POLLUTION PREVENTION (P2) PLAN

FOR

TEXAS STATE UNIVERSITY®

The rising STAR *of Texas*

601 UNIVERSITY DRIVE
SAN MARCOS, TEXAS 78666

DECEMBER 2015

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

This Pollution Prevention (P2) Plan was prepared for Texas State University (the University) to comply with Senate Bill 1099. This bill requires generators of hazardous wastes (large and small quantity) to prepare a P2 plan. This plan includes the components required by the Texas Commission of Environmental Quality in 30 TAC335 Subchapter Q. This current plan is the 5-year renewal plan to the Source Reduction Waste Minimization plan prepared in 2010.

1.1 FACILITY DESCRIPTION

Texas State University is a four-year accredited university located at 601 University Drive in San Marcos, Texas. The University was classified as an Emerging Research University in 2012, and is now the fourth largest university in the state with a student population of greater than 37,000. The University offers undergraduate and graduate programs in the following colleges: Applied Arts, McCoy College of Business Administration, Education, Fine Arts and Communication, Health Professions, Liberal Arts, Science and Engineering, University College and Graduate College.

From various maintenance activities and routine laboratory practices, the University generates hazardous and non-hazardous waste. The University is registered with the Environmental Protection Agency (EPA) and the Texas Commission on Environmental Quality (TCEQ) as a large quantity generator. The Texas solid waste registration number is 66137 and the EPA I.D. number is TXD980812168.

1.2 SOURCES OF HAZARDOUS WASTE GENERATION

Hazardous wastes are generated as a result of teaching, research and operational activities at the University. The Environmental Health Safety and Risk Management Office (EHSRM) is responsible for proper handling and ultimate disposal of these wastes. RCRA hazardous wastes are generated at the following departments:

1. Physical Plant Shops and Garage
2. Print Shop
3. Art Department
4. Chemistry and Biochemistry
5. Aquatic Biology
6. Biology
7. Physics
8. Family and Consumer Science
9. Engineering and Technology

10. Edwards Aquifer Research and Data Center
11. Photo Labs
12. Chilled Water Plants
13. Campus Recreation

The various departments may generate general types of wastes such as solvent waste or acid waste, or specific wastes such as mercury or silver laden waste. Each of these wastes is assigned a unique waste code in accordance with the TCEQ Guidance (Guidelines for the Classification and Coding of Industrial and Hazardous Wastes, RG-22). The waste codes are included on the TCEQ Notice of Registration (NOR).

1.3 Waste Identification/Waste Volume

Table 1 lists the hazardous wastes generated at the University. The hazardous waste is managed by an offsite permitted treatment, storage and disposal facility (TSDF) that is allowed to bulk waste and send it with wastes from multiple generators to appropriate disposal facilities.

Table 2 summarizes the volume of hazardous waste disposed of offsite by the University over the past four years. The six top waste streams are shown in bold based on volume and toxicity. These hazardous waste streams will be targeted for reduction by the University and addressed by this plan. Because the University's SIC code is 8221, they are not required to report emissions through SARA Section 313 Toxic Release Inventory Reports. This plan addresses hazardous waste reduction only.

1.4 Commitment to the Environment

Texas State University will continue to maintain environmental responsibility and compliance to regulatory requirements as a top priority. The University's vision statement includes the commitment to be ethical, responsible and protective of the environment. This commitment is demonstrated in the Environmental Health and Safety Policy signed by the president, Dr. Denise Trauth.

2.0 SOURCE REDUCTION/WASTE MINIMIZATION GOALS

The University strives to reduce the risk to human health and the environment and reduce the cost of offsite disposal through our pollution prevention program. The program is implemented through the use of policy, continual training and awareness, and through specific projects in the categories of recycling and reuse, waste minimization, source reduction, and treatment. The University has already established several successful waste minimization and source reduction measures. New strategies and potential projects have been identified to continue working towards our waste minimization and source reduction goals.

The proposed projects for this five year cycle of the P2 Plan (calendar year 2015 -2019) will target reduction of the top six waste streams identified in **Table 2.** These proposed projects are described in more detail below and are listed in **Table 3**.

2.1 POLICY

The Hazardous Materials and Hazardous Waste Management Policy is found within the Public Health and Safety University Policy and Procedure Statement (UPPS) 04.05.15. The policy is written to establish a hazardous materials and hazardous waste management program and ensure compliance with applicable federal and state regulations. The statement also establishes an initiative to reduce the quantity of hazardous waste generated on campus. All waste minimization and source reduction programs are rooted in this policy. The Environmental Health, Safety & Risk Management (EHSRM) Office has the primary responsibility for managing these programs.

Waste minimization is also discussed in the campus Chemical Hygiene Plan. The Chemical Hygiene Plan is referenced in the Hazard Communication Policy, also found in UPPS 04.05.15. During the new cycle of the P2 Plan the waste minimization section of the Chemical Hygiene Plan will be expanded and updated. In addition, the Hazardous Materials and Hazardous Waste Policy will be reviewed and updated if necessary.

2.2 TRAINING AND AWARENESS

In a university environment, there is an ever-changing population of faculty, staff, and students. Generally speaking, numerous waste streams are generated in small volumes. Changes in research, class focuses, and university growth present challenges to minimizing specific waste streams. This is why it is important to provide training and

awareness of the significance of waste minimization and source reduction in all communications with generators on campus.
Currently, the University provides Hazardous Waste training for all employees working with chemical purchasing and waste generation. Waste minimization and source reduction awareness is included in this training. In addition, specific, in-person training is provided to new labs when a lab check-in form is submitted, and when chemicals with high toxicity or volume are ordered.

Because the University relies on the generators to assist with source reduction and waste minimization projects, the following training and awareness projects will be implemented during the current 5 year cycle of the P2 Plan:

2.2.1 Waste Minimization Manual

A Waste Minimization Manual will be developed to provide waste generators on campus with information and ideas which may be useful in their areas. The manual will provide concepts that are targeted at specific waste streams, such as solvent waste streams, and for specific departments, such as the art department.

2.2.2 Website Updates

Update the EHSRM web page to make it more user friendly, and to provide a one-stop shop for new faculty and staff. The website will have easy access to training, manuals, and lab check-in forms.

2.2.3 Waste Tips

The EHSRM office communicates with waste generators on campus in a number of ways, including the monthly newsletter and a weekly waste pick-up notification e-mail. These communications provide an excellent opportunity for providing tips and other useful information about source reduction and waste minimization. During the new cycle of the P2 Plan, a Waste Tip of the Day will be included in these communications whenever possible.

2.3 Reuse and Recycling

Currently, the University manages a recycling program on campus for the collection of batteries, cell phones, and ink jet cartridges at 65 locations on campus. The program collects all types of batteries including alkaline, lithium ion, Ni-Cd, and lead acid

batteries. The batteries and ink jet cartridges are sorted and sent to the appropriate recycling facilities. Used oil from campus-related activities is also collected and recycled under 30 TAC 324.6.

2.3.1 Solvent Recovery

In addition to the programs above, some waste generators on campus are recycling solvents on a small scale within their laboratories by distillation. During the current 5 year cycle, records of recycling efforts will be maintained to better determine the volume of solvents that are being recycled, and to determine the feasibility of a larger scale solvent recovery system.

2.3.2 Chem-Swap Program

Planning for this program is complete and implementation of the program is imminent. This program will allow chemical users within the Texas State University main campus to obtain, free of charge, unused chemicals which still have a good shelf life and are uncontaminated. The chemicals are generated from laboratory cleanouts, stockroom cleanouts, or research laboratory decommissioning.

The Chem-Swap program will also incorporate used latex paint and empty nonhazardous drums for use in other areas of campus. Use of these chemicals and materials, rather than disposal, keeps them out of the hazardous waste classification.

EHSRM will act as the facilitator of the Chem-Swap program and maintain an up-to-date inventory in the Texas State University group on Quartzy (Quartzy.com). A dedicated e-mail box, chem-swap@txstate.edu, has been set up to facilitate communication for the program.

The basic components of this program are:

EHSRM maintains the inventory in clean, well labeled storage cabinets (Labeled "Chem Swap Program");
EHSRM marks the initial date they receive the product; for recycle the product must be reused within one year or sent offsite for disposal;
EHSRM posts a listing of the products available on EHSRM group on the Quartzy website;
Only professors or laboratory technicians can request chemicals (not students);
Labels must be in good condition and the shelf life of the material must be good;

If a department wants a chemical, they post the request to EHSRM and trained staff will deliver the product to the department. The same procedure follows for a department that wants to donate an unused chemical to the Chem-Swap program.

2.4 SOURCE REDUCTION

Source reduction is considered in several policies and projects within the University. The source reduction strategies below are continually employed whenever possible.

2.4.1 Product Substitution

Product substitution will continue to be encouraged across campus. Examples of common product substitutions will be discussed in detail in the new Waste Minimization Manual to be developed.

In addition, specific waste streams will be targeted to determine the feasibility of substitution with non-hazardous substances, including purchase of specimens packed in Formalternate rather than formalin.

2.4.2 Inventory Control

The American Chemical Society (ACS) estimates that 40% of the chemical waste generated by labs consists of unused chemicals. As a result, EHSRM encourages departments and laboratories to purchase chemicals only in amounts that will be used within the budget year.

In order to better track chemical purchases, the purchasing department has implemented a program in SAP called Bobcatalog that tracks and flags purchases of chemicals. The EHSRM department is notified of these purchase requests and can approve or deny these purchases based on volume or toxicity of the chemical.

To make labs more accountable for their chemical inventories, EHS will implement an inventory protocol using a web based platform. Spot checks of inventory will be performed during lab inspections.

2.5 WASTE MINIMIZATION

The University encourages waste minimization through on-line training, and through one-on-one meetings with waste generators.

2.5.1 Segregation

Specific waste streams will be targeted during the current 5-year cycle of the P2 Plan, including segregation of halogenated and non-halogenated solvents and the segregation of trash from waste rags with solvents.

Segregation of halogenated and non-halogenated solvents is already encouraged whenever possible; however, this waste stream will be further pursued to facilitate the feasibility study for solvent recycling.

Segregation of waste rags with solvents and trash is challenging in some departments where students are the generators. These departments will be targeted for more specific in-person training.

2.6 TREATMENT

The University will continue to pursue small scale treatment projects where possible. One successful project is already in place in the Chemistry department. This project involves segregation of acidic waste streams into metal-bearing and non-metal bearing streams. This is accomplished by process knowledge of the laboratory experiment waste streams, and providing waste containers with proper labels for each of the experiments.

The non-metal bearing streams are neutralized to eliminate the hazardous waste characteristic of corrosivity (D002). The neutralized waste stream has a low COD and is discharged to the sanitary sewer. An example of the procedure that can be used to safely neutralize acidic streams is shown in **Attachment A.** Neutralization of these streams will continue and if possible, streams from research labs will be added.

2.6.1 Ethidium Bromide

During the current 5-year cycle of the P2 Plan, the University will determine the feasibility of filtering ethidium bromide solutions with a Greenbag Kit or by deactivating ethidium bromide using bleach and neutralization as a last step to an experiment. Sampling of the treated solutions will be conducted to ensure it meets the University's wastewater discharge limits for the City of San Marcos. If these methods are feasible, they will be put in place in labs where the solution is most commonly used.

2.6.2 Paint Rinsewater Treatment

Cadmium paint rinse water is a significant volume of hazardous waste generated at the campus. Product substitution to cadmium-hue paints has been moderately successful, but with new students in the art department each semester, this practice is difficult to enforce and monitor. While product substitution will continue to be practiced, another method of paint rinse water volume reduction will continue to be investigated.

Coagulation and sedimentation of paint solids to yield a supernatant that has less than 1.0 mg/L cadmium will be explored. This technology is already available for latex and acrylic paint and its effectiveness will be explored for cadmium-containing rinse water. Based on analytical testing, the supernatant may be reclassified as nonhazardous waste water and will either be discharged to the sanitary sewer or disposed of offsite. The City of San Marcos industrial wastewater permit will control discharge limits. The paint solids will be disposed of as hazardous waste, however, at a greatly reduced volume.

2.2 Schedule of Implementation and Measurable Goals

The proposed schedule of implementation for these projects is listed in **Table 4**. The schedule covers the period of time from 2015 to 2019. The University is dedicated to reduce the volume of hazardous waste by 20% over the next five years. The baseline for this assessment is the year 2014 and the annual waste reduction reports will compare to this baseline to determine if the reduction goals are being met.

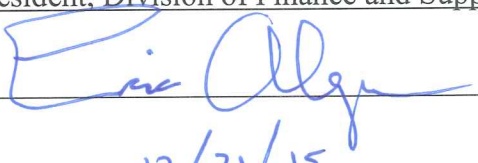
2.3 CERTIFICATE OF COMPLETION

This document certifies that the Pollution Prevention Plan has been completed and meets the specific requirements of the Waste Reduction Policy Act of 1991, the Solid Waste Disposal Act, and 30 TAC Sections 335.471 – 335.480, and that the information provided herein is true, correct and complete.

This document also certifies that the person whose signature appears below has the authority to commit the resources necessary to implement the plan.

Name: Mr. Eric Algoe

Title: Vice President, Division of Finance and Support Services

Signature: 

Date: 12/21/15

Tables

Pollution Prevention Plan

TABLE 1

Hazardous Wastes Generated
Texas State University
San Marcos, Texas

TCEQ Waste Code	*Waste Description*	EPA Waste Code	Most Common Method of Disposal
Hazardous			
0001204H	Mixed halogenated/non-halogenated solvents from labs throughout campus and solvents consolidated at the storage facility.	D001, F001, F002, F003, F005	Incineration or fuel blending
0002103H	Acids with metals from campus labs	D002,D005, D006, D007, D008, D009, D011	Wastewater treatment
0003003H	Mixed lab packs containing hazardous chemicals from campus labs.	D001, D002, F001, F002, F003, F005, U057, U196, U239	Incineration
0004198H	Photographic waste may contain silver, may be reactive	D002, D003, D011	Silver recovery and wastewater treatment
0007119H	Laboratory waste – inorganic, may contain oxidizers.	D001, D002, D005, D006, D007, D008, D009, D011	Wastewater treatment
0010117H	Mercury waste or aqueous mercuric salt solutions	D009, D002	Mercury recovery and wastewater treatment
0016219H	Caustic liquids from consolidating lab wastes, flammable caustics	D001, D002, F002, F003	Incineration

TABLE 1 (continued)

Hazardous and Class 1 Non-hazardous Wastes Generated
Texas State University
San Marcos, Texas

TCEQ Waste Code	*Waste Description*	EPA Waste Code	Most Common Method of Disposal
0017219H	Lab waste consolidation, flammable acids	D001, D002, F002, F003	Incineration
0020310H	Activated carbon filters, spent or out of date	D001	Regenerate
0021202H	Spent halogenated solvents and aqueous mixtures	D001, F001, F002	Incineration or Fuel blending
0022203H	Spent non-halogenated solvents and aqueous mixtures	D001, F003, F005	Incineration or Fuel blending
0025207H	Organic solutions with aquatic organisms. May be formaldehyde, ethanol or formalin.	D001	Incineration or Fuel blending
0029310H	Waste Rags containing F003 and/or F005 solvents.	D001, F003, F005, D035	Incineration or Fuel Blending
0030310H	Waste Sorbents, may contain gasoline and oil	D018	Incineration or Fuel Blending
0034119H	Aqueous waste containing sodium azide from a laboratory analysis	P105	Incineration
0035110H	Caustic Aqueous Waste from Labs and Shops	D002	Wastewater treatment or hazardous waste landfill
0036319H	Old sodium hydroxide pellets in drums	D002	Hazardous waste landfill
0037310H	Solids that fail one or more TCLP metal	D004-D011	Hazardous waste landfill

TCEQ Waste Code	*Waste Description*	EPA Waste Code	Most Common Method of Disposal
0038219H	Old glycolic acid in drums	D002	Neutralization/Incineration
0040403H	Acid bed water softener resin	D002	Neutralization/Incineration
0041110H	Old chemical in drums, caustic/aqueous	D002	Hazardous waste landfill
0049103H	Aqueous waste from labs that contain RCRA and Non RCRA metals.	D005, D006, D007, D008, D011	Wastewater Treatment

Table 2
Summary of Hazardous Waste Generation
Texas State University
San Marcos, Texas

TCEQ Waste Code	Waste Description	Base Year 2014 (lbs)	2013 (lbs)	2012 (lbs)	2011 (lbs)
0001204H	Water w/spent solvents (nonhalogenated)	2,582	1,953	1,700	1,510
0002103H	**Generic acid with metals**	**5,400**	**5,361**	**6,550**	**13,237**
0003003H	**Mixed lab packs with hazardous chemicals**	**3,883**	**3,671**	**4,975**	**3,873**
0004198H	Bulk fixer waste, may contain silver or be reactive	2,490	3,350	4,100	5,720
0007119H	**Inorganic laboratory waste with oxidizing characteristic.**	**4,200**	**2,850**	**2,700**	**2,863**
0010117H	Mercury waste or mercury wastewater	2,140	2,740	2,490	2080
0016219H	Caustic (basic) liquids, flammable bases	1,500	3,680	790	750
0017219H	Flammable acids	2,621	2,675	2,250	3,690
0022203H	**Spent non halogenated solvents**	**3,911**	**3,083**	**4,850**	**5,110**
0025207H	**Organic solutions mixed with specimens**	**3,625**	**2,190**	**1,100**	**2,010**

TCEQ Waste Code	Waste Description	Base Year 2014 (lbs)	2013 (lbs)	2012 (lbs)	2011 (lbs)
0029310H	Waste Rags with Solvents	1325	1600	1,150	1600
0035110H	Caustic Aqueous Waste From Labs and Shops	550	1,340	1,190	590
0049103H	**Aqueous Waste from labs that contain RCRA and Non RCRA metals.**	**4,830**	**1,474**	**0**	**0**
UNIV209H	Paint waste (changed to universal status in 2004)*Universal waste is excluded from reporting in the Annual Waste Summary numbers.*	1,540	2,875	3,500	7,200
Total (lbs)	(not including Universal Waste)	40,597	38,842	37,345	50,233
Total (tons)		20	19	19	25

Note: **Bold** entries are those wastes targeted for reduction by this plan.

Table 3. Proposed Source Reduction/Waste Minimization Projects

Waste Min/Source Reduction Activity	Resulting Waste Eliminated or Reduced
1. Expand training and awareness of waste minimization and source reduction practices by creating a manual, updating the website, and expanding weekly communications with generators.	• All waste streams, but specifically targeting generic acids with metals (0002103H), inorganic lab waste with oxidizing characteristics (0007119H), and aqueous wastes with RCRA & non-RCRA metals (0049103H)
2. Segregate halogenated and non-halogenated solvents. Begin keeping records of small scale solvent distillation projects in different labs. Determine feasibility of large scale solvent recovery project in Chemistry Department.	• Non-halogenated solvents (0022203H)
3. Fully implement the Chem-Swap program to reuse commercial chemical products rather than discard them.	• Hazardous Waste Lab Packs (0003003H)
4. Product substitution in art department, and science labs.	• Organic solutions mixed with specimens (0025207H) • Inorganic laboratory waste with oxidizing characteristic (0007119H) • Universal Paint wastewater containing cadmium (UNIV209H)
5. Develop inventory protocol for labs and implement spot check inspections of inventory to make labs more accountable.	• Hazardous Waste Lab Packs (0003003H)
6. Investigate products and methods to filter (volume reduction) or deactivate ethidium bromide solution (disposal to sanitary sewer).	• Class 1 inorganic waste solutions (0231191)
7. Continue to investigate products to separate paint from water so the water can be disposed of offsite or in the sanitary sewer and the paint can be disposed of as a solid.	• Universal Hazardous Waste paint rinse water with Cadmium. (UNIV209H) • Paint Rinse water (Class 1 & Class 2)

Table 4. Schedule of Implementation and Measurable Goals

Waste Minimization Activity	Schedule of Implementation
1. Expand training and awareness of waste minimization and source reduction practices by creating a manual, updating the website, and expanding weekly communications with generators.	Draft a waste minimization manual during Spring 2016, submit for review prior to Fall 2016 semester. Submit updates for website during the summer 2016 to prepare for rollout by Fall 2016 semester. Begin weekly and monthly waste tips during Fall 2015 semester.
2. Segregate halogenated and non-halogenated solvents. Begin keeping records of small scale solvent distillation projects in different labs. Determine feasibility of large scale solvent recovery project in Chemistry Department.	Meet with faculty and staff who are distilling solvents in labs during Fall 2016. Have faculty and staff maintain records of solvent recovery data for one year. Review records in Fall 2017 and determine feasibility for large scale project in Chemistry department. If feasible, obtain necessary supplies by Spring 2018, and implement by Fall 2018.
3. Fully implement the Chem-Swap program to reuse commercial chemical products rather than discard them.	Create chem-swap group in Quartzy and upload inventory by beginning of Spring semester 2016. Use EHSRM newsletter to roll out the program and gain interest. Begin facilitating swaps by end of Spring 2016.
4. Product substitution in art department, and science labs.	Meet with faculty and staff in art and science departments to discuss feasibility of product substitutions in Spring 2016. Develop protocol and find vendors for use of alternative products during Summer 2016, implement by Fall 2017.
5. Develop inventory protocol for labs and implement spot check inspections of inventory to make labs more accountable.	Develop protocol during Spring 2016. Implement spot checks by Fall 2016.
6. Investigate products and methods to filter (volume reduction) or deactivate ethidium bromide solution (disposal to sanitary sewer).	Meet with faculty and staff who are generating this waste stream in Fall 2017. Conduct a feasibility study in labs using both methods. Develop a protocol and add to waste minimization manual by Fall 2018.
7. Continue to investigate products to separate paint from water so the water can be disposed of offsite or in the sanitary sewer and the paint can be disposed of as a solid.	Research products and scout potential locations for treatment unit on campus during Fall 2017. Conduct cost analysis to determine feasibility and outcomes during Spring 2018. If feasible, implement project in Fall 2018.

ATTACHMENT A

UTMB Environmental Protection Management

Example Neutralization & Proper Destruction Method

Many chemicals used in the laboratory can be made less or even non-hazardous by labpersonnel as the final step in protocol. Incorporate these procedures into the experimental protocol, whenever possible, and call EPM if you have a specific chemical of interest that is not described below.

Simple diluted acid & base neutralizations:

- Use appropriate personal protective equipment and chemical fume hood (chemically resistant gloves, goggles or face shield, lab coat, and plastic apron.
- Keep solutions cool in an ice bath to reduce the generation of heat and fumes.
- Always add acid to water or base to water. NEVER REVERSE.

Acid Neutralization:

1.	Slowly add dilute (5N or less) acid solution to a large dilute amount of an ice water mixture of either sodium carbonate, calcium hydroxide, potassium hydroxide, or 10M sodium hydroxide. Stir constantly while adding acid.
2.	Check pH frequently (acceptable range is 6 to 8).
3.	Flush down sink with copious amounts of water.

Some acid should never be neutralized, due to either their high reactivity, creation of toxic residues, or other high inherent hazards including:

Acetic Acid	Acid Anhydrides and Chlorides
Chlorosulfonic Acid	Fuming Nitric and Sulfuric Acid
Hydrofluoric Acid	Trichloro- and Trifluoro- Acetic Acids
Liquid Halides of Boron, Silicon, Tin, Titanium, and Vanadium	Liquid Halides and Oxyhalides of Phosphorus, Selenium, and Sulfur