Appendix E

Process Information and Container Management Plan

Process Information and Container Management Plan

Receiving Containers of Waste at the ESF

Wastes shipped to the University of Vermont and State Agricultural College's (UVM) Environmental Safety Facility (ESF) are accompanied by a hazardous waste manifest (manifest) or a standard bill of lading (BOL). As the ESF is a permitted captive hazardous waste storage facility for UVM and performs no disposal operations, Land Disposal Restriction notifications do not accompany shipments from UVM personnel. Land Disposal Restriction notifications are required for hazardous wastes shipped from non-UVM generators. Wastes are transported in appropriate containers (see Appendix E4 for a list of container compatibilities) to the ESF from the University in a hazardous waste permitted vehicle. The waste containers are unloaded from the truck into the building at the loading dock using the hydraulic dock leveler, if necessary. The waste containers are moved into the waste storage rooms after being unloaded from the truck.

Hazardous and Non-hazardous Labeling and Inventory

ESF uses a waste inventory and tracking system to communicate:

- waste information as described in Appendix I: Waste Analysis Plan,
- inventory, tracking, and labeling of waste containers, and
- tracking of waste during consolidation and repackaging, as described in this Appendix.

Individual waste container information is entered into an online waste database. This information follows the waste from the point of generation on UVM's campuses through the waste management process to the ESF. Non-UVM waste accepted at ESF is entered into the online database upon arrival at the ESF.

Upon receiving hazardous and non-hazardous wastes, ESF personnel input container information into the waste database, and container labels are printed. These labels include generator information, container identification, and waste information. Printed labels are affixed to the containers to replace the labels affixed to the container upon receipt. ESF personnel verify the new label is consistent with the original label. All container labels meet the container markings required in VHWMR § 7-311(f). Each container is issued a unique container number, which is used for waste tracking and inventory purposes.

The database can produce a complete inventory of all wastes stored in any room at the ESF. ESF personnel check the physical inventory in accordance with the Inspection Plan (Appendix J). For each container the waste database can report its location in the ESF, content information as reported in the online system, and the ESF arrival date.

Non-hazardous wastes are managed in the same manner as hazardous waste except that the label states "Non-Hazardous Waste."

Florescent Lamp Labeling and Inventory

Upon receiving spent florescent lamps at the ESF, personnel count and repack the bulbs into similar types. Due to the variability in frequency and volume, lamps awaiting repack may be temporarily stored in Room 109 of the facility. Lamps are counted and packaged in cardboard containers. When a new container is started, it is labeled with a "Universal Waste Lamps" sticker. When the containers are full, the box is sealed with packing tape to prevent unintentional opening during transport. Each time lamps are added, the paper inventory is updated. The inventory is kept on the door of the storage room and contains information regarding the type of lamp, type of container and number of containers currently in storage. Both the inventory and the container label have storage dates recorded on them to ensure no container is stored longer than one year.

ESF Operations: Consolidate, Repack, and Treat

To mitigate costs and facilitate disposal, ESF personnel consolidate, repack, and treat hazardous and non-hazardous wastes at the ESF. Details are these processes are described below.

Waste Consolidation - Labeling and Inventory

At the ESF, some wastes are consolidated, according to their chemical compatibility, to help reduce waste costs and facilitate disposal. New containers used for consolidation are entered into the online waste database with a unique container number and properly labeled. Wastes that are consolidated are tracked into the new container using the online waste database. Containers that are emptied through the process of consolidation are removed from the inventory, but the tracking history remains available in the online waste database.

When waste consolidation is complete, containers are transported to their appropriate storage room and a complete container inventory is generated.

Repackaging of Lab Packs – Labeling and Inventory

At the ESF, lab packs may be repackaged to meet the requirements of regulations or end disposal facilities, and to lower costs. If a new lab pack container is entered into the online waste database, a new label is printed, that includes a unique container number, and is affixed to the container. Lab packed wastes are tracked into the new container using the online waste database. Containers that are emptied through the process of repackaging are removed from the inventory, but the tracking history remains available in the online waste database.

When waste repacking is complete, containers are transported to their appropriate storage room and a complete container inventory is generated.

Treatment – Methods, Labeling, and Inventory

At the ESF wastes may be treated in the following way: 1) compaction for consolidation; 2) puncturing aerosol cans; 3) gases captured or liquefied, and 4) stabilization of reactive compounds. The following are procedures for each of these methods.

Compaction for Consolidation

ESF personnel compact waste to minimize its total volume saving raw materials (drums, liners etc.), energy and lowering disposal costs. Some examples of wastes that are compacted include:

- plastic contaminated with lead paint chips,
- empty waste containers, and
- paper towels containing trace amounts of mineral spirits.

Compaction is performed using the hydraulic crusher located in Room 109, the mixing room. Wastes are compacted and consolidated into a new container. Procedures for labeling and inventorying the waste containers is the same as listed in the "Consolidation – Labeling and Inventory" section of this Appendix.

Puncturing Aerosol Cans

ESF personnel who puncture aerosol cans follow a written procedure detailing how to safely puncture and drain aerosol cans. This includes the proper assembly, operation, and maintenance of the unit, segregation of incompatible wastes, and proper waste management practices to prevent fires or releases.

All puncturing and draining activities utilize a device specifically designed to safely puncture aerosol cans and effectively contain the residual contents and any emissions thereof. The emptied aerosol cans are sent for metal reclamation. The captured contents are labeled and inventoried following the same procedures as those listed in the "Consolidation – Labeling and Inventory" section of this Appendix.

Not all waste aerosols cans are punctured. Some are collected and managed as universal waste. This determination is made based on the contents and classification of the aerosol cans.

Management of Compressed Gas Cylinders

Cylinders containing unwanted and unused gases and liquefied compressed gases are occasionally generated as a result of teaching and research activities. Prior to off-site disposal, it is sometimes prudent to transfer these compressed gases from the cylinders into containers of compatible liquid solvents or into filters (e.g., carbon filter).

The recontainerization of the compressed gas is performed by specialists who are trained to handle cylinders and chemicals; these specialists may include outside contractors. Prior to conducting this treatment activity, notice will be provided to the Secretary that meets the information requirements of "The Treatment of Hazardous Waste in Containers or Tanks by Generators," VHWMR 7-502(o), and a site-specific health and safety plan will be developed.

Stabilization of Reactive Compounds

Reactive wastes such as unstable peroxide formers and nitro-compounds should be stable prior to being received at the ESF. However, in the case where stabilization is required prior to shipment off-site, compounds will be stabilized by means of remote or safe opening and then wetting with water or appropriate solvent at the ESF. This stabilization process will be performed with all appropriate safety measures in place and specialized contractors trained to stabilize reactive materials will be utilized, as appropriate. Prior to conducting this treatment activity, notice will be provided to the Secretary and a site specific health and safety plan will be developed.

Movement and Storage of Waste Containers within the ESF

Upon receipt at the ESF, all waste containers are moved to storage rooms, based on compatibility.

All hazardous, non-hazardous, and universal wastes at the ESF are stored in appropriate containers (see Attachment E-4) that maintain structural integrity and are compatible with the contents of the container.

All containers are kept closed during storage except when necessary to add or remove waste (e.g., consolidation). Containers holding waste will not be opened, handled, or stored in a manner that may rupture the container or cause it to leak. Containers will be placed in storage areas in such a way that at least 24 inches of aisle space will be maintained.

Containers may be stacked no higher than the equivalent height of two stacked 55-gallon drums. Stacking will only take place as long as the containers are stable, the integrity of the containers is not impaired, the appropriate markings are visible for inspection, and the required aisle space is maintained.

Containers of hazardous wastes are transported throughout the ESF on drum carts, flat bed carts, service carts with shelf sides, or other appropriate means.

Reactive wastes (air reactive, water reactive, high-energy compounds, etc.) are stored in their original containers and lab packed or overpacked into appropriate DOT-rated containers. Most of these containers are stored in the Reactives Storage Building; air-reactive materials that are packed in water may be stored in the main ESF building to prevent the water from freezing. No more than eight (8), 55-gallon drums or the equivalent of reactive and water-reactive wastes will be stored in the Reactives Storage Building. The maximum manufacturer's suggested capacity for this building is twelve (12), 55-gallon drums.

Transport to Off-Site TSDFs

All hazardous waste removed from the ESF will be transported to permitted TSD facilities. Hazardous wastes leaving the ESF for off-site treatment, storage, and disposal may be staged within the workroom prior to shipment. Staging in the corridor is allowed for no more than 24

hours. Drums and containers are staged according to the line items on the manifest or according to the destination site's accepted waste information profiles.

All hazardous wastes transported from the ESF will be packaged in accordance with DOT regulations as set forth in 49 CFR §172 and §173. Containers are loaded onto vehicles destined for off-site treatment, storage, or disposal with the aid of the hydraulic loading dock leveler, located at the end of the truck bay. All hazardous waste shipped from the ESF will be transported by Vermont permitted hazardous waste haulers in vehicles permitted for hazardous waste hauling.

Wastes in Storage for Longer than 1-Year

Under 40 CFR §268.50, the ESF is allowed to store hazardous wastes for up to one year. In some instances, storage beyond one year is necessary for the purpose of accumulating such quantities of hazardous waste to facilitate proper recovery, treatment, or disposal. ESF personnel document all containers of waste that are stored at the ESF for more than one year. Such documentation will include the reason for storage of the waste as well as the intended fate of the container. Examples of this documentation are listed in Attachment E-2 of this Appendix; additional documentation letters may be created as needed.

Personal Protective Equipment

ESF personnel wear appropriate levels of personal protective equipment (PPE) to control the risks associated with handling hazardous materials. Attachment E-1 includes a list of the PPE associated with specific ESF operations.

Prevention of Hazardous Release to the Environment

Precautions to Prevent Accidental Ignition or Reaction of Ignitable, Reactive, or Incompatible Wastes

The UVM Environmental Safety Facility has the following precautions in place to prevent accidental ignition or reaction of ignitable, reactive, or incompatible wastes:

- Only compatible materials are stored together in each of the waste storage rooms.
- All lights, switches, fans, and other electrical devices in the areas where hazardous wastes are stored are intrinsically safe to guard against fire or explosion caused by sparks.
- There are separate ventilation systems for the East and the West waste storage rooms.
- Each room is ventilated above and below the floor grate to prevent a buildup of fumes.
- The storage areas are constructed of 2-hour fire rated concrete block with 1½-hour fire rated doors to meet the building code requirements for Type H (Hazardous) Occupancy rating of this building.
- The facility is protected by a wet sprinkler system connected to the Champlain Water District water main. The alarm systems are supervised 24 hours a day by the University's Physical Plant and Police Services Departments at a central monitoring station on the main campus.

- Water-reactive and air-reactive wastes are stored in a separate, appropriately labeled, building designed for reactive storage.
- Drums of bulk ignitable wastes are grounded during consolidation at the pouring station and in the storage rooms.
- Before co-mingling, samples of the wastes to be co-mingled are combined in a smaller container at the pouring station to ensure that the wastes are compatible.
- Non-ferrous, spark-proof tools are used when appropriate.
- The facility has ABC fire extinguishers accessible throughout the building as well as a Class D extinguisher for use on flammable metal fires.
- Smoking is not allowed anywhere within the facility fence line. "No smoking" signs are prominently displayed throughout the facility, including exterior doors to waste storage areas.
- All ESF personnel are trained in the appropriate emergency response procedures and there is an emergency response drill conducted annually as part of the emergency response training refresher course.
- Daily inspections reduce the likelihood of a potentially dangerous incident developing. Any noted deficiencies to any of the emergency and fire protection equipment discovered during the daily inspections are corrected as soon as possible.
- UVM Police Services regularly patrol the area during nights, weekends, and holidays.

Secondary Containment System Design and Operation

The waste storage rooms are designed and operated to provide the secondary containment system at the ESF; design specifications for each room are found in Attachment E-3 of this Appendix. The floor of each room is constructed of a removable, epoxy-coated fiberglass grate that allows any spilled material to fall into a ventilated sump area. Each sump measures approximately 21.5 feet by 8.5 feet (same footprint as the storage room) by 2 feet in depth.

1. The floor and walls of each sump are constructed of epoxy-coated concrete and the joints are filled with non-shrink grout. This creates a base that underlies the containers which is free of cracks or gaps and is sufficiently impervious to contain leaks and spills until the collected material is detected and removed. Appendix J (Inspection Plan) contains an inspection plan to ensure that the sump areas are free of visible cracks and gaps.
2. The floor of each sump is sloped to the center of the sump/room. The removable, epoxy-coated fiberglass grate elevates the waste containers approximately 2 feet above the base, protecting them from contact with accumulated liquids.
3. The capacity of the sump in each room is equal to the volume of all the drums (20 x 55 gallons =1,100 gallons) plus 20 minutes of fire sprinkler flow. The containment system has sufficient capacity to contain 10% of the volume of containers that could be stored in the room. Furthermore, the threshold at the emergency exit door of each room is 8 inches higher than the door into the hallway; in the event of a catastrophic release, the materials would overflow into the building instead of to the exterior.
4. The roof and walls of the ESF prevent run-on into the containment system.
5. The removable floor grates allow for timely removal of spilled or leaked waste from the sump/containment area as necessary to prevent overflow of the collection system.

A containment sump is located below the loading dock leveler in the truck bay to contain a spill within the building should occur at this transfer point. The control valve for the containment sump is maintained in a closed position.

The Reactives Storage Building contains a 6-inch deep sump area located below the grated floor with capacity to store 250 gallons of material below the floor level at which waste is stored. In addition, all reactive hazardous wastes stored in this building are in individual containers that are lab packed or over-packed into appropriate DOT-rated shipping containers that serve as secondary containment.

In accordance with 40 CFR§264.15, a written schedule for inspecting equipment and devices that are important to preventing, detecting, or responding to environmental or human health hazards is included in Appendix J.

Leaking Containers

If a container is found to be leaking, the contents of the container will be transferred into an appropriate container, or the leaking container will be overpacked into an appropriate overpack container. Any material that has leaked will be absorbed using an appropriate absorbent material (e.g., Speedi-Dri, absorbent pads, etc.). Hazardous waste spill debris will be placed in appropriate containers, sealed, labeled, stored in an appropriate storage room, and ultimately transported off site to a certified TSDF.

Control of Stormwater

The ESF is elevated above the surrounding area and enclosed by a drainage ditch that leads to a water retention pond to prevent run-on from outside the facility and run-off from within the facility. There is a subsurface drainage system outside along the north side of the building adjacent to the waste storage rooms to divert rain and snow water away from the facility.

Removal of Accumulated Liquids from Containment System

Any liquids, from spills, leaks, etc., which accumulate within the ESF, will be removed immediately upon detection as soon as possible through standard spill response practices. The ventilated sump areas in each waste storage room are easily accessible by removing the epoxy coated grated floors. All spill and cleanup materials that are removed from the sumps will be assumed to be hazardous waste and managed accordingly. Materials from a known waste container will be disposed of according to requirements and standards necessary for that waste type. Materials from an unknown source will be containerized and handled as an unknown waste (Appendix I).

The truck bay is designed to drain to the containment sump where spilled materials could be pumped out of the building. The control valve for the truck bay containment sump is maintained in the closed position and opened only for the following non-emergency uses:

- Snowmelt from vehicles in the truck bay is drained into the retention pond via the containment sump.
- City water generated from flushing safety showers and eye wash stations may be discharged into the drain leading to the containment sump and released into the retention pond. This material also may be discharged into the sanitary sewer system.
- City water used to hose down ordinary dirt and grit from the truck bay floor is discharged into the drain leading to the containment sump and into the retention pond.

The retention pond is equipped with a manual release valve that is maintained in a closed position. When necessary, ESF personnel open the valve to drain the pond to control mosquitoes and drain excess water. After draining, the pond valve is returned to the closed position. The pond valve is inspected weekly.

Attachment E-1

Personal Protective Equipment
Minimum Requirements

University of Vermont Environmental Safety Facility
Personal Protective Equipment Minimum Requirements

Task	PPE Level	Body Protection	Eye/Face Protection	Respiratory Protection	Foot Protection	Hand Protection	Head Protection	Hearing Protection
Delivering Chemicals	D	Work Uniform*	Safety Glasses	None	ANSI or ASTM-approved footwear	Nitrile gloves	None	None
Collecting Chemical Waste	D	Work Uniform	Safety Glasses	None	ANSI or ASTM-approved footwear	Nitrile gloves	None	None
Bulking Chemicals (Pourer and Assistant)	C	Tychem Coveralls (or equivalent)	Full-face cartridge respirator		ANSI or ASTM-approved footwear	Inner: Nitrile gloves; Outer: Neoprene (or other compatible) gloves	None	None
Lab-Packing	D	Work Uniform	Safety Glasses	None	ANSI or ASTM-approved footwear	Nitrile gloves	None	None
ESF Inspections	N/A	none	Safety Glasses	None	Closed-toe shoes	None	None	None
Lab Visits	N/A	none	Safety Glasses	None	Closed-toe shoes	None	None	None
Biowaste handling	D	Work Uniform	Safety Glasses	None	ANSI or ASTM-approved footwear	Nitrile gloves	None	None
Moving Drums	D	Work Uniform	none	None	ANSI or ASTM-approved footwear	Leather/Cotton gloves	None	None
Performing Lab Tests	D	Work Uniform	Safety Glasses	None	ANSI or ASTM-approved footwear	Nitrile gloves	None	None
Outdoor work	D	Work Uniform	Safety Glasses	None	ANSI or ASTM-approved footwear	Leather/Cotton gloves	Hard Hat, if necessary	As needed
Spill Clean-up	C - D	To be determined by emergency coordinator on-site						

*"Work Uniform" includes UVM issued 100% cotton shirts and 100% cotton pants or UVM issued lab coat.

These recommendations are made based on hazard assessments reviewed by the ESF staff April 2022.

Attachment E-2

Storage Documentation

The University of Vermont
Environmental Safety Facility
667 Spear Street
Burlington, VT 05405
802-656-0767

Storage Documentation

Drum #: XXXXX

Date when drum was first stored at ESF: xx/xx/xx

Contents of Drum: _____<No U.S. Disposal Option>_____

Comments:

There are no permitted disposal outlets in the United States that can manage this material in a cost effective and environmentally acceptable manner. When a cost-effective, legal and acceptable disposal outlet is identified, this drum will be closed out and transported on the next available shipment, which can handle this type of waste in accordance with all regulations and end disposal requirements, for proper recovery, treatment or disposal.

_____ _____
Environmental Compliance Manager Date

The University of Vermont
Environmental Safety Facility
667 Spear Street
Burlington, VT 05405
802/656-0767

Storage Documentation

Drum #: XXXXX

Date when drum was first stored at ESF: xx/xx/xx

Contents of Drum: _____<Drum Not full>_____

Comments:

This drum is not full, and due to the costs associated with proper handling of the hazardous waste, continued storage is necessary until the drum is full to facilitate proper recovery, treatment or disposal.

Once filled, the drum will be transported on the next available shipment, which can handle this type of waste in accordance with all regulations and end disposal requirements, for proper recovery, treatment or disposal.

_____ _____
Environmental Compliance Manager Date

The University of Vermont
Environmental Safety Facility
667 Spear Street
Burlington, VT 05405
802/656-0767

Storage Documentation

Drum #: XXXXX

Date when drum was first stored at ESF: xx/xx/xx

Contents of Drum: ____<Drum not filled within one year>_____

Comments:

This drum was not full within one year of its storage date, and due to the costs associated with proper handling of the hazardous waste, continued storage was necessary until the drum became full to facilitate proper recovery, treatment or disposal.

This drum became full on XX/XX/XX and will be transported on the next available shipment, which can handle this type of waste in accordance with all regulations and end disposal requirements, for proper recovery, treatment or disposal.

_____ _____

Environmental Compliance Manager Date

The University of Vermont
Environmental Safety Facility
667 Spear Street
Burlington, VT 05405
802/656-0767

Storage Documentation

Drum #: XXXXX

Date when drum was first stored at ESF: xx/xx/xx

Contents of Drum: _____<cylinders>_____

Comments:

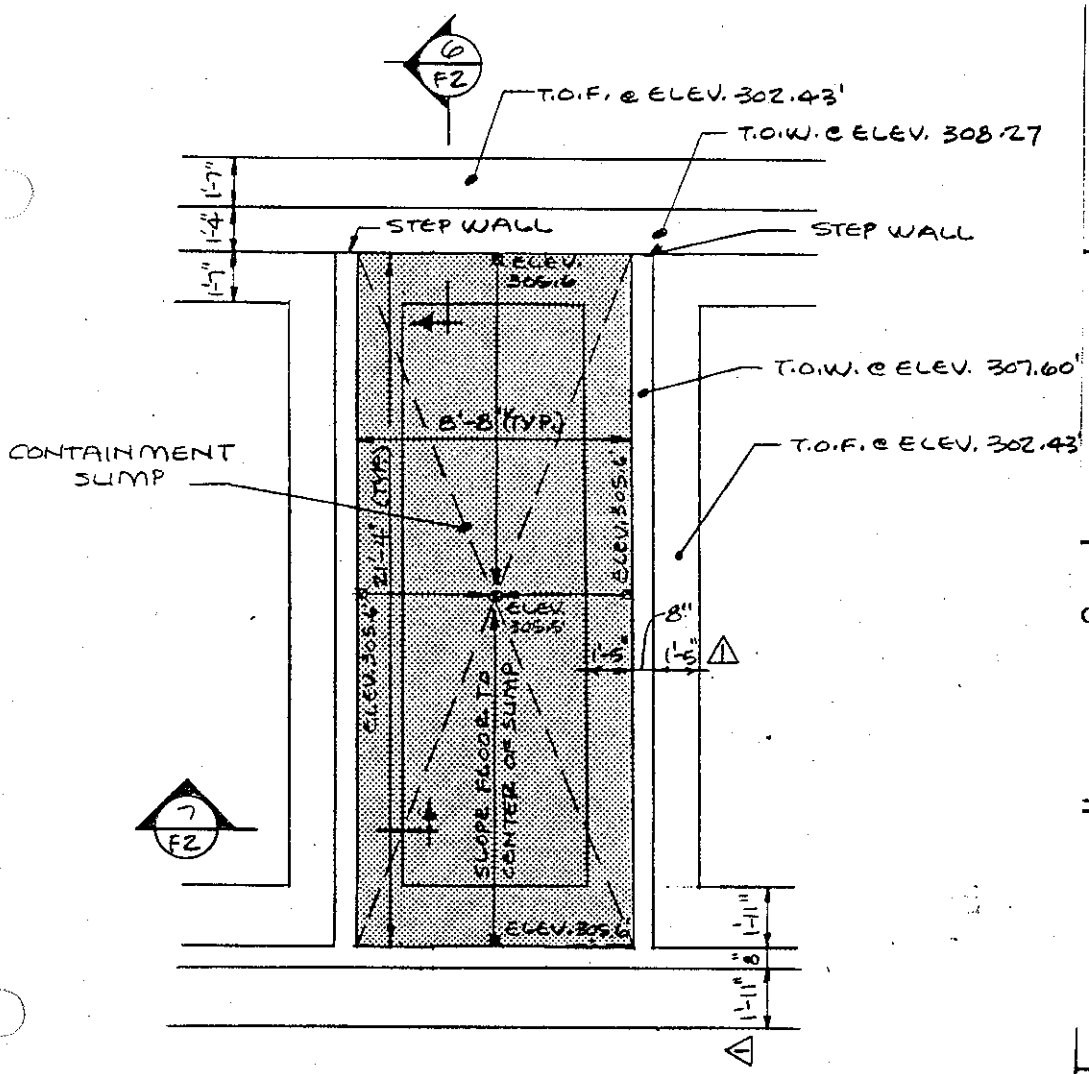
Due to the costs associated with proper handling of compressed gas cylinders containing hazardous materials, continued storage is necessary to accumulate quantities sufficient to facilitate proper recovery, treatment or disposal; specifically hiring a qualified contractor to download these cylinders into an appropriate solvent.

When sufficient amounts of this material have been accumulated, treatment and disposal will be scheduled at the next available opportunity to handle this type of waste in accordance with all regulations and end disposal requirements, for proper recovery, treatment or disposal.

_____ _____
Environmental Compliance Manager Date

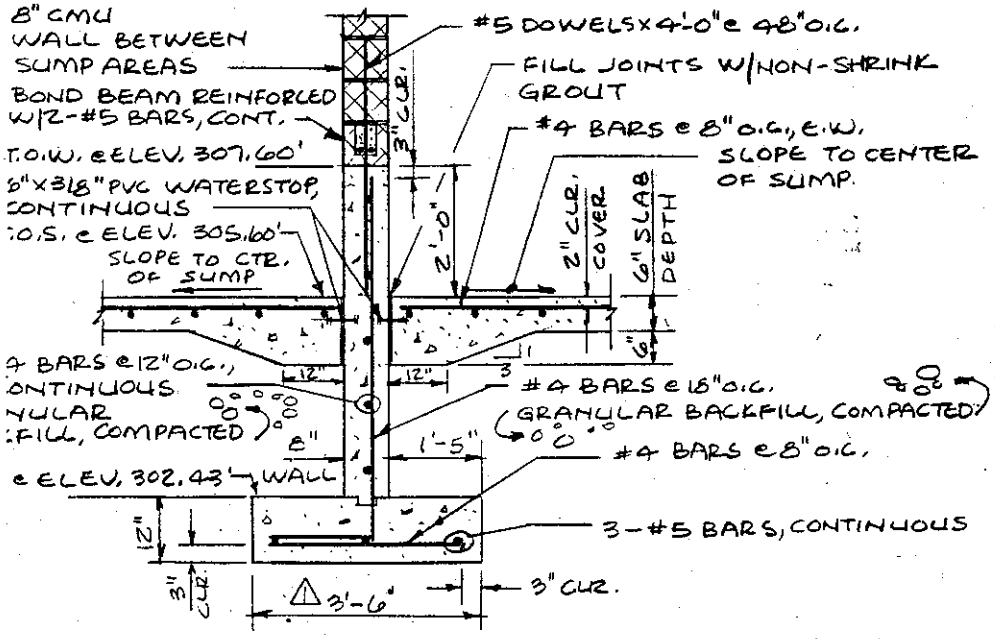
Attachment E-3

Sump Area Construction Plans



⚠1 (5) TYPICAL CONTAINMENT SUMP PLAN

1/4" = 1'-0"



⚠1 (7) CONTAINMENT SUMP WALL DETAIL

1/2" = 1'-0"

University of Verm

ARCHITECTURAL & ENGINEERING SER
109 SOUTH PROSPECT S1
BURLINGTON, VERMONT 05405
(802) 656

STATE OF VERMONT
GREGORY J. BOMBARDIER
NO. 4496
REGISTERED
PROFESSIONAL ENGINEER

Consultants

CHAMPLAIN CONSULTING ENGINEE
HARBORSIDE PROFESSIONAL BUILDI
SUITE 1D
128 PRIM ROAD
COLCHESTER, VERMONT 05446
(802) 863-8060

Project

UNIVERSITY OF VERMONT
ENVIRONMENTAL SAFETY FACILTY

ENSF 89020

Project No.	90138
Scale	NOTED
Drawn by	LRB
Checked by	4/1/93
Date	12/1/92

Revisions

No.	Date	
⚠	4/1/93	FINAL PLAN

Drawing Title

FOUNDATION DETAILS

Drawing No.

F-2

Attachment E-4

Waste Container Compatibility

Compatibility of Waste with Containers

Hazardous wastes stored at the Environmental Safety Facility (ESF) at the University of Vermont and State Agricultural College (UVM) will be stored in appropriate containers that have good structural integrity and are made of, or lined with, materials that will not react with, and are otherwise compatible with, the hazardous waste to be stored.

UVM's ESF uses DOT standards as set forth in 49 CFR §172 and §173 as a guideline for compatibility of hazardous waste with its container. All hazardous materials destined for off-site disposal, recycling or those managed as Universal Wastes, are shipped according to DOT requirements, and are stored with compatible materials.

Below are examples of commonly generated hazardous wastes and their corresponding compatible container.

WASTE TYPE	COMPATIBLE CONTAINER MATERIAL
Alkaline liquids	Poly/fiber/stainless steel
Acid liquids	Poly/fiber/stainless steel
Flammable liquids/solids	Steel, Poly/fiber
PCB liquids/solids	Steel
Poison liquids	Steel, Poly/fiber
Halogenated solvents	Steel, Poly/fiber
Flammable, corrosives	Poly/fiber
Other Haz waste (i.e., lead paint chips, oily debris)	Steel, Poly/fiber, cubic yard boxes
Reactive Wastes	Steel, Poly/fiber, combination

Waste containers, such as laboratory wastes awaiting lab packing, may be stored in their original or accumulation containers, while bulking and re-packing activities are in progress. While these containers are still chemically compatible, they are not DOT shipping containers. These containers are either bulked into or lab packed into the appropriate waste stream with the chemically compatible DOT-approved shipping container prior to shipment.