Appendix I

Waste Analysis Plan

Waste Analysis Plan

Purpose
The purpose of this plan is to describe how wastes accepted at The University of Vermont and State Agricultural College's (UVM) Environmental Safety Facility (ESF) are identified, in order to safely manage them and arrange for proper final disposition. This plan assures compliance with applicable requirements found in 40 CFR 270.14(b)(2) and 264.13.

Introduction

All wastes accepted at the ESF go through an approval process based predominantly on "generator knowledge." The ESF primarily accepts waste from UVM, and its tenants and affiliates (referred to as "University personnel" or "UVM personnel" hereafter). UVM can also accept waste at the ESF from the generators not affiliated with the University that are listed in Appendix D. Procedures for waste analysis vary depending on whether the waste is generated by University personnel or not.

Waste Analysis Procedures for Wastes from UVM Personnel

The University of Vermont assumes generator status of all wastes from the activities of University personnel at the point of generation. The main activities generating UVM wastes are laboratory activities (teaching/research), on-going campus maintenance, and one-time facility projects.

Laboratory Waste
The majority of wastes accepted at the ESF are generated in UVM's research and teaching labs. These "laboratory wastes" consist of small containers (usually less than 4 liters) filled or partially filled with different types of laboratory chemicals. A substantial percentage of the University's laboratory waste is composed of surplus or excess unused chemicals still in the original containers with manufacturer labels describing the chemical constituents and their relative concentrations. Other laboratory wastes are typically mixtures of known materials generated as byproducts from activities performed by, or under the supervision of, qualified laboratory personnel. Occasionally, due to laboratory closures and errors in labeling or marking, some laboratory wastes are considered "unknowns." Procedures for managing and screening unknowns are outlined later in this Appendix (see "Procedures for Unknown Wastes"). A small portion of laboratory wastes are collected in containers greater than 5 gallons.

Facilities Waste (on-going maintenance and one-time projects)
UVM generates wastes from facilities maintenance and construction activities. Examples of facility wastes include, but are not limited to, oily debris, paint related materials and lead paint debris. UVM also generates used oil and universal wastes such as spent batteries, florescent lamps, mercury-containing devices, ballasts, and cathode ray tubes.

Waste Identification
ESF personnel typically rely upon the knowledge of the person creating a waste, not on laboratory analysis, to identify the hazardous constituents and/or characteristics of the waste (i.e., "generator knowledge"). The University personnel who control the processes and experiments

generating laboratory and facility wastes generally know, and can provide supporting documentation of, the chemical components used.

University personnel identify and communicate chemical constituent information to ESF personnel by filling out a waste tag for each container of waste generated. Waste tags include contact information, general waste information (i.e., physical state and quantity/amount) and the chemical constituents or appropriate waste profile. Waste profiles are used in cases where certain waste streams are frequently generated. The waste profiles are generated by ESF personnel, based on disposal and shipping requirements. Laboratories are only allowed to use these profiles if the wastes generated match the constituents and characteristics provided in the profile or contain only constituents that are chemically and reactively similar.

Each waste tag, with its unique identification number, is entered into an on-line tracking system, along with the waste-specific information provided on the tag.

The generator knowledge provided to the ESF by UVM personnel has been excellent since the ESF began accepting waste in 1994. ESF personnel routinely communicate the importance of accurate generator knowledge and proper waste identification procedures to University personnel using the following methods:

- Regular classroom training provided by ESF personnel
- Regular ESF inspections/audits of laboratories and other UVM waste-generating activities
- On-line training and reference material available to all University personnel
- Printed reference material available to all University personnel
- Frequent interaction between ESF personnel and University personnel

UVM's waste management system provides no incentives for University personnel to mismanage waste or withhold information from ESF personnel.

Commercial TSDFs that accept waste from un-affiliated off-site generators cannot rely solely on "generator knowledge" for hazardous waste identification information because those generators may: 1) have a financial incentive to "downplay" the hazardous nature of a waste; 2) rely on TSDF representatives or a third party to complete waste profile information based on limited process and/or waste constituent information; 3) have a poor understanding of applicable state/federal hazardous waste regulations. Since UVM already owns its waste, UVM personnel do not have a financial incentive to improperly describe waste being sent to the ESF. In addition, ESF personnel are familiar with most waste generating processes conducted by UVM personnel and can follow-up immediately with the individuals responsible for generating waste to resolve waste identification questions.

Waste Pickup and Verification

Once waste is ready for removal by the generator, the generator submits an online request for waste pickup. Once the request is received, ESF personnel collect tagged waste from UVM campus locations. As wastes are collected, ESF personnel inspect the waste containers and their contents to verify that the wastes visually conform to the information on the tag. Wastes that do not visually conform to the expected waste in the container undergo additional review with the

generator. ESF personnel will attempt to resolve the discrepancy by communicating with University personnel at the time of the waste pickup. If the discrepancy is resolved, the information is corrected on the tag and in the database, and the waste is accepted.

If the ESF personnel cannot visually verify a waste at the time of pickup and no University personnel are present, the container will be left under the control of the person or group that generated the waste, until sufficient information can be gathered. When campus safety or security is of concern, main campus wastes may be moved to the short-term storage area until sufficient information can be gathered.

If sufficient waste information is not available and cannot be obtained, ESF personnel will follow the procedures for managing and screening unknowns outlined later in this Appendix (see "Procedures for Unknown Wastes").

In addition to visually inspecting waste, ESF personnel regularly field test liquid wastes to verify the pH and oxidation potential. These tests are performed at the time of pickup or upon arrival at the short-term storage area, and results are compared to the waste tag information and recorded on the physical tag attached to the chemical container. Any discrepancy between tag information and field verification results in a communication between ESF personnel and the person or group who generated the waste.

In any instance where waste is non-conforming or is not managed appropriately, ESF personnel communicate with the person or group who submitted the tag information, investigate the waste identification procedures used, and re-emphasize the importance of proper waste identification and management. When ESF personnel observe repeated instances of incorrect or inadequate tag information, they will address this performance issue with the generator and supervisor(s), as appropriate. If the problems are not resolved, they will be handled through the oversight procedure in UVM's Environmental Management Plan.

Short-term Storage Operations and Waste Verification

ESF personnel operate the UVM on-campus short-term storage area. The primary function of the short-term storage area is to receive wastes from main campus locations, evaluate tag and label information for the purpose of making hazardous waste determinations, and provide short-term storage prior to transfer to the ESF.

In most cases, wastes generated from on-campus activities are transported to the campus short-term storage area. Once received, waste containers are segregated into compatible groups, labeled and, if appropriate, marked with applicable EPA and Vermont hazardous waste codes.

When waste is not generated on main campus, ESF personnel accept wastes and transport them directly to the ESF, instead of the short-term storage area. The same waste labeling/tagging and waste verification/determination procedures apply for wastes not generated on main campus.

ESF Operations and Waste Verification
Prior to accepting wastes at the ESF, ESF personnel have verified that the wastes conform to tag and label information and have determined if the wastes are hazardous according to the procedures described above.

At the ESF, many wastes are consolidated, or "bulked," with other compatible wastes into larger containers. Prior to bulking any waste, ESF personnel re-examine waste tag information to ensure that all wastes to be bulked are compatible with each other and the container. After reviewing the tag information, a small amount of each waste to be bulked is poured into a bucket to further ensure waste/container compatibility. Throughout this process, any discrepancy noted results in a review of relevant tag and process information related to the waste to determine where the error in identification occurred. Additional follow up is provided to the generators, as necessary.

End Disposal Verification
ESF personnel prepare hazardous waste profiles for all hazardous wastes prior to shipping them to commercial end disposal facilities. Those disposal facilities are required to perform waste analysis on UVM wastes, according to their TSDF permit procedures. If they inform UVM of a discrepancy, ESF personnel review relevant tag and process information related to the waste to determine where the error in identification occurred. A communication from ESF to the person or group who made the error will re-emphasize the importance of proper waste identification.

Waste Analysis Procedures for Wastes from Generators Not Affiliated with UVM

In order to assist local governments in managing household waste and waste from very small quantity generators in their communities, the ESF allows several generators to ship hazardous waste to the ESF. Refer to Appendix D for a complete listing of accepted source generators. While UVM is required to be available to accept these wastes, they are typically managed by the local solid waste district. The following procedures are designed for those situations when UVM accepts wastes from generators not affiliated with UVM.

Non-UVM generators must complete a Waste Profile (Attachment I-1) and submit this to the ESF for approval. ESF personnel will approve or reject the waste based on information provided in the profile as well as any additional information that may be necessary to properly identify the waste (sample, SDS, etc.). Only approved wastes can be shipped to the ESF. ESF personnel maintain the right to reject hazardous wastes from off-site generators at any time.

Wastes received at the ESF from off-site generators are transported by a Vermont-certified hazardous waste transporter and must be accompanied by a uniform hazardous waste manifest or, if appropriate, a standard bill of lading. If applicable, completed Land Disposal Restriction notifications must also be provided. In all cases, the off-site generator's EPA ID# must be included on the shipping document.

To ensure quality control, every non-labpack container received at the ESF from "Non-UVM" generators will be visually inspected to verify the information on the waste profile and checked

for pH and oxidation potential. One of every ten non-labpack containers will be randomly sampled for analysis by an independent, NELAP certified laboratory to verify profile information. Results of the analysis will be compared to the approved Waste Profile. If the analysis results differ from the profile, ESF will work with the generator to resolve the discrepancy. Additional wastes from the shipment may be sampled and analyzed. If obvious discrepancies remain, ESF may return all hazardous wastes from the shipment to that generator.

Procedures for Characterizing Unknown Wastes

Wastes will be classified and tagged as "unknowns" when generator knowledge is insufficient for purposes of making a hazardous waste determination. ESF personnel or a contracted waste management firm will screen unknowns prior to shipping the wastes. In addition to screening unknown wastes, samples of the wastes may be taken for further testing and analysis. Characterized unknowns will be lab packed and sent for disposal.

Screening does not always specifically identify the unknown material being tested, but is used to accomplish the following three objectives:

1.) Determine the compatibility of unknown materials to safely labpack or consolidate them.
2.) Determine any dangerous properties of a material to ensure safe transportation and storage.
3.) Determine if the material exhibits any hazardous waste characteristics to ensure proper disposal.

Materials believed to be reactive or contain unstable peroxides produced by the decomposition of organic solvents will not be screened. These will be individually packed, handled, stored, and managed as reactive wastes as described in the container management plan (Appendix E).

Screening Methods for Characterization of Unknown Wastes
The following analytical parameters and test methods may be used for wastes stream identification on unknown wastes prior to shipment to the ESF:

- Physical description - including liquid - solid - sludge content, water layer, color, and viscosity - an inspection of the general wastestream is used to determine its suitability for consolidation and consistency with tag and label information.
- pH - used to determine the corrosivity of the waste by using a pH indicator strip which measures waste stream as a strong acid, moderately acidic, weak acid, neutral, moderately basic, or a strong base.
- Oxidizer screen - used to determine if the waste is an oxidizer having the potential to react with a wide range of waste streams. The test method uses a potassium iodide-starch, or equivalent, indicator strip that turns color if the waste is an oxidizer.
- Reactive Cyanides - used to determine if the waste would produce hydrogen cyanide if mixed with a strong acid by using a hydrogen cyanide indicator strip and reagents.
- Reactive Sulfides - used to determine if the waste would produce hydrogen sulfide if mixed with a strong acid by using a hydrogen sulfide indicator strip and reagents.
- Water reactivity - used to determine whether the waste has the potential to react with water to generate heat, flammable gases, or other products. Water reactivity is determined by adding approximately 3 mls of water to 1/10 ml of liquid or 1/10 gm of solid. If there is gas evolution or a significant rise in temperature the test is considered positive.
- Peroxides - used to determine if the waste contains explosive peroxides. If there are crystalline solids on or in a container that is suspected to contain a peroxide-forming compound, the container will not be opened, and the peroxide test will be assumed positive. The test uses peroxide indicator strips.

- Ignitability - used to indicate the fire-producing potential of the waste and determines whether the waste is RCRA ignitable. A closed crucible ignitability screening test may be used. A closed cup flash test is used to determine the flash point of wastes if necessary.
- Specific gravity - used in conjunction with other test data to determine whether the waste conforms to generator supplied data. A hydrometer is used to determine specific gravity.
- Lead - used to indicate whether the waste is RCRA hazardous due to lead toxicity by using a colorimetric strip and an acetic acid reagent.
- Chlorine - used to indicate if the waste is chlorinated. This information is used to determine disposal options. The test uses either colorimetric test strips or flame color.
- Organic solvents - used to indicate if the waste contains organic solvents. This information is used to determine disposal options. This test uses colorimetric test strips.
- Arsenic - used to indicate whether the waste is RCRA hazardous due to arsenic toxicity by using colorimetric strips.
- Compatibility - used to verify compatibility of liquid or sludge waste prior to commingling with other wastes. A representative sample of the waste to be consolidated is mixed with a representative sample of the wastes with which it will be commingled. If any reactions are observed, the wastes are considered incompatible and will not be commingled.

Results from the screening of unknowns are recorded on a characterization sheet and attached to the hazardous waste manifest.

Attachment I-1

Waste Profile

The UNIVERSITY of VERMONT
University of Vermont - Environmental Safety Facility
667 Spear Street, UVM-ESF, Burlington, VT 05405
Tel: 802-656-0767

ESF USE ONLY
Approved Profile # _____
Management Code: _____
Date: _____
Approved by:

Waste Profile for Non-UVM Generators of Hazardous Waste

Generator type (Check One)
☐ City of Burlington VSQG
☐ Chittenden Solid Waste District
☐ Primary/Secondary School

1. Generator Information

Name: _____

U.S. EPA ID #: _____

Site Address: _____

Mailing Address: _____

Contact Name: _____ Phone #: _____

2. Waste Description

Common Name of Waste:
_____
_____

Process Generating Waste:
_____
_____
_____

Source of Waste (check one)
☐ Unused chemical
☐ Process waste by-product
☐ Spill clean-up
☐ Lab pack
☐ Other: _____

Form Code: _____
Source Code: _____

Waste Composition SDS attached? ☐ Yes ☐ No

Chemical Name	Concentration	Units	CAS#

Metals (☐ Total, ☐ TCLP)
Arsenic: _____
Barium: _____
Cadmium: _____
Chromium: _____
Lead: _____
Mercury: _____
Selenium: _____
Silver: _____

Air Reactive	☐
Asbestos	☐
CFC	☐
Dioxins	☐
Explosive	☐
Gas	☐
Halogens	☐
Infectious	☐
PCB	☐
Strong odor	☐
Water Reactive	☐

3. Physical Properties (at 25°C or 77°F)

Physical State:
☐ Solid
☐ Liquid
☐ Semi-solid (pumpable? Y/N)
☐ Gas
Number of Phases:
☐ 1 ☐ 2 ☐ 3
%: Top ___ Mid ___ Bot ___

Viscosity:
☐ low (water)
☐ med (oil)
☐ high (molasses)
Specific Gravity:
☐ < 1
☐ 1
☐ >1

Flash Point:
☐ <100°F
☐ 100 – 140°F
☐ >140°F
Boiling Point: ☐ <100°F ☐ >100°F
pH: _____

4. Manifest Information

Is this a DOT Hazardous Material? ☐ Yes ☐ No
Proper DOT Shipping Name: _____
Hazard Class: _____ ID number: _____ PG: _____ RQ: _____
EPA Waste Code(s): _____

5. Generator Assurance

I certify that the information provided regarding this hazardous waste, including this profile, any sample submitted or additional conversations is accurate.
This information is based upon ☐ **Process knowledge** ☐ **Waste analysis** (check one).

_____
Signature Printed name Date