The UNIVERSITY of VERMONT

Risk Management & Safety
667 Spear Street, UVM-ESF
Burlington, VT 05405
Tel: 802-656-3242

March 20, 2019

Lynn Metcalf
Vermont Department of Environmental Conservation
Environmental Assistance Office
1 National Life Dr., Main 2
Montpelier, Vermont 05620-3804

RE: 2018 Annual Progress Report on Pollution Prevention

Dear Ms. Metcalf:

Please consider this letter the 2018 Pollution Prevention Plan Annual Progress Report for the University of Vermont (UVM). Being a Class A Generator with more than five hazardous waste streams, we have enclosed the maximum fee of $2,000. Please see the attached appendices for the breakdown of the processes and wastes at UVM. This report covers waste management activities at all UVM sites, including those not located within our main campus. Information pertaining to UVM Environmental Health and Safety programs, including the projects discussed below can be found at the Risk Management & Safety web page located at: https://www.uvm.edu/riskmanagement/safety

Additionally, the University's *Environmental Management Plan,* which includes the *Pollution Prevention Plan,* is located at: https://www.uvm.edu/riskmanagement/laboratory-environmental-management-plan

Results from the 2018 Hazardous Waste Report

The attached *Hazardous Waste Generation Information* (see appendix) shows that UVM generated 63,156 pounds of hazardous waste in 2018. This represents a 12.9% decrease over the previous year and a 5.8% decrease compared to the average of the previous 10 years (67,063 pounds).

Categories	2018	2017	2016	10-year Avg (2009-2018)
Total pounds of hazardous waste	63,156	72,534	82,625	67,063
Pounds from research and teaching	44,643	46,827	44,293	41,155
Pounds from on-going maintenance	7,539	12,753	11,033	7,857
Pounds from one-time facilities projects	10,974	12,954	27,299	18,141

The processes generating hazardous waste at UVM can be grouped into three categories. Wastes generated from: **1)** research and teaching activities; **2)** on-going maintenance of our facilities; and **3)**

one-time projects such as building renovations, tank removals, etc. Factors affecting each of these categories are as follows:

1. **Research & Teaching:** Waste generated in 2018 from research and teaching activities decreased 4.6% over the previous year. The following is a discussion of activities describing the generation of this waste stream.

   a) Success Stories:

   - Glove Recycling: In June of 2017, the UVM Chemistry department initiated a glove-recycling program for its teaching laboratories. Students in these classes discard uncontaminated nitrile laboratory gloves into a recycling bin located within the classroom. Full recycling containers are sent back to the manufacturer and the materials are integrated into new eco-friendly products. Since then, the University has expanded the program across other departments on campus. The largest supporter for this initiative is the College of Medicine, which possesses the majority of the laboratories at UVM. For more information on the glove recycling program see: https://www.fishersci.com/us/en/scientific-products/selection-guides/kimberly-clark-professional-rightcycle.html

   - Recycling/Repurposing of Waste: In 2018, UVM was able to find alternative uses for some of its hazardous wastes. Approximately 1,200 pounds of a urea-based fertilizer was repurposed to UVM's Miller Research Farm. Working with the farm manager, a use for the material on an area field was identified. Risk Management and Safety (RM&S) staff stored the fertilizer until the conditions were right for the material to be applied. In addition to this, the Chemistry department continues to use its solvent recovery system to reduce waste within the department. In 2018, they recovered approximately 680 pounds (85 gallons) of acetone, hexanes and ethyl acetate.

   - Uncontaminated Laboratory Waste Audit: During the month of March, Risk Management & Safety conducted an audit of uncontaminated laboratory waste across its campus. Laboratories utilize a "one-time use" container (cardboard box with plastic liner) to discard broken glass and "lab-like" materials that are not contaminated with any chemical, biological and radiologic materials. Typical materials that meet these criteria are petri dishes with sugar or broth media, microscope slides with plant or insect material, test tubes that contained soil or stream water samples etc. The results of the audit found that there were a number of materials in them that could be recycled (cardboard) or disposed of in the regular trash receptacles (brown paper towels). These findings were summarized and published at the annual laboratory safety officer meeting in April. The goal was to reduce the amount of waste leaving laboratories by better informing lab staff on the proper disposal options (recycling, regular trash, uncontaminated waste box).

   - On Going Initiatives:

     1. Gas Cylinder Recycling: UVM has made a conscious effort to send discarded gas cylinders, still containing material, back to the manufacturer for reclamation. This involves researching the origins of the cylinder, contacting the company and arranging for shipment via common carrier. In 2018, UVM was able to send back 7 cylinders of varying sizes that would normally be disposed through one of our approved hazardous waste vendors.

2. Laboratory Safety Officer Meetings: RM&S continues to host Lab Safety Officer (LSO) meetings that are held twice per year. The 2-hour meeting incorporates a variety of safety topics in addition to proper waste characterization and disposal. Last year there were 121 attendees at the spring session. The fall meeting was canceled due to staffing and scheduling constraints. The next meeting is scheduled for April 18, 2019.

3. Systematic Laboratory Auditing System: UVM continues to use an electronic auditing system to manage and track laboratory inspections conducted by RM&S staff. The system was fully implemented in 2015, and covers many health and safety parameters, in addition to proper waste characterization and management. During these audits safety staff review labeling of chemicals and wastes in addition to their storage. It is believed these audits help keep the number of chemical "unknowns" low and also prevents old unstable compounds from forming (peroxides).

b) Changes in Research and Teaching Activity: The indicator *pounds-of-hazardous-waste per $1,000-in-research-funding* has been calculated to assess a "Production/Service Factor."

Funding	2018	2017	10-year Avg (2009-2018)
Dollars received by UVM to fund research	$96,839,919	$88,790,412	$98,291,545
Chemical waste (lbs) from research & teaching	44,643	46,827	42,248
Pounds of waste / 1,000 research dollars	0.46	0.53	0.44

The amount of hazardous waste generated from research and teaching in 2018 decreased over the 2017 totals while research funding increased 9.1%. The 2018 correlation between the amount of waste generated and research dollars (0.46) is significantly lower than in 2017 and near the 10-year average. This is an encouraging trend. It is believed that this ratio will drop again in 2019 as the State of Vermont laboratories leave UVM's campus and move to their new location in Randolph. The state laboratories are the number one generator of inorganic acid waste on campus. The current schedule is to have all state laboratories decommissioned by the end of March.

c) Unknown Chemical Waste: The number of chemical unknowns dropped sharply in 2018 and is significantly less than the 10-year average. RM&S will continue to communicate and partner with laboratories to emphasize the importance of proper waste management, and to minimize the generation of chemical unknowns.

Unknown Chemical Waste	2018	2017	10-year Avg
# Containers of unknown waste	54	151	89

d) Training: UVM maintains an aggressive safety-training program for laboratory personnel that includes information about chemical safety, biological safety, hazardous waste

management and pollution prevention. Training is provided through a collection of on-line and classroom courses.

EHS Training	2018	2017	2016	2015
Completed On-line courses	8193	7352	7327	8178
Completed Classroom courses	1604	1235	1366	1375

In 2018 the number of people completing Environmental Health and Safety (EHS) training increased significantly both with the on-line and classroom sessions. We estimate that the UVM permanent laboratory worker population has a turnover of about 400 people per year. The increase was seen across the board and not due to any one particular class or training topic. We believe that the awareness developed through our rigorous training program explains in part, the ongoing success in effectively managing UVM's hazardous materials.

2. **On-going Maintenance:** The University's 2018 on-going maintenance waste decreased compared to the previous year. Over the last two years UVM has experienced unprecedented growth with its facilities and infrastructure. For this reason, the total amount of waste has increased. Last year that growth subsided, and as a result the waste numbers decreased and now closely trend with the 10-year average.

   Recycling Opportunities: Additionally, in 2018 UVM recycled 1,795 pounds of alkaline and rechargeable batteries (nickel-cadmium, lithium and nickel-metal hydride) through "Call2Recycle" to Inmetco in Pennsylvania. UVM also shipped 5,285 pounds of lead-acid batteries to Interstate Battery Solutions for lead reclamation, and approximately 1,397 pounds of latex paint to the Chittenden Solid Waste Environmental Depot for reuse.

3. **One-Time Facilities Projects:** One-time facility projects continue to be the most variable waste total. In 2018 "one-time" facilities projects accounted for 10,974 pounds of UVM's waste. This category of waste varies depending on building renovations, facility upgrades and spills. The most significant project contributing to the total was a large-scale exterior lead abatement project at 133 South Prospect. This project generated 4,254 pounds of lead debris.

   Also, in July RM&S staff repurposed 220 gallons of diesel fuel. The fuel was pumped out of a tank that was no longer in service. Safety staff containerized and transported the fuel to UVM Horticultural farm in South Burlington where it was transferred into their bulk tank. Diesel is used on the farm to fuel tractors and other equipment.

   To emphasize the importance of proper waste management, RM&S staff attend monthly coordination meetings lead by UVM's Facility Design and Construction team where projects are planned and tracked. Our staff provides consulting services to the project on ways to minimize and best manage any regulated materials and wastes generated from these activities.

Universal Wastes & Recycling

UVM recycles waste whenever possible. Wastes sent for recycling, universal wastes, and wastes that are not listed as hazardous are excluded from the above totals. These waste streams are included in the appendix of this report on the fourth page and is entitled *Non-Hazardous Waste Generation Information.*

a. Electronic Waste and Fluorescent Bulbs: UVM manages its electronics waste and fluorescent light bulbs under the Universal Waste regulations. The amounts of these wastes fluctuate from year to year. In 2018 the amount of growth seen on campus slowed and as a result the numbers decreased.

Name of Waste Stream	2018		2017		2016	
Fluorescent lamps –straight	41,253	Feet	72,358	Feet	33,552	Feet
Fluorescent lamps - compact & specialty	3,856	Bulbs	1,783	Bulbs	1,836	Bulbs
Electronic equipment	*NA	Tons	46.04	Tons	30.57	Tons

***NA = Data not available by the specified due date**

Summary

The University of Vermont's total pounds of hazardous waste for 2018 decreased nearly 13%. All three waste generating processes saw decreases in their totals when compared to 2017. The most significant reductions were with "On-going Maintenance" and "One-time Facilities Projects." As mentioned previously, UVM has seen large-scale growth on its main campus. In 2018 the focus was on constructing new buildings and less on deconstructing old ones. This shift had significant impact on the waste totals.

The waste generating process of "Research and Teaching" is the most repeatable. The totals for 2018 are similar to previous years. These numbers are expected to decrease in 2019 as the Vermont Agricultural and Engineering laboratories leave UVM, and occupy their new building in Randolph. The state laboratories are UVM's number one generator of inorganic acid waste.

We still lack a clear mechanism for normalizing the amount of waste generated, but continue to encourage toxics use reduction and pollution prevention on any scale.

If you have any questions in regards to this prevention plan update, please contact me at (802) 656-0767.

Sincerely,

Jeff L. Rogers
Environmental Compliance Manager

cc: Steve Simoes, VT Department of Environmental Conservation
Al Turgeon, UVM Chief Risk & Public Safety Officer
Dan Harvey, UVM Office for the Vice President for Research

2018
Pollution Prevention Plan
Annual Progress Report

I. Facility Information & Certification

Facility Name:	University of Vermont & State Agricultural College
Facility mailing Address:	Environmental Safety Facility 667 Spear Street – UVM Burlington, VT 05405
Contact Person:	Jeff Rogers
Telephone:	802 656-0767
E-mail address:	jrogers2@uvm.edu
Current Year Planning Status:	Class A Generator

Certification: I certify that the information provided in this report and all attached documents is true, accurate, and complete to the best of my knowledge and belief.

Signature: _____ Date: March 20, 2019 _____
Jeff L. Rogers

Title: Environmental Compliance Program Manager
(This report must be signed by an officer of the company or the person responsible for the operation of the site.)