approve. After I send it back to you, the title color of those items still be blue. Please read my comments or questions and rewrite or expand on your original information provide an answer.

— Tethering of liquid hoses ✖

Describe how you plan to tether or secure liquid hoses from pumps and pressure equipment or list "none".

Content *

+ Tethering of liquid hoses

Safety Admin Comment

You can list "not applicable or none" here

Once you have completed your responses to all the [blue](#), or not yet approved, items press "Submit" again. Then the ESP will come back to [me](#) for another round of review.

We may repeat this process a few times. I will approve some or all of your ESP items during each cycle and eventually the entire document will be "Approved"

Common Issues with ESPs:

From my past-experience, many teams fail to do some of all of these:

1. Complete understandable descriptions of your experiment and conditions. This can be as long as you want. Sometimes photos or diagrams can be very helpful to me.
2. Submit a good flow diagram. A titled sketch with labeled boxes and input/output lines may be plenty, but be sure to account for all of your steps.
3. Submit all of the SDS documents in pdf form. This includes all household chemicals, paint, glue, and any specially obtained materials (e.g. test dust, regolith, etc.)
4. List complete names for chemicals. You can include the abbreviation but the complete name is required.
5. Write an answer for each +sign item.
 - a. You have an option for some of them to write "none" or "not applicable".
6. Hazard Identification
 - a. Review and check items that apply on the WERC Benchscale Lab Checklist
 - b. Describe how you will ensure safety for any item you checked.
 - i. Even if your work involves only a laptop computer you need to account for slip/trip/fall hazards. List any mitigations such as taping cords to avoid trips, placing equipment away from table edge, etc.
 - ii. Other demonstrations may require special personal protective equipment such as UV shaded safety glass, gloves, face shield, lab coats etc.
7. Wastes
 - a. List all your anticipated waste types and volumes and so we can plan to segregate and collected separately some items as needed)
 - b. Even a laptop can have an expended battery so you need to account for that.