POLLUTION PREVENTION (P2) PLAN

FOR

TEXAS STATE UNIVERSITY – SAN MARCOS

601 UNIVERSITY DRIVE
SAN MARCOS, TEXAS 78666

JANUARY 2010

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ATTACHMENTS

1.0 INTRODUCTION

This Pollution Prevention (P2) Plan was prepared for Texas State University – San Marcos (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 30TAC335 Subchapter Q. This current plan is the 5-year renewal plan to the Source Reduction Waste Minimization plan prepared in 2005.

1.1 FACILITY DESCRIPTION

Texas State University – San Marcos is a four-year accredited university located at 601 University Drive in San Marcos, Texas. The University is the fifth largest university in the state with a student population of greater than 30,000. 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, 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 municipal 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. CoGeneration Plant

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 at the University. The hazardous waste is managed by a 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 stated in the Environmental Health and Safety Policy signed by the president, Dr. Denise Trauth.

1.5 EMPLOYEE AWARENESS AND TRAINING

Employees working with chemical purchasing and waste generation will be trained to increase awareness of the environmental policy of pollution prevention and reduction. This training will be included in safety and hazardous waste management training conducted on our computer based TRACS program and at onsite training sessions (generally annually).

The purchasing department has implemented a new program called Bobcatalog that tracks and flags purchases of chemicals. The EHSRM department is notified of these purchase requests prior to the purchase and can approve or deny these purchases based on volume or toxicity of the chemical. This will provide an opportunity to give specific pollution prevention training to the purchasing agent in terms of the university's goals of minimizing waste and reducing toxicity of chemicals onsite.

2.0 SOURCE REDUCTION/WASTE MINIMIZATION GOALS

The University will strive to reduce the risk to human health and the environment and reduce the cost of offsite disposal through our pollution prevention program. The projects identified as potentially beneficial to meet these goals are described in more detail below.

2.1 PROPOSED SOURCE REDUCTION PROJECTS

The University has identified several key projects to pursue over the next five years (calendar year 2010 -2014). These projects are designed to reduce the six top waste streams identified in **Table 2.** These proposed projects are described in more detail below and listed in **Table 3**.

Cadmium Paint Rinse Water 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 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 waste water permit will control discharge limits. A pretreatment permit may be necessary prior to discharge to the sanitary sewer. The paint solids will be disposed of as hazardous waste, however, at a greatly reduced volume.

Segregate Photographic Waste

This project was implemented during the first five-year waste minimization cycle. The EHSRM department provides two receptacles for the photography classes to dispose of spent fixer and developer separately. This reduces the volume of hazardous waste that would occur if the two were mixed (as in previous practices). The fixer is hazardous due to the concentration of silver (i.e. greater than 5.0 mg/L), where as the developer is nonhazardous.

Silver recovery units were not found to be successful for reducing the silver consistently to less than 5.0 mg/L from the fixer solution. However, during this next five year cycle, the EHSRM department will continue to investigate new technologies for recovering silver and eliminating this stream as a hazardous waste. If the fixer can be treated to a nonhazardous waste stream, it will continue to be containerized for offsite disposal at a reduced cost. The treated water will not be discharged to the sanitary sewer due to our industrial wastewater permit limits for silver (0.306 mg/L) and COD (350 mg/L).

Transition of traditional photography practices to digital processes is not foreseen in the next five years. This transition, when implemented, will eliminate both the fixer and developer waste streams.

Segregate and Neutralize Acidic Wastewater Streams

This P2 project has two steps that are currently in place in the Chemistry department (the primary generator of this waste stream). The first step involves segregating acidic streams that contain any of the 8 hazardous waste metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver) or the additional nonhazardous waste metals regulated by the industrial waste water permit (copper, molybdenum, nickel, zinc, iron) These metal bearing acidic wastes streams are segregated from acidic streams that do not contain these metals. This is accomplished by process knowledge of the laboratory experiment waste streams, and providing waste containers with proper labels for each of the experiments.

Neutralization of the non metal containing acidic waste streams is done to eliminate the hazardous waste characteristic of corrosivity (D002). This process is performed by the Chemistry Department staff only for safety and consistency. Students in the labs do not perform this procedure. 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**

Product Substitution

Substitution of less toxic or hazardous materials will result in smaller volumes of hazardous waste requiring disposal. Examples of substitutions that have been effective at other university labs are:

- For quantitative tests for halide ions, substitute cyclohexane instead of carbon tetrachloride

- For phase change and freezing point depression, substitute acetamide for stearic acid
- For glassware cleaning, substitute potassium hydroxide, sonic baths, alconox, Pierce RBS35 or enzymatic cleaners for chromic/sulfuric acid baths or alcoholic potassium hydroxide baths. The latter solutions are not only hazardous, but have high disposal costs due to the corrosivity of the products.
- Substitute non-mercury thermometers (red liquid, digital, or thermocouple) for mercury thermometers
- Substitute high flashpoint scintillation fluids (e.g. Ecoscint)
- Substitute ethanol for formaldehyde for specimen preservation.

Implement Chem Swap Program

This program has been implemented successfully at different Universities as a method to reduce the amount of commercial chemical product disposed of. These products typically are generated from laboratory cleanouts, stockroom cleanouts, or research laboratory decommissioning. According to the definition of U and P listed wastes, the product is only a waste when it is discarded. Use of these chemicals rather than disposal keeps them out of the hazardous waste classification. The Chem Swap program allows laboratory professors and personnel to obtain free of charge unused chemicals donated by other departments. 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 the EHSRM website;
- Only professors or laboratory technicians can request the chemical (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.
- The service if free to the chemical provider and free to the chemical receiver.

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 2010 to 2014. The University is dedicated to reduce the volume of hazardous waste by 30% over the next five years. The baseline for this assessment is the year 2009 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. William A. Nance_____

Title: Vice President, Financial Support Services Division

Signature:_____

Date: _____

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

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

TCEQ Waste Code	Waste Description	Base Year 2009 (lbs)	2008 (lbs)	2007 (lbs)	2006 (lbs)
0001204H	Water w/spent solvents (nonhalogenated)	590	860	1,552	1,131
0002103H	**Generic acid with metals**	**3,370**	**1,540**	**1,450**	**2,822**
0003003H	**Mixed lab packs with hazardous chemicals**	**1,376**	**1,186**	**4,748**	**4,385**
0004198H	**Bulk fixer waste, may contain silver or be reactive**	**4,640**	**7,030**	**15,170**	**7,655**
0007119H	Inorganic laboratory waste with oxidizing characteristic.	350	245	1,770	1,899
0010117H	**Mercury waste or mercury wastewater**	**2,430**	**1,840**	**2,728**	**848**
0016219H	Caustic (basic) liquids, flammable bases	870	735	1675	780
0017219H	Flammable acids	1,060	980	1,908	883
0021202H	Spent Halogenated Solvents	0	35	460	190
0022203H	**Spent non halogenated solvents**	**2,390**	**2,290**	**2,490**	**2,226**
0025207H	Aquatic organisms in organic solutions	575	230	290	839
0029310H	Waste Rags with Solvents	990	960	1,220	0
UNIV209H	**Paint waste (changed to universal status in 2004)*Universal waste is excluded from reporting in the Annual Waste Summary numbers.***	**9,100**	**9,511**	**11,775**	**5,416**
Total (lbs)	(not including Universal Waste)	18,641	17,931	35,461	23,658
Total (tons)		9	9	18	12

Note:

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

Table 3. Proposed Source Reduction/Waste Minimization Projects

Source Reduction Activity	Resulting Waste Eliminated or Reduced
1. 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. Volume reduction. Small onsite water treatment systems using coagulation and sedimentation will be explored.	• Universal Hazardous Waste paint rinse water with Cadmium. (UNIV209H) • Paint Rinse water (Class 1 and Class 2)
2. Segregate silver fixer waste and developer. Investigate silver recovery methods to recover silver and declassify fixer waste to Class 1 waste.	• Bulk fixer/photographic waste (0004198H)
3. Segregate acid wastes containing RCRA metals from non metal containing acid wastes. Neutralize non metal acid wastes to remove the hazardous waste characteristic of corrosivity and discharge to the sanitary sewer.	• Generic acids with metals (0002103H)
4. Product substitution in art department, and science labs.	• Generic acids with metals (0002103H) • Caustic/flammable liquids (0016219H) • Universal Paint wastewater containing cadmium (UNIV209H)
5. Implement a Chem Swap program to reuse commercial chemical products rather than discard them.	• Hazardous waste lab packs. (003003H)

Table 4. Schedule of Implementation and Measurable Goals

Source Reduction Activity	Schedule of Implementation
1. 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. Volume reduction of paint rinsewater. Small onsite water treatment systems using coagulation and sedimentation will be explored.	Assess during the first three quarters of calendar year 2010 and implement if feasible during calendar year 2011. Will need budget approval to purchase treatment system. System will need to pass discharge limits for our industrial waste water permit. May need a pretreatment permit from the City of San Marcos.
2. Segregate silver fixer waste and developer. Investigate silver recovery methods to recover silver and declassify fixer waste to Class 1 waste.	Segregation practices are already in place. Investigate and acquire demonstrations from vendors selling silver recovery units. Identify facilities that can take the recovered silver. Do these steps in the second year of the plan (2011) and if the technology is feasible and cost effective, implement during 2012.
3. Segregate acid wastes containing RCRA metals from non metal containing acid wastes. Neutralize non metal acid wastes to remove the hazardous waste characteristic of corrosivity and discharge to the sanitary sewer.	Segregation practices are already in place primarily in the Chemistry department. Maintain this system for the next 5 years by supplying the containers and labels for proper segregation of the acid waste streams and consistent disposal of the hazardous metal bearing acid wastes.
4. Product substitution in art department, and science labs.	Ongoing project for entire 5-year period. Utilize the Bobcatalog to approve or disapprove of chemicals that present high risk due to the hazard class of the chemical and/or the volume of the proposed purchase. Recommend alternate chemicals with lower risk to consider if possible.
5. Implement a Chem Swap program to use commercial chemical products rather than discard them.	Obtain the necessary storage cabinets for flammables and corrosives and determine the location of these cabinets (2011). Need funds for cabinets. Develop the Chem Swap program and put on the web site. Also determine the best way to update interested professors of products available. Have program implemented by 2012.

ATTACHMENT A

UTMB Environmental Protection Management

Neutralization & Proper Destruction

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 personnel 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

Last updated 3/24/03