

Foundry Safety Management System at Virginia Tech

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ABSTRACT

The Environmental Health and Safety Department at Virginia Tech created a safety management system for the on-campus Kroehling Advanced Materials Foundry. This system was so successful that it was rolled out to the entire University. This paper describes the safety management system and how it is used by students, faculty, and staff at the foundry.

Keywords: occupational health and safety, safety management, foundry safety

INTRODUCTION

The role of the Virginia Tech Environmental Health and Safety Department is to promote a positive, integrated safety culture for the university community, advocate safe and healthy living, learning, and working environments, and help departments comply with local, state, and federal regulations and mandates. When Virginia Tech decided to build the Kroehling Advanced Materials Foundry, the Environmental Health and Safety Department was asked to develop a comprehensive safety management system for the new facility. The system that was developed was so successful that it was eventually rolled out to the entire Virginia Tech University. The Director of the Virginia Tech Foundry Institute for Research and Education, which is located at the Kroehling Advanced Materials Foundry, is responsible for maintaining the foundry safety management system.

FOUNDRY SAFETY MANAGEMENT SYSTEM

The Virginia Tech Safety Management System is on-line and available 24/7. To access the safety management system, faculty, staff, or students go to the Virginia Tech Environmental Health and Safety homepage and click on the Safety Management System link, Figure 1, which takes the user to the lab/workspaces that they are “associated” with, Figure 2. The user then selects the lab/workspace in which they are interested.

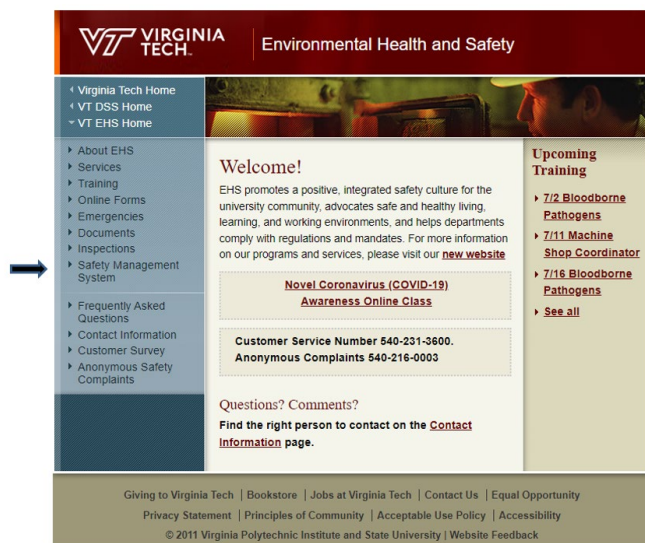


Figure 1. Virginia Tech Environmental Health and Safety Home Page.

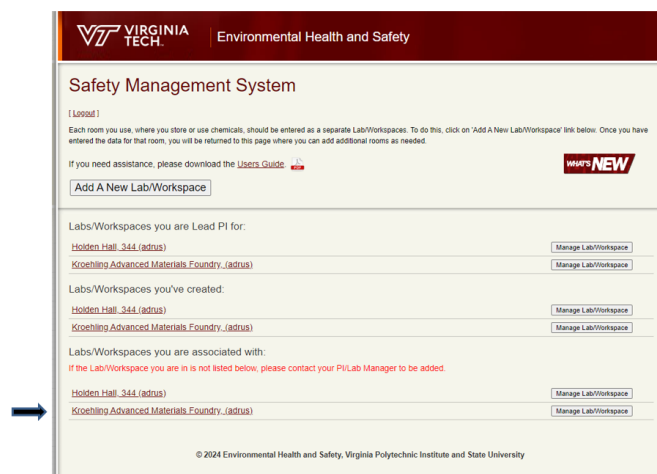


Figure 2. The lab/workspaces that the user is “associated” with.

If the user is not familiar with the Virginia Tech (VT) EHS safety management system, a comprehensive user guide is available, Figure 3.

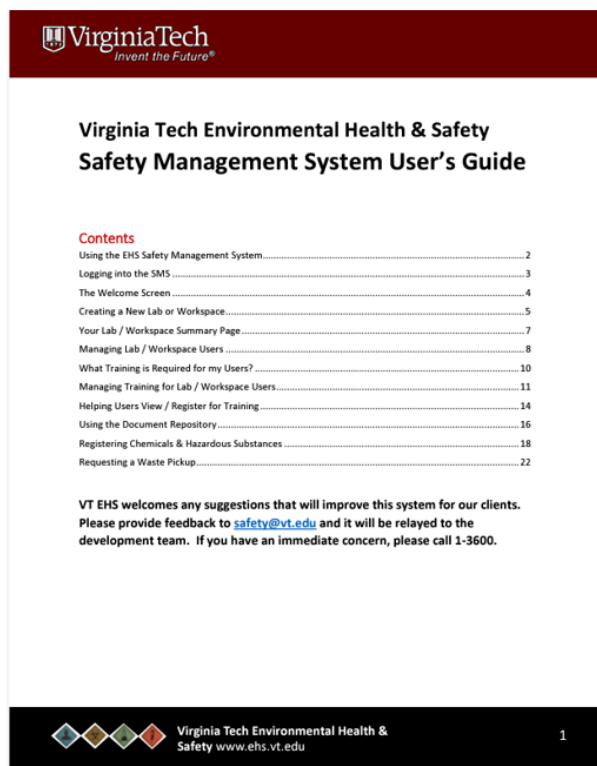


Figure 3. The contents of the "VT EHS Safety Management System User's Guide."

Each lab/workspace in the safety management system has a summary page that contains important information about the lab/workspace and has tabs for various functions, Figure 4. Personally identifiable information has been redacted in Figure 4.



Figure 4. The Kroehling Advanced Materials Foundry "Summary" page.

From the "Summary" page, the user chooses a "tab" that takes them to whatever information they are interested in, such as the lab/workspace "Users," in Figure 5. Only principal investigators or managers can edit user information. Again, personally identifiable information has been redacted.

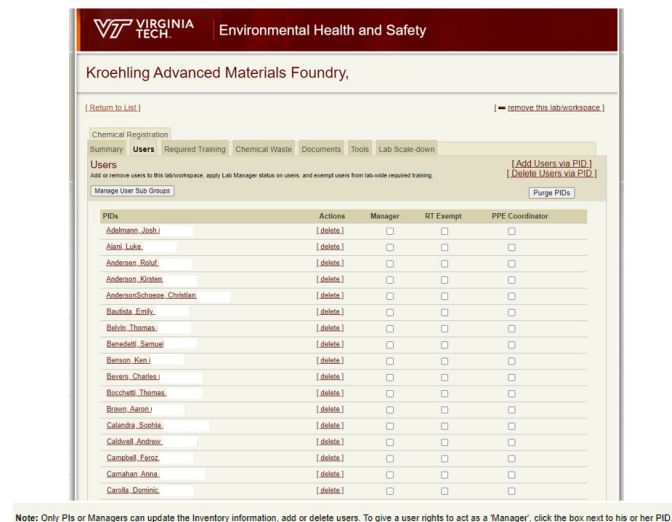


Figure 5. List of lab/workspace users. Only principal investigators or managers can edit user information.

The "Required Training" page is used to track user training. Green and red "dots" allow the principal investigators, managers, or auditors to quickly determine groups that have completed all of the required training, Figure 6. Training can be broken down into classes required for all users or classes required for specific users.

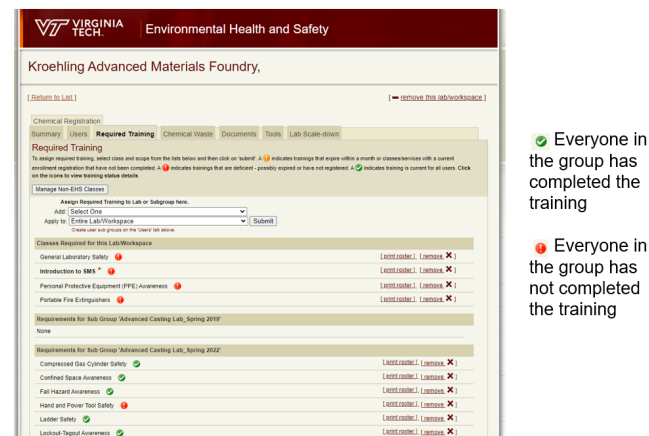


Figure 6. The Kroehling Advanced Materials Foundry "Required Training" page.

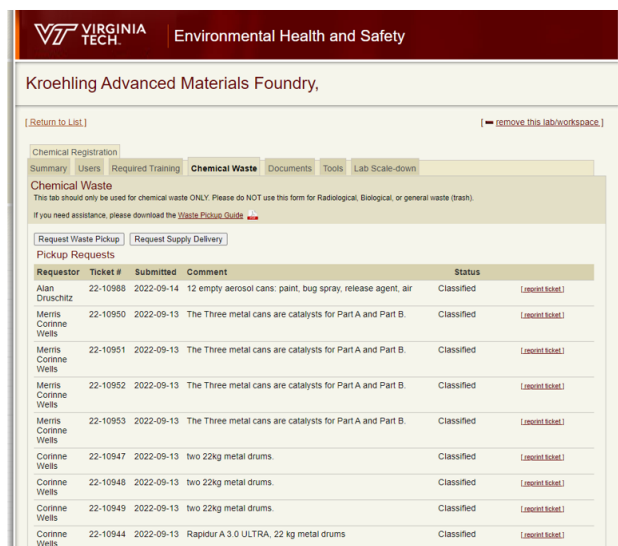
At Virginia Tech, MSE 3354: Foundry Safety is a one credit hour online class that is a co-requisite for all of the classes that take place in the Kroehling Advanced Materials Foundry.

There are fourteen training classes required for working in the foundry, Figure 7. A minimum grade of 80% is required to pass a training class.

REQUIRED TRAINING CLASSES	
1.	Chemical Safety – General Lab Safety
2.	Personal Protective Equipment (PPE) Awareness
3.	Fire and Life Safety – Portable Fire Extinguishers
4.	Lockout – Tagout Authorized User
5.	Silica Awareness
6.	Respiratory Protection
7.	Compressed Gas Cylinder Safety
8.	Hand and Power Tool Safety
9.	Fall Protection – Fall Hazard Awareness
10.	Ladder Safety
11.	Powered Industrial Truck Training
12.	Crane Safety – Overhead Crane Training
13.	Machine Shop Safety
14.	Confined Space Awareness

Figure 7. List of required classes for working in the Kroehling Advanced Materials Foundry at Virginia Tech.

The “Chemical Waste” page is used to request waste handling supplies and to schedule pick-up of hazardous waste, Figure 8.



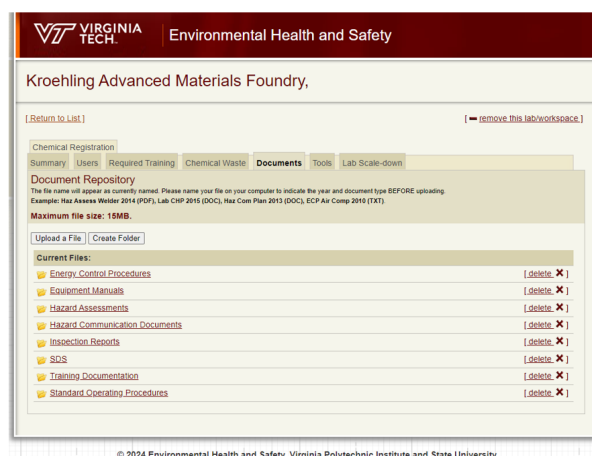
Requestor	Ticket #	Submitted	Comment	Status
Alan Druschitz	22-10988	2022-09-14	12 empty aerosol cans: paint, bug spray, release agent, air	Classified
Merris Corinne Wells	22-10950	2022-09-13	The Three metal cans are catalysts for Part A and Part B.	Classified
Merris Corinne Wells	22-10951	2022-09-13	The Three metal cans are catalysts for Part A and Part B.	Classified
Merris Corinne Wells	22-10952	2022-09-13	The Three metal cans are catalysts for Part A and Part B.	Classified
Merris Corinne Wells	22-10953	2022-09-13	The Three metal cans are catalysts for Part A and Part B.	Classified
Corinne Wells	22-10947	2022-09-13	two 22kg metal drums.	Classified
Corinne Wells	22-10948	2022-09-13	two 22kg metal drums.	Classified
Corinne Wells	22-10949	2022-09-13	two 22kg metal drums.	Classified
Corinne Wells	22-10944	2022-09-13	Rapidur A 3.0 ULTRA, 22 kg metal drums	Classified

Figure 8. The “Chemical Waste” page is used for requesting waste handling supplies and to schedule the pick-up of hazardous waste.

The “Document” page contains energy control procedures, equipment manuals, hazard assessments, hazard communication documents, inspection reports, safety data sheets (SDSs), training documentation, and standard operating procedures, Figure 9. This page contains all the “right-to-know” and other important information for the lab/workspace.

For the Kroehling Advanced Materials Foundry at Virginia Tech, available documents in the “Document Repository” include:

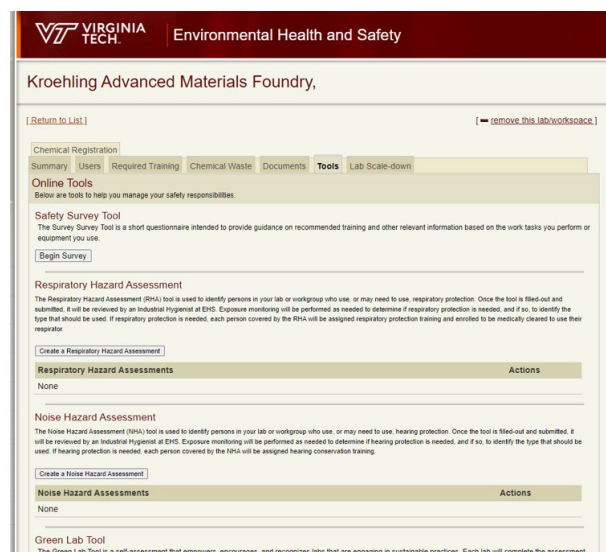
- 92 safety data sheets;
- 5 standard operating procedures;
- 6 hazard assessments;
- 10 energy control plans; and
- Numerous specialized testing documents (i.e., respirable crystalline silica exposure when molding, lead exposure when melting copper alloys, and hexavalent chromium exposure when melting stainless steel alloys).



Document Name	Year	Document Type
Energy Control Procedures		
Equipment Manuals		
Hazard Assessments		
Hazard Communication Documents		
Inspection Reports		
SDSs		
Training Documentation		
Standard Operating Procedures		

Figure 9. The “Document” page provides easy access to “right-to-know” and other important information.

The “Tools” page contains helpful information for performing assessments (i.e., Respiratory Hazard Assessment, Noise Hazard Assessment, etc.), Figure 10.



Respiratory Hazard Assessment

The Respiratory Hazard Assessment (RHA) tool is used to identify persons in your lab or workgroup who use, or may need to use, respiratory protection. Once the tool is filled-out and submitted, it will be reviewed by an Industrial Hygienist at EHS. Exposure monitoring will be performed as needed to determine if respiratory protection is needed, and if so, to identify the type that should be used. If respiratory protection is needed, each person covered by the RHA will be assigned respiratory protection training and enrolled to be medically cleared to use their respirator.

Noise Hazard Assessment

The Noise Hazard Assessment (NHA) tool is used to identify persons in your lab or workgroup who use, or may need to use, hearing protection. Once the tool is filled-out and submitted, it will be reviewed by an Industrial Hygienist at EHS. Exposure monitoring will be performed as needed to determine if hearing protection is needed, and if so, to identify the type that should be used. If hearing protection is needed, each person covered by the NHA will be assigned hearing conservation training.

Green Lab Tool

The Green Lab Tool is a self-assessment that empowers, encourages, and recognizes labs that are engaging in sustainable practices. Each lab will complete the assessment.

Figure 10. The “Tools” page provides helpful information for performing assessments.

The “Lab Scale-down” page provides information and a checklist for lab closures or reduced operations, Figure 11. This page was developed to assist with meeting Covid-19 requirements.

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Kroehling Advanced Materials Foundry,

[Return to List] [remove this lab/workspace]

Chemical Registration Summary Users Required Training Chemical Waste Documents Tools **Lab Scale-down**

Lab Scale-down
Use the checklist provided to manage your lab closure or scale-down.
[Update Checklist]

PREPARATION Complete N/A Notes
Identify all non-critical activities that can be reduced, curtailed, suspended or delayed.
Identify personnel able to safely perform essential activities.
Develop a schedule for staffing critical functions in the lab that enables social distancing. Practice the buddy system as needed and incorporate social distancing.
Remove all perishable and open food items for the lab's break areas, lockers, and personal spaces.

COMMUNICATION Complete N/A Notes
Review and update as needed: Contact lists including all lab personnel, principal investigator, lab administrative director, research operations manager, EHS, and building manager.
Ensure the contact list is saved where it can be remotely accessed by everyone in the lab. Include home and cell phone numbers.
Test your phone tree or email group to facilitate emergency communication amongst lab researchers and staff.
Ensure that emergency contacts to date and posted on outside of lab doors.

SHIPPING/RECEIVING Complete N/A Notes
Do not order any new research materials except those items needed to support minimal critical functions.
Cancel orders for non-essential research materials if they have not yet shipped.

Figure 11. The “Lab Scale-down” page provides information and a checklist for lab closures or reduced operation.

Hazardous chemicals are inventoried every year, and the “Chemical Registration” pages simplify this process, Figure 12. When the user clicks on “annual chemical registration,” they are taken to a list of hazardous materials. To complete the registration process, all the user needs to do is scroll down the list of materials and fill-in the amounts of the materials that are on-hand or expected to be on-site during the year. There are 196 hazardous materials included in the chemical inventory list, Figure 13.

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[Return to List] [remove this lab/workspace]

Summary Users Required Training Chemical Waste Documents Tools Lab Scale-down

Chemical Registration
Please click the Annual Chemical Registration button below to begin entering, or edit existing information on the types and quantities of chemicals that are present in this location.
[Annual Chemical Registration] [Registration Summary]

Registration Last Submitted on: **2024-03-06**
Download an excel spreadsheet of all the chemicals in this form if you need a guide to help gather the information needed to complete your registration. Note that you will still need to submit your registration by clicking on the Annual Chemical Registration button above.

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Figure 12. The “Chemical registration” page makes it easy to produce yearly inventories of hazardous materials.

For each of the following chemicals, enter the **total amount** you would expect to have on-hand during the course of the year. If you do not have a specific chemical, leave that field blank.

Chemical	Total Amount in Storage and Use	Units	Primary Hazard	Secondary Hazard
Acetone			Flammable	Corrosive
Ethanol			Flammable	Corrosive
Hydrochloric Acid			Corrosive	Flammable
...

If you have any other chemicals that are not included on the above list, please provide the quantities for each class of chemical below, along with the names. If chemical lists are used, then you must enter their own hazard codes, enter the full names.

Chemical Hazard Class	Total Amount in Storage and Use	Units	List of Chemicals by Name
...

196 hazardous materials are included in the chemical inventory list.

Figure 13. Examples of the hazardous materials included in the chemical inventory list.

SUMMARY

In summary, the Virginia Tech Safety Management System that was created and is maintained by the Virginia Tech Environmental Health and Safety Department is a comprehensive online system for providing faculty, staff, and students with needed/required safety information in an easy-to-access format that is available 24/7.

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