UNIVERSITY OF LOUISVILLE ENVIRONMENTAL PROTECTION SERVICES CENTER

Louisville, Kentucky

Parts A & B Permit Applications

June 2022

Prepared by:
University of Louisville
Department of Environmental Health and Safety Louisville, Kentucky

Table of Contents
University of Louisville
Environmental Protection Services Center (EPSC)

Part A and Part B Applications

A. Part A Application
Exhibit A-1 Topographic Maps
Exhibit A-2 Photographs of EPSC

B. Facility Description
B.1 General Description
B.2 Topographic Map
B.3 Location Information
B.3.a Geological Information
1) Seismic Considerations
2) An Evaluation of Subsurface Geologic Formations and Surface Topography for Solution or Karst Features
B.3.b Floodplain Standard
B.4 Traffic Information
B.5 Requirements for Applicants for Construction Permits
B.6 Past Compliance Record
B.7 Fees
B.8 Public Participation

Attachments

Attachment B-1 Site Plans
Attachment B-2 Topographic Map, Well Search Data
Attachment B-3 Wind Rose Data
Attachment B-4 Flood Insurance Rate Map
Attachment B-5 Vehicle Volume Count Information
Attachment B-6 Compliance History
Attachment B-7 Geologic Map

C. Waste Characteristics
C.1 Chemical and Physical Analysis
C.2 Hazardous Waste Generated at the EPSC
C.3 Waste Analysis Plan

Commented [MK1]: NOD 22

Attachments

Attachment C-1 Waste Analysis Plan
1.0 Introduction
2.0 Scope of Waste Accepted
- 2.1 Characteristic Wastes (D Codes)
- 2.2 Lists of Hazardous Wastes (F, K, P and U Codes)
- 2.3 Wastes from Chemicals
- 2.4 Mixed Wastes
- 2.5 Non-Hazardous Wastes
- 2.6 Land Disposal Restricted Wastes
- 2.7 Prohibited Wastes

3.0 Waste Review Procedures
- 3.1 Technical Review Process Overview
- 3.2 Determination of Waste Status
- 3.3 Determination of Treatment
- 3.4 Treatment Technologies
  - 3.4.1 Stabilization
  - 3.4.2 Bulking
- 3.5 Evaluating Treatment of Performance
- 3.6 Professional Judgment
- 3.7 Waste Tracking
  - 3.7.1 Pickup
  - 3.7.2 Scheduling
  - 3.7.3 Transportation
  - 3.7.4 Receipt at the Facility
  - 3.7.5 Documentation
    - 3.7.5.1 Information Flow Overview
    - 3.7.5.2 Data Entry Requirements
    - 3.7.5.3 Work Order / Drum Inventory Completion

4.0 Parameters and Rationale
- 4.1 Rationale for Analysis
- 4.2 Parameter Selection Procedure
- 4.3 Facility Laboratory

5.0 Test Methods
6.0 Sampling Methods
- 6.1 Preparation for Shipment to Off-Site Facility
- 6.2 Field Quality Assurance/Quality Control
- 6.3 Sampling Packaging and Shipment
- 6.4 Sampling Records
  - 6.4.1 Sample Labels
  - 6.4.2 Chain-of-Custody

6.4.3 Security Seals
6.4.4 Shipment
7.0 Frequency of Analysis
7.1 Non-Routine Waste Chemicals
7.2 Routine Wastes
7.3 Incompletely Characterized Wastes
7.4 Bulked Wastes
8.0 Requirements for Waste Generated Off-Site

9.0 Additional Requirements for Facilities Handling Ignitable, Reactive, and Incompatible Wastes
9.1 Basis of Incompatibility
9.2 Basis of Segregation
9.3 Waste Stream Compatibility Review
9.4 Storage of Wastes
10.0 Recordkeeping
11.0 Appendices
Appendix 1 EPSC Land Disposal Restrictions One-Time Notice to File
Appendix 2 Pictures of High Hazard Storage Areas

Attachment C-2 SOP for Unknown Waste Management
1 Introduction
2 DEHS Staff Training
3 Health & Safety Requirements
4 Spill Response
5 Equipment and Supplies
6 Screening and Identifying Unknown Waste
7 Unknown Waste Identification Procedure

Attachment C-3 AHURA First Defender User Manual
Attachment C-4 Oakton pH510 Series Benchtop Meters User Manual Attachment
Attachment C-5 Chemical and Hazardous Waste Pickup Request Form

D. Process Information
D.1 Containers
D.1.a Containers with Free Liquids/Description of System
D.1.b Containers without Free Liquids
D.1.c Container Management
D.1.d Air Emission Standards for Process Vents
D.1.e Air Emission Standards for Equipment Leaks
D.1.f Organic Air Emissions for Containers

Commented [MK2]: NOD 23

Commented [MK3]: NOD 24

Attachments

Attachment D-1 Containment Volume Calculations

E. Groundwater Monitoring and Corrective Action for Waste Management Units

F. Procedures to Prevent Hazards
- F.1 Security
  - F.1.a Security Procedures and Equipment
    - (1) 24-hour Surveillance System
    - (2) Barrier and Means to Control Entry
      - (a) Barrier
      - (b) Means to Control Entry
    - (3) Warning Signs
  - F.1.b Waiver
- F.2 Inspection Schedule
  - F.2.a General Inspection Requirements
    - (1) Types of Problems
    - (2) Frequency of Inspection
  - F.2.b Specific Process Inspection Requirements
    - (1) Container Inspection
  - F.2.c Remedial Action
  - F.2.d Inspection Log
- F.3 Waiver of Preparedness and Prevention Requirements
  - F.3.a Equipment Requirements
    - (1) Internal Communications
    - (2) External Communication
    - (3) Emergency Equipment
    - (4) Water for Fire Control
  - F.3.b Aisle Space Requirement
- F.4 Preventive Procedures, Structures, and Equipment
  - F.4.a Unloading Operations
  - F.4.b Runoff
  - F.4.c Water Supplies
  - F.4.d Equipment and Power Failure
  - F.4.e Personnel Protection Equipment
- F.5 Prevention of Reaction of Ignitable, Reactive, and Incompatible Wastes
  - F.5.a Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Wastes
  - F.5.b General Precautions for Handling Ignitable or Reactive and Mixing of Incompatible Wastes

F.5.c Management of Ignitable or Reactive Waste in Containers
F.5.d Management of Incompatible Waste in Containers

Attachments

Attachment F-1 Example EPSC Operational, Weekly, and Monthly Inspection Forms

G. Contingency Plan

Attachments

Attachment G-1 Contingency Plan
Quick Reference Guide
1.0 General Information
2.0 Emergency Coordinator
3.0 Implementation
4.0 Emergency Response Procedures
4.1 Notification
4.2 Identification of Hazardous Materials
4.3 Hazard Assessment
4.4 Control Procedures
4.5 Prevention of Recurrence or Spread of Fires, Explosions, or Releases
4.6 Storage and Treatment of Released Material
4.7 Incompatible Wastes
4.8 Post-Emergency Equipment Maintenance
4.9 Container Spills and Leakage
5.0 Emergency Equipment
6.0 Coordination Agreements
7.0 Evacuation Plan
8.0 Required Repots

Exhibits

Exhibit A Contingency Plan Notification List
Exhibit B Letter of Agreement with Emergency Response Agency
Exhibit C Evacuation Routes
Exhibit D Street View and Fire Hydrant Location
Exhibit E Location of Spill Supplies and Emergency Equipment

H. Personal Training

H.1 Outline of Training Program
H.1.a Job Titles and Duties

H.1.b Training Content, Frequency, and Techniques
H.1.c Training Director
H.1.d Relevance of Training Program
H.1.e Training for Emergency Response
H.2 Implementation of Training Program
H.2.a Training Subjects
H.2.b Personnel Training Documents
H.2.c Visitors/Contractors

Attachments

Attachment H-1 Job Titles and Duties Descriptions

I. Closure Plan, Post-Closure Plan and Financial Requirements

I.1 Closure Plan
I.1.a Closure Performance Standards
I.1.b Partial Closure and Closure Activities
I.1.c Maximum Waste Inventory
I.1.d Schedule for Closure, Time Allowed for Closure, and Extension of Closure Time
I.1.e Inventory Disposal, Removal, or Decontamination of Equipment
(1) Closure of Containers
I.1.f Closure Certification
I.2 Post-Closure Plan
I.3 Notices Required for Disposal Facilities
I.4 Closure Cost Estimates
I.5 Financial Assurance Mechanism for Closure
I.6 Post-Closure Cost Estimate
I.7 Financial Assurance Mechanism for Post-Closure
I.8 Liability Requirements

Attachments

Attachment I-1 Closure Plan
I1.0 Closure Plan
I1.1 Facility Description
I1.2 Closure Performance Standards
I1.3 Partial Closure Activities
I1.4 Maximum Waste Inventory
I1.5 Closure Activities
I1.6 Closure Schedule
I1.7 Closure Certification

I2.0 Closure Cost Estimate
I2.1 Regulatory Requirements
I2.2 Unit Costs for Closure Activities
I2.3 Inventory Elimination Costs
I2.4 Facility Decontamination Costs
I2.5 Sampling and Analytical Costs
I3.0 Closure Plan Amendments, and Annual Cost Updates and Adjustments to Closure Cost Estimates
I3.1 Plan Amendment
I3.2 Closure Cost Estimates Adjustments
14.0 Financial Assurance
15.0 Liability Requirements

Exhibits

Exhibit A Unit Cost Assumptions

J. Other Federal and State Laws

K. Waste Minimization

L. Permit Application Signatures and Certification

A PART A APPLICATION

This section contains the University of Louisville Environmental Protection Services Center (EPSC) Part A Application. The Part A Application provides information on the facility, facility location, and descriptions of waste management processes as well as designed capacities. The Part A Application has been completed on U.S. Environmental Protection Agency (EPA) Forms 8700-12, 8700-23 and Kentucky Department for Environmental Protection (KDEP) Division of Waste Management (DWM) form 7058A. Included with the Applications are EPSC location maps (Exhibit A-1) derived from the Louisville/Jefferson County Information Consortium (LOJIC) and U.S. Geological Survey topographic maps. Representative photographs of the EPSC are included as Exhibit A-2.

United States Environmental Protection Agency
RCRA SUBTITLE C SITE IDENTIFICATION FORM

1. Reason for Submittal (Select only one.)

☐	Obtaining or updating an EPA ID number for an on-going regulated activity that will continue for a period of time. (Includes HSM activity)
☐	Submitting as a component of the Hazardous Waste Report for _____ (Reporting Year)
	☐ Site was a TSD facility and/or generator of ≥ 1,000 kg of non-acute hazardous waste, > 1 kg of acute hazardous waste, or > 100 kg of acute hazardous waste spill cleanup in **one or more months of the reporting year** (or State equivalent LQG regulations)
☐	Notifying that regulated activity is no longer occurring at this Site
☐	Obtaining or updating an EPA ID number for conducting Electronic Manifest Broker activities
☑	Submitting a new or revised Part A Form

2. Site EPA ID Number

K	Y	0	0	0	1	0	1	2	0	1	2

3. Site Name

University of Louisville Environmental Protection Services Center (EPSC)

4. Site Location Address

Street Address	**1810 Arthur Street**		
City, Town, or Village	**Louisville**	County	**Jefferson**
State **KY**	Country **USA**	Zip Code	**40292**

5. Site Mailing Address

☐ Same as Location Address

Street Address	**1800 Arthur Street; U of L - DEHS**		
City, Town, or Village	**Louisville**		
State **Kentucky**	Country **USA**	Zip Code	**40292**

6. Site Land Type

☐ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☑ State ☐ Other

7. North American Industry Classification System (NAICS) Code(s) for the Site (at least 5-digit codes)

A. (Primary) **61131**	C.
B.	D.

8. Site Contact Information

☐ Same as Location Address

First Name **Catharine**	MI **R**	Last Name **Price**
Title **Hazardous Materials Manager**		
Street Address **1800 Arthur Street; U of L - DEHS**		
City, Town, or Village **Louisville**		
State **Kentucky**	Country **USA**	Zip Code **40292**
Email **cathy.price@louisville.edu**		
Phone **502-852-2956**	Ext	Fax **502-852-0880**

9. Legal Owner and Operator of the Site

A. Name of Site's Legal Owner

☐ Same as Location Address

Full Name **University of Louisville**	Date Became Owner (mm/dd/yyyy) **10/19/1996**
Owner Type ☐ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☑ State ☐ Other	
Street Address **1800 Arthur Street; U of L - DEHS**	
City, Town, or Village **Louisville**	
State **Kentucky** / Country **USA**	Zip Code **40292**
Email **cathy.price@louisville.edu**	
Phone **502-85-2956** / Ext	Fax **502-852-0880**
Comments	

B. Name of Site's Legal Operator

☐ Same as Location Address

Full Name **University of Louisvill**	Date Became Operator (mm/dd/yyyy) **10/19/1996**
Operator Type ☐ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☑ State ☐ Other	
Street Address **1800 Arthur Street; U of L - DEHS**	
City, Town, or Village **Louisville**	
State **Kentucky** / Country **USA**	Zip Code **40292**
Email **cathy.price@louisville.edu**	
Phone **502-852-2956** / Ext	Fax **502-852-0880**
Comments **DEHS = Department of Environmental Health & Safety**	

10. Type of Regulated Waste Activity (at your site)

Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities

☑ Y ☐ N	1. Generator of Hazardous Waste—If "Yes", mark only one of the following—a, b, c	
☑	a. LQG	-Generates, in any calendar month (includes quantities imported by importer site) 1,000 kg/mo (2,200 lb/mo) or more of non-acute hazardous waste; or - Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lb/mo) of acute hazardous waste; or - Generates, in any calendar month or accumulates at any time, more than 100 kg/mo (220 lb/mo) of acute hazardous spill cleanup material.
☐	b. SQG	100 to 1,000 kg/mo (220-2,200 lb/mo) of non-acute hazardous waste and no more than 1 kg (2.2 lb) of acute hazardous waste and no more than 100 kg (220 lb) of any acute hazardous spill cleanup material.
☐	c. VSQG	Less than or equal to 100 kg/mo (220 lb/mo) of non-acute hazardous waste.
☐ Y ☑ N	2. Short-Term Generator (generates from a short-term or one-time event and not from on-going processes). If "Yes", provide an explanation in the Comments section. *Note: If "Yes", you MUST indicate that you are a Generator of Hazardous Waste in Item 10.A.1 above.*	
☑ Y ☐ N	3. Treater, Storer or Disposer of Hazardous Waste—Note: Part B of a hazardous waste permit is required for these activities.	
☑ Y ☐ N	4. Receives Hazardous Waste from Off-site	
☐ Y ☑ N	5 Recycler of Hazardous Waste	
☐	a. Recycler who stores prior to recycling	
☐	b. Recycler who does not store prior to recycling	
☐ Y ☑ N	6. Exempt Boiler and/or Industrial Furnace—If "Yes", mark all that apply.	
☐	a. Small Quantity On-site Burner Exemption	
☐	b. Smelting, Melting, and Refining Furnace Exemption	

B. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g. D001, D003, F007, U112). Use an additional page if more spaces are needed.

D001	D006	D011	D018	D024	D029	D038
D002	D007	D012	D019	D025	D031	D039
D003	D008	D015	D021	D026	D035	D040
D004	D009	D016	D022	D027	D036	D041
D005	D010	D017	D023	D028	D037	D043

C. Waste Codes for State Regulated (non-Federal) Hazardous Wastes. Please list the waste codes of the State hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

Section 10. B. Waste Codes for Federally Regulated Hazardous Wastes (continued)

F001	P050	P120	U050	U094	U144	U208
F002	P051	P127	U052	U098	U151	U209
F003	P059	P204	U053	U103	U154	U210
F004	P060	U001	VOID	U108	U159	U211
F005	P063	U002	U056	U110	U160	U213
F027	P068	U003	U057	U112	U161	U218
P001	P071	U004	U058	U113	U162	U219
P003	P074	U006	U060	U114	U165	U220
P005	P075	U007	U063	U117	U169	U221
P008	P077	U008	U067	U119	U170	U223
P010	P081	U009	U069	U120	U171	U227
P012	P082	U010	U070	U122	U182	U228
P014	P087	U012	U071	U123	U185	U236
P015	P094	U019	U072	U124	U186	U237
P018	P095	U021	U075	U125	U188	U238
P022	P098	U022	U076	U130	U190	U239
P023	P102	U029	U077	U132	U194	U240
P028	P105	U031	U078	U133	U196	U246
P030	P106	U037	U080	U134	U197	U328
P037	P108	U041	U085	U135	U200	U359
P042	P113	U043	U088	U136	U202	U404
P043	P116	U044	U089	U138	U204	
P048	P119	U045	U091	U140	U206	

11. Additional Regulated Waste Activities (NOTE: Refer to your State regulations to determine if a separate permit is required.)

A. Other Waste Activities

☑ Y ☐ N		1. Transporter of Hazardous Waste—If "Yes", mark all that apply.
	☑	a. Transporter
	☐	b. Transfer Facility (at your site)
☐ Y ☑ N		2. Underground Injection Control
☐ Y ☑ N		3. United States Importer of Hazardous Waste
☐ Y ☑ N		4. Recognized Trader—If "Yes", mark all that apply.
	☐	a. Importer
	☐	b. Exporter
☐ Y ☑ N		5. Importer/Exporter of Spent Lead-Acid Batteries (SLABs) under 40 CFR 266 Subpart G—If "Yes", mark all that apply.
	☐	a. Importer
	☐	b. Exporter

B. Universal Waste Activities

☑ Y ☐ N		1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) - If "Yes" mark all that apply. Note: Refer to your State regulations to determine what is regulated.
	☑	a. Batteries
	☐	b. Pesticides
	☑	c. Mercury containing equipment
	☑	d. Lamps
	☐	e. Other (specify) _____
	☐	f. Other (specify) _____
	☐	g. Other (specify) _____
☐ Y ☑ N		2. Destination Facility for Universal Waste Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities

☐ Y ☑ N		1. Used Oil Transporter—If "Yes", mark all that apply.
	☐	a. Transporter
	☐	b. Transfer Facility (at your site)
☐ Y ☑ N		2. Used Oil Processor and/or Re-refiner—If "Yes", mark all that apply.
	☐	a. Processor
	☐	b. Re-refiner
☐ Y ☑ N		3. Off-Specification Used Oil Burner
☐ Y ☑ N		4. Used Oil Fuel Marketer—If "Yes", mark all that apply.
	☐	a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner
	☐	b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Pharmaceutical Activities

☐ Y ☑ N	1. Operating under 40 CFR 266 Subpart P for the management of hazardous waste pharmaceuticals—if "Yes", mark only one. Note: See the item-by-item instructions for definitions of healthcare facility and reverse distributor.
☐	a. Healthcare Facility
☐	b. Reverse Distributor
☐ Y ☑ N	2. Withdrawing from operating under 40 CFR 266 Subpart P for the management of hazardous waste pharmaceuticals. Note: You may only withdraw if you are a healthcare facility that is no longer an LQG or SQG.

12. Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR 262 Subpart K.

☐ Y ☑ N	A. Opting into or currently operating under 40 CFR 262 Subpart K for the management of hazardous wastes in laboratories— If "Yes", mark all that apply. Note: See the item-by-item instructions for definitions of types of eligible academic entities.
☐	1. College or University
☐	2. Teaching Hospital that is owned by or has a formal written affiliation with a college or university
☐	3. Non-profit Institute that is owned by or has a formal written affiliation with a college or university
☐ Y ☑ N	B. Withdrawing from 40 CFR 262 Subpart K for the management of hazardous wastes in laboratories.

13. Episodic Generation

☐ Y ☑ N	Are you an SQG or VSQG generating hazardous waste from a planned or unplanned episodic event, lasting no more than 60 days, that moves you to a higher generator category. If "Yes", you must fill out the Addendum for Episodic Generator?

14. LQG Consolidation of VSQG Hazardous Waste

☐ Y ☑ N	Are you an LQG notifying of consolidating VSQG Hazardous Waste Under the Control of the Same Person pursuant to 40 CFR 262.17(f)? If "Yes", you must fill out the Addendum for LQG Consolidation of VSQGs hazardous waste.

15. Notification of LQG Site Closure for a Central Accumulation Area (CAA) (optional) OR Entire Facility (required)

☐ Y ☑ N	LQG Site Closure of a Central Accumulation Area (CAA) or Entire Facility.
	A. ☐ Central Accumulation Area (CAA) or ☐ Entire Facility
	B. Expected closure date: _____ mm/dd/yyyy
	C. Requesting new closure date: _____ mm/dd/yyyy
	D. Date closed : _____ mm/dd/yyyy ☐ 1. In compliance with the closure performance standards 40 CFR 262.17(a)(8) ☐ 2. Not in compliance with the closure performance standards 40 CFR 262.17(a)(8)

16. Notification of Hazardous Secondary Material (HSM) Activity

☐ Y ☑ N	Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 260.30, 40 CFR 261.4(a)(23), (24), (25), or (27)? If "Yes", you must fill out the Addendum to the Site Identification Form for Managing Hazardous Secondary Material.

17. Electronic Manifest Broker

☐ Y ☑ N	Are you notifying as a person, as defined in 40 CFR 260.10, electing to use the EPA electronic manifest system to obtain, complete, and transmit an electronic manifest under a contractual relationship with a hazardous waste generator?

18. Comments (include item number for each comment)

Additional page attached for item 10 B.

19. Certification I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. **Note: For the RCRA Hazardous Waste Part A permit Application, all owners and operators must sign (see 40 CFR 270.10(b) and 270.11).**

Signature of legal owner, operator or authorized representative	Date (mm/dd/yyyy) 06-01-2022
Printed Name (First, Middle Initial Last) **Catharine R. Price**	Title **Hazardous Materials Manager**
Email **cathy.price@louisville.edu**	
Signature of legal owner, operator or authorized representative	Date (mm/dd/yyyy) 06/01/2022
Printed Name (First, Middle Initial Last) **Cheri L. Hildreth**	Title **Director of DEHS**
Email **cheri.hildreth@louisville.edu**	

United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT PART A FORM

1. Facility Permit Contact

First Name	**Catharine**	MI	**R**	Last Name	**Price**
Title	**Hazardous Materials and Environmental Manager**				
Email	**cathy.price@louisville.edu**				
Phone	**502-852-2956**	Ext		Fax	**502-852-0880**

2. Facility Permit Contact Mailing Address

Street Address	**1800 Arthur Street: U of L - DEHS**				
City, Town, or Village	**Lousiville**				
State	**Kentucky**	Country	**USA**	Zip Code	**40208**

3. Facility Existence Date (mm/dd/yyyy)

10/19/1996

4. Other Environmental Permits

A. Permit Type	B. Permit Number	C. Description

5. Nature of Business

The Environmental Protection Services Center (EPSC) receives wastes and stores and/or treats the waste for eventual shipment to an off-site treatment, storage, or disposal facility. Typically waste generation is from research laboratories, trade shops, art studios, athletic facilities, teaching, laboratories, and routine maintenance.

6. Process Codes and Design Capacities

Line Number		A. Process Code			B. Process Design Capacity		C. Process Total Number of Units	D. Unit Name
					(1) Amount	(2) Unit of Measure		
X	1	S	0	1	2560	G	1	FLAMSTORE
X	2	S	0	1	350	G	1	OXPERSTORE
X	3	S	0	1	690	G	1	INOACSTORE
X	4	S	0	1	350	G	1	ORGASTORE
X	5	S	0	1	1130	G	1	NFORGSTORE

7. Description of Hazardous Wastes (Enter codes for Items 7.A, 7.C and 7.D(1))

Line No.		A. EPA Hazardous Waste No.				B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes									
								(1) Process Codes									(2) Process Description (if code is not entered in 7.D1))
A	A	D	0	0	1	2500	G	S	0	1							Ignitable Liquid-Bulk
A	B	D	0	0	2			S	0	1							Included with above
A	C	D	0	0	4			S	0	1							Included with above
A	D	D	0	0	5			S	0	1							Included with above
A	E	D	0	0	6			S	0	1							Included with above
A	F	D	0	0	7			S	0	1							Included with above
A	G	D	0	0	8			S	0	1							Included with above
A	H	D	0	0	9			S	0	1							Included with above
A	I	D	0	1	0			S	0	1							Included with above
A	J	D	0	1	1			S	0	1							Included with above
A	K	D	0	1	8			S	0	1							Included with above

8. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.

9. Facility Drawing

All existing facilities must include a scale drawing of the facility. See instructions for more detail.

10. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas. See instructions for more detail.

11. Comments

Additional pages attached for Sections 6 and 7.

6. Process Codes and Design Capacities (continued)

Line Number		A. Process Code			B. Process Design Capacity		C. Process Total Number of Units	D. Unit Name
					(1) Amount	(2) Unit of Measure		
X	6	S	0	1	405	G	1	HRBPTSTORE
X	7	S	0	1	635	G	1	CBSCBNSTORE
X	8	S	0	1	405	G	1	METALSTORE
X	9	S	0	1	230	G	1	REACTSTORE
1	0	S	0	1	550	G	1	GASCYSTORE
1	1	S	0	1	110	G	1	BLENDSTORE
1	2	S	0	1	790	G	1	PCBSTORE
1	3	S	0	1	100	U	1	STABILIZE
1	4	S	0	1	500	U	1	BLENDWASTE

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
A L	D 0 1 9			S 0 1			Included with above
A M	D 0 2 1			S 0 1			Included with above
A N	D 0 2 2			S 0 1			Included with above
A O	D 0 2 3			S 0 1			Included with above
A P	D 0 2 4			S 0 1			Included with above
A Q	D 0 2 5			S 0 1			Included with above
A R	D 0 2 6			S 0 1			Included with above
A S	D 0 2 7			S 0 1			Included with above
A T	D 0 2 8			S 0 1			Included with above
A U	D 0 2 9			S 0 1			Included with above
A V	D 0 3 5			S 0 1			Included with above
A W	D 0 3 6			S 0 1			Included with above
A X	D 0 3 8			S 0 1			Included with above
A Y	D 0 3 9			S 0 1			Included with above
A Z	D 0 4 0			S 0 1			Included with above
B A	F 0 0 1			S 0 1			Included with above
B B	F 0 0 2			S 0 1			Included with above
B C	F 0 0 3			S 0 1			Included with above
B D	F 0 0 4			S 0 1			Included with above
B E	F 0 0 5			S 0 1			Included with above
B F	U 0 0 2			S 0 1			Included with above
B G	U 0 0 3			S 0 1			Included with above
B H	U 0 1 2			S 0 1			Included with above
B I	U 0 1 9			S 0 1			Included with above
B J	U 0 3 1			S 0 1			Included with above
B K	U 0 5 3			S 0 1			Included with above
B L	U 0 5 6			S 0 1			Included with above
B M	U 0 5 7			S 0 1			Included with above
B N	U 1 0 8			S 0 1			Included with above
B O	U 1 1 0			S 0 1			Included with above
B P	U 1 1 2			S 0 1			Included with above
B Q	U 1 1 3			S 0 1			Included with above
B R	U 1 2 4			S 0 1			Included with above
B S	U 1 4 0			S 0 1			Included with above
B T	U 1 5 4			S 0 1			Included with above
B U	U 1 5 9			S 0 1			Included with above
B V	U 1 6 1			S 0 1			Included with above
B W	U 1 6 9			S 0 1			Included with above
B X	U 1 8 6			S 0 1			Included with above
B Y	U 1 9 6			S 0 1			Included with above
B Z	U 2 1 3			S 0 1			Included with above
C A	U 2 2 0			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
C B	U 2 3 9			S 0 1			Included with above
C C	U 3 5 9			S 0 1			Included with above
C D	U 0 4 4			S 0 1			Included with above
C E	U 0 3 7			S 0 1			Included with above
C F	U 0 7 7			S 0 1			Included with above
C G	U 0 8 0			S 0 1			Included with above
C H	U 2 0 9			S 0 1			Included with above
C I	U 2 1 0			S 0 1			Included with above
C J	U 2 1 1			S 0 1			Included with above
C K	U 1 6 2			S 0 1			Included with above
C L	**D 0 0 1**	**1,500**	**G**	**S 0 1**			**Ignitable Liquid Labpack-Store**
C M	D 0 0 2			S 0 1			Included with above
C N	D 0 0 4			S 0 1			Included with above
C O	D 0 0 5			S 0 1			Included with above
C P	D 0 0 6			S 0 1			Included with above
C Q	D 0 0 7			S 0 1			Included with above
C R	D 0 0 8			S 0 1			Included with above
C S	D 0 0 9			S 0 1			Included with above
C T	D 0 1 0			S 0 1			Included with above
C U	D 0 1 1			S 0 1			Included with above
C V	D 0 1 8			S 0 1			Included with above
C W	D 0 1 9			S 0 1			Included with above
C X	D 0 2 1			S 0 1			Included with above
C Y	D 0 2 2			S 0 1			Included with above
C Z	D 0 2 3			S 0 1			Included with above
D A	D 0 2 4			S 0 1			Included with above
D B	D 0 2 5			S 0 1			Included with above
D C	D 0 2 6			S 0 1			Included with above
D D	D 0 2 7			S 0 1			Included with above
D E	D 0 2 8			S 0 1			Included with above
D F	D 0 2 9			S 0 1			Included with above
D G	D 0 3 5			S 0 1			Included with above
D H	D 0 3 6			S 0 1			Included with above
D I	D 0 3 8			S 0 1			Included with above
D J	D 0 3 9			S 0 1			Included with above
D K	D 0 4 0			S 0 1			Included with above
D L	F 0 0 1			S 0 1			Included with above
D M	F 0 0 2			S 0 1			Included with above
D N	F 0 0 3			S 0 1			Included with above
D O	F 0 0 4			S 0 1			Included with above
D P	F 0 0 5			S 0 1			Included with above
D Q	U 0 0 1			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
D R	U 0 0 2			S 0 1			Included with above
D S	U 0 0 3			S 0 1			Included with above
D T	U 0 0 4			S 0 1			Included with above
D U	U 0 0 6			S 0 1			Included with above
D V	U 0 0 9			S 0 1			Included with above
D W	U 0 1 2			S 0 1			Included with above
D X	U 0 1 9			S 0 1			Included with above
D Y	U 0 3 1			S 0 1			Included with above
D Z	U 0 3 7			S 0 1			Included with above
E A	U 0 4 3			S 0 1			Included with above
E B	U 0 4 4			S 0 1			Included with above
E C	U 0 5 3			S 0 1			Included with above
E D	U 0 5 6			S 0 1			Included with above
E E	U 0 5 7			S 0 1			Included with above
E F	U 0 7 6			S 0 1			Included with above
E G	U 0 7 8			S 0 1			Included with above
E H	U 0 8 0			S 0 1			Included with above
E I	U 0 8 5			S 0 1			Included with above
E J	U 1 0 8			S 0 1			Included with above
E K	U 1 1 0			S 0 1			Included with above
E L	U 1 1 2			S 0 1			Included with above
E M	U 1 1 3			S 0 1			Included with above
E N	U 1 1 7			S 0 1			Included with above
E O	U 1 2 2			S 0 1			Included with above
E P	U 1 2 4			S 0 1			Included with above
E Q	U 1 4 0			S 0 1			Included with above
E R	U 1 5 4			S 0 1			Included with above
E S	U 1 5 9			S 0 1			Included with above
E T	U 1 6 1			S 0 1			Included with above
E U	U 1 6 2			S 0 1			Included with above
E V	U 1 6 9			S 0 1			Included with above
E W	U 1 7 1			S 0 1			Included with above
E X	U 1 8 2			S 0 1			Included with above
E Y	U 1 8 6			S 0 1			Included with above
E Z	U 1 9 4			S 0 1			Included with above
F A	U 1 9 6			S 0 1			Included with above
F B	U 2 0 9			S 0 1			Included with above
F C	U 2 1 0			S 0 1			Included with above
F D	U 2 1 1			S 0 1			Included with above
F E	U 2 1 3			S 0 1			Included with above
F F	U 2 2 0			S 0 1			Included with above
F G	U 2 3 9			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes (1) Process Codes			D. Processes (2) Process Description (if code is not entered in 7.D1)
F H	U 3 5 9			S 0 1			Included with above
F I	U 4 0 4			S 0 1			Included with above
F J	**D 0 0 1**	**1,200**	**P**	S 0 1			**Ignitable Solid Labpack-Store**
F K	D 0 0 3			S 0 1			Included with above
F L	D 0 0 5			S 0 1			Included with above
F M	D 0 0 6			S 0 1			Included with above
F N	D 0 0 7			S 0 1			Included with above
F O	D 0 0 8			S 0 1			Included with above
F P	D 0 0 9			S 0 1			Included with above
F Q	D 0 1 0			S 0 1			Included with above
F R	D 0 1 1			S 0 1			Included with above
F S	F 0 0 2			S 0 1			Included with above
F T	F 0 0 3			S 0 1			Included with above
F U	F 0 0 4			S 0 1			Included with above
F V	F 0 0 5			S 0 1			Included with above
F W	U 1 6 5			S 0 1			Included with above
F X	U 2 1 3			S 0 1			Included with above
F Y	U 2 2 0			S 0 1			Included with above
F Z	U 2 3 9			S 0 1			Included with above
G A	U 0 0 2			S 0 1			Included with above
G B	U 1 1 2			S 0 1			Included with above
G C	U 1 1 7			S 0 1			Included with above
G D	D 0 1 8			S 0 1			Included with above
G E	**D 0 0 2**	**1,200**	**G**	**S 0 1**			**Corrosive, Acid Liquid - Bulk**
G F	D 0 0 4			S 0 1			Included with above
G G	D 0 0 5			S 0 1			Included with above
G H	D 0 0 6			S 0 1			Included with above
G I	D 0 0 7			S 0 1			Included with above
G J	D 0 0 8			S 0 1			Included with above
G K	D 0 1 0			S 0 1			Included with above
G L	D 0 1 1			S 0 1			Included with above
G M	U 1 2 2			S 0 1			Included with above
G N	**D 0 0 1**	**1,200**	**G**	**S 0 1**			**Corrosive, Acid Liquid Labpack - Store**
G O	D 0 0 2			S 0 1			Included with above
G P	D 0 0 3			S 0 1			Included with above
G Q	D 0 0 4			S 0 1			Included with above
G R	D 0 0 5			S 0 1			Included with above
G S	D 0 0 6			S 0 1			Included with above
G T	D 0 0 7			S 0 1			Included with above
G U	D 0 0 8			S 0 1			Included with above
G V	D 0 0 9			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes					
				(1) Process Codes					(2) Process Description (if code is not entered in 7.D1)
G W	D 0 1 0			S 0 1					Included with above
G X	D 0 1 1			S 0 1					Included with above
G Y	D 0 2 2			S 0 1					Included with above
G Z	U 1 2 2			S 0 1					Included with above
H A	U 1 2 3			S 0 1					Included with above
H B	U 1 3 3			S 0 1					Included with above
H C	U 1 3 4			S 0 1					Included with above
H D	U 1 5 1			S 0 1					Included with above
H E	U 1 8 8			S 0 1					Included with above
H F	U 1 9 0			S 0 1					Included with above
H G	**D 0 0 2**	**600**	**G**	**S 0 1**					**Corrosive, Base Liquid - Bulk**
H H	D 0 0 4			S 0 1					Included with above
H I	D 0 0 5			S 0 1					Included with above
H J	D 0 0 6			S 0 1					Included with above
H K	D 0 0 7			S 0 1					Included with above
H L	D 0 0 8			S 0 1					Included with above
H M	D 0 1 0			S 0 1					Included with above
H N	D 0 1 1			S 0 1					Included with above
H O	**D 0 0 1**	**600**	**G**	**S 0 1**					**Corrosive, Base Liquid Labpack - Store**
H P	D 0 0 2			S 0 1					Included with above
H Q	D 0 0 3			S 0 1					Included with above
H R	D 0 0 4			S 0 1					Included with above
H S	D 0 0 5			S 0 1					Included with above
H T	D 0 0 6			S 0 1					Included with above
H U	D 0 0 7			S 0 1					Included with above
H V	D 0 0 8			S 0 1					Included with above
H W	D 0 0 9			S 0 1					Included with above
H X	D 0 1 0			S 0 1					Included with above
H Y	D 0 1 1			S 0 1					Included with above
H Z	F 0 0 3			S 0 1					Included with above
I A	**D 0 0 4**	**1,500**	**G**	**S 0 1**					**Toxic Liquid - Bulk**
I B	D 0 0 5			S 0 1					Included with above
I C	D 0 0 6			S 0 1					Included with above
I D	D 0 0 7			S 0 1					Included with above
I E	D 0 0 8			S 0 1					Included with above
I F	D 0 1 0			S 0 1					Included with above
I G	D 0 1 1			S 0 1					Included with above
I H	D 0 1 8			S 0 1					Included with above
I I	D 0 1 9			S 0 1					Included with above
I J	D 0 2 1			S 0 1					Included with above
I K	D 0 2 2			S 0 1					Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
I L	D 0 2 3			S 0 1			Included with above
I M	D 0 2 4			S 0 1			Included with above
I N	D 0 2 5			S 0 1			Included with above
I O	D 0 2 6			S 0 1			Included with above
I P	D 0 2 7			S 0 1			Included with above
I Q	D 0 2 8			S 0 1			Included with above
I R	D 0 2 9			S 0 1			Included with above
I S	D 0 3 5			S 0 1			Included with above
I T	D 0 3 6			S 0 1			Included with above
I U	D 0 3 8			S 0 1			Included with above
I V	D 0 3 9			S 0 1			Included with above
I W	D 0 4 0			S 0 1			Included with above
I X	F 0 0 1			S 0 1			Included with above
I Y	F 0 0 2			S 0 1			Included with above
I Z	F 0 0 3			S 0 1			Included with above
J A	F 0 0 4			S 0 1			Included with above
J B	F 0 0 5			S 0 1			Included with above
J C	U 0 0 1			S 0 1			Included with above
J D	U 0 0 7			S 0 1			Included with above
J E	U 0 0 2			S 0 1			Included with above
J F	U 0 0 3			S 0 1			Included with above
J G	U 0 1 9			S 0 1			Included with above
J H	U 0 2 1			S 0 1			Included with above
J I	U 0 4 4			S 0 1			Included with above
J J	U 0 5 6			S 0 1			Included with above
J K	U 0 7 7			S 0 1			Included with above
J L	U 0 8 0			S 0 1			Included with above
J M	U 1 1 2			S 0 1			Included with above
J N	U 1 2 2			S 0 1			Included with above
J O	U 1 5 4			S 0 1			Included with above
J P	U 1 9 6			S 0 1			Included with above
J Q	U 2 1 0			S 0 1			Included with above
J R	U 2 1 3			S 0 1			Included with above
J S	U 2 2 0			S 0 1			Included with above
J T	U 2 2 8			S 0 1			Included with above
J U	U 2 3 9			S 0 1			Included with above
J V	U 3 5 9			S 0 1			Included with above
J W	**U 1 5 1**	**500**	**P**	**S 0 1**			**Toxic Solid - Bulk**
J X	D 0 0 8			S 0 1			Included with above
J Y	D 0 0 9			S 0 1			Included with above
J Z	**D 0 0 4**	**1,500**	**G**	**S 0 1**			**Toxic Liquid Labpack - Store**
K A	D 0 0 5			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
K B	D 0 0 6			S 0 1			Included with above
K C	D 0 0 7			S 0 1			Included with above
K D	D 0 0 8			S 0 1			Included with above
K E	D 0 1 0			S 0 1			Included with above
K F	D 0 1 1			S 0 1			Included with above
K G	D 0 1 8			S 0 1			Included with above
K H	D 0 1 9			S 0 1			Included with above
K I	D 0 2 1			S 0 1			Included with above
K J	D 0 2 2			S 0 1			Included with above
K K	D 0 2 3			S 0 1			Included with above
K L	D 0 2 4			S 0 1			Included with above
K M	D 0 2 5			S 0 1			Included with above
K N	D 0 2 6			S 0 1			Included with above
K O	D 0 2 7			S 0 1			Included with above
K P	D 0 2 8			S 0 1			Included with above
K Q	D 0 2 9			S 0 1			Included with above
K R	D 0 3 5			S 0 1			Included with above
K S	D 0 3 6			S 0 1			Included with above
K T	D 0 3 8			S 0 1			Included with above
K U	D 0 3 9			S 0 1			Included with above
K V	D 0 4 0			S 0 1			Included with above
K W	F 0 0 1			S 0 1			Included with above
K X	F 0 0 2			S 0 1			Included with above
K Y	F 0 0 3			S 0 1			Included with above
K Z	F 0 0 4			S 0 1			Included with above
L A	F 0 0 5			S 0 1			Included with above
L B	U 0 0 1			S 0 1			Included with above
L C	U 0 0 4			S 0 1			Included with above
L D	U 0 0 6			S 0 1			Included with above
L E	U 0 0 7			S 0 1			Included with above
L F	U 0 0 8			S 0 1			Included with above
L G	U 0 1 0			S 0 1			Included with above
L H	U 0 1 1			S 0 1			Included with above
L I	U 0 1 2			S 0 1			Included with above
L J	U 0 2 2			S 0 1			Included with above
L K	U 0 4 1			S 0 1			Included with above
L L	U 0 4 4			S 0 1			Included with above
L M	U 0 5 0			S 0 1			Included with above
L N	U 0 5 2			S 0 1			Included with above
L O	U 0 5 3			S 0 1			Included with above
L P	V O I D						
L Q	U 0 5 6			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
L R	U 0 5 8			S 0 1			Included with above
L S	U 0 6 0			S 0 1			Included with above
L T	U 0 6 3			S 0 1			Included with above
L U	U 0 6 7			S 0 1			Included with above
L V	U 0 6 9			S 0 1			Included with above
L W	U 0 7 0			S 0 1			Included with above
L X	U 0 7 1			S 0 1			Included with above
L Y	U 0 7 2			S 0 1			Included with above
L Z	U 0 7 8			S 0 1			Included with above
M A	U 0 8 0			S 0 1			Included with above
M B	U 0 8 8			S 0 1			Included with above
M C	U 0 8 9			S 0 1			Included with above
M D	U 0 9 1			S 0 1			Included with above
M E	U 0 9 4			S 0 1			Included with above
M F	U 0 9 8			S 0 1			Included with above
M G	U 1 0 3			S 0 1			Included with above
M H	U 1 0 8			S 0 1			Included with above
M I	U 1 1 4			S 0 1			Included with above
M J	U 1 1 9			S 0 1			Included with above
M K	U 1 2 0			S 0 1			Included with above
M L	U 1 2 2			S 0 1			Included with above
M M	U 1 2 3			S 0 1			Included with above
M N	U 1 2 5			S 0 1			Included with above
M O	U 1 3 0			S 0 1			Included with above
M P	U 1 3 2			S 0 1			Included with above
M Q	U 1 3 3			S 0 1			Included with above
M R	U 1 3 6			S 0 1			Included with above
M S	U 1 3 8			S 0 1			Included with above
M T	U 1 4 4			S 0 1			Included with above
M U	U 1 5 1			S 0 1			Included with above
M V	U 1 6 9			S 0 1			Included with above
M W	U 1 7 0			S 0 1			Included with above
M X	U 1 8 8			S 0 1			Included with above
M Y	U 1 9 0			S 0 1			Included with above
M Z	U 1 9 7			S 0 1			Included with above
N A	U 2 0 0			S 0 1			Included with above
N B	U 2 0 2			S 0 1			Included with above
N C	U 2 0 6			S 0 1			Included with above
N D	U 2 0 9			S 0 1			Included with above
N E	U 2 1 0			S 0 1			Included with above
N F	U 2 1 1			S 0 1			Included with above
N G	U 2 1 3			S 0 1			Included with above
N H	U 2 1 8			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes (1) Process Codes			D. Processes (2) Process Description (if code is not entered in 7.D1)
N I	U 2 1 9			S 0 1			Included with above
N J	U 2 2 1			S 0 1			Included with above
N K	U 2 2 3			S 0 1			Included with above
N L	U 2 2 7			S 0 1			Included with above
N M	U 2 2 8			S 0 1			Included with above
N N	U 2 3 6			S 0 1			Included with above
N O	U 2 3 7			S 0 1			Included with above
N P	U 2 3 8			S 0 1			Included with above
N Q	U 2 4 0			S 0 1			Included with above
N R	U 2 4 6			S 0 1			Included with above
N S	U 3 2 8			S 0 1			Included with above
N T	D 0 1 2			S 0 1			Included with above
N U	D 0 1 6			S 0 1			Included with above
N V	D 0 1 7			S 0 1			Included with above
N W	D 0 3 7			S 0 1			Included with above
N X	U 1 8 5			S 0 1			Included with above
N Y	U 2 4 0			S 0 1			Included with above
N Z	F 0 2 7			S 0 1			Included with above
O A	**D 0 0 4**	**6,000**	**P**	**S 0 1**			**Toxic Solid Labpack - Store**
O B	D 0 0 5			S 0 1			Included with above
O C	D 0 0 6			S 0 1			Included with above
O D	D 0 0 7			S 0 1			Included with above
O E	D 0 0 8			S 0 1			Included with above
O F	D 0 1 0			S 0 1			Included with above
O G	D 0 1 1			S 0 1			Included with above
O H	D 0 1 8			S 0 1			Included with above
O I	D 0 1 9			S 0 1			Included with above
O J	D 0 2 1			S 0 1			Included with above
O K	D 0 2 2			S 0 1			Included with above
O L	D 0 2 3			S 0 1			Included with above
O M	D 0 2 4			S 0 1			Included with above
O N	D 0 2 5			S 0 1			Included with above
O O	D 0 2 6			S 0 1			Included with above
O P	D 0 2 7			S 0 1			Included with above
O Q	D 0 2 8			S 0 1			Included with above
O R	D 0 2 9			S 0 1			Included with above
O S	D 0 3 5			S 0 1			Included with above
O T	D 0 3 6			S 0 1			Included with above
O U	D 0 3 8			S 0 1			Included with above
O V	D 0 3 9			S 0 1			Included with above
O W	D 0 4 0			S 0 1			Included with above
O X	F 0 0 1			S 0 1			Included with above
O Y	F 0 0 2			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
O Z	F 0 0 3			S 0 1			Included with above
P A	F 0 0 4			S 0 1			Included with above
P B	F 0 0 5			S 0 1			Included with above
P C	U 0 0 1			S 0 1			Included with above
P D	U 0 0 4			S 0 1			Included with above
P E	U 0 0 6			S 0 1			Included with above
P F	U 0 0 7			S 0 1			Included with above
P G	U 0 0 8			S 0 1			Included with above
P H	U 0 1 0			S 0 1			Included with above
P I	U 0 1 1			S 0 1			Included with above
P J	U 0 1 2			S 0 1			Included with above
P K	U 0 2 2			S 0 1			Included with above
P L	U 0 4 1			S 0 1			Included with above
P M	U 0 4 4			S 0 1			Included with above
P N	U 0 5 0			S 0 1			Included with above
P O	U 0 5 2			S 0 1			Included with above
P P	U 0 5 3			S 0 1			Included with above
P Q	V O I D						
P R	U 0 5 6			S 0 1			Included with above
P S	U 0 5 8			S 0 1			Included with above
P T	U 0 6 0			S 0 1			Included with above
P U	U 0 6 3			S 0 1			Included with above
P V	U 0 6 7			S 0 1			Included with above
P W	U 0 6 9			S 0 1			Included with above
P X	U 0 7 0			S 0 1			Included with above
P Y	U 0 7 1			S 0 1			Included with above
P Z	U 0 7 2			S 0 1			Included with above
Q A	U 0 7 7			S 0 1			Included with above
Q B	U 0 8 0			S 0 1			Included with above
Q C	U 0 8 8			S 0 1			Included with above
Q D	U 0 8 9			S 0 1			Included with above
Q E	U 0 9 1			S 0 1			Included with above
Q F	U 0 9 4			S 0 1			Included with above
Q G	U 0 9 8			S 0 1			Included with above
Q H	U 1 0 3			S 0 1			Included with above
Q I	U 1 0 8			S 0 1			Included with above
Q J	U 1 1 4			S 0 1			Included with above
Q K	U 1 1 9			S 0 1			Included with above
Q L	U 1 2 0			S 0 1			Included with above
Q M	U 1 2 2			S 0 1			Included with above
Q N	U 1 2 3			S 0 1			Included with above
Q O	U 1 2 5			S 0 1			Included with above
Q P	U 1 3 0			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
Q Q	U 1 3 2			S 0 1			Included with above
Q R	U 1 3 3			S 0 1			Included with above
Q S	U 1 3 6			S 0 1			Included with above
Q T	U 1 3 8			S 0 1			Included with above
Q U	U 1 4 4			S 0 1			Included with above
Q V	U 1 5 1			S 0 1			Included with above
Q W	U 1 6 9			S 0 1			Included with above
Q X	U 1 7 0			S 0 1			Included with above
Q Y	U 1 8 8			S 0 1			Included with above
Q Z	U 1 9 0			S 0 1			Included with above
R A	U 1 9 7			S 0 1			Included with above
R B	U 2 0 0			S 0 1			Included with above
R C	U 2 0 2			S 0 1			Included with above
R D	U 2 0 6			S 0 1			Included with above
R E	U 2 0 9			S 0 1			Included with above
R F	U 2 1 0			S 0 1			Included with above
R G	U 2 1 1			S 0 1			Included with above
R H	U 2 1 3			S 0 1			Included with above
R I	U 2 1 8			S 0 1			Included with above
R J	U 2 1 9			S 0 1			Included with above
R K	U 2 2 1			S 0 1			Included with above
R L	U 2 2 3			S 0 1			Included with above
R M	U 2 2 7			S 0 1			Included with above
R N	U 2 2 8			S 0 1			Included with above
R O	U 2 3 6			S 0 1			Included with above
R P	U 2 3 7			S 0 1			Included with above
R Q	U 2 3 8			S 0 1			Included with above
R R	U 2 4 0			S 0 1			Included with above
R S	U 2 4 6			S 0 1			Included with above
R T	U 3 2 8			S 0 1			Included with above
R U	D 0 1 2			S 0 1			Included with above
R V	D 0 1 6			S 0 1			Included with above
R W	D 0 1 7			S 0 1			Included with above
R X	D 0 3 7			S 0 1			Included with above
R Y	U 1 8 5			S 0 1			Included with above
R Z	U 2 4 0			S 0 1			Included with above
S A	F 0 2 7			S 0 1			Included with above
S B	**D 0 0 4**	**750**	**G**	**S 0 1**			**TCLP Liquid - Bulk**
S C	D 0 0 5			S 0 1			Included with above
S D	D 0 0 6			S 0 1			Included with above
S E	D 0 0 7			S 0 1			Included with above
S F	D 0 0 8			S 0 1			Included with above
S G	D 0 0 9			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes (1) Process Codes			D. Processes (2) Process Description (if code is not entered in 7.D1)
S H	D 0 1 0			S 0 1			Included with above
S I	D 0 1 1			S 0 1			Included with above
S J	D 0 2 2			S 0 1			Included with above
S K	**D 0 0 4**	**3000**	**P**	**S 0 1**			**TCLP Solid - Bulk**
S L	D 0 0 5			S 0 1			Included with above
S M	D 0 0 6			S 0 1			Included with above
S N	D 0 0 7			S 0 1			Included with above
S O	D 0 0 8			S 0 1			Included with above
S P	D 0 0 9			S 0 1			Included with above
S Q	D 0 1 0			S 0 1			Included with above
S R	D 0 1 1			S 0 1			Included with above
S S	**D 0 0 4**	**750**	**G**	**S 0 1**			**TCLP Liquid Labpack-Store**
S T	D 0 0 5			S 0 1			Included with above
S U	D 0 0 6			S 0 1			Included with above
S V	D 0 0 7			S 0 1			Included with above
S W	D 0 0 8			S 0 1			Included with above
S X	D 0 0 9			S 0 1			Included with above
S Y	D 0 1 0			S 0 1			Included with above
S Z	D 0 1 1			S 0 1			Included with above
T A	D 0 2 2			S 0 1			Included with above
T B	D 0 2 3			S 0 1			Included with above
T C	D 0 2 4			S 0 1			Included with above
T D	D 0 2 5			S 0 1			Included with above
T E	D 0 2 6			S 0 1			Included with above
T F	D 0 2 7			S 0 1			Included with above
T G	D 0 2 8			S 0 1			Included with above
T H	D 0 2 9			S 0 1			Included with above
T I	D 0 3 1			S 0 1			Included with above
T J	D 0 3 6			S 0 1			Included with above
T K	D 0 3 7			S 0 1			Included with above
T L	D 0 3 8			S 0 1			Included with above
T M	D 0 3 9			S 0 1			Included with above
T N	D 0 4 0			S 0 1			Included with above
T O	D 0 4 3			S 0 1			Included with above
T P	U 1 5 1			S 0 1			Included with above
T Q	**D 0 0 4**	**6,000**	**P**	**S 0 1**			**TCLP Solid Labpack-Store**
T R	D 0 0 5			S 0 1			Included with above
T S	D 0 0 6			S 0 1			Included with above
T T	D 0 0 7			S 0 1			Included with above
T U	D 0 0 8			S 0 1			Included with above
T V	D 0 0 9			S 0 1			Included with above
T W	D 0 1 0			S 0 1			Included with above
T X	D 0 1 1			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
T Y	D 0 1 8			S 0 1			Included with above
T Z	D 0 1 9			S 0 1			Included with above
U A	D 0 2 2			S 0 1			Included with above
U B	D 0 2 3			S 0 1			Included with above
U C	D 0 2 4			S 0 1			Included with above
U D	D 0 2 5			S 0 1			Included with above
U E	D 0 2 6			S 0 1			Included with above
U F	U 1 2 2			S 0 1			Included with above
U G	U 1 5 1			S 0 1			Included with above
U H	**D 0 0 1**	**150**	**G**	**S 0 1**			**Acute Hazardous Liquid Labpack-Store**
U I	D 0 0 2			S 0 1			Included with above
U J	D 0 0 3			S 0 1			Included with above
U K	D 0 0 4			S 0 1			Included with above
U L	D 0 0 9			S 0 1			Included with above
U M	D 0 1 1			S 0 1			Included with above
U N	D 0 1 2			S 0 1			Included with above
U O	D 0 1 5			S 0 1			Included with above
U P	D 0 1 6			S 0 1			Included with above
U Q	D 0 1 7			S 0 1			Included with above
U R	D 0 2 6			S 0 1			Included with above
U S	D 0 4 1			S 0 1			Included with above
U T	P 0 0 1			S 0 1			Included with above
U U	P 0 0 3			S 0 1			Included with above
U V	P 0 0 5			S 0 1			Included with above
U W	P 0 0 8			S 0 1			Included with above
U X	P 0 1 0			S 0 1			Included with above
U Y	P 0 1 2			S 0 1			Included with above
U Z	P 0 1 4			S 0 1			Included with above
V A	P 0 1 5			S 0 1			Included with above
V B	P 0 1 8			S 0 1			Included with above
V C	P 0 2 2			S 0 1			Included with above
V D	P 0 2 3			S 0 1			Included with above
V E	P 0 2 8			S 0 1			Included with above
V F	P 0 3 0			S 0 1			Included with above
V G	P 0 3 7			S 0 1			Included with above
V H	P 0 4 2			S 0 1			Included with above
V I	P 0 4 3			S 0 1			Included with above
V J	P 0 4 8			S 0 1			Included with above
V K	P 0 5 0			S 0 1			Included with above
V L	P 0 5 1			S 0 1			Included with above
V M	P 0 5 9			S 0 1			Included with above
V N	P 0 6 0			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes (1) Process Codes			D. Processes (2) Process Description (if code is not entered in 7.D1)
V O	P 0 6 3			S 0 1			Included with above
V P	P 0 6 8			S 0 1			Included with above
V Q	P 0 7 1			S 0 1			Included with above
V R	P 0 7 4			S 0 1			Included with above
V S	P 0 7 5			S 0 1			Included with above
V T	P 0 7 7			S 0 1			Included with above
V U	P 0 8 1			S 0 1			Included with above
V V	P 0 8 2			S 0 1			Included with above
V W	P 0 8 7			S 0 1			Included with above
V X	P 0 9 4			S 0 1			Included with above
V Y	P 0 9 5			S 0 1			Included with above
V Z	P 0 9 8			S 0 1			Included with above
W A	P 1 0 2			S 0 1			Included with above
W B	P 1 0 5			S 0 1			Included with above
W C	P 1 0 6			S 0 1			Included with above
W D	P 1 0 8			S 0 1			Included with above
W E	P 1 1 3			S 0 1			Included with above
W F	P 1 1 6			S 0 1			Included with above
W G	P 1 1 9			S 0 1			Included with above
W H	P 1 2 0			S 0 1			Included with above
W I	P 1 2 7			S 0 1			Included with above
W J	P 2 0 4			S 0 1			Included with above
W K	D 0 3 1			S 0 1			Included with above
W L	**D 0 0 1**	**3000**	**P**	**S 0 1**			**Acute Hazardous Solid Labpack-Store**
W M	D 0 0 2			S 0 1			Included with above
W N	D 0 0 3			S 0 1			Included with above
W O	D 0 0 4			S 0 1			Included with above
W P	D 0 0 9			S 0 1			Included with above
W Q	D 0 1 1			S 0 1			Included with above
W R	D 0 1 2			S 0 1			Included with above
W S	D 0 1 5			S 0 1			Included with above
W T	D 0 1 6			S 0 1			Included with above
W U	D 0 1 7			S 0 1			Included with above
W V	D 0 2 6			S 0 1			Included with above
W W	D 0 4 1			S 0 1			Included with above
W X	P 0 0 1			S 0 1			Included with above
W Y	P 0 0 3			S 0 1			Included with above
W Z	P 0 0 5			S 0 1			Included with above
X A	P 0 0 8			S 0 1			Included with above
X B	P 0 1 0			S 0 1			Included with above
X C	P 0 1 2			S 0 1			Included with above
X D	P 0 1 4			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
X E	P 0 1 5			S 0 1			Included with above
X F	P 0 1 8			S 0 1			Included with above
X G	P 0 2 2			S 0 1			Included with above
X H	P 0 2 3			S 0 1			Included with above
X I	P 0 2 8			S 0 1			Included with above
X J	P 0 3 0			S 0 1			Included with above
X K	P 0 3 7			S 0 1			Included with above
X L	P 0 4 2			S 0 1			Included with above
X M	P 0 4 3			S 0 1			Included with above
X N	P 0 4 8			S 0 1			Included with above
X O	P 0 5 0			S 0 1			Included with above
X P	P 0 5 1			S 0 1			Included with above
X Q	P 0 5 9			S 0 1			Included with above
X R	P 0 6 0			S 0 1			Included with above
X S	P 0 6 3			S 0 1			Included with above
X T	P 0 6 8			S 0 1			Included with above
X U	P 0 7 1			S 0 1			Included with above
X V	P 0 7 4			S 0 1			Included with above
X W	P 0 7 5			S 0 1			Included with above
X X	P 0 7 7			S 0 1			Included with above
X Y	P 0 8 1			S 0 1			Included with above
X Z	P 0 8 2			S 0 1			Included with above
Y A	P 0 8 7			S 0 1			Included with above
Y B	P 0 9 4			S 0 1			Included with above
Y C	P 0 9 5			S 0 1			Included with above
Y D	P 0 9 8			S 0 1			Included with above
Y E	P 1 0 2			S 0 1			Included with above
Y F	P 1 0 5			S 0 1			Included with above
Y G	P 1 0 6			S 0 1			Included with above
Y H	P 1 0 8			S 0 1			Included with above
Y I	P 1 1 3			S 0 1			Included with above
Y J	P 1 1 6			S 0 1			Included with above
Y K	P 1 1 9			S 0 1			Included with above
Y L	P 1 2 0			S 0 1			Included with above
Y M	P 1 2 7			S 0 1			Included with above
Y N	P 2 0 4			S 0 1			Included with above
Y O	D 0 3 1			S 0 1			Included with above
Y P	**D 0 0 1**	**150**	**G**	**S 0 1**			**Reactive Liquid Labpack-Store**
Y Q	D 0 0 2			S 0 1			Included with above
Y R	D 0 0 3			S 0 1			Included with above
Y S	D 0 0 7			S 0 1			Included with above
Y T	D 0 1 0			S 0 1			Included with above
Y U	D 0 2 3			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes (1) Process Codes			D. Processes (2) Process Description (if code is not entered in 7.D1)
Y V	D 0 2 4			S 0 1			Included with above
Y W	D 0 2 5			S 0 1			Included with above
Y X	U 0 5 2			S 0 1			Included with above
Y Y	U 0 5 3			S 0 1			Included with above
Y Z	U 0 6 9			S 0 1			Included with above
Z A	U 1 1 7			S 0 1			Included with above
Z B	U 1 3 3			S 0 1			Included with above
Z C	U 1 6 0			S 0 1			Included with above
Z D	U 1 7 0			S 0 1			Included with above
Z E	U 2 0 4			S 0 1			Included with above
Z F	U 2 1 3			S 0 1			Included with above
Z G	**D 0 0 1**	**1200**	**P**	**S 0 1**			**Reactive Solid Labpack-Store**
Z H	D 0 0 3			S 0 1			Included with above
Z I	D 0 0 7			S 0 1			Included with above
Z J	D 0 0 9			S 0 1			Included with above
Z K	D 0 1 0			S 0 1			Included with above
Z L	D 0 2 3			S 0 1			Included with above
Z M	D 0 2 4			S 0 1			Included with above
Z N	D 0 2 5			S 0 1			Included with above
Z O	U 0 5 2			S 0 1			Included with above
Z P	U 0 5 3			S 0 1			Included with above
Z Q	U 0 6 9			S 0 1			Included with above
Z R	U 1 1 7			S 0 1			Included with above
Z S	U 1 3 3			S 0 1			Included with above
Z T	U 1 6 0			S 0 1			Included with above
Z U	U 1 7 0			S 0 1			Included with above
Z V	**D 0 0 1**	**375**	**G**	**S 0 1**			**Ignitable Gas -Store**
Z W	D 0 0 2			S 0 1			Included with above
Z X	D 0 0 3			S 0 1			Included with above
Z Y	D 0 2 1			S 0 1			Included with above
Z Z	D 0 4 3			S 0 1			Included with above
A 1	U 0 4 3			S 0 1			Included with above
A 2	U 0 8 0			S 0 1			Included with above
A 3	**D 0 0 2**	**150**	**G**	**S 0 1**			**Corrosive Gas - Store**
A 4	D 0 0 3			S 0 1			Included with above
A 5	U 1 3 4			S 0 1			Included with above
A 6	**D 0 0 1**	**150**	**G**	**S 0 1**			**Toxic Gas - Store**
A 7	D 0 0 2			S 0 1			Included with above
A 8	D 0 0 3			S 0 1			Included with above
A 9	D 0 4 3			S 0 1			Included with above
B 1	U 0 2 9			S 0 1			Included with above
B 2	U 0 4 3			S 0 1			Included with above
B 3	U 0 4 5			S 0 1			Included with above

7. Description of Hazardous Wastes (continued)

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes			
				(1) Process Codes			(2) Process Description (if code is not entered in 7.D1)
B 4	U 0 7 5			S 0 1			Included with above
B 5	U 1 3 5			S 0 1			Included with above
B 6	U 2 0 8			S 0 1			Included with above
B 7	**D 0 0 1**	**15**	**G**	**S 0 1**	T 0 4		**Mixed Waste Labpack - Store**
B 8	D 0 0 4			S 0 1			Included with above **NOD**
B 9	D 0 0 8			S 0 1			Included with above **1 & 2**
C 1	D 0 2 2			S 0 1			Included with above
C 2	F 0 0 2			S 0 1			Included with above
C 3	F 0 0 3			S 0 1			Included with above
C 4	F 0 0 5			S 0 1			Included with above

Kentucky Department for Environmental Protection
Division of Waste Management
Hazardous Waste Branch
300 Sower Boulevard, Frankfort, KY 40601
(502) 564-6716

Part A Application Addendum

(EPA Form 8700-23)

FOR OFFICIAL USE ONLY.
DO NOT WRITE IN THIS SPACE.

FEE SUBMITTED: $____ *(See instructions to determine your fee)*

I. Reason for Submittal *(see instructions)*

Reason for Submittal:

☐ **FIRST SUBMITTAL** – Must be accompanied by the completed forms EPA 8700-12 and Addendum DWM-7037A.

☒ **REVISION – Identify the classification of the revision.** See instructions for when a revised application should be submitted.

- ☒ **Class 1 not requiring approval**
- ☐ **Class 1 requiring approval**
- ☐ **Class 2**
- ☐ **Class 3**

☒ **RENEWAL** – See instructions for when a renewal application should be submitted.

☐ **STANDARDIZED PERMIT** – See instructions for the eligibility of a standardized permit.

II. ID Numbers

A. EPA ID Number: KY0-001-012-012

B. AGENCY INTEREST Number: 48952

III. Existing and New Facilities

Existing Facilities, the date operation began or construction commenced: (mm/dd/yyyy) 10/19/1996

New Facilities, the date operation is expected to begin: (mm/dd/yyyy) __/__/____

IV. Contact Email Address

Facility Contact
Email address: cathy.price@louisville.edu

V. Facility Operator (2)

Name of Facility Operator 2 (see Instructions)**:**

VI. Type of Operator (2)

Type of Operator 2: ☐Federal (F) ☐State (S) ☐County (C) ☐Indian (I) ☐Municipal (M) ☐District (D) ☐Private (P) ☐Other (O) Specify:

VII. Operator Mailing Address (2)

Operator 2 Street Address or P.O. Box:

City: | **State:** | **County:** | **Zip Code:**

Facility Operator 2 Telephone Number: | **Phone Number Extension:**

New Operator Assumed Responsibility for Facility on this Date: (mm/dd/yyyy) __/__/____

VIII. Facility Operator (3)

Name of Facility Operator 3 (see Instructions)**:**

IX. Type of Operator (3)

Type of Operator 3: ☐Federal (F) ☐State (S) ☐County (C) ☐Indian (I) ☐Municipal (M) ☐District (D) ☐Private (P) ☐Other (O) Specify:

X. Operator Mailing Address (3)

Operator 3 Street Address or P.O. Box:

City: | **State:** | **County:** | **Zip Code:**

Facility Operator 3 Telephone Number: | **Phone Number Extension:**

New Operator Assumed Responsibility for Facility on this Date: (mm/dd/yyyy) __/__/____

EPA ID Number: KY0-001-012-012 **Agency Interest Number:** 48952

XI. PROCESS DESCRIPTION: (See Instructions)

a. Commercial Indicator	b. Unique Unit or Group Name	c. Legal Status Code	d. Operating Status Code(s)	e. Description of Process
2	FLAMSTORE	PI	OP	STORAGE OF FLAMMABLE WASTES IN CONTAINERS
2	OXPERSTORE	PI	OP	STORAGE OF OXIDIZERS AND PEROXIDE WASTES IN CONTAINERS
2	INOACSTORE	PI	OP	STORAGE OF INORGANIC ACID WASTES IN CONTAINERS
2	ORGASTORE	PI	OP	STORAGE OF ORGANIC ACID WASTES IN CONTAINERS
2	NFORGSTORE	PI	OP	STORAGE OF NON-FLAMMABLE ORGANIC WASTE IN CONTAINERS
2	HRBPTSTORE	PI	OP	STORAGE OF HERBICIDES / PESTICIDES IN CONTAINERS
2	CBSCNSTORE	PI	OP	STORAGE OF CAUSTICS, BASES, AND CYANIDE WASTES IN CONTAINERS
2	METALSTORE	PI	OP	STORAGE OF METAL CONTAMINATED WASTES IN CONTAINERS
2	REACTSTORE	PI	OP	STORAGE OF REACTIVE WASTES IN CONTAINERS
2	GASCYSTORE	PI	OP	STORAGE OF GASES IN GAS CYLINDERS

EPA ID Number: KY0 -001 - 012 - 012 **Agency Interest Number:** 48952

XI. PROCESS DESCRIPTION: (See Instructions)

a. Commercial Indicator	b. Unique Unit or Group Name	c. Legal Status Code	d. Operating Status Code(s)	e. Description of Process
2	BLENDSTORE	PI	OP	STORAGE OF WASTES BEING BLENDED FROM SMALL CONTAINERS INTO LARGER CONTAINERS; INVOLVES CONSOLIDATION OF WASTES INTO LAB PACK
2	PCBSTORE	PI	OP	STORAGE OF PCB CONTAMINATED MATERIALS IN CONTAINERS
2	STABILIZE	PI	OP	STABILIZATION OF INORGANIC OR FREE LIQUIDS
2	BLENDWASTE	PI	OP	BLENDING OF WASTE FROM SMALL CONTAINERS INTO LARGE CONTAINERS FOR OFF-SITE DISPOSAL; INVOLVES BULKING OF SIMILAR WASTE STREAMS INTO 55-GALLON DRUMS

EPA ID Number: KY0 – 001 – 012 – 012 Agency Interest Number: 48952

XII. WASTE STREAM DESCRIPTION (See Instructions)

a. Line Number	b. Waste Stream Number	c. Waste Description
AA-CK	1	Ignitable Liquid - Bulk
CL-FI	2	Ignitable Liquid - Labpack
FJ-GD	3	Ignitable Solid Labpack-Store
GE-GM	4	Corrosive, Acid Liquid - Bulk
GN-HF	5	Corrosive, Acid Liquid Labpack - Store
HG-HN	6	Corrosive, Base Liquid - Bulk
HO-HZ	7	Corrosive, Base Liquid Labpack - Store
IA-JV	8	Toxic Liquid - Bulk
JW-JY	9	Toxid Solid - Bulk
JZ-NZ	10	Toxid Liquid Labpack - Store
OA-SA	11	Toxid Solid Labpack - Store
SB-SJ	12	TCLP Liquid - Bulk
SK-SR	13	TCLP Solid - Bulk
SS-TP	14	TCLP Liquid Labpack - Store
TQ-UG	15	TCLP Solid Labpack - Store
UH-WK	16	Acute Hazardous Liquid Labpack - Store
WL-YO	17	Acute Hazardous Solid Labpack - Store
YP-ZF	18	Reactive Liquid Labpack - Store
ZG-ZU	19	Reactive Solid Labpack - Store
ZV-A2	20	Ignitable Gas - Store

EPA ID Number: KY0 – 001 – 012 – 012 **Agency Interest Number:** 48952

XII. WASTE STREAM DESCRIPTION (See Instructions)

a. Line Number	b. Waste Stream Number	c. Waste Description
A3-A5	21	Corrosive Gas - Store
A6-B6	22	Toxic Gas - Store
B7-C4	23	Mixed Waste Labpack - Store

EPA ID Number: KY0-001-012-012	Agency Interest Number: 48952
XIII. Facility Status	☐ Waste is NOT received from off-site ☐ Accepts waste from any off-site source(s) [A] ☒ Accepts waste from only a restricted group of off-site sources [R]: Specify: Belknap, Health Sciences Center, and ShelbyHurst Campus
XIV. Facility Owner Certification	If the facility owner is also the facility operator, please skip this section and complete item XV below. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. NAME (PRINT OR TYPE) SIGNATURE DATE
XV. Operator Certification	I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. Cheri Hildreth — SIGNATURE — 06/01/2022 NAME (PRINT OR TYPE) SIGNATURE DATE
XVI. Land Owner Certification	I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. NAME (PRINT OR TYPE) SIGNATURE DATE

PART A APPLICATION

EXHIBIT A-1

TOPOGRAPHIC MAPS

UNIVERSITY OF LOUISVILLE

ENVIRONMENTAL PROTECTION SERVICES CENTER

PART A APPLICATION

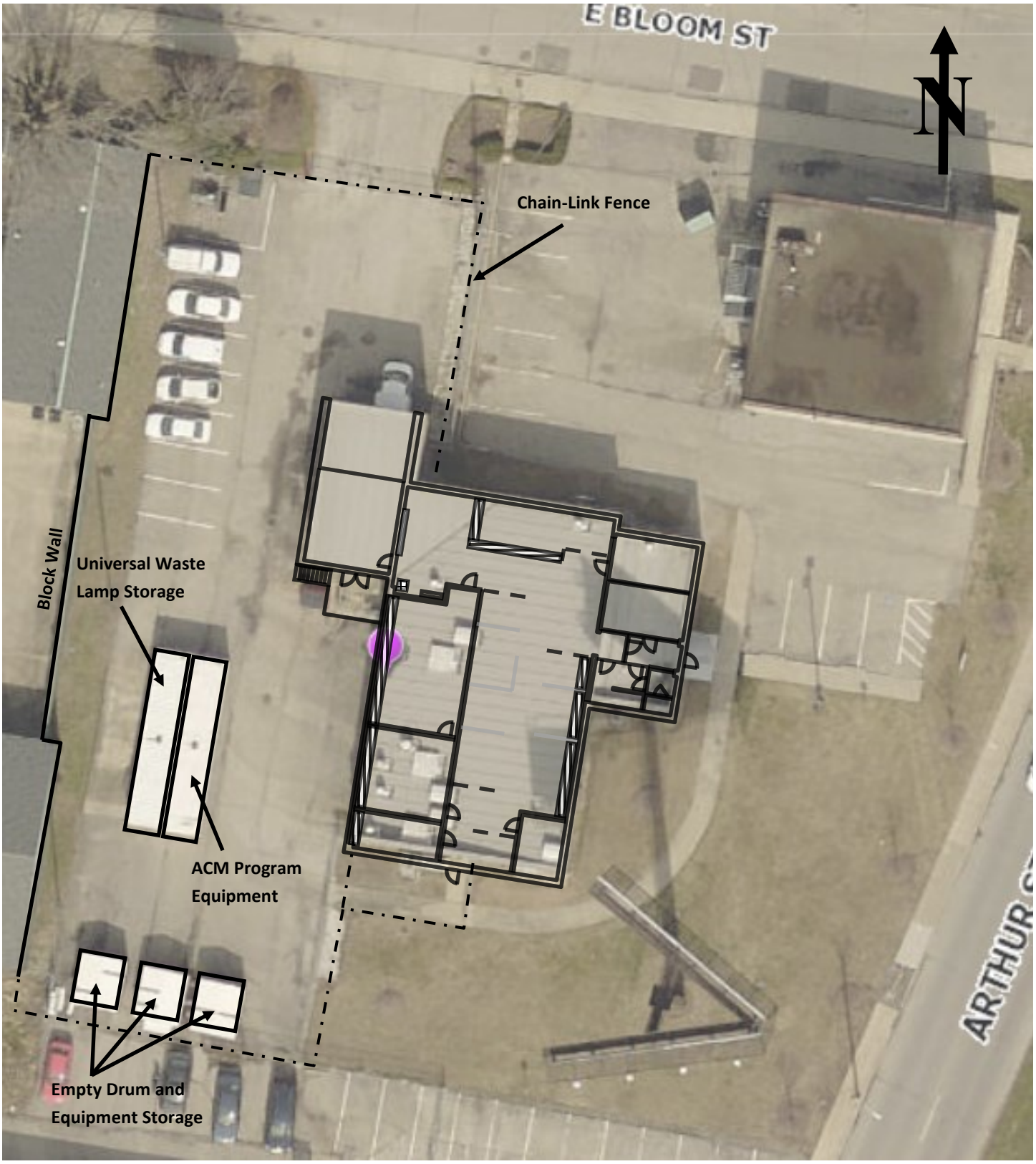
EXHIBIT A-2

PHOTOGRAPHS OF THE

UNIVERSITY OF LOUISVILLE

ENVIRONMENTAL PROTECTION SERVICES CENTER

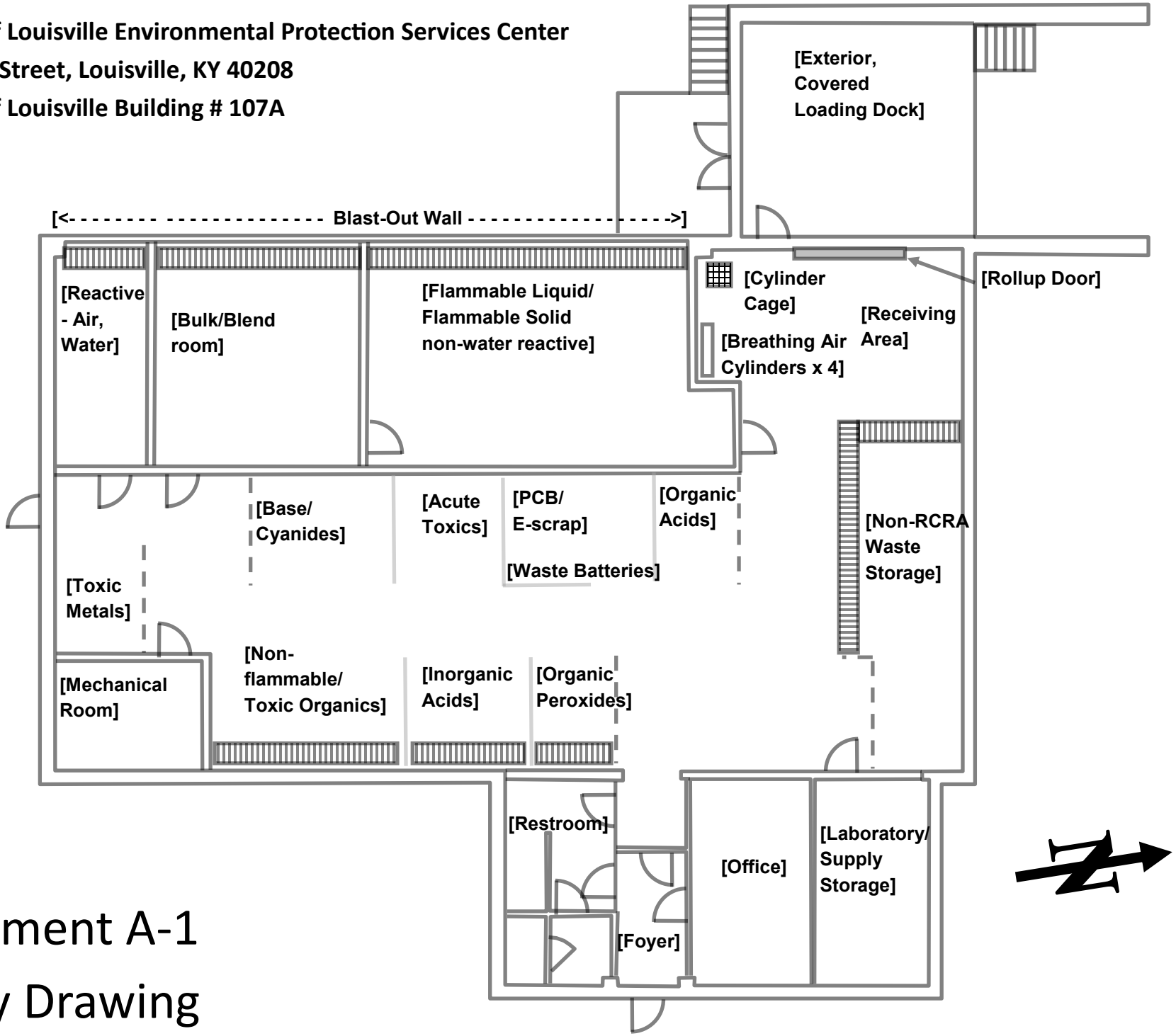
DRAWN BY RLB	FILE NO. P:\Indy Office\EPSC\EPSC Site Plan.dwg	University of Louisville Environmental Protection Services Center 1810 Arthur Street Louisville, KY 40208	EXHIBIT
APPROVED BY MPO	DATE 03/28/2019	SITE MAP	A-1
SOURCE USGS 7.5 minute topographic survey maps of Louisville East & Louisville West, KY, 2016.			
PROJECT NO. 7362 18 2596	SCALE 1" = 1500'		SHEET 1 of 1



University of Louisville Environmental Protection Services Center
1810 Arthur Street, Louisville, KY 40208
University of Louisville Building # 107A

Attachment A-1 Site Map

University of Louisville Environmental Protection Services Center
1810 Arthur Street, Louisville, KY 40208
University of Louisville Building # 107A



Attachment A-1
Facility Drawing

Photographic Log

Site Name: University of Louisville Environmental Protection Services Center (EPSC)

Site Location: Louisville, KY

Date:
January 28, 2019

Description: East side of EPSC showing entrance to office area.

Comments:

Photographer:
Mike Olges

PHOTO #1

Date:
January 28, 2019

Description: South side of EPSC showing fence extending from SW corner of building to south end of property.

Comments:

Photographer:
Mike Olges

PHOTO #2

Photographic Log

Site Name: EPSC

Site Location: Louisville, KY

Date:
January 28, 2019

Description:
Loading dock of EPSC on north side of facility.

Comments:

Photographer:
Mike Olges

PHOTO #3

Date:
January 28, 2019

Description: Interior of EPSC, main storage area.

Comments:
Organic peroxides, inorganic acids, and non-flammable toxic organics.

Photographer:
Mike Olges

PHOTO #4

Photographic Log

Site Name: EPSC

Site Location: Louisville, KY

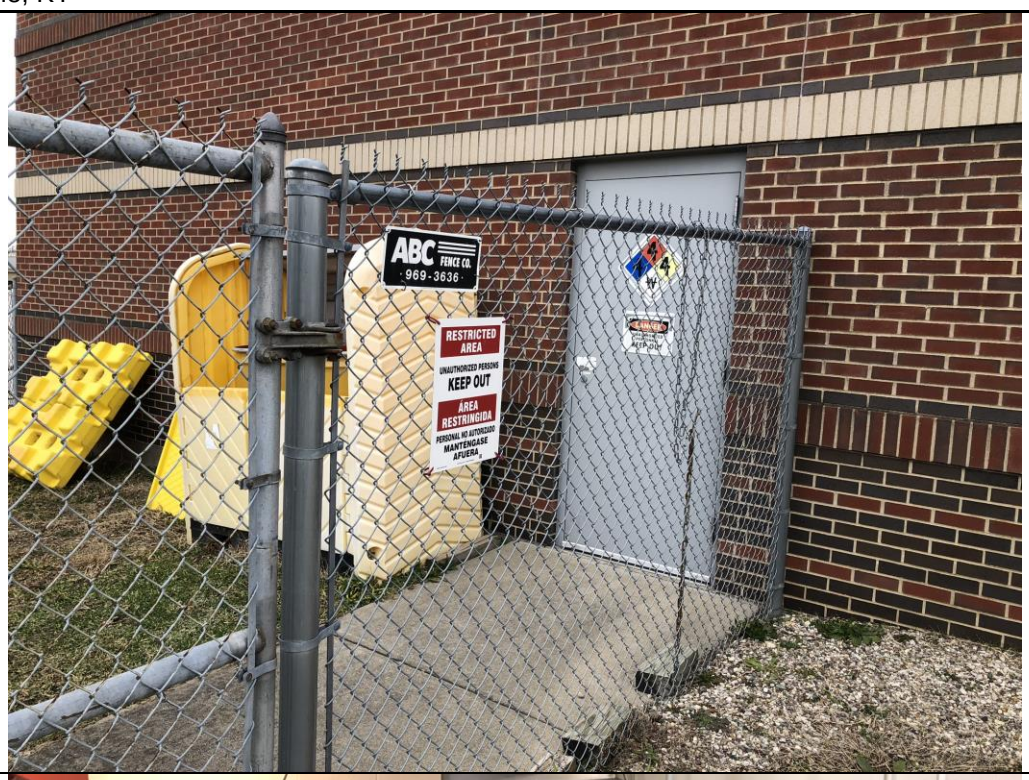
Date:
January 28, 2019

Description: Door on south side of building**.**

Comments:

Photographer:
Mike Olges

PHOTO #5



Date:
January 28, 2019

Description: Hood in blending and bulking room

Comments:

Photographer:
Mike Olges

PHOTO #6

Photographic Log

Site Name: EPSC

Site Location: Louisville, KY

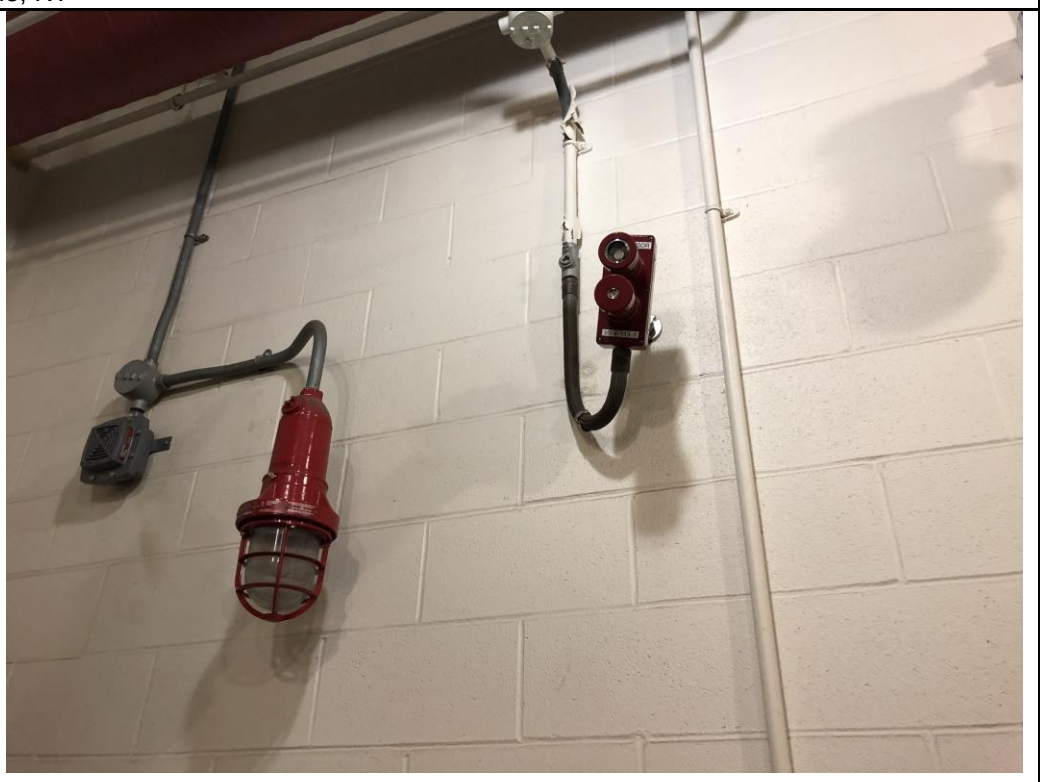
Date:
January 28, 2019

Description:
Explosion-proof lighting, smoke/fire detection and alarm systems, and infrared flame and thermal detector in flammables storage room.

Comments:

Photographer:
Mike Olges

PHOTO #5



Date:
January 28, 2019

Description: Lower explosion limit sensor in blending/bulking room

Comments:

Photographer:
Mike Olges

PHOTO #6

Photographic Log

Site Name: EPSC

Site Location: Louisville, KY

Date:
January 28, 2019

Description: Interior of EPSC, main storage area.

Comments:
Base/cyanides and acute toxics

Photographer:
Mike Olges

PHOTO #7

Date:
January 28, 2019

Description: Interior of EPSC, main storage area.

Comments:
PCB, E-scrap, and waste batteries

Photographer:
Mike Olges

PHOTO #8

Photographic Log

Site Name: EPSC

Site Location: Louisville, KY

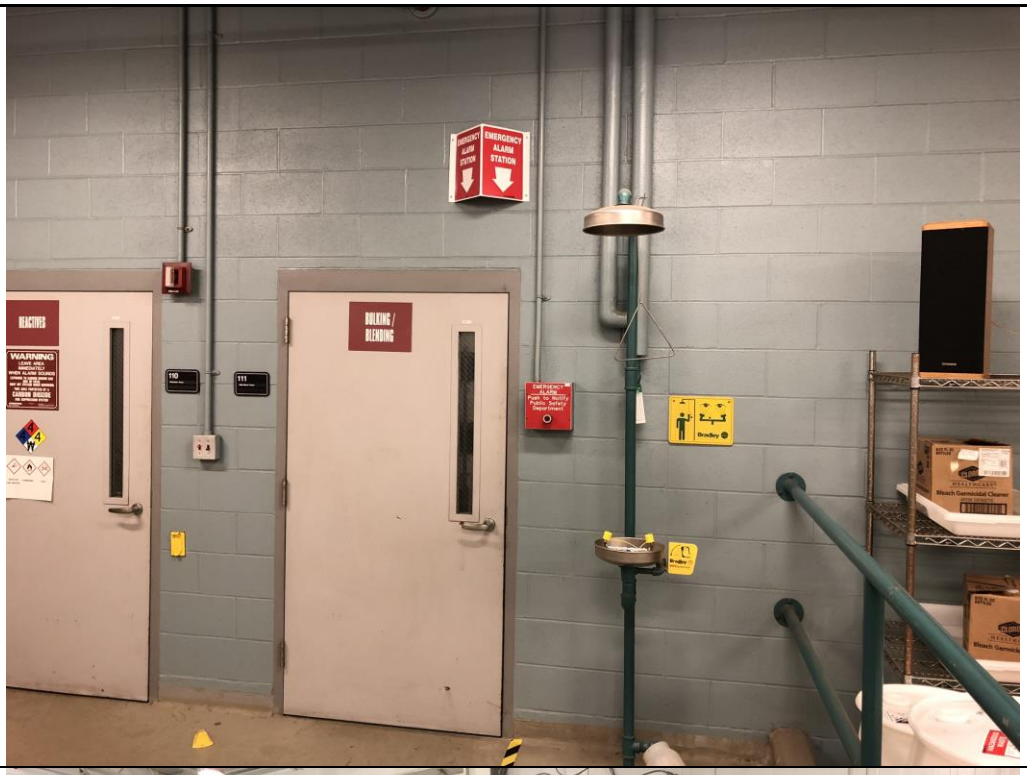
Date:
January 28, 2019

Description: Doors to the reactives room and the blending/bulking area

Comments:

Photographer:
Mike Olges

PHOTO #9



Date:
January 28, 2019

Description: View inside the flammable liquids and solids room.

Comments:

Photographer:
Mike Olges

PHOTO #10

Photographic Log

Site Name: EPSC

Site Location: Louisville, KY

Date:
January 28, 2019

Description:
Cylinder cage

Comments:

Photographer:
Mike Olges

PHOTO #11

Date:
January 28, 2019

Description:

Comments:
Non-RCRA waste storage area

Photographer:
Mike Olges

PHOTO #12

SECTION B –
FACILITY DESCRIPTION

B FACILITY DESCRIPTION

40 CFR 270.14(b)

B.1. GENERAL DESCRIPTION

40 CFR 270.14(b)(1)

The University of Louisville (U of L) is a multifaceted research, teaching, and medical treatment facility serving the Commonwealth. As a result of these operations, amounts of hazardous wastes are produced and must be managed in accordance with applicable regulations.

The U of L Environmental Protection Services Center (EPSC), at 1810 Arthur Street, Louisville, KY, is a repository for a wide variety of both hazardous and non-hazardous wastes from University operations only. The EPSC is operated by the U of L Department of Environmental Health and Safety (DEHS), and has an United States Environmental Protection Agency (USEPA) ID number (KY0-001-012-012). The EPSC accepts waste from the ShelbyHurst Campus, the Belknap Campus, the Health Science Campus, the Forensic Pathology Laboratory, and the Center for Predictive Medicine.

This Part B application renewal reflects the design specifications and management procedures to be conducted by the facility in accordance with applicable regulations. The location of the facility is shown in Attachment B-1.

The Kentucky Division of Waste Management (DWM) issued a hazardous waste management permit to the EPSC effective on October 19, 1996. The facility receives waste and stores and/or treats it for eventual shipment to an off-site treatment, storage, or disposal facility. Typically, waste generation is from research laboratories, chemistry teaching laboratories, and some routine maintenance.

The facility Part A application (Section A) specifically lists the RCRA hazardous wastes considered acceptable by the facility. Section C, Waste Characteristics, provides a detailed description of the wastes to be managed by the facility.

The facility also manages such non-hazardous wastes as:

- Asbestos
- Polychlorinated Biphenyls
- Waste Oils
- Pesticides/Herbicides not specifically listed or characterized in 40 CFR 261
- Off-spec or out-dated pharmaceuticals
- Off-spec or out-dated chemicals not specifically listed in 40 CFR 261 or characteristically hazardous.

Land disposal restricted hazardous wastes are received for storage. Storage of these wastes will be limited to one year in accordance with 40 CFR 268.50, unless circumstances exist which require longer storage (i.e. no disposal capacity for a particular

waste stream). If longer storage is required, the appropriate documentation of the reason for this time extension will be maintained by DEHS. The facility also stores mixed waste.

All wastes to be picked up by DEHS must be accurately described. When an unknown material or waste is discovered, an attempt to identify its contents will be routinely undertaken. Usually the contents can be identified by consulting individuals who work in the area where the unknown was found. If this fails, the chemical will be analyzed, and the cost of analysis will be borne by the department in which the unknown was generated.

Several routine operations are required for the proper handling and shipment as well as control of the waste minimization program and disposal costs. Operations utilized at the facility may include, but are not limited to the following:

- Addition of absorbents to containers for shipment.
- Lab packing of wastes for shipment to an off-site facility for disposal or treatment.
- Elementary neutralization in containers.
- Blending/bulking of compatible materials into larger containers for eventual shipment off-site for disposal or treatment.
- Stabilization of reactives on a case-by-case basis for storage or shipment off-site.

B.2. TOPOGRAPHIC MAP

40 CFR 270.14(b)(19)

A topographic map from the Louisville/Jefferson County Information Consortium (LOJIC) showing a distance of 1,000 feet around the facility at a scale of one (1) inch equals 200 feet is provided in Attachment B-2. A topographic map from the U.S. Geological Survey is also provided in Attachment B-2. A water well search was conducted on a 1,000-foot radius around the EPSC using the Kentucky Geological Survey (KGS) database. Attachment B-2 provides an aerial photograph and a topographic map showing the well locations, as well as tables with information on each well. The wells contained in the KGS database are monitoring wells. No injection or withdrawal wells are present within the 1,000-foot radius.

Wind rose information is provided as Attachment B-3.

B.3. LOCATION INFORMATION

40 CFR 270.14(b)(11) and 40 CFR 264.18

B.3.a Geological Information

Local Geology

The EPSC is underlain by sand, gravel, silt, and clay glacial outwash sediments. Soils underlying the campus are of the Wheeling-Weinback-Huntington Association. These well-drained soils developed in mixed alluvium that washed from the upper part of the Ohio River drainage basin. Additionally, artificial fills are common throughout the area.

Area of Site Geology

Geotechnical investigations of a nearby former convenience store can be used to demonstrate the anticipated geology in the immediate area of the site. This nearby site is located in the southeast quadrant of the intersection of Brandeis Avenue and Floyd Street in Louisville, Kentucky approximately 1000 feet from the EPSC.

Based on a review of the site investigation reports, the general soil profile is as follows:

0 to 3 feet	Stiff, dark brown, silty clay with gravel, red brick fragments, trace cinders (fill)
3 to 10 feet	Silty clay and clayey silt
10 to 12 feet	Clayey silt with fine sand lenses; silty sand
12 to 18 feet	Weathered black shale

Groundwater measurements indicated water levels from an approximate elevation of 444.49 to 451.15 feet. Fluctuations in the groundwater table will occur in response to seasonal influences and precipitation. Groundwater varied between 28 to 35 feet below grade at this location.

In addition, subsurface investigations have been conducted at MacKay Gravure Systems Louisville plant located adjacent to the site on the opposite corner of Arthur and Bloom Streets. At this location, New Albany Shale was encountered at depths between 9.0 and 10.6 feet below ground surface. Groundwater was encountered at the soil-bedrock interface.

Attachment B-7 contains a geologic map in the vicinity of the EPSC.

B.3.a (1) Seismic Considerations

40 CFR 270.14(b)(11)(i) & (ii) 40CFR 264.18(a)

Portions of new facilities where treatment or storage of hazardous waste will be conducted cannot be located within 200 feet of a fault which had displacement in Holocene time. The facility is located in Jefferson County, Kentucky, and is not within one of the political jurisdictions identified in Appendix VI of 40 CFR 264. Therefore, the

data evaluation and the EPA identification show that no further demonstration of compliance with the seismic standard is required.

B.3.a (2) An Evaluation of Subsurface Geological Formations and Surface Topography for Solution or Karst Features

401 KAR 39:060 Section 5(15)

All applicants for hazardous waste facilities are required to provide an evaluation of subsurface geologic formations and surface topography for solution or karst features. Based on existing geologic data described in Section B.3.a, the facility is not underlain by soluble limestone. Therefore, the U of L is exempt from the requirements of 401 KAR 39:060 Section 5(15).

B.3.b Floodplain Standard

40 CFR 270.14(b)(11)(iii) & (iv)
40 CFR 264.18(b)

Applicants for hazardous waste facilities must provide an identification of whether the facility is located within a 100-year flood plain, floodway, or seasonal high water table. One hundred year flood plains are identified in Flood Insurance Rate Maps (FIRM) developed by the Federal Emergency Management Agency (FEMA).

The EPSC was identified on FIRM Panel 70 of 330, Map Number 21111 C0070 D. The hazardous waste facility is located in Zone X, which is an area determined to be outside the 500-year flood plain (Attachment B-4). The nearest areas within a 100-year flood plain are approximately four (4) miles to the southeast, three (3) miles to the southwest, and two (2) miles to the northeast. Because the location of the facility is not within the boundary of the 100-year flood plain, no demonstration of compliance is required.

B.4. TRAFFIC INFORMATION

40 CFR 270.14(b)(10)

This section is intended to provide a description of the means of transporting hazardous wastes to and from the facility.

The U of L is traversed by primary and secondary roads. Access to the facility is from the secondary or local streets. Specifically, the facility is located on Arthur Street. Ingress and egress into the facility can be accomplished from East Bloom Street, which is a local street (see Attachment B-1). These local streets are maintained by the Louisville Metro and, as such, are built in accordance with City specifications. Load limits for these roads are 73,280 pounds. No traffic signals are present at the entrance to the EPSC.

Access routes to the facility are constructed of non-reinforced concrete with an underlying dense graded aggregate base. The aggregate base consists of various types and sizes of rock. The access routes are built in accordance with Louisville Metro specifications.

The Louisville Metro Department of Public Works has conducted turning movements and traffic counts for the intersection of Brandeis Avenue and Arthur Streets. These data demonstrate general traffic patterns for this intersection and are presented in Attachment B-5. Based on this information, the majority of the vehicles which traveled through the intersection were personal vehicles (approximately 5% were trucks).

Maps demonstrating traffic flows both to and from the nearest major highway (Interstate 65 North and South) are given in the text below. These maps show the streets utilized by the EPSC to bring waste materials to and from the Belknap, Health Science Center, ShelbyHurst Campus, and other small generator locations. These routes may be deviated from if: a) alternative routes reduce travel distances, b) weather conditions prohibit traffic movement, or c) traffic has been re-routed due to an accident. A description of this traffic information is as follows:

Movement of Waste to and from the Facility

I. Trucks coming from the North to the Facility

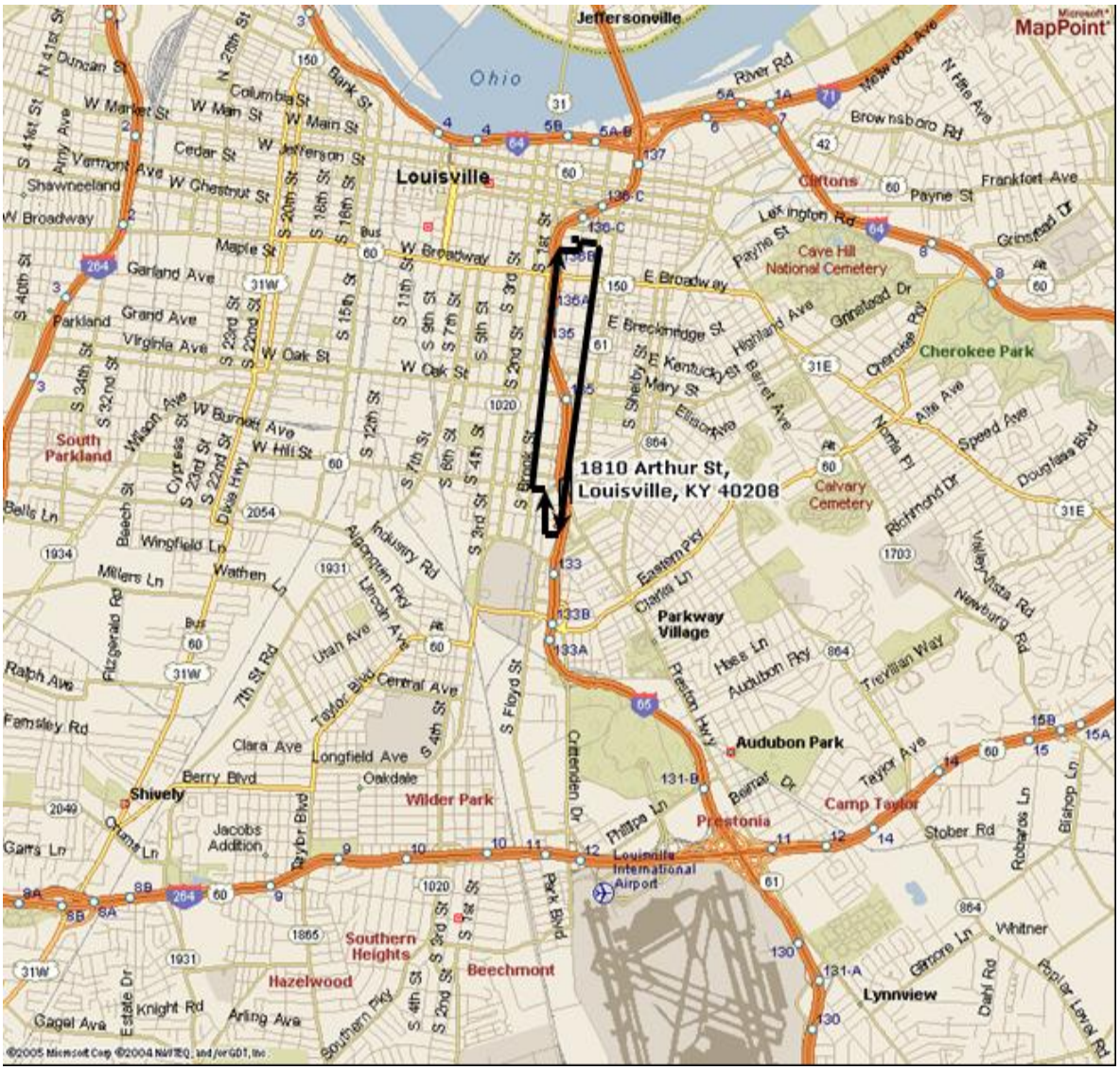
Vendor trucks will be traveling on I-65 South and will exit at the Arthur Street Exit. They will take a right turn to East Bloom Street. The trucks will turn left off of East Bloom Street into the facility.

The U of L Hazardous Waste truck departs the Health Science Center Campus via local side streets, mainly Preston Street to the south. From Preston, a ramp to I-65 south joins the Arthur Street exit. The truck then turns right on Bloom Street and enters the facility parking lot.

II. Trucks leaving the Facility to the North

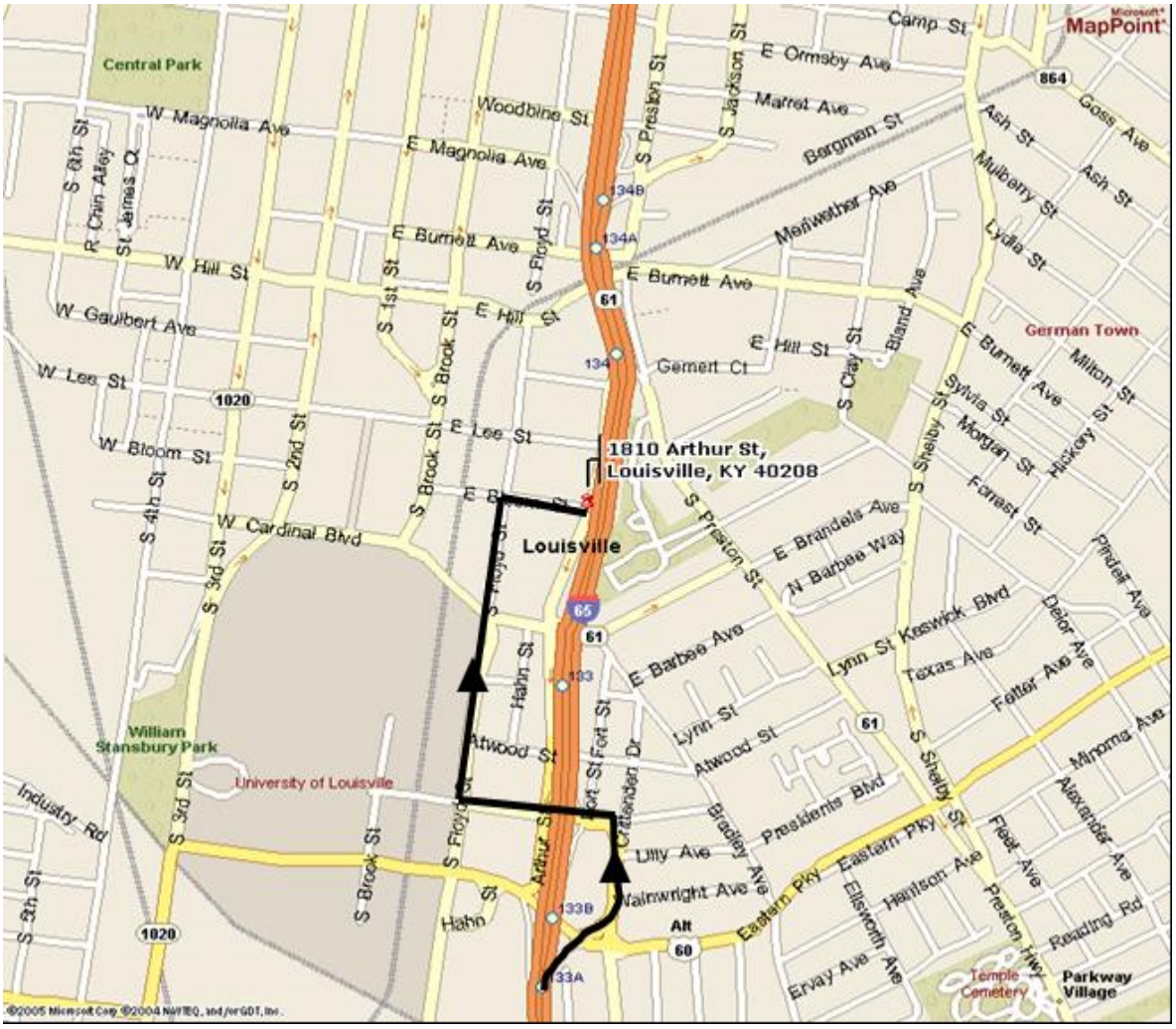
Vendor trucks will exit the Facility on East Bloom Street and turn right onto Arthur Street. The trucks will continue south on Arthur Street one block and turn left onto Brandeis Street. At the intersection of Brandeis and Preston, trucks will turn right and continue to the north bound I-65 on ramp from Preston Street.

The U of L Hazardous Waste truck departs the EPSC turning left onto Bloom Street. The truck turns right onto Floyd Street and proceeds north to Hill Street, turning left and proceeding west on Hill one block to Brook Street. At Brook, the truck makes a right turn to the north and proceeds approximately two miles to Chestnut Street. A right turn on Chestnut takes the truck one block to Floyd Street, where the truck turns left proceeding to the north. One block later the truck turns left onto Abraham Flexner Way for U of L Parking at the Health Science Center Campus.



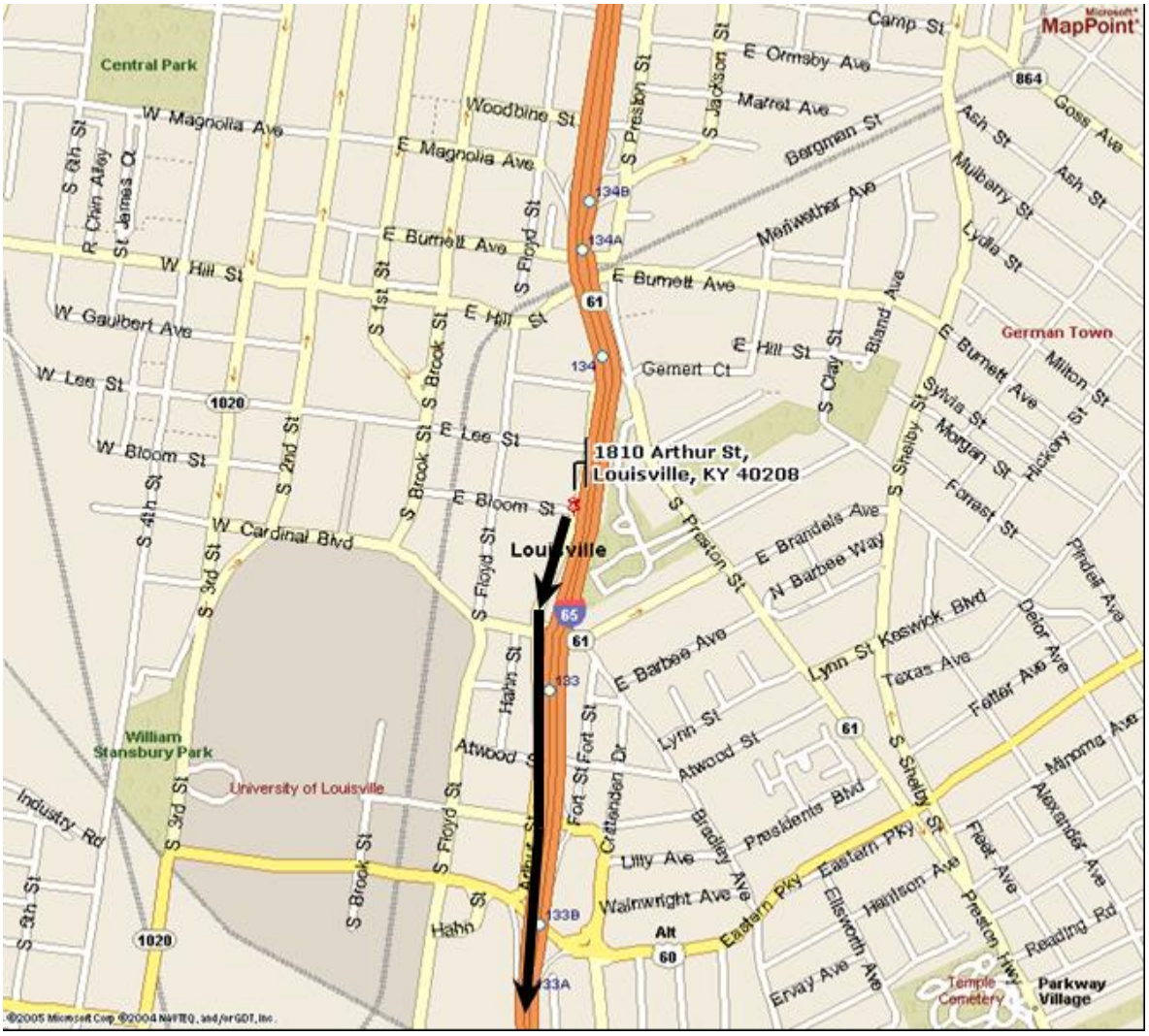
III. Trucks coming from the South to the Facility

The trucks coming up I-65 North will exit at the Eastern Parkway East Exit. At the bottom of the off ramp the trucks will move across Eastern Parkway to the left turn lane. The trucks will turn left onto Crittenden Drive and proceed one block and turn left again on Warnock Street. The trucks will cross Arthur Street and proceed one block to Floyd Street, turning right onto Floyd at McDonalds. Approximately ½ mile later, at the second intersection on the right, the trucks will turn right onto East Bloom Street and continue east approximately one block to the facility.



IV. Trucks leaving the Facility to I-65 South

The trucks will exit the Facility on East Bloom Street and turn right on to Arthur Street. The trucks will continue south on Arthur Street for approximately ½ mile to the south bound I-65 on ramp.



V. Trucks moving waste to and from the Belknap Campus

Trucks will use local access roads through the campus to transport waste via South Floyd Street. Once on South Floyd Street the trucks will continue to East Bloom Street and the facility.

An estimated one or two shipments of waste per day will be transported to the facility in a DEHS vehicle. Waste will be transported from the facility an estimated two to four times per year by an outside contractor. The effects on traffic from the facility will be negligible. Veolia Environmental Services transports most of the hazardous waste from the EPSC to the TSDF via a 53-foot tractor trailer. In the event that the previously mentioned 53-foot tractor trailer cannot fit all of the waste, Veolia will transport the waste to their local 10-day in transit facility via a 30-foot box truck with a lift gate and/or a pickup truck with a topper and lift gate. Bionomics, Inc. transports our mixed waste to the TSDF via a 30-foot box truck with a lift gate. UofL DEHS transports all hazardous and mixed waste to the EPSC via a Chevy Truck with a Stahl Body with a length of 10-feet and a lift gate.

B.5. REQUIREMENT FOR APPLICANTS FOR CONSTRUCTION PERMITS

401 KAR 39:060 Section 5(8)

Not applicable.

B.6. PAST COMPLIANCE RECORD

401 KAR 39:060 Section 5(14)

401 KAR 39:060 Section 5(14) requires that Part B applications provide past compliance records for both the applicant and any other individual or entity designated to own or operate the site (as required by KRS 224.40-330(1)) as follows:

a) Organizational structure
b) Detailed listing of violations of environmental laws and regulations for every individual listed in a)
c) A current financial statement prepared by a certified public accountant.
d) Applicant Disclosure Statement form for the company.
e) Key Personnel Disclosure Statement forms.

The regulations provide guidance for the following organizational structures:

- Proprietorship
- General or listed partnership
- Corporation
- Joint venture

As the U of L does not meet any of these organizational structures, the regulatory language of 401 KAR 39:060 Section 5(14) is not applicable. However, the language of KRS 224.40-330(1) is broader and is applicable to the U of L.

KRS 224.40-330(1) states:

The cabinet may revoke, modify, suspend, or deny a permit for a waste site or facility if the applicant, or any of its key personnel has:

(a) Intentionally misrepresented or concealed any material fact in the application;
(b) Obtained or attempted to obtain the permit by misrepresentation or concealment;
(c) Been convicted by final judgment of any felony within five (5) years preceding the filing of the application;
(d) Been adjudicated by an administrative agency or a court to have violated the environmental protection laws or administrative regulations of the United States, the Commonwealth, or any other state, and the cabinet determines that the conviction or adjudication is sufficiently probative of the applicant's inability or unwillingness to operate the facility in a lawful manner as to warrant revocation, modification, suspension, or denial of the permit. In making the determination, the cabinet shall consider:

1. The nature and details of the acts attributed to key personnel;
2. The degree of culpability of the applicant, if any;
3. The applicant's policy or history of discipline of key personnel of such activities;
4. Whether the applicant has substantially complied with all rules, administrative regulations, permits, orders, and statutes applicable to the applicant's activities in Kentucky;
5. Whether the applicant has implemented formal management controls to minimize and prevent the occurrence of these violations; and
6. Mitigation based upon demonstration of good behavior by the applicant, including prompt payment of damages, cooperation with investigations, termination of employment or other relationship with key personnel or other persons responsible for the violations, or other demonstrations of good behavior by the applicant that the cabinet finds relevant to its decision.

KRS 224.1-010(44) defines "key personnel" as an officer, partner, director, manager, or shareholder of five percent (5%) or more of stock or financial interest in a corporation, partnership, or association or parent, subsidiary, or affiliate corporation and its officers, directors, or shareholders of five percent (5%) or more of stock or financial interest.

The U of L, as a state institution, does not employ anyone which meets the definition of key personnel. Thus, KRS 224.40-330(1) is relevant to the applicant only.

B.6.a Intentional Misrepresentation of Material Fact
KRS 224.04-330(1)(a)

The U of L has not intentionally misrepresented or concealed any material fact in this application. The certification of trueness, accuracy, and completeness is provided in Section L.

B.6.b Permit Misrepresentation
KRS 224.04-330(1)(b)

The U of L has not attempted to obtain a hazardous waste permit by misrepresentation or concealment. The application is certified as being true, accurate, and complete in Section L.

B.6.c Felony Conviction
KRS 224.04-330(1)(c)

The U of L has not been convicted by final judgment of any felony within the five (5) years preceding the submittal of this application.

B.6.d Compliance History

The "Applicant Compliance Record", form DEP 7087H, is provided as Attachment B-6.

B.7 Financial Responsibility to Construct and Operate

401 KAR 39:090 SECTION 7 and KRS 224.46-520(3)

FEES

In accordance with KRS 224.10-100(20), the U of L, as a publicly-owned facility, is exempt from all permit application fees.

B.8 PUBLIC PARTICIPATION

40 CFR Sec. 124.31 and

This is not applicable as the U of L is not seeking a permit renewal involving a "significant change", which 40 CFR 124.31 defines as "any change that would qualify as a class 3 permit modification under 40 CFR 270.42".

ATTACHMENT B-1

Site Plans

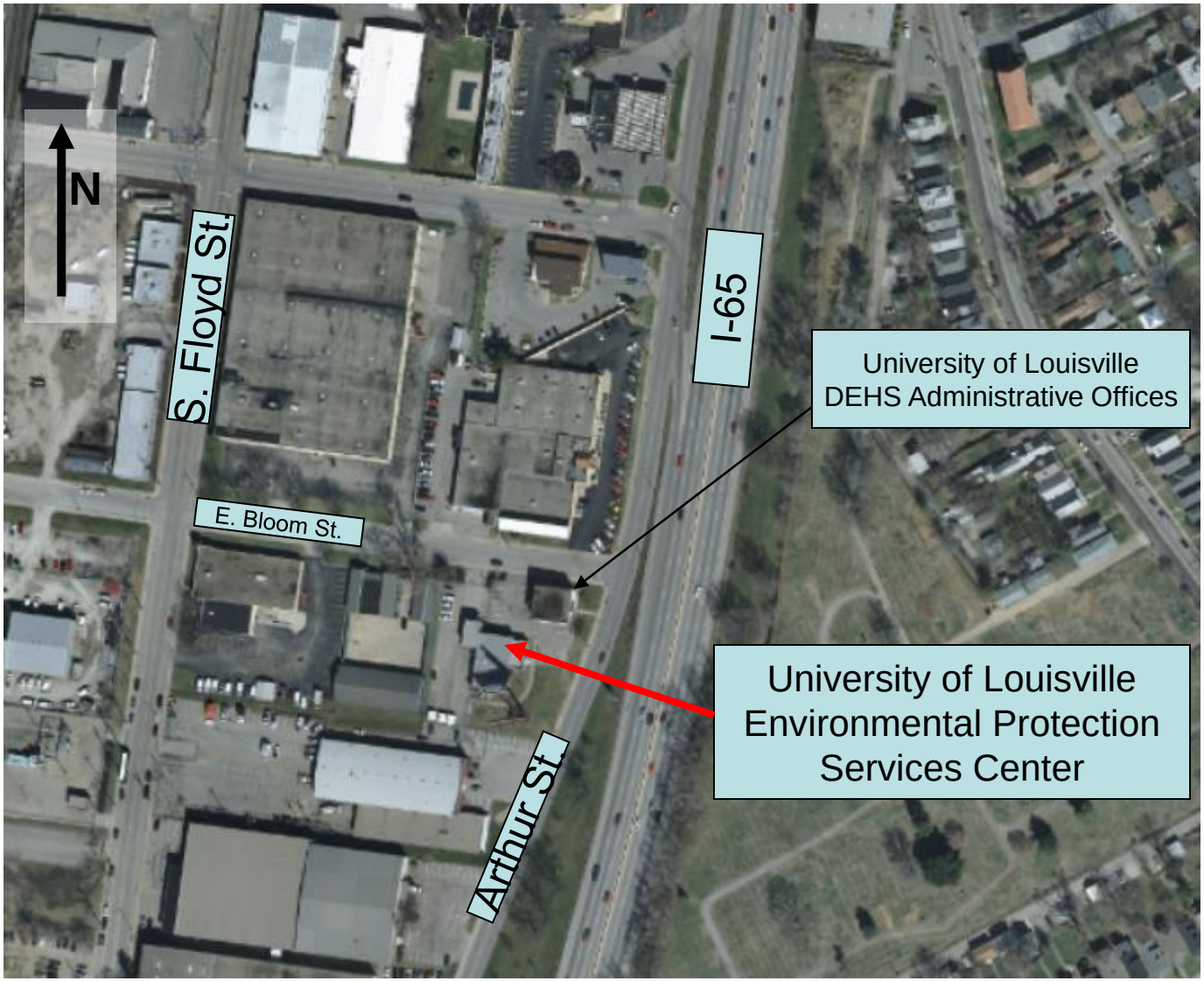


Photo Source: http://kygeonet.maps.arcgis.com
Photo Date: 2012

200 feet

Attachment B-1
Site Plan

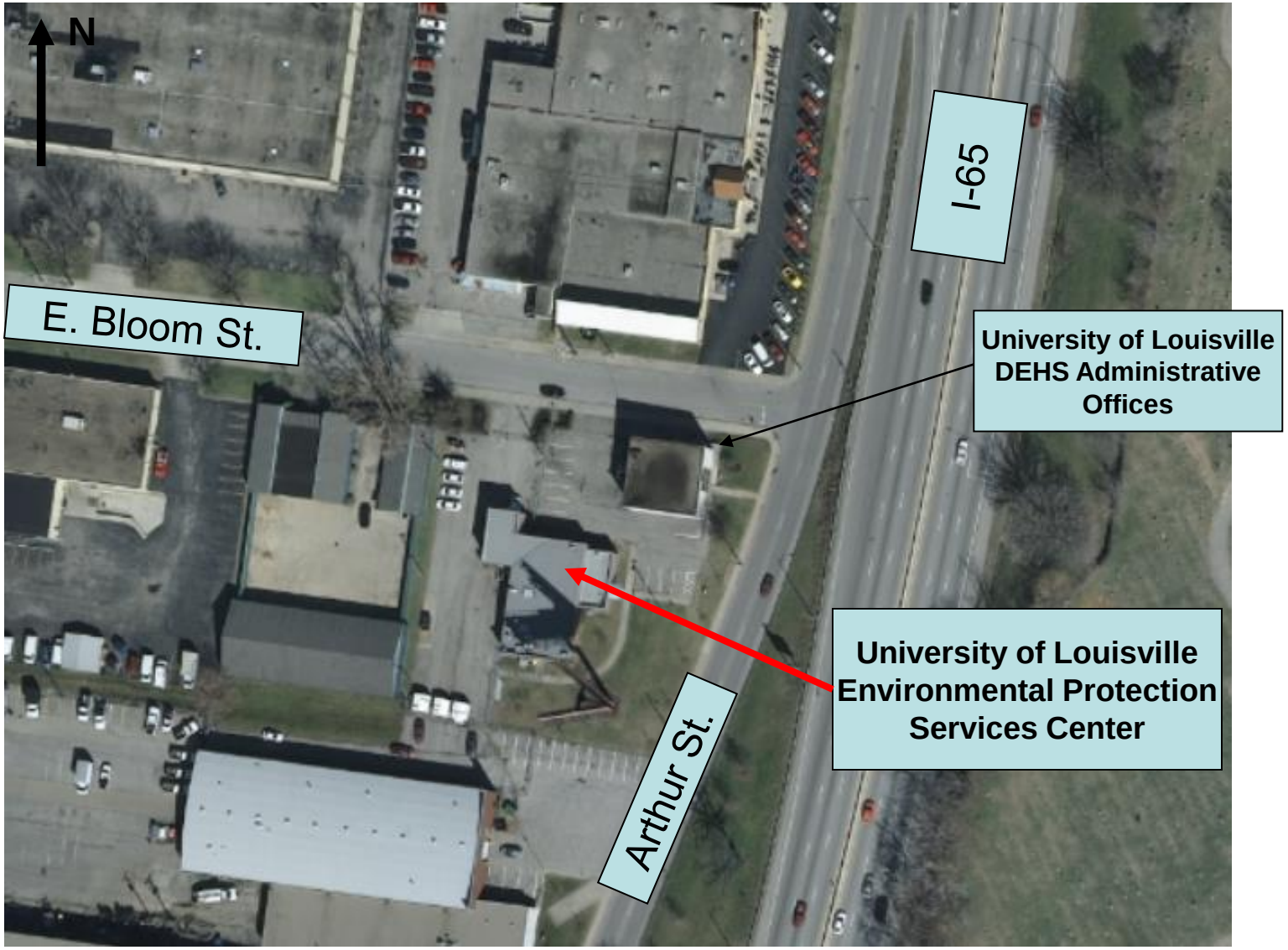


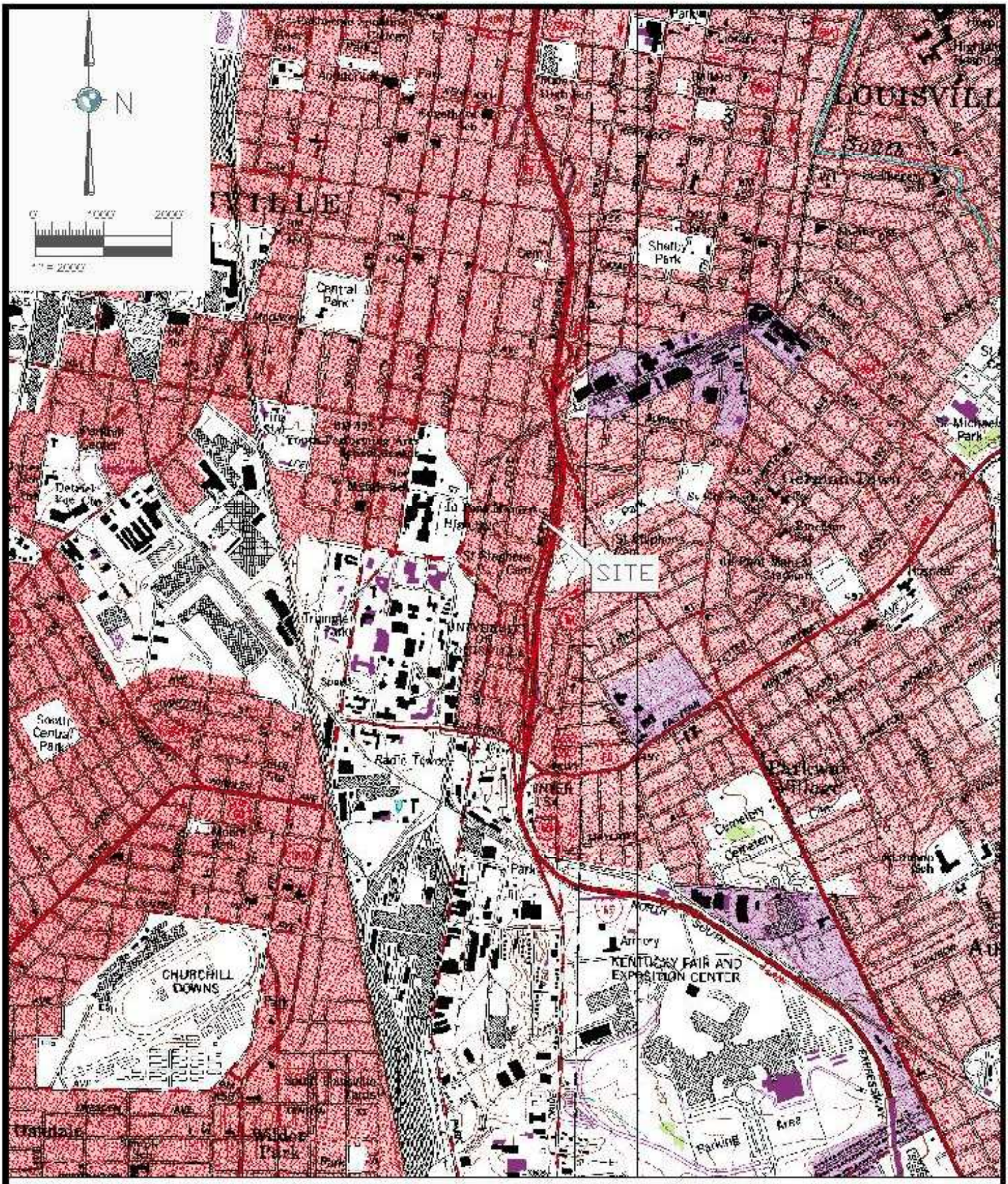
Photo Source: http://kygeonet.maps.arcgis.com
Photo Date: 2012

200 feet

Attachment B-1
Site Plan

ATTACHMENT B-2

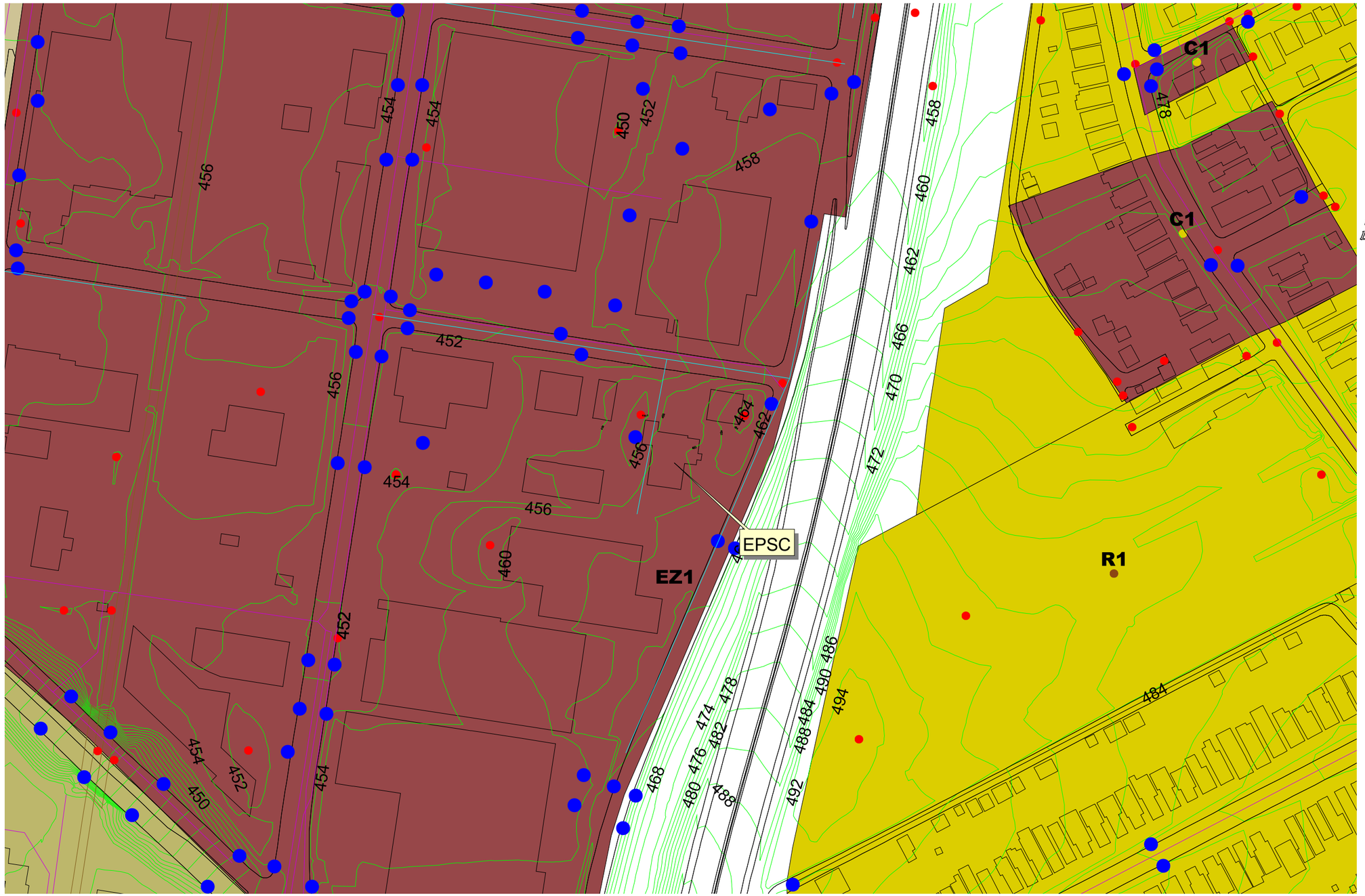
Topographic Maps



REF: USGS TOPOGRAPHICAL QUADRANGLE LOUISVILLE EAST KY AND LOUISVILLE WEST KY

UNIVERSITY OF LOUISVILLE ENVIRONMENTAL PROTECTION SERVICES CENTER	USGS TOPOGRAPHICAL QUADRANGLE	ATTACHMENT B-2

FILE: P:\7362\UOFL-546260DOC-RCRAPARTBAPPLICATION\CAD-GIS\USGSTOPO



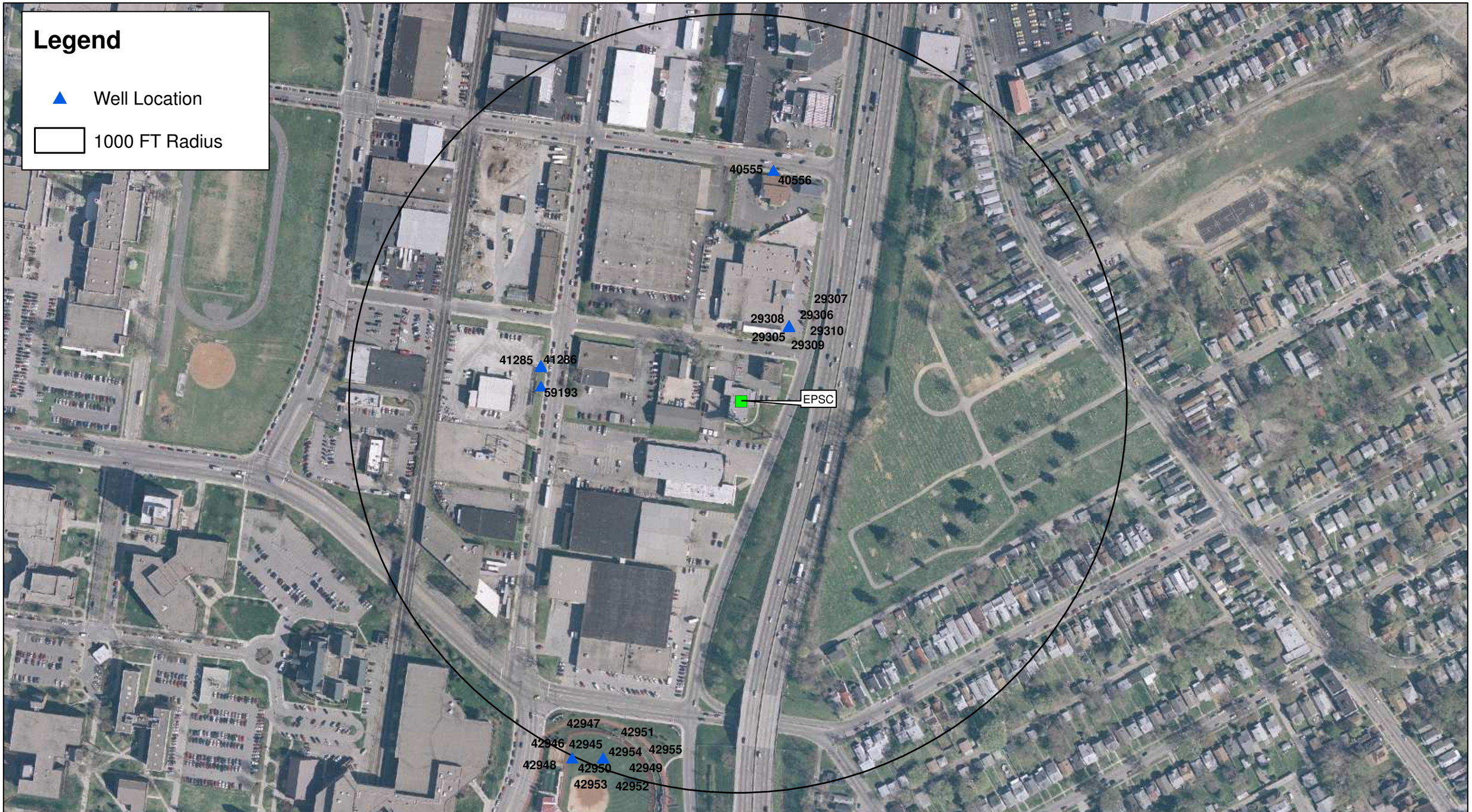
LOJIC™
Louisville/Jefferson County Information Consortium

Copyright (c) 2004, Louisville and Jefferson County Metropolitan Sewer District (MSD) Louisville Water Company (LWC) and Louisville Metro Government All Rights Reserved

EZ1 - Enterprising Zone
R1 - Residential Single Family District
C1 - Commercial District

Legend:
Contour Line with Elevation
Zoning Residential
Sewer
Catch Basin
Drainage
Zoning Commercial
Spot Elevation

UNIVERSITY OF LOUISVILLE ENVIRONMENTAL PROTECTION SERVICES CENTER	LOJIC Topographic Map	ATTACHMENT B-2



amec
Earth & Environmental, Inc.
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299
Tel: (502) 267-0700
Fax: (502) 267-5900

University of Louisville
Environmental Protection Services Center

N

0 200 400 600 800 Feet

0 100 200 Meters

WATER WELL LOCATIONS

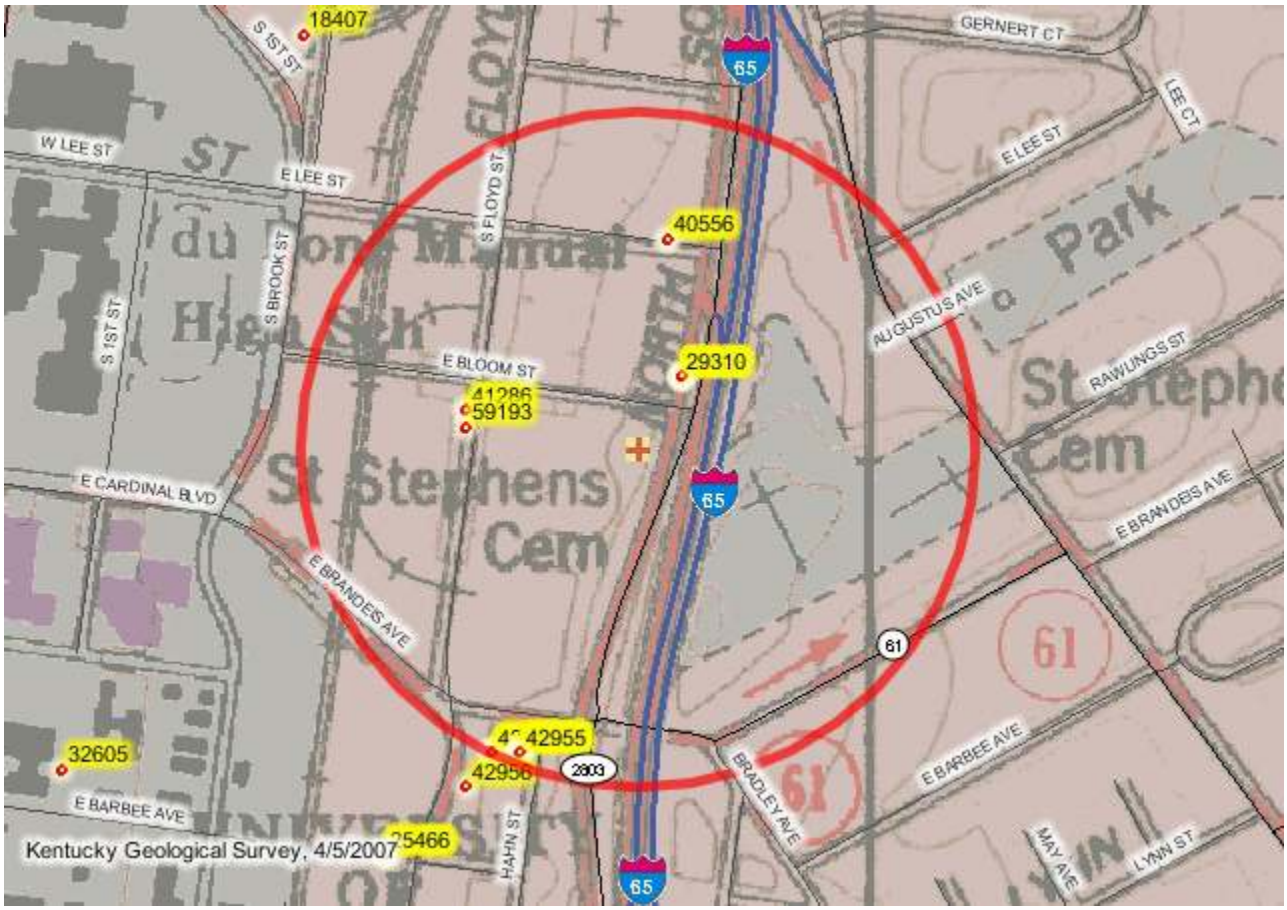
Notes:
Spatial Data Provided by LOJIC and Kentucky Geological Survey

Attachment B-2

Kentucky Groundwater Data Repository
Kentucky Geological Survey
Water Well and Spring Location Map

Current Scale = 1:6,947

Search Criteria:
search radius: **1000 feet**
lat,lon: **38.220591, -85.752352**;
7.5' quadrangle: **Louisville West**



WELL TABLE:

Symbol	KGS ID	AKGWA #	Primary Use	Distance from Circle Center
	29305	80015900	monitoring	251 ft | 76 m
	29306	80015899	monitoring	252 ft | 77 m
	29307	80015898	monitoring	252 ft | 77 m
	29308	80015897	monitoring	251 ft | 76 m
	29309	80015895	monitoring	251 ft | 76 m

Symbol	KGS ID	AKGWA #	Primary Use	Distance from Circle Center
	18407	80004783	monitoring	1577 ft | 481 m
	25463	80015200	monitoring	1415 ft | 431 m
	25464	80015195	monitoring	1414 ft | 431 m

	25465	80015194	monitoring	1414 ft | 431 m
	25466	80015191	monitoring	1414 ft | 431 m

Symbol	KGS ID	AKGWA #	Primary Use	Distance from Circle Center
	29310	80015896	monitoring	252 ft | 77 m
	32605	80006648	monitoring	1952 ft | 595 m
	40555	80030701	monitoring	626 ft | 191 m
	40556	80030702	monitoring	628 ft | 191 m
	41285	80035635	monitoring	523 ft | 159 m

	KGS ID	AKGWA #	Primary Use	Distance from Circle Center
	41286	80035637	monitoring	523 ft | 159 m
	42945	80009789	monitoring	994 ft | 303 m
	42946	80009790	monitoring	994 ft | 303 m
	42947	80009791	monitoring	995 ft | 303 m
	42948	80009792	monitoring	995 ft | 303 m

Symbol	KGS ID	AKGWA #	Primary Use	Distance from Circle Center
	42949	80014667	monitoring	960 ft | 293 m
	42950	80014668	monitoring	963 ft | 293 m
	42951	80014669	monitoring	961 ft | 293 m
	42952	80014670	monitoring	961 ft | 293 m
	42953	80014666	monitoring	961 ft | 293 m

Symbol	KGS ID	AKGWA #	Primary Use	Distance from Circle Center
	42954	80014671	monitoring	961 ft | 293 m
	42955	80014672	monitoring	963 ft | 293 m
	42956	80015356	monitoring	1121 ft | 342 m
	59193	80038590	monitoring	514 ft | 157 m

Attachment B-2
Water Wells Within 1000-Foot Radius of University of Louisville
Environmental Protection Services Center*

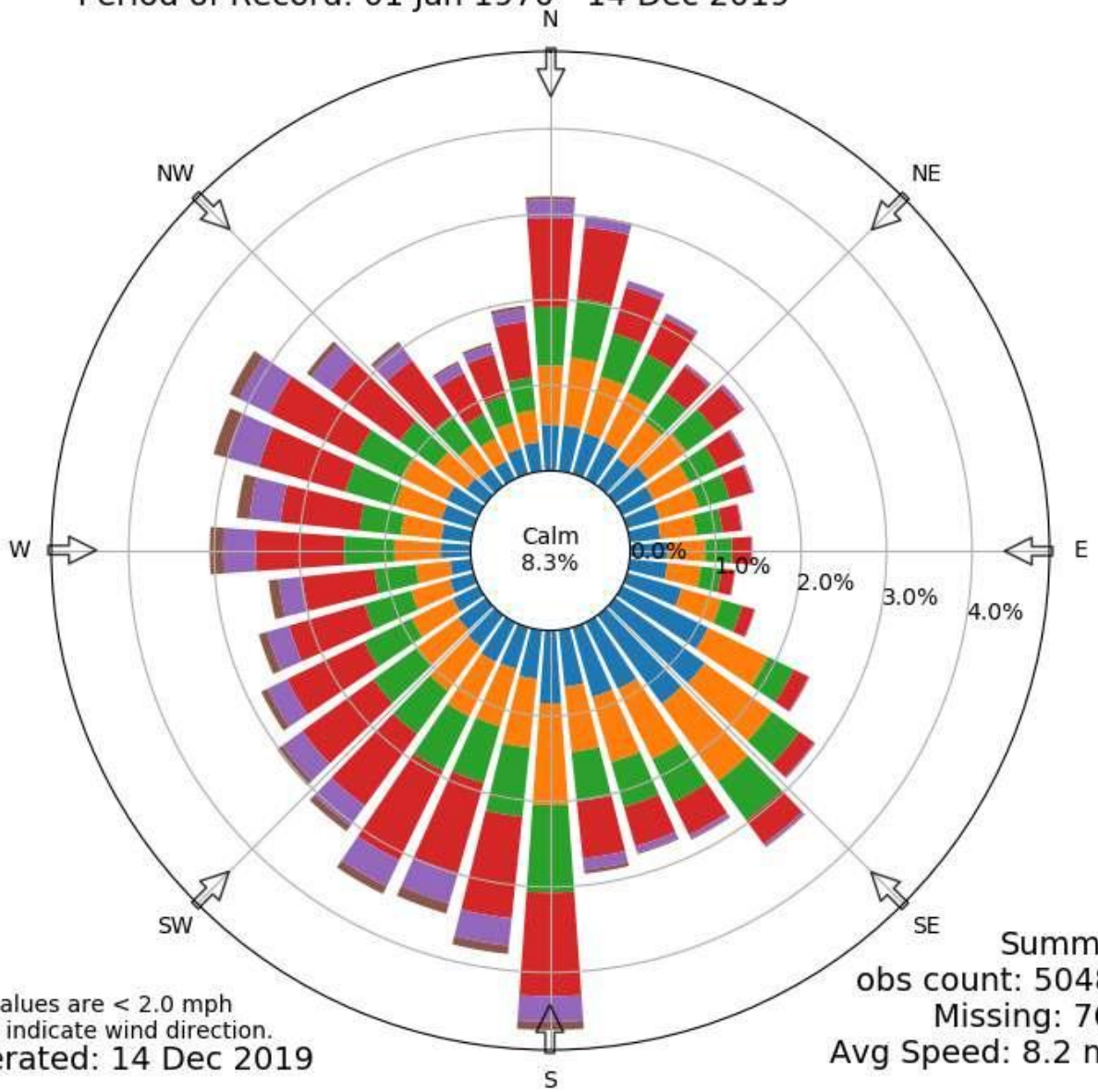
KGS ID	DOW AKGWA**	LATITUDE	LONGITUDE	INSTALLATION DATE	PRIMARY USE	TOTAL DEPTH (FEET)
29307.00000	80015898	38.22112	-85.75194	3/7/1995	Monitoring	14.0
29310.00000	80015896	38.22111	-85.75194	3/8/1995	Monitoring	14.5
42951.00000	80014669	38.21806	-85.75361	11/13/1998	Monitoring	14.5
42949.00000	80014667	38.21806	-85.75361	11/13/1998	Monitoring	18.5
42955.00000	80014672	38.21806	-85.75361	11/12/1998	Monitoring	13.0
40555.00000	80030701	38.22222	-85.75208	3/3/1998	Monitoring	20.0
29305.00000	80015900	38.22111	-85.75194	3/9/1995	Monitoring	14.5
29309.00000	80015895	38.22111	-85.75194	3/10/1995	Monitoring	14.5
29308.00000	80015897	38.22111	-85.75194	3/5/1995	Monitoring	13.5
42950.00000	80014668	38.21806	-85.75361	11/13/1998	Monitoring	20.5
42954.00000	80014671	38.21806	-85.75361	11/13/1998	Monitoring	14.0
42953.00000	80014666	38.21806	-85.75361	11/13/1998	Monitoring	14.5
42952.00000	80014670	38.21806	-85.75361	11/13/1998	Monitoring	15.0
41285.00000	80035635	38.22083	-85.75417	9/2/1998	Monitoring	18.0
59193.00000	80038590	38.22069	-85.75417	12/8/1999	Monitoring	13.5
40556.00000	80030702	38.22222	-85.75208	3/3/1998	Monitoring	20.0
29306.00000	80015899	38.22111	-85.75194	3/8/1995	Monitoring	14.0
41286.00000	80035637	38.22084	-85.75417	9/2/1998	Monitoring	19.0

* data derived from Kentucky Geological Survey (KGS) database
** AKGWA = Kentucky Department for Environmental Protection official well registration number.

ATTACHMENT B-3

Wind Rose Data

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [All Year]
Period of Record: 01 Jan 1970 - 14 Dec 2019

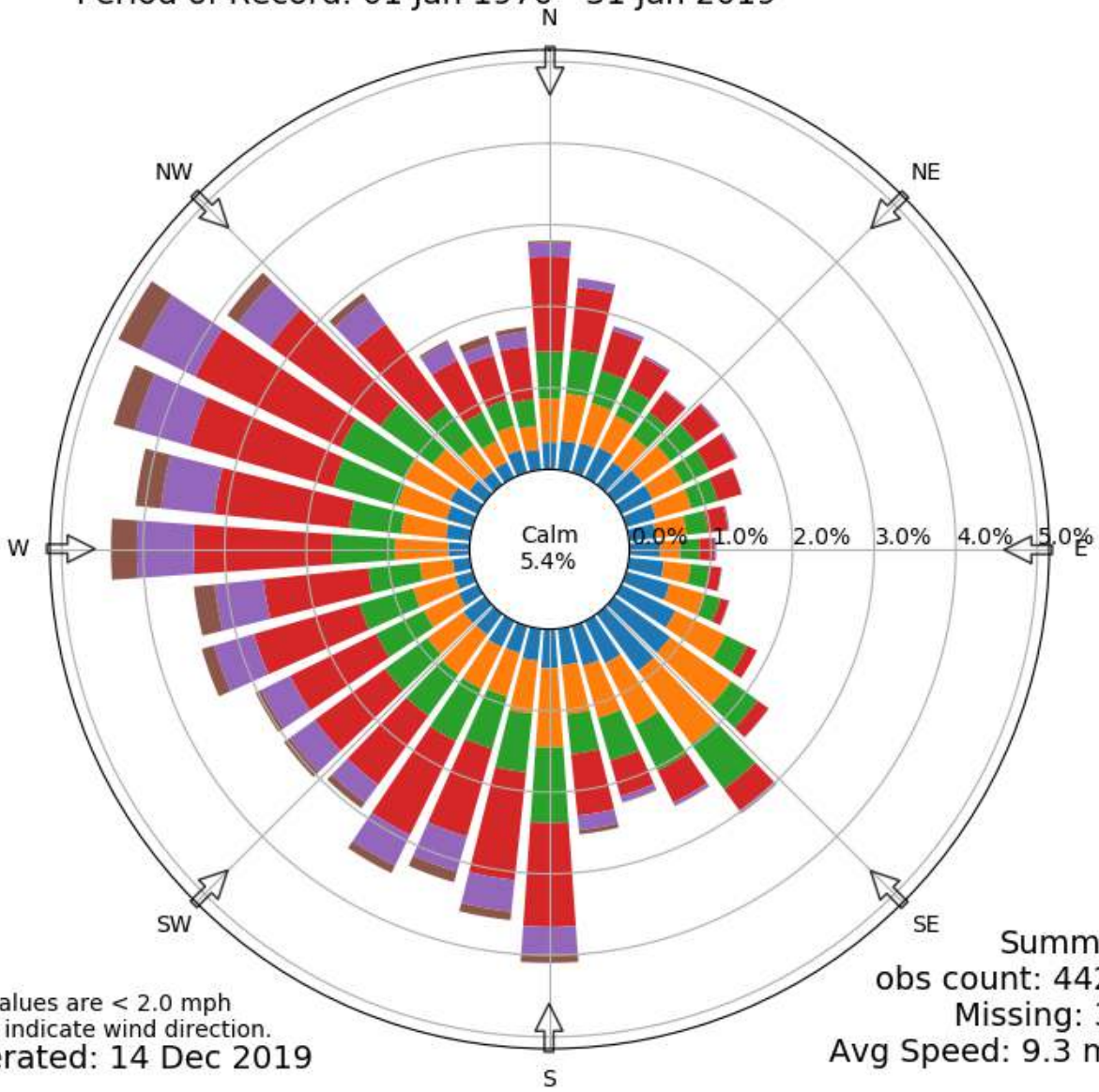


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 504839
Missing: 7681
Avg Speed: 8.2 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Jan,]
Period of Record: 01 Jan 1970 - 31 Jan 2019

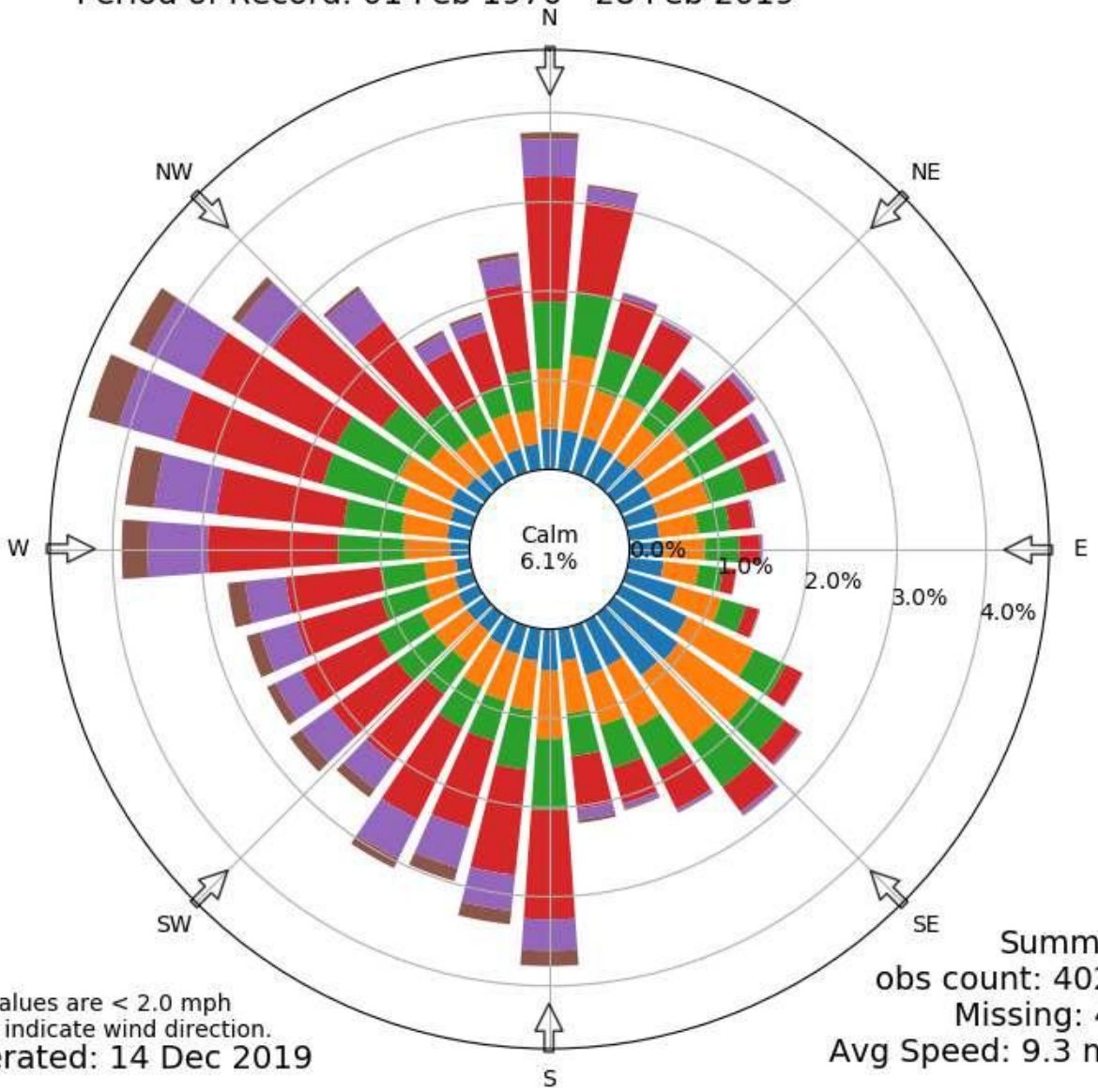


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 44286
Missing: 347
Avg Speed: 9.3 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Feb,]
Period of Record: 01 Feb 1970 - 28 Feb 2019

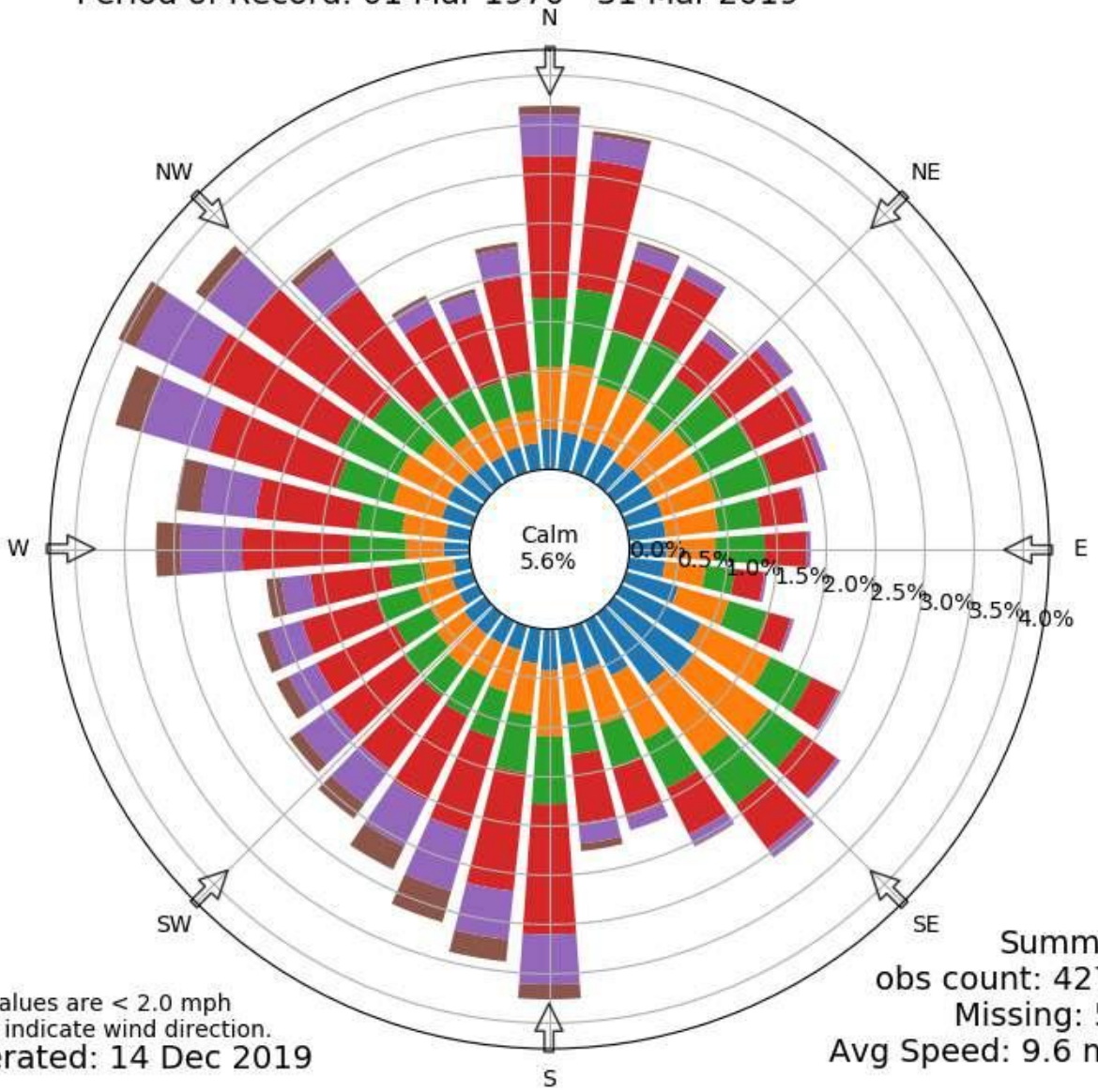


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 40245
Missing: 402
Avg Speed: 9.3 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Mar,]
Period of Record: 01 Mar 1970 - 31 Mar 2019

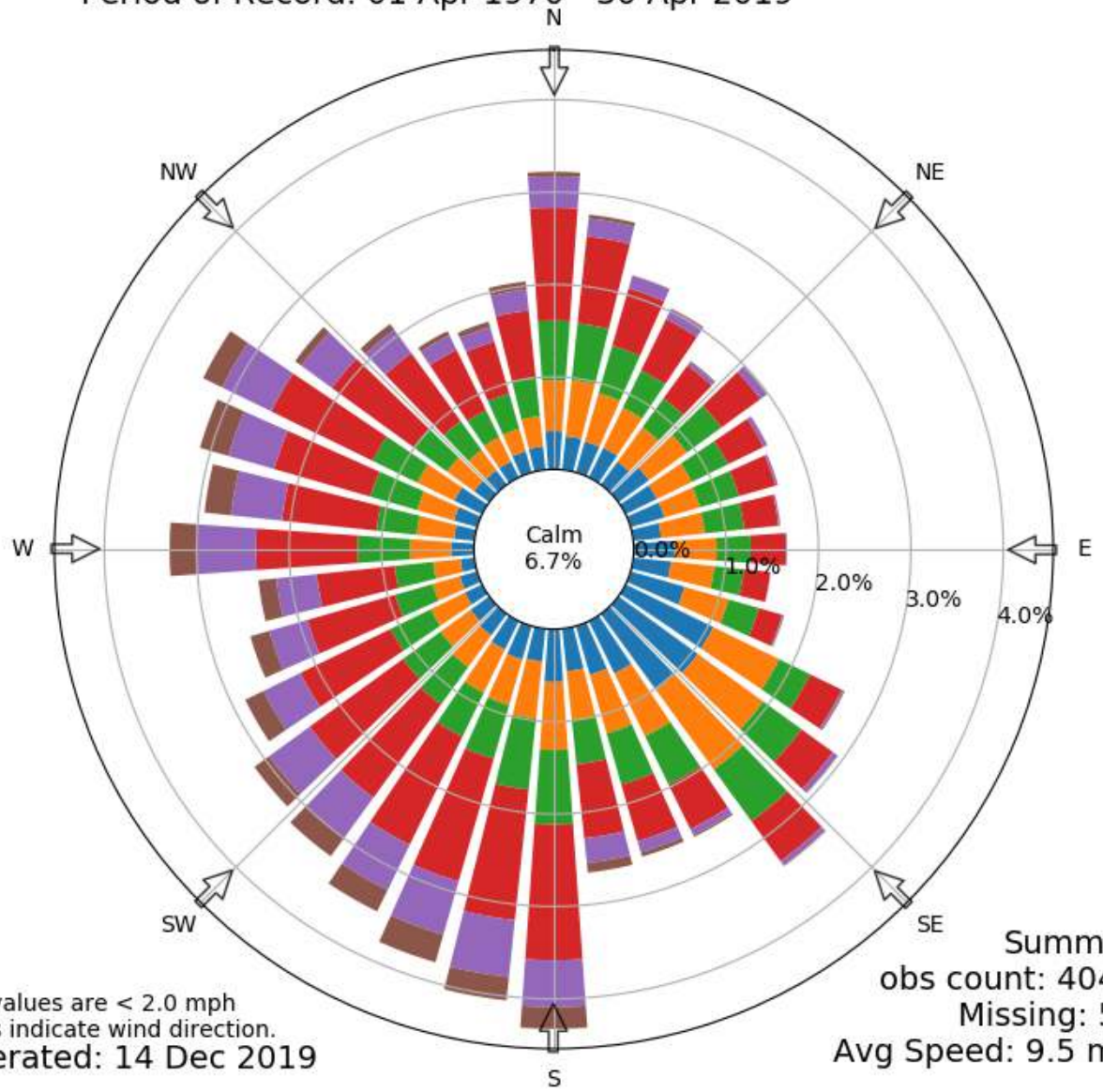


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 42728
Missing: 509
Avg Speed: 9.6 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Apr,]
Period of Record: 01 Apr 1970 - 30 Apr 2019

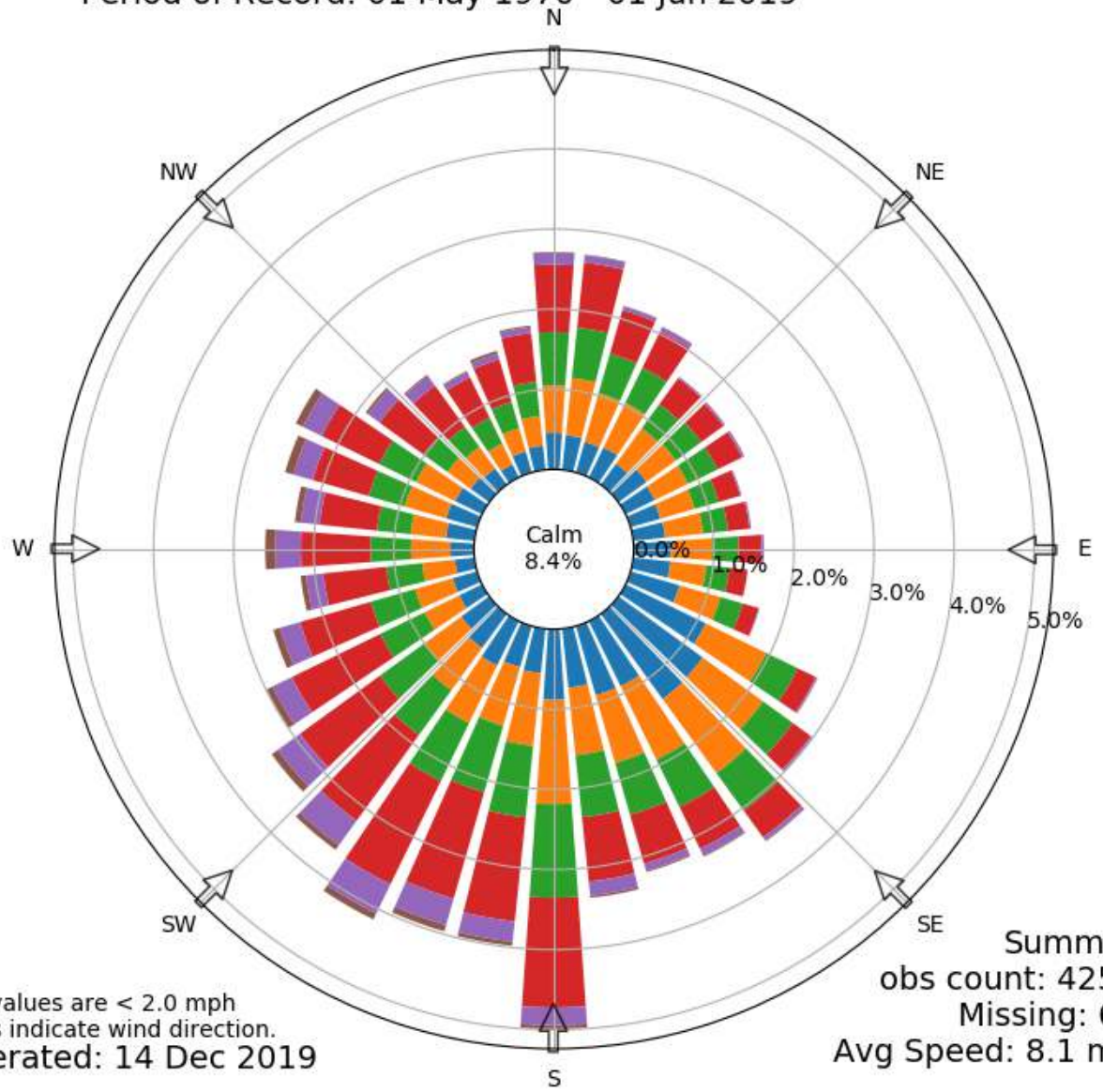


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 40429
Missing: 551
Avg Speed: 9.5 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: May,]
Period of Record: 01 May 1970 - 01 Jun 2019

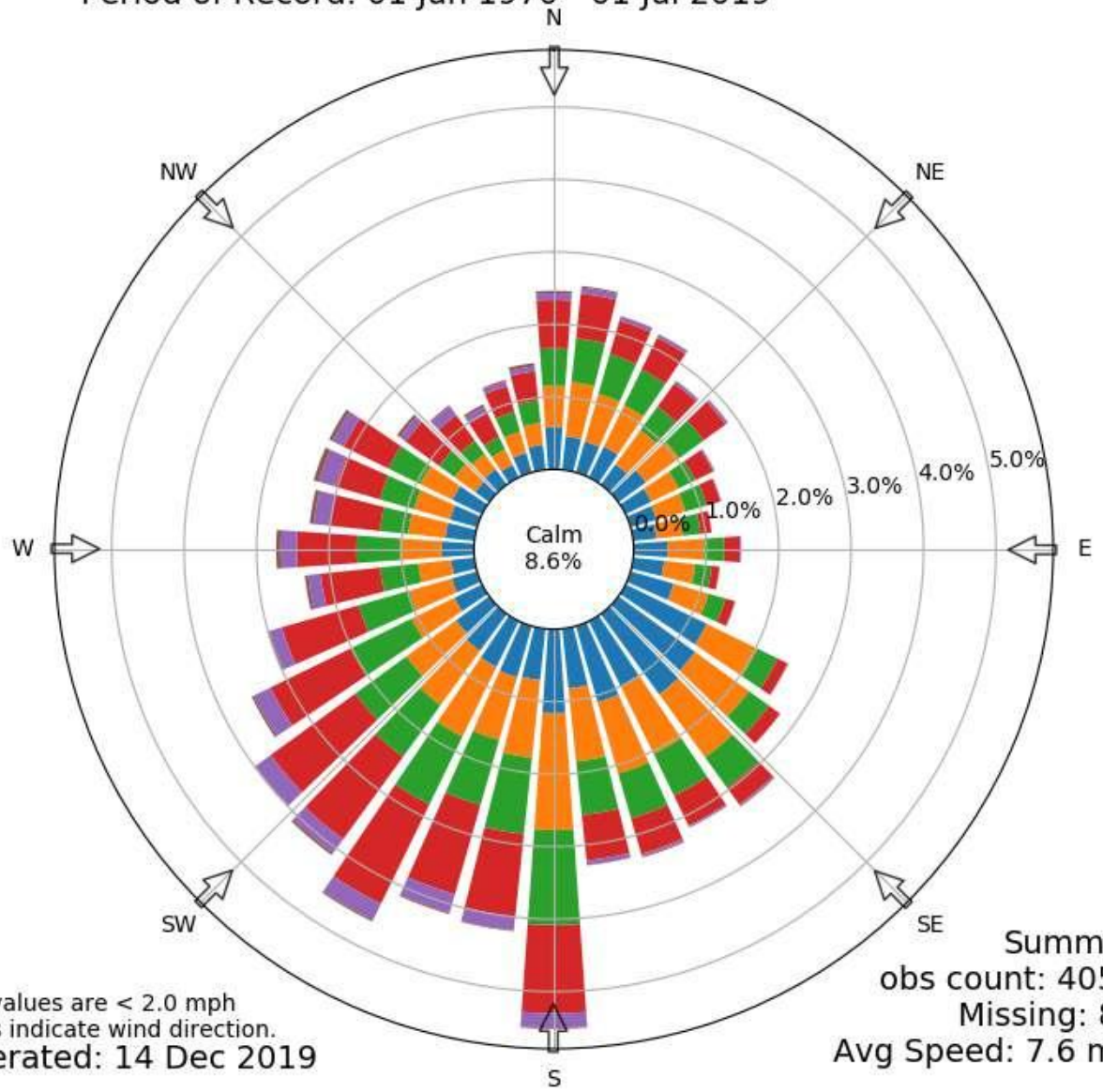


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 42521
Missing: 693
Avg Speed: 8.1 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Jun,]
Period of Record: 01 Jun 1970 - 01 Jul 2019

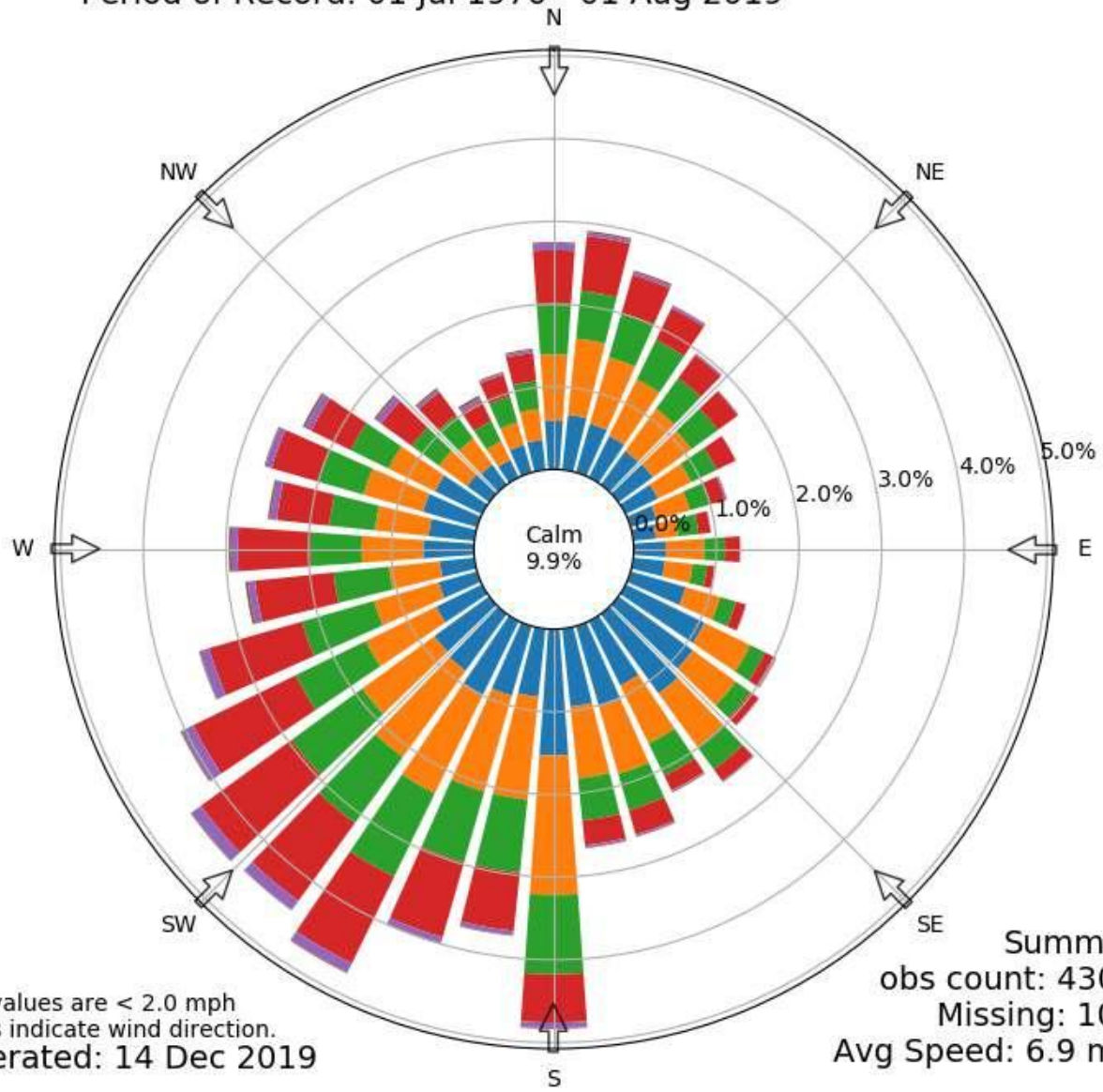


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 40507
Missing: 851
Avg Speed: 7.6 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Jul,]
Period of Record: 01 Jul 1970 - 01 Aug 2019

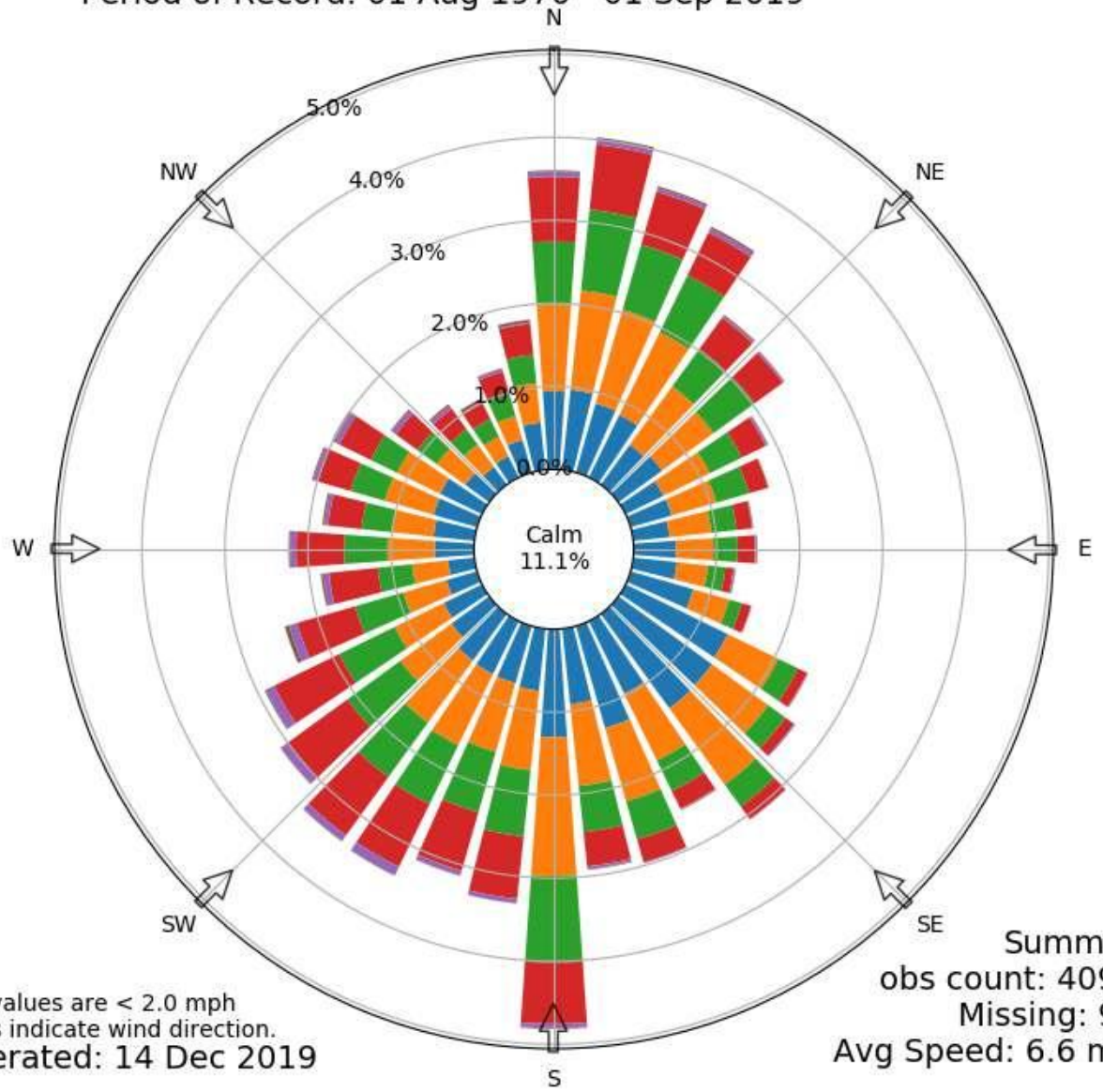


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 43022
Missing: 1083
Avg Speed: 6.9 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Aug,]
Period of Record: 01 Aug 1970 - 01 Sep 2019

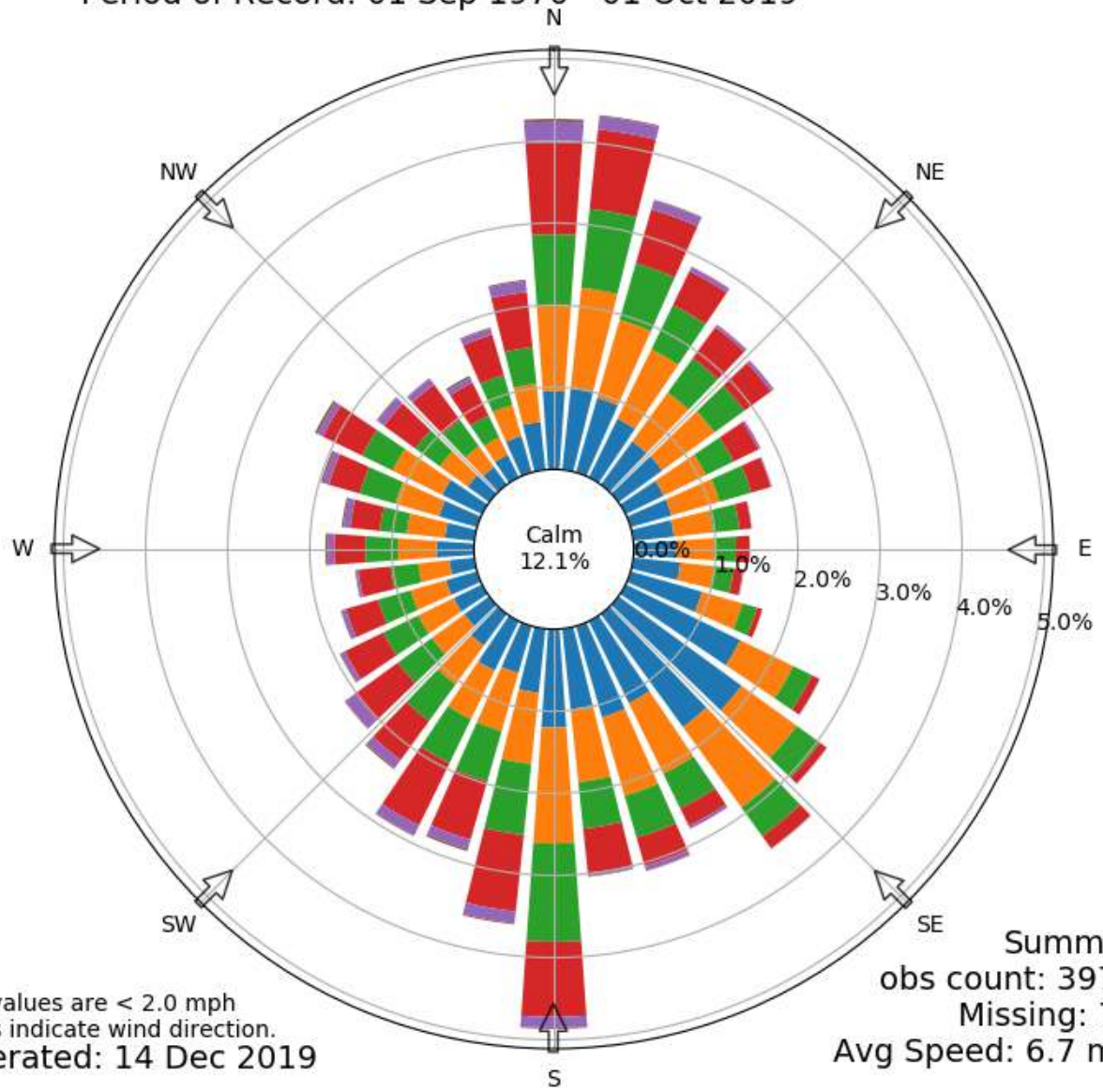


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 40935
Missing: 980
Avg Speed: 6.6 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Sep,]
Period of Record: 01 Sep 1970 - 01 Oct 2019

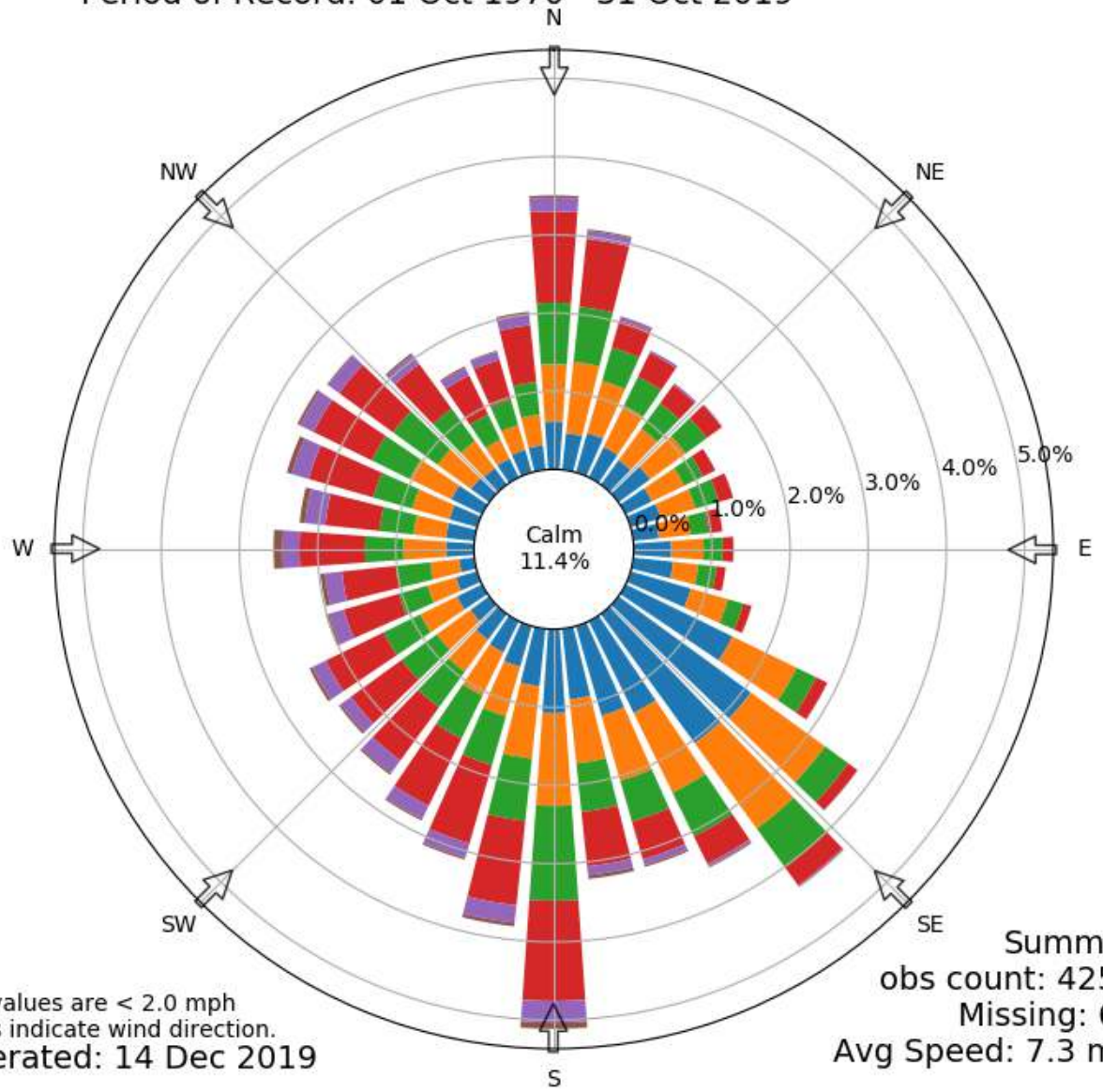


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 39797
Missing: 794
Avg Speed: 6.7 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Oct,]
Period of Record: 01 Oct 1970 - 31 Oct 2019

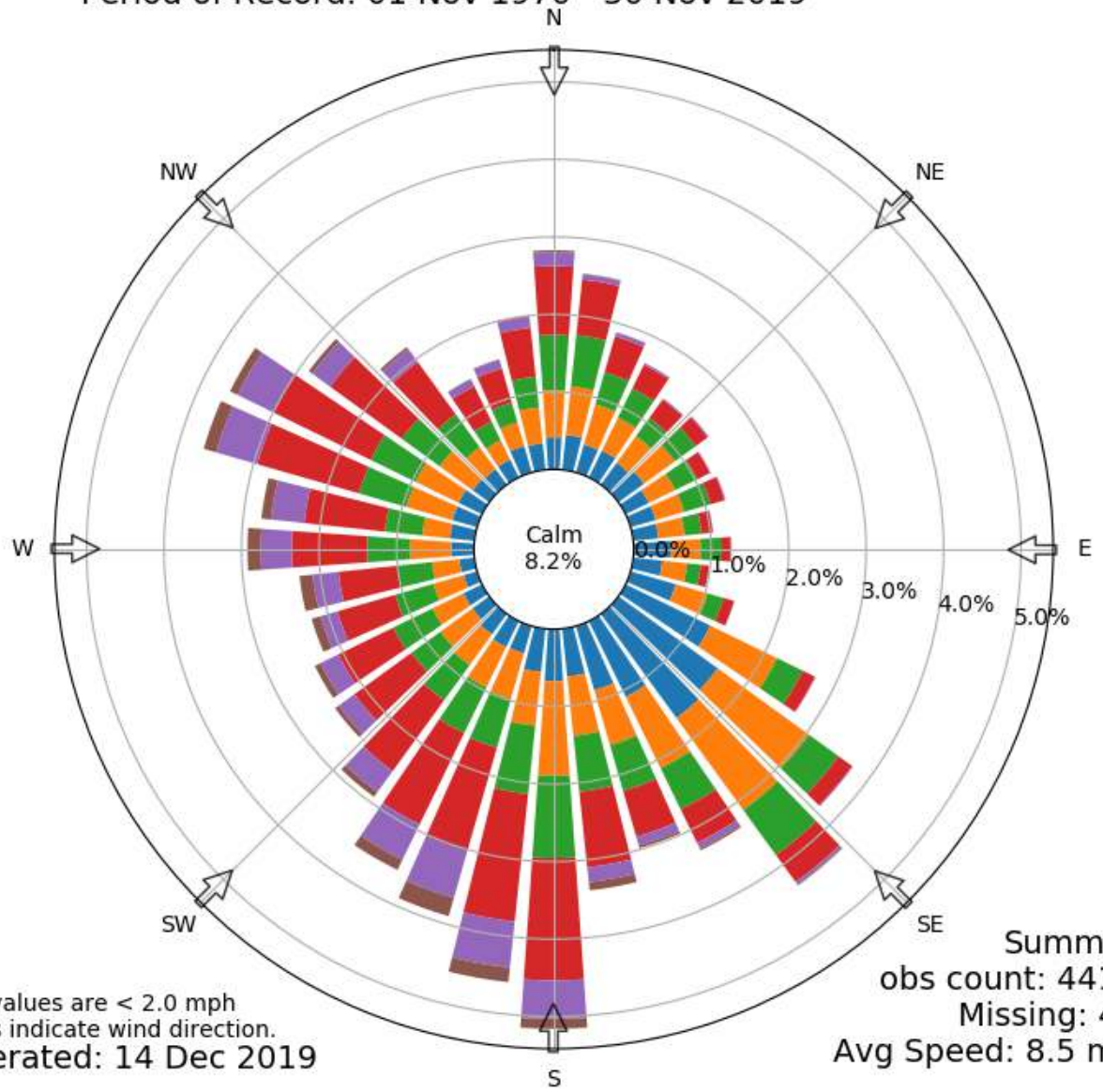


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 42537
Missing: 680
Avg Speed: 7.3 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Nov,]
Period of Record: 01 Nov 1970 - 30 Nov 2019

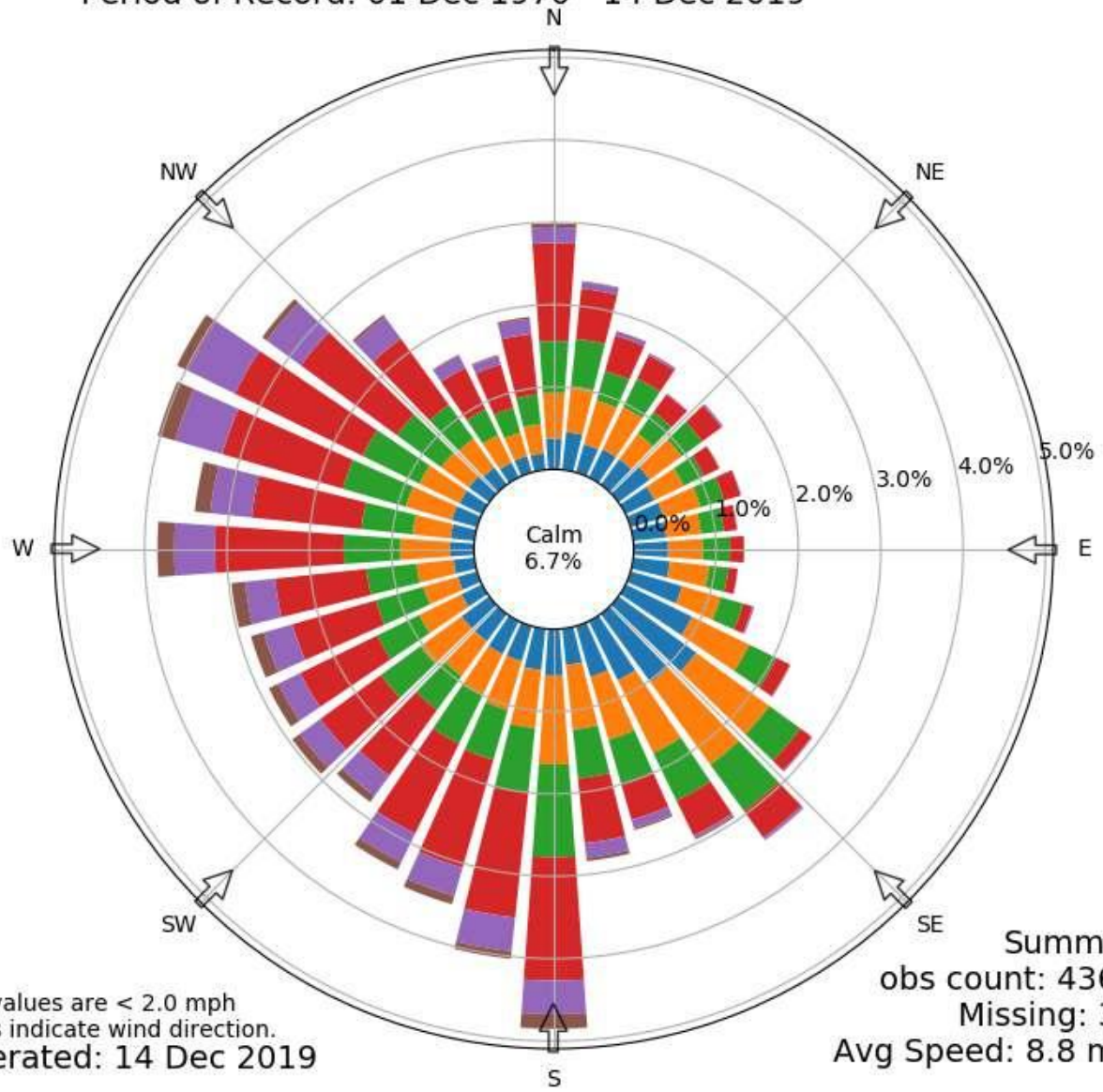


Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 44198
Missing: 447
Avg Speed: 8.5 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

[SDF] LOUISVILLE/STANDIFO
Windrose Plot [Time Domain: Dec,]
Period of Record: 01 Dec 1970 - 14 Dec 2019



Calm values are < 2.0 mph
Arrows indicate wind direction.
Generated: 14 Dec 2019

Summary
obs count: 43634
Missing: 344
Avg Speed: 8.8 mph

Wind Speed [mph]
2 - 5 | 5 - 7 | 7 - 10 | 10 - 15 | 15 - 20 | 20+

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 508136/7975/516111
01 Jan 1970 01:00 AM - 05 Nov 2020 02:56 PM America/New_York
Hour Limiter: All included
Month Limiter: All included
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:06 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	8.33,	0.536,	0.691,	0.686,	1.043,	0.209,	0.037
005-014 ,	,	0.538,	0.801,	0.691,	0.837,	0.115,	0.022
015-024 ,	,	0.500,	0.684,	0.529,	0.554,	0.071,	0.010
025-034 ,	,	0.484,	0.643,	0.498,	0.469,	0.052,	0.007
035-044 ,	,	0.403,	0.538,	0.411,	0.374,	0.032,	0.007
045-054 ,	,	0.474,	0.562,	0.410,	0.378,	0.040,	0.006
055-064 ,	,	0.410,	0.473,	0.369,	0.329,	0.027,	0.003
065-074 ,	,	0.398,	0.482,	0.370,	0.278,	0.022,	0.002
075-084 ,	,	0.364,	0.426,	0.303,	0.225,	0.013,	0.002
085-094 ,	,	0.445,	0.437,	0.312,	0.223,	0.016,	0.002
095-104 ,	,	0.448,	0.395,	0.241,	0.155,	0.008,	0.002
105-114 ,	,	0.666,	0.488,	0.251,	0.149,	0.010,	0.003
115-124 ,	,	1.120,	0.781,	0.332,	0.191,	0.012,	0.004
125-134 ,	,	1.301,	0.977,	0.400,	0.214,	0.019,	0.003
135-144 ,	,	1.275,	1.128,	0.569,	0.344,	0.035,	0.009
145-154 ,	,	0.869,	0.910,	0.566,	0.421,	0.050,	0.014
155-164 ,	,	0.844,	0.791,	0.543,	0.477,	0.075,	0.019
165-174 ,	,	0.663,	0.764,	0.580,	0.675,	0.135,	0.045
175-184 ,	,	0.846,	1.187,	1.018,	1.206,	0.295,	0.096
185-194 ,	,	0.572,	0.809,	0.804,	1.190,	0.320,	0.097
195-204 ,	,	0.509,	0.700,	0.683,	1.112,	0.349,	0.120
205-214 ,	,	0.519,	0.711,	0.705,	1.159,	0.338,	0.096
215-224 ,	,	0.457,	0.645,	0.623,	1.042,	0.282,	0.081
225-234 ,	,	0.403,	0.597,	0.636,	1.025,	0.288,	0.076
235-244 ,	,	0.340,	0.537,	0.621,	0.997,	0.255,	0.082
245-254 ,	,	0.289,	0.468,	0.568,	0.925,	0.265,	0.100
255-264 ,	,	0.244,	0.403,	0.486,	0.848,	0.277,	0.117
265-274 ,	,	0.350,	0.547,	0.586,	1.023,	0.379,	0.159
275-284 ,	,	0.350,	0.480,	0.485,	0.928,	0.363,	0.149
285-294 ,	,	0.394,	0.572,	0.604,	1.053,	0.391,	0.159
295-304 ,	,	0.419,	0.580,	0.595,	1.125,	0.399,	0.126
305-314 ,	,	0.284,	0.449,	0.517,	0.994,	0.276,	0.065
315-324 ,	,	0.252,	0.355,	0.423,	0.791,	0.223,	0.043
325-334 ,	,	0.237,	0.296,	0.320,	0.535,	0.125,	0.029
335-344 ,	,	0.312,	0.321,	0.333,	0.504,	0.111,	0.032
345-354 ,	,	0.343,	0.385,	0.388,	0.657,	0.151,	0.039

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 45004/363/45367
01 Jan 1970 01:00 AM - 31 Jan 2020 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (1,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:12 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	5.49,	0.327,	0.553,	0.584,	1.133,	0.167,	0.027
005-014 ,	,	0.367,	0.602,	0.533,	0.758,	0.107,	0.002
015-024 ,	,	0.384,	0.507,	0.402,	0.507,	0.053,	0.002
025-034 ,	,	0.409,	0.438,	0.373,	0.404,	0.031,	0.000
035-044 ,	,	0.351,	0.389,	0.347,	0.320,	0.016,	0.002
045-054 ,	,	0.413,	0.440,	0.380,	0.333,	0.024,	0.000
055-064 ,	,	0.424,	0.416,	0.353,	0.362,	0.022,	0.000
065-074 ,	,	0.373,	0.458,	0.336,	0.304,	0.004,	0.000
075-084 ,	,	0.336,	0.376,	0.258,	0.242,	0.020,	0.000
085-094 ,	,	0.376,	0.244,	0.231,	0.180,	0.024,	0.002
095-104 ,	,	0.436,	0.327,	0.229,	0.149,	0.009,	0.002
105-114 ,	,	0.558,	0.442,	0.202,	0.109,	0.004,	0.004
115-124 ,	,	0.738,	0.678,	0.289,	0.140,	0.000,	0.002
125-134 ,	,	0.864,	0.944,	0.420,	0.164,	0.007,	0.000
135-144 ,	,	0.875,	1.109,	0.680,	0.327,	0.038,	0.009
145-154 ,	,	0.582,	0.844,	0.631,	0.440,	0.044,	0.011
155-164 ,	,	0.516,	0.664,	0.536,	0.451,	0.078,	0.013
165-174 ,	,	0.453,	0.598,	0.509,	0.773,	0.180,	0.056
175-184 ,	,	0.484,	0.962,	0.911,	1.287,	0.347,	0.107
185-194 ,	,	0.402,	0.649,	0.715,	1.331,	0.389,	0.107
195-204 ,	,	0.347,	0.551,	0.662,	1.115,	0.438,	0.131
205-214 ,	,	0.362,	0.564,	0.709,	1.258,	0.427,	0.100
215-224 ,	,	0.311,	0.596,	0.622,	1.044,	0.278,	0.082
225-234 ,	,	0.333,	0.544,	0.651,	1.073,	0.369,	0.089
235-244 ,	,	0.262,	0.480,	0.655,	1.173,	0.393,	0.080
245-254 ,	,	0.229,	0.529,	0.671,	1.360,	0.509,	0.158
255-264 ,	,	0.213,	0.413,	0.635,	1.278,	0.596,	0.258
265-274 ,	,	0.258,	0.655,	0.762,	1.667,	0.700,	0.329
275-284 ,	,	0.296,	0.549,	0.635,	1.667,	0.664,	0.322
285-294 ,	,	0.338,	0.633,	0.815,	1.824,	0.709,	0.264
295-304 ,	,	0.371,	0.631,	0.867,	1.978,	0.740,	0.298
305-314 ,	,	0.233,	0.547,	0.784,	1.667,	0.467,	0.162
315-324 ,	,	0.198,	0.396,	0.576,	1.244,	0.367,	0.091
325-334 ,	,	0.220,	0.298,	0.393,	0.707,	0.240,	0.029
335-344 ,	,	0.296,	0.307,	0.333,	0.569,	0.144,	0.100
345-354 ,	,	0.264,	0.302,	0.329,	0.644,	0.178,	0.058

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 40883/415/41298
01 Feb 1970 01:00 AM - 29 Feb 2020 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (2,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:12 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	6.02,	0.457,	0.670,	0.790,	1.441,	0.416,	0.073
005-014 ,	,	0.450,	0.839,	0.724,	1.032,	0.152,	0.027
015-024 ,	,	0.421,	0.555,	0.484,	0.602,	0.051,	0.007
025-034 ,	,	0.386,	0.597,	0.443,	0.494,	0.037,	0.010
035-044 ,	,	0.360,	0.475,	0.364,	0.377,	0.042,	0.007
045-054 ,	,	0.421,	0.594,	0.377,	0.484,	0.073,	0.012
055-064 ,	,	0.386,	0.521,	0.404,	0.457,	0.066,	0.007
065-074 ,	,	0.364,	0.594,	0.438,	0.352,	0.086,	0.010
075-084 ,	,	0.350,	0.440,	0.345,	0.264,	0.024,	0.002
085-094 ,	,	0.389,	0.460,	0.384,	0.225,	0.029,	0.002
095-104 ,	,	0.389,	0.391,	0.269,	0.144,	0.005,	0.002
105-114 ,	,	0.589,	0.521,	0.284,	0.149,	0.012,	0.005
115-124 ,	,	0.807,	0.832,	0.391,	0.210,	0.012,	0.002
125-134 ,	,	0.876,	1.003,	0.475,	0.227,	0.024,	0.007
135-144 ,	,	0.839,	0.937,	0.604,	0.350,	0.046,	0.010
145-154 ,	,	0.553,	0.766,	0.521,	0.501,	0.042,	0.007
155-164 ,	,	0.570,	0.585,	0.492,	0.408,	0.059,	0.017
165-174 ,	,	0.357,	0.592,	0.477,	0.582,	0.125,	0.037
175-184 ,	,	0.465,	0.785,	0.795,	1.213,	0.342,	0.169
185-194 ,	,	0.355,	0.582,	0.656,	1.181,	0.391,	0.149
195-204 ,	,	0.345,	0.558,	0.475,	1.015,	0.467,	0.152
205-214 ,	,	0.313,	0.536,	0.509,	1.125,	0.482,	0.117
215-224 ,	,	0.262,	0.430,	0.438,	0.954,	0.362,	0.117
225-234 ,	,	0.262,	0.445,	0.516,	0.898,	0.413,	0.149
235-244 ,	,	0.254,	0.455,	0.543,	0.934,	0.313,	0.108
245-254 ,	,	0.210,	0.330,	0.528,	1.013,	0.408,	0.161
255-264 ,	,	0.161,	0.345,	0.501,	1.076,	0.462,	0.193
265-274 ,	,	0.215,	0.511,	0.756,	1.468,	0.665,	0.284
275-284 ,	,	0.269,	0.519,	0.660,	1.419,	0.690,	0.316
285-294 ,	,	0.267,	0.575,	0.910,	1.734,	0.648,	0.342
295-304 ,	,	0.333,	0.651,	0.793,	1.707,	0.660,	0.215
305-314 ,	,	0.259,	0.511,	0.646,	1.531,	0.457,	0.098
315-324 ,	,	0.230,	0.394,	0.516,	1.133,	0.445,	0.046
325-334 ,	,	0.227,	0.350,	0.374,	0.656,	0.208,	0.037
335-344 ,	,	0.281,	0.411,	0.323,	0.646,	0.176,	0.039
345-354 ,	,	0.294,	0.384,	0.465,	1.003,	0.308,	0.051

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 43314/525/43839
01 Mar 1970 01:00 AM - 31 Mar 2020 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (3,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:13 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	5.6,	0.402,	0.630,	0.700,	1.434,	0.427,	0.083
005-014 ,	,	0.386,	0.686,	0.760,	1.304,	0.263,	0.051
015-024 ,	,	0.356,	0.568,	0.579,	0.743,	0.166,	0.032
025-034 ,	,	0.386,	0.579,	0.603,	0.700,	0.120,	0.014
035-044 ,	,	0.305,	0.519,	0.531,	0.469,	0.102,	0.021
045-054 ,	,	0.365,	0.573,	0.487,	0.665,	0.127,	0.014
055-064 ,	,	0.369,	0.549,	0.559,	0.589,	0.074,	0.005
065-074 ,	,	0.395,	0.566,	0.575,	0.517,	0.067,	0.000
075-084 ,	,	0.372,	0.529,	0.436,	0.429,	0.035,	0.002
085-094 ,	,	0.381,	0.485,	0.496,	0.418,	0.044,	0.000
095-104 ,	,	0.376,	0.418,	0.300,	0.293,	0.030,	0.000
105-114 ,	,	0.540,	0.554,	0.404,	0.247,	0.030,	0.005
115-124 ,	,	0.898,	0.792,	0.455,	0.293,	0.030,	0.002
125-134 ,	,	1.002,	0.944,	0.459,	0.402,	0.042,	0.005
135-144 ,	,	0.887,	0.926,	0.603,	0.545,	0.095,	0.014
145-154 ,	,	0.619,	0.725,	0.549,	0.515,	0.122,	0.012
155-164 ,	,	0.459,	0.582,	0.457,	0.536,	0.134,	0.005
165-174 ,	,	0.369,	0.489,	0.418,	0.716,	0.208,	0.074
175-184 ,	,	0.416,	0.672,	0.704,	1.337,	0.508,	0.148
185-194 ,	,	0.349,	0.519,	0.591,	1.256,	0.510,	0.229
195-204 ,	,	0.252,	0.450,	0.483,	1.023,	0.633,	0.326
205-214 ,	,	0.266,	0.367,	0.455,	0.958,	0.519,	0.261
215-224 ,	,	0.259,	0.399,	0.367,	0.921,	0.434,	0.182
225-234 ,	,	0.268,	0.358,	0.420,	0.903,	0.422,	0.127
235-244 ,	,	0.196,	0.339,	0.395,	0.889,	0.312,	0.145
245-254 ,	,	0.215,	0.356,	0.422,	0.797,	0.335,	0.134
255-264 ,	,	0.155,	0.305,	0.349,	0.801,	0.293,	0.152
265-274 ,	,	0.259,	0.379,	0.566,	1.099,	0.619,	0.252
275-284 ,	,	0.256,	0.450,	0.453,	1.032,	0.559,	0.254
285-294 ,	,	0.330,	0.519,	0.596,	1.341,	0.688,	0.277
295-304 ,	,	0.344,	0.566,	0.676,	1.542,	0.741,	0.208
305-314 ,	,	0.307,	0.489,	0.614,	1.586,	0.483,	0.141
315-324 ,	,	0.270,	0.349,	0.499,	1.328,	0.411,	0.092
325-334 ,	,	0.247,	0.381,	0.388,	0.792,	0.199,	0.037
335-344 ,	,	0.275,	0.319,	0.376,	0.713,	0.217,	0.039
345-354 ,	,	0.272,	0.335,	0.388,	1.007,	0.298,	0.053

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 40813/577/41390
01 Apr 1970 01:00 AM - 30 Apr 2020 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (4,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:14 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	6.79,	0.419,	0.544,	0.652,	1.208,	0.336,	0.049
005-014 ,	,	0.372,	0.605,	0.615,	0.931,	0.191,	0.039
015-024 ,	,	0.355,	0.539,	0.529,	0.640,	0.140,	0.005
025-034 ,	,	0.360,	0.480,	0.439,	0.605,	0.113,	0.012
035-044 ,	,	0.311,	0.453,	0.382,	0.434,	0.042,	0.015
045-054 ,	,	0.402,	0.490,	0.451,	0.517,	0.083,	0.007
055-064 ,	,	0.372,	0.436,	0.439,	0.421,	0.042,	0.005
065-074 ,	,	0.380,	0.409,	0.431,	0.404,	0.027,	0.000
075-084 ,	,	0.299,	0.480,	0.421,	0.365,	0.017,	0.002
085-094 ,	,	0.443,	0.453,	0.372,	0.368,	0.012,	0.002
095-104 ,	,	0.409,	0.478,	0.326,	0.282,	0.005,	0.000
105-114 ,	,	0.613,	0.488,	0.348,	0.257,	0.012,	0.007
115-124 ,	,	1.058,	0.794,	0.372,	0.377,	0.022,	0.012
125-134 ,	,	1.085,	0.887,	0.512,	0.421,	0.059,	0.007
135-144 ,	,	1.014,	1.054,	0.681,	0.534,	0.054,	0.010
145-154 ,	,	0.635,	0.747,	0.593,	0.534,	0.069,	0.022
155-164 ,	,	0.559,	0.649,	0.564,	0.630,	0.123,	0.047
165-174 ,	,	0.475,	0.524,	0.470,	0.801,	0.267,	0.108
175-184 ,	,	0.568,	0.730,	0.796,	1.460,	0.500,	0.235
185-194 ,	,	0.348,	0.625,	0.769,	1.397,	0.608,	0.247
195-204 ,	,	0.372,	0.522,	0.600,	1.362,	0.588,	0.304
205-214 ,	,	0.341,	0.519,	0.532,	1.294,	0.532,	0.252
215-224 ,	,	0.287,	0.431,	0.500,	1.237,	0.534,	0.238
225-234 ,	,	0.252,	0.397,	0.512,	1.262,	0.539,	0.191
235-244 ,	,	0.211,	0.407,	0.490,	1.095,	0.439,	0.216
245-254 ,	,	0.194,	0.306,	0.439,	1.009,	0.424,	0.208
255-264 ,	,	0.159,	0.292,	0.419,	0.838,	0.439,	0.191
265-274 ,	,	0.247,	0.439,	0.559,	1.098,	0.647,	0.279
275-284 ,	,	0.218,	0.409,	0.434,	1.027,	0.561,	0.294
285-294 ,	,	0.260,	0.409,	0.532,	1.107,	0.522,	0.321
295-304 ,	,	0.333,	0.446,	0.539,	1.250,	0.588,	0.230
305-314 ,	,	0.201,	0.368,	0.451,	1.110,	0.414,	0.083
315-324 ,	,	0.194,	0.274,	0.385,	0.924,	0.311,	0.081
325-334 ,	,	0.201,	0.287,	0.353,	0.747,	0.174,	0.051
335-344 ,	,	0.243,	0.260,	0.419,	0.598,	0.164,	0.064
345-354 ,	,	0.265,	0.338,	0.441,	0.733,	0.223,	0.086

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 42858/715/43573
01 May 1970 01:00 AM - 31 May 2020 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (5,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:20 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	8.43,	0.450,	0.593,	0.663,	0.852,	0.142,	0.012
005-014 ,	,	0.429,	0.716,	0.632,	0.805,	0.089,	0.009
015-024 ,	,	0.399,	0.635,	0.506,	0.567,	0.049,	0.005
025-034 ,	,	0.408,	0.623,	0.481,	0.499,	0.058,	0.005
035-044 ,	,	0.320,	0.546,	0.373,	0.394,	0.021,	0.002
045-054 ,	,	0.427,	0.462,	0.387,	0.338,	0.023,	0.005
055-064 ,	,	0.406,	0.462,	0.422,	0.355,	0.028,	0.002
065-074 ,	,	0.385,	0.448,	0.331,	0.292,	0.019,	0.000
075-084 ,	,	0.397,	0.481,	0.310,	0.285,	0.021,	0.000
085-094 ,	,	0.474,	0.520,	0.329,	0.289,	0.033,	0.000
095-104 ,	,	0.478,	0.464,	0.287,	0.236,	0.002,	0.000
105-114 ,	,	0.637,	0.539,	0.287,	0.222,	0.009,	0.000
115-124 ,	,	1.115,	0.842,	0.436,	0.245,	0.021,	0.005
125-134 ,	,	1.300,	0.924,	0.450,	0.271,	0.030,	0.005
135-144 ,	,	1.321,	1.146,	0.579,	0.404,	0.044,	0.014
145-154 ,	,	0.915,	1.013,	0.663,	0.576,	0.091,	0.014
155-164 ,	,	0.889,	0.877,	0.674,	0.637,	0.089,	0.019
165-174 ,	,	0.740,	0.842,	0.770,	0.812,	0.173,	0.028
175-184 ,	,	0.870,	1.283,	1.164,	1.356,	0.215,	0.044
185-194 ,	,	0.562,	0.910,	0.884,	1.302,	0.250,	0.049
195-204 ,	,	0.530,	0.751,	0.854,	1.370,	0.338,	0.079
205-214 ,	,	0.614,	0.789,	0.803,	1.426,	0.397,	0.082
215-224 ,	,	0.530,	0.665,	0.695,	1.328,	0.380,	0.075
225-234 ,	,	0.427,	0.565,	0.684,	1.223,	0.343,	0.093
235-244 ,	,	0.320,	0.481,	0.623,	1.216,	0.266,	0.084
245-254 ,	,	0.317,	0.483,	0.576,	0.910,	0.259,	0.086
255-264 ,	,	0.247,	0.408,	0.455,	0.789,	0.212,	0.065
265-274 ,	,	0.301,	0.497,	0.495,	0.863,	0.320,	0.124
275-284 ,	,	0.366,	0.448,	0.425,	0.719,	0.233,	0.075
285-294 ,	,	0.404,	0.546,	0.481,	0.726,	0.257,	0.110
295-304 ,	,	0.380,	0.548,	0.502,	0.796,	0.259,	0.096
305-314 ,	,	0.301,	0.355,	0.383,	0.684,	0.173,	0.037
315-324 ,	,	0.247,	0.331,	0.315,	0.628,	0.145,	0.021
325-334 ,	,	0.184,	0.294,	0.357,	0.555,	0.075,	0.019
335-344 ,	,	0.273,	0.310,	0.348,	0.560,	0.084,	0.035
345-354 ,	,	0.296,	0.380,	0.427,	0.614,	0.077,	0.021

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 40590/883/41473
01 Jun 1970 01:00 AM - 30 Jun 2020 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (6,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:21 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	8.58,	0.569,	0.567,	0.512,	0.663,	0.091,	0.030
005-014 ,	,	0.461,	0.754,	0.613,	0.616,	0.081,	0.022
015-024 ,	,	0.436,	0.687,	0.562,	0.478,	0.059,	0.005
025-034 ,	,	0.466,	0.626,	0.547,	0.490,	0.044,	0.007
035-044 ,	,	0.345,	0.581,	0.407,	0.402,	0.037,	0.007
045-054 ,	,	0.471,	0.564,	0.424,	0.382,	0.037,	0.007
055-064 ,	,	0.407,	0.419,	0.259,	0.281,	0.022,	0.002
065-074 ,	,	0.372,	0.414,	0.298,	0.200,	0.010,	0.000
075-084 ,	,	0.320,	0.377,	0.251,	0.158,	0.002,	0.002
085-094 ,	,	0.461,	0.510,	0.286,	0.227,	0.015,	0.000
095-104 ,	,	0.424,	0.429,	0.234,	0.121,	0.002,	0.002
105-114 ,	,	0.613,	0.498,	0.251,	0.140,	0.005,	0.007
115-124 ,	,	1.237,	0.766,	0.313,	0.160,	0.012,	0.005
125-134 ,	,	1.303,	0.921,	0.345,	0.182,	0.005,	0.002
135-144 ,	,	1.365,	1.077,	0.517,	0.286,	0.022,	0.012
145-154 ,	,	0.995,	1.032,	0.643,	0.458,	0.027,	0.007
155-164 ,	,	1.082,	1.017,	0.643,	0.505,	0.032,	0.017
165-174 ,	,	0.818,	1.003,	0.742,	0.645,	0.076,	0.010
175-184 ,	,	1.143,	1.601,	1.284,	1.224,	0.202,	0.020
185-194 ,	,	0.710,	1.067,	1.050,	1.126,	0.192,	0.015
195-204 ,	,	0.729,	0.894,	0.934,	1.276,	0.254,	0.022
205-214 ,	,	0.697,	1.069,	1.037,	1.532,	0.241,	0.027
215-224 ,	,	0.655,	0.909,	0.904,	1.417,	0.241,	0.037
225-234 ,	,	0.569,	0.857,	0.887,	1.444,	0.261,	0.020
235-244 ,	,	0.436,	0.660,	0.939,	1.234,	0.249,	0.034
245-254 ,	,	0.365,	0.594,	0.729,	1.099,	0.168,	0.039
255-264 ,	,	0.313,	0.461,	0.530,	0.818,	0.175,	0.057
265-274 ,	,	0.443,	0.584,	0.611,	0.825,	0.217,	0.064
275-284 ,	,	0.407,	0.517,	0.402,	0.702,	0.222,	0.057
285-294 ,	,	0.404,	0.520,	0.493,	0.650,	0.241,	0.071
295-304 ,	,	0.458,	0.490,	0.490,	0.687,	0.170,	0.052
305-314 ,	,	0.237,	0.355,	0.259,	0.564,	0.099,	0.044
315-324 ,	,	0.264,	0.254,	0.224,	0.436,	0.143,	0.027
325-334 ,	,	0.190,	0.244,	0.200,	0.367,	0.091,	0.037
335-344 ,	,	0.283,	0.305,	0.283,	0.360,	0.064,	0.025
345-354 ,	,	0.345,	0.308,	0.315,	0.402,	0.069,	0.044

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 42952/1125/44077
01 Jul 1970 01:00 AM - 31 Jul 2020 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (7,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:21 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	10.02,	0.589,	0.796,	0.594,	0.668,	0.079,	0.021
005-014 ,	,	0.664,	0.910,	0.570,	0.659,	0.042,	0.026
015-024 ,	,	0.617,	0.827,	0.549,	0.477,	0.033,	0.023
025-034 ,	,	0.589,	0.754,	0.538,	0.428,	0.033,	0.005
035-044 ,	,	0.512,	0.638,	0.447,	0.342,	0.021,	0.002
045-054 ,	,	0.526,	0.573,	0.391,	0.296,	0.005,	0.009
055-064 ,	,	0.438,	0.449,	0.335,	0.261,	0.000,	0.000
065-074 ,	,	0.326,	0.419,	0.258,	0.182,	0.019,	0.007
075-084 ,	,	0.286,	0.270,	0.247,	0.147,	0.007,	0.000
085-094 ,	,	0.403,	0.461,	0.251,	0.179,	0.002,	0.005
095-104 ,	,	0.398,	0.338,	0.179,	0.088,	0.000,	0.002
105-114 ,	,	0.694,	0.435,	0.200,	0.121,	0.005,	0.002
115-124 ,	,	1.059,	0.617,	0.198,	0.130,	0.014,	0.005
125-134 ,	,	1.127,	0.638,	0.212,	0.123,	0.009,	0.002
135-144 ,	,	1.197,	0.796,	0.331,	0.172,	0.014,	0.005
145-154 ,	,	0.868,	0.778,	0.431,	0.203,	0.012,	0.014
155-164 ,	,	0.999,	0.850,	0.452,	0.312,	0.023,	0.007
165-174 ,	,	0.936,	0.868,	0.498,	0.307,	0.028,	0.009
175-184 ,	,	1.492,	1.667,	0.955,	0.582,	0.061,	0.016
185-194 ,	,	0.820,	1.234,	0.882,	0.703,	0.049,	0.012
195-204 ,	,	0.878,	1.190,	0.892,	0.934,	0.075,	0.012
205-214 ,	,	1.003,	1.343,	1.125,	1.173,	0.116,	0.014
215-224 ,	,	0.859,	1.294,	0.980,	1.173,	0.130,	0.009
225-234 ,	,	0.817,	1.080,	1.052,	1.348,	0.137,	0.016
235-244 ,	,	0.619,	0.948,	0.943,	1.371,	0.156,	0.019
245-254 ,	,	0.482,	0.815,	0.894,	1.157,	0.116,	0.014
255-264 ,	,	0.421,	0.617,	0.664,	0.952,	0.086,	0.033
265-274 ,	,	0.615,	0.757,	0.617,	0.864,	0.079,	0.033
275-284 ,	,	0.568,	0.647,	0.559,	0.640,	0.077,	0.030
285-294 ,	,	0.678,	0.766,	0.573,	0.584,	0.075,	0.016
295-304 ,	,	0.612,	0.624,	0.515,	0.531,	0.086,	0.033
305-314 ,	,	0.333,	0.424,	0.405,	0.454,	0.075,	0.030
315-324 ,	,	0.312,	0.386,	0.354,	0.345,	0.042,	0.026
325-334 ,	,	0.244,	0.254,	0.268,	0.270,	0.042,	0.035
335-344 ,	,	0.349,	0.298,	0.328,	0.272,	0.021,	0.019
345-354 ,	,	0.366,	0.377,	0.342,	0.338,	0.030,	0.021

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 40940/1025/41965
01 Aug 1970 01:00 AM - 31 Aug 2020 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (8,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:22 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	11.17,	0.950,	1.045,	0.760,	0.767,	0.066,	0.015
005-014 ,	,	0.970,	1.214,	0.972,	0.777,	0.056,	0.034
015-024 ,	,	0.877,	1.165,	0.813,	0.664,	0.042,	0.024
025-034 ,	,	0.838,	1.102,	0.760,	0.572,	0.049,	0.027
035-044 ,	,	0.589,	0.867,	0.554,	0.467,	0.024,	0.017
045-054 ,	,	0.650,	0.762,	0.601,	0.418,	0.020,	0.010
055-064 ,	,	0.525,	0.618,	0.420,	0.320,	0.029,	0.010
065-074 ,	,	0.511,	0.562,	0.410,	0.247,	0.000,	0.007
075-084 ,	,	0.449,	0.508,	0.308,	0.183,	0.007,	0.007
085-094 ,	,	0.506,	0.447,	0.291,	0.210,	0.017,	0.012
095-104 ,	,	0.523,	0.374,	0.205,	0.098,	0.022,	0.007
105-114 ,	,	0.787,	0.452,	0.156,	0.115,	0.007,	0.002
115-124 ,	,	1.370,	0.672,	0.259,	0.125,	0.007,	0.007
125-134 ,	,	1.383,	0.838,	0.254,	0.127,	0.017,	0.000
135-144 ,	,	1.392,	1.126,	0.327,	0.181,	0.007,	0.002
145-154 ,	,	0.984,	0.892,	0.410,	0.232,	0.007,	0.012
155-164 ,	,	1.273,	0.916,	0.474,	0.293,	0.012,	0.000
165-174 ,	,	0.901,	0.987,	0.557,	0.418,	0.032,	0.010
175-184 ,	,	1.273,	1.671,	1.028,	0.740,	0.046,	0.012
185-194 ,	,	0.755,	0.953,	0.794,	0.747,	0.054,	0.005
195-204 ,	,	0.711,	0.857,	0.752,	0.713,	0.059,	0.007
205-214 ,	,	0.718,	0.955,	0.789,	0.838,	0.112,	0.007
215-224 ,	,	0.703,	0.923,	0.801,	0.865,	0.078,	0.010
225-234 ,	,	0.572,	0.765,	0.816,	0.887,	0.098,	0.010
235-244 ,	,	0.506,	0.652,	0.740,	0.865,	0.117,	0.015
245-254 ,	,	0.379,	0.542,	0.603,	0.728,	0.098,	0.051
255-264 ,	,	0.320,	0.435,	0.418,	0.589,	0.071,	0.027
265-274 ,	,	0.479,	0.572,	0.528,	0.567,	0.076,	0.015
275-284 ,	,	0.496,	0.501,	0.376,	0.405,	0.046,	0.022
285-294 ,	,	0.550,	0.618,	0.430,	0.408,	0.054,	0.017
295-304 ,	,	0.584,	0.581,	0.352,	0.415,	0.066,	0.034
305-314 ,	,	0.357,	0.430,	0.283,	0.320,	0.056,	0.017
315-324 ,	,	0.274,	0.340,	0.227,	0.310,	0.049,	0.022
325-334 ,	,	0.291,	0.274,	0.234,	0.213,	0.020,	0.039
335-344 ,	,	0.425,	0.318,	0.298,	0.266,	0.037,	0.010
345-354 ,	,	0.589,	0.508,	0.342,	0.371,	0.015,	0.037

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 39912/833/40745
01 Sep 1970 01:00 AM - 30 Sep 2020 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (9,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:22 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	12.11,	0.942,	1.037,	0.867,	1.092,	0.248,	0.038
005-014 ,	,	1.017,	1.218,	0.972,	0.970,	0.155,	0.015
015-024 ,	,	0.940,	0.985,	0.714,	0.681,	0.108,	0.015
025-034 ,	,	0.792,	0.940,	0.594,	0.471,	0.053,	0.005
035-044 ,	,	0.651,	0.727,	0.526,	0.471,	0.035,	0.003
045-054 ,	,	0.661,	0.784,	0.461,	0.408,	0.040,	0.003
055-064 ,	,	0.509,	0.584,	0.381,	0.343,	0.028,	0.003
065-074 ,	,	0.519,	0.596,	0.408,	0.251,	0.013,	0.000
075-084 ,	,	0.501,	0.486,	0.336,	0.153,	0.008,	0.000
085-094 ,	,	0.531,	0.461,	0.273,	0.163,	0.003,	0.000
095-104 ,	,	0.594,	0.416,	0.236,	0.110,	0.008,	0.005
105-114 ,	,	0.907,	0.524,	0.180,	0.065,	0.003,	0.000
115-124 ,	,	1.553,	0.737,	0.253,	0.100,	0.005,	0.003
125-134 ,	,	1.832,	0.834,	0.343,	0.110,	0.005,	0.000
135-144 ,	,	1.699,	1.228,	0.433,	0.193,	0.008,	0.003
145-154 ,	,	1.110,	0.962,	0.476,	0.233,	0.038,	0.000
155-164 ,	,	1.160,	0.977,	0.529,	0.358,	0.058,	0.010
165-174 ,	,	0.967,	0.889,	0.571,	0.541,	0.040,	0.008
175-184 ,	,	1.193,	1.421,	1.195,	0.904,	0.125,	0.018
185-194 ,	,	0.774,	0.867,	0.854,	0.935,	0.140,	0.018
195-204 ,	,	0.606,	0.742,	0.626,	0.742,	0.115,	0.028
205-214 ,	,	0.676,	0.666,	0.586,	0.844,	0.125,	0.018
215-224 ,	,	0.496,	0.586,	0.544,	0.606,	0.113,	0.023
225-234 ,	,	0.378,	0.496,	0.509,	0.639,	0.138,	0.013
235-244 ,	,	0.396,	0.494,	0.476,	0.521,	0.055,	0.018
245-254 ,	,	0.393,	0.446,	0.426,	0.408,	0.063,	0.008
255-264 ,	,	0.301,	0.383,	0.351,	0.406,	0.030,	0.010
265-274 ,	,	0.466,	0.471,	0.391,	0.378,	0.075,	0.033
275-284 ,	,	0.361,	0.466,	0.326,	0.356,	0.080,	0.025
285-294 ,	,	0.484,	0.559,	0.451,	0.388,	0.073,	0.030
295-304 ,	,	0.536,	0.666,	0.421,	0.541,	0.070,	0.033
305-314 ,	,	0.318,	0.426,	0.366,	0.474,	0.093,	0.020
315-324 ,	,	0.268,	0.311,	0.391,	0.534,	0.080,	0.013
325-334 ,	,	0.316,	0.236,	0.291,	0.436,	0.063,	0.028
335-344 ,	,	0.464,	0.388,	0.373,	0.499,	0.075,	0.013
345-354 ,	,	0.584,	0.461,	0.441,	0.659,	0.130,	0.020

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 42921/714/43635
01 Oct 1970 01:00 AM - 31 Oct 2020 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (10,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:23 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	11.37,	0.606,	0.722,	0.794,	1.170,	0.177,	0.030
005-014 ,	,	0.478,	0.934,	0.697,	0.885,	0.103,	0.021
015-024 ,	,	0.527,	0.692,	0.447,	0.387,	0.051,	0.002
025-034 ,	,	0.429,	0.592,	0.415,	0.340,	0.030,	0.000
035-044 ,	,	0.389,	0.494,	0.401,	0.280,	0.023,	0.002
045-054 ,	,	0.494,	0.564,	0.338,	0.238,	0.012,	0.000
055-064 ,	,	0.375,	0.461,	0.270,	0.179,	0.002,	0.000
065-074 ,	,	0.403,	0.475,	0.317,	0.193,	0.005,	0.000
075-084 ,	,	0.340,	0.417,	0.242,	0.172,	0.002,	0.000
085-094 ,	,	0.485,	0.415,	0.245,	0.133,	0.002,	0.000
095-104 ,	,	0.531,	0.315,	0.231,	0.119,	0.000,	0.000
105-114 ,	,	0.804,	0.496,	0.205,	0.107,	0.002,	0.000
115-124 ,	,	1.528,	0.913,	0.280,	0.154,	0.005,	0.000
125-134 ,	,	2.102,	1.191,	0.375,	0.142,	0.005,	0.002
135-144 ,	,	2.048,	1.372,	0.606,	0.289,	0.016,	0.009
145-154 ,	,	1.305,	1.137,	0.624,	0.389,	0.035,	0.016
155-164 ,	,	1.181,	0.857,	0.536,	0.508,	0.075,	0.028
165-174 ,	,	0.913,	0.832,	0.622,	0.701,	0.110,	0.051
175-184 ,	,	1.067,	1.186,	1.202,	1.281,	0.273,	0.079
185-194 ,	,	0.736,	0.923,	0.794,	1.083,	0.221,	0.047
195-204 ,	,	0.552,	0.666,	0.650,	1.034,	0.186,	0.026
205-214 ,	,	0.443,	0.615,	0.608,	0.941,	0.184,	0.021
215-224 ,	,	0.405,	0.506,	0.555,	0.841,	0.193,	0.028
225-234 ,	,	0.294,	0.529,	0.545,	0.806,	0.156,	0.030
235-244 ,	,	0.352,	0.520,	0.524,	0.806,	0.189,	0.042
245-254 ,	,	0.273,	0.373,	0.387,	0.732,	0.186,	0.047
255-264 ,	,	0.193,	0.370,	0.429,	0.680,	0.217,	0.056
265-274 ,	,	0.352,	0.541,	0.482,	0.820,	0.217,	0.112
275-284 ,	,	0.363,	0.422,	0.429,	0.683,	0.254,	0.068
285-294 ,	,	0.377,	0.508,	0.513,	0.853,	0.219,	0.068
295-304 ,	,	0.452,	0.592,	0.531,	0.820,	0.189,	0.040
305-314 ,	,	0.296,	0.522,	0.692,	0.855,	0.170,	0.019
315-324 ,	,	0.259,	0.443,	0.524,	0.720,	0.147,	0.028
325-334 ,	,	0.266,	0.280,	0.356,	0.573,	0.107,	0.023
335-344 ,	,	0.305,	0.329,	0.342,	0.529,	0.112,	0.012
345-354 ,	,	0.322,	0.408,	0.419,	0.743,	0.149,	0.028

Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 43984/451/44435
01 Nov 1970 01:00 AM - 05 Nov 2020 02:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (11,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:24 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	8.14,	0.407,	0.612,	0.707,	0.882,	0.180,	0.025
005-014 ,	,	0.457,	0.623,	0.664,	0.716,	0.068,	0.007
015-024 ,	,	0.373,	0.541,	0.427,	0.482,	0.052,	0.002
025-034 ,	,	0.387,	0.468,	0.418,	0.336,	0.025,	0.002
035-044 ,	,	0.348,	0.425,	0.291,	0.291,	0.016,	0.002
045-054 ,	,	0.407,	0.489,	0.334,	0.191,	0.016,	0.000
055-064 ,	,	0.334,	0.377,	0.316,	0.189,	0.011,	0.000
065-074 ,	,	0.339,	0.387,	0.355,	0.191,	0.014,	0.000
075-084 ,	,	0.327,	0.336,	0.218,	0.143,	0.009,	0.000
085-094 ,	,	0.477,	0.384,	0.268,	0.116,	0.014,	0.000
095-104 ,	,	0.377,	0.321,	0.177,	0.105,	0.007,	0.000
105-114 ,	,	0.602,	0.425,	0.211,	0.143,	0.007,	0.000
115-124 ,	,	1.212,	0.953,	0.364,	0.177,	0.007,	0.002
125-134 ,	,	1.587,	1.453,	0.471,	0.221,	0.016,	0.000
135-144 ,	,	1.667,	1.478,	0.730,	0.432,	0.036,	0.016
145-154 ,	,	1.084,	1.030,	0.600,	0.484,	0.077,	0.027
155-164 ,	,	0.862,	0.755,	0.614,	0.614,	0.114,	0.036
165-174 ,	,	0.618,	0.768,	0.730,	0.978,	0.193,	0.107
175-184 ,	,	0.671,	1.221,	1.080,	1.564,	0.493,	0.127
185-194 ,	,	0.568,	0.698,	0.887,	1.648,	0.598,	0.186
195-204 ,	,	0.371,	0.618,	0.653,	1.378,	0.648,	0.243
205-214 ,	,	0.375,	0.580,	0.657,	1.303,	0.507,	0.143
215-224 ,	,	0.332,	0.489,	0.562,	1.130,	0.334,	0.077
225-234 ,	,	0.268,	0.512,	0.462,	0.898,	0.250,	0.057
235-244 ,	,	0.266,	0.450,	0.559,	0.796,	0.255,	0.082
245-254 ,	,	0.180,	0.407,	0.518,	0.771,	0.227,	0.118
255-264 ,	,	0.198,	0.352,	0.455,	0.762,	0.334,	0.166
265-274 ,	,	0.300,	0.532,	0.557,	0.966,	0.398,	0.171
275-284 ,	,	0.323,	0.364,	0.484,	1.041,	0.432,	0.130
285-294 ,	,	0.332,	0.618,	0.634,	1.369,	0.557,	0.168
295-304 ,	,	0.339,	0.614,	0.646,	1.387,	0.527,	0.111
305-314 ,	,	0.266,	0.530,	0.600,	1.146,	0.286,	0.055
315-324 ,	,	0.250,	0.346,	0.523,	0.832,	0.202,	0.034
325-334 ,	,	0.255,	0.277,	0.271,	0.512,	0.100,	0.007
335-344 ,	,	0.350,	0.316,	0.264,	0.459,	0.118,	0.009
345-354 ,	,	0.343,	0.464,	0.398,	0.632,	0.143,	0.018

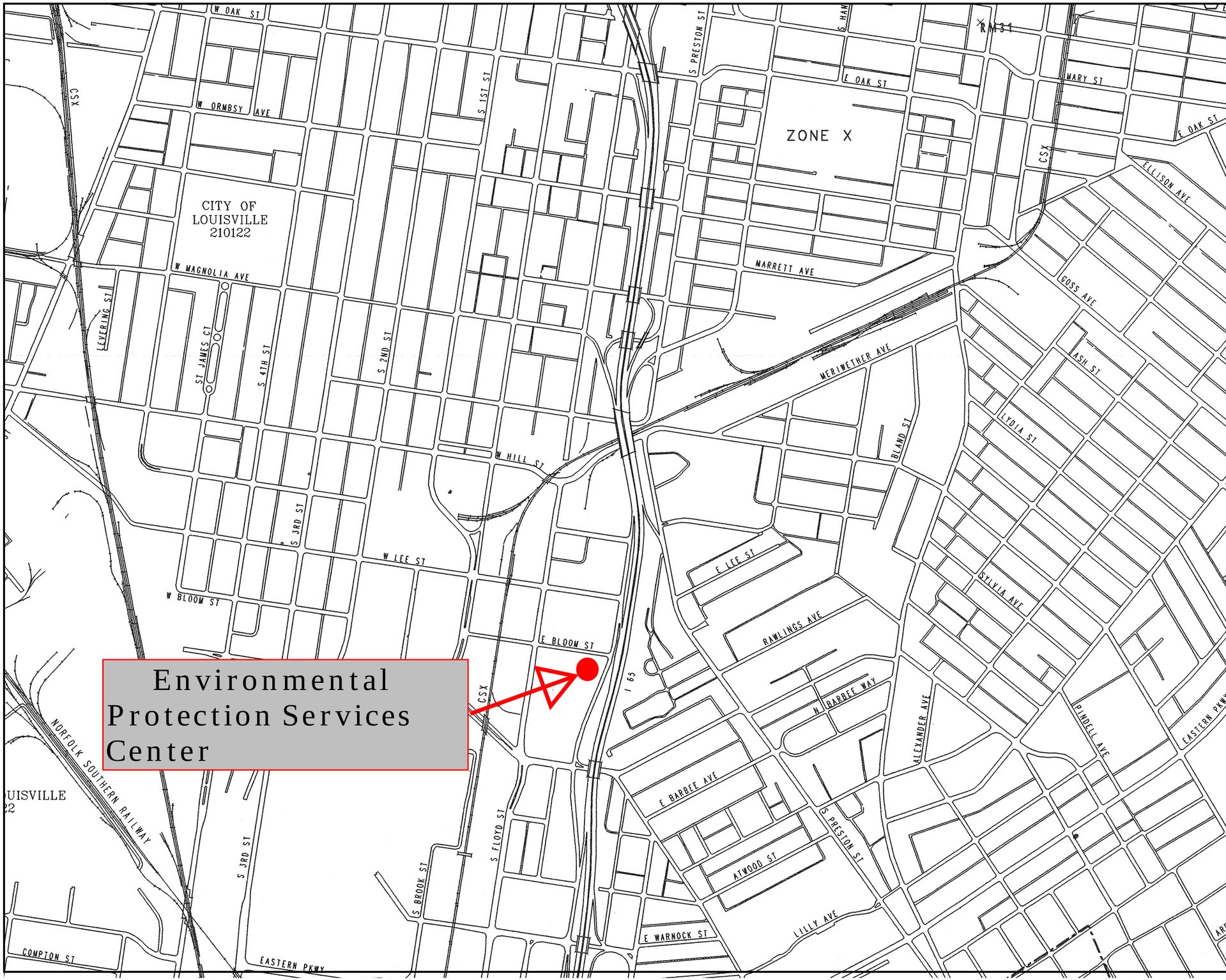
Windrose Data Table (Percent Frequency) for LOUISVILLE/STANDIFO (SDF)
Observations Used/Missing/Total: 43954/349/44303
01 Dec 1970 01:00 AM - 31 Dec 2019 11:56 PM America/New_York
Hour Limiter: All included
Month Limiter: (12,)
Wind Speed Units: miles per hour
Generated 05 Nov 2020 20:25 UTC, contact: akrherz@iastate.edu
First value in table is CALM

Direction,	Calm,	2.0 4.9,	5.0 6.9,	7.0 9.9,	10.0 14.9,	15.0 19.9,	20.0+
355-004 ,	6.66,	0.375,	0.557,	0.630,	1.201,	0.189,	0.043
005-014 ,	,	0.460,	0.567,	0.573,	0.607,	0.082,	0.011
015-024 ,	,	0.362,	0.560,	0.369,	0.439,	0.057,	0.000
025-034 ,	,	0.389,	0.567,	0.398,	0.307,	0.030,	0.000
035-044 ,	,	0.378,	0.384,	0.321,	0.259,	0.014,	0.002
045-054 ,	,	0.469,	0.478,	0.312,	0.284,	0.025,	0.000
055-064 ,	,	0.384,	0.400,	0.273,	0.207,	0.005,	0.002
065-074 ,	,	0.421,	0.464,	0.293,	0.212,	0.009,	0.000
075-084 ,	,	0.396,	0.428,	0.280,	0.157,	0.007,	0.002
085-094 ,	,	0.425,	0.421,	0.325,	0.173,	0.000,	0.000
095-104 ,	,	0.448,	0.480,	0.228,	0.114,	0.002,	0.000
105-114 ,	,	0.664,	0.489,	0.282,	0.116,	0.020,	0.000
115-124 ,	,	0.919,	0.776,	0.364,	0.177,	0.007,	0.005
125-134 ,	,	1.179,	1.108,	0.473,	0.173,	0.014,	0.002
135-144 ,	,	1.024,	1.267,	0.705,	0.396,	0.032,	0.007
145-154 ,	,	0.796,	0.987,	0.639,	0.469,	0.032,	0.020
155-164 ,	,	0.637,	0.789,	0.551,	0.453,	0.100,	0.025
165-174 ,	,	0.444,	0.792,	0.589,	0.785,	0.173,	0.043
175-184 ,	,	0.571,	1.078,	1.113,	1.474,	0.405,	0.175
185-194 ,	,	0.501,	0.708,	0.780,	1.517,	0.407,	0.096
195-204 ,	,	0.439,	0.621,	0.621,	1.345,	0.355,	0.105
205-214 ,	,	0.448,	0.555,	0.648,	1.199,	0.382,	0.098
215-224 ,	,	0.407,	0.523,	0.514,	0.976,	0.300,	0.091
225-234 ,	,	0.410,	0.617,	0.589,	0.917,	0.319,	0.114
235-244 ,	,	0.282,	0.567,	0.573,	1.035,	0.300,	0.134
245-254 ,	,	0.241,	0.435,	0.610,	1.065,	0.366,	0.168
255-264 ,	,	0.255,	0.453,	0.607,	1.131,	0.380,	0.173
265-274 ,	,	0.284,	0.607,	0.694,	1.563,	0.496,	0.198
275-284 ,	,	0.287,	0.466,	0.617,	1.351,	0.498,	0.182
285-294 ,	,	0.319,	0.573,	0.796,	1.524,	0.594,	0.212
295-304 ,	,	0.305,	0.544,	0.764,	1.722,	0.628,	0.143
305-314 ,	,	0.305,	0.419,	0.664,	1.426,	0.507,	0.068
315-324 ,	,	0.264,	0.425,	0.507,	0.990,	0.319,	0.034
325-334 ,	,	0.209,	0.371,	0.346,	0.571,	0.171,	0.011
335-344 ,	,	0.214,	0.298,	0.312,	0.562,	0.109,	0.014
345-354 ,	,	0.205,	0.364,	0.359,	0.733,	0.191,	0.027

ATTACHMENT B-4

Flood Insurance Rate Map

For Evaluation Only
Copyright (c) by VeryPDF.com Inc
Edited by VeryPDF PDF Editor Version 2.0



N

SCALE IN FEET

800 400 0 800

Attachment B-4

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- **ZONE A** No base flood elevations determined.
- **ZONE AE** Base flood elevations determined.
- **ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- **ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- **ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- **ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- **ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside 500-year flood plain.
- **ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

- Flood Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zone.
- 567 — Base Flood Elevation Line; Elevation in Feet*
- A — A — Cross Section Line
- (EL 19) — Base Flood Elevation in Feet Where Uniform Within Zone*
- RM5 — Elevation Reference Mark
- M3.0 — Mile Mark

*Referenced to the National Geodetic Vertical Datum of 1929

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

ATTACHMENT B-5

Vehicle Volume Count Information

Engineering and Architecture Division
Department of Public Works
217 City Hall • 601 West Jefferson • Louisville, KY • 502/625-3121
JERRY E. ABRAMSON
MAYOR
William E. Herron
Director

VEHICLE VOLUME COUNT
TURNING MOVEMENT SUMMARY DIAGRAM

Location Arthur 5th – Brandeis AVE

Weather Cloudy

Counted by Ted – Mitch

Summarized by RM

Diagrammed by

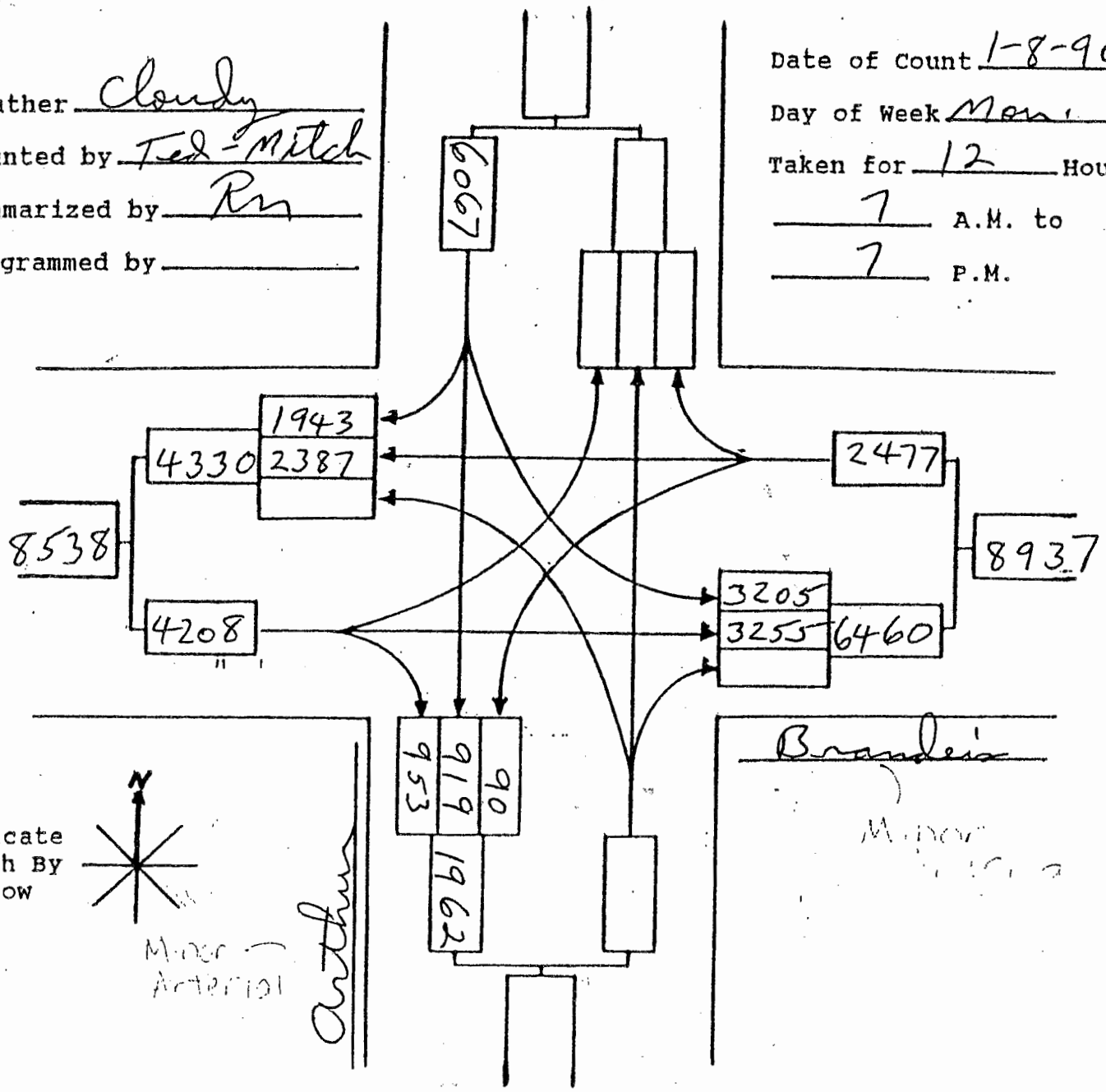
Date of Count 1-8-90

Day of Week Mon.

Taken for 12 Hours

7 A.M. to

7 P.M.



Indicate North By Arrow

Remarks

Stop 3-way

T.E. 7

CITY OF LOUISVILLE
Pedestrain Count
Summary Sheet

N

Date 11/8/90 Day Mon. Location Arthur & Brandeis

Weather Partly Cloudy Time: From 7 AM. To 7 PM

Recorder Mike & Ted Remarks: Stops So on Arthur East Lg on Brandeis

TMC #1

Time	Crossing on West Side of Arthur St.			Crossing on East side of Arthur St.			Crossing on North side of Brandeis St.			Crossing on South side of Brandeis St.			Jay Walkers	TOTAL
	Going S.	Going N.	Total	Going S.	Going N.	Total	Going E.	Going W.	Total	Going E.	Going W.	Total		
7														
8										1	4	5		5
9										2	4	6		6
10											2	2		2
11										1	1	2		2
12														
1		1	1					1	1	2	4	6		8
2														
3				1		1				6	5	11		12
4	1	1	2	1		1	1		1	3	2	5		9
5										5		5		5
6	1		1							4	1	5		6
7										2	1	3		3
Tot	2	2	4	2		2	1	1	2	26	24	45		58
Hr Ave														
Tot Hr. Ave														

CITY OF LOUISVILLE

REFERENCE: Public Works
NTERSECTION OF Arthur AND Brandeis
NAME OF COUNTER: Ted/Mitch
WEATHER: Partly Cloudy

FILENAME: ARTHBRAN

DATE: 1 / 8 / 90

PERIOD	NORTH BOUND				SOUTH BOUND				EAST BOUND				WEST BOUND				VEHICLE	TRKS
BEGIN	TRKS	LT	THRU	RT	TRKS	LT	THRU	RT	TRKS	LT	THRU	RT	TRKS	LT	THRU	RT	TOTAL	TOTAL
07:00	0	0	0	0	2	32	157	22	1	0	9	4	3	1	31	0	114	6
07:15	0	0	0	0	5	50	20	37	4	0	18	1	6	3	82	0	211	15
07:30	0	0	0	0	10	56	11	48	3	0	26	7	7	2	111	0	261	20
07:45	0	0	0	0	9	70	19	46	11	0	44	12	2	4	71	0	266	22
HR TOTAL	0	0	0	0	26	208	65	153	19	0	97	24	18	10	295	0	852	63
08:00	0	0	0	0	7	59	14	56	7	0	24	12	3	2	77	0	244	17
08:15	0	0	0	0	4	46	19	43	2	0	17	9	1	2	61	0	196	7
08:30	0	0	0	0	3	41	14	52	1	0	22	2	1	3	55	0	189	5
08:45	0	0	0	0	5	35	25	61	4	0	21	9	1	2	60	0	213	10
HR TOTAL	0	0	0	0	19	181	71	212	14	0	84	32	6	9	253	0	842	39
09:00	0	0	0	0	9	36	20	59	6	0	38	7	1	0	56	1	217	16
09:15	0	0	0	0	5	37	17	49	9	1	31	13	5	3	45	0	195	19
09:30	0	0	0	0	5	43	13	36	8	0	28	13	3	2	31	0	166	16
09:45	0	0	0	0	4	31	15	44	5	0	37	11	0	1	25	0	164	9
HR TOTAL	0	0	0	0	23	147	65	187	28	1	134	44	9	6	157	1	742	60
[illegible]	0	0	0	0	7	44	21	35	5	0	24	13	1	2	27	0	166	13
[illegible]	0	0	0	0	11	43	22	33	4	0	41	16	3	1	42	0	198	18
10:30	0	0	0	0	6	44	14	48	7	0	39	14	2	0	29	0	188	15
10:45	0	0	0	0	4	35	11	26	6	0	55	11	0	2	37	0	177	10
HR TOTAL	0	0	0	0	28	166	68	142	22	0	159	54	6	5	135	0	729	56
11:00	0	0	0	0	4	36	23	39	4	0	37	25	1	3	37	0	200	9
11:15	0	0	0	0	10	48	17	28	9	0	41	24	1	0	31	0	189	20
11:30	0	0	0	0	5	38	21	21	7	0	37	17	2	1	38	0	176	14
11:45	0	0	0	0	7	49	31	46	6	0	72	16	0	3	54	0	271	13
HR TOTAL	0	0	0	0	26	171	92	137	26	0	187	82	4	7	160	0	836	56
12:00	0	0	0	0	6	50	23	47	7	0	93	25	2	1	44	0	283	15
12:15	0	0	0	0	10	65	21	41	4	0	75	33	2	0	49	1	285	16
12:30	0	0	0	0	6	55	19	31	6	0	90	15	2	2	58	0	269	14
12:45	0	0	0	0	7	49	23	56	6	0	78	30	0	5	56	0	297	13
HR TOTAL	0	0	0	0	29	219	85	175	23	0	336	103	6	8	207	1	1134	58
13:00	0	0	0	0	6	47	20	53	2	0	53	30	2	4	42	0	249	10
13:15	0	0	0	0	6	48	17	47	6	0	60	26	2	2	59	0	259	14
13:30	0	0	0	0	6	65	16	41	3	0	69	22	5	2	52	0	267	14
13:45	0	0	0	0	9	46	16	43	2	0	54	29	7	3	71	0	262	18
HR TOTAL	0	0	0	0	27	207	69	184	13	0	235	107	16	11	224	0	1037	56
14:00	0	0	0	0	7	66	14	44	6	0	58	18	6	1	75	0	276	21
14:15	0	0	0	0	6	56	20	42	5	0	90	26	4	3	57	0	294	15
[illegible]	0	0	0	0	3	69	26	33	8	0	124	23	3	2	53	0	330	14
[illegible]	0	0	0	0	9	59	22	43	10	0	80	32	1	3	42	0	281	20
HR TOTAL	0	0	0	0	27	250	82	162	29	0	352	99	14	9	227	0	1181	70

CITY OF LOUISVILLE

REFERENCE: Public Works
INTERSECTION OF Arthur AND Brandeis
NAME OF COUNTER: Ted/Mitch
WEATHER: Partly Cloudy

FILENAME: ARTHBRAN

DATE: 1 / 8 / 90

PERIOD	NORTH BOUND				SOUTH BOUND				EAST BOUND				WEST BOUND				VEHICLE	TRKS
BEGIN	TRKS	LT	THRU	RT	TRKS	LT	THRU	RT	TRKS	LT	THRU	RT	TRKS	LT	THRU	RT	TOTAL	TOTAL
15:00	0	0	0	0	7	55	13	49	3	0	106	36	3	2	57	0	318	13
15:15	0	0	0	0	10	92	30	44	8	1	116	35	3	3	59	0	380	21
15:30	0	0	0	0	7	81	25	34	5	0	104	31	4	4	55	0	334	16
15:45	0	0	0	0	5	83	22	45	3	0	106	29	4	1	62	0	348	12
HR TOTAL	0	0	0	0	29	311	90	172	19	1	432	131	14	10	233	0	1380	62
16:00	0	0	0	0	4	106	24	47	6	0	101	34	0	3	55	0	370	10
16:15	0	0	0	0	9	137	25	45	2	0	91	43	3	1	48	0	390	14
16:30	0	0	0	0	1	100	18	46	7	0	145	33	1	0	46	0	388	9
16:45	0	0	0	0	1	143	35	47	4	0	140	20	3	4	51	0	440	8
HR TOTAL	0	0	0	0	15	486	102	185	19	0	477	130	7	8	200	0	1588	41
17:00	0	0	0	0	5	127	19	44	5	0	139	22	3	1	46	0	398	13
17:15	0	2	0	0	1	244	33	55	4	0	191	25	1	2	55	0	607	6
17:30	0	0	0	0	4	156	22	44	3	0	144	25	0	1	47	0	439	7
17:45	0	0	0	0	2	107	14	37	2	0	91	28	1	1	39	0	317	5
HR TOTAL	0	2	0	0	12	634	88	180	14	0	565	100	5	5	187	0	1761	31
18:[illegible]	0	0	0	0	2	91	14	22	0	0	95	25	1	2	54	0	303	3
[illegible]	0	0	0	0	5	102	17	22	1	0	87	15	0	0	33	1	277	6
[illegible]	0	0	0	0	1	32	11	10	0	0	15	7	0	0	22	0	97	1
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HR TOTAL	0	0	0	0	8	225	42	54	1	0	197	47	1	2	109	1	677	10
DAY TOTAL	0	2	0	0	269	3205	919	1943	227	2	3255	953	106	90	2387	3	12759	603

CITY OF LOUISVILLE

REFERENCE: Public Works
INTERSECTION OF Arthur AND Brandeis
NAME OF COUNTER: Ted/Mitch
WEATHER: Partly Cloudy

FILENAME: ARTHBRAN

DATE: 1 / 8 / 90

FOR THE PERIOD 07:00 - 09:00 THE PEAK HOUR IS 07:15 - 08:15

DIRECTION	PEAK HR FACTOR	VOLUMES LEFT	VOLUMES THRU	VOLUMES RIGHT	PERCENTS LEFT	PERCENTS THRU	PERCENTS RIGHT
NORTH	0.00	0	0	0	0	0	0
SOUTH	0.90	235	64	197	48	13	38
EAST	0.64	0	112	32	0	78	22
WEST	0.78	11	341	0	3	97	0

FOR THE PERIOD 09:00 - 16:00 THE PEAK HOUR IS 15:00 - 16:00

DIRECTION	PEAK HR FACTOR	VOLUMES LEFT	VOLUMES THRU	VOLUMES RIGHT	PERCENTS LEFT	PERCENTS THRU	PERCENTS RIGHT
NORTH	0.00	0	0	0	0	0	0
SOUTH	0.81	311	90	172	54	16	30
EAST	0.93	1	432	131	0	77	23
WEST	0.96	10	233	0	4	96	0

FOR THE PERIOD 16:00 - 18:00 THE PEAK HOUR IS 16:45 - 17:45

DIRECTION	PEAK HR FACTOR	VOLUMES LEFT	VOLUMES THRU	VOLUMES RIGHT	PERCENTS LEFT	PERCENTS THRU	PERCENTS RIGHT
NORTH	0.25	2	0	0	100	0	0
SOUTH	0.73	670	109	190	69	11	20
EAST	0.82	0	614	92	0	87	13
WEST	0.91	8	199	0	4	96	0

FOR THE PERIOD 07:00 - 19:00 THE PEAK HOUR IS 16:45 - 17:45

DIRECTION	PEAK HR FACTOR	VOLUMES LEFT	VOLUMES THRU	VOLUMES RIGHT	PERCENTS LEFT	PERCENTS THRU	PERCENTS RIGHT
NORTH	0.25	2	0	0	100	0	0
SOUTH	0.73	670	109	190	69	11	20
EAST	0.82	0	614	92	0	87	13
WEST	0.91	8	199	0	4	96	0

ATTACHMENT B-6

University of Louisville Environmental Protection Services Center

Compliance History

University of Louisville – Compliance History
Facility: Environmental Protection Services Center (EPSC)
EPA ID No. KY0 001 012 012 KY AI: 48952

NOD 3

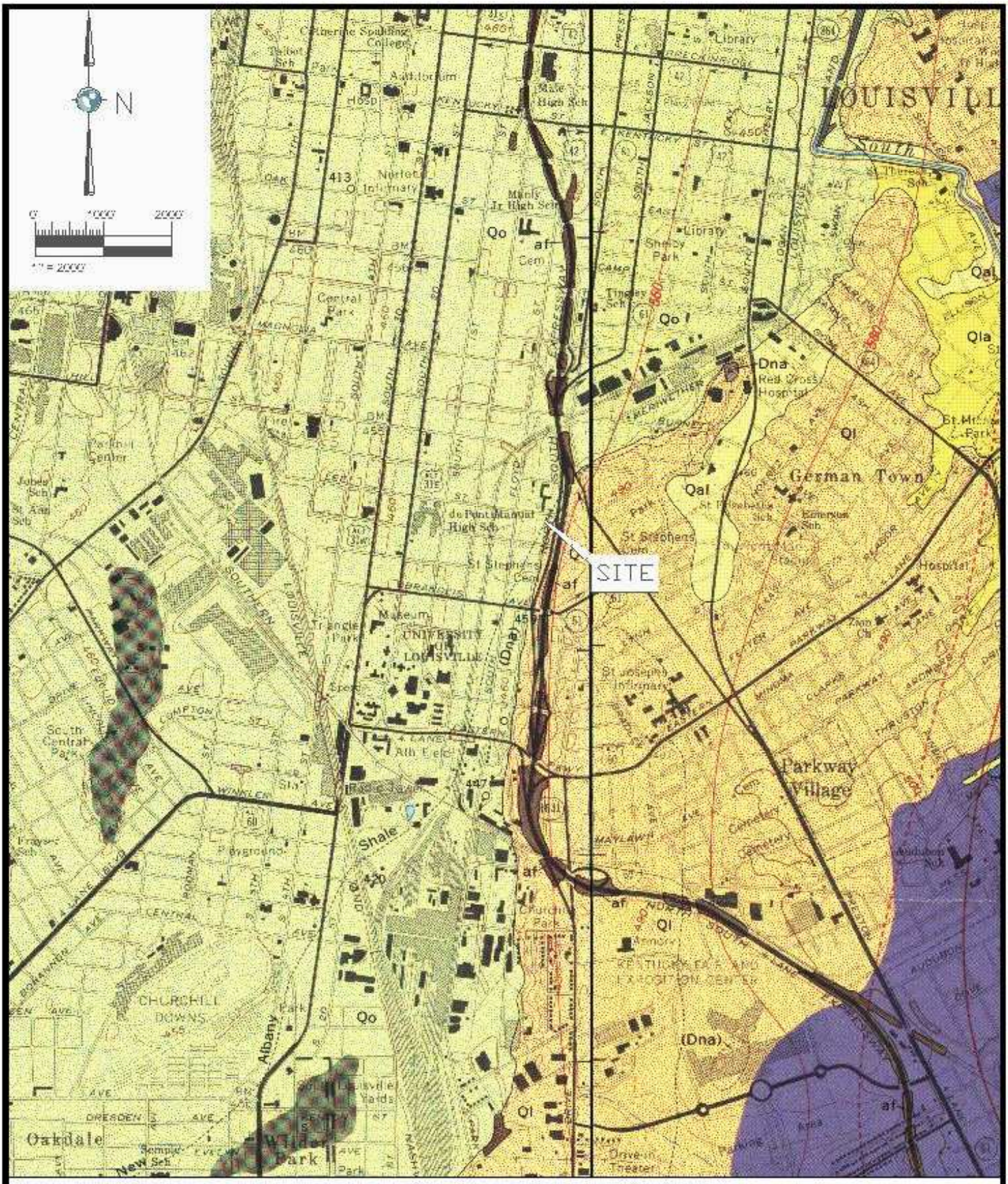
(From Jan 1, 2007 through March 16, 2022)

Style of Complaint	Case, File, Tracking or Agency Interest #	Agency (ies) involved in complaint	Date of inspection	Alleged Act or Omission	Law or Regulation alleged to have violated	Corrective Action performed	Complaint resolved
		USEPA KY DEP DWM	July 1, 2021	No deficiencies noted.			
		USEPA KY DEP DWM	Nov 6, 2019	No deficiencies noted.			
		USEPA KY DEP DWM	Nov 27, 2018	No deficiencies noted.			
NOV		USEPA KY DEP DWM	Oct. 19, 2017	Accumulation date not marked on HW container.	401 KAR 32:030 Section 5(1)(b)(2006); 40 CFR 262.34(a)(2)	Corrected at time of inspection.	Yes
NOV		USEPA KY DEP DWM	Oct. 19, 2017	Two used lamps were not properly contained.	401 KAR 43:020 Section 4(4) (2006; 40 CFR 273.13(d)	Corrected at time of inspection.	Yes
NOV		USEPA KY DEP DWM	Oct. 19, 2017	Two used lamps were not properly marked or labeled.	401 KAR 43:020 Section 5(5) (2006; 40 CFR 273.14(e)	Corrected at time of inspection.	Yes
NOV		USEPA KY DEP DWM	Oct. 19, 2017	Used lead-acid batteries containment pallet not properly marked or labeled.	401 KAR 43:020 Section 5(1) (2006; 40 CFR 273.14(a)	Corrected at time of inspection.	Yes
		USEPA KY DEP DWM	May 16, 2017	No deficiencies noted.			
		KY DEP DWM	May 16, 2016	No deficiencies noted.			
		KY DEP DWM	Aug 12, 2015	No deficiencies noted.			
NOV		USEPA KY DEP DWM	Sept 25, 2014	Small container of D001 waste not properly marked or labeled.	401 KAR 32:030 Section 5; 40 CFR 262.34(c)(1)(ii)	Corrected at time of inspection.	Yes
NOV		USEPA KY DEP DWM	Sept 25, 2014	Four containers of used oil not properly marked or labeled.	401 KAR 44:020 Section 3; 40 CFR 279.22(c)	Corrected at time of inspection.	Yes
		USEPA KY DEP DWM	Oct 31, 2012	No inspection conducted in 2013.			
NOV		USEPA KY DEP DWM	July 17, 2012	Accumulation date not marked on two HW containers.	401 KAR 32:030 Section 5(1); 40 CFR 262.34(a)(2)	Corrected at time of inspection.	Yes
NOV		USEPA KY DEP DWM	July 17, 2012	Accumulation date not marked on UW container.	401 KAR 43:030 Section 7; 40 CFR 273.35		

Style of Complaint	Case, File, Tracking or Agency Interest #	Agency (ies) involved in complaint	Date of inspection	Alleged Act or Omission	Law or Regulation alleged to have violated	Corrective Action performed	Complaint resolved
NOV		USEPA KY DEP DWM	July 17, 2012	Two drums of used oil not properly marked or labeled.	401 KAR 44:020 40 CFR 279.22(c)(1)	Corrected at time of inspection.	Yes
		USEPA KY DEP DWM	Sept 20, 2011	No deficiencies noted.			
NOV		USEPA KY DEP DWM	Apr 28, 2010	Accumulation date not marked on five HW containers	401 KAR 32:030 Section 5(1); 40 CFR 262.34(a)(2)	Corrected at time of inspection.	Yes
		KY DEP DWM	Sept 22, 2009	No deficiencies noted.			
		KY DEP DWM	Sept 9, 2008	No deficiencies noted.			
NOV		USEPA KY DEP DWM	Oct 29, 2007	Accumulation date not marked on waste container.	401 KAR 32:030 Section 5(1); 40 CFR 262.34(a)(2)	Corrected at time of inspection.	Yes
NOV		USEPA KY DEP DWM	Oct 29, 2007	Accumulation date not marked on three PCB waste drums.	401 KAR 47:005 40 CFR 761.65	Corrected at time of inspection.	Yes
NOV		USEPA KY DEP DWM	Oct 29, 2007	HW drum in poor condition – rust and dent noted (but not leaking).	401 KAR 32:030 Section 5(1); 40 CFR 262.34(a)(2)	Corrected at time of inspection, DEHS staff over-packed in 90-gal DoT rated Overpack drum	Yes

ATTACHMENT B-7

Geologic Map


N
0
1000
2000
1" = 2000'
SITE
LOUISVILLE
German Town
Parkway Village
Qo
Qal
Qla
Ql
Dna
(Dna)
af
Shale
Albany
Oakdale
CHURCHILL DOWNS
UNIVERSITY OF LOUISVILLE
Red Cross Hospital
St Stephens
Central Park
Shawnee Park
Library
Norton Infirmary
Male High Sch
Catherine Spalding College
Auditorium
Manly Jr High Sch
Tingley Sch
Jobes Sch
St Aloysius Sch
Triangle Park
Museum
Ath Field
Fraysse Sch
Fairgrounds
Louisville Yards
Drive-in Theater
Cemetery
Hospital
St Joseph Infirmary
Zoo Ch
Emerson Sch
Church Park
Wilder Park
New Sch
Sempar Sch
South Central Park
Southern Park
Tyler Park
Iroquois Park
Audubon Park
Shawnee Park
Louisville Water Co
Pumping Station
Ohio River
Kentucky
Jackson
Preston
Floyd
Brandeis
Bardstown
Dixie
Poplar Level
Southern Parkway
Lexington
Frankfort
Taylorsville
Bowman
Lane
Central
Dresden
Winklen
Compton
Oak
Market
Jefferson
Chestnut
Broadway
Maryland
Thruston
Cooper
Parkway
Avenue
Boulevard
Drive
Road
Street
Place
Park
Hill
Bluff
Creek
Branch
Run
Fork
Mill
Cemetery
Church
Hospital
Infirmary
Sch
Library
Theater
Yards
Station
Water Co
Pumping
Fairgrounds
Ath Field
Museum
Triangle Park
Shawnee Park
Tingley Sch
Jobes Sch
St Aloysius Sch
Fraysse Sch
Emerson Sch
Zoo

SECTION C –
WASTE CHARACTERISTICS

C WASTE CHARACTERISTICS

This section provides a general description of the types of waste material managed at the facility. The facility has distinct, physically separate areas for the management of various compatible groups of materials. This section describes the procedures which are utilized to ensure that, at a minimum, all information must be known to manage the waste in accordance with 40 CFR Parts 261 and 262.

The Waste Analysis Plan (WAP) is designed to be a "stand-alone" document for ease of the operator in the facility and is contained herein as Attachment C-1. Furthermore, the below attachments describe the procedures used to obtain chemical and physical information on the waste to ensure proper management.

- Attachment C-1 Waste Analysis Plan (WAP)
- Attachment C-2 SOP for Unknown Waste Management
- Attachment C-3 AHURA First Defender User Manual
- Attachment C-4 Oakton pH510 Series Benchtop Meters User Manual
- Attachment C-5 Chemical and Hazardous Waste Pickup Request Form Example

Commented [MK1]: NOD 26

C.1 CHEMICAL AND PHYSICAL ANALYSES

The majority of waste generated at the University of Louisville (U of L) campuses is from research laboratories, teaching laboratories, medical and dental schools, and maintenance operations. The only materials accepted by the Environmental Protection Services Center (EPSC) are generated by U of L operations.

SCOPE OF WASTES ACCEPTED

The EPSC, by design, is a repository for a wide variety of both hazardous and non-hazardous wastes from U of L operations only. Operations and activities include research labs, dental health clinical labs, chemistry teaching labs, machine shops, art studios, and maintenance operations.

The following table provides several of the routinely generated wastes accepted at the EPSC:

Activity	Waste Type	EPA Codes)
Research labs	Non-halogenated organic solvents	D001, D035, F-Listed solvents
Research Labs	Halogenated and Non-halogenated organic solvent mixtures	D001, D022, F-Listed solvents
Chemistry Teaching Labs	Acid, Inorganic mixture (not concentrated)	D002, D005, D007
Printmaking Shop	Solvent contaminated solids (paper and gloves)	F-Listed solvents
Pathology Lab	Xylene and alcohol	D001, F003

Activity	Waste Type	EPA Codes)
Dental Clinic	Dental amalgam waste	D009, D011, U151
Additive Manufacturing Shops	Stainless steel condensate and contaminated debris	D007
Paint Shop	Spent mineral spirits	D001
Research labs	Unused expired and/or unwanted hazardous chemicals	D-Codes, P-Codes and/or U-codes

Hazardous Wastes - The facility Part A Application (see Section A) specifically lists the RCRA hazardous wastes accepted by the facility. Section C.3 provides a detailed description of the wastes to be received.

Commented [MK2]: NOD 25

Non-Hazardous Wastes - Several examples of non-hazardous wastes which may be managed at the facility include:

- Polychlorinated Biphenyls (PCBs)
- Used Oils
- Pesticides/Herbicides not specifically listed or characterized in 40 CFR 261
- Off-spec or out-dated pharmaceuticals
- Off-spec or out-dated chemicals not specifically listed in 40 CFR 261 or not characteristically hazardous.

Mixed Waste (X-RAD) - Certain waste materials are as both hazardous and regulated by the Nuclear Regulatory Commission (NRC). These materials are classified as “mixed wastes” and are designated as “Mixed Waste” or “X-RAD.” This classification does not include NRC “non-regulated” or “de minimis” wastes.

Land Disposal Restricted Wastes - Land disposal restricted hazardous wastes are received for management. Storage of these wastes is limited to one year in accordance with 40 CFR 268.50, unless circumstances exist requiring longer storage (i.e. no disposal capacity for a particular waste stream). If longer storage is required, the appropriate documentation of the reason for this time extension will be maintained by the EPSC.

Prohibited Wastes - The following wastes are not accepted for management.

- Unknown wastes*
- Any chemical/waste deemed unacceptable by the Chemical Regulatory Specialist/Hazardous Waste Coordinator (CRS). The basis for this determination will be such items as insufficient information, safety considerations, or lack of disposal method considerations.

*Unknown waste will be assessed on-site whenever possible using the procedure in Attachment C-2. Once properly identified, it can be accepted into the EPSC. The EPSC will not accept unknown wastes.

All wastes to be picked up by DEHS are accurately described so that they can be properly segregated. When a request is made for an unknown material or waste to be managed, an attempt to identify its contents is routinely undertaken. Usually the contents can be identified by consulting individuals who work in the area where the unknown material or waste was identified. DEHS staff will assess and characterize unknown waste in accordance with the procedure in Attachment C-2.

U of L has developed a series of control procedures to determine the acceptability of wastes for management at the EPSC. A summary of these procedures is described below. The procedures are described in detail in Section C.3, the Waste Analysis Plan.

Commented [MK3]: NOD 25

1. Generator affixes a unique label number provided by the EPSC to the waste container.
2. Generator submits a Chemical and Hazardous Waste Pickup Request Form that is shown in Attachment C-5.
3. Information from the Chemical and Hazardous Waste Pickup Request Form is entered into the Hazardous Waste Tracking System (Tracking System) by DEHS.
4. DEHS staff evaluates the waste profile information to determine acceptability in accordance with permit conditions and regulations.
5. DEHS staff requires the generating location to submit additional information if necessary, to adequately characterize the material.
6. DEHS may reject any waste it cannot identify or cannot manage in accordance with permit conditions and regulations.

C.1.a Containers

Many wastes received by the facility are received in their original containers. The exception is certain laboratories and maintenance operations which accumulate like wastes into larger containers. As an extra precaution, all containers are stored as though they contained free liquids.

Each container is inspected upon receipt to determine if it is in good condition (i.e. not leaking, properly sealed, not corroding) and to ensure that it is compatible with the waste material. If the container is found to be in an impaired condition, it is transferred into a compatible container or is over-packed into a compatible container.

Each container is made of or is lined with materials that will not react with and are otherwise compatible with the hazardous waste to be stored so that the ability of the container to contain the waste is not impaired.

Section D describes in detail the design and containment of the discrete storage areas. Section F describes in detail the container inspection requirements.

C.2 HAZARDOUS WASTE GENERATED AT THE EPSC

The EPSC is registered as a Large Quantity Generator of hazardous waste and is subjected to 40 CFR Part 262. During normal operation, the EPSC generates aerosol cans. Their waste determinations are made via SDSs.

The EPSC also generates contaminated debris (i.e. PPE, spill pads, and wipes) when the bulking of waste is being performed. The debris is put into a drum and the waste determination is made based on process knowledge of what is being commingled.

C.3 WASTE ANALYSIS PLAN

The Waste Analysis Plan is provided as Attachment C-1.

ENVIRONMENTAL PROTECTION SERVICES CENTER
Louisville, Kentucky

Waste Analysis Plan
Attachment C-1 of the
Part B Permit Application

June 2022
Prepared by:

University of Louisville
Environmental Health & Safety Department
Louisville, Kentucky

WASTE ANALYSIS PLAN
Table of Contents

Section **Page**

1.0 INTRODUCTION 1
2.0 SCOPE OF WASTES ACCEPTED 2
2.1 Characteristic Wastes (D Codes) 3
2.2 Lists of Hazardous Wastes (F, K, P, and U Codes) 4
2.3 Wastes from Chemicals 5
2.4 Mixed Wastes 5
2.5 Non-Hazardous Wastes 5
2.6 Land Disposal Restricted Wastes 6
2.7 Prohibited Wastes 6
3.0 WASTE REVIEW PROCEDURES 6
3.1 Technical Review Process-Overview 7
3.2 Determination of Waste Status 9
3.3 Determination of Treatment 10
3.4 Treatment Technologies 10
3.4.1 Stabilization 10
3.4.2 Bulking 11
3.5 Evaluating Treatment Performance 12
3.6 Professional Judgment 13
3.7 Waste Tracking 13
3.7.1 Pickup 13
3.7.2 Scheduling 13
3.7.3 Transportation 14
3.7.4 Receipt at the Facility 15
3.7.5 Documentation 15
3.7.5.1 Information Flow Overview 16
3.7.5.2 Data Entry Requirements 16
3.7.5.3 Chemical Work Order/Drum Inventory Completion 17
4.0 PARAMETERS AND RATIONALE 20
4.1 Rationale for Analysis 22
4.2 Parameter Selection Procedure 22
4.3 Facility Laboratory 23
5.0. TEST METHODS 24
6.0 SAMPLING METHODS 24
6.1 Preparation for Shipment to Off-Site Laboratory 25
6.2 Field Quality Assurance/Quality Control 25
6.3 Sample Packaging and Shipment 26
6.4 Sampling Records 27
6.4.1 Sample Labels 27
6.4.2 Chain of Custody 27
6.4.3 Security Seals 28
6.4.4. Shipment 28
7.0 FREQUENCY OF ANALYSIS 28

7.1 Non-Routine Waste Chemicals 28
7.2 Routine Wastes 29
7.3 Incompletely Characterized Wastes 29
7.4 Bulked Waste 29
8.0 REQUIREMENTS FOR WASTE GENERATED OFF-SITE 29
9.0 ADDITIONAL REQUIREMENTS FOR FACILITIES HANDLING IGNITABLE, REACTIVE OR INCOMPATIBLE WASTES 30
9.1. Basis of Incompatibility 30
9.2. Basis of Segregation 30
9.3. Waste Stream Compatibility Review 34
9.4 Storage of Wastes 35
10.0 RECORDKEEPING 35
11.0 APPENDICES 36
Appendix 1 EPSC Land Disposal Restrictions One-Time Notice to File 36
Appendix 2 Pictures of High Hazard Storage Areas 37

Commented [MK4]: NOD 27; Page numbers are based on the non-redline copy.

ATTACHMENT C-1

WASTE ANALYSIS PLAN
40 CFR 270.14(b)(3)
40 CFR 264.13

1.0 INTRODUCTION

This Waste Analysis Plan (WAP) is incorporated into the University of Louisville (U of L) Part B Application as Attachment C-1 of Section C, Waste Characteristics. The WAP describes the procedures used to obtain chemical and physical information and data on the wastes to ensure proper storage, treatment, and disposal.

The U of L has developed this WAP as an integral part of its waste management operations. Ensuring compliance with the WAP and subsequent waste management operations will be the responsibility of the U of L's Department of Environmental Health and Safety (DEHS). The staff of DEHS consists of individuals with academic or specialized training or experience in proper methods and handling of hazardous waste and materials. **A copy of this plan will be available at the facility at all times.**

The Environmental Protection Services Center (EPSC) requires that contractor's employees and subcontractors handling hazardous wastes and/or other wastes must receive training per OSHA 29 CFR 1910.120. This training includes HAZWOPER 24-hour OSHA (per 29 CFR 1910) training. Additionally, qualified personnel must also receive annual 8-Hr HAZWOPER Refresher training. Training program and qualified personnel certificates must be provided upon request by EPSC staff and/or University Procurement Contract Administrator. Specific contractor training requirements are referenced in Table H-2 of Section H Personnel Training.

The only waste materials accepted by the U of L EPSC will be generated by U of L operations. Before a waste material will be accepted for treatment and/or storage at the EPSC, its chemical and physical characteristics will be identified by analytical and/or process information provided by the generator and/or obtained by the facility. The waste being received by the EPSC is exclusively from U of L generators which are under the same ownership. The EPSC relies on the knowledge of these generators when processing waste until such time that the onsite treatment generates a new waste which requires a new waste determination. The "generator" will be such groups as research laboratories, chemistry teaching laboratories, medical and dental schools, and maintenance operations from the University's associated properties.

The purpose of this WAP is to document the necessary sampling methodologies, analytical techniques, and overall procedures for all hazardous wastes which will enter this facility for management.

The WAP provides guidelines for process specific evaluation of wastes. It is not intended to give detailed information regarding every waste material that could potentially be received for management.

2.0 SCOPE OF WASTES ACCEPTED

Wastes accepted at the EPSC will be generated by University operations on campus and at off-site locations, such as research labs, art studios, teaching labs, dental and health clinics, and maintenance operations. Currently, waste is accepted at the EPSC from the following locations:

- Belknap Campus – 2200 Brook Street
- Health Sciences Center Campus – 511 S Floyd Street
- ShelbyHurst Campus – 950 N Hurstbourne Parkway

The EPSC, by design, is a repository for a wide variety of both hazardous and non-hazardous wastes from U of L operations only. The procedures set forth in this WAP are based on evaluation of the hazardous wastes generated by the University during the past ten years. Based on this, evaluation the following information has been determined.

Commented [MK5]: NOD 28

- Approximately 40% of the waste received is halogenated or non-halogenated solvents and therefore lends itself to bulking (i.e., consolidating compatible wastes for transportation and disposal at off-site TSD facilities).
- Approximately 20% of waste received are corrosive acids, inorganic, non-flammable (not concentrated)
- Approximately 60 % of waste containers received are currently being lab packed for off-site disposal
- Since 2010, less than 1% of all waste containers received at the EPSC are ≥ 30-gallon drums
- The majority of wastes can be adequately characterized (i.e., hazard class, EPA hazardous waste code) by process and generator knowledge.

Moreover, only EPA waste codes that have been identified in the EPSC Part A Application will be managed and stored on-site for up to 1 year. If EPSC staff determine that a hazardous waste has been generated by an entity offering waste to the EPSC carries an EPA waste code that is not listed on the Part A Application, the container will not be accepted into the EPSC until an appropriate permit modification is approved by KYDEP Division of Waste Management.

Commented [MK6]: NOD 29

The physical design of the EPSC (i.e., compatibility segregation) described in this WAP is based on the needs of the University, including anticipated growth. To ensure compliance with all applicable regulations, each waste stream will be evaluated using the information provided by the generator and additional information as necessary, such as, analytical test results, specific information on the experiment or process generating the waste, product SDS or technical specification sheet.

Commented [MK7]: NOD 30

Each waste category is discussed below, including waste descriptions, hazard characteristics, and the basis for hazard designations. The Part A Application lists the EPA Hazardous Waste Codes potentially accepted by the facility.

2.1 Characteristic Wastes (D Codes)

A solid waste is a hazardous waste if it exhibits any of the characteristics identified in 40 CFR 261 Subpart C, which include ignitability, corrosivity, reactivity, and toxicity.

Many wastes exhibiting a hazardous characteristic are produced at the U of L. These include, but are not limited to:

D001 ignitable waste – spent non-halogenated solvent waste streams are routinely generated form from research and Chemistry teaching laboratories (usually Organic, Bio-chem and P-chem labs). Used mineral spirits and other paint thinners from Physical Plant Paint Shop, and aerosol cans.

D002 corrosive liquid waste – includes spent acid waste streams and spent base wastes streams are routinely generated from research and teaching laboratories.

D003 reactive waste – includes sulfide bearing waste streams, such as b-mercaptoethanol. This waste is typically generated from research laboratories collected in containers 4 L in size or less.

Listed wastes, discussed in Section 2.2, and mixed waste, Section 2.4, may also exhibit a characteristic. Evaluation of listed waste also exhibiting a characteristic waste code is described in Section 3.5 of this WAP. Wastes in this category will be designated based on the generator's knowledge. DEHS staff only bulk compatible materials (no chemical treatment), therefore, no new chemicals will be created. The sole exception is the stabilization of NORM nitrates, such as uranyl nitrate and thorium nitrate. In accordance with receiving disposal facility criteria and instruction, DEHS staff deactivate the D001 (ignitability potential) by mixing the NORM nitrate with cement mix. In this instance, a flash test for ignitability isn't appropriate. To ensure that the solid NORM waste no longer exhibits oxidizing potential, DEHS staff will test the waste with potassium iodide paper. The negative test will be confirmed with no color change. See Attachment C-6 for the supporting literature from the current disposal vendor.

Commented [MK8]: NOD 31

Commented [MK9]: NOD 5

Characteristic Wastes are also evaluated for Underlying Hazardous constituents (UHCs) as listed in 40 CFR 268.48. UHC determination is made by the CRS and that determination is based on generator knowledge. Wastes with a UHC are recorded in the Chemical Work Order under the Waste Description tab that is detailed in Section 3.7.5.3 of this WAP. The information that goes into the Waste Description tab automatically goes onto the label that accompanies the waste until final disposal.

Commented [MK10]: NOD 4

2.2 Lists of Hazardous Wastes (F, K, P, and U Codes)

Hazardous Wastes from Non-Specific Sources (F Codes)

Spent solvent wastes are the most commonly found F codes. They are generated from operations that use listed solvents or a specified formulation of solvents. When the solvent becomes unusable, it is designated as waste for disposal. Most of these solvent wastes are relatively pure but are unusable for research purposes. Spent non-halogenated solvents and spent halogenated solvents are generated primarily in research and chemistry teaching labs and maintenance activities. Evaluation of listed waste also exhibiting a characteristic waste code is described in Section 3.5 of this WAP.

Commented [MK11]: NOD 32

Commented [MK12]: NOD 31

Listed Wastes are also evaluated for Underlying Hazardous constituents (UHCs) as listed in 40 CFR 268.48. UHC determination is made by the CRS and that determination is based on generator knowledge. Wastes with a UHC are recorded in the Chemical Work Order under the Waste Description tab that is detailed in Section 3.7.5.3 of this WAP. The information that goes into the Waste Description tab automatically goes onto the label that accompanies the waste until final disposal.

Commented [MK13]: NOD 6

Hazardous Wastes from Specific Sources (K Codes)

Manufacturing activities are not performed at the University; therefore, hazardous wastes from specific sources will not be generated.

Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residues (P and U Codes)

This category will contain wastes with many different chemical qualities, including virgin chemicals from lab decommissioning, out-of-date reagents, excess chemicals, contaminated chemicals, rinsate residue form acutely hazardous chemical containers, and spill materials.

Discarded chemical products will typically be received in the manufacturer's original container. These containers will typically be glass or polyethylene jars or bottles and metal cans having a volume equal to or less than 4 liters. Wastes in this category will generally be designated on the basis of container label, and substantiated by the generator's knowledge.

Commented [MK14]: NOD 31, moved up to F Code Information

2.3 Wastes from Chemicals

Wastes from chemicals synthesized or created in research laboratories will typically consist of organic material and inorganic material received in small containers. These wastes may contain metals. Wastes from chemicals synthesized or created in research laboratories are typically limited in quantity. Wastes in this category will be designated on the basis of the generator process knowledge, EPA equivalent testing, and literature review. EPA equivalent testing examples include multiple spectroscopic techniques such as NMR spectroscopy, FT-IR spectroscopy, and mass spectrometry.

2.4 Mixed Wastes

Certain waste materials will be classified as both hazardous by the Kentucky Division of Waste Management and as regulated by the Nuclear Regulatory Commission. These materials are considered to be mixed waste and are designated as "Mixed Waste" or "X-RAD". Mixed waste is stored in a separate tray in segregated compatible waste storage area. The tray is marked or labeled to clearly identify that the waste is "mixed hazardous waste." Prior to pick up of any mixed waste, EPSC staff consult with the University Radiation Safety Office to ascertain if any additional personnel safety precautions, including the use of shielding for transport and storage, is needed. In the past 10 years, mixed waste picked up and stored at the EPSC has contained low level C-14 (0.1 to 10 uCi) or H-3 (0.1 to 10 uCi) in flammable solvents. The waste container, usually glass, provides adequate shielding. This classification does not include materials considered non-regulated or de-minimis by the Nuclear Regulatory Commission or those not considered hazardous by the Resource Conservation and Recovery Act. Due to extremely high cost of off-site treatment and disposal, mixed waste will not be bulked.

2.5 Non-Hazardous Wastes

The EPSC will also manage wastes that are not regulated by RCRA, but because of their hazards or properties, have special management requirements. Non-hazardous waste will not be mixed with hazardous waste. Several examples of non-RCRA wastes which will be managed at the EPSC include:

- Asbestos
- Polychlorinated Biphenyls (PCBs)
- Used Oils
- Pesticides/Herbicides not specifically listed or characterized in 40 CFR 261
- Off-spec or out-date pharmaceuticals
- Off-spec or out-date chemicals not specifically listed in 40 CFR 261 or not characteristically hazardous

2.6 Land Disposal Restricted Wastes

The vast majority of wastes managed at the EPSC does not meet the LDR treatment standards and as a result requires further off-site treatment. Based on this LDR information, an LDR certification or notification form is completed by the contracted off-site TSDF technicians at the point of shipment from the EPSC.

Storage of accepted wastes at the EPSC will be limited to one year in accordance with 40 CFR 268.50, unless circumstances exist which require longer storage (i.e. no treatment or disposal capacity for a particular waste stream is available or if hazardous waste is assigned EPA waste code not currently listed on Part A Application). In such case, DEHS will submit storage extension request to KYDEP Division of Waste Management for approval and receive approval. If an EPA waste code is not currently listed, the waste container will not be accepted at the EPSC and must be transported out of the generators location within 90 days. EPSC staff will then ensure to add the new EPA waste code on next annual EPSC Hazardous Waste Registration Activity renewal as well as perform a permit modification for the EPSC to manage this waste. If longer storage is required, the appropriate documentation of the reason for this time extension will be maintained by DEHS. EPSC staff ensure that the University's contracted EPA permitted off-site disposal vendor properly treat wastes identified in Sections 2.1, 2.2, 2.3, 2.4 and 2.5 as documented on the vendor land-disposal restriction (LDR) forms.

Commented [MK15]: NOD 33

Commented [MK16]: NOD 34

2.7 Prohibited Wastes

The following wastes will not be accepted for management. These determinations will be made by trained EPSC personnel or in consultation with the DEHS Director.

- Wastes that cannot be characterized by process knowledge or analyses. Unknown waste will be identified/categorized using the procedure in Attachment C-2.
- Wastes deemed to be unsafe for storage at the EPSC
- Any chemical/waste deemed unacceptable by the Chemical Regulatory Specialist (CRS). The basis for this determination will be such items as insufficient information, safety considerations, or lack of viable disposal methods
- Radioactive waste, except that defined in Section 2.4

3.0 WASTE REVIEW PROCEDURES

The chemical and physical characteristics of waste accepted at the facility will be sufficiently identified by analytical and/or detailed process knowledge provided by the individual generator via Attachment C-5 Chemical and Hazardous Waste Pickup Request

Form. This information will be necessary to accept, store, treat, and dispose of the waste. Waste review decisions will be made by the CRS. The qualifications and job description for the CRS are described in Section H.

Commented [MK17]: NOD 35

All accompanying information will be entered into the Hazardous Waste Tracking System. The facility will be equipped with a computer terminal for access to that system. Section 3.7.5 describes the documentation procedures.

3.1 Technical Review Process-Overview

When a generating location in the U of L system determines that materials are waste, the generator provides a request to DEHS via Attachment C-5 Chemical and Hazardous Waste Pickup Request Form. The pickup request identifies the number of the containers that the generator wishes to send to the facility, a unique label number for each container, chemical makeup of each container with percentages that must add up to 100, quantity of each container, and the process that generated the waste.

The generator must also label each container of hazardous waste. If multiple small waste containers of the same waste are placed in a larger container, the CRS can make an exception and allow one label to be placed on the larger container. The generator would have to provide the total quantity for the entire package. If the generating location needs assistance in completing either of these forms, s/he is encouraged to contact DEHS for assistance.

Commented [MK18]: NOD 36

The DEHS procedures for waste pick-up are also provided on its web site.

The information submitted by the UofL generator on the Chemical & Hazardous Waste Pick Up Form is then entered into the Hazardous Waste Tracking System (Tracking System) (see Section 3.7.5 for more detailed information on the Tracking System). The system is used to track each container movement and waste management method within the facility, regardless of the size of the container. For each DEHS chemical waste pick up, a copy of each generator's Chemical & Hazardous Waste Pick Up Form is printed and attached to the printed e-manifest, Field Work Order and LDR. These records are retained for at least five (5) years, and are available upon request by regulatory officials.

The generating location must comply with these waste identification procedures for every container of waste, regardless of how routine the generation.

The technical review uses chemical information, analytical data, and/or information from the generator regarding the process generating the waste, together with literature reviews (M/SDS, technical spec sheets) and the professional judgment of the CRS, to determine if a waste will be accepted for storage, treatment, and subsequent disposal.
The CRS administers the waste acceptance program. The qualifications and job description are described in Section H. The review is conducted by the CRS utilizing procedural guidelines and professional judgment. The CRS is authorized to request

additional information or require additional analytical data before determining waste acceptability.

The technical review is conducted with a thorough knowledge of applicable federal and state regulations and facility operational permits and guidelines. The CRS bases waste acceptance on that knowledge, as well as his or her own technical knowledge.

The technical review is designed to accomplish four objectives: (1) determine if the facility can accept the material, (2) identify special handling procedures necessary to safely store the material prior to treatment or off-site disposal, (3) identify potential treatment technologies that will meet the intent of waste minimization efforts and provide successful treatment, and (4) provide confirmation of wastes acceptance.

Commented [MK19]: NOD 37

The Work Order includes the information from the Container label, and attachments, if any, submitted by the generator and any literature reviews, records of conversations, etc., completed by the CRS:

- Copies of laboratory tests results, specific information on the process that generated the waste, Safety Data Sheets, etc., to determine the components of the waste.

- A contact name must be provided on the Pickup Request. The waste description must be provided before a waste stream will be approved for pick up by the facility.

- When omissions or discrepancies on the Container label are found, the CRS will contact the individual noted for additional information.

- If further information is needed or if analytical testing is necessary, the CRS notifies the generator. Until adequate information for hazardous waste determination or analysis is obtained, the facility will not process the waste for pick up.

- For in-house information and planning purposes, the generator of routine waste streams may be asked to provide waste quantities, shipment frequencies, and handling instructions.

The technical review process provides the information necessary to make decisions concerning waste acceptance or denial, storage requirements, stabilization to be performed, legal/regulatory requirements, potential hazards in safety and handling, and methods to verify that stabilization is successful. The information is updated as needed to incorporate periodic changes or revisions to existing federal and state regulations and developments and improvements in hazardous material management technology.

Commented [MK20]: NOD 38

Commented [MK21]: NOD 39

3.2 Determination of Waste Status

The CRS continues to obtain additional data necessary to answer unresolved issues or to answer new questions suggested by the additional information. Final approval depends on proper waste characterization and receipt of all required completed paperwork. A generators failure to satisfy any questions about characterization of the waste on pickup will result in a denial.

If the waste is acceptable, the EPSC staff pick up the waste for proper management by the facility. Upon pick up of the waste, EPSC personnel will ensure waste container is securely closed, container integrity is intact and, if the container is translucent, view the waste physical state to ensure it aligns with the chemical waste description provided by the generator. Upon pickup, EPSC staff carry chemical indicator paper and will check physical properties if container is bulging, waste is layering, color is wrong, labeled wrong, or any other discrepancies the CRS feels need to be investigated.. Papers available include:

- Hydrion pH range 0.0 – 14.0 indicator strips
- Spectrum pH range 0.0 – 14.0 pH strips
- Fluka Potassium Iodide Starch Paper strips (oxidizing potential)
- CI Agent Solutions Hydrocarbon Detection Strips
- Quantofix Peroxide Test sticks 1-100 mg/L range

Unless otherwise noted, once a waste stream has been adequately reviewed and approved for management, the material shall be authorized for a period of one year. Any time during this period, the waste stream information may be reviewed again. A complete review shall be conducted if additional information is presented by the waste generator or if the waste stream is suspected to have changed. This procedure has been developed to efficiently manage larger volume routine waste streams (e.g. waste solvents from maintenance activities).

A waste will be denied for incomplete characterization, unknown constituents, incomplete paperwork, lack of response to technical questions, concern for handling requirements, incompatibility with other waste on hand, lack of capacity, prohibited wastes, and any other reasons the CRS may deem necessary.

Generators are notified of a denied status and given the reasons for the denial. This information becomes part of the file. Waste streams which have been denied may be re-evaluated at any time provided the cause for the denial is resolved.

Situations may arise where a chemical is listed on a pickup request, but is not present when DEHS makes the pickup at the generating location. Many times, in these instances, the unused chemicals have been redistributed for use and would no longer be classified as

a waste. The fact that the material was not picked up is noted on the Work Order, and DEHS is not responsible for tracking or managing the material.

3.3 Determination of Treatment

The major thrust of the EPSC is to properly store or repackage waste materials to most efficiently prepare them for off-site disposal. The sole exception is described Section 3.4.1 of this WAP.

All hazardous waste shipments received at the EPSC are accompanied by a LDR. All hazardous waste shipments that ship out from the EPSC are accompanied by a LDR. All required certifications under the land disposal restrictions are completed and attached to the Work Order after the waste is treated, as applicable.

One-time notices are completed within compliance of 40 CFR 268.7. One-time notices will be kept on-file at the EPSC when waste is reclassified to a product and given to U of L personnel as well as when waste is declassified to a non-hazardous waste. The one-time notice form is shown in Appendix 1

3.4 Treatment Technologies

The Part A Application (see Section A of the Part B Application) lists operations which may be utilized by the facility based on an intensive review of waste receipts and waste management alternatives. This section provides detailed process descriptions for these treatment technologies.

EPSC personnel that conduct hazardous waste bulking or treatment operations will be equipped with the appropriate PPE outlined in table as follows:

	Bulking	Stabilization
Long Pants	X	X
Closed Toed shoes	X	X
Long Sleeves or Lab coat	X	X
Disposal Suit, Saranex	X	
Rubber Apron	X	
Full Face with Supplied air	X	
Safety goggles		X

3.4.1 Stabilization

Stabilization or solidification processes (described in 2.1 and 4.0) may be utilized during which wastes are mixed with reagents (e.g., cement, fly ash, clay, silicates) to reduce mobility of inorganic materials, deactivate oxidizer hazard, or to eliminate free liquids. If

Commented [MK22]: NOD 40

stabilization or solidification of hazardous waste is required for off-site disposal at permitted TSDF, the hazardous waste will be solidified or stabilized in accordance with requirements provided by TSDF. To ensure that the solid NORM waste no longer exhibits oxidizing potential, DEHS staff will test the waste with potassium iodide paper. The negative test will be confirmed with no color change. See Attachment C-6 for the supporting literature from the current disposal vendor. Furthermore, see Section 4.0 Paragraph five of this WAP for additional details.

Commented [MK23]: NOD 41

Commented [MK24]: NOD 42

Waste stabilization or solidification processes are only conducted by the EPSC in containers with design capacities less than or equal to 0.1 m^3 or 26 gallons. Per 40 CFR 264.1080(b)(2), such containers are not subject to Subpart CC requirements.

Commented [MK25]: NOD 43

Absorbent pads may be utilized to protect the working surface from being contaminated. If absorbent pads become contaminated, then they will be appropriately managed as hazardous waste.

Commented [MK26]: NOD 8

3.4.2 Bulking

Liquid compatible wastes which are in small containers (< 5 gal/20 L size) may be bulked into DOT approved UN-rated 30 gallon or 55-gallon drums prior to further treatment and/or disposal. Within the EPSC, bulking operations are performed in room 111. EPSC personnel don appropriate PPE as indicated in the table in Section 3.4. The primary risk inherent in consolidation operations is the inadvertent combination of incompatible wastes. Combining incompatible wastes could result in the evolution of heat, the release of toxic gases, or even fire and explosion. DEHS recognizes these hazards and understands that appropriate controls must be established to prevent the occurrence of these types of incidents. Only those wastes designated for bulking in the EPSC's Part A Application will be consolidated. These wastes are relatively stable and are not considered reactive. Bulking is performed in accordance to waste profiles established with our offsite contracted hazardous waste disposal vendor. However, this permit will not be violated in order to meet the demands of the disposal vendor.

Commented [MK27]: NOD 44

Prior to placement of any waste in a 30-gallon or 55-gallon drum, EPSC staff ensures the compatibility of the waste with the materials to be placed into the drum or materials already in storage in the drum. A bench-scale test may be performed to determine the compatibility of the waste prior to placement of materials in the drum. This test is performed by taking a small portion of the chemical and mixing it with a sample of the waste materials already in the drum. This mixture is observed for signs of heat generation, changes in color, polymerization, evolution of gases, or formation of precipitates. If any of these are encountered, the chemical is considered incompatible and is not bulked with the materials already in the drum. The bulking/blending of waste materials is conducted solely for efficient waste handling. The blending of materials is not conducted to eliminate or reduce the toxicity or hazard.

Commented [MK28]: NOD 45

Prior to bulking, EPSC staff will conduct the following:

- Review all containers waste name description and EPA waste codes to ensure the wastes to be combined are compatible (i.e. all flammable liquids).
- All containers that are bulked will have pH verified within acceptable range (<4 for acids, 4-10 for solvents, > 10 for bases).
- Typically, containers 1 gallon or less are lab packed.
- No P-code listed waste will be bulked.
- No waste with Reactive (R) characteristic will be bulked (When a waste is considered for bulking, but it is a potential peroxide former, before bulking, the waste will be tested by peroxide test strip. If peroxide measured is less than 25 ppm, the waste may be bulked. If not less than 25 ppm, the R characteristic is applicable, and the waste will not be eligible for bulking.)
- When using on-line breathing air, check breathing air cylinder system to ensure adequate availability for activity duration

After the contents of the small containers are emptied into the appropriate DOT rated drum, the tracking label/tag is removed from the container and the computer records are updated to include the assigned drum number, date the waste was bulked, and EPSC staff who bulked waste initials. The drum list is then printed and attached to the top of the drum. This provides for complete tracking of each container. The last paragraph of Section 3.7.5.3 of this WAP details how the drum will be labeled after it is bulked. The empty containers are then discarded in accordance with all applicable EPA regulations. A container is considered "empty" based on the criteria specified in 40 CFR 261.7. Waste containers that previously held acutely hazardous wastes are not triple rinsed and are managed as acutely hazardous waste.

3.5 Evaluating Treatment Performance

The approval of a waste for treatment involves identifying a treatment process which is appropriate and determining how treatment success will be verified.

This section outlines post-treatment decisions of concern and how the facility addresses these concerns. Central to the post-treatment concern is the method of evaluating treatment performance. The waste code, as prescribed by 40 CFR 261, and our evaluation of Underlying Hazardous Constituents (UHCs) identifies what constituents are of concern in a particular waste. This includes listed wastes that also exhibits a hazardous characteristic waste code. This information is then evaluated to identify either a regulatory approved treatment standard (40 CFR 268.42) or the concentration levels (either in a waste [40 CFR 268.40] or waste extract [40 CFR 268.41]) that must be achieved by treatment to reduce the toxicity or volume of a waste.

Commented [MK29]: 46

Commented [MK30]: NOD 9

Commented [MK31]: NOD 31

If the treatment residue is to be land-filled, residues are sampled by the facility, outside laboratory, or disposal contractor to verify treatment success as specified in the treatment standard for a particular waste, if necessary. The sampling procedures in the last paragraph of Section 4.0 of this WAP will be used. Analyses for treatment verification measure the level of amelioration or destruction of regulated constituents in a waste.

Commented [MK32]: NOD 47

If a non-LDR waste or characteristic waste has been treated to remove the characteristic property, it may then be managed as a non-hazardous waste. Evaluation by process knowledge, literature review, and/or testing to confirm that the characteristic property no longer exists will be conducted prior to being declared a non-hazardous waste.

Commented [MK33]: NOD 48

3.6 Professional Judgment

Hazardous waste management professionals are required to meet minimum job classification standards for their individual position. These qualifications and standards are detailed in Section H. By meeting these professional standards, the operations staff is authorized to make waste management decisions. These decisions can be made using any acceptable combinations of regulatory standards and available published literature. Technical expertise, common sense, regulatory guidelines, and safe handling procedures are all integrated in professional judgment.

3.7 Waste Tracking

As discussed in Section C.3.1, each hazardous waste must be entered into the University's hazardous waste tracking system to ensure compliance with state and federal regulations and to expedite the safe handling of these wastes by DEHS personnel. Wastes are assigned a unique tracking number. The EPSC Waste label is created that will accompany the waste from pickup to final disposition. When waste is bulked, the container EPSC Waste Label is removed and the container label information is then included on the drum inventory form. See end of Section 3.7.5.3 for details. The EPSC hazardous waste tracker database provides the EPSC with an electronic repository of all wastes which have been received, managed, and shipped from the EPSC.

Commented [MK34]: NOD 10

3.7.1 Pickup

Each waste material must be identified by the proper forms and labels. EPSC staff assigned to pick up waste will inspect all paperwork and the integrity of all containers prior to transporting the material.

3.7.2 Scheduling

The CRS prepares the daily schedule of approved pickups based on such factors as amount of waste, personnel availability, weather conditions, DOT hazard classes, and

other considerations needed for safe collection of the materials. Collection and removal of materials is performed on an as-needed basis.

The EPSC staff proceeds to each generation location with an approved request to remove the waste. At each generation location, EPSC staff inspect the materials and ensure that the following requirements are met before accepting any container of waste.

- EPSC waste label is affixed to the container
- Each container conforms to the labeling requirements.
- Each container conforms to conditions needed for safe handling and transportation, e.g.: container type, closure, headspace, etc.
- Sufficient space is available on the vehicle to achieve compatible storage conditions.
- Proper packaging is available for the specific waste type(s) if required.

If the above requirements are not met, the EPSC staff informs the person in charge so that deficiency (s) can be resolved.

3.7.3 Transportation

The waste containers are transported from the waste generating location by hand or by using a cart or other similar device to the transportation vehicle. EPSC staff segregates the containers according to Department of Transportation (DOT) hazard classification for transportation back to the facility. Small chemical waste containers (typically ≤5 L) are overpacked into DOT UN approved containers to minimize breakage during transport. Outer containers are labeled with appropriate DOT hazard label(s). All liquid and solid hazardous waste containers transported must be DOT UN approved.

Shipment of wastes is performed in accordance with DOT requirements. Where possible, the original shipping container is used. The original shipping container allows for quick, safe containment of the hazardous materials and meets and/or exceeds construction and performance requirements of DOT 49 CFR 173.12. Large containers (e.g., 55 gallon drums) are marked and labeled in accordance with DOT requirements prior to transportation. Transportation will be by the DEHS Hazardous Materials Vehicle to the facility. In addition, the use of polyethylene twist top salvage drums or similar containers may be used to transport smaller containers (less than 5 gallons) to the facility. These containers are 100% polyethylene or similar materials to provide chemical resistance to a wide variety of chemicals.

All shipments of hazardous waste to the facility are considered generated off-site and therefore require a uniform hazardous waste manifest and a land disposal restriction

certification. The EPSC is a registered facility on the EPA E-manifest system. Therefore, the hazardous waste manifest information is entered into this system and a hard copy of the manifest is printed to carry on vehicle for pick up. All shipments are also accompanied by a Work Order to permit tracking of the types and quantities of materials delivered to the facility.

3.7.4 Receipt at the Facility

In addition to the inspection at the generation sites, all incoming waste shipments are inspected and checked prior to placement in storage. The items to be investigated are:

- Compliance with DOT and other regulatory requirements as applicable
- Uniform manifest completion and consistency
- Waste conformance with physical characteristics
- Agreement in name, number, and volume of waste with work order
- Tightness of sealed containers and integrity of container
- EPSC waste label intact on containers.

If everything is in conformance, the waste is accepted and placed into storage in accordance with the segregation system at the facility (see Section 9). All records in the tracking system are then updated for recordkeeping and reporting.

3.7.5 Documentation

The structure and operation of the Hazardous Waste Tracking System (Tracking System) is designed to follow an item of hazardous waste from the time it is collected by the EPSC staff until it is lab-packed, treated, and/or consolidated with other compatible wastes. The Hazardous Waste Tracking System is designed to meet most hazardous waste recordkeeping needs for a University, research institute, laboratory, or similar organization. The system will also produce detailed reports and summaries for daily use or for use in regulatory reports.

All information to be stored, as required by the regulations, is stored electronically and hard copy is available upon request. The Tracking System is used for convenience and as a mechanism to generate reports.

The system tracks each item from the date a request for collection is provided to the EPSC staff up to date the item is shipped off-site from the EPSC for treatment or disposal. Each waste container is identified by the date it is collected, and a unique label number. Later, when the container is blended, treated, disposed, or lab packed, the information in the computer can be updated.

3.7.5.1 Information Flow Overview

When a generation location determines that certain materials are waste, the generator submits an electronic pick up request to DEHS via the online Chemical Hazardous Waste Pick Up form that is shown in Attachment C-5. Since the EPSC only accepts wastes generated from UofL generators, personnel can only login to the form with UofL provided credentials. The CRS will review submitted waste pick up form information for completeness and make decisions as to the proper packaging, marking and segregation of the materials. The CRS gives the EPSC staff assigned to pick up waste instructions and appropriate paperwork (Field Order Labpack form, LDR, and e-manifest document) for the pickup, transportation, segregation, and storage of the materials. The assigned staff picks up the waste materials, transports them to the facility, and checks in the materials. After the materials have been placed in storage, the records are updated. Any subsequent movements in the facility are approved by the CRS.

3.7.5.2 Data Entry Requirements

In order to ensure the hazardous waste tracking system works effectively, proper data in the correct format is required. Before entering any data, the following records must be available (all this information is present on Chemical Work Order form):

Commented [MK35]: NOD 11

Source File

The Source File contains a listing of each source (address-waste location by building and room number)). The listing contains a department contact name and supervisor or Principal Investigator (PI) (all from pickup request forms).

Department Listing

If one department takes over a particular room or lab, then the computer system will be updated with the new department listing in the Source File.

Chemical Reference File

Information to be put in this file includes chemical names or description, DoT hazard class and CERCLA Reportable Quantity. Any assigned EPA waste code(s) would also be in this file.

Treatment/Storage/Management Method File

This file contains up to four on-site methods that describe how waste can be managed at the EPSC. These methods include the following:

- Storage
- Labpack for offsite disposal
- Bulking for offsite disposal

- Solidification for offsite disposal

Commented [MK36]: NOD 11

3.7.5.3 Chemical Work Order/Drum Inventory Completion

The Chemical Work Order and Drum Inventory are completed by the CRS and serve as the main tracking documents for item review, classification, pickup, transportation, storage, and processing. The Chemical Work Order is the platform within the Hazardous Waste Tracker computer system that the CRS inputs the waste information from the generator's Chemical Hazardous Waste Pick up Request form. Once the CRS inputs the waste information into the Chemical Work Order, then forms such as labpack inventories and LDRs can be automatically generated. The following section describes each component within the Chemical Work Order and Drum Inventory.

Chemical Work Order

- **Container label** – This is the preprinted number on each label. This number is used to eliminate errors caused by transposing numbers.

- **Container Type/Size** – The type of generator location is selected (i.e. R = Research lab or shop, PP = Physical Plant/Trades, T = Teaching lab, etc.) Size field has been re-purposed to indicate if the submitted waste item is Unused, the letter "U" is entered or if Spent, the letter "S" is entered

- **Container / /amount** – At the time of pick-up the EPSC pick up staff will confirm amount of material as listed on pick up request.

- **Waste Description** – The CRS completes this section of the work order based on the generator chemical waste description provided on the pick-up form.

- **Building/Room/Dept**: The CRS lists the generating building and room location of the waste as well as department name.

Commented [MK37]: NOD 49

- **Generator:** The CRS enters the Last name of the generator that submitted the waste.

- **EPA Waste Code**: The CRS will use information such as waste description (including unused and spent designations) and descriptions for process(es) generating the waste to ensure the correct EPA waste code(s) is applied. Descriptions such as expired, unwanted, or contaminated are utilized to help with "unused" designations. Information describing a process generating a waste will be used to help with "spent" designations.

Commented [MK38]: NOD 50

- **DOT Hazard Class** – This is assigned by the CRS. This information is used by EPSC pick up staff to segregate materials during transportation back to the facility.

- **RQ (Reportable Quantity) : as listed in 40 CFR 302.4**

- **Emergency Response Guidebook (ERG) Number** – This number is assigned by the CRS based on the latest DOT ERG publication.

- **Storage Area)** – CRS will assign waste to designated compatible chemical segregation area for EPSC pick up staff to place waste into storage. This designation allows individuals to find any item in the facility.

- **NOR # -** CRS will select appropriate EPA hazardous waste stream number to assign to waste item. The waste streams are as listed on the EPSC hazardous waste annual registration. This is also important for hazardous waste annual reporting.

- **Pickup Date** – Date waste items are picked up and the accumulation start date.

- **PI MGR** – CRS will enter the generator provided Principal Investigator (PI) or Manager (MGR)

- **Hazardous Waste** – CRS will enter the letter "Y" for Yes that the waste item is an EPA regulated hazardous waste OR the letter "N" for No, the waste item is not EPA regulated hazards waste.

- **Comments** – If any special handling equipment or specialized safety equipment is needed to handle a particular material, the CRS will give instructions here.
- During waste pickups, if it is determined that the original descriptions need to be modified, the EPSC pick up staff will contact the CRS and appropriate changes to the work order/manifest will be completed, noted and initialed.

- **Pre-Pickup Review** – Initials of EPSC staff completing the chemical review and assigning compatibility groups. Date should follow.

- **Picked By** – Initials of EPSC staff performing the Hazardous Material Technician function.

- **Date Entered in computer record**– Date records updated in computer system and initials or person updating computer records.

- **Date** –The date the waste will be shipped out from the EPSC for final disposal.

- **Incoming Manifest #** – If a manifest is required, the UofL internal manifest number will be added to work order. If a manifest is not required, N/A will be entered.

Commented [MK39]: NOD 51

Commented [MK40]: NOD 52

Commented [MK41]: NOD 53

Commented [MK42]: NOD 54.

- **Generator EPA ID # -** For each non-contiguous campus, the EPA ID# will be provided for the manifested waste.

Drum Inventory Form

The drum inventory form (or its equivalent) will be used to review chemicals before bulking and lab-packing and provide a written record of the contents of each drum.

The information to be provided is as follows:

- **Drum Number –** The drum number consist of the year (first two digits) and sequential number (1-999). For example, the tenth drum started on 1999 would be number 99-010. The CRS will keep a log of the drum numbers.

- **Accumulation Start Date –** Date first waste is placed in drum.

- **Shipping Date –** Date drum shipped off-site for treatment or disposal.

- **Date Drum Filled –** Date drum is completely full and ready for shipment.

- **Manifest # -** If applicable, manifest number used to ship drum to an off-site treatment, storage, or disposal facility.

- **Drum Type/Size –** Lists drum type (metal, 17C, 17E, etc.) and size (35-gallon, 85-gallon, etc.)

- **Compatibility Group –** Assigned by the CRS.

- **Storage Location –** Area in facility where drum is located.

- **Chemical Name/Source –** Name of chemical or other description (assigned by CRS).

- **Technical Review –** Date and initials of individual performing technical review. Required before any bulking is performed to ensure no adverse reactions. If a contractor is used to perform lab-packing operations, this review will be the responsibility of the contractor's technical reviewers and will be noted on the contractor's drum inventory.

- **Placement –** Date and initials of individual placing material in drum. Estimated amounts will be listed.

All labels will be removed from containers as blending is accomplished and collected for updating computer record. The drum of bulked waste will be labeled "Hazardous Waste." Furthermore, it will be labeled by following the below guidelines:

- Contents: Waste Information Profile name given by the disposal vendor

- Accumulation Start Date: Earliest pickup date from waste that was bulked
- Waste Codes: All waste codes from the waste that was bulked
- Hazard Communication: The applicable DOT hazard class

4.0 PARAMETERS AND RATIONALE

40 CFR 264.13(b)(1)

This section is intended to describe the parameters chosen for analysis and provides an explanation of the rationale for their selection, i.e. how analysis for these parameters will provide sufficient information on the waste's properties for proper waste management. However, due to the wide variability and number of waste streams received by the facility, the complete list of waste analyses to be performed during waste characterization will be unique for each waste stream. At a minimum, sufficient data will be gathered to ensure that each waste can be safely managed in an environmentally sound manner.

Analyses are not always performed on each waste and are not necessarily repeated for sequential activities or movement of the same waste within the facility, unless required by changes in the waste's characteristics. The frequency of analysis depends on the waste materials received. More frequent analysis is performed if there is a reason to believe the waste composition has changed dramatically. Analysis is not performed on waste materials for which process knowledge from the generator is utilized, unless it is suspected that the waste material has been incorrectly characterized by the generator.

For a hazardous waste stream that is generated on an on-going basis (i.e. one year or more), periodic review and re-approval of the wastes that have been previously approved and received by the EPSC will be conducted to assure the waste continues to match the waste approval. EPSC staff have regular contact with University generators as well as routinely being onsite at generators campus location. Through these close interactions, EPSC staff are able to regularly review the waste generating process and determine if there have been any notable changes in the process or constituents in the wastes. If it is determined that there is a change that could affect the waste type or characteristic, the waste stream will be considered a new waste and the generator will ensure that the new chemical waste pick up form reflects the newly characterized waste. If the waste generating process has significant changes that could impact the presence or quantity of constituents in the waste or the properties of the waste and the generator does not have adequate knowledge to accurately complete waste determination, EPSC staff will collect a sample using sampling equipment methods recommended in "Test Methods for Evaluating Solid Waste (SW-846)". Samples will be collected in containers type and size provided by off-site EPA certified commercial laboratory. Each sample will have a label attached to it with the following information: profile number, name of collector, date of collection and place of collection (generator name). See 6.3 and 6.4.1 of the WAP for additional labeling requirements. The labels will be filled out at the time of collection. The labels will be filled out at the time of collection. Samples will undergo analysis at an

Commented [MK43]: NOD 55

Commented [MK44]: NOD 56

Commented [MK45]: NOD 57

off-site commercial laboratory. The analytical methodology utilized by the commercial laboratory will be those methods specified in EPA's SW-846 or equivalent methods.

For stabilized waste (i.e. Naturally Occurring Radioactive Material [NORM] Nitrates), EPSC staff will use an industry wide best management practice summarized as follows. Add NORM Nitrates to wet concrete mixture. Allow to solidify and cure for one week. 100 grams will be chipped off and placed into a small beaker with an equivalent weight of water. It will sit for 24 hours and the water will be tested with Potassium Iodide paper to confirm that there is no oxidizing potential.

Most of the wastes received by the EPSC are in their original containers or have sufficient process information provided that makes sampling and analysis unnecessary or inappropriate. Sampling and analysis of these materials would increase worker exposures and would not contribute to the proper management of these materials. However, certain wastes, especially waste that will be bulked, may be sampled and verified. Limited screening analyses may be performed at the EPSC, such as pH, reactivity screen, peroxides, or oxidizing potential if EPSC staff determines that the generator provided information is inadequate. Common screening methods EPSC staff will use include the following:

Commented [MK46]: NOD 58

- Testing pH with pH 0.0 – 14.0 indicator strip
- Reactivity screen (add water and mix to see if reaction occurs)
- Specific gravity (observed when water is added)
- Oxidizing potential using Potassium Iodide Starch paper strip
- Utilizing portable hand-held Ramen Spectroscopy equipment (AHURA FirstDefender) See Attachment C-3 for the Owner's Manual

Commented [MK47]: NOD 59

When an unknown material or waste is presented to DEHS for management, an attempt to characterize its contents is routinely undertaken by following the Unknown Waste Procedure included in Attachment C-2.

If the waste cannot be characterized, the waste will be sent for lab analysis. If necessary, the University will contract a waste disposal company or laboratory to augment or verify the information supplied by the waste generators and to comply with off-site TSD facility acceptance criteria. Any samples collected will be accordance with EPA SW-846 or equivalent methods.

DEHS can provide sample containers (50 ml VOA up to 1-quart glass) or obtain method approved containers from the off-site commercial laboratory that will be performing the analysis. Most all waste containers generated from UofL operations are 5 gallon or smaller. EPA SW-846 methods or equivalent methods are used when collecting a representative sample from a container that is 5 gallons or smaller by using proper equipment such as pipettes, laboratory spatulas, scoops, tongs, and funnels. For example, when collecting a representative sample from a 5 gallon container of mixed solvents, the container would be slightly shaken up and then a pipette would be used to pull out a

sample. In the event an unknown 30 gallon or larger drum requires sampling, DEHS has 48" plastic and glass coliwasa sample rods available to extract a sample and place in lab required size method approved containers. The nature of the lab processes or work area activity will be considered when selecting lab sample parameters. Analytical methods will be as described in EPA SW-846 (most current edition).

In instances of large (> 5 gal) spill residues and waste liquids stratification, EPSC personnel will consult and/or contract with an EPA certified laboratory.

Commented [MK48]: NOD 12

4.1 Rationale for Analysis

Verification analysis can be used to confirm that the constituents of the waste are the same as profiled. This ensures that proper treatment is available for the hazardous constituents of the waste, and that the waste is safely stored. Analysis cannot confirm that a waste has been properly coded, except for characteristic wastes, which are determined by constituent concentration. The determination that waste is a listed waste is truly process-dependent, therefore, generator and process knowledge is relied upon to provide proper characterization of listed wastes.

4.2 Parameter Selection Procedure

The EPSC bulked hazardous waste streams contained in 30 gal or 55 gal drums (i.e. non-halogenated solvents, halogenated solvents, acids, and bases) received by the contracted off-site permitted TSDF will conduct verification analysis as necessary to confirm the waste is as profiled and/or to confirm the absence of material believed not to be present. The analysis is also used to obtain additional information required to set treatment parameters or evaluate treatment capability. The verification analysis may be necessary to provide additional details required to fully and safely handle, store, and treat the waste.

To prevent prohibited materials from being accepted, detailed process knowledge provided by the generator and professional judgment of the facility operations staff is used.

If applicable or whenever necessary, the following methods may be used to confirm the absence of prohibited materials. In most all cases, except for pH, EPSC staff will have to send sample off-site for analysis (lab will follow EPA SW-846 current edition).

- pH (of 50% solution for solids) – to confirm compatibility grouping.
- Ash content – to determine what portion of the waste is organic.
- Total volatile solids – to determine if a portion of waste is volatile.
- Oil and grease – to distinguish high molecular weight organics from lower molecular weight wastes, such as solvents.

- Total metals – to verify the total concentration of any metal present in the waste. Usually used to confirm concentrations of the primary metal constituents of a waste, whether hazardous or not.

- General GC scan – to determine level of possible organic concentration. May also be used to identify specific organic compounds.

- Specific GC scan – to identify and verify concentration of major waste constituents or concentration of hazardous constituents.

- Herbicide/Pesticide scan – to determine identity and concentration of herbicides and pesticides.

Wastes generated at the U of L are generally not production by-products or produced as a continuous waste stream. Normally, quantities of waste generated from a specific laboratory or other work location total less than 100 pounds annually. In addition, nearly all hazardous waste generated is comprised of commercially available chemical products; therefore, it is obtained and usually discarded as a well-defined entity (i.e. with original labels in place), or as an easily definable mixture of nearly pure chemicals resulting from experimental studies. The final waste product is classifiable to an extreme degree of assurance by the generator of the waste, since rigid quality control is required in research laboratories. Furthermore, waste determinations are also made by utilizing acceptable knowledge (e.g., academic literature, safety data sheets, technical specification sheets, and laboratory procedures).

4.3 Facility Laboratory

The facility laboratory has the capability to conduct "fingerprint" tests prior to blending compatible wastes. These tests could include the following:

- Testing pH with pH 0.0 – 14.0 indicator strip
- Reactivity screen (add water to small sample and mix to see if reaction occurs)
- Oxidizing potential using Potassium Iodide Starch paper strip
- Utilizing portable hand-held Ramen Spectroscopy equipment (AHURA FirstDefender) See Attachment C-3 for the Owner's Manual

Commented [MK49]: NOD 59

In cases where the off-site TSD vendor may require additional analysis, the contracted vendor personnel will collect samples and analyze in accordance with current EPA approved methodologies. More sophisticated waste characterizations are completed by an authorized off-site laboratory. Facility laboratory analytical equipment may include, but not be limited to, the following items:

Commented [MK50]: NOD 60

- Oakton 510 series pH Meter – Measures the corrosive nature of an aqueous or water soluble waste (Owner's Manual is Attachment C-4)

5.0. TEST METHODS

40 CFR 264.13(b)(2)

Screening, such as pH, potassium iodide-starch test paper (oxidizer test), hydrocarbon, peroxides, or other limited qualitative testing of chemical constituents (HazCat® kit or similar) may be performed at the EPSC or upon pickup at the generating facility. If necessary, the University will contract to a waste disposal company or laboratory to augment or verify the information supplied by the waste generators and to comply with off-site treatment or disposal acceptance criteria. The analysis to be performed will depend on the management or disposal options to be used, as well as the requirements of the TSD facility's permit. Analytical methods will be as described in SW-846 (most current edition).

Commented [MK51]: NOD 61

6.0 SAMPLING METHODS

40 CFR 264.13(b)(3)

The purpose of this section is to provide personnel with techniques to ensure sampling performed provides representative samples. The sampling program is designed to determine that a waste stream can be safely and properly managed, does not contain prohibited or restricted constituents, and to confirm its chemical composition.

Commented [MK52]: NOD 62

Most of the wastes received by the facility are in their original containers, or are submitted with sufficient process information, such that sampling and analyses are not necessary.

All of the sampling equipment listed will not be used on a routine basis by the University. In some situations, the University may contract with an outside contractor to provide equipment and personnel to perform the sampling. In these cases, the CRS will require the contractor to use acceptable EPA-approved methodologies which have been reviewed and approved by the CRS for use.

Current on-site sampling equipment include:

- 48" L x ½" OD plastic and glass coliwasa sampling rods
- Dayton hand drum pump, pump siphon, polyethylene, 38" L x ¾" OD
- QORPAK, wide-mouth round pre-cleaned sampling bottle, 120 ml with polypropylene lid
- Grainger wide-mouth round pre-cleaned sampling bottle, 1000 ml with polypropylene lid
- Transfer pipettes, LDPE, 5 ml, 155 mm length
- Transfer spatula, LDPE, 155 mm length
- Plastic scoops, tongs, and funnels

- DEHS has the ability to purchase any method approved container or supplies if the EPSC doesn't have it in stock

All sampling methods and protocols are under the direction of a trained supervisor. The supervisor uses his knowledge and experience, together with available analytical information, in selecting the sampling methodology. For all non-routine sampling, a sampling plan is developed and reviewed by appropriate technical staff prior to implementing.

6.1 Preparation for Shipment to Off-Site Laboratory

If it is necessary to ship waste samples to off-site laboratories for a more complete analysis, all Department of Transportation (DOT) and other regulations are followed during transport.

- DOT, U.S. Postal Service (USPS), or any other applicable shipping requirements must be complied with.

- If the sample collector determines that DOT, USPS, or other shipping requirements do not apply to the sample, at a minimum the following is affixed:

- The sample collector's name, mailing address, and telephone number;
- The laboratory's name, mailing address, and telephone number;
- The quantity of sample;
- The date of shipment, and
- A description of the sample.

A Chain of Custody Record is used to satisfy the requirements above, and the sampler will ensure that all DOT and packaging requirements are met.

The sample, after placement in a suitable container, is sealed, using security tape, and checked for leakage. The Chain of Custody Record is completed, noting the security seal number. The sample container is placed in an appropriate package. The signed Chain of Custody Record is place inside the package, which is securely closed, and the appropriate DOT labels, if applicable, applied. At this point, the sample is ready for shipment to the off-site laboratory.

6.2 Field Quality Assurance/Quality Control

As necessary, the following field blanks are prepared and analyzed for all of the required parameters. The bottles filled with the blank will be handled and transported to the laboratory like any other sample.

Trip Blank – One of each type of sample bottle are filled with reagent grade water, transported to the site, handled like a sample, and returned to the laboratory for analysis. One trip blank per sampling event is recommended.

Equipment Blank – To ensure that the non-dedicated sampling device has been effectively cleaned (in the laboratory or field), the device is rinsed with reagent grade water, transferred to a sample bottle(s), and returned to the laboratory for analysis. A minimum of one equipment blank for each sampling event is recommended.

6.3 Sample Packaging and Shipment

All sample bottles and other equipment must be inspected for cleanliness and for flaws before use. Each bottle shall have a tag or label for recording location, date, time, analysis to be performed, preservatives, and sample collector's name.

Laboratory testing will be done as soon as possible. Samples for transport will be stored at 4 degrees C when appropriate. Preservative techniques and holding times (contained in SW-846 or laboratory protocols) will be followed for shipments to outside laboratories.

If a local independent laboratory is used, the preservatives may be omitted (only after consultation with the laboratory to be sure that holding times are not exceeded). All preserved samples will be clearly marked with the type and amount of preservative. All samples to be analyzed for parameters that require cooling will be stabilized in a refrigerator or cooler with ice or dry ice, then packed into a cooler(s) and sealed to ensure they stay at 4 degrees C.

The sample containers for collecting the samples must be scrupulously clean. All containers will be sealed and stored in a clean environment, immediately after cleaning or upon receipt from an outside laboratory, to prevent any accumulation of dust or other contaminants.

It is extremely important that proper size and type (material construction) of containers be used for the particular analysis to be performed. Certain parameters may be absorbed into the wall of a particular type of container, producing incorrect results.

Samples containing high levels of fluorides or caustic must be placed in plastic containers since these materials are incompatible with glass. Solvent samples will be placed in glass containers. All other waste types may be placed in glass or plastic containers.

6.4 Sampling Records

6.4.1 Sample Labels

Pre-printed, labels will be provided for sampling use. The labels will be applied to the sample container immediately after sampling. The sample label must, at a minimum, contain the following information:

- Sample number
- Location of sampling
- Name of sample collector
- Date and time of sampling
- Preservatives used
- Type of analysis to be performed.

6.4.2 Chain of Custody

When properly completed and signed, the Chain of Custody is considered to be a suitable legal document in testimony of the validity of the sample. In the ideal situation, each person who has custody of the sample from the time it is sampled, until all analyses have been completed, will sign and date this document. Each signature represents that the sample was secure from any outside forces (tampering), during the custody period.

The Chain of Custody Record must accompany the sample to the laboratory. Samples arriving at the laboratory without the Chain of Custody Record may be discarded.

After completing and signing the Chain of Custody, the sample collector files one copy and seals the original in the shipping container. When the sample is received at the laboratory, the Chain of Custody Record is signed and stamped with the laboratory control number. A copy of the record is then sent to the facility to confirm that the sample arrived intact.

6.4.3 Security Seals

A Security Seal is applied to the sample container (or outside container) in such a way that the seal must be broken when the container is opened. If the seal has been broken the sample may be discarded.

6.4.4. Shipment

The DOT states in 49 CFR 171.2 (a) that "no person may offer or accept a hazardous material for transportation in commerce within the United States unless the material is properly classed, described, packaged, marked, labeled and in the condition for shipment as required by this subchapter." All transportation will conform to these regulations, where applicable.

7.0 FREQUENCY OF ANALYSIS

40 CFR 264.13(a)(3) and (b)(4)

This section describes the frequency with which the initial waste analysis shall be reviewed or repeated to ensure that the information is accurate and up to date. As provided for in 40 CFR 264.13, the analysis can include data developed under 40 CFR 261, existing documented data on the waste, or data on waste generated from similar processes. Verification analyses are performed annually. This will include academic laboratory course curriculum, research laboratory protocols and experiment notes, SDSs, and/or laboratory testing.

Commented [MK53]: NOD 13

Commented [MK54]: NOD 14

As described in Section 3, the wastes stream review process involves the careful evaluation of the process generating the waste. Detailed process knowledge provided by the generator is considered a viable addition to the periodic verification analysis.

7.1 Non-Routine Waste Chemicals

During laboratory and maintenance area clean-outs, many hazardous and non-hazardous materials are classified as wastes and are submitted to DEHS. These discarded chemical products are typically received in the manufacturer's original container. Therefore, no verification analysis is necessary since detailed chemical and physical analysis of the waste can be easily obtained via academic literature, safety data sheets, technical specification sheets, and laboratory procedures. Should there be circumstances in which the generating location is not able to provide enough information to completely characterize the waste, verification analysis of the waste is obtained analytically.

7.2 Routine Wastes

Wastes that are routinely generated are received in greater volumes than other laboratory wastes. Routinely generated wastes include but aren't limited to Chemistry Teaching Labs and various research labs that generate aqueous inorganic acids, aqueous inorganic bases, organic solvents and contaminated solids. Routine generators will have waste verifications performed on an annual basis. Section 7.0 of this WAP describes the information which will be reviewed. As with the Non-Routine Waste Chemicals mentioned above, if the generating location is not able to provide enough information to completely characterize the waste, verification analysis of the waste is obtained analytically.

Commented [MK55]: NOD 63

Commented [MK56]: NOD 15

7.3 Incompletely Characterized Wastes

All wastes to be managed at the EPSC must be accurately characterized to allow for proper waste management. When an unknown waste is submitted for review by DEHS personnel, an attempt to identify its contents will be undertaken by following the Unknown Waste Procedure included in Attachment C-2. As these types of waste streams will be characterized on a case by case basis, no future verification analysis will be necessary.

7.4 Bulked Waste

Wastes that are received in small containers may be bulked into 30-gallon or 55-gallon drums prior to further treatment and/or disposal. Prior to placement of any waste in a 30-gallon or 55-gallon drum, EPSC staff ensures the compatibility of the waste with the other materials to be placed into the drum. Waste streams to be blended may receive a bench scale test as described in the second paragraph under Section 3.4.2.

Commented [MK57]: NOD 64

8.0 REQUIREMENTS FOR WASTE GENERATED OFF-SITE

40 CFR 264.13(b), (c)

The EPSC, located off campus, receives its waste from other University owned and operated properties (e.g. Belknap Campus, ShelbyHurst Campus, and the Health Sciences Center). As such, the facility must be described as an "off-site" facility because it receives waste from properties that are non-contiguous to the facility. Future planning expects the University to expand the areal extent of the Belknap Campus to the north of Cardinal Boulevard. As such, the facility property will become part of the Belknap Campus. When this occurs, the facility and the generation locations on the Belknap

Campus will be considered on-site for purposes of manifesting and other generation recordkeeping.

For off-site U of L facilities, the regulations require that the WAP specify the procedures used to inspect and, if necessary, analyze each hazardous waste received at the facility to ensure that it matches the identity of the waste designated on the accompanying manifest.

The wastes which are manifested to the facility are subject to all the requirements set forth in this WAP. The movement of each waste is identified and included in the waste stream file. All generating locations, both on-site and off-site, are required to completely identify the waste by analysis and/or process knowledge.

9.0 ADDITIONAL REQUIREMENTS FOR FACILITIES HANDLING IGNITABLE, REACTIVE OR INCOMPATIBLE WASTES

40 CFR 270.14(b)(3); 40 CFR 264.13(b)(6); 40 CFR 264.17

Not all wastes are compatible with each other. The mixture of two or more chemicals (wastes) may produce undesirable or uncontrolled reactions resulting in adverse consequences (e.g., fire, explosion, toxic gas generation)

Incompatible wastes and chemicals will be physically separated, while items of similar nature and characteristics can be placed together or in close proximity.

9.1. Basis of Incompatibility

The main objective of a working compatibility segregation system is to prevent the commingling of incompatible wastes which may result in uncontrolled releases of heat or toxic fumes or vapor in quantities which may cause harm to human health or the environment.

The facility waste segregation system is based primarily upon the assumption that a waste (be it pure or a mixture) exhibits certain physical characteristics and is composed of specific chemical elements (both previously identified). Assuming that the waste is at steady state (not reacting with itself or the surrounding environment), it can be classified for the purpose of safe storage and processing.

9.2. Basis of Segregation

Elementary chemistry indicates that acids and bases, oxidizers and reducers, and certain elemental metals should not be commingled. These basic examples are illustrated in 40 CFR 264 Appendix V.

Using all the information available, including generator contacts and literature searches, the CRS evaluates the waste characteristics. Using professional/educational training and waste management experience, the compatibility group most closely related to the waste is selected.

To help with compatibility determinations, the following guidelines are detailed below.

- Classes of incompatible chemicals
- Functional groups in some explosive compounds
- Types of compounds known to auto-oxidize to form peroxides
- Classes of chemicals that can form peroxides upon aging

Commented [MK58]: NOD 65

Classes of Incompatible Chemicals	
A incompatible with	**B**
Alkali and alkaline earth	Water
Carbides	Acids
Hydrides	Halogenated organic compounds
Hydroxides	Halogenating agents
Metals	Oxidizing agents
Oxides	
Peroxides	
Azides, inorganic	Acids
	Heavy metals and their salts
	Oxidizing agents
Cyanides, inorganic	Acids
	Strong bases
Nitrates, inorganic	Acids
	Reducing agents
Nitrites, inorganic	Acids
	Oxidizing agents
Organic compounds	Oxidizing agents
Organic acyl halides	Bases
	Organic hydroxy and amino compounds
Organic anhydrides	Bases
	Organic hydroxy and amino compounds
Organic halogen compounds	Group IA and IIA metals
	Aluminum
Organic nitro compounds	Strong bases
Oxidizing agents	Reducing agents

Chlorates Chromates Chromium trioxide Dichromates Halogens Halogenating agents Hydrogen peroxide Nitric acid Nitrates Perchlorates Peroxides Permanganates Persulfates	Ammonia, anhydrous and aqueous Carbon Metals Metal hydrides Nitrites Organic compounds Phosphorus Silicon Sulfur

Reducing agents	Oxidizing agents Arsenates Arsenites Phosphorus Selenites Selenates Tellurium salts and oxides

Sulfides, inorganic	Acids

Functional Groups in Some Explosive Compounds **Total storage of these compounds will not exceed 1 kg.**
Acetylenic compound
Metal acetylide or carbide
Haloacetylide
Diazo compounds
Nitroso compounds
Nitroalkanes, C-Nitro and polynitroary compounds, polynitroalkyl compounds, trinitroethyl compounds
Acyl or alkyl nitrites
Acyl or alkyl nitrates
Alkyl or acyl peroxides
Alkyl hydroperoxides
Dialkyl peroxycarbonates
Metal fulminates or *aci*-nitro salts, oximates
Organic azides, acyl azides Metal azides, metal azide complexes
Transition metal-carbonyl compounds
Metal cyanides, organic nitriles, cyanogen halides

Types of Compounds Known to Autooxidize to Form Peroxides
▪Aldehydes
▪Ethers, especially cyclic ethers and those containing primary and secondary alkyl groups(*never* distill an ether before it has been shown to be free of peroxide)
▪Compounds containing benzylic hydrogens
▪Compounds containing allylic hydrogens (C=C-CH), including most alkenes; vinyl and vinylidene compounds
▪Compounds containing a tertiary C-H group (e.g., decalin and 2,5-dimethylhexane)

Classes of Chemicals That Can Form Peroxides Upon Aging

Class I: Unsaturated materials, especially those of low molecular weight, may polymerize violently and hazardously due to peroxide initiation.

Acrylic Acid	Tetrafluoroethylene
Acrylonitrile	Vinyl acetate
Butadiene	Vinyl acetylene
Chlorobutadiene (chloroprene)	Vinyl chloride
Chlorotrifluoroethylene	Vinyl pyridine
Methyl methacrylate	Vinylidene chloride
Styrene	

Class II: The following chemicals are a peroxide hazard upon concentration (distillation / evaporation). A test for peroxide will be performed if concentration is intended or suspected.

Acetal	Dioxane (*p*-dioxane)
Cumene	Ethylene glycol dimethyl ether (glyme)
Cyclohexene	Furan
Cyclooctene	Methyl acetylene
Cyclopentene	Methyl cyclopentane
Diacetylene	Methyl-*i*-butyl ketone
Dicyclopentadiene	Tetrahydrofuran
Diethylene glycol dimethyl ether (diglyme)	Tetrahydronaphthalene
Diethyl ether	Vinyl ethers

Class III: Peroxides derived from the following compounds may explode without concentration.

Organic	Inorganic
Divinyl ether	Potassium metal
Divinyl acetylene	Potassium amide
Isopropyl ether	Sodium amide (sodamide)
Vinylidene chloride	

9.3. Waste Stream Compatibility Review

Characterization of wastes by process information and literature searches, combined with chemical waste analysis, if necessary, enables the facility to classify wastes according to compatibility. By knowing initial raw materials in the process, the resulting products/by-products, and evaluating any supporting analytical data performed on the waste, the facility technical staff determines the compatibility classification. The container is clearly marked with the corresponding compatibility designation.

The EPSC waste segregation system uses the compatibility groups provided in Section 9.2 to allow for proper waste segregation. Potential consequences for mixing incompatible wastes are also provided per compatibility grouping in previous Section 9.2.

9.4 Storage of Wastes

Stored containerized wastes are segregated with respect to ignitability, compatibility, and considerations for ultimate treatment and/or disposal. Liquid wastes in small containers may be bulked into 30-gallon or 55-gallon drums prior to further treatment or off-site shipment. Before any waste is bulked into a 30-gallon or 55-gallon drum, the technical staff assesses the compatibility of the waste with the materials already in storage in the drum.

The storage of wastes is in accordance with the segregation system described in Section 9.2. Each waste is placed in storage according to its compatibility class.

In addition, the EPSC has separate storage for wastes that have special storage requirements. For potentially explosive waste, an Alcohol Tobacco Firearms Agency (ATF) certified explosives magazine is used for storage. For hazardous waste that requires refrigeration, an explosion proof refrigerator is used. For storage of toxic inhalation hazard wastes, a constantly mechanically ventilated enclosure is used. Storage of these wastes will not exceed equipment capacity limitations. Pictures are included in Appendix 2.

10.0 RECORDKEEPING

The following information regarding waste materials is recorded, as it becomes available, and maintained in the operating record until closure of the facility:

(I) A description and quantity of each hazardous waste received, and the method and date of its treatment, storage, or disposal.
(II) Results of waste analysis.
(III) Copies of out-going manifests.
(IV) Annual Reports.

Per regulations set forth in 40 CFR 270.30, the EPSC records will be furnished upon request, and made available at all reasonable times, for inspection by any officer, employee, or representative of the Cabinet who is designated by the secretary of the Cabinet as well as EPA personnel.

11.0 Appendices

Appendix 1 EPSC Land Disposal Restrictions One-Time Notice to File

U of L EPSC Land Disposal Restrictions One-Time Notice to File [§268.7(a)(7)]

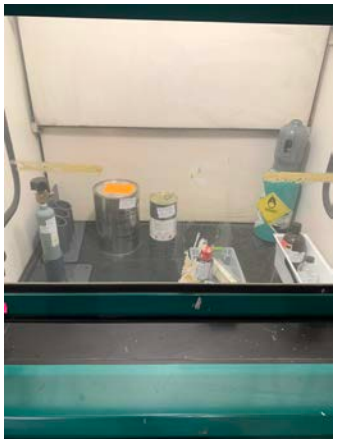
1. Generator information: Name _____ Address _____ EPA ID No. _____
Section 268.7(a)(7) states: "If a generator determines that he is managing a prohibited waste that is excluded from the definition of hazardous or solid waste or is exempted from Subtitle C regulation under 40 CFR 261.2 through 261.6 subsequent to the point of generation (including deactivated characteristic hazardous wastes managed in wastewater treatment systems subject to the Clean Water Act (CWA) as specified at 40 CFR 261.4(a)(2) or that are CWA-equivalent, or are managed in an underground injection well regulated by the SDWA), he must place a one-time notice describing such generation, subsequent exclusion from the definition of hazardous or solid waste or exemption from RCRA Subtitle C regulation, and the disposition of the waste, in the facility's on-site files."
2. Waste description at point of generation:
Waste stream(s)
Waste codes
Description of waste generation
3. Waste disposition:
Subsequent exclusion or exemption
Current disposition
4. Signature:
Generator's signature / Printed/typed name & title / Date

Source: McCoy and Associates, Inc.

Appendix 2 Pictures of High Hazard Storage Areas

Figures above show the day box that is used for potentially explosive material.

Figures above show the explosion proof refrigerator that is used for materials requiring refrigeration.



Figures above show the mechanically constantly mechanically ventilated enclosure that is used for materials that have a toxic inhalation hazard.

Attachment C-2
SOP for Unknown Waste Management

Attachment C-2

SOP for Unknown Waste Management

1. Introduction

Unknown wastes include any material whose chemical makeup or characteristic is unidentifiable and is considered a hazardous material until it is properly identified. Once properly identified, it can be accepted into the EPSC. The EPSC will not accept unknown wastes.

2. DEHS Staff Training

2.1 Prior to sorting, managing, or preparing hazardous waste for transport, DEHS staff shall complete DEHS hazardous waste training, EPSC facility operations and safety & health training, and DOT training. Refresher training shall be conducted annually.

2.2 Staff shall be trained within six months of hire or starting a new position or shall be supervised by trained and experienced staff;

2.3 Staff responsible for any aspect of hazardous waste management shall be trained relevant to job duties, including contingency plan implementation

2.4 Only trained DEHS staff shall manage unknown waste. Staff shall be trained on Personal Protective Equipment (PPE) use and requirements. Staff shall also be trained to respond to spills in accordance with Contingency Plan.

3. Health & Safety Requirements

3.1 Unknown wastes are potentially dangerous and may require more stringent safety precautions. DEHS staff shall assess and manage these waste types on a case-by-case basis. DEHS staff shall assess containers to determine if a threat to life, health, or the environment exists.

3.2 A properly operating chemical fume hood is required when performing the Unknown Waste Identification Procedure. Work practice controls shall be utilized to eliminate or minimize exposure to staff.

3.3 DEHS may choose to implement a more restrictive PPE policy if the situation requires. The following minimum PPE shall be used when managing unknown hazardous waste:

- safety glasses with side shields, goggles, or equivalent
- foot protection
- protective gloves
- long-sleeved shirt and long pants or equivalent
- protective apron or equivalent

4. Spill response

4.1 DEHS staff shall be responsible for cleaning up incidental spills that happen in the course of processing hazardous waste that poses potential safety or health hazards. DEHS staff shall be trained and able to respond to small spills. Only trained emergency response staff or an emergency contractor shall respond to chemical spills requiring assistance beyond the capabilities of DEHS staff. (DEHS has agreements with response teams and/or contractors/suppliers who can be used in case of emergency).

4.2 DEHS staff will u**se** extreme caution and minimize handling leaking or potentially reactive materials (e.g., temperature sensitive, spontaneously combustible, bulging/leaking containers, etc).

4.3 DEHS Staff shall immediately ascertain waste container integrity and place leaking containers in secondary containment to prevent environmental impacts.

5. Equipment and supplies

5.1 Proper equipment and supplies shall be available to effectively process materials received. Over-pack containers may be required for containers with compromised integrity. Although a majority of chemical containers in University labs and work areas are ≤ 5 gallon in capacity, staff shall use a cart or drum mover to transport large or heavy containers to avoid injury.

5.2 DEHS staff will place absorbent pads or towels on work area surface while processing or transferring materials from one container to another. If absorbent pads become contaminated, then they will be appropriately managed as hazardous waste.

Commented [MK1]: NOD 8

5.3 DEHS staff will use unknown identification kits or equipment for identifying waste types. These kits and equipment include:

- Spillfyter test strips
- pH paper (range 0 -14)
- peroxide test strip paper
- hydrocarbon test strip paper
- potassium-iodide starch paper
- lead-acetate paper
- AHURA Scientific First Defender, portable Raman spectrometer which quickly identifies unknown chemicals, including explosives, toxic industrial chemicals, chemical warfare agents (CWAs), narcotics, precursors, white powders and more.

6. Screening and Identifying Unknown Waste

6.1 DEH**S s**taff waste shall attempt to learn as much as possible about the unknown waste from personnel working in the lab or other work area the unknown chemical waste was discovered. DEHS staff can look for container markings which may provide clues.

6.2 Unknown waste container shall be examined for any degradation (bulging, cracks, crystals, etc), any precipitation formation on outer or inner container, and container marking and labeling to determine waste type. If unknown is not already located in properly operating chemical fume hood, DEHS staff will ensure the chemical contents are stable and clear nearest hood (i.e. remove any other known chemical in hood to another safe temporary storage location). If container markings indicate dried picric acids, out-dated uninhibited ethyl ether, or other dangerous material, DEHS will immediately secure area and restrict access. If imminent safety hazard to life and health is present, DEHS will staff will activate respective Campus Contingency Plan.

6.3 Each waste material presents its own unique hazard. Staff will be alert for indications of chemical reactions in waste containers (e.g., bulging, smoking, fizzing).

6.4 DEHS **s**taff shall attempt to learn as much as possible about unidentified wastes from the personnel at the generating facility. Questions should be asked such as:

- Type of lab research or work activity (including waste processes) in the area
- Copy of up to date chemical inventory
- Names of former personnel and contact info (are they working at another location at UofL, still in area?)

6.5 If contents are still unknown at this point, segregate the container from other stored waste, place into properly operating chemical fume hood or other secure area that is at the point of generation.

6.6 Every effort shall be made to properly identify the unknown waste. A recommended method may be to take a digital picture of the unknown waste container and e-mail to former lab personnel for identification assistance and further direction.

6.7 If necessary, DEHS staff will perform preliminary testing (e.g., pH, flammability, water reactive) of the unknown waste to determine its hazard class. Taking samples of unknown materials to determine hazard class may be necessary. See Section 7 and 8 of this SOP.

6.8 After proper identification of unknown material is determined, the waste will be labeled

with DEHS uniquely number label, chemical ID info, and lab packed for transport to EPSC.

7. Unknown Waste Identification Procedure

Staff safety is the most important issue. Following proper PPE suggestions, guidelines for sampling and test away from any stored waste to decrease errors or accidents. Steps for waste identification includes the following:

Step 1: Determine radioactivity.

If radioactivity is a potential contaminant, DEHS staff will consult with University Radiation Safety Office (RSO). RSO personnel are trained on methods and have equipment (i.e Geiger-Mueller meter and scintillation counter) available needed to confirm or deny presence of radioactive material.

Step 2: Determine physical description. Note the following:

- color
- state (solid, liquid)
- particle size
- free liquids
- layering
- incidental odor (DO NOT SMELL)

Step 3: Determine flammability.

- Place a nickel-sized, 5 grams, of the unknown material into a cup or weight dish.
- Apply an ignition source (a lit match or butane lighter flame) to the unknown material.
- If the sample ignites immediately, or in a somewhat delayed fashion, consider the material to be flammable.

Observation	Result
Sample immediately combusts	**Chemical is RCRA Hazardous for ignitability (D001)**
Delayed combustion or at a lesser degree	**Chemical is combustible for DOT purposes but is not considered a RCRA Hazardous Waste**
Sample melts	**Non combustible**

Step 4: Determine water reactivity.

- Place a pea-sized amount of the unknown material, using a disposable spatula or pipette into cup or weight dish.
- Add a few drops of water on the sample.

Observation	Result
Smokes, emits fumes, sizzles, fizzes, or jumps in water	**Sample is water reactive, potentially an inorganic metal if solid, organic if liquid and would be RCRA Hazardous for reactivity (D003)**

Step 5: Determine if sample is an oxidizer.

- For liquids, place a few drops of the sample onto a strip of potassium-iodide starch paper.
- For solids or semi-solids, slurry sample with some distilled water in a 1:1 mixture or ratio. Place the potassium-iodide starch paper onto the sample.
- Observe for any color changes.

Observation	Result
Potassium-iodide starch paper turns purple	Chemical is RCRA Hazardous for an oxidizer (D001).
No color change	Chemical is not an oxidizer

Step 6: Determine corrosivity.

- For solids, add a pea-sized portion of the material to a few drops of distilled water.
- Dip pH paper into the sample.
- For liquids, dip pH paper into sample.

Observation	Result
pH = 0	Acidic – the lesser the number, the stronger the acid. A result of less than or equal to 2.0 is RCRA Hazardous for Corrosivity (D002)
PH = 5 – 9	Neutral
PH =10 – 14	Alkaline – the higher the number, the stronger the alkalinity. A result of greater than 12.5 is considered a RCRA Hazardous for Corrosivity (D002)

Step 7: Cyanide test.

- Place 5 grams, nickel-size, of the sample into a test tube.
- If material is solid or semi-solid, slurry it with distilled water.
- Wet a strip of the testing paper with some distilled water and place it well above the sample.
- Add 5 ml of concentrated sulfuric acid to sample and gently stir. Immediately cover the test tube.
- Observe for any test paper color changes.

Observation	Result
Pale green test paper turns blue	Cyanide is present. Chemical is RCRA hazardous for cyanides (D003).

Step 8: Sulfide test.

- Place 5 grams, nickel-size, of the sample into a test tube.
- If material is solid or semi-solid, slurry it with some distilled water.
- Wet a strip of lead-acetate paper with some distilled water and place the paper well above sample.
- Add 5 ml of hydrochloric acid to the sample and gently stir and immediately cover the test tube.
- Observe for any color changes to the test paper.

Observation	Result
Lead-acetate test strip turns brown	Possible reactive sulfides (D003).

Step 9: Determine if the material is hazardous.

If an unknown material is negative to all tests, or if unsure about what to classify the material as, label the waste as hazardous waste pending analysis and place the material to the side at the point of generation for further testing by contracted hazardous waste vendor. DEHS staff will complete the Unknown Material Screening Report Form in Section 8 of this SOP.

Commented [MK2]: NOD 66

Keep these… +	**Away from these…** ➔	**Or you may get these…**
Acids	**Bases**	**Heat violent reaction**
Acids or bases	Reactive metals (aluminum, beryllium, calcium, lithium, potassium, magnesium, sodium, zinc powder) metal hydrides	Fire Explosion Hydrogen gas
Water or alcohols	Concentrated acids or bases calcium, lithium, potassium, metal hydrides, other waste reactives	Heat Fire Explosion Flammable and toxic gases
Reactive organic compounds or solvents (alcohols, aldehydes, nitrated hydrocarbons)	Concentrated acids or bases, reactive metals and metal hydrides	Fire Explosion
Cyanide or sulfide solutions	Acids	Toxic hydrogen Cyanide Sulfide gas
Strong oxidizers (chlorates, chlorine, chlorites, chromic acid, hypochlorites, nitrates,	Organic acids, concentrated mineral acids, reactive metals, metal hydrides, reactive organic compounds or	Fire Explosion

perchlorates, permanganates, peroxides)	solvents, flammable or combustible waste	

8. Unknown Material Screening Report Form (example)

Date/Time Sampled:	
Generator:	PI:
Bldg/room:	Dept:
DEHS Staff Performing analysis:	

Sample Description: Solid ☐ Liquid ☐ Semi- solid ☐

Color: No of Layer(s): Single ☐ Dual ☐ Multi ☐

Test performed	**Result**
pH (write in exact result)	
Water reactive (yes or no)	
Water soluble/based (yes or no)	
Air reactive (yes or no)	
Flash point (yes or no, does the material flash)	
Oxidizer (yes or no)	
Sulfides (yes or no)	
Cyanides (yes or no)	
Peroxides (yes or no)	

AHURA Frist Defender Scan:

DEHS Label Number:	
DoT Class(es):	EPA Waste code(s):

Attachment C-3

FirstDefender User Manual

Commented [MK1]: NOD 67

Attachment C-3

*First*Defender User Manual

Ahura Scientific

24/7 Customer Support**:**
1.800.374.1992

Part number: 110-00001-08

The FirstDefender® Handheld Chemical Identification System is covered by a limited warranty, which is included on page 43 of this manual.

Information in this document is subject to change without notice and does not represent a commitment on the part of Ahura Scientific. Ahura Scientific has made its best effort to ensure the accuracy of the contents of this document. However, Ahura makes no guarantee that said contents are complete and or correct in all respects; the information contained herein is subject to change without notice.

Ahura Scientific assumes no responsibility for the use of this instrumentation or other rights of third parties resulting from its use.

The software described in this document is furnished under a license agreement and may be used or copied only in accordance with the terms of the agreement.

Ahura Scientific products are the subject of US patent applications.

The technical information contained with this document is subject to the Export Administration Regulations. Export of this technical information to foreign persons or foreign companies, within or outside the United States, may require prior written authorization by the U.S. Department of Commerce, Bureau of Industry and Security. Contact Ahura Scientific prior to such a transfer.

The technical data contained in this document are subject to the export controls imposed by the International Traffic In Arms Regulations. Export of this technical data to foreign persons or foreign companies, within or outside the United States, requires prior written authorization by the U.S. Department of State, Office of Defense Trade Controls.

Copyright © 2005, 2006, 2010 Ahura Scientific. All rights reserved. No part of this document may be reproduced in any form or by any means, electronic or mechanical, including photocopying without written permission from Ahura Scientific.

FirstDefender and DecisionEngine are trademarks of Ahura Scientific. All other brands and products mentioned are registered trademarks or trademarks of their respective holders.

Ahura Scientific

46 Jonspin Rd.

Wilmington MA 01887

www.ahurascientific.com

Telephone: 978.657.5555

Fax: 978.657.5921

24/7 Customer Support: 1-800-374-1992

How To Use This Manual

FirstDefender® is designed for use in the field and in the lab by military, law enforcement, and civilian first responders. This user manual is primarily for personnel who want to adjust settings, interpret scan results, and manage the Library of information on the units.

Consult the *FirstDefender Quick Reference Guide* (Part number 112-00004-04) for essential tasks such as:

- Performing a scan
- Using best practices to perform scans of specific materials and containers
- Using the optional FlexProbe

Icons

This User Manual includes the following icons:

Offers additional information on using the unit.

Provides a helpful hint for using the unit more effectively.

Indicates that improper use of the unit may cause harm to the user or damage to the unit.

Signifies that a laser may be in use.

Contents

How To Use This Manual 3

Icons 4

1. Introducing FirstDefender 7

1.1 How it works 7

2. Using the Keypad, On-Screen Keyboard, and Menus 10

2.1 Keypad 10
2.2 Using the on-screen keyboard 11
2.3 Navigating through the menus 11
2.3.1 Using the keypad to move through the menus 11
2.4 Menus 13
2.4.1 Scan menu 14
2.4.2 Review menu 16
2.4.3 Library menu 18
2.4.4 Tools menu 20

3. Interpreting Scan Results 22

3.1 Understanding how the DecisionEngine works 22
3.2 Mixture analysis 25
3.3 Compensating for fluorescence in scanning 26

4. Exporting and Importing Data 27

4.1 Viewing exported spectrum (.spc) files 27
4.2 Exporting reachback files 28
4.3 Exporting Library items 28
4.4 Importing Library items 28

5. Managing the Library 29

5.1 Editing the LRD files of Library items 29
5.2 Working with Library Info files 32

6. Performing Maintenance and Upgrade Procedures 33

6.1 Cleaning the unit 33
6.2 Recharging the battery 34
6.3 Replacing the battery 35
6.4 Inserting and ejecting the CF card 36
6.4.1 Inserting the CF card 36
6.4.2 Ejecting the CF Card 37
6.5 The SD card 37
6.6 Returning the unit to the manufacturer 37

7. Upgrading the System Software 39

Appendix A – Glossary **40**
Appendix B – Limited Warranty **43**
Appendix C – Warnings and Safety Considerations **44**
Appendix D – Safety and Information Labels **46**
Appendix E – Error Messages and Responses **48**
Messages during scanning 49
Messages when exporting 49
Message from Unit Self Test 49
Temperature-related messages 50
Appendix F – Specifications **51**
Optical specifications 51
Sampling specifications 51
Electronics and data processing specifications 52
Compliance 52
Environmental considerations 52
Electrical considerations 53
Physical considerations 53
FlexProbe (optional) 53
MIL-STD-810F tests passed 54
Calibration 54
FCC and Industry Canada Statements **55**
European Union Directives and Statements **56**
European WEEE Recycling and RoHS **57**

1. Introducing FirstDefender

The FirstDefender handheld chemical identification system can determine the composition of unknown solid and liquid substances, conveniently, in the field. Light in weight—four pounds (1.8 kg)—easy to use, and completely self-contained, FirstDefender accurately identifies a wide variety of organic and inorganic compounds, including

- Petroleum products, pesticides, fertilizers, and plastics
- Chemical weapons
- Explosives and propellants
- Drugs (both legal and illicit)
- Other "white powders" (e.g., sugar, corn starch, chalk)
- Mineral acids (sulfuric, nitric, etc.)
- Inorganic substances (e.g., potassium cyanide, titanium dioxide, ammonium nitrate)
- Organometallics
- Some ionic salts and ions (sulfates, phosphates, carbonates, etc.)
- FirstDefender can also identify substances in water. Though water itself has a very weak molecular signal (see below), FirstDefender can readily identify compounds suspended or dissolved *in* water.

If the unknown substance occurs in the open or in an accessible container, FirstDefender can scan it with a simple point-and-shoot methodology. If the substance is in a transparent plastic bottle or bag, or a glass bottle, FirstDefender can scan right through the wall of the container. In addition, FirstDefender has a built-in vial chamber for scanning a small amount of material in a standard 4-mL vial. The optional FlexProbe™ extension probe adapts the unit to even more scanning situations. Since it uses a non-destructive analytical technique, FirstDefender does not consume, destroy, or contaminate any of the sample.

FirstDefender scans the unknown substance, and then performs an analysis of the data acquired, matching it against reference data for thousands of substances stored in its onboard Library. Scanning and analysis happen rapidly, the actual time depending on the particular substance or mixture of substances. For example, scanning and analysis of isopropyl alcohol takes about 30 seconds.

Built of rugged, chemical-resistant materials, FirstDefender is designed for challenging environments. It withstands shock, vibration, and submersion in water. If necessary, it can be completely decontaminated. Its battery provides approximately five hours of service at room temperature.

To customize the FirstDefender's Library to your specific requirements, you can scan materials and add the data to FirstDefender's internal Library database. You can also import and export data via the unit's compact flash card, including transferring data from one FirstDefender unit to another.

1.1 How it works

FirstDefender uses a technology known as Raman spectroscopy. This technology is based on one of the ways light is scattered by molecules, an effect first observed by an Indian physicist, Sir C. V. Raman, in 1928. Sir Raman received the Nobel Prize in physics in 1930 for his work.

When photons of light interact with a molecule, most are scattered, retaining the same energy they had when they encountered the molecule. This is called *elastic*, or *Rayleigh scattering*, and was well known before Sir Raman's time. Some photons, however, have different energy after they are scattered. This is in*elastic scattering*, the effect that Sir Raman demonstrated, and is called *Raman scattering*.

Sometimes when a photon hits a molecule, it causes the bonds within the molecule to vibrate. The photon leaves the molecule with energy at a different level than it had originally. This difference in energy, noted by Sir Raman, is called the *Raman shift*. Each type of molecular bond produces a characteristic Raman shift. And every chemical compound produces its own pattern of characteristic Raman shifts, which can be used to identify the compound as

positively as a fingerprint identifies a person. Two examples of Raman shift are shown in Figure 1. Each is a Raman *spectrum*, showing the intensity of the shift over a range of photon energies (the Raman shift). Notice that there are well-defined peaks in each spectrum.

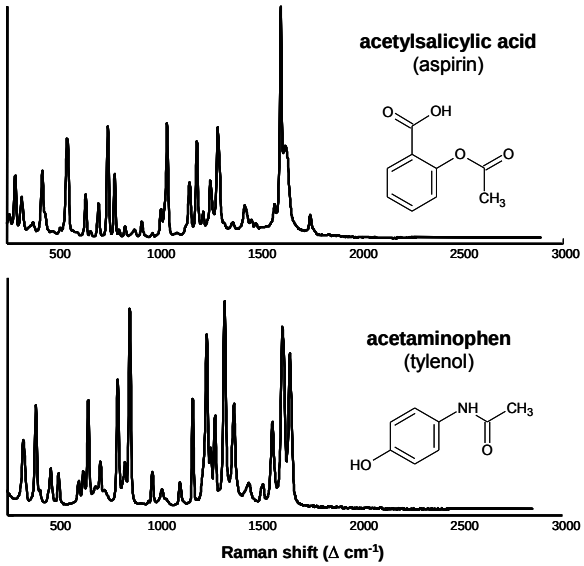


Figure 1. Raman spectra for two substances

Raman scattering is much less intense than Rayleigh scattering. For most molecules, Raman scattering is about one-billionth of the Rayleigh scattering. Detecting Raman scattered light was for many years very difficult. Now, with a number of recent advances in instrumentation—near-infrared laser light sources and charge-coupled device detectors (CCDs)—Raman spectroscopy has become a standard laboratory analysis technique. Laboratory Raman spectrometers tend to be large and delicate instruments.

Ahura's expertise in dense optical packaging, narrow-linewidth stabilized laser fabrication, and robust spectrometer design has brought the capabilities of the dishwasher-sized laboratory systems into a handheld package with unparalleled field-ruggedness: FirstDefender.

FirstDefender uses a 785 nm laser as the light source for the Raman measurement. During a scan, the laser shines on the substance. The scattered light is gathered by optics and conducted to a wavelength dispersive spectrometer inside the unit, which separates it by energy (wavelength). Then, a CCD device measures the intensity of light at each wavelength, collecting this data for analysis.

The FirstDefender analyzes the data with a patent-pending analytical software package called DecisionEngine™. This package is designed to provide probabilistic material identification, and mixture analysis, while minimizing false identifications, all with minimal user intervention. See Figure 2 for an illustration of the DecisionEngine's logic tree.

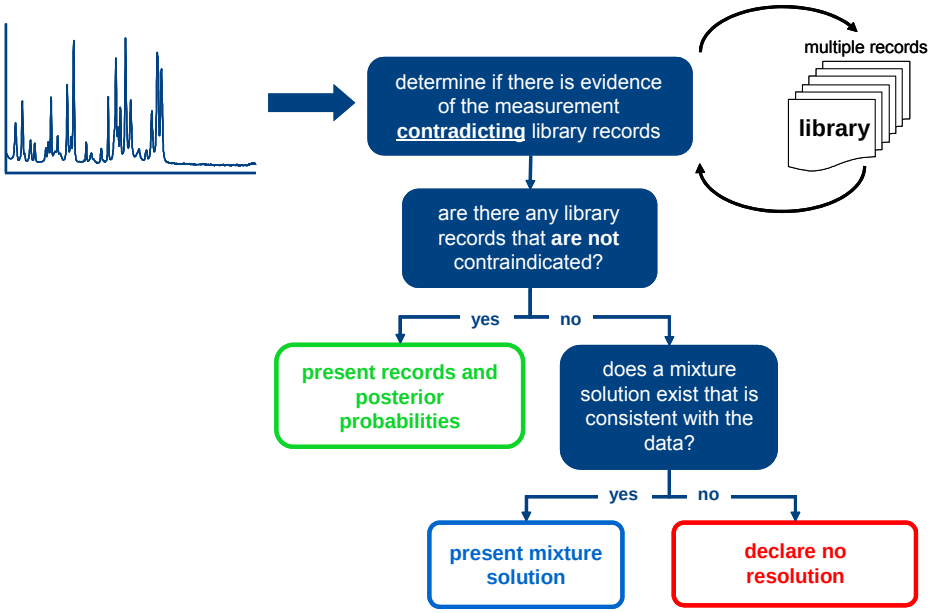


Figure 2. The Ahura DecisionEngine logic tree

After you scan a substance, DecisionEngine compares the measured Raman spectrum data to an on-board Library containing spectra of thousands of materials. If the scan data is statistically consistent with one or more Library items, DecisionEngine declares a positive match, and the unit displays the results on a green screen.

If the measured data is not consistent with any of the individual Library items, DecisionEngine automatically undertakes a mixture analysis, searching for mixtures of Library items that could explain the measured data, considering mixtures of up to six Library items. If it finds a consistent solution, it declares a mixture match, and the unit displays the results on a blue screen. If the mixture analysis cannot find a plausible match for the measured data, the unit displays a red "No match" screen.

2. Using the Keypad, On-Screen Keyboard, and Menus

The following sections summarize the keys and menus available on the unit. Figure 3 illustrates the physical keys on the front of the unit.

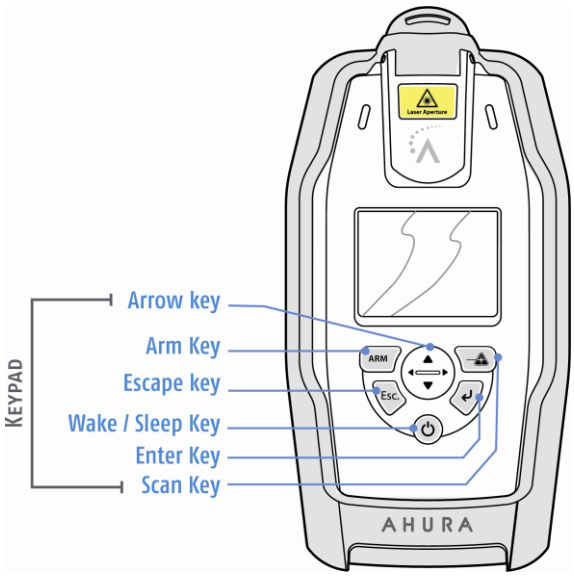


Figure 3. Keypad keys

2.1 Keypad

Table 1 provides a summary of the keypad on the unit and descriptions of the use of the keys.

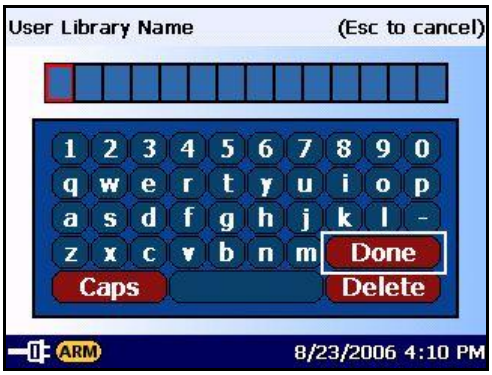
Table 1. Keypad keys and descriptions

Key	Key name	Description
	Scan	Goes to the Scan menu. Starts a scan (shortcut to the **Scan – Go** menu).
	Arrow	Up Arrow, Down Arrow move through vertical lists of items Right Arrow, Left Arrow select among values, move horizontally, other functions
ARM	Arm	Toggles the unit between two states: laser-armed and laser-disarmed.
Esc.	Escape	Returns to the previous display without accepting any changes. Press and hold to exit all the menus and return to the Main menu.
	Enter	Completes the selection of a menu item. This starts the indicated action or brings up a sub-menu display. Completes selection of a character on the on-screen keyboard.
	Wake/Sleep (Power)	Toggles the unit between two states: WAKE and SLEEP.

2.2 Using the on-screen keyboard

When you need to enter a name for a Library item, or other item, the On-Screen Keyboard appears. It is laid out like a computer keyboard.

- Enter the characters of the name one at a time.
- Use the Arrow keys to select a character or space. Press the Enter key to accept it.
- To remove a character, select ***Delete*** and press the Enter key.
- To change from the lower case/numerals to upper case/symbols keyboard (see figures below), select ***Caps*** and press the Enter key.
- When you are finished entering the name, select ***Done***, and press the Enter key.



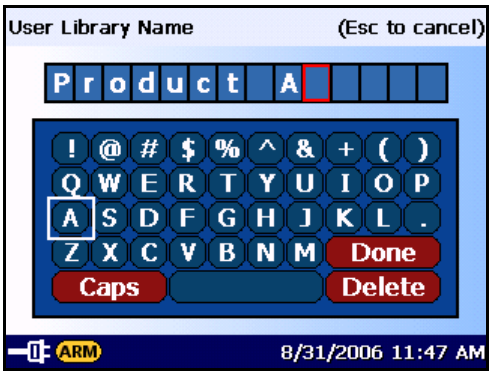


Figure 4. On-screen Keyboards

When you create a new session, the unit assigns a default session name, which appears at the top of the keyboard screen. To enter a different name, use Delete to delete the characters of the default name.

2.3 Navigating through the menus

A series of menus guides you through all the operations you perform with the unit. Use the keys on the keypad to move from one menu to another, make selections, and enter names for scans and sessions.

The following sections demonstrate how to navigate through the menus and summarize the menu selections.

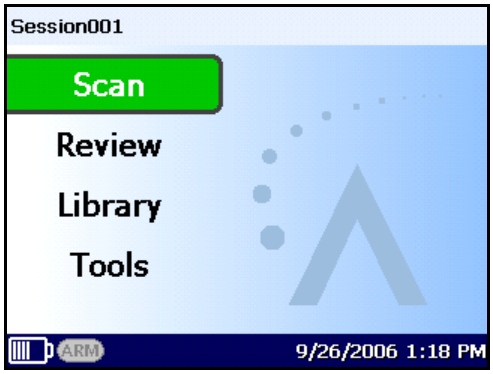
2.3.1 Using the keypad to move through the menus

In the example below you will use the keys on the keypad to navigate through the menus to select a Library item and see information about it. For more about the Library, see "2.4.3 Library menu."

NOTE

To exit a screen, press the Esc key.

1. Press the Wake/Sleep key to turn on the unit. The screen shows four menu items, with Scan highlighted

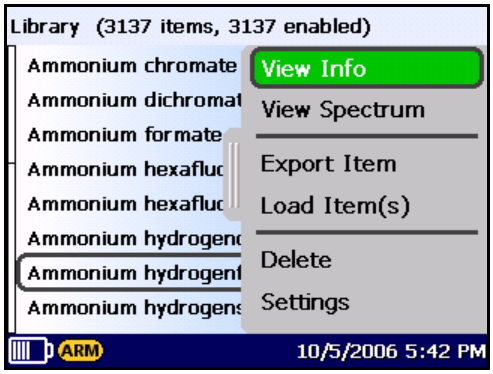


2. Press the Down Arrow key twice to highlight Library. Press the Enter key. A list of Library items appears.

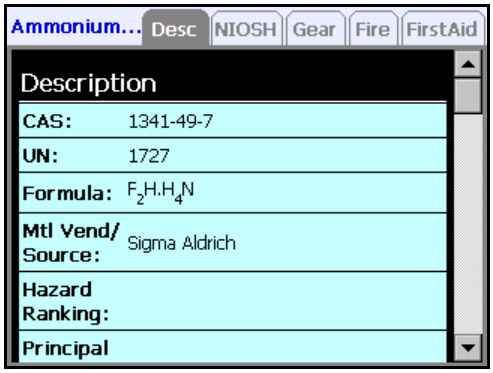
TIP

To rapidly scroll the list, hold the arrow key down. To skip to the end of a long list, select the first item on the list and press the Up Arrow key.

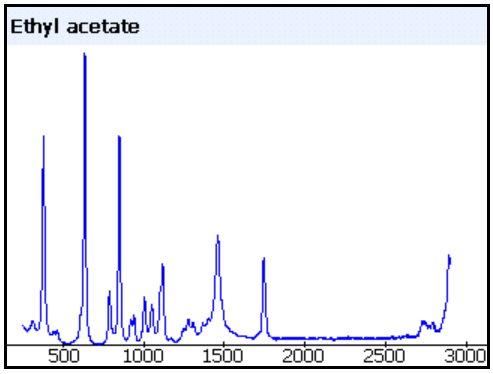
3. Press the Down Arrow or Up Arrow key to select an item.
4. Press the Enter key. A menu appears, listing things you can do with the selected item. View Info shows you information for the item. View Spectrum shows you the item's Raman spectrum.



5. Highlight ***View Info***, and press the Enter key. An information screen appears. Some items, including user-added items, may not have information available.



6. Press the Right Arrow and Left Arrow keys to look at the different screens of information. Press the Up Arrow and Down Arrow keys to scroll up and down the screen.
7. Press the Esc key to exit this screen and return to the Library item menu.
8. Press the Down Arrow key to highlight ***View Spectrum***. Press the Enter key. A screen appears showing the spectrum of the selected Library item.

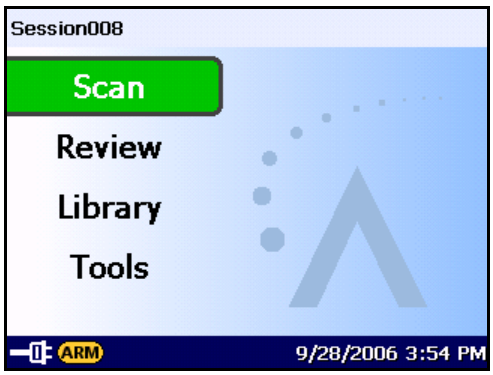


9. Press the Esc key to exit this window; press and hold to exit all the menus and return to the Main menu.

2.4 Menus

The unit's Main menu. See the sections below for information about how to use the menus. Also, refer to the *FirstDefender Quick Reference Guide.*

- Scan menu
- Review menu
- Library menu
- Tools menu



To select an item, highlight it and press the Enter key.

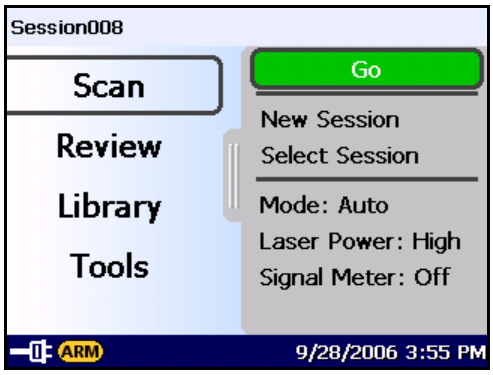
NOTE

All menu settings remain at the level you most recently selected until you reboot the unit or change the battery when AC power is not connected. For example, if you change the Laser Power setting to ***Low*** *or* ***Medium****, the setting remains at this level until you reboot the unit. Then, the setting for Laser Power goes back to its default value of* ***High****.*

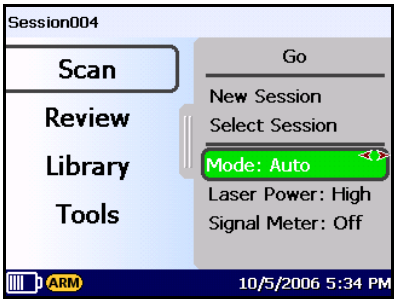
2.4.1 Scan menu

Consult the *FirstDefender Quick Reference Guide* for information on performing a scan and best practices for performing scans of specific materials and with specific types of containers.

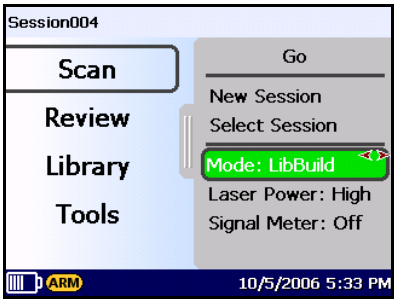
The Scan menu allows you to initiate a scan, set scan parameters, create a new session (group of scans) or select an existing session in which to place a new scan.



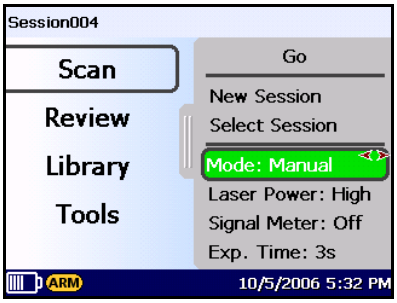
The parameters available to be set depend on the operating mode of the unit. See Figure 4 for the Scan menus in different modes.



Mode: Auto menu



Mode: LibBuild menu



Mode: Manual menu

Figure 4. The Scan menus in the three different modes

To change the ***Mode*** setting, highlight ***Mode*** and press the Right Arrow key.

Mode: Auto	The normal mode for scanning. The system chooses scanning parameters to obtain the best result. You can change the ***Laser Power*** setting, and enable the ***Signal Meter*** in this mode.
Mode: LibBuild	Use this mode only when scanning a substance to acquire data for adding it to the Library. You can change the ***Laser Power*** setting, and enable the ***Signal Meter*** in this mode.
Mode: Manual	If you are using FirstDefender in the laboratory for data acquisition, you may want to use ***Mode: Manual*** so you can fine tune all the scanning parameters. Otherwise, this mode is not normally used. In Manual mode, you can change the ***Laser Power*** setting, enable the ***Signal Meter*** , and set the ***Exp. Time*** (exposure time).

The following sections describe the menu options available from the **Scan** menu.

Go

To start a scan, highlight ***Go*** and press the Enter key. You can also press the Scan key. A scan begins, using the mode selected. A screen appears, similar to the following.

New Session

Allows you to enter a new name for the session. Otherwise, the unit will assign a default name (*session###)*. See "2.2 Using the on-screen keyboard."

Mode: Auto

This is the normal scanning mode. The settings are managed by the DecisionEngine.

Mode: LibBuild

Allows you to add the scan a substance and add the data to the Library. In this mode, the unit scans with high level of accuracy; it can take significantly longer than ***Mode: Auto***. Refer to the *FirstDefender Quick Reference Guide* for more information. After the scan is complete, you will give it a name and add it to the Library

Mode: Manual

This scanning mode is not commonly used in the field. It is used most often in the laboratory. If you want to use Manual mode, contact Ahura Customer Support.

Exp Time

This is only available in the ***Mode: Manual*** menu. It allows you to set the length of time (in milliseconds or seconds) that the aperture is open. Available settings: 250 ms, 500 ms (the default), 1 sec, 3 sec, 5 sec, or 10 sec. In ***Mode: Auto,*** the setting for Exp Time is managed by the DecisionEngine.

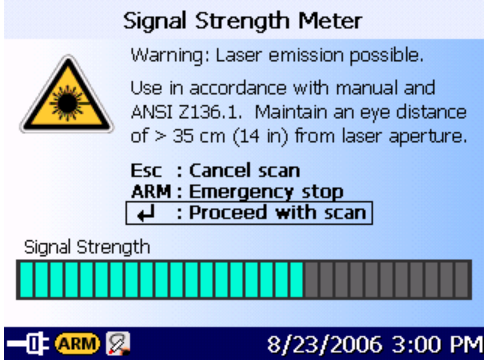
Laser Power

Allows you to set laser power. Available settings: High (300 mW, the default), Med (150 mW), and Low (30 mW). If the substance you are scanning appears to be rapidly heating, try scanning with a lower laser power.

Signal Meter

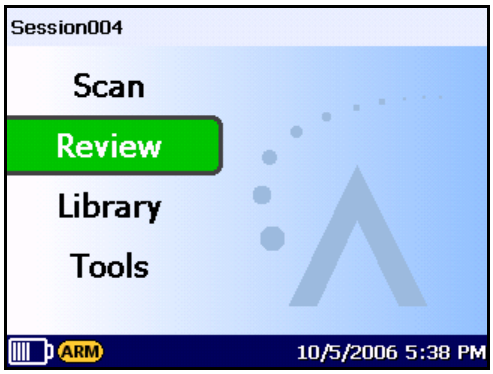
Highlight this item and use the Left and Right Arrow keys to toggle between ***On*** and ***Off***.

When you initiate a scan with ***Signal Meter: On,*** after the laser is activated you will see a screen that shows the strength of the Raman signal. When the signal reaches full strength, the scan automatically begins. You can start the scan at any time by pressing the Enter key. This feature can be helpful when you are scanning a powder, or having difficulty aligning the laser with the sample of interest. See your *FirstDefender Quick Reference Guide* for more information.



2.4.2 Review menu

The Review menu allows you to view scans that have already been collected.



The Review menu selections allow you to access scan data for all previous sessions, including spectrum and hazard information; create a new session, rename an existing session, export a session to the CF card, or delete a session. You can also export Reachback information to the CF card when requested to do so by Ahura Customer Support.

2.4.2.1 Reviewing sessions

To display the Review Sessions screen, select **Review** and press the Enter key. The unit displays a screen listing the previous sessions, in alphabetical order. Select a session. Press the Enter key. A list of menu options appears. To review a scan, see below.

Open [Session]

When you select ***Open*** and press the Enter key, the screen displays a list of the scans in the selected session. See "2.4.2.2 Reviewing scans," below.

New Session

To create a new session, highlight ***New Session*** and press the Enter key. The on-screen keyboard appears. Enter the name of the new session.

Rename Session

To rename the selected session, highlight ***Rename Session*** and press the Enter key. The on-screen keyboard appears. Enter the new name.

Export Session

To export the selected session to the CF card, first make sure the card is inserted (see "6.4 Inserting and ejecting the CF card.") Highlight ***Export Session*** and press the Enter key.

Delete Session

To delete the selected session, highlight ***Delete Session*** and press the Enter key.

Export Reachback

Ahura Customer Support may request you to send Reachback files. To export the Reachback files for the selected session, first, make sure a CF card is inserted (see "6.4 Inserting and ejecting the CF card.") Then Highlight ***Export Reachback,*** and press the Enter key.

2.4.2.2 Reviewing scans

Select and open a session, as described above ("Open [Session]"). On the Reviewing Sessions menu that appears, highlight ***Open*** and press the Enter key. The screen displays a list of the scans in that session.

Select a scan and press the Enter key to see menu options for that scan. You can Open, Rename Scan, Export to Card, Delete Scan, Export Reachback or Print Report. These options are described below

Open [Scan]

Highlight ***Open*** and press the Enter key. The unit displays the result screen for this scan. See your *FirstDefender Quick Reference Guide*, and "3 Interpreting Scan Results" in this manual.

Press the Enter key again to see options: viewing hazard information, viewing spectrum, exporting or printing the scan information. See your *FirstDefender Quick Reference Guide*.

Rename Scan

To rename the selected scan, highlight ***Rename Scan*** and press the Enter key. The on-screen keyboard appears. Enter the new name. (See "2.2 Using the on-screen keyboard.")

Export to Card

To export the selected scan to the CF card, first make sure the card is inserted (see "6.4 Inserting and ejecting the CF card.") Then, highlight ***Export to Card***, and press the Enter key. The scan will be exported to the CF card in standard .spc format.

Delete Scan

To delete the selected scan, highlight ***Delete Scan*** and press the Enter key.

Export Reachback

Ahura Customer Support may request you to send Reachback files. To export the Reachback files for the selected scan, first, make sure a CF card is inserted (see "6.4 Inserting and ejecting the CF card.") Then, highlight ***Export Reachback***, and press the Enter key.

Print Report

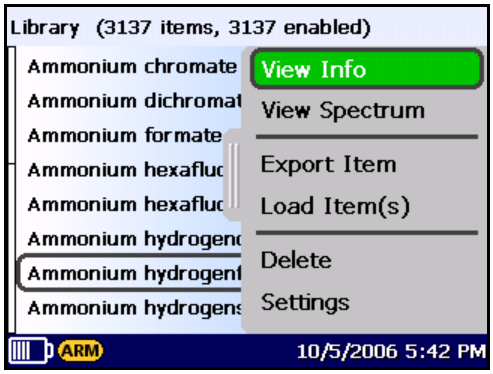
This function places the result information and spectrum of the scan on the CF card in .JPEG format.

To do this, first make sure a CF card is inserted (see "6.4 Inserting and ejecting the CF card.") Then, highlight ***Print Report*** and press the Enter key. You can transfer the file to your computer and print it out. See your *FirstDefender Quick Reference Guide* for more information.

2.4.3 Library menu

When you select ***Library*** and press the Enter key, the screen displays a list of all the items currently enabled in the Library, in alphabetical order, without any category distinction.

To access the Library menu, select an item and press the Enter key. The Library menu appears.



The following sections describe the options available from the Library menu.

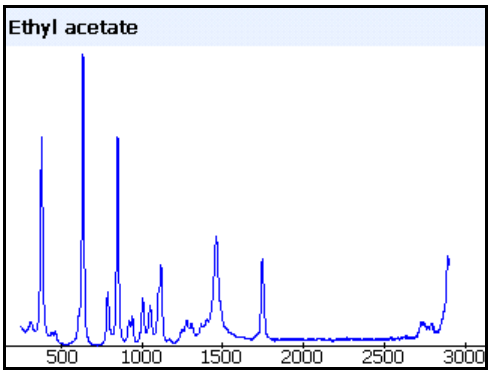
View Info

Displays in-depth information about the selected item, in the five Library Info Files tabs. To view the contents of a tab, select it with the Right Arrow / Left Arrow keys.

- **NIOSH:** Information about the compound from the NIOSH (National Institute for Occupational Safety and Health) guide.
- **Desc:** General description about the compound, including color, smell, synonyms, common uses, etc.
- **Gear:** Suggested protective gear to wear when handling the compound.
- **Fire:** Suggested fire response when the compound is identified.
- **FirstAid:** Suggested first aid procedures if you come in contact with the compound.

View Spectrum

Displays the spectrum of the selected item. Select View Spectrum and press the Enter key. The display shows the spectrum of the item.



To change the view of the graph, press the Enter key, and then select from the following menu choices:

- **Zoom In:** Magnifies the graph by approximately 50% each time selected.
- **Zoom Out:** Reduces the graph by approximately 50% each time you selected.
- **Autoscale Y:** Scales the graph to the maximum size that will fit on the screen.
- **Reset View:** Resets the spectrum to the initial view.

Press the Enter key. Press the Esc key to return to the Library screen.

Export Item

Exporting user-added items allows you to copy items scanned on one unit onto another unit via ***Load Item*** (next section).

If the selected item is in the User Added category (any category created by the user), select ***Export Item*** to copy it to the CF card. The item will be placed in a directory on the CF card called "UserAddedLib". See "Exporting Library Items" in the *FirstDefender Quick Reference Guide*. Exporting items from the Ahura Library is not permitted and will cause an error message to display: "Export of factory Library items not permitted."

Load Item(s)

To copy all items from the CF card to the unit's Library first insert the CF card containing the items (see "6.4 Inserting and ejecting the CF card.") Then highlight ***Load Item(s)*** and press the Enter key.

Delete

If the selected item is a User Added item, you can delete it by selecting ***Delete*** and pressing the Enter key.

Settings

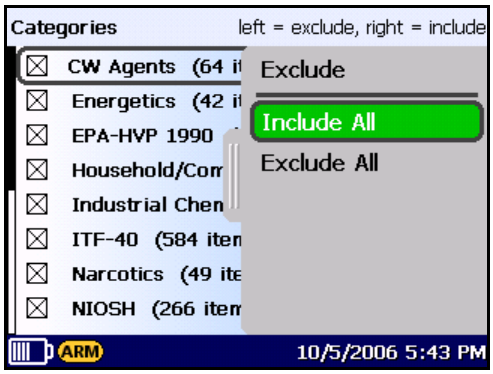
Use this menu to select Highlight ***Settings*** and press the Enter key. A list of Library categories appears. This screen allows you to select categories of Library items that will be searched during the next scan. Use the Left and Right Arrow keys to include or exclude individual categories as follows:

- Include: Right Arrow key: places an x in the box of the selected category.
- Exclude: Left Arrow key: removes the x from the box of the selected category.

TIP

When you make a scan, FirstDefender will search only *the selected categories when looking for a match. It is very important, therefore, to make sure all the categories are selected before you make a scan. See your* FirstDefender Quick Reference Guide *for more information.*

1. Highlight ***Settings*** and press the Enter key. A list of Library categories appears.
2. Select a category from the list. Press the Enter key. A menu of choices appears.



3. Use the menu items to include and exclude categories.

   Include/Exclude: Includes or excludes only the selected category, placing an x in or removing it from the box next to the category.

   Include All: Includes all categories on the list; places an x in the box next to each category.

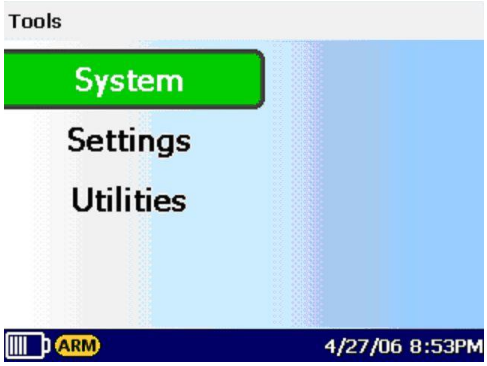
   Exclude All: Excludes all categories on the list; removing the x from the boxes next to each category.
4. When done, press the Esc key to save your changes and exit the menu.

NOTE

Press the Esc key to save your changes when you exit. This is different from most menus.

2.4.4 Tools menu

The Tools menu includes setting unit parameters, checking the revision level of the unit, clearing the memory, and other functions



The following sections describe the options available from the Tools menu.

System

Support

Displays the firmware version and the unit's serial number. During a call to Ahura Customer Support, you may be asked to relay the information displayed in this window.

Restart System

Restarts the unit, re-booting it without opening the battery compartment to remove the battery.
To restart, highlight ***Restart System*** and press the Enter key.

Settings

Date/Time

Sets the time and date for the unit. Highlight ***Date/Time*** and press the Enter key.

- To set the date: Select ***Date*** and press the Enter key. With the arrow keys, select numbers from each list, Month (mm), Day (dd), and Year (yyyy). Then press the Esc key.
- To set the time: Select ***Time.*** and press the Enter key. With Left/Right Arrow keys, highlight the Hr (0-23), Min (0-59), and Time Zone (+ or – hours from GMT). Then press the Esc key.

Language

Allows you to choose from languages available on the unit.

1. Highlight ***Language***. Press the Enter key. A screen appears listing the available languages.
2. Highlight your choice of language. Press the Esc key.

Utilities

Clear Sessions

This deletes all existing scans and sessions, freeing up the memory. Highlight ***Clear Sessions***, and press the Enter key.

Format CF

Deletes all the data on the CF card and formats the card. To do this, insert the CF card in the unit (see "6.4 Inserting and ejecting the CF card.") Then, highlight ***Format CF***, and press the Enter key.

3. Interpreting Scan Results

3.1 Understanding how the DecisionEngine works

DecisionEngine , the patent-pending custom analysis software in FirstDefender, automatically analyzes the data collected by scans. It also controls the scanning process in Auto mode and enables the "quality bar" visible during a Library Build (LibBuild) scan.

The DecisionEngine is designed to:

- Put a 'spectroscopist in a box.'
- Operate with high precision.
- Provide the user with probabilities, not ranks.
- Control the true-positive rate, false-positive rate.

Once the scan is taken of a substance, a spectrum is generated. Figure 5 shows an example.

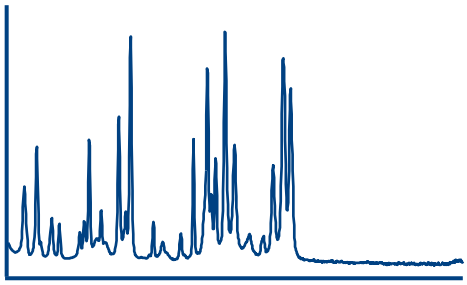


Figure 5. Sample spectrum

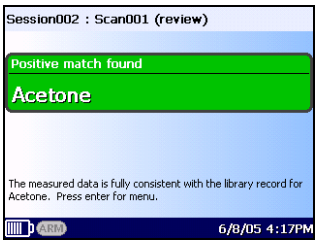
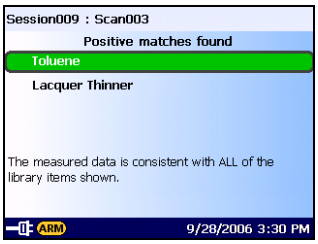
DecisionEngine uses a process of elimination to match the scan spectrum to data in the Library. It compares the measured data to Library items to see if any aspects of the scan spectrum contradict the Library items. When it finds a substance or combination of substances whose data *does not* contradict the unknown scan, then that item or those items are declared a match.

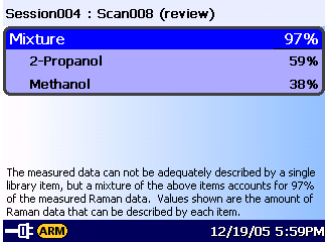
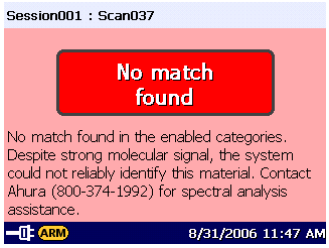
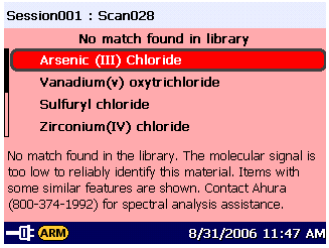
The software first seeks to find a single substance, then looks for a mixture of substances. See the next section, "3.2 Mixture analysis," for more information.

Table 2 shows the DecisionEngine's search process.

Table 2. DecisionEngine process for compound identification

Question 1: Are there any Library items that could *not* be contradicted?	
YES – go to **Question 2**.	**NO** – go to **Question 3** (next page).

Question 2: Is only one Library item *not* contradicted?	
YES –There is **ONE POSITIVE MATCH**	**NO –** There are **MULTIPLE POSITIVE MATCHES**
 TIP *If a yellow triangle appears next to the compound in any result screen, you can select it to view more specific match information (for example, different brands of acetone).*	 The data matches two or more Library items, meaning that the unknown substance could be any one of them.

Question 3: Does a mixture of Library items exist that is consistent with the scan data?	
YES – Classify as **MIXTURE**	**NO –** Classify as **NO MATCH**
 A single positive Library match for the data could not be found. A mixture of Library items matches the data. The percentages indicate the proportion of the data that matches the individual items. In the example screen, 59% of the data matches to the Library's 2-propanol item and 38% matches to the Library's methanol item. The percentage total will not add up to 100% if some of the data cannot be explained. Mixture identification is a complex analysis and more susceptible to false positives than the One Positive Match or Multiple Positive Matches results. **NOTE** *The percentages are not concentrations.*	The data did not match anything in the Library, including mixtures of Library items. **NOTE** *The text on the No match screen contains important information and may be different, depending on each particular case. Read it carefully.* A  B  The unit will list any Library items that are similar to the data (example B). Be careful when interpreting this type of result. This screen does not mean that the listed substances are present, only that the data resembles them in some respects.

There are several possible reasons for a **No Match** result:

- Proper scanning technique was not used.
- The scanned substance is not present in the included Library.
- The scanned substance has no or a very weak molecular signal (for example, water or flour) or emits excessive fluorescence (see "3.3 Compensating for fluorescence in scanning").

If possible, repeat the scan with a different sampling method. See the Best Practices tables in the *FirstDefender Quick Reference* Guide for more details.

3.2 Mixture analysis

If DecisionEngine cannot establish a positive match for a scan based comparison with the individual items in the Library, it automatically invokes the mixture-extension algorithms. These algorithms find mixtures of Library items—as many as six items—that could account for the spectrum of the unknown material. In doing so, the algorithms effectively expand the Library geometrically. When a plausible solution is found, a blue screen labeled **Mixture** shows the items in the mixture and their proportions.

Figure 6 shows a substance that the mixture-extensions determined to be a mixture of calcium formate (A) and acetaminophen (B).

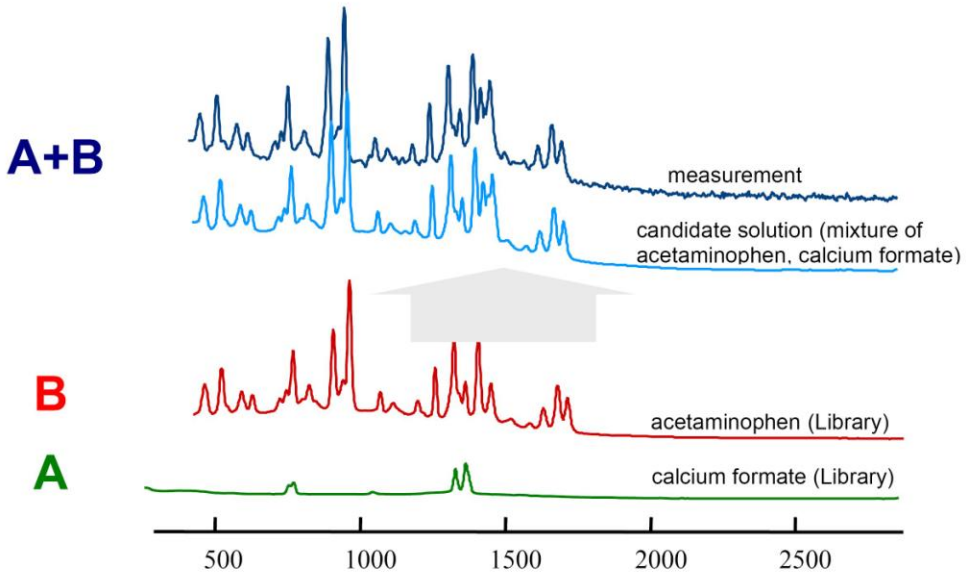


Figure 6. A mixture of two Library items

In some cases, the unit displays the message, *Cluster of n Items.* This means that the items listed in the cluster could not be separately analyzed by the mixture analysis algorithms – one or all of the clustered items may be present. This is the only instance in which the unit identifies a set of items as a cluster.

This unit will not show results for components accounting for less than 1% of the measured Raman signal, or components failing statistical significance. Because Raman signal strength can be quite variable across different molecular species, compounds *can* be present at sizable concentrations, but not be identified.

Some combinations of substances can have very strong interactions (or even reactions) when mixed. If this results in a substantial change in the spectra of the individual components, they will be difficult to detect as a mixture.

3.3 Compensating for fluorescence in scanning

Fluorescence is like background static on the radio, and can slow the acquisition of data. It is a noisy baseline wave that obscures the Raman signal. In extreme cases, fluorescence can result in a red "No Match" screen.

However, the Ahura DecisionEngine software solves this problem in the majority of cases. Figure 7 shows the background fluorescence as a dashed line, beneath, and the sum of the fluorescence plus the Raman signal, above. As you can see, the peaks in the Raman spectrum are still apparent. When DecisionEngine performs its analysis, it automatically corrects for the fluorescence, and can determine what the Raman spectrum looks like.

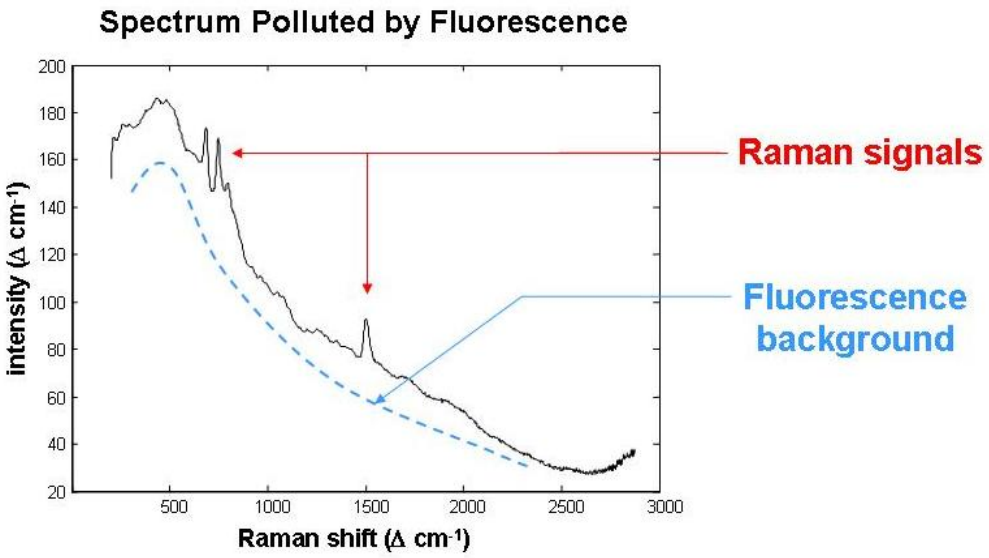
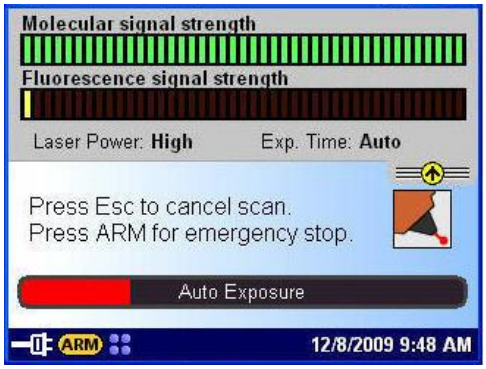


Figure 7. Fluorescent Background and Identifiable Spectrum

Fluorescence is usually caused by richly-hued green or blue materials, or black/dark brown ones; some natural materials such as proteins and starches; and some types of glass containers. Fluorescence is a characteristic of the electrons populating a molecule, while a Raman spectrum is a characteristic of the specific inter-atomic bonds within molecules. Since electrons carry little information about the molecule itself, fluorescence tends to be broad and nondescript. In contrast, a Raman spectrum displays many distinct bands that identify the structure of specific molecules.

When you scan a substance, the Signal Strength Meter displays the relative strength of the fluorescence and Raman (molecular) signals. Press the Up Arrow to hide the Signal Strength Meter.



4. Exporting and Importing Data

Several kinds of information and data can be exported from and imported to the unit. The table below summarizes the file types and how to export and import them.

Table 3. Files for Export and Import

File type	Suffix	Menu Selection(s) for Export	Menu Selection for Import
Scan	.spc	From result screen After Mode: Auto scan: Enter – ***Export to card*** – Enter From "Library build complete" screen after Mode: LibBuild scan: Enter – ***Export to card*** – Enter ***Review*** – Enter – [select session] – Enter – ***Open*** – Enter – [select scan] – Enter – ***Export to card*** – Enter	Cannot import.
Session	.spc	***Review*** – Enter – [select session] – Enter – ***Export session*** – Enter Exports a folder containing all the scan .spc files. The name of the folder is the name of the session (e.g. Session003).	Cannot import.
Reachback (session)	.arz or .arb	***Review*** – Enter – [select session] – Enter – ***Export Reachback*** – Enter	Cannot import.
Reachback (scan)	.arz or .arb	Review ***– Enter – [select session] – Enter –*** Open ***– Enter – [select scan] – Enter –*** Export Reachback ***– Enter***	Cannot import.
LRD	.lrd	Library ***– Enter – [select item] – Enter –*** Export Item ***– Enter***	***Library*** – Enter – [select item] – Enter – ***Load Item(s)*** – Enter
Lib Info	.html	Nothing to export	No menu selection. If you need to import Lib Info, contact Ahura Customer Support.

4.1 Viewing exported spectrum (.spc) files

To view spectrum (.spc files) on your computer, you must have appropriate software. Ahura recommends GRAMS software, an integrated suite of spectroscopic software tools from Thermo Electron Corporation. Go to www.thermo.com/grams for information. You can also use a freeware program called SpekWin32, available on http://www.effemm2.de/spekwin/index_en.html

NOTE

This software only allows you to open .spc files, not Ahura reachback files.

4.2 Exporting reachback files

A reachback file (suffix .arz) is a proprietary file type that contains the scan data, configuration and other information for a particular scan or session. Customer Service may ask you to export a reachback file to a CF memory card, and then e-mail it to Ahura. See "Export Reachback" in the "2.4.2.1 Reviewing sessions" or "2.4.2.2 Reviewing scans" section.

4.3 Exporting Library items

You can export your User-Added items. This is convenient if you want to copy them to another unit.

1. Insert the CF card (See "6.4 Inserting and ejecting the CF card.")
2. Select ***Library – Export Item*** and export the Library items one by one. The exported items will be copied to the CF card in LRD format in a directory called \UserAddedLib. (See "5.1 Editing the LRD files of Library items".)

4.4 Importing Library items

To transfer edited LRD files from the PC back to the unit:

1. Copy the edited LRD files into the \UserAddedLib directory in the CF card.
2. Insert the CF card in the unit. (See "6.4 Inserting and ejecting the CF card.")
3. Select ***Library – Load item(s)***.

5. Managing the Library

Managing the Library on the unit involves these tasks:

- Editing the LRD files of Library items
- Working with Library Info files

5.1 Editing the LRD files of Library items

LRD files are ASCII (text) files created by the system used to move data from the unit to a computer for editing. You can export, edit and reload LRD files for items you added to the Library from LibBuild scans. Figure 8, below, shows an example of an LRD file. To export Library items, see "4.3 Exporting Library items."

Each item has a unique identifier, its "ahurainvno" which is also used for its file name, with the file extension *.lrd*; example: *A0010.lrd*. LRD files consist of command words and their values. The values you can edit are those shown in Table 4. For example, **name** is a command word and its value in Figure 8 is SCAN001. You can change the name to, for example, SmithCo aspirin.

Description	LRD file
beginning of file	#! Defender LRD 2.1
Date and time in UTC format	datetime 20050513 15:27:15
name of the material	name SCAN001
unique identifier	ahurainvno A0010
	instrument USB2000 SN#18234, Probe2 SN#3
	source Alfa Aesar Lot 1234-1234
CAS number, or identifier	cas 67-64-1
	SNR 1 56.44822 56.81597
Group membership	group Aspirin
Category membership	category Pharma

Figure 8. Sample LRD file

When you edit the LRD files, you can change the values for the command words shown in Table 4—name, ahurainvno, category, and group. Command words:

- Are always a single word, without spaces.
- Are not case-sensitive, although the corresponding value may be.
- Can appear in any order.

In addition:

- Unrecognized command words will be ignored.
- If a command word is repeated, the last instance is saved.
- No carriage returns are allowed within the section of a line containing the value.

Table 4 summarizes fields that can be changed, with the cautions noted below. "name" is the field most commonly changed.

Table 4. Command word definitions: name, ahurainvno, category, and group

Command word	Information format and cautions	Example
name	ASCII text, 256 characters maximum, spaces are allowed. NOTE: Be sure to use a unique name, not one that exists in the Ahura Library or among your User-Added items.	`name SmithCo aspirin`
ahurainvno	ASCII text, no spaces allowed. A unique character string that is used within the system software to identify an individual Library item. An ahurainvno starting with "A" is reserved by Ahura, and "U" is generally used only for temporary user items. The ahurainvno is also used to look up the chemical information shown in **View Info**. CAUTION: **If the ahurainvno was changed, when the exported items are loaded back into the unit's Library, you have to delete the original items from the User Added category; otherwise, you will have more than one instance of the same item.**	`ahurainvno BCD-111506-02`
category	Multiple category names allowed, separated by commas. Category names may contain spaces. CAUTION: **There is no master category list—it is up to you to make sure that categories are not duplicated (for example, to avoid creating categories for both "Pharma" and "Pharmaceutical").**	`category Pharma, Generic`
group	Group membership. If blank or absent, then this item is not a member of any group. See Glossary.	`group Aspirin`

To edit the values for name and other command words, follow these guidelines:

- The **name** field is commonly edited to make it more descriptive. On the unit's keyboard screen, when you name a newly-scanned item, you are limited to 14 characters. A new name can be longer.

  Example: **`name`** `SmithCo aspirin`

- If you want to edit the **ahurainvno,** develop a standard naming scheme. You can begin the ahurainvno with any character *except "A,"* (See Table 4, above).

  For example, if you are a member of Boston Civil Defense, you can start the ahurainvno with the characters *BCD*. The next characters could be the date it was scanned. The names should be consistent and logical, but the character strings are your choice.

  Example: **`ahurainvno`** `BCD-111506-2`

  Develop a strategy for creating new **categories**. If you add a large number of new items, placing them in appropriate categories, instead of leaving them all in the **User Added** category, will help you keep track of the items.

  Example: **`category`** `Category 1`

You can place a new item in one or more categories **(**Figure 9**)**—existing categories or new categories that you create. List the categories on the category line, separated by commas. For example, an item can have the following category line

```
category Category 1, Category 2
```

where **Category 1** and **Category 2** are new categories you create.

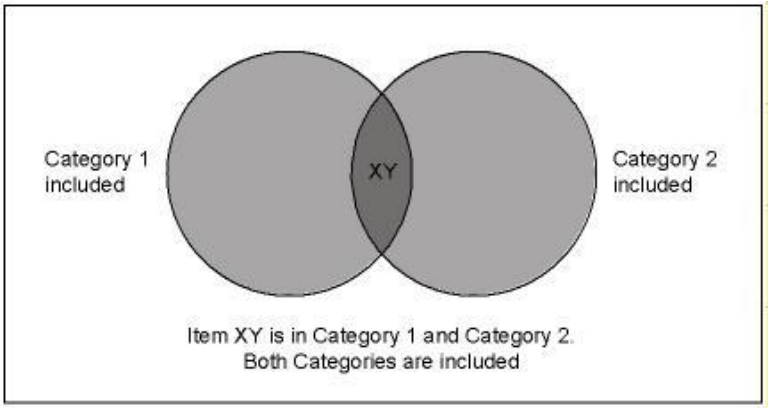


Figure 9. Item 'XY' in two categories

Even though you can assign one item to more than one category, as in Figure 9, category membership is independent. For example, you can make item **XY** a member of both **Category 1** and **Category 2.** Then, if you exclude **Category 1** but include **Category 2** (Figure 10) using the ***Library – Settings*** menu, item **XY** will still be searched during a scan and displayed in Category 2.

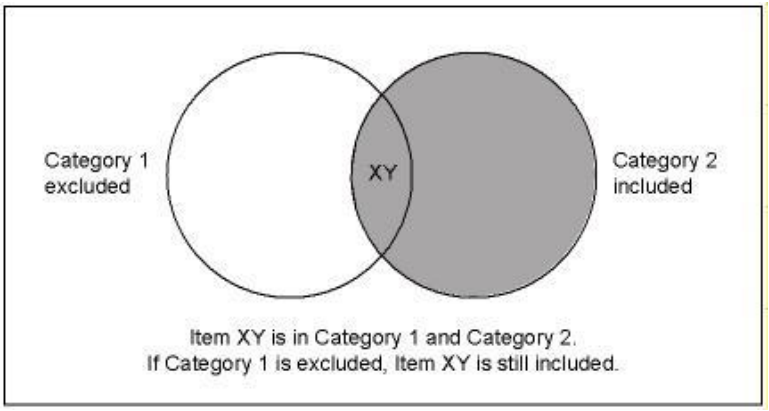


Figure 10. With one category included and one excluded, item 'XY' is still displayed

5.2 Working with Library Info files

When you select ***View Info*** for a scan, the unit displays a screen with five tabs, each of which displays the indicated information. Use the Right Arrow and Left Arrow keys to select among the tabs. Table 5 provides a description of each tab.

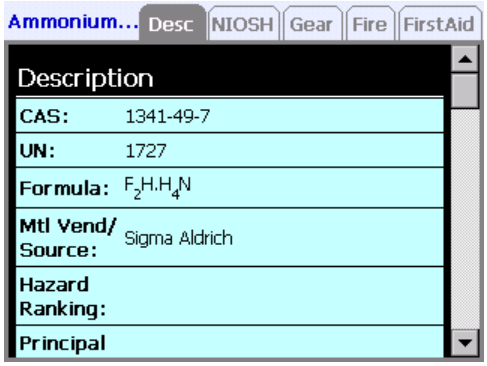


Table 5. Library Info File tabs and descriptions

Tab Name	Description
NIOSH	Information about the compound from the NIOSH (National Institute for Occupational Safety and Health) guide.
Desc	General description about the compound, including color, smell, synonyms, common uses, etc.
Gear	Suggested protective gear to wear when handling the compound.
Fire	Suggested fire response when the compound is identified.
FirstAid	Suggested first aid procedures if you come in contact with the compound.

For each item in the Library, there can be from zero to five Library Info files. If no file exists for this item, the screen displays "No information available."

All of the Library Info files are located on the Secure Digital (SD) card. These files are simple HTML. If you want to add more information to the files, contact Ahura Customer Support at 1-800-374-1992.

6. Performing Maintenance and Upgrade Procedures

Routine maintenance includes the following procedures.

- 6.1 Cleaning the unit
- 6.2 Recharging the battery
- 6.3 Replacing the battery
- 6.4 Inserting and ejecting the CF card
- 6.5 The SD card
- **Error! Reference source not found. Error! Reference source not found.**
- 6.6 Returning the unit to the manufacturer

6.1 Cleaning the unit

To remove dirt or nonhazardous external contaminants from the unit and nose cone, wipe them with a clean cloth moistened with water, household bleach (5% sodium hypochlorite), or alcohol.

NOTE

If you have the optional FlexProbe, clean the inside of its coupling with a moistened swab.

If the unit is contaminated with potentially hazardous substances, follow your organization's decontamination guidelines. The unit may be immersed in water and in household bleach (5% sodium hypochlorite).

Before beginning decontamination procedures, be sure to:

- Press the Wake/Sleep key to put the unit to sleep.
- Make sure the battery compartment door fasteners are fully tightened and the gasket is properly seated.

The boot may be removed for cleaning or decontamination. To remove it, place your thumbs on either side of the nose and push the boot off, then peel it away from the rest of the unit. See Figure 11, below. You can also remove the boots from the optional FlexProbe, if necessary.

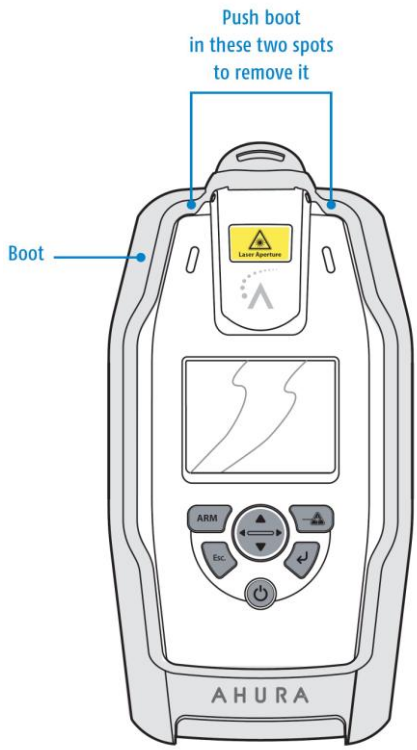


Figure 11. Removing the boot from the unit

6.2 Recharging the battery

The unit's 7.4 V battery, when fully charged, provides approximately 5 hours of use at room temperature. This icon indicates the battery's charge, from one to seven bars: . The battery has sufficient charge for scanning when it indicates at least three bars.

You can also power the unit with the wall plug adapter included with the unit. This icon indicates the wall plug adapter is correctly connected: .

You can charge the battery in two ways:

- In the external battery charger provided with the unit, A red light on the charger indicates battery is charging; green means it is fully charged.
- In the unit when it is powered with the wall plug adapter.

The battery compartment door (Figure 12) provides access to the battery and the jack for the wall plug adapter. To open the door, release the two quarter-turn fasteners by turning counterclockwise.

TIP

The unit's rechargeable lithium ion batteries perform best if they are kept charged and not allowed to discharge completely.

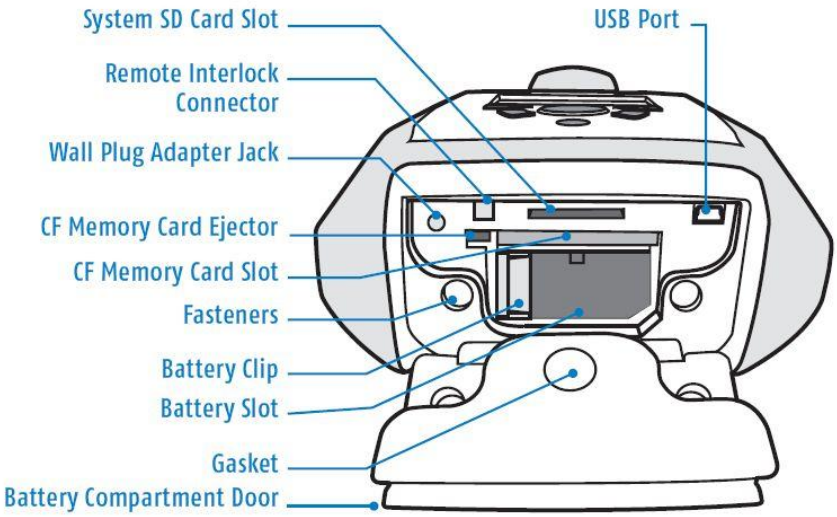


Figure 12. Battery compartment components

6.3 Replacing the battery

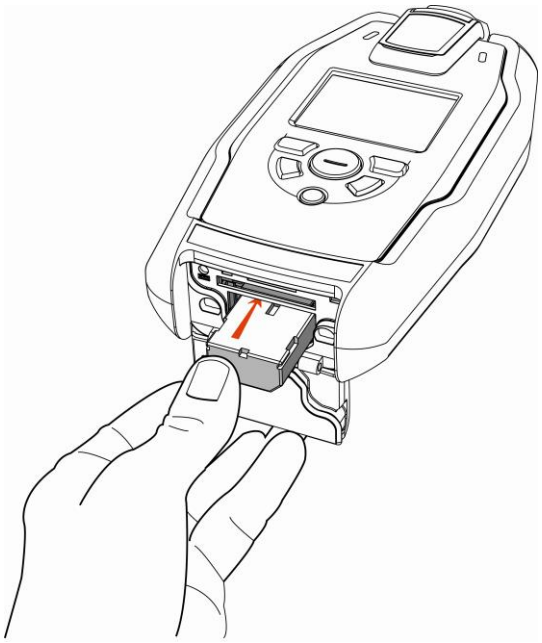


Figure 13. Installing the Battery in the Battery Compartment

When the low-battery icon <> appears in the status bar on the display, or the screen does not illuminate, replace the battery.

1. Release the two quarter-turn fasteners on the battery compartment door by turning them counterclockwise. Open the door.
2. Press the plastic clip at the left side of the battery slightly to the left to release the battery from the battery compartment.

3. Remove the battery.
4. Insert a charged battery into the battery compartment.
5. Close the battery compartment door and secure it by turning the two quarter-turn fasteners clockwise.

6.4 Inserting and ejecting the CF card

Before exporting data files to another unit or to your computer, follow the instructions below to install a CF card. For more information, see the FirstDefender Quick Reference Guide.

NOTE

Be sure the unit is awake (on) before you insert the CF card. If the unit is asleep (off), it will not recognize the CF card when you insert it.

6.4.1 Inserting the CF card

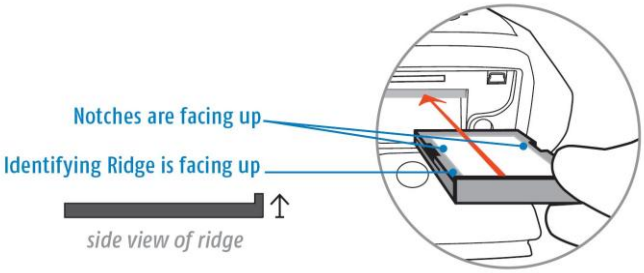


Figure 14. Inserting the CF card

To insert the CF card:

1. If necessary, press the Wake/Sleep key to wake the unit.
2. Open the battery compartment door.
3. Orient the CF card as indicated in Figure 14. Gently insert the CF card into the CF card slot inside the battery compartment. It should slide in without forcing.

6.4.2 Ejecting the CF Card

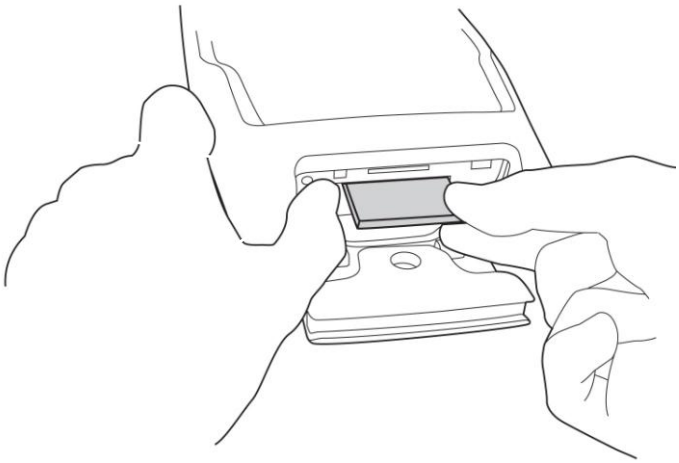


Figure 15. Ejecting the CF card

To eject the CF card:

1. Verify that the unit is awake.
2. Press the square button to the left of the CF card to eject it (see Figure 15).

6.5 The SD card

The Secure Digital (SD) card is similar to the hard drive on a computer. It contains the application, all chemical libraries (info and Raman spectra), all user-created Library items, and all scan history. It is not normally removed from the unit. If you think you need to remove the SD card, contact Ahura Customer Support.

CAUTION

Do not remove the SD card unless instructed by Ahura Customer Support. Removal of the SD card while power is applied to the unit (battery or wall plug adapter) can corrupt the SD card.

6.6 Returning the unit to the manufacturer

To return the unit to Ahura or to your local Ahura distributor, contact Ahura or your local Ahura distributor and request a return material authorization (RMA) number.

1. Clean the unit.

NOTE

To conform to safety and common carrier requirements, all returned units must be clean.

2. Pack the unit securely and verify that your RMA number is written on the outside of the package.

NOTE

Packages that are not identified with an RMA number will be returned to the shipper unopened.

3. Send to Ahura or to your local Ahura distributor.

7. Upgrading the System Software

All upgrades include improvements to the application logic and an expansion of the Library. Installation of the software upgrade may also mean an upgrade of the unit's firmware. Your scan/session history and your user-added Library items will be safe during this upgrade process.

Installation requires less than 5 minutes of your time, and is complete after 60 minutes or more, depending on how many user-added Library items are stored. Each user-added Library item adds about 30 seconds.

To begin the process, you will need:

- The unit
- Compact Flash (CF) card labeled "FirstDefender Upgrade Vn.n," where n.n is the version number of the application.
- Wall plug adapter
- Access to electrical outlet

CAUTION

External electrical power must be provided to the unit throughout the upgrade process.

Please follow the steps below for a successful upgrade installation.

1. Apply power to the unit as follows: install the battery, and then plug the power adapter into the unit.
2. Remove any CF card from the unit (see "6.4 Inserting and ejecting the CF card.")

CAUTION

To avoid damaging the unit, do not remove the power adapter until the upgrade is completed.

3. Wait for the unit to start up and the Main menu to appear.
4. Insert the CF Upgrade Card into the unit with the label facing up. Press gently to be sure it is seated. The card should go in smoothly, and should not be forced.
5. The unit will automatically exit the application and start the auto-install process. At the start of the install process the user is asked to confirm the procedure. Once confirmed the process continues with no more user input required. If cancelled then the system software is restarted.
6. When the process is completed, the screen may show a First Defender license agreement. Use the up and down arrows to read the document to the end, then press the Enter key to accept the license and continue.
7. The screen will return to the Main menu and show an "install complete" dialog. You can confirm a successful installation by selecting Tools – System – Support and verifying the line "Def. Ver: n.n."
8. Remove the CF Upgrade card and place it card in a safe location, making sure that it will not be inserted accidentally. The upgrade process is complete.

Appendix A – Glossary

Item	Description
Add to Library	Adds the scan to the User Added category of the Library.
Ahura Library	Library items factory-installed by Ahura. You cannot export, delete, or edit items in the Ahura Library.
ahurainvno	A unique identifier for each item. All ahurainvnos starting with "A" are reserved by Ahura for use in the Ahura Library, and all that start with "U" are reserved for use as temporary user items.
Auto	Normal scanning mode, in which the embedded computer and DecisionEngine control the data acquisition settings. This is similar to the Auto setting of a camera, where the focus, aperture and shutter speed are chosen by the logic circuitry of the camera.
Autoscale Y	Displays the graph at the maximum peak value visible on the Y axis.
Category	A collection of items or groups of items in the Library helpful for organizing the Library.
CF Card	Compact Flash card, a removable memory card to which information such as user-added scan files, reports and other data can be copied for export.
Clear Sessions	Deletes the scan data of all sessions.
Cluster	This term is used only in reference to a mixture result, designating a group of items that cannot be analyzed separately. See "3.2. Mixture analysis."
Compound	Chemical compound contained in or added to the Library as an item.
Date/Time	Date and time the data was acquired in YYYYMMDD hh:mm:ss 24-hour format (+ or – hours from GMT).
Delete Session	Removes a session from memory.
Exclude Exclude All	Removes a category, or all categories, of Library items from those available for identification during scans
Export Item	Copies the item from the User Added category of the Library to the CF card. Exporting items from the Ahura Library is prohibited.
Export Reachback	Writes the Log and Configuration files to a CF card in the form of a proprietary file named, for example, FD1234Ses-20060320141745.arz (reachback).
Export Scan	Copies the selected scan to the CF card.
Export Session	Copies the scans, one at a time, from the selected session to the CF card.
Export to card	Copies the live or selected scan to the CF card.
FlexProbe	An optional optical extension probe.
Format CF	Deletes all data from the inserted CF card.
Group	A collection of Library items that will always be presented on the results screen according to the group name, rather than the individual names. In some cases, the items in the group may represent different trade names of the same overall product.
Include / Include All	Adds one or all categories of Library items to those available for identification during scans.
Item	Individual set of data from a scan stored in the Library.
Keyboard screen	Displayed as a means of entering a name, deleting a name, or accepting a default name.

Item	Description
Laser Power	Setting for laser intensity during scans.
LibBuild	Scan mode used to acquire high-quality data for adding to the Library.
Library	Displays a list of all included compounds
Library Info Files	Five HTML files, one for each of the following topics for in-field use: NIOSH—Information about the compound from the NIOSH (National Institute for Occupational Safety and Health) guide. Desc—Description about the compound, including color, smell, synonyms, common uses, etc. Gear—Suggested protective gear to wear when handling the compound. Fire—Suggested fire response when the compound is identified. First Aid—Suggested first aid procedures if you come in contact with the compound.
Load Item	Imports files from a CF card to the Library.
LRD	File format for transfer of Library item files between FirstDefender unit and a PC.
Manual	The mode selection that allows you to set the exposure time. Not normally used.
Molecular signal	The Raman signal. See "1 Introducing FirstDefender."
New session	Creates a new session.
NIOSH	National Institute for Occupational Safety and Health
Open [Scan]	Gives menu of options for viewing and managing scans.
Open [Session]	Gives menu of options for viewing and managing sessions.
Raman Signal	The information contained in the scattered light that enables the unit to identify compounds. Also called "molecular signal." See "1 Introducing FirstDefender."
Scan	The acquired spectrum and resulting analysis of a measured material. Also, the process of acquiring the spectrum. See "1 Introducing FirstDefender."
Scan key	Shortcut to the main menu with ***Go*** highlighted. Starts a scan.
SD Card	Secure Digital memory card.
Settings [Tools]	Sub-menu menu of the Tools menu that includes Time/Date.
Settings [Library]	Sub-menu of the Library menu that displays all categories and let you include/exclude any of them in the Library list, which determines which categories are available for DecisionEngine to match with a scanned substance.
SNR	Signal-to-noise ratio
Reset System	Similar to re-booting the system. Useful when you can't open the battery compartment to remove the battery.
Spectrometer	Device that measures a spectrum.
Support	Displays the serial number of the unit and its firmware version. (***Tools – System – Support)***
Time/Date	Lets you set the Hour, Minute, Time Zone (+ or – hours from GMT) and/or Month, Day, Year by using the Arrows key.
USB Port	Universal Serial Bus; the USB port is for factory/service use only. USB connection to other systems is not supported at this time.
User Added	Category in the Library that contains items you have added to the Library.
Utilities	Sub-menu of the ***Tools*** menu with the following selections: ***Clear History***, ***Format CF***.

Item	Description
View Info	See Library Info Files
View Spectrum	Displays a graph of a substance's Raman spectrum.
Zoom In	Magnifies the spectrum graph by approximately 50% each time you press the Enter key.
Zoom Out	Reduces the spectrum graph by approximately 50% each time you press the Enter key.

Appendix B – Limited Warranty

A. Limited Warranty. The limited warranty set forth herein applies only to the Buyer, may be acted upon only by the Buyer, and may not be assigned, sold or transferred to any third party. Ahura warrants only to the Buyer that, for the applicable warranty period set forth below, the Product shall substantially conform to Ahura's published specifications as of the date of shipment. The warranty period shall be set forth in the applicable Sales Quotation for each Product. The limited warranty herein shall not apply to (i) any Product that has been customized, altered or repaired by any person or entity other than personnel of Ahura or personnel specifically authorized by Ahura, (ii) any Product that has been subjected to abuse, misuse, damage, neglect, or accident beyond Ahura's published limitations for the Product or other causes external to the Products (including, without limitation, environmental conditions and power conditions), (iii) use of the Product in combination with products or software not supplied by Ahura, (iv) any use or operation of the Product other than in accordance with Ahura's then-current published specifications and instructions for the Product, or (v) any non-conformities or defects notified by Buyer to Seller with respect to a Product after the expiration of the applicable warranty period for such Product.

B. Remedies. Buyer's sole and exclusive remedy and Seller's sole and exclusive liability for a breach of this limited warranty shall be, at Seller's option, Seller's use of its commercially reasonable efforts to repair or replace the non-conforming Product. If Ahura is unable, after reasonable efforts, to repair or replace such substantially non-conforming Products, Ahura, may, at its sole discretion, elect to refund of an amount not to exceed the actual payments received by Ahura for such Product(s). Buyer shall not return any Product to Ahura without an Ahura-issued RMA number. Shipping costs and the risk of loss for a returned Product shall be borne solely by Ahura, and Ahura shall assume the risk of loss while the Product is in the Ahura facility. Products that are repaired or replaced by Ahura shall be covered by this limited warranty for the remaining warranty period for such Product.

C. Disclaimers. THIS LIMITED WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT) WITH RESPECT TO THE PRODUCTS, THE MANUFACTURE, SALE, SUPPLYING OR FAILURE OR DELAY IN SUPPLYING OF THE PRODUCTS, SERVICES RELATED THERETO OR THE USE, RESULTS OR DISPOSITION OF THE PRODUCTS. AHURA EXPRESSLY DISCLAIMS ALL WARRANTIES (WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL) WITH RESPECT TO THE RESULTS OBTAINED FROM THE PRODUCT. AHURA DOES NOT WARRANT THAT THE USE OF THE PRODUCT OR ITS RESULTS SHALL BE UNINTERRUPTED OR ERROR-FREE.

Appendix C – Warnings and Safety Considerations

CAUTION

Do not use FirstDefender unless you have been trained.

The FirstDefender unit incorporates a laser diode that emits a 350 mW beam at 785 nm. An 18 mm focal length lens is used to concentrate the energy on a sample. The beam diameter at the plane of the focal lens is approximately 9.6 mm.

This unit is certified as a CLASS IIIB laser product to the requirements of the U.S. Federal Product Performance Standard for Laser Products contained in the regulations of 21 CFR Sub-Chapter "J" except for deviations pursuant to Department of Health and Human Services issued Laser Notices. FirstDefender also complies with IEC 60825-1 Ed. 1.2(2001-2008).

Exposure to Class IIIB levels of laser energy can be hazardous. Avoid exposure to the beam. Exposure to specular (mirror-like) reflections should also be avoided. Never point the unit at anyone.

In the absence of a work place safety standard or requirements, refer to the American National Standard ANSI Z136.1 for the safe use of lasers or the International Standard IEC 60825-14 user's guide for guidance on identifying and controlling hazards associated with laser use.

Calculations performed in accordance with the recommended practices of ANSI Z136.1 and IEC 60825-1 give a Nominal Ocular Hazard Distance (NOHD) of approximately 14" (35 cm) from the focal point of the lens and an estimated optical density (OD) greater than 2.8.

Use administrative controls, engineering controls, and/or laser safety glasses to avoid exposure to laser radiation within the 14" (35 cm) hazard zone. Use laser safety eyewear of an optical density (OD) greater than 2.8.

Ahura provides a protective laser shield to further protect the operator from an exposure above the maximum permissible exposure (MPE). It is strongly recommended that this shield be used with the device.

WARNING: Exposure to levels of laser energy above the MPE can be harmful to the eye. The emitted energy must travel a minimum distance of 14" (35 cm) before its concentration is below the MPE for normal viewing. This distance is defined as the hazard zone. With proper use exposure to levels above the MPE can be avoided. Avoid exposure to the beam.

CAUTION

There are no user-adjustable components inside the unit. The battery compartment door may be opened, but do not open the protective enclosure or modify the electronics within. All service operations must be performed by Ahura Scientific or an authorized service agent of Ahura Scientific. Any attempt by the user to open the unit will render the warranty null and void.

FirstDefender is specifically designed to be used in an everyday environment in the field and is therefore considerably more rugged than a laboratory unit. However, the user should recognize that this is a precision scientific instrument and should be treated with care. Abuse and mistreatment may lead to a degradation of performance or premature failure.

Important information continued on next page.

WARNING: Use of controls, adjustments or performance of procedures other than those specified herein in or those specified by Ahura Scientific personnel may result in a hazardous condition.

Follow your organization's procedure and regulations for the handling of unknown substances.

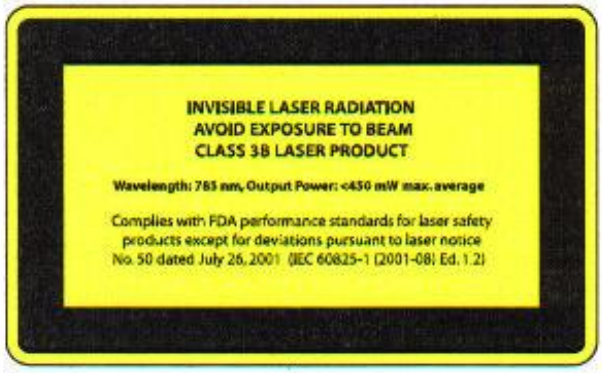
Always use small sample sizes and the lowest possible laser power setting to limit possible hazards.

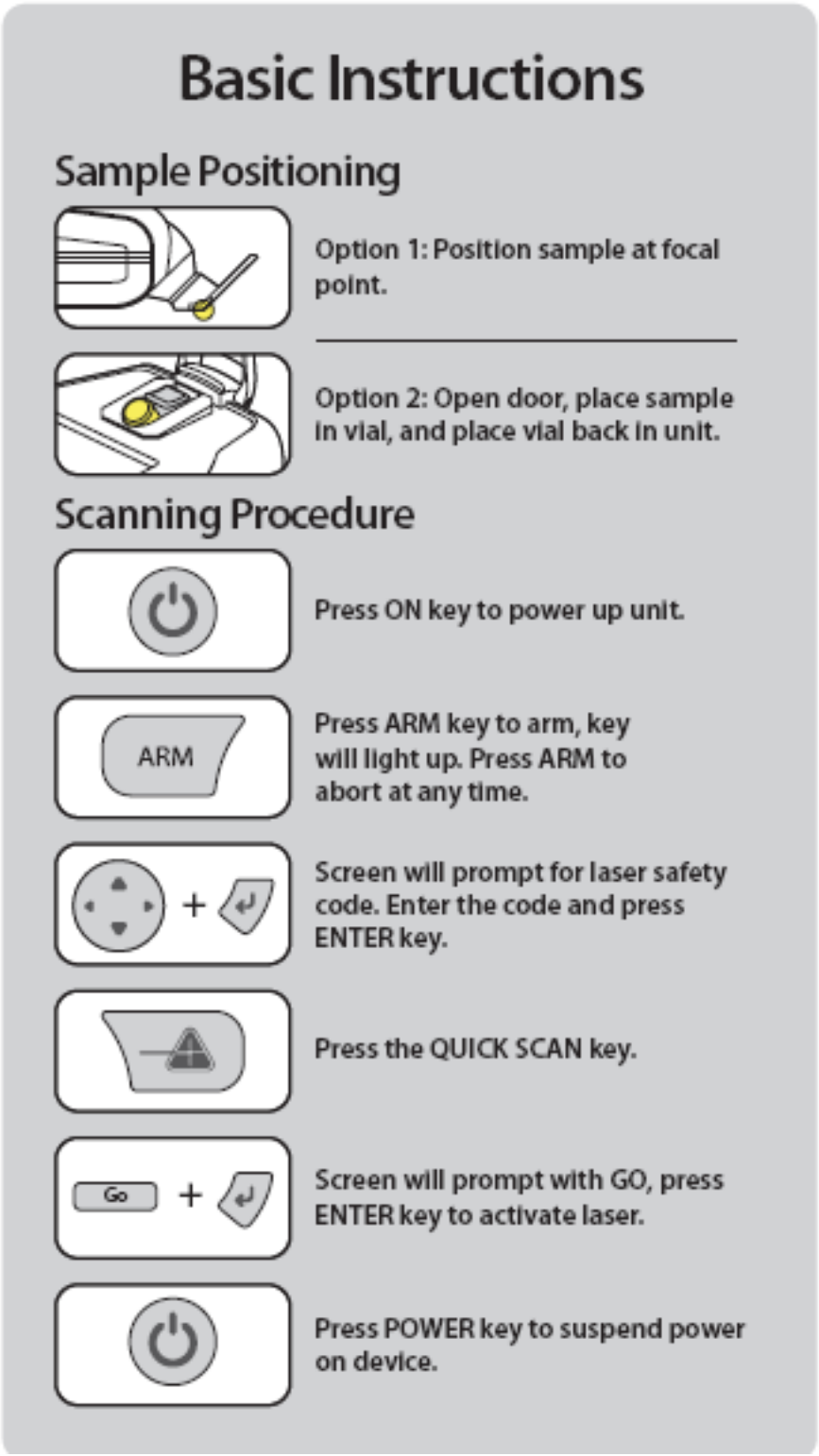
WARNING: Scanning a thermally sensitive material contained in a tightly sealed vessel (e.g. capped jar or vial) with FirstDefender may cause a pressure build up and subsequent explosion of the vessel.

FirstDefender is **not** designed to be intrinsically safe and the user should take the necessary precautions when using the unit.

Appendix D – Safety and Information Labels

The following labels are attached to the unit for the convenience of and safe operation by the user.

Label	Description
	Indicates the location of the **Eject** button, located on the top of the unit under the vial area cover. Pressing this button removes a vial from the holder.
	Alerts the user that energy from the laser exits through an opening on the nose of the unit. This radiation can harm the eyes; therefore, take care that the eyes are suitably protected. The label is by the aperture, which is located in the nose of the unit.
	Alerts the user that energy from the laser exits through an opening under the hinged vial holder cover This radiation can harm the eyes; therefore, take care that the eyes are suitably protected. The label is located on the top of the unit immediately above the screen.
	Identifies the unit. If you have questions about using the unit, please provide the information on this label to Ahura Scientific. This label is located on the back of the unit.
	Provides the user with information on the class, wavelength, and output power of the laser contained within the product. This label is located on the back of the unit.

Label	Description
	Outlines the procedure employed to scan a sample. It is on the back panel of the unit. Consult the "Scanning" chapter in the *FirstDefender Quick Reference Guide* for detailed information on getting a good scan and best practices for scanning. See Chapter 2 of this User Manual for a discussion of the user interface for the unit.

Appendix E – Error Messages and Responses

E.1 How to re-boot the unit

Occasionally you may need to re-boot the unit, as follows.

1. Press the Wake/Sleep key to put the unit to sleep.
2. Remove the battery
3. Re-insert the battery.

If you still have a problem after re-booting, contact Ahura Customer Support.

E.2 Verifying unit's operation with polystyrene test rod

Ahura provides a polystyrene test rod to use in verifying the unit's performance. The rod comes packaged with the vial set included with your unit.

To verify the operation of your unit.

1. Place the polystyrene test rod in the vial compartment.
2. Set the scan mode to Mode: Auto.
3. Take a scan.

If the system returns a positive match to polystyrene, it is operating within factory specifications.

E.3 Error messages

The following table presents error messages you might see when working with the unit, what each error message means, and how to correct the error.

- Messages during scanning
- Messages when exporting
- Message from Unit Self Test
- Temperature-related messages

Messages during scanning

Error Message	Cause and remedy
Auto Exposure failed. Try lowering laser power.	This message indicates that the substance scanned may be flaring up. Scan again with a lower laser power. See "2.4.1 Scan menu."
Scan Warning - Results may be suspect due to High Ambient Light	This message indicates that there is too much ambient light (sun or interior lights). The scan should be performed in a darker area or try to shield the unit and sample from direct lighting sources.
Laser Enable Timed Out Laser Arm failed Laser Arm Timed Out CCD Temperature Timed Out Enable Laser Failed Enable Spectrometer TEC Failed Failed to turn on laser emission Failed to turn off laser emission Failed to read spectrum	These messages relate to hardware problems. Reboot the unit (see "E.1 How to re-boot the unit.") If the problem persists after rebooting, the unit must be factory serviced. Contact Ahura Customer Support.

Messages when exporting

Error Message	Cause and remedy
Could not export scan. ERROR: Unable to export session. ERROR: Unable to create Reachback file ' Could not export scan. Could not save reachback file	These messages indicate that there is a problem with the CF card. Make sure a CF card is inserted. If it is, eject and re-insert it. See "6.4 Inserting and ejecting the CF card." TIP *The unit must be awake when you insert the CF card. Otherwise, it will not recognize the card.*

Message from Unit Self Test

Error Message	Cause and remedy
Out of Calibration - results may be suspect and should be viewed with caution. Your system should be sent back to Ahura for service. Do you want to continue?	The system performs a periodic check for calibration and laser power. This message indicates that the unit is out of calibration and that it needs to be serviced. A calibration icon will appear in the status bar of the display. A red icon <CAL> indicates your unit requires factory recalibration. A yellow icon <CAL> indicates slight calibration variation but does not require user action.

Temperature-related messages

Error Message	Cause and remedy
CCD Temperature is out of supported operating range. Low Battery Power – change the battery or use AC adapter System Temperature Range - System Temperature is out of supported operating range. Shutting down system Laser Temperature Range - Laser Temperature is out of supported operating range. The system will now power off. Please try again when the system is within supported operating limits. For further details please consult the user manual.	These messages are temperature related. The unit operates in ambient temperatures of -20°C to +40°C. Outside this range, there is a risk of damage to the unit, so it shuts itself off. Cool down or warm up the unit to within its operating temperature range.

Appendix F – Specifications

Optical specifications

Principle of Operation	Raman Spectroscopy
Monochromator Spectral Range	781 nm - 1014 nm
Raman Spectrum Range	250 cm^{-1} to 2875 cm^{-1}
Spectral Resolution	7 to 10.5 cm^{-}1 (FWHM) across range
Laser (excitation wavelength)	785 nm +/- 0.5 nm, 2 cm^{-1} linewidth
Laser Output	Settable, 50 mW, 150 mW, 300 mW
Rayleigh Rejection Filters	OD 7
Detector	Silicon CCD 2048 Pixels
Detection Mode	Direct Dispersive
Dispersion Mode	Single Pass Spectrometer (1200 groove/mm Blazed @ 900 nm)
Nose Collection Optics	NA= 0.33
Nose Beam Divergence	15 degrees half angle

Sampling specifications

Sampling via Vials	Integrated 4 mL Vial Holder
Remote Mode	Point and Shoot, Stand-off Distance = 18mm

Electronics and data processing specifications

Computer	Built-in single board computer
Calibration	Self Checks on Start up
Algorithm	Proprietary chemometric routines
Average Integration Time	Has an Auto feature that optimizes the data automatically, and a Manual mode that allows you to select from 250ms to 10 seconds integration time.
Library	CW's, ITF40 chemicals, Explosives, Toxic chemicals Narcotics, White powders, Pharmaceuticals, etc. User can add compounds to the Library.
Software	Proprietary; but the data can be exported to a Galactic 'SPC' file format.

Compliance

Safety Standards	UL 61010-1 CSA C22.2 No. 61010-1 EN 61010-1:03/93 + A2:07/95 CB Scheme per IEC 1010-1:09/90 + A1:09/92 + A2:06/95
Laser Safety	FDA CDRH 1040.1 (Accession Number 0412714) IEC 60825-1:2007, 2nd Edition
Emissions	FCC Part 15 Subpart B, Class A ICES-003, Issue 4 Industry Canada, Class A CISPR 11:2003 +A1:2004
Immunity	EN 61326-1:2006

Environmental considerations

Operating Temperature	-20°C to +40°C
Storage Temperature	-30°C to +60°C
Pollution Degree	2
Maximum Altitude	Up to 2000 m
Enclosure Type	3R
Sunlight	The unit is not to be exposed to the sun for extended periods.

Electrical considerations

Power Supply	Internal 7.4 V Battery Pack DC Wall Adapter, 9 V 1.5 A
Battery Life	> 5 h at 25C, rechargeable

Physical considerations

Weight	<4 lbs (<1.8 kg)
Size	12” x 6” x 3” (30 cm x 15 cm x 7.6 cm)

FlexProbe (optional)

Attaches to FirstDefender unit for remote scanning.

Weight	0.85 lbs (0.39 kg)
Size	41” overall (104 cm)

MIL-STD-810F tests passed

Qualification Test	Detail	Condition
Mechanical Shock	MIL-STD-810F (516.5) Procedure I	Ground Equipment, 40g, 11ms, saw tooth
Vibration	MIL-STD-810F (514.5) Procedure I (Composite Wheeled Vehicle)	1 hour / axis, Category 20 - Composite Wheeled Vibration Exposure
Transit Shock (Drop)*	MIL-STD-810F (516.5) Procedure IV	48" unpackaged drop onto plywood on concrete, all surfaces, edges and corners, 26 times
Humidity	MIL-STD-810F (507.4)	5X (48 hour) 60C & 95% RH
Sand & Dust*	MIL-STD-810F (510.4) Procedure I	Blowing Dust
Thermal Shock	MIL-STD-810F (503.4) Procedure I	<1 min Transition -30 to +60C 1 day
Low Temp. (Operation)	MIL-STD-810F (502.4) Procedure II	-20C 1 day exposure following stabilization (Restrained Glass)
High Temp. (Operation)	MIL-STD-810F (501.4) Procedure II	35C 3-day soak following stabilization
High Temp. (Storage)	MIL-STD-810F (501.4) Procedure I	+60C 7 days exposure
Low Temp. (Storage)	MIL-STD-810F (502.4) Procedure I	-30C 1 day exposure
Immersion	MIL-STD-810F (512.4) Procedure I	30 min at 1 meter depth

* Unit with FlexProbe attached has not been tested to the Sand & Dust or Transit Shock (Drop) requirements.

Calibration

Standard	Detail
ASTM Raman Shift	Cyclohexane, acetonitrile, and toluene per ASTM E1840, *Standard Guide for Raman Shift Standards. Factory calibration is verified with the above materials, plus polystyrene and 4-acetamidophenol (acetaminophen).*
NIST Response	NIST traceable white-light source for system response standardization.
Verification	Polystyrene rods are supplied by Ahura (447-11171-01) for use in system performance verification. Set the device to "AUTO" measurement mode, insert the polystyrene rod into the vial-holder, and press go. If the system returns a positive match to polystyrene, it is operating within factory specifications.

FCC and Industry Canada Statements

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Directives and Statements

This equipment is in conformity with the provisions of the following EC Directives

- Low-Voltage Directive (LVD) 73/23/EEC
- Electromagnetic Compatibility (EMC) 89/336/EEC as amended by 92/31/EEC and 93/68/EEC
- Waste of Electrical and Electronic Equipment (WEEE) 2002/96/EC
- Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) 2002/95/EC

CAUTION

This is a class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

European WEEE Recycling and RoHS

On January 27, 2003, the European Parliament and the Council of the European Union issued directive 2002/96/EC concerning the waste of electrical and electronic equipment (WEEE). That directive's goals are to:

- Reduce the amount of WEEE produced.
- Increase the amount of WEEE that is reused, recycled, or recovered.

Along with Restriction of Hazardous Substances Directive (RoHS) 2002/95/EC, the WEEE directive became European Union law in February, 2004. The goals of the RoHS directive are to reduce the amounts of hazardous materials in EEE.

Ahura Scientific is compliant with WEEE and RoHS, offering disposal of its equipment that adheres to the EU directive:

- If you purchased your equipment through an Ahura Reseller, please contact them directly for recycling instructions.
- If you purchased your equipment directly from Ahura, please contact us at +1 978 642-1132 or email us at sales@ahurascientific.com. At the time of collection, Ahura Scientific will cover the cost of shipping equipment back to its headquarters in the United States.

For information about how to dispose of your Ahura Scientific equipment, visit our Web site at www.ahurascientific.com.

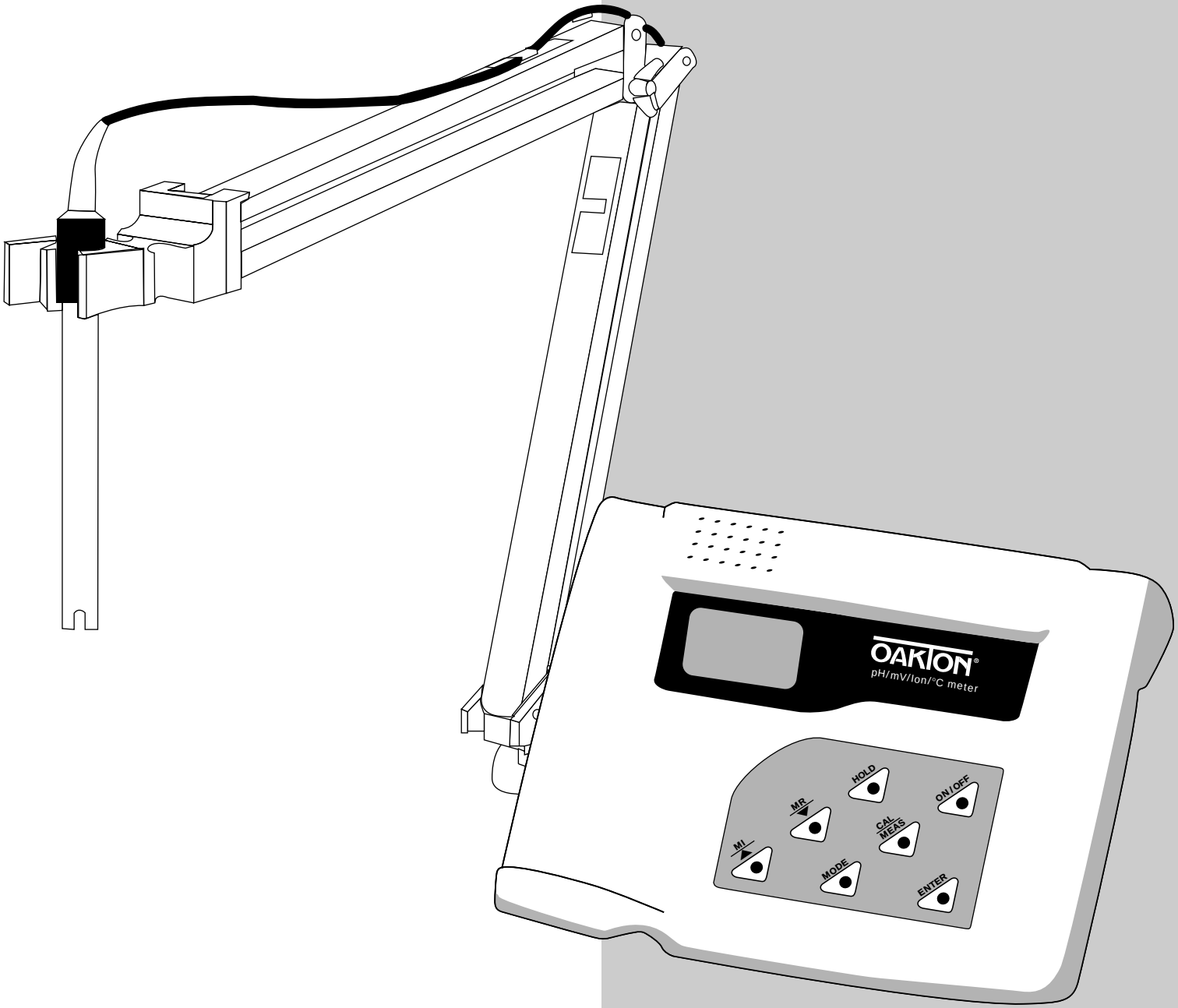
Attachment C-4

The Oaklon pH 510 and Ion 510 Series Benchtop Meters User Manual

Commented [MK2]: NOD 67

Attachment C-4

The OAKTON® pH 510 and Ion 510 Series Benchtop Meters



pH 510—pH/mV/°C meter

WD-35619-00, -02, -03, -05, -07,
-08, -10, -12, -15, -17

Ion 510—pH/Ion/mV/°C meter

WD-35619-20, -22, -23, -25, -27, -28

OAKTON®

2/00 ©2000

00702-93

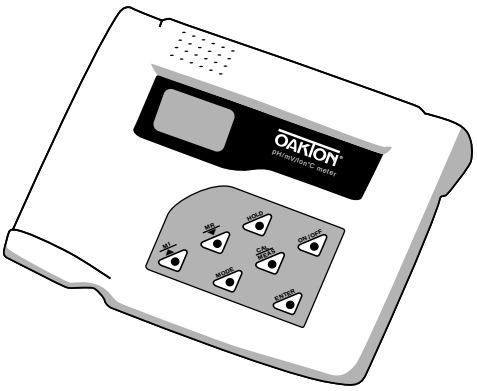
Table of contents

1. Introduction 4-7
   • Keypad • Rear panels • Optional Electrode Holder
2. Starting up 8
3. pH calibration and measurement 9-13
   • Calibration • Measurement (with manual or automatic temperature compensation) • Hold function
4. mV calibration and measurement 14-15
   • Calibration • Measurement • Hold function
5. Ion calibration and measurement (Ion 510 only) 16-18
   • Calibration • Measurement • Hold function
6. Memory Function 19
   • Memory input • Memory recall
7. Temperature Calibration 20
8. Setup mode 21-23
   • Clear memory • Electrode data • Buffer selection • Reset
9. Electrode care 24-25
   • Electrode activation • Electrode maintenance • Storing pH/ORP electrode • Electrode cleaning
10. Troubleshooting 26-27
11. Additional information 28
12. Specifications 29
13. Accessories 30
14. Warranty 31
15. Return of items 31

Quick tip

let the mini table of contents in the outer margins of this manual guide you instantly to the right section

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items



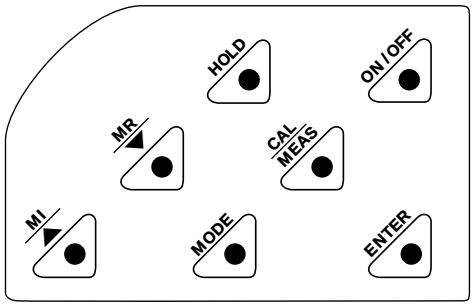


Figure 1

1. Introduction

Thank you for purchasing the OAKTON® WD-35619-series Benchtop meters. These meters are microprocessor controlled, user-friendly and reliable. The large customized LCD allows clear, easy operation. The display has mode annunciators for pH, temperature, mV and ion readings.

Keypad

See Figure 1.

A large membrane keypad with touch feedback makes the meter easy to use. Names and symbols describe the function button controls.

Key	Description
ON/OFF	Powers the meter **ON/OFF**. When the meter is switched on, it starts in the mode the meter was last in when powered down.
CAL/MEAS	Switches between the measurement and calibration modes of the meter. In SETUP mode, **CAL/MEAS** returns to the measurement mode.
MODE	**pH 510:** *Measurement:* **MODE** switches between pH and mV. *Calibration:* **MODE** switches from pH to temperature in the pH calibration mode (if **MODE** is pressed again, it will NOT switch back to pH). **Ion 510:** *Measurement:* **MODE** switches between pH, mV and ion. *Calibration:* **MODE** switches from pH to temperature in the pH calibration mode (if **MODE** is pressed again, it will NOT switch back to pH).
MI/▲	▲ Scrolls values in mV and temperature calibration mode. Selects calibration points in the ion calibration mode (Ion 510). Scrolls to the next program in the SETUP mode. **MI** inputs measurements into memory and scrolls through memory values.
MR/▼	▲ Scrolls values in mV and temperature calibration mode. Selects calibration points in the ion calibration mode (Ion 510). Scrolls to the previous program in the SETUP mode. **MR** recalls measurements from memory and scrolls through memory values.
HOLD	Freezes a measurement on the display. Press again to get current readings.
ENTER	Confirms and enters the value selected for calibration. Enter also functions in the memory mode.

Rear Panel

See Figure 2.

The OAKTON® WD-35619-series meters provide a complete set of input connections for the various accessories commonly used. Listed in the table below are details of the connections that you can make.

Connection	Function
ATC	Phono jack connection from the temperature probe for Automatic Temperature Compensation.
INPUT	For connection to sensor electrodes with BNC type connectors. The meter accepts any pH, ORP or ISE with BNC connector. Always make sure that the connector is clean and dry.
REF	For connection to pin type reference electrode normally used with half cell (mono) type pH electrodes or ISEs.
REC	For connection to strip chart recorders. Use subminiature plug with positive tip.
GND	For connection to the earth ground jack (standard tip connectors).
DC	For connection of the AC adapter power supply (included).

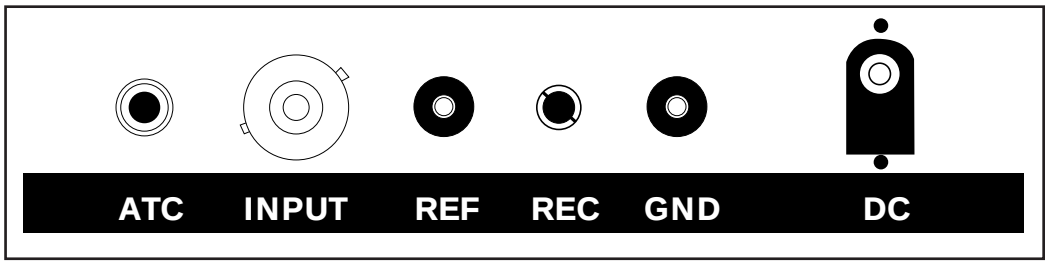


Figure 2

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

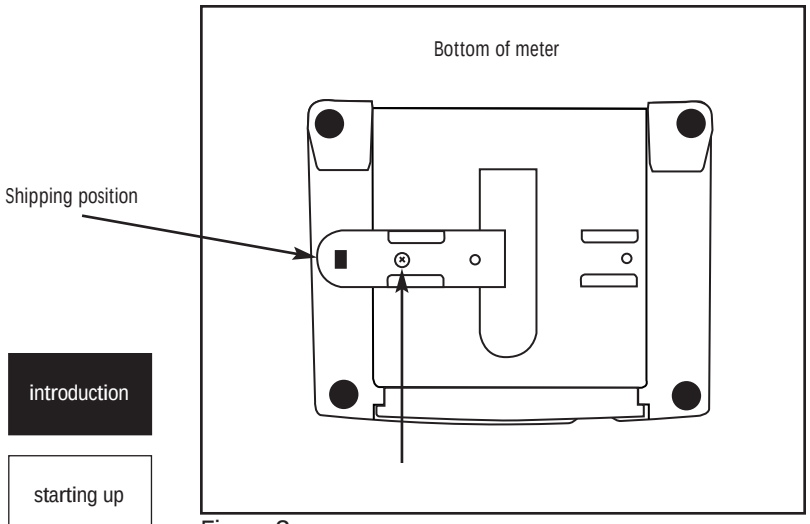


Figure 3

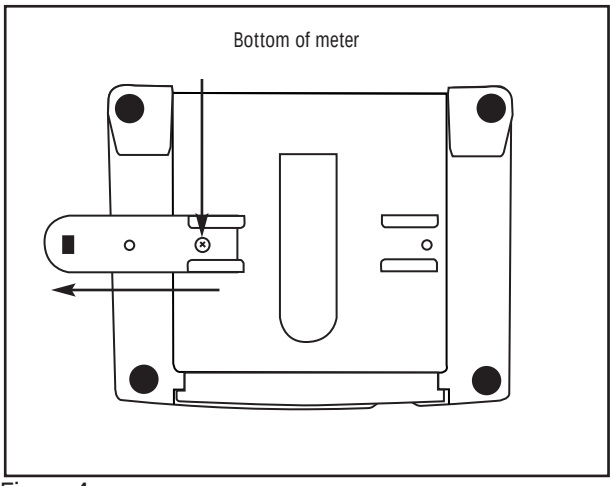


Figure 4

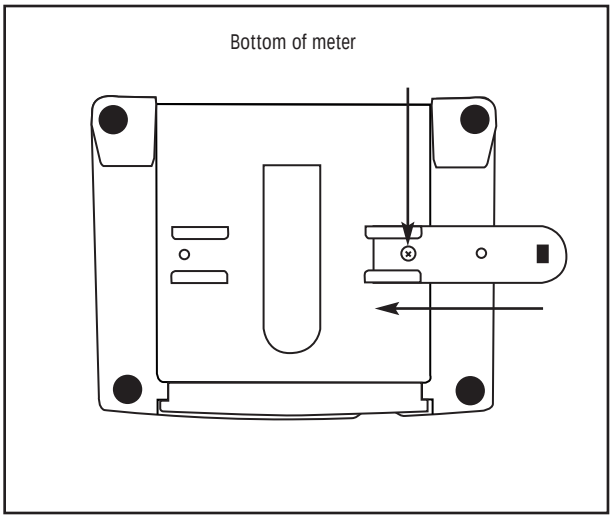


Figure 5

Optional Electrode Holder

If you have purchased a benchtop meter with the optional electrode holder, the electrode holder is included in the same box as the meter.

To attach the electrode holder to the meter:

1. The electrode holder base attached to the bottom of the meter comes in the shipping position.
   — See Figure 3.
2. Use a Phillips screwdriver to remove the screw holding the electrode holder in shipping position.
   — See Figure 3.
3. Slide the electrode base away from the meter until the second screw slot lines up with the original screw hole. Use the screw removed earlier to secure electrode holder base into position.
   — See Figure 4.
4. The electrode holder arm is reversible. If desired, remove screw holding electrode holder base and slide base out of brackets. Slide base into brackets on opposite side and replace screw.
   — See Figure 5.

5. To install the electrode arm, turn meter back to the upright position.
— See Figure 6.

6. Line up the hole on the base of the electrode holder arm with the peg on the electrode holder base. Slide the hole securely onto the electrode holder base.
— See Figure 7.

The electrode arm is now ready to swing into desired position.— See Figure 8.

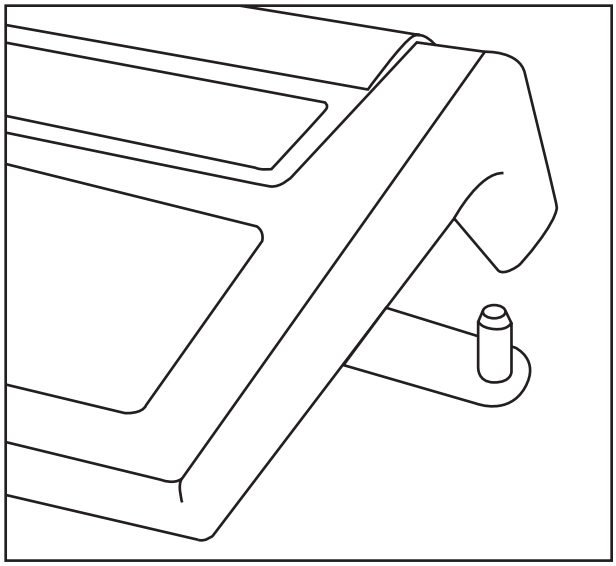


Figure 6

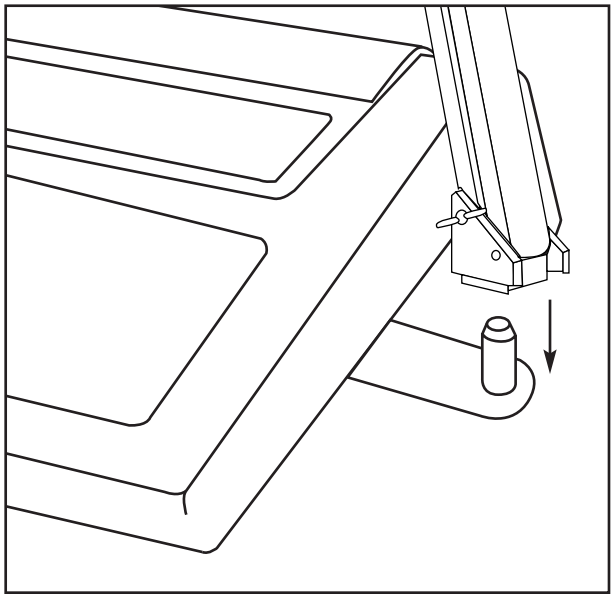


Figure 7

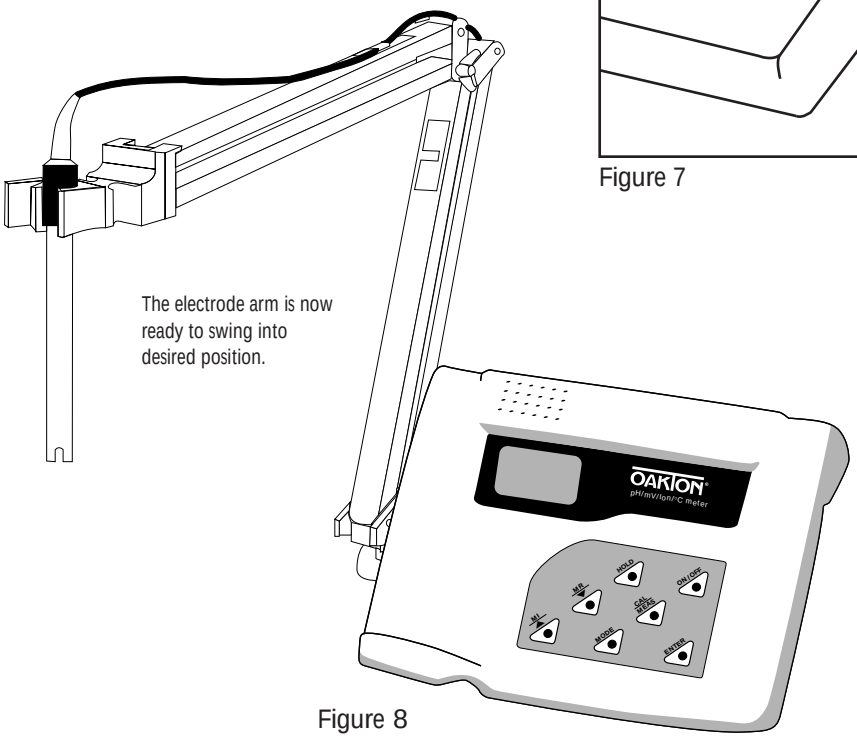


Figure 8

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

2. Starting Up

Attention!
Do not get water on the BNC connector during operation. Avoid touching the connector with soiled or wet hands.

Back panel connections

See Figure 9 .

1. **Connect the AC adapter** from an AC power source to the power jack (DC). Slide in the adapter jack of the A/C adapter into the meter until it is firmly seated. Voltage is set at 9V and the current is at 500 mA, (center positive connector).
2. **Connect a sensor electrode** to the BNC input connector (**INPUT**). The meter can accept any pH, ORP, or Ion Selective Electrode with a BNC connector. Make sure the connector is clean and dry. Slide the electrode connector of the electrode over the BNC connector socket. Make sure the slots of the connector are in line with the posts of the socket. Rotate and push the connector clockwise until it locks. For separate reference electrodes, push electrode pin into jack marked "**REF**".
3. **Connect a temperature probe** to the input jack marked **ATC**. Insert the probe into the jack marked with **ATC** on the rear of the instrument panel.
4. **Connect your chart recorder** to the jack marked **REC** You can connect chart recorders or other data collection devices. Plug in the sub miniature (2.5 mm) connector from the chart recorder into the jack marked with **REC**. Output signal is a mV signal equal to the measured electrode output. The tip of the connector is positive, the sleeve is negative

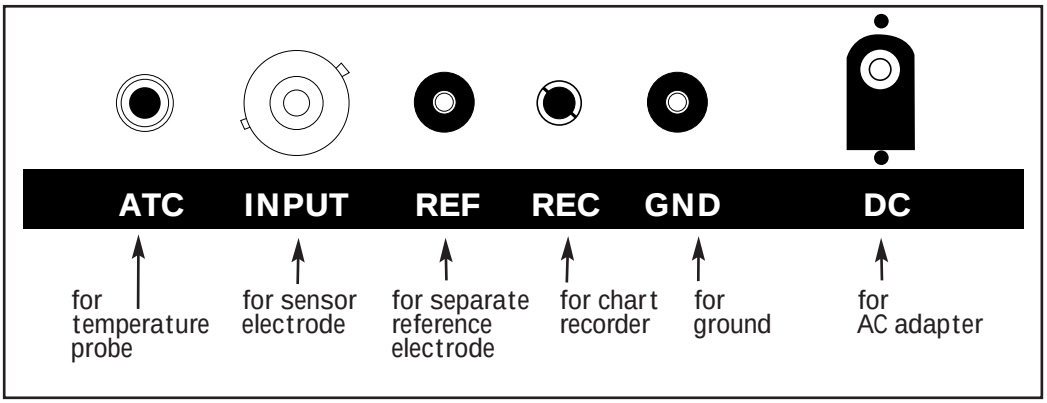


Figure 9

3. pH calibration and measurement

For best accuracy calibrate at least a two points using fresh pH buffers. Select calibration buffers with calibration values closest to the measurement range you expect to work in. A three point calibration (USA buffers: 4.01, 7.01, and 10.01 or NIST buffers: 4.01, 6.86 and 9.18) ensures maximum accuracy throughout the measurement range.

For quick checks with less accuracy, perform a one point calibration. Select the buffer value closest to the measurement range you will work in.

If you choose to calibrate to only 1 or 2 pH values, the older calibration values you do not calibrate to will remain stored. These old stored calibration values may cause accuracy loss when your readings are close to the old stored calibration values. To clear old calibration data, reset the meter as shown in Section 8, Program 4.0 on page 23.

For ATC measurements, attach the temperature probe to the meter. The **ATC** mode annunciator shows on the display. —See Figure 10. Insert the probe into the solution to be measured so that the sample temperature can be recorded and pH readings automatically temperature compensate. If manual temperature compensation is preferred, do not plug a temperature probe into the meter.

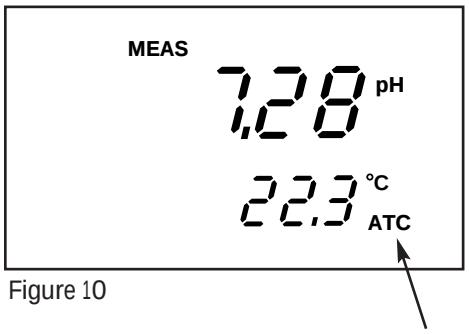


Figure 10

DO NOT REUSE SOLUTIONS AFTER CALIBRATION.
Contaminants in the solution can affect the calibration, and eventually the accuracy of the measurements.

All new pH calibrations will over-ride existing stored pH calibration data at these calibration points. The meter retains stored pH calibrations even when the meter is turned **OFF**.

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

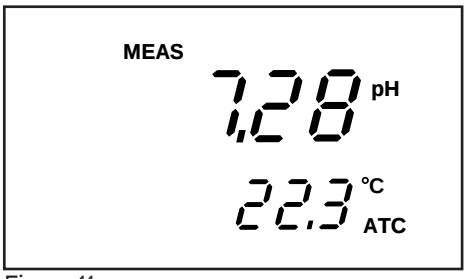


Figure 11

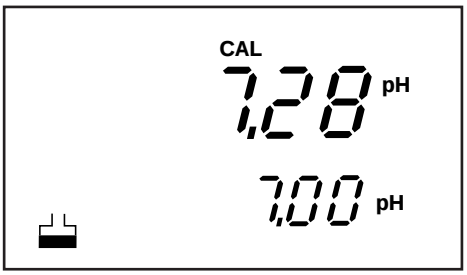


Figure 12

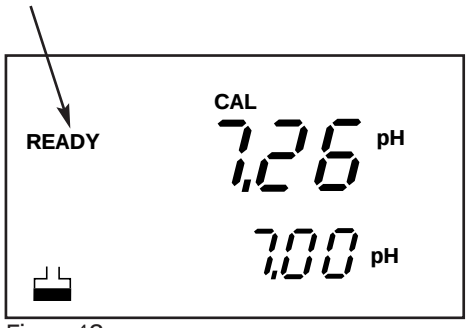


Figure 13

pH calibration

NOTE: We recommend that you perform at least a 2-point calibration using buffers that bracket (one above and one below) the expected sample range. You can perform a 1-point calibration, but make sure that the buffer value is close to the sample value you are measuring. Select pH 4, 7, or 10 buffers in pouches or bottles from the OAKTON standard buffer solutions.

1. Press the **ON/OFF** key. All the LCD segments display for a few seconds. The LCD switches to the last mode the meter was turned **OFF** in when powered down from the key pad. —See Figure 11

The customized LCD display will indicate the following:

Display	Remarks
MEAS	Measurement mode is selected.
pH	Unit of measurement
°C	Unit of temperature measurement
ATC	Automatic Temperature Compensation (if temperature probe or "All-in-One" probe is connected)

pH Calibration

1. Make sure the meter is **ON** and if necessary, press the **MODE** key to select pH mode. The pH indicator appears in the upper right hand corner of the display. —See Figure 11.
2. Rinse the electrode in deionized water or rinse solution. If using the ATC function with a separate temperature probe, rinse the temperature probe as well. **DO NOT WIPE THE pH OR TEMPERATURE PROBES DRY!** Wiping the probes causes static, and will create calibration and measurement instability.
3. Select the pH buffer and pour some into a CLEAN container.
4. Dip the probe into the calibration buffer. The end of the probe must be completely immersed into the sample. Stir the probe gently to create a homogeneous sample.
5. Press **CAL/MEAS** to enter the pH calibration mode. The **CAL** indicator appears. The primary display will show the measured reading while the smaller secondary display will indicate the pH standard buffer solution. —See Figure 12.
   The meter automatically recognizes the buffers in the set you have selected in the **SETUP** mode (see page 23 for instructions on how to select buffer sets): USA (4.01, 7.00 or 10.01) or NIST (4.01, 6.86, or 9.18) buffers.
7. Wait for the measured pH value to stabilize (when the **READY** indicator displays in the left hand corner) —See Figure 13.

8. Press the **ENTER** button. The primary display flashes the calibration value. The calibration point is now stored in the meter. —See Figure 14.

- If you are performing a one-point calibration, press **CAL/MEAS** to return to the measurement mode and start taking pH readings.
- If you are performing a multi-point calibration go to step 9.

9. Rinse the probe with de-ionized water or a rinse solution, and place it in the next pH buffer. The meter automatically switches to the next buffer solution selected in the secondary display.

10. Wait for the measured pH value to stabilize (when the **READY** indicator displays in the left hand corner)

11. Press the **ENTER** button. The primary display flashes the calibration value. The calibration point is now stored in the meter.

- If you are performing a two-point calibration, press **CAL/MEAS** to return to the measurement mode and start taking pH readings.
- If you are performing a three-point calibration go to step 12.

12. Rinse the probe with de-ionized water or a rinse solution, and place it in the next pH buffer.

13. Wait for the measured pH value to stabilize (when the **READY** indicator displays in the left hand corner).

14. Press the **ENTER** button. The primary display flashes the calibration value. The calibration point is now stored in the meter. The meter automatically returns to the pH measurement mode after a three-point calibration is performed.

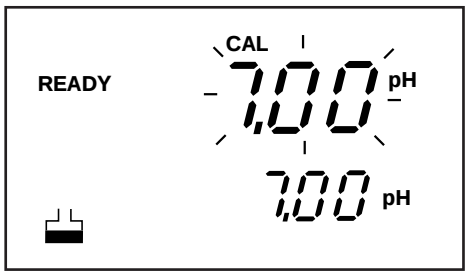


Figure 14

NOTES:

To exit from pH calibration mode without confirming calibration, **DO NOT** press **ENTER** in step 8. Press **CAL/MEAS** instead.

If the selected buffer value is not within the accepted window (see below) from the measured pH value: the electrode and buffer icon blink and **ERR** annunciator appears next to the secondary display. Press **CAL/MEAS** to exit the **ERR** condition.
—See Figure 15.

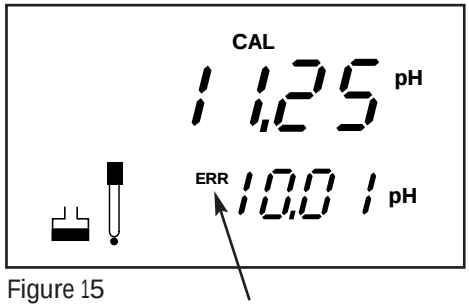


Figure 15

Window of Accepted Values:

USA	4.01	±1.00
	7.00	±1.50
	10.01	±1.00
NIST	4.01	±1.00
	6.86	±1.25
	9.18	±1.00

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

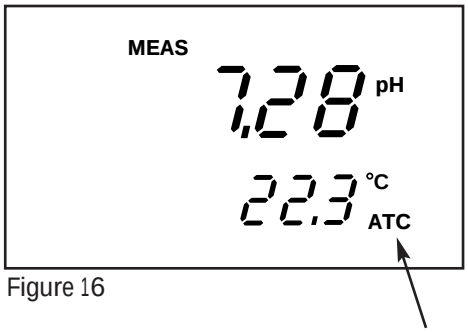


Figure 16

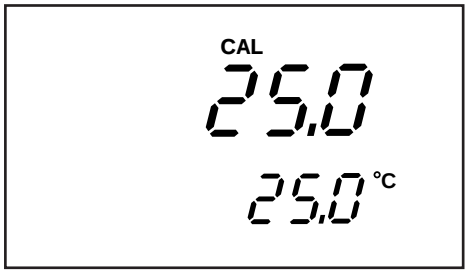


Figure 17

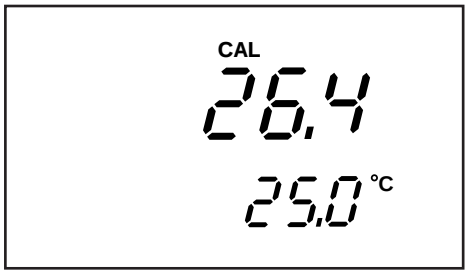


Figure 18

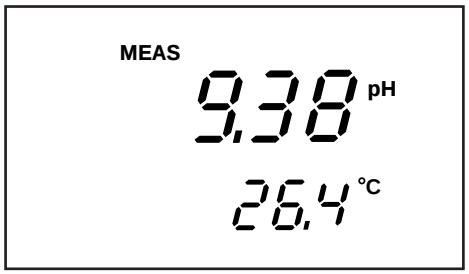


Figure 19

pH Measurement

This meter is capable of taking measurements with automatic or manual temperature compensation. Automatic temperature compensation only occurs when a temperature sensor is plugged into the meter. If there is no temperature sensor plugged into the meter, the default setting is automatically 25°C (if the meter has never been manually set for temperature) or the last manually set value will display. You can manually set the temperature to match your working conditions using a separate thermometer.

Automatic Temperature Compensation

For automatic temperature compensation (ATC) simply plug the temperature probe into the meter (see page 8 for directions). The **ATC** indicator will light on the LCD. —See Figure 16..

NOTE: If you are using a temperature probe, the probe must be submersed in the liquid you are measuring.

Manual Temperature Compensation

IMPORTANT: For manual compensation, you must disconnect the temperature probe.

1. Switch the meter on. Press the **MODE** key to select pH mode.
2. Press the **CAL/MEAS** key to enter pH calibration mode. The **CAL** indicator will appear above the primary display.
3. While the pH calibration mode, press the **MODE** key to enter temperature calibration mode. The primary display shows the current temperature setting and the secondary display shows the default value 25°C (if the meter has never been manually set for temperature) or the last manually set value if the meter has previously set for manual temperature compensation. If you have not set the current temperature setting the primary display will also show the default value of 25°C. —See Figure 17.
4. Check the temperature of your sample using an accurate thermometer.
5. Press the ▼ or ▲ keys to offset the temperature to the measured value from step 4. —See Figure 18.
6. Press **ENTER** to confirm the selected temperature and to return to the pH measurement mode.

The meter will now compensate pH reading for the manually set temperature. —See Figure 19.

NOTE: To exit this program without confirming the manual temperature compensation value, **DO NOT** press **ENTER** in step 6. Press **CAL/MEAS** instead.

Taking pH Measurements

Be sure to remove the electrode soaker bottle or protective rubber cap on the electrode before measurement.

To take readings:

1. Rinse the probe with deionized or distilled water before use to remove any impurities adhering to the probe body. If the pH electrode had dehydrated, soak it for 30 minutes in OAKTON electrode storage solution or a 2M-4M KCl solution.
2. Press **ON** to switch on meter. The **MEAS** annunciator appears on the top center of the LCD. The **ATC** indicator appears in the lower right hand corner to indicate Automatic Temperature Compensation if temperature probe is plugged. (For Manual Temperature Compensation see page 12)
   —See Figure 20.
3. Dip the probe into the sample. When dipping the probe into the sample, the sensor or the glass bulb of the electrode must be completely immersed into the sample. Stir the probe gently in the sample to create a homogenous sample.
4. Allow time for the reading to stabilize. When the readings stabilize, a **READY** indicator displays. The **READY** mode shows the readings are stable within a range of ±0.01 pH. When this occurs, **READY** appears on the top left corner of your display.
   —See Figure 21.
5. To toggle between pH and mV in the pH 510, or to toggle between pH, mV and ion in the Ion 510, press the **MODE** key.

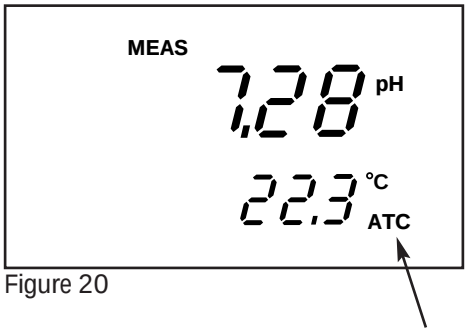


Figure 20

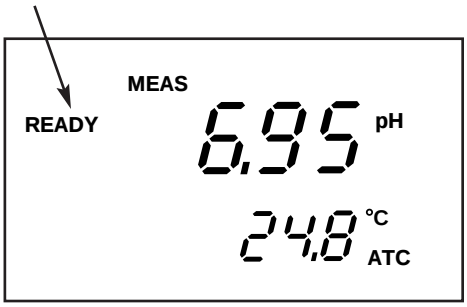


Figure 21

HOLD Function

This feature lets you freeze the value of pH and temperature, mV and temperature or Ion and mV (Ion 510 only). **HOLD** can be used anytime when in **MEAS** mode.

1. To hold a measurement, Press the **HOLD** key while in measurement mode. "**HOLD**" will appear on the display. —See Figure 22.
2. To release the held value, press **HOLD** again. Continue to take measurements.

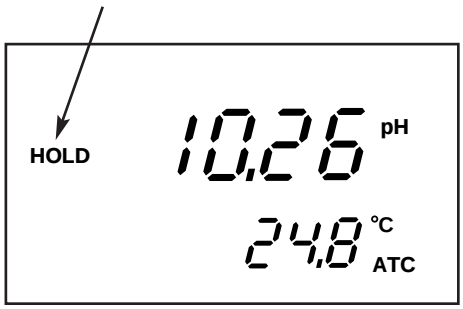


Figure 22

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

4. mV calibration and measurement

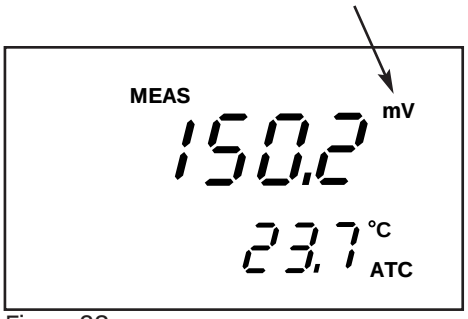


Figure 23

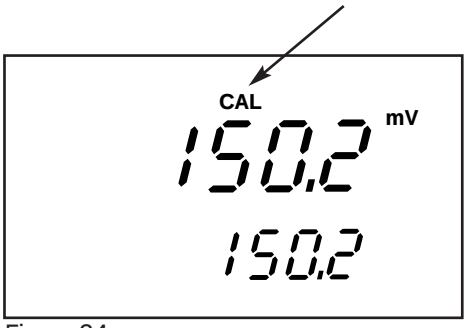


Figure 24

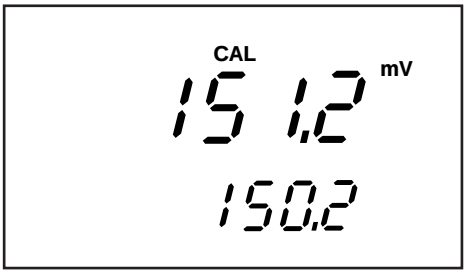


Figure 25

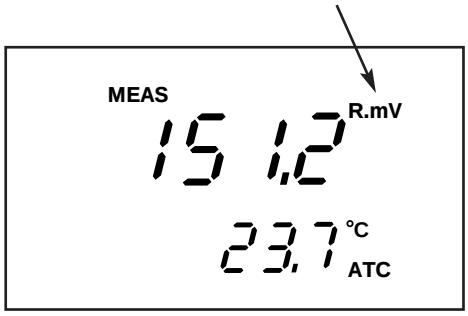


Figure 26

mV calibration

The customized LCD display will indicate the following:

Display	Remarks
MEAS	Measurement mode is selected.
R.mV	Unit of measurement
°C	Unit of temperature measurement
ATC	Automatic Temperature Compensation (if temperature probe or "All-in-One" probe is connected)

mV Calibration

1. Make sure the meter is **ON** and if necessary, press the **MODE** key to select mV mode. The mV indicator appears in the upper right hand corner of the display. —See Figure 23.
2. Press the **CAL/MEAS** key The **CAL** indicator appears above the primary display. The primary display shows the relative mV reading and the secondary display shows the absolute mV value. —See Figure 24.

NOTE: If you have never calibrated relative mV or if the meter has been reset, the value shown in the primary display is the same as the absolute mV value.

3. Press the ▲ or ▼ keys to enter the relative mV value that matches your desired reading. —See Figure 25.
4. Press the **ENTER** key to confirm the reading and to return to the measurement mode. The primary display now shows the relative mV reading. The **R.mV** indicator appears in the upper hand corner. The meter automatically returns to the mV measurement mode the **ENTER** key is pressed. —See Figure 26.

NOTE: New mV calibrations will over-ride existing the stored mV calibration data. The meter retains stored mV calibrations even when the meter is turned **OFF**.

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

mV Measurement

1. Make sure you are in the mV measurement mode. Press the **MODE** key to choose the mV mode.

2. Dip the electrode into the sample. The sensor or glass bulb of the electrode must be completely immersed into the sample. Stir the electrode gently to create a homogeneous sample.

4. Allow time for the reading to stabilize. The primary display will show the mV reading, and the secondary display will show the current temperature reading. When the readings stabilize, a **READY** indicator displays. The **READY** mode shows the readings are stable within ±0.1 mV. When this occurs, **READY** appears on the top left corner of your display.
—See Figure 27.

5. To toggle between pH and mV in the pH 510, or to toggle between pH, mV and ion in the Ion 510, press the **MODE** key. —See Figure 28.

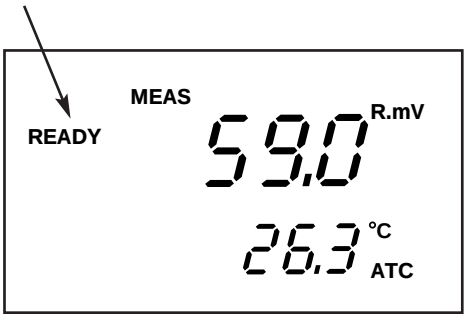


Figure 27

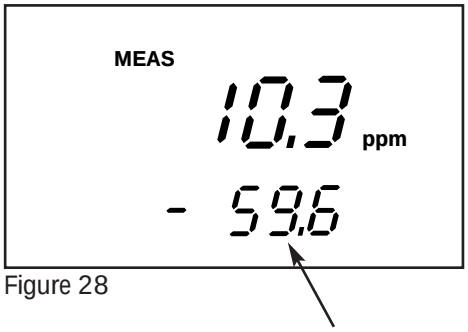


Figure 28

HOLD Function

This feature lets you freeze the value of pH and temperature, mV and temperature or Ion and mV (Ion 510 only). **HOLD** can be used anytime when in **MEAS** mode.

1. To hold a measurement, Press the **HOLD** key while in measurement mode. "**HOLD**" will appear on the display. —See Figures 29 and 30.

2. To release the held value, press **HOLD** again. Continue to take measurements.

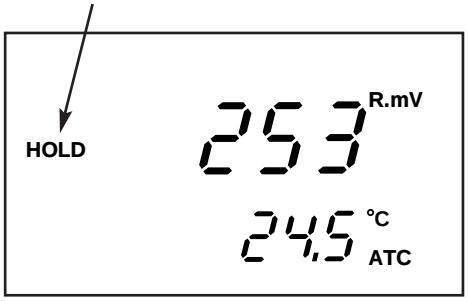


Figure 29

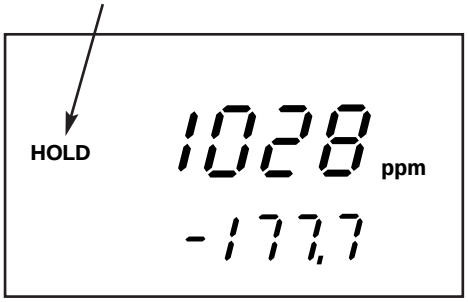


Figure 30

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

5. Ion calibration and measurement (Ion 510 only)

Ion calibration

This instrument is capable of up to three-point ion calibration with a minimum of two-point calibration. Calibration values are 0.10, 1.0, 10.0 or 100.0. All calibration should be one decade apart. For example you may perform three-point calibration to 0.10, 1.0 and 10.0, or two-point calibration to 10.0 and 100.0. Do **NOT** perform two-point calibration to 1.0 and 100.0 the meter will display "**Er4**". For best accuracy calibrate your meter to points with similar concentrations to the solutions you want to test.

ION Calibration

The customized LCD display will indicate the following:

Display	Remarks
MEAS	Measurement mode is selected.
ppm	Unit of measurement

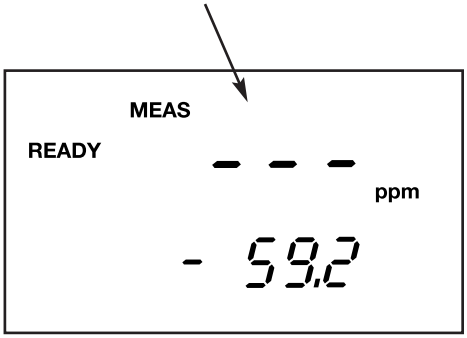


Figure 31

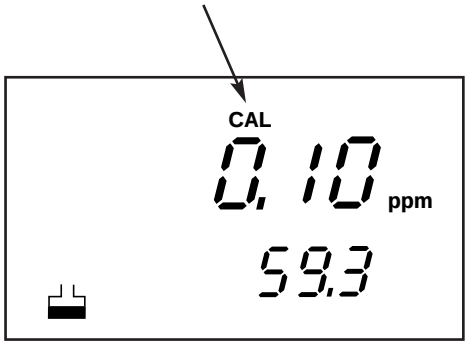


Figure 32

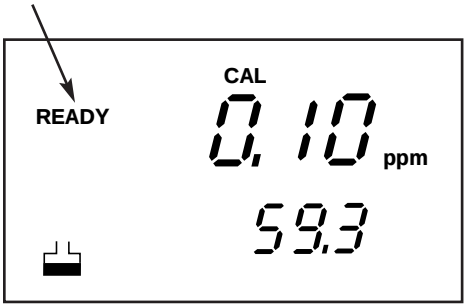


Figure 33

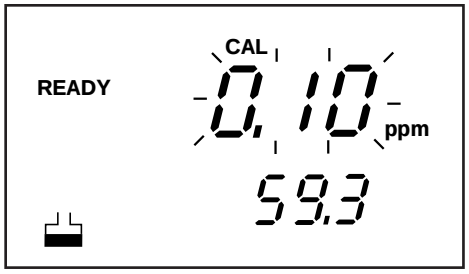


Figure 34

1. Connect an Ion Selective Electrode (ISE) to the BNC input connector on the back of the meter (See page 8) and turn the meter **ON.**
2. Press **MODE** to select ion measurement mode. If the meter has not been previously calibrated in the Ion mode, the display will read "**- - -**" in the primary display —See Figure 31.
3. Dip the electrode into the first calibration standard. Make sure to start with the calibration standard that has the lowest concentration and move up to the standards that have higher concentrations.
4. Press **CAL** to enter the ion calibration mode. The **CAL** indicator appears above the primary display and primary display reads "**0.10**" —See Figure 32.
5. The first calibration point of **0.10 ppm** appears on the display. If you do **NOT** wish to calibrate to this point, press ▲ (up arrow) to skip and continue to the next calibration point of 1.0 ppm or 10.0 ppm.
6. If you **DO** wish to calibrate to 0.10 ppm, make sure the electrode is in the 0.10 calibration standard. The meter will display the mV output of your electrode in the standard solution in the lower display. Allow the mV reading to stabilize. When the reading stabilizes the **READY** indicator will appear on the display. —See Figure 33.

Stabilization may take a few minutes depending on electrode and standard concentration. Electrode response in low concentrations is much slower than response in high concentrations.

7. Press **ENTER** to confirm your calibration. The primary display will flash for a few seconds —See Figure 34. The meter will move on to the next calibration standard of **1.0 ppm**.

8. Rinse off the electrode with deionized water before placing it in the next calibration standard.

9. Allow meter to stabilize in the next calibration standard. Wait for the **READY** indicator to appear before you press the **ENTER** key to confirm the second calibration point. The primary display flashes for a few seconds then moves to the next calibration point of **10.0 ppm**.

If you are performing a 2-point ion calibration, press **CAL/MEAS**. "**SLO**" appears in the primary display with the mV indicator, the number in the secondary display is the actual electrode slope in mV. —See Figure 35. After a few seconds the meter reverts to the measurement mode. You are now ready to take ion measurements. If the slope is outside acceptable limits or if incorrect standards have been used the primary display will show **Er3**. —See Figure 36.

If you are performing a 3-point ion calibration, rinse off the electrode with deionized water and place it in the next calibration standard.

10. Allow meter to stabilize in the next calibration standard. Wait for the **READY** indicator to appear before you press the **ENTER** key to confirm the third calibration point. The primary display flashes for a few seconds then "**SLO**" appears in the primary display with the mV indicator, the number in the secondary display is the average electrode slope in mV. —See Figure 35. After a few seconds the meter reverts to the measurement mode. You are now ready to take ion measurement.

NOTES: You may compare the average electrode slope value with the expected slope value for your electrode from your electrode manual to verify electrode operation.

If you want to leave the calibration mode prior to confirming two calibration points, press the **CAL/MEAS** key to exit the calibration mode. The meter will revert to back to the earlier calibration curve. If you have calibrated to two points pressing **CAL/MEAS** will confirm the new calibration

You must calibrate to at least two points in order for calibration to take effect. If you only confirm the one calibration point, the meter will display "**Er2**" when you exit the calibration mode, and the meter will revert back to the earlier calibration curve.—See Figure 37.

New ion calibrations will over-ride existing the stored ion calibration data. The meter retains stored ion calibrations even when the meter is turned **OFF**.

Ion calibrations will be erased if the power cord is unplugged or power is cut off to the AC adapter even if the meter is turned off.

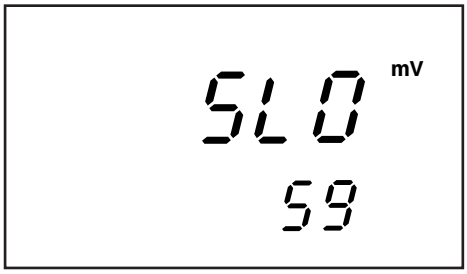


Figure 35

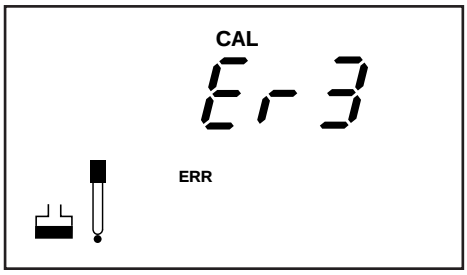


Figure 36

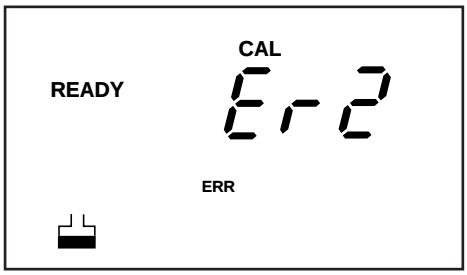


Figure 37

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

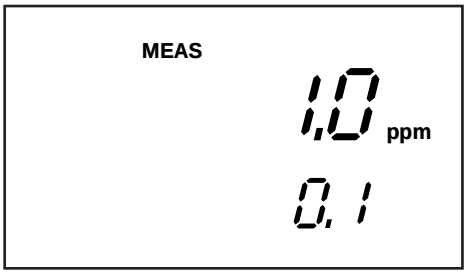


Figure 38

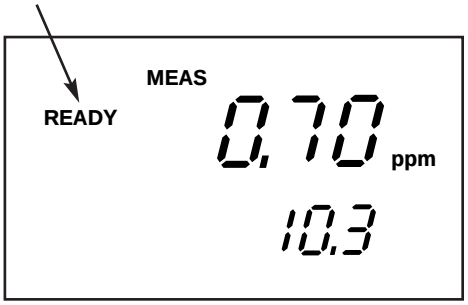


Figure 39

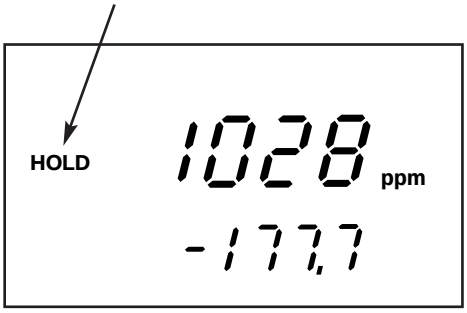


Figure 40

Ion measurement

1. Turn meter **ON**. Press **MODE** to select ion measurement mode. —See Figure 38.
2. Prepare samples as necessary (i.e. add Ionic Strength Adjuster). Sample preparation varies depending on ion type—see your electrode manual for details on the specific electrode that you are using.
3. Dip electrode into the sample. The sensor or glass bulb of the electrode must be completely immersed into the sample.
4. Allow time for the reading to stabilize. When the readings stabilize, a **READY** indicator displays. The **READY** indicator shows when the readings are stable. When this occurs, **READY** appears on the top left corner of your display. The reading holds until the measured value fluctuation exceeds the set limits. —See Figure 39.

NOTE: The lower display in the ion measurement mode shows mV that correlates to the electrode output. Change in mV will typically be 59.7 mV for monovalent ions (1^+ or 1^- charge) and 29.8 mV for divalent ions (2^+ or 2^- charge).

HOLD Function

This feature lets you freeze the value of pH and temperature, mV and temperature or Ion and mV (Ion 510 only). **HOLD** can be used anytime when in **MEAS** mode.

1. To hold a measurement, Press the **HOLD** key while in measurement mode. "**HOLD**" will appear on the display—See Figure 40.
2. To release the held value, press **HOLD** again. Continue to take measurements.

6. Memory functions

Memory Input

Your meter can store up to 50 sets of data in any combination of values:

pH 510 meter:

- pH and temperature
- mV (or relative mV) and temperature.

Ion 510 meter:

- pH and temperature
- mV (or relative mV) and temperature.
- ion and mV

For example, you can store 32 pH and 18 mV values for the pH 510 or 15 ion, 12 mV and 23 pH values for the Ion 510.

To store a readings:

1. During any measurement or HOLD function, press the **MI** key to input any data into the memory
2. **MEM**, "**StO**" and memory number will flash. The meter then returns to measurement mode. —See Figure 41.

NOTE: If the memory is full, the first value stored will be erased to create space for the new value.

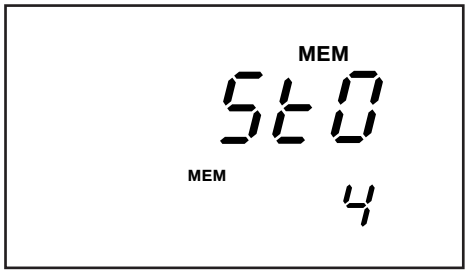


Figure 41

Memory Recall

This function recalls the previous readings stored in the memory. You can only access MR from the measurement mode. Memory recall is in "Last In First Out" order.

To recall readings:

1. Press the **MR** key once to retrieve the last reading stored. The memory location screen—**MEM**, "**LOC**" and the memory number—will flash on the display. —See Figure 42.
2. Press the **ENTER** key to recall the reading stored under that memory number. —See Figure 43.
3. Press the **ENTER** key again to return to the memory location screen. The display automatically moves to the next memory location screen. —See Figure 44.
4. If necessary, press the ▲ key to select the next memory location screen; press the ▼ key to select the previous memory location screen.
5. Repeat steps 2-4 to review additional stored data sets.
6. To exit Memory Recall, press the **MEAS** key to return to the measurement mode.

NOTES: Readings stored in memory are retained even if the unit is turned off. To erase all readings stored in memory, see program P1.0 on page 21.

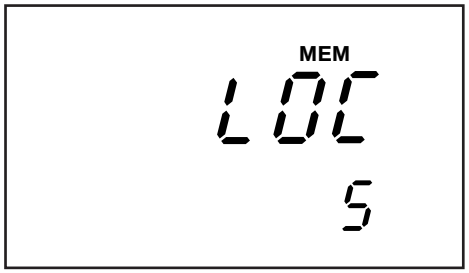


Figure 42

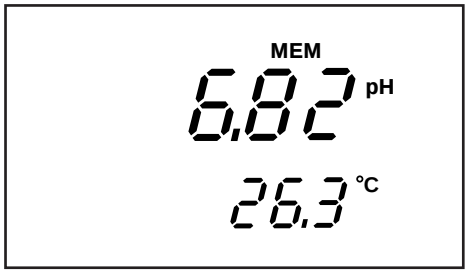


Figure 43

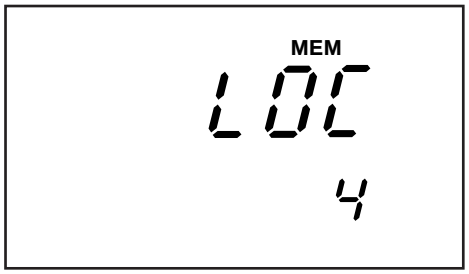


Figure 44

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

7. Temperature calibration

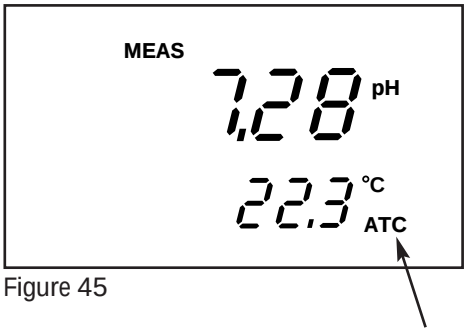


Figure 45

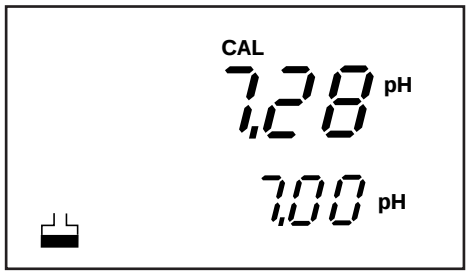


Figure 46

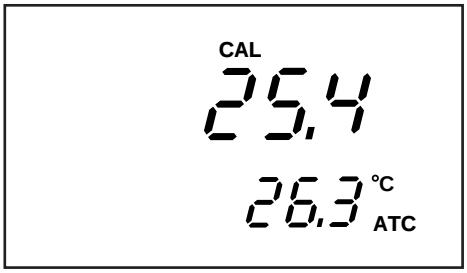


Figure 47

Temperature Calibration

In this calibration procedure, the ATC probe is attached to the meter and the **ATC** annunciator displays on the right hand side of the LCD.—See Figure 45.

1. Dip the temperature probe into a solution of known temperature, such as a temperature bath for a few minutes until the temperature probe stabilizes.
2. To perform temperature calibration, you must be in the pH measurement mode.
3. Press **MODE** to switch to the pH measurement mode if you are in the mV or ion measurement modes.
4. Press **CAL/MEAS** to enter pH calibration mode. —See Figure 46.
5. Press **MODE** again to switch to temperature calibration —See Figure 47.
6. Press ▲ and ▼ to scroll to the correct temperature value corresponding to the known solution temperature. The meter allows a limit of ±5°C variation (with 0.1°C resolution) of the input reading, and of the original displayed reading.
7. Once you select the correct temperature, press **ENTER** to confirm. The meter automatically returns to the pH measurement mode.

NOTE: The meter will not allow input values that exceed the allowable limit of ±5°C of the original displayed reading.

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

8. Setup Mode

The advanced SETUP mode lets you customize your meter's preferences and defaults:

P1.0: Memory clear (**CLr**)
P2.0: Viewing electrode data (**ELE**)
P3.0: Selecting buffer sets (**bUF**)
P4.0: Reset to factory default settings (**rSt**)

To enter the **SETUP** mode:

1. Turn meter **OFF**.

2. With meter off, press and hold the **MODE** key. Continue to hold down the **MODE** key while pressing and releasing the **ON** key. The will show the **SETUP** indicator. —See Figure 48. Release the MODE key if the **SETUP** indicator is present. If the display indicates you are in the measurement mode (**MEAS** indicator) turn the meter off and try step 2 again until **SETUP** appears.

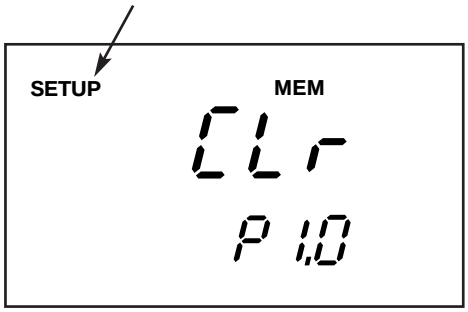


Figure 48

NOTE: To exit the **SETUP** mode at anytime without confirming changes press **CAL/MEAS** until the measurement mode reappears. If the meter is inside a program, press **CAL/MEAS** two times to revert the meter to the measurement mode.

P1.0: Memory Clear

Use this program to clear all memory values when you need to store a new series of values. This lets you avoid confusing the old values with the new ones. **NO** is the default setting.

1. Enter the **SETUP** mode as described above. The meter automatically goes to program **P1.0**. **CLr** appears in the primary display and **P1.0** in the secondary display. —See Figure 48.

2. Press the **ENTER** key to enter program **P1.0**.

3. Press ▲ and ▼ keys to toggle between **NO** and **YES**. —See Figures 49 and 50.
- **NO** retains current memory values.
- **YES** clears all memory

4. Press **ENTER** to confirm selection and return to the **SETUP** mode. Press **CAL/MEAS** to return to the measurement mode.

To continue to the next **SETUP** program, press the ▲ or ▼ keys to select a new program.

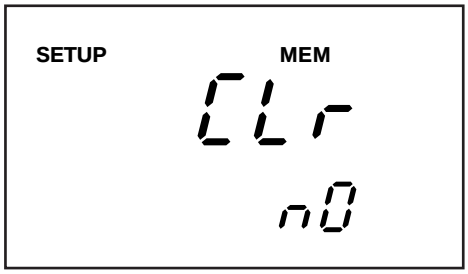


Figure 49

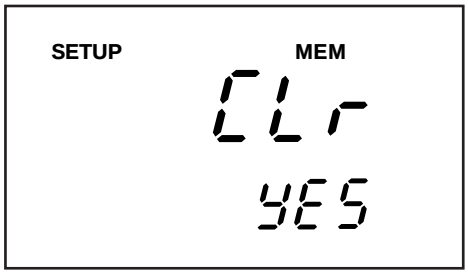


Figure 50

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

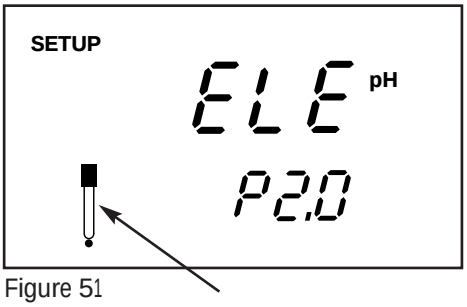


Figure 51

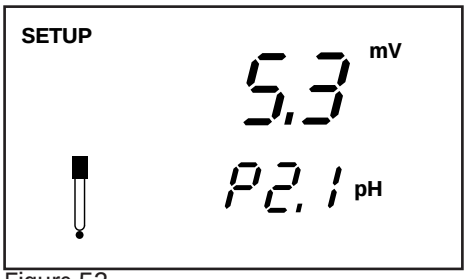


Figure 52

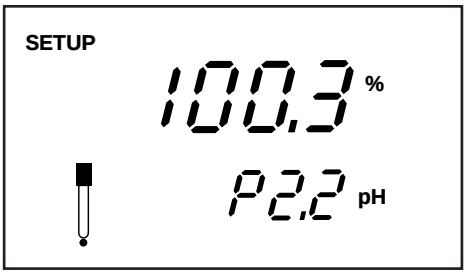


Figure 53

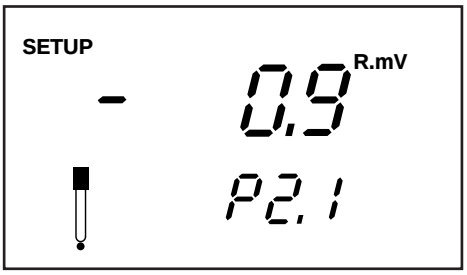


Figure 54

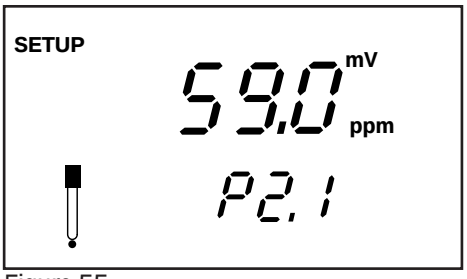


Figure 55

P2.0: Viewing electrode data

This program lets you check the electrode parameters for diagnostic purposes.

1. Enter the **SETUP** mode as described on page 21. The meter automatically goes to program **P1.0**.
2. Press ▲ and ▼ keys to scroll through the programs until you view **ELE** in the primary display and **P2.0** in the secondary display. The electrode annuciator also appears.
   —See Figure 51.
3. Press the **ENTER** key to enter program **P2.0**. The secondary display will read **P2.1**

The information you will see in program **P2.0** will depend upon which **MODE** the meter was in prior to shutting the meter off:

From the pH measurement MODE:

P2.1 shows the mV offset of the electrode.
Press **ENTER** to go to **P2.2**
P2.2 shows the slope in % of the electrode.
—See Figures 52 and 53.

From the mV measurement MODE:

P2.1 shows the mV offset of the electrode
—See Figure 54.

From the ion measurement MODE (Ion 510 only):

P2.1 show the slope in mV of the electrode
—See Figure 55.

4. To exit **P2.0** program press **ENTER** until **ELE** is in the primary display and **P2.0** is in the secondary display —See Figure 51. press the ▲ or ▼ keys to select a new program OR press **CAL/MEAS** to return to the measurement mode.

P3.0: Selecting buffer sets

This program lets select between two standard calibration buffer sets, depending upon your requirements.
The available sets are USA and NIST.

1. Enter the **SETUP** mode as described on page 21. The meter automatically goes to program **P1.0**.
2. Press ▲ and ▼ keys to scroll through the programs until you view **bUF** in the primary display and **P3.0** in the secondary display. The buffer annuciator also appears. —See Figure 56.
3. Press the **ENTER** key to enter program **P3.0**. The secondary display will read read either **USA** or **nSt**.
4. Press the ▲ and ▼ keys to select the buffer set you require:
   - *USA buffers:* 4.01, 7.00 and 10.01
     USA in the secondary display—See Figure 57.
   - *NIST buffers:* 4.01, 6.86 and 9.18
     nSt in the secondary display—See Figure 58.
5. To confirm the buffer set, press **ENTER**. All the characters on the display will flash for about a second then returns to **P3.0**.
6. To exit **P3.0** program press the ▲ or ▼ keys to select a new program OR press **CAL/MEAS** to return to the measurement mode.

P4.0: Resetting to factory default settings

This program resets and clears all calibration data and memory data EXCEPT the offset value in temperature calibration and manually set temperature for manual temperature compensation. **NO** is the default setting.

1. Enter the **SETUP** mode as described on page 21. The meter automatically goes to program **P1.0**.
2. Press ▲ and ▼ keys to scroll through the programs until you view **rSt** in the primary display and **P4.0** in the secondary display. The mV and pH annuciators also appear. —See Figure 59.
3. Press the **ENTER** key to enter program **P4.0**. The secondary display will read **NO**. —See Figure 60.
4. Press the ▲ and ▼ keys to select **NO** or **YES**. Selecting **YES** erases all calibration values for all modes (pH, mV and ion) and all memory values. —See Figures 60 and 61.
5. To confirm the reset, make sure **YES** is selected and press **ENTER**. All the characters on the display will flash for about a second then the meter returns to the measurement mode.

NOTE: Once **YES** is selected and the **ENTER** key is pressed, the reset program clears all old calibration data and memory data. The data is no longer retrievable. You must calibrate the meter before taking any new measurements. Meter will however retain buffer set selection (NIST or USA).

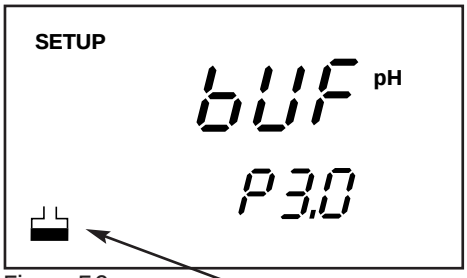


Figure 56

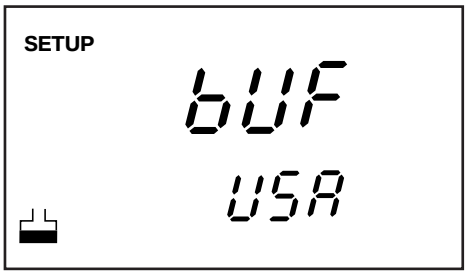


Figure 57

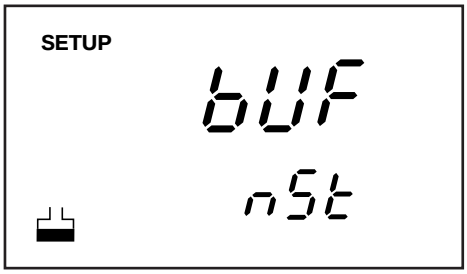


Figure 58

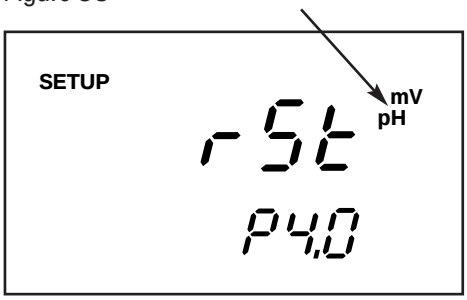


Figure 59

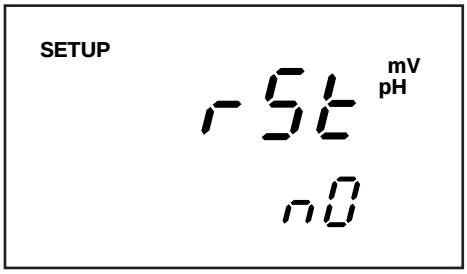


Figure 60

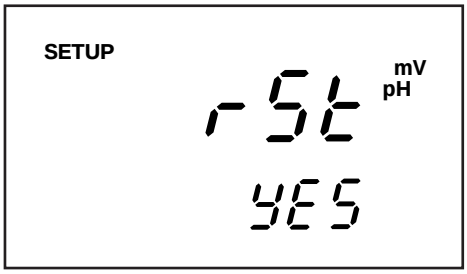


Figure 61

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

9. Electrode Care

Electrode Activation

DO NOT touch or rub the glass bulb. If you follow the storing and maintenance procedure, you can use your electrode immediately. If the electrode responds sluggishly or drifts, the bulb may be dehydrated. Immerse the electrode in an ideal storage solution such as electrode storage solution or pH 4 buffer solution for 1-2 hours to hydrate it. See **Storing pH/ORP electrodes** below.

If this procedure does not hydrate the electrode, reactivate or replace it.

Use 2 or 3 point calibration to test your electrode performance. If you do not get good readings, use a different pH electrode to confirm the meter is working properly. If the results are still not satisfactory, consult your OAKTON distributor.

Electrode Maintenance

pH electrodes are susceptible to dirt dehydration and contamination. Clean them regularly depending on the extent and condition of use.

Storing pH/ORP electrodes

For best results, always keep the pH bulb wet, preferably in pH 4 buffer with 1% saturated KCl. Other pH buffers or tap water are also acceptable storage solutions. Do not store in de-ionized water. The protective rubber cap filled with buffer solution is an adequate method for storing pH electrodes.

OAKTON® offers a complete line of low cost electrode storage and cleaning solutions and containers.

After Use

1. After each series of measurements, wash the electrode and reference junction in deionized water.
2. If using a refillable electrode, close the refilling hole by returning its rubber sleeve or stopper plug over the opening in the side of the electrode. —See Figure 62.
3. Store the electrode as mentioned above.

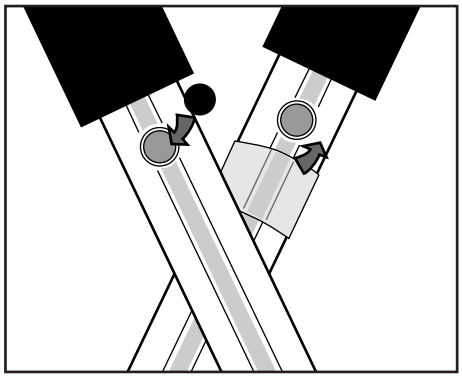


Figure 62

Electrode Cleaning

Electrodes that are mechanically intact can often be restored to normal performance by one or a combination of the following options.

Some suggestions for:

a. Salt deposits which are normal on all electrodes.
Dissolve the deposit by immersing the electrode in tap water for ten to fifteen minutes. Thoroughly rinse with de-ionized water.

b. General dirt and light oil coatings.
Soak the electrode for several hours in OAKTON general purpose electrode cleaning solutions. Rinse in deionized or distilled water.

c. Oil/Grease Films
Wash the electrode pH bulb in a little dish washing detergent and water. Rinse the electrode tip with de-ionized water.

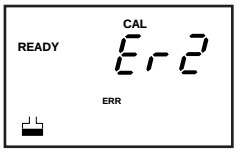
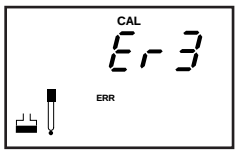
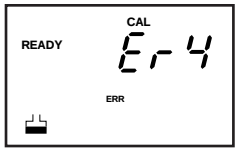
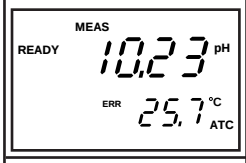
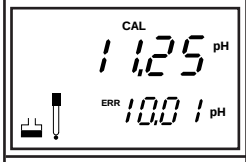
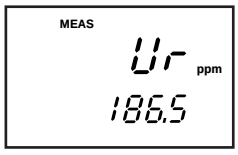
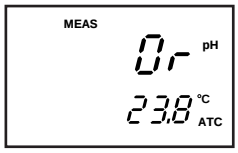
d. Clogged reference junction
Heat a dilute 1% KCl solution or pH 4.01 buffer solution to 60-80°C. Place the sensing portion of the pH electrode into the heated KCl solution for approximately 30 minutes. Allow the electrode to cool while immersed in some unheated KCl solution or pH 4.01 buffer solution. Rinse with deionized water.

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

10. Troubleshooting

Error Messages

The following table provides a guideline to enable diagnosis of possible problems indicated by the messages generated by the OAKTON WD-35619-series. The table also provides possible solutions to the problems encountered.

Error Message	Indicates	Cause	Corrective Action
Err. 2 (In primary display) During Ion calibration 	Too few calibration points	Meter calibrated with only 1-point in ion calibration	Recalibrate using 2 or more points
Err. 3 (In primary display) During Ion calibration 	Slope error	Calibration solution not within acceptable range Bad electrode	Recalibrate using fresh ion solutions Replace electrode
Err. 4 (In primary display) During Ion calibration 	Calibration points more than 1 decade apart	Calibration points more than 1 decade apart	Recalibrate using calibration points 1 decade apart
Err (In secondary display) 	Wrong keypad input.	Button does not work in the current operation mode.	Release key. Select valid buttons depending on mode.
Electrode icon (Indicator) 	Calibration error	Buffer value does not match value displayed or electrode is disconnected or failing.	Use fresh buffer or check electrode connection. Possibly replace electrodes.
Ur or Or (In primary display)  	Measured value out of range	Electrode not connected Meter not calibrated Electrode clogged, dirty or broken Measurement is under range or over range	Make sure electrode is connected Recalibrate meter Clean or replace electrode Treat samples to bring within meter measuring range

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

Troubleshooting

Problem	Cause	Solution
Nothing is displayed when the ON/OFF key is selected.	a. AC outlet power not switched on. b. AC adapter socket not inserted properly.	a. Switch on the power supply b. Re-insert Ac adapter socket.
Unstable reading	a. Insufficient reference electrolyte in electrode. b. Broken electrode. c. Electrical field interference (electrical noise caused by a nearby motor or ultrasonic device). d. Dirty electrode	a. Fill electrode with reference electrolyte. b. Replace electrode. c. Remove or switch off interfering device. d Clean the electrode. Hydrate if needed.
Slow response	a. Dirty electrode	a. Clean electrode. Hydrate if needed.
No response from keypad.	a. HOLD mode in operation Hold displayed. See LCD. b. Internal program error.	a. Cancel HOLD mode. Press Hold button. b. Reset all internal programs by removing A/C adapter from meter and re-inserting

11. Additional Information

pH and Temperature

The pH electrode is affected by temperature changes. Automatic Temperature Compensation (ATC) compensates for temperature changes. Some solutions show an increase while others a decrease in pH with the same temperature change. Record the solution temperature along with the pH value, or the measurement may be meaningless. Temperature changes also affect the signal the pH electrode sends to the meter and causes a loss of accuracy for the reading. To limit the loss of accuracy during calibration, make the temperature of the pH buffer calibrating solutions and the sample solution the same.

pH Buffer Calibration Solution

Use standard buffer solutions to calibrate a pH meter before you measure the pH of a sample. Calibration solutions serve as basis of comparison between measurements. The most common standard buffers are the pH 4.01, pH 7.00 and pH 10.01. For 1-point calibration, use a standard buffer of pH 7.00 or a standard buffer whose pH value is close to that of the sample. Use 2-point calibration when you know the sample is acidic (low pH) or basic (high pH). For acidic samples, use standard buffers of pH 7.00 and pH 4.01. For basic samples, use standards of pH 7.00 and pH 10.01. Use a 3-point calibration when the sample pH is completely unknown. Use all pH 7.00, pH 4.01 and pH 10.01 calibration solutions. Contact your OAKTON® distributor for information on pH buffer and calibration solutions.

Standard pH Buffers

The following table shows the various pH values at different temperature of the solution during calibration. The table also illustrates why a calibration value may be different from the buffer value at 25°C.

Temperature		pH buffer values		
°C	**°F**	**4.01 (phthalate)**	**7.00 (neutral phosphate)**	**10.00 (carbonate)**
0	**32**	4.01	7.12	10.33
5	**41**	4.01	7.09	10.25
10	**50**	4.00	7.06	10.18
15	**59**	4.00	7.04	10.11
20	**68**	4.00	7.02	10.05
25	**77**	4.01	7.00	10.00
30	**86**	4.01	6.99	9.95
35	**95**	4.02	6.98	9.92
40	**104**	4.03	6.98	9.88
45	**113**	4.04	6.97	9.85
50	**122**	4.06	6.97	9.82
55	**131**	4.07	6.98	9.80
60	**140**	4.09	6.98	9.77
70	**158**	4.12	6.99	9.73
80	**176**	4.16	7.00	9.69
90	**194**	4.20	7.02	9.66

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

12. Specifications

Mode		pH 510	Ion 510
pH	**Range**	0.0 to 14.0 pH	
	Resolution	0.01 pH	
	Accuracy	±0.01 pH	
	Calibration	1 to 3 points USA: 4.01, 7.00, 10.01 NIST: 4.01, 6.86, 9.18	
mV	**Range**	-1999 to 1999 mV	
	Resolution	0.1 mV between ±199.9 mV 1 mV beyond ±199.9 mV	
	Accuracy	±0.2 mV between ±199.9 mV ±2 mV beyond ±199.9 mV	
	Calibration	Offset up to ±150 mV	
Ion	**Range**		0.01 to 1999 ppm
	Resolution		0.01 ppm for 0.01 to 0.99 ppm 0.1 ppm for 1.0 to 199.9 ppm 1 ppm for 200 to 1999 ppm
	Accuracy		±0.5% of full scale for monovalent ions 1% of full scale for divalent ions
	Calibration		2 to 3 points 0.1, 1, 10, 100 ppm
	Minimum slope		15 mV
	Maximum slope		90 mV
Temp	**Range**	0 to 100°C	
	Resolution	0.1°C	
	Accuracy	±0.3°C	
	Calibration	Offset in 0.1°C increments; Offset range: ±5°C	

Temperature compensation: automatic (ATC) or manual from 0 to 100°C
Operating temperature: 0 to 50°C
Power: 9V DC adapter for 110 or 220 VAC
Display: Dual LCD
Connectors: pH/mV/Ion uses BNC connector, temperature uses mini-phono plug, recorder uses mini-pin (sub-mini phono plug)
Memory: Stores up to 50 readings
Recorder Output: ±1999 mV directly proportional to input
Power Requirements: 110 or 220 VAC depending upon model.
Input Impedance: 10^{12} Ω
Instrument Drift: < 50 uV/°C
Input Bias Current: 50 pA max. at 25°C
Hold function: YES
ATC Function: 0.0 to 100.0°C
READY Indicator: YES
Meter Dimensions: 7.2” L x 9.2” W x 2.52” H (180 x 230 x 63 mm)
Shipping weight: 1.4 lbs (0.64 kg)

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

13. Accessories

To order some accessories, contact your OAKTON® distributor and describe the items listed below.

WD-35613-05 ATC probe

WD-35615-07 110 VAC adapter

WD-35615-08 220 VAC adapter

WD-35801-00 OAKTON general purpose pH electrode

WD-35805-04 OAKTON general purpose double junction refillable liquid filled pH electrode. Glass body.

WD-35805-15 OAKTON general purpose double junction ORP electrode. Epoxy body.

WD-35811-71 OAKTON All-in-One single junction sealed gel filled general purpose pH electrode with temperature sensor. Epoxy body.

WD-00654-00 pH 4.01 buffer calibration solution, 1 pint

WD-00654-04 pH 7.01 buffer calibration solution, 1 pint

WD-00564-08 pH 10.00 buffer calibration solution, 1 pint

WD-35653-00 De-ionized rinse water pouches 20/box

WD-35653-01 pH 4.01 buffer calibration solution pouches 20/box

WD-35653-02 pH 7.01 buffer calibration solution pouches 20/box

WD-35653-03 pH 10.00 buffer calibration solution pouches 20/box

WD-35653-04 Buffer pouches assortment pack, 5 each pH 4, 7, 10 and rinse water

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

14. Warranty

OAKTON warrants this meter to be free from significant deviations in material and workmanship for a period of three years from date of purchase. OAKTON warrants this probe to be free from significant deviations in material and workmanship for a period of six months from date of purchase. If repair or adjustment is necessary and has not been the result of abuse or misuse within the warrantied time period, please return—freight prepaid—and correction will be made without charge. OAKTON alone will determine if the product problem is due to deviations or customer misuse.

15. Return of items

Authorization must be obtained from our Customer Service Department before returning items for any reason. When applying for authorization, please include data regarding the reason the items are to be returned. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. We will not be responsible for damage resulting from careless or insufficient packing. a restocking charge will be made on all unauthorized returns.

NOTE: We reserve the right to make improvements in design, construction, and appearance of products without notice

introduction
starting up
pH calibration and measurement
mV calibration and measurement
Ion calibration and measurement
memory function
temperature calibration
setup mode
electrode care
troubleshooting
additional information
specifications
accessories
warranty
return of items

ATTACHMENT C-5

Chemical and Hazardous Waste Pickup Request Form

Attachment C-5

Chemical and Hazardous Waste Pickup Request Example

1. Please fill out form completely - incomplete forms will result in pickup delays.
2. Room must be the location of where the waste was generated and currently is stored. Do not set waste out in hallway.
3. Container Labels from DEHS must be affixed to containers - use the number from the Container Label for the "Container Label# " field below. Contact DEHS at 852-6670 for Hazardous Waste Container Labels if you do not have any. Each item must have a container label. Exception: Used lamps (UV, Mercury, et al) and batteries do not require a DEHS container label for pick up. Users should enter the numerals 123 in this field. However, all other fields must be completed.
4. Chemical Name must be the actual chemical name. Formulas, tradenames, and abbreviations cannot be used. If it is a mixture, must include percent of each chemical in mixture. Total must be equal to at least 100%, but not more than 101%. If trace amount, enter the value less than 1%. Important to include any other chemical contaminant that could have entered the process. For example:
   Hydrochloric acid with nitric acid used to clean metal substrates that contain chromium, platinum, and silver. The chemical waste name would be entered as "Hydrochloric acid 70, nitric acid 30 chromium, platinum, silver 0.9".
   Additional Requirement: If the waste contains ANY amount of mercury or trace amount (≥ 0.0001%) of any of the following chemicals you must include the listed constituent in the waste name:

   Arsenic Cresol (o,m,p) Methyl ethyl ketone Barium 2,4-D Nitrobenzene Cadmium 1,4-Dichlorobenzene Pentachlorophenol Chromium 1,2-Dichoroethane Pyridine Lead 1,1-Dichloroethylene Tetrachloroethylene Mercury 2,4-Dinitrotoluene Toxaphene Selenium Endrin Trichloroethylene Silver Heptachlor (& epoxide) 2,4,5-Trichlorophenol Benzene Hexachlorobenzene 2,4,6-Trichorophenol Carbon Tetrachloride Hexachlorobutadiene 2,4,5-TP (Silvex) Chlordane Hexachloroethane Vinyl chloride Chlorobenzene Lindane Chloroform Methoxychlor
5. Check the appropriate box.
   a. If the chemical waste was generated from being "spent", or used in a process, check this box.
   b. If the chemical has not been used (i.e. expired, off-spec, no longer need, etc.), check this box.
6. Give size and units (e.g. 5 gallons, 4 L, 1 lb) of container (not how full container is).
7. Enter up to 10 items. If additional items are to be picked up, please complete another form. Note: If you are conducting a lab chemical clean out (more than 30 waste chemicals to submit), contact DEHS Hazardous Waste at 852-2956 to schedule an on-site waste consult (no service charge).
8. You must use your full email address in the "Email Address..." field below. If you do not receive a copy of this form in your email then it was not submitted correctly.
9. After entering all required information, select Check Values. If all values are correct, click Submit - Within a few seconds you will receive a Thank You message in email box. If not, the form will remain on screen and fields that require correction will be denoted in red, make corrections, click Submit.

Name

John Price

Date

Year 2022 / Month November / Day 13

PI / Supervisor's Name

Hildreth

Department

Biochemistry

E-Mail Address (eg.flast02@louisville.edu)

john.price@louisville.edu

Phone Number

502-852-7138

Building

Life Sciences

Room Number

110

Detailed Description of process(es) generating this waste (i.e. HPLC, electrophoresis, cleaning equipment, chemical synthesis of... [specify chemical], discarding unused reagents, etc. To attach additional process info, experiment details, etc. please click the Document Upload button.)

High Performance Liquid Chromatography

112 characters remaining

Upload Document

Choose File SOP 1234 High Performance Liquid Chromatography.docx

Number of Items on this Pickup

1

Item #1

Item 1 Container Label #

478902

Item 1 Spent or Unused?

- (●) Spent (means used in a process, i.e. lab analysis, cleaning, etc)
- ( ) Unused (expired, unwanted)

Item 1 Size / Units

2.5 gal

Item 1 Chemical Name or Mixture Content

(List all chemical constituents in waste mixture with percentage of each. Total must be 100. DO NOT enter the percent sign %. For trace enter 0.1 . Ensure to include any contaminants that could have entered process.)

Chemical Name 1

Acetonitrile

Percentage 1

50

Chemical Name 2

Ethyl Acetate

Percentage 2

20

Chemical Name 3

Xylene

Percentage 3

20

Chemical Name 4

Water

Percentage 4

10

Chemical Name 5

Percentage 5

Chemical Name 6

Percentage 6

Chemical Name 7

Percentage 7

Chemical Name 8

Percentage 8

Chemical Name 9

Percentage 9

Chemical Name 10

Percentage 10

Comments

Need replacement container

Check Values

Submit

ATTACHMENT C-6

Bionomics Literature for Stabilization

Tel: (865) 220-8501 / Inquiries: info@bionomics-inc.com

Attachment C-6

URANYL AND THORIUM COMPOUNDS

We encounter a number of small locations, usually schools and small laboratories, that have these compounds. As the possession of this material does not require a license, these locations are often unaware of their options and can fall prey to unscrupulous operators.

Most Uranium and Thorium Compounds should qualify as **"Unimportant Quantities of Source Material"** under NRC guidelines.

Acetates can easily be disposed in with the regular Radioactive Wastes or the NRC, or the agreement state may have regulations that permit alternate disposal. **Nitrates** are usually an issue, as these are considered a **DOT Oxidizer** and, unless stabilized in water and concrete, would be considered a Mixed Waste if sent for disposal.

There is only one Compound manufacturing company, **IBI Labs**, that will use these compounds recovered from others. They require that anything considered for their reuse must be relatively new and unopened in the original container. Typically, all we encounter from licensees are compounds that are several years old, opened, used, degraded or in a liquid. None of them are candidates for recycling and reuse.

SECTION D –
PROCESS INFORMATION

D PROCESS INFORMATION

The Environmental Protections Services Center (EPSC) is located at 1810 Arthur Street on adjacent property southwest of the existing administrative offices of the Department of Environmental Health and Safety (DEHS) on a site near the University of Louisville's Belknap campus in Louisville, Kentucky. A site location map is provided in Figure D-1.

The facility does not house the administrative offices of the staff of the DEHS. However, an office is provided within the facility for facility operations staff, filing of records, and to serve as a break room.

The following building criteria were adhered to in construction of the EPSC:

- Kentucky Building Code (KBC, 1991 Edition)
- Uniform Building (UBC, 1988 Edition)
- Minimum Design Loads for Building and Other Structures (ASCE-7-88)
- Building Code Requirements for Reinforced Concrete (ACI-318.89)
- Building Code Requirements for Masonry Structures (ACI-530.88)
- Kentucky Transportation Cabinet Department of Highways Standard Specifications, 1992 Edition
- National Fire Protection Association (NFPA)

Exhibit A-2 of the Part A Application contains a photographic log of representative parts of the EPSC.

The office and the laboratory are served by an independent constant volume air handler. The laboratory is 100% exhausted by a by-pass type fume hood. The laboratory is negatively pressurized with respect to other administrative spaces, and the entire administrative area is positive with respect to the general storage area.

The building general ventilation provides six air changes per hour to the active facility. The flammables and blending/bulking rooms have a minimum of eight air changes per hour. During an emergency (defined as 10% of the lower explosive limit (LEL) conditions, a separate system provides 25-30 air changes per hour.

Interior finish of exterior walls and interior walls are sturdy enough to withstand contact with waste storage equipment and the impact of 55-gallon drums being positioned. Walls are full height, running from floor slab to the underside of the structure, to aid in the prevention of fume and vapor migration.

The facility is protected by various fire safety systems. The first system, fire suppression, is provided by a wet sprinkler system and a carbon dioxide system. The wet system is based on Light Hazard Occupancy for a majority of the spaces protected, and Ordinary Hazard Occupancy for administrative areas. The sprinkler system was installed and is operated in compliance with OSHA Standard 29 CFR 1910.159. All sprinkler discharge heads have a minimum vertical clearance of 18 inches from any fixtures or material in

FIGURE D-1

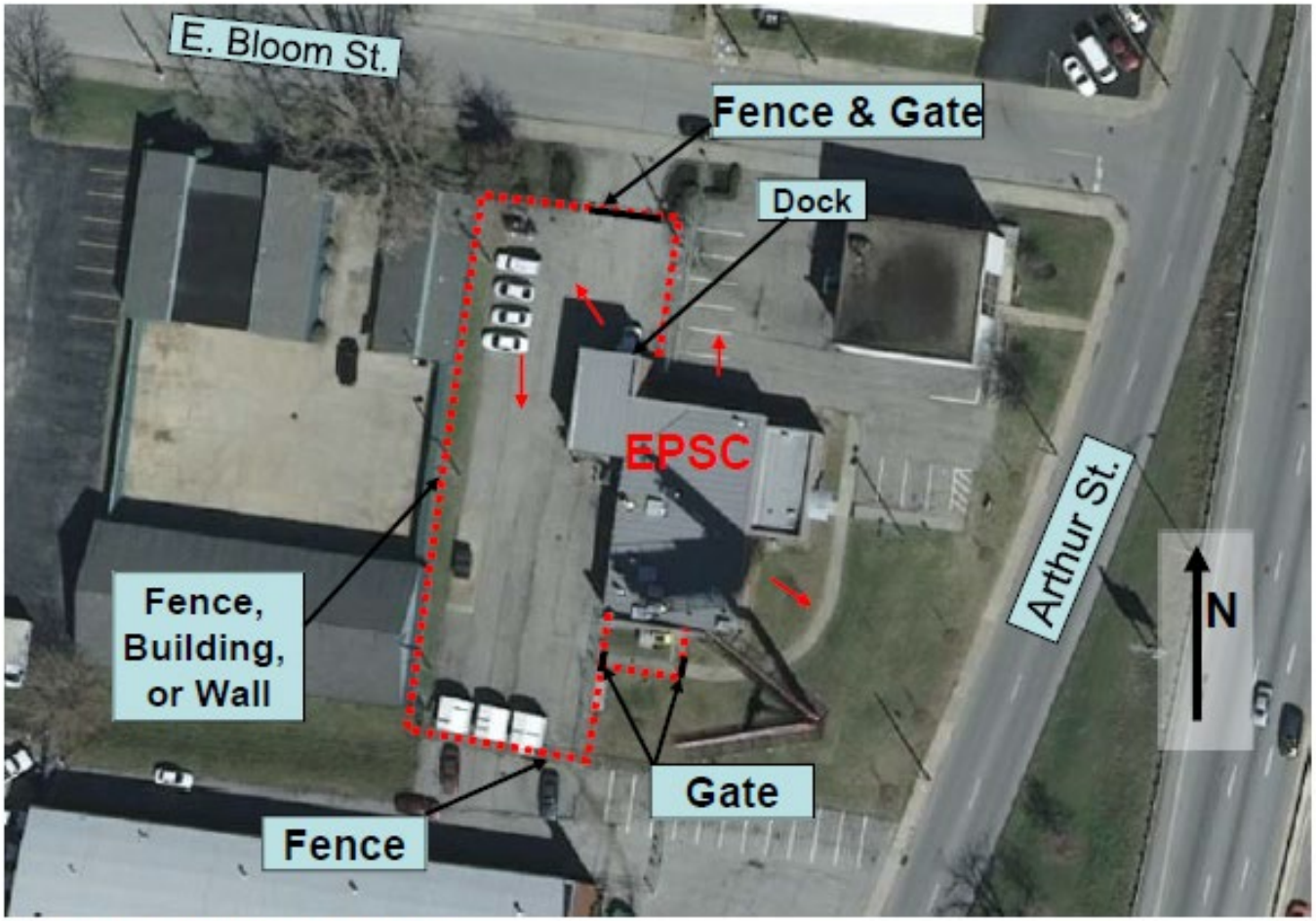


Photo Source: http://kygeonet.maps.arcgis.com
Photo Date: 2012

Storm water drainage directions

SITE PLAN

University of Louisville
Environmental Protection Services Center
Fence Locations & Drainage

storage. A carbon dioxide system is used in the reactives room due to the presence of water reactive substances. Both systems sound a local alarm when activated, as well as a remote alarm annunciation at the Department of Public Safety office.

The second fire safety system is fire detection. The facility has programmable smoke detectors located in each room and throughout the storage area. When activated these detectors sound an alarm locally and at the campus fire alarm annunciator at Public Safety. The fire alarm control panel and annunciator panel are located in the office area. The flammables and blending/bulking rooms also contain an infrared flame and thermal detector.

Portable extinguishes are installed throughout the building to use in fighting incipient fires. Fixed combustible gas sensors are installed in the blending/bulking and the flammables rooms. An audible alarm and high volume exhaust system are activated when flammable gases or vapors reach ten percent of the lower explosive limit. When the alarm is activated at the facility, a remote alarm is also activated in the Public Safety Office.

Light fixtures in the storage area are industrial fluorescent or H.I.D. low bay type. Exit lighting is provided over all required means of egress and at other locations to control traffic flow to the exit.

The flammables, reactives, and blending/bulking rooms have been designed as Hazardous (classified) Locations as defined in the National Electric Code, and all electrical work in these rooms is treated accordingly.

The covered loading dock area for delivery and removal of materials accommodates semi-tractor trailers and is designed for spill containment. Run-on from precipitation in the parking area is managed by a storm trench which is connected to the sewer system and controlled by a manual shut-off valve. Any spillage at the loading dock will be contained in a separate sump. The sump is not connected to any piping or discharge, and accumulated liquids must be removed by pumping. During any loading or unloading operations any spill which exceeds the containment capacity of the sump will be captured in the valved-off storm trench.

No loading operations will occur during events of heavy precipitation which might cause the area to flood. During all loading operations the trenches will be monitored in the event of a light rain to ensure that no precipitation accumulates in this area.

In the event that a spill occurs during loading operations, sufficient quantities of absorbent materials in conjunction with the trenches will provide adequate response and will prevent any entry into the storm sewer system. Any liquid from a spill will be pumped into an appropriate container. The liquid will be characterized in accordance with the WAP. If analysis is required, the parameters chosen would be based upon the chemical composition of materials which were stored in the specific container at the time of the spill or leak. If the circumstances surrounding the spill or leak provide enough

evidence about the material spilled (e.g. one drum of known solvent material was punctured), analysis will not be necessary.

Removal of any spilled or leaked liquid will be accomplished using a small portable pump. Typically, corrosives and inorganic materials will be transferred utilizing a plastic hand pump. Organic materials will be transferred using a metal non-sparking hand pump. Containers and pumps will be properly grounded and bonded during these operations. The pump utilized will be compatible with the material which has spilled and will be adequately flushed and decontaminated after use.

If the nature of the spill or the nature of the material does not lend itself to pumping, the spilled material will be absorbed in compatible spill media and the resultant mixture will be containerized. Materials which are powders or solids will be removed by use of brooms, pans, or shovels. All equipment will be constructed of non-sparking materials and will be compatible with the material to be cleaned. Any rinsate generated from the decontamination of equipment, as well as any personal protection equipment, will be managed as a hazardous waste until determined otherwise by sampling and analysis.

D.1 CONTAINERS

40 CFR 264.170 through 264.179
40 CFR 270.15

40 CFR 264.170 through 264.179 and 40 CFR 270.15 establish the minimum standards for the use and management of containers and the specific Part B requirements for facilities that manage hazardous waste in containers, respectively. This section describes how the container storage area is designed, constructed, and operated to meet the regulatory requirements. The term "container" in this section is used to indicate any portable enclosure in which a hazardous waste is stored, transported, or treated. The term "drum" in this section refers to a specific type of container.

D.1.a Containers with Free Liquids/ Description of System

40 CFR 270.15 and 40 CFR 264.175(a) and (b)

D-1a (1) Basic Design Parameters, Dimensions, and Materials of Construction

40 CFR 264.175(b)(1)

The secondary containment system for the container storage area is designed to facilitate effective operations and prevent the release of hazardous constituents into the environment. The basic design of the containment system provides an area of sufficient capacity, which is sloped to drain and remove liquids, the base of which is sufficiently impervious to contain any such liquid until the material is detected and removed.

The building is designed to retain both liquids of accidental spills and the water from the sprinkler system in the event of a discharge for a period of twenty minutes. The entire storage area is six inches below the office area and the exterior doors of the building. A list of volumes of liquid that the hazardous waste storage areas can retain is provided in Section D.1.a (3).

The floor of the container storage area consists of a six inch concrete slab on rock. Storage areas are provided with a minimum six inch curb around the exterior and with perimeter trenches for floor drainage. Movement of containers and drums is accomplished by hand carts and drum dollies. The maximum weight of any single container (drum) is estimated at 1,000 pounds.

The floor of the storage area is a concrete slab which has been designed to support the movement and placement of 1000 pound, 55-gallon drums. The floor surface in the entire storage area is finished concrete which is sealed with a chemical resistant coating used in chemical tank linings (two-component solvent-less NOVALAC modified epoxy-resins which are cured with select amine functional curatives (Epoxy-NOVALACS)). The coating is hard wearing, durable, chemical resistant, and seamless. The selected coating is, at a minimum, resistant to concentrated sulfuric acid; concentrated chromic acid; aqueous solutions of nitric acid, and acetic acid; sodium hydroxide, mineral spirits, gasoline and alcohols. The chemical resistance is based on full immersion for seven days at 75° F.

Concrete structures may be subject to cracking. Shrinkage cracks may develop during cure and stress cracks may develop later due to expansion, contraction, settling, or other movement. Therefore, an inspection plan is followed in accordance with the facility inspection of the containment dikes (see Section F). Should an inspection indicate that a crack has developed the following measures will be taken:

1) As necessary, waste materials will be relocated, shipped off-site, or provided with alternative means of secondary containment (i.e. over-pack drum, portable dike, etc.)

2) First the area will be totally decontaminated by an appropriate method such as steam cleaning or flushing with high pressure water.

3) Weak concrete or cracking will be removed by chipping.

4) After removing any loose concrete or aggregate, the area will again be flushed with high pressure water. All materials from this operation will be accumulated for eventual off-site disposal. After the area is clean the surface will be allowed to dry.

5) All holes and imperfections will be repaired using an appropriate epoxy/grout compound. The new concrete mix will be troweled and feather-edged as required.

6) The repair will be allowed to cure as required.

7) The surface will be swept free of dirt, etc., just before coating with appropriate coating compound in compliance with the manufacturer's requirements.

D-1a (2) Description of How Design Promotes Drainage or How Containers are

Kept from Contact with Standing Liquids in the Containment System

40 CFR 270.15(a)(2)
40 CFR 264.175(b)(2)

The containment system promotes drainage and prevents containers from coming into contact with standing liquid by having a sloped (minimum of 1%) reinforced concrete pad with berms, drainage trenches, and collection sumps. Also, the storage area is located within a building which eliminates the possibility that the containers will come in contact with precipitation. The entire containment area slopes from the aisle side (or opposite side in the case of rooms) toward the sump. The trenches are designed to contain 10% of the volume or the largest container, whichever is greater, ensuring that the containers will never be standing in free liquid. Containment calculations are provided as Attachment D-1.

Many wastes are received in the original chemical container, or are in small (less than one (1) gallon) containers. These containers are stored on chemical storage racks. The racks are ferrous metal or equivalent. Tertiary containment is provided in that the containers are positioned in minimum one (1) inch lipped trays on the chemical storage racks. Thus, these containers would not come in contact with standing liquid should they leak or should there be a leak from a drum on the floor. A sketch of the storage racks is provided in Figure D-2.

Drums are placed in orderly rows in the storage areas. The aisles between rows are at least three feet wide and a buffer zone of one (1) foot between walls and berms is maintained to facilitate visual inspections and safe operations. A typical aisle space layout, demonstrating three feet between rows and sufficient space to inspect the drums is shown in Figure D-3.1.

D.1.a (3) Capacity of the Containment System Relative to the Number and Volume of Containers to be Stored.

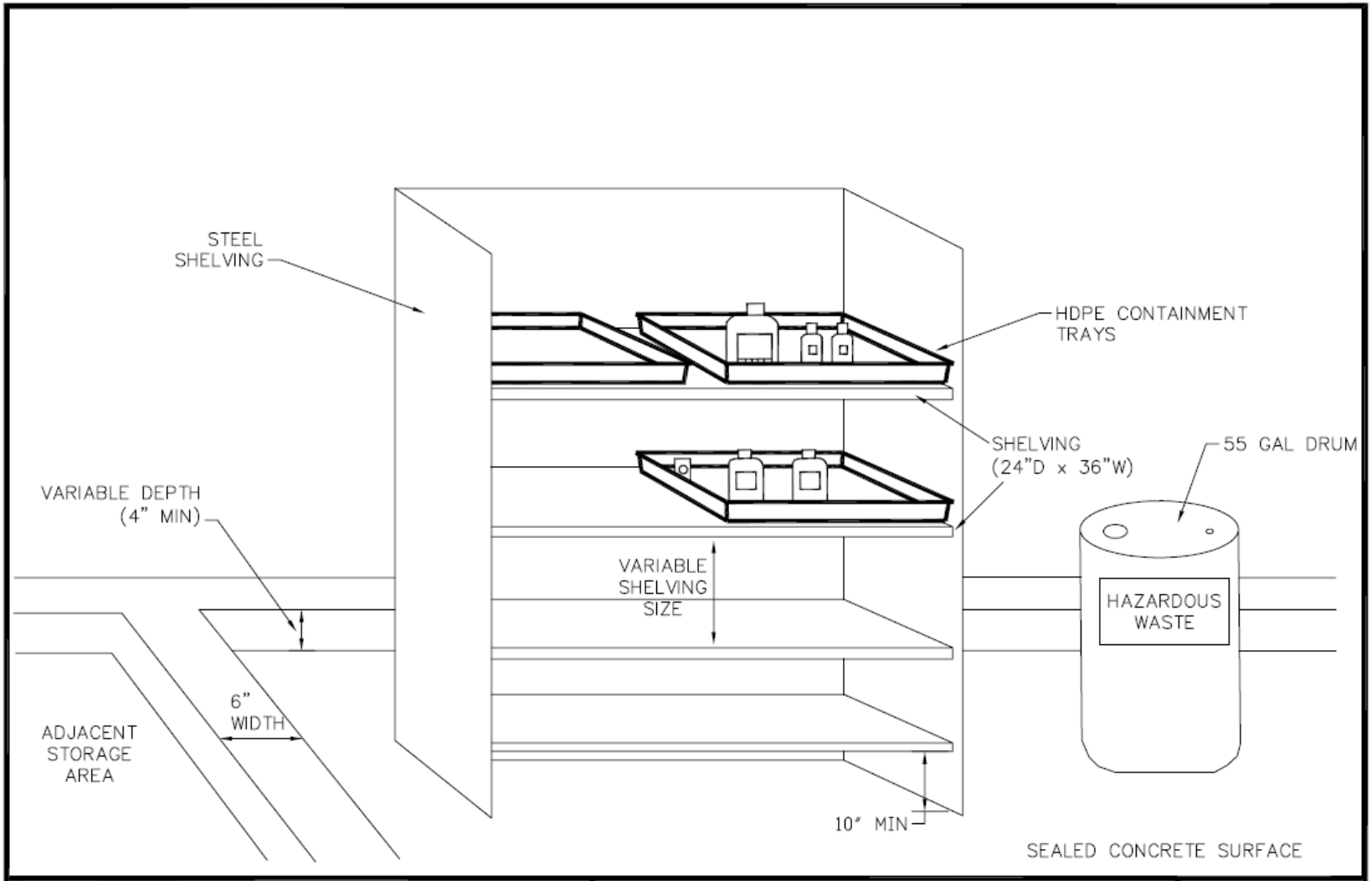
40 CFR 270.15(a)(3) and 264.175(b)(3)

The containment system for each compatibility class is required to have sufficient capacity to contain ten percent of the volume of containers or the volume of the largest container, whichever is greater. Containers with no free liquids do not need to be considered in this determination; however, the EPSC has been conservatively designed with the assumption that all containers will contain free liquids. Table D-1 presents the maximum inventory and the required and actual capacity for each area. Attachment D-1 provides the secondary containment calculations.

D.1.a (4) Provision for Preventing or Managing Run-On

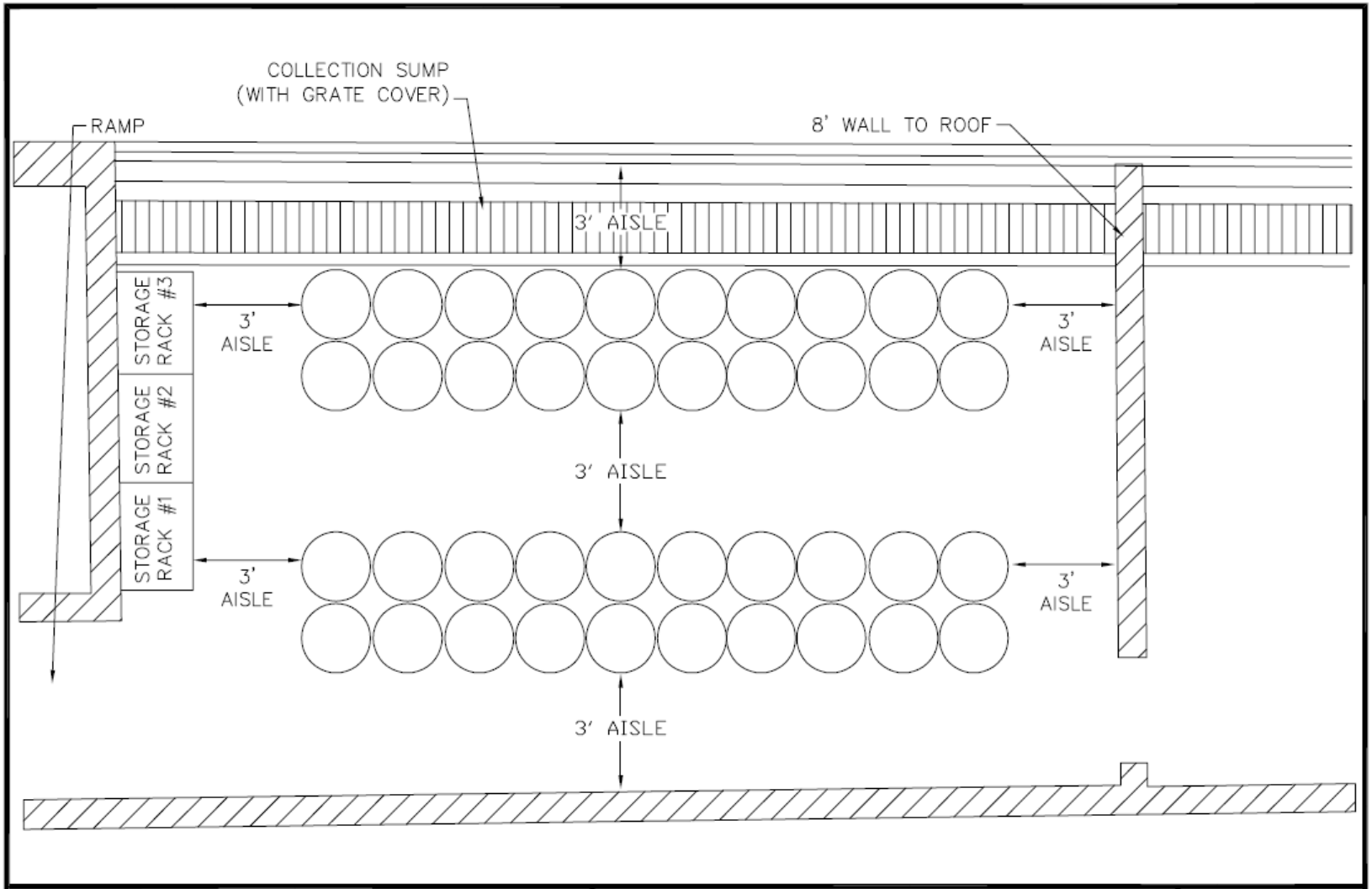
40 CFR 270.15(a)(4) and 264.175(b)(4)

The regulations require that run-on into the containment must be prevented unless the collection system has sufficient excess capacity in addition to the ten percent minimum to contain any run-on which might enter the system. As the hazardous waste management activities will be confined <u>within</u> a building, run-on will not pose a problem.



UNIVERSITY OF LOUISVILLE ENVIROMENTAL PROTECTION SERVICES CENTER	TYPICAL WASTE STORAGE	FIGURE D-2

FILE: P:\7362\UOFL-546260000-RCRAPARTBAPPLICATION\CAD-GIS\WASTESTORE



UNIVERSITY OF LOUISVILLE ENVIROMENTAL PROTECTION SERVICES CENTER	TYPICAL AISLE SPACE	FIGURE D-3.1

FILE: P:\7362\UOFL-546260000-RCRAPARTBAPPLICATION\CAD-GIS\TYPAISLE

The grading in and around the facility promotes the drainage of run-on and run-off away from the facility and into catch basins that are connected to the existing storm sewers. Pavement on the west side of the building slopes away from the building and is directed to the existing catch basin at the center of the parking area. This catch basin is connected to the existing storm sewer.

Drainage south of the building is provided by grading away from the building promoting sheet run-off to the south. Run-off from the eastern side of the building drains to the north and south, away from the building, and towards the storm water catch basins. These catch basins are also connected to the existing storm sewers. The entrance on the eastern side of the building is graded away from the building and to the north. Sheet water form the entrance flows to the catch basin and on to the storm sewer.

At the loading dock, run-off which has come into contact with accidental spillage from loading-unloading operations is contained by the slope of the concrete pavement.

TABLE D-1
STORAGE AND CONTAINMENT VOLUMES

Area	No. of Drums (x 55 gallons)	No. of Storage Racks[1] (x 120 gallons)	Total Storage Volume[2] (gallons)	Containment Capacity Required[3] (gallons)	Total Containment
Cyanides/Bases	5	3	635	64	317
Oxidizers	2	2	350	55	191
Inorganic/Acids	6	3	690	69	286
Herbicides/Pesticides	3	2	405	55	238
Metals	3	2	405	55	198
Gas Cylinders	Gas cylinders are stored in the EPSC, but containment is not applicable.				
Non-Flammable Organics	14	3	1130	113	458
Organic Acids	2	2	350	55	185
Reactives	2	1	230	55	645
Flammables	40	3	2560	256	2425
PCBs	10	2	790	198[4]	793
Blending	2	0	110	55	1512

[1] Maximum Inventory for each chemical storage rack is 120 gallons.
[2] For areas which are not being operated as storage areas, a minimum inventory of 55 gallons is assumed.
[3] 10% of the total volume stored, or the volume of the largest container, whichever is greater.
[4] 40 CFR 761 requires 25% of the total volume stored, or the volume of the largest container, whichever is greater.

D.1.a (5) Removal of Liquids from Containment System

270.15(a)(5) and 264.175(b)(5)

Each hazardous waste management area is inspected daily (each operation day) for leaking or deterioration of containers. Spilled or leaked waste will be removed from the sump or collection area in a timely manner to prevent overflow of the collection system. This section describes how liquids will be analyzed, the removal methods, and the management of accumulated liquid.

For each hazardous waste management area, should there be a leak or a spill, the liquid will be pumped into an appropriate container. The liquid will be analyzed in accordance with the WAP. The parameters chosen for analysis would be based upon the chemical composition of materials which were stored in the specific area at the time of the spill or leak. If the circumstances surrounding the spill or leak provide enough evidence about the material spilled (e.g. one drum of known solvent material was punctured), analysis will not be necessary. If the liquid is uncontaminated (e.g. water from washing the floor), it will be analyzed by the facility laboratory, outside laboratory, or disposal contractor to determine its characteristics and management method.

Equipment that contains or contacts hazardous waste with an organic concentration of at least 10 percent by weight for less than 300 hours per calendar year is excluded from the requirements of 40 CFR 264.1052 through 264.1060 of this subpart if it is identified, as required in 264.1064(g)(6) of this subpart. Since most all hazardous waste containers received and stored at the EPSC are 5 gallon capacity or less, portable pumps are not used for managing or transferring wastes from one container to another. Removal of any spilled or leaked liquid within the dry collection sump area of a hazardous material unit likely will be accomplished using a small portable pump. Typically, corrosives and inorganic materials will be transferred utilizing a plastic hand pump. Organic materials will be transferred using a metal non-sparking hand pump. Containers and pumps will be properly grounded and bonded during these operations. The pump utilized will be compatible with the material which has spilled and will be adequately flushed and decontaminated after use. Portable hand-held pumps within the EPSC are stored in room 111, "Bulk/Blend room" and operate under the 300 hours per calendar year exemption of 40 CFR 264.1050(c). In order to demonstrate compliance with the 300 hour per calendar year exemption, a log sheet is stored with the pumps. The two pumps that are used at the EPSC are detailed below:

- Grovhac electric pump Model PFP-XP with M3X motor (explosion-proof), 42" polypropylene tube, designed for light to medium viscosity liquids - this pump will be used for flammable liquids and non-flammable organic liquids
- Dayton hand drum pump, pump siphon, ¾" OD, 36" polyethylene tube, 5 gpm. – this pump can be selected for other acids, bases and non-flammable organic liquids

If the nature of the spill or the nature of the material does not lend itself to pumping, the spilled material will be absorbed in compatible spill media and the resultant mixture will

be containerized. Materials which are powders or solids will be removed by use of brooms, pans, or shovels. All equipment will be constructed of non-sparking materials and will be compatible with the material to be cleaned.

Because the storage areas are inside and not exposed to precipitation, it is virtually impossible that the containment system would overflow during the course of normal operations. If the liquid is pumped into a container, operating personnel will be present to control against overfilling. As an added precaution, the containers will always be located in a containment area during filling.

The material will be stored in the area from which it was generated until it is transported off-site to an authorized treatment, storage or disposal facility. Any rinsate generated from the decontamination of equipment, as well as any personal protection equipment, will be managed as hazardous waste until determined otherwise by sampling and analysis.

D.1.b Containers Without Free Liquids

40 CFR 270.15(b) and 40 CFR 264.175(c)

D.1.b (1) Test for Free liquids

The facility has been designed with the conservative assumption that all containerized hazardous wastes have free liquid.

D.1.b (2) Drainage

See section D.1.a (2).

D.1.b (3) Containment Requirements for Containers Storing F020, F021, F022, F023, F026 and F027

Containers that do not have free liquids and that store the above listed wastes have a containment system as defined by 40 CFR 264.175(a) and (b), described in Sections D.1.a (1)-(5).

D.1.c Container Management

This section describes additional management requirements for containers including:

(i) Type of containers
(ii) Container handling procedures
(iii) Weekly inspections
(iv) Procedures to move containers
(v) Description of aisle space
(vi) Maximum number, height, volume and types of containers
(vii) Containers kept close
(viii) Ignitable, reactive and incompatible wastes

(i) Type of containers

The facility is capable of receiving and managing containers sizes ranging from small vials to 85-gallon drums. A majority of the containers are small (5 gallons or less). Drums are generally fifty-five (55) gallons.

Containers are constructed of materials which are compatible with the contents to decrease the potential for container deterioration. The generator of the waste is responsible for placing the waste in a compatible container for transport to the facility.

Only Department of Transportation (DOT)-approved containers are transported to or accepted at the facility. All containers greater than 1.0 cubic meter (26 gallons) managed at the facility are specifically certified for use by the DOT or placed into a DOT-approved container (see D.1.g). Each of these containers is indented with required DOT specifications.

All containers leaving the facility for transportation and final disposal are DOT-approved. Many of these are in lab pack form.

If a container holding hazardous waste is not in good condition or if it begins to leak, the hazardous waste is transferred from this container to a compatible container that is in good condition or over-packed into another compatible container with appropriate absorbents as necessary.

(ii) Container handling procedures

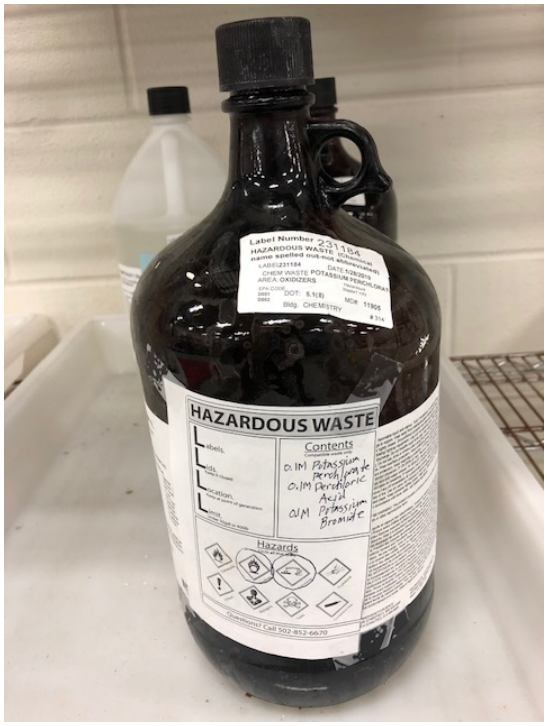
A container of hazardous waste will not be opened, handled, or stored in a manner which could rupture the container or cause it to leak. Drums are stacked one high and are placed directly on the floor under normal operating conditions. A three-foot aisle space is maintained in drum storage areas. A one foot buffer aisle between drums and walls/berms is also maintained. A container hand dolly is utilized to move drums within the facility.

Small containers are stored on chemical storage racks in the containment areas. As previously described, hazardous wastes are generally received in small containers, but may be transferred to a larger container (e.g. drum) for storage and disposal efficiency. Any transfer of materials from a smaller container is performed in secondary containment areas with compatible materials. Before transferring materials, all materials undergo appropriate screening for compatibility in accordance with the facility WAP set forth in Section C.3.

NOD 25; Morris

An example of drum labeling is provided below:

An example of the labeling system for smaller containers is as follows:



(iii) <u>Weekly Inspections</u>

Each discrete hazardous waste management area is inspected weekly. The inspector looks for leaking containers, deterioration of containers, and any deterioration of the containment system caused by corrosion or other factors. Containers are also inspected to

verify that appropriate labels and dates are present. The inspection also includes a check on aisle space, closed condition of containers, proper waste segregation, and condition of safety showers and fire alarms.

(iv) Procedures to Move Containers

All small containers are generally moved by hand onto a laboratory-type wheeled cart for movement within the facility. Drums are moved by utilizing a container hand dolly specifically designed for safely moving drums. Any container holding hazardous waste is not moved in such a way as to rupture the container or cause it to leak. All operations personnel tasked with the movement of hazardous waste containers are properly trained as described in Section H.

(v) Description of Aisle Space

Aisle space is maintained to allow the unobstructed movement of personnel, fire protection equipment, and decontamination equipment to any area of the facility in an emergency. The three-foot aisle in drum storage areas and one-foot buffer between drums and walls provides adequate space for movement of drums and routine inspections, as illustrated in Figure D-3.1.

(vi) Maximum Number, Height, Volume and Types of Containers

This information is described in Section D.1.a (3)

(vii) Containers Kept Closed

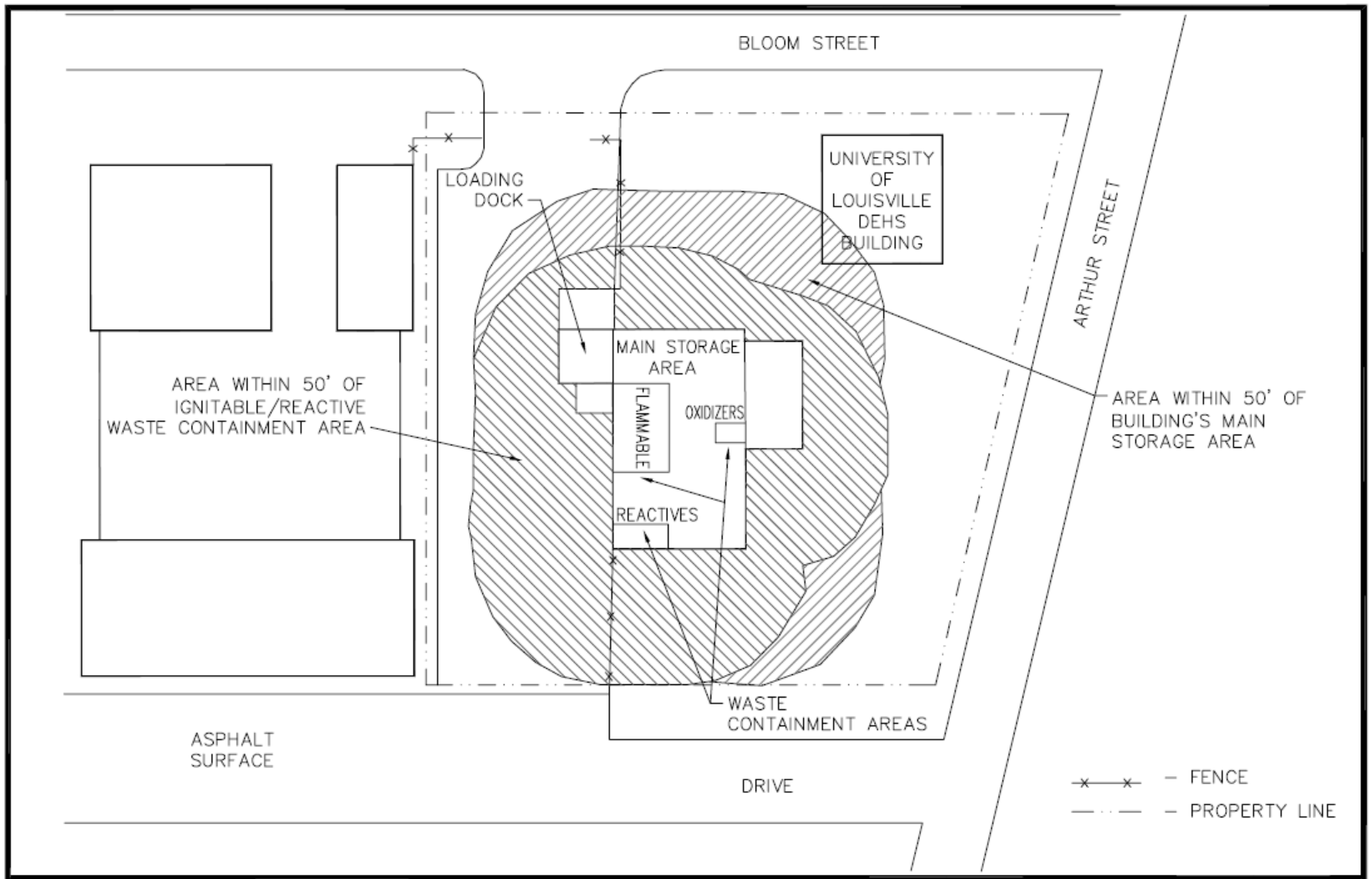
Each container of hazardous waste is kept closed during storage, except when it is necessary to add or remove waste or during inspections or sampling.

(viii) Ignitable, Reactive and Incompatible Wastes

The hazardous waste management facility is designed and operated to safely and properly manage ignitable, reactive and incompatible wastes. As described in Section C.3, WAP, the compatibility of each waste stream is determined during the waste characterization process.

NOD 25; Morris

The storage areas which hold ignitable or reactive wastes are located greater than fifty feet from the facility property line. Figure D-4 shows an area fifty feet from the outer walls of the ignitable/reactive waste storage areas. The Loading Dock, Office Areas, and other storage areas are not included in these fifty-foot radii.



UNIVERSITY OF LOUISVILLE ENVIROMENTAL PROTECTION SERVICES CENTER	50' RADIUS FROM IGNITABLE/REACTIVE WASTE	FIGURE D-4

FILE: P:\7362\UOFL-546260000-RCRAPARTBAPPLICATION\CAD-GIS\WASTE

The general storage area has discrete management areas/rooms with individual secondary containment structures as described in Section D.1.a (3). Ignitable and reactive wastes are managed in self-contained explosion-proof rooms. The rooms are provided with explosion-proof equipment and lighting. Containers of flammable materials are bonded and grounded during all opening/transfer operations. Each area managing flammables have LEL detectors which activate an emergency ventilation system should a potentially dangerous situation occur.

Reactive wastes are segregated in a closed room. The room has a carbon dioxide fire suppression system to prevent potentially water-reactive wastes from coming into contact with water. Water-reactive chemicals are stored higher than the containment berm (on shelves) to prevent contact with any water from other areas.

D.1.d Air Emission Standards for Process Vents

40 CFR 264.1030 and 40 CFR 270.24

The EPSC does not manage processes falling under the air emission standards for process vents (40 CFR Subpart AA).

D.1.e Air Emission Standards for Equipment Leaks

40 CFR 264.1050 and 40 CFR 270.25

The facility does not manage equipment falling under the air emission standards for equipment leaks (40 CFR Subpart BB).

D.1.f Organic Air Emissions for Containers

40 CFR 264.179
40 CFR 264.1080
40 CFR 264.1082
40 CFR 264.1083
40 CFR 265.1086

The facility manages waste with an average volatile organic concentration greater than 100 ppm by weight. The facility operations and handling do not require the facility to perform specific emission monitoring of its containers due to the following conditions:

a) All waste placed or stored in containers less than 0.1 cubic meter (26 gallons) is not subject to emission standards. This includes a large portion of the waste received from laboratories.

b) The facility, when managing waste in containers greater than 0.1 cubic meter (26 gallons) to 0.46 cubic meter (122 gallons), only uses containers specifically certified for use by the DOT. Table D-2 contains a summary of Subpart CC requirements. Waste containers are closed at all times, except during the addition or removal of waste from the container. All proper seals and gaskets are used during storage.

c) The facility pours materials from smaller (less than 26 gallons containers) into 55 gallon drums in a specially designed blending/bulking area. This area has ventilation for removal of fugitive emissions; however, no VOC abatement equipment is provided with this system, since only DOT containers are used for this process. Per 40 CFR 264.1086(c)(3)(i)(B), in the case when discrete quantities or batches of material intermittently are added to a container over a period of time, EPSC personnel shall promptly secure the closure devices in the closed position, upon either the container being filled to the intended final level; the completion of a batch loading after which no additional material will be added to the container within 15 minutes; the person performing the loading operation leaving the immediate vicinity of the container; or the shutdown of the process generating the material being added to the container, whichever condition occurs first. Per 40 CFR 264.1086(c)(3)(ii)(B), when discrete quantities or batches of material are removed from a container, but the container does not meet the conditions to be an empty container as defined in 40 CFR 261.7(b), EPSC personnel shall promptly secure the closure devices in the closed position upon the completion of a batch removal after which no additional material will be removed from the container within 15 minutes or the person performing the unloading operation leaves the immediate vicinity of the container, whichever condition occurs first.

d) Treatment processes for small waste streams are conducted in containers, however, these containers are less than 0.1 cubic meter (26 gallons). These containers (small bench-scale treatment processes) are still managed to minimize emissions. All bench-scale treatments are performed in a laboratory hood.

TABLE D-2
SUBPART CC SUMMARY TABLE

Hazardous Waste Management Unit (HWMU)	HWMU Location	EPA Hazardous Waste Codes Managed	Waste Description	Average Volatile Organic Concentration of Hazardous Waste	DOT Performance Packaging Std ID Code Used for Each Waste Managed	Container Type	Subpart CC Status	Control Option
Existing Drum Storage and Bulking Room	U of L EPSC	See Note 1	Organic and inorganic liquids, pumpable sludges, semi-solids, or solids	Greater than or equal to 500 ppmw	1H1, 1A1	Type A (see Note 2)	Container Level 1 Controls per 40 CFR 264.1086(c)	See Note 3

Notes:

1. Waste codes as described in the Part A Application and Waste Analysis Plan, Section 2.0 in Attachment C-1 of the Part B Application.
2. Container Type A: All containers subject to Subpart CC which have a design capacity greater than 0.1 m^3 and less than or equal to 0.46 m^3.
3. Containers are equipped with a cover and closure devices which form a continuous barrier over container openings. The container and its cover and closure devices shall be visually inspected for defects at the time the container first manages hazardous wastes or is accepted at the facility. If a container remains at the facility for one year or more, it shall be visually inspected for defects at least once every 12 months.

ATTACHMENT D-1

University of Louisville

NOD 68

EPSC Containment Volume Calculations

Attachment D-1

Table of Contents

I) Formula for Determination of Containment Volume 2
II) Herbicides/Pesticides 3
III) Caustics/Bases/Cyanides 4
IV) Oxidizers/Peroxides 5
V) Inorganic Acids 6
VI) Heavy Metals 7
VII) Non-Flammable Organics 8
VIII) Organic Acids 9
IX) Reactives 10
X) Flammables 11
XI) PCBs 12
XII) Blending/Bulking 13
XIII) Formula for determination of loading dock area containment volume 14

Attachment D-1

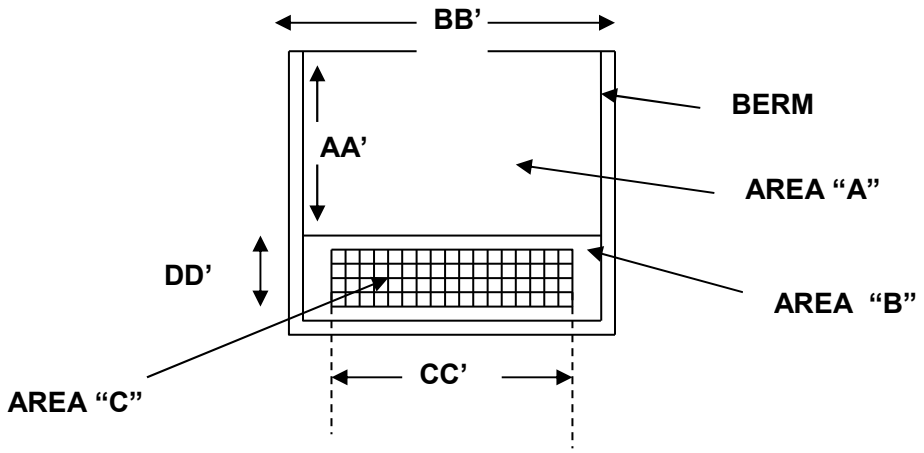
I) Formula for Determination of Containment Volume

BASIS FOR INDIVIDUAL AREAS:

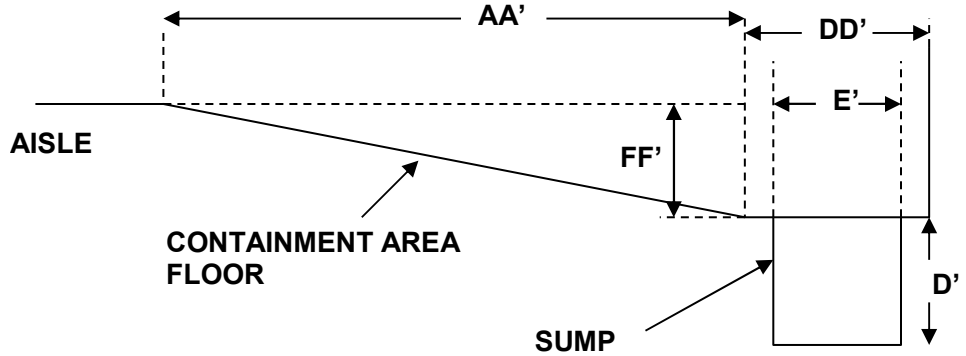
A = SLOPED PORTION OF INDIVIDUAL CONTAINMENT AREA VOLUME
B = NON-SLOPED AREA VOLUME OVER SUMP
C = SUMP VOLUME

TOTAL = A+B+C

TOP VIEW



SIDE VIEW



Attachment D-1

Example Calculations

II) Herbicides/Pesticides

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A" + Area "B" + Area "C"

Area Name = Herbicides/Pesticides
AA' = 9.67 ft – 2.5 ft = 7.17 ft
BB' = 9 ft
CC' = 9 ft
DD' = 2.5 ft
FF' = 0.33 ft
E' = 1.5 ft
D' = 99.67 ft – 98.67 ft = 1ft

Total Stored Material Volume = 405 gallons
10% or 55 gallons = 55 gallons
AREA "A" = (7.17 ft x 0.33 ft x 9 ft)/2 = 10.75 cu ft
AREA "B" = 2.5 ft x 9 ft' x 0.33 ft = 7.5 cu ft
AREA "C" = 1.5 ft x 9 ft x 1 ft = 13.5 cu ft

Total Volume = 10.75 + 7.5 + 13.5 = 31.75 cu ft

TEST:

Capacity of Containment (TOTAL):	31.75 x 7.481 = 238 gallons
Capacity of Containment (SUMP):	13.5 x 7.481 = 101 gallons
Volume to be Contained:	55 gallons

Attachment D-1

III) Caustics/Bases/Cyanides

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A" + Area "B" + Area "C"

Area Name = Caustics/Bases/Cyanides		Total Stored Material Volume =	635 gallons
AA' =	7.17 ft	10% or 55 gallons =	64 gallons
BB' =	12.00 ft	AREA "A" =	14.33 cu ft
CC' =	12.00 ft	AREA "B" =	10.00 cu ft
DD' =	2.50 ft	AREA "C" =	18.00 cu ft
FF' =	0.33 ft		
E' =	1.50 ft	Total Volume =	42.33 cu ft
D' =	1.00 ft		

TEST:

Capacity of Containment (TOTAL):	317 gallons
Capacity of Containment (SUMP):	135 gallons
Volume to be Contained:	64 gallons

Attachment D-1

IV) Oxidizers/Peroxides

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A" + Area "B" + Area "C"

Area Name = Oxidizers/Peroxides		Total Stored Material Volume =	350 gallons
AA' =	7.83 ft	10% or 55 gallons =	55 gallons
BB' =	7.00 ft	AREA "A" =	9.14 cu ft
CC' =	7.00 ft	AREA "B" =	5.83 cu ft
DD' =	2.50 ft	AREA "C" =	10.50 cu ft
FF' =	0.33 ft		
E' =	1.50 ft	Total Volume =	25.47 cu ft
D' =	1.00 ft		

TEST:

Capacity of Containment (TOTAL):	191 gallons
Capacity of Containment (SUMP):	79 gallons
Volume to be Contained:	55 gallons

Attachment D-1

V) Inorganic Acids

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A" + Area "B" + Area "C"

Area Name = Inorganic Acids		Total Stored Material Volume =	690 gallons
AA' =	7.83 ft	10% or 55 gallons =	69 gallons
BB' =	10.50 ft	AREA "A" =	13.71 cu ft
CC' =	10.50 ft	AREA "B" =	8.75 cu ft
DD' =	2.50 ft	AREA "C" =	15.75 cu ft
FF' =	0.33 ft		
E' =	1.50 ft	Total Volume =	38.21 cu ft
D' =	1.00 ft		

TEST:

Capacity of Containment (TOTAL):	286 gallons
Capacity of Containment (SUMP):	118 gallons
Volume to be Contained:	69 gallons

Attachment D-1

VI) Heavy Metals

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A" + Area "B" + Area "C"

Area Name = Heavy Metals		Total Stored Material Volume =	405 gallons
AA' =	7.17 ft	10% or 55 gallons =	55 gallons
BB' =	7.50 ft	AREA "A" =	8.96 cu ft
CC' =	7.50 ft	AREA "B" =	6.25 cu ft
DD' =	2.50 ft	AREA "C" =	11.25 cu ft
FF' =	0.33 ft		
E' =	1.50 ft	Total Volume =	26.46 cu ft
D' =	1.00 ft		

TEST:

Capacity of Containment (TOTAL):	198 gallons
Capacity of Containment (SUMP):	84 gallons
Volume to be Contained:	55 gallons

Attachment D-1

VII) Non-Flammable Organics

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A" + Area "B" + Area "C"

Area Name = Non-Flammable Organics		Total Stored Material Volume =	1130 gallons
AA' =	7.83 ft	10% or 55 gallons =	113 gallons
BB' =	16.83 ft	AREA "A" =	21.74 cu ft
CC' =	16.83 ft	AREA "B" =	13.88 cu ft
DD' =	2.50 ft	AREA "C" =	25.25 cu ft
FF' =	0.33 ft		
E' =	1.50 ft	Total Volume =	60.87 cu ft
D' =	1.00 ft		

TEST:

Capacity of Containment (TOTAL):	455 gallons
Capacity of Containment (SUMP):	189 gallons
Volume to be Contained:	113 gallons

Attachment D-1

VIII) Organic Acids

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A"+ Area "B" + Area "C"

Area Name = Organic Acids		Total Stored Material Volume =	350 gallons
AA' =	7.17 ft	10% or 55 gallons =	55 gallons
BB' =	7.00 ft	AREA "A" =	8.36 cu ft
CC' =	7.00 ft	AREA "B" =	5.83 cu ft
DD' =	2.50 ft	AREA "C" =	10.50 cu ft
FF' =	0.33 ft		
E' =	1.50 ft	Total Volume =	24.69 cu ft
D' =	1.00 ft		

TEST:

Capacity of Containment (TOTAL):	185 gallons
Capacity of Containment (SUMP):	79 gallons
Volume to be Contained:	55 gallons

Attachment D-1

IX) Reactives

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A"+ Area "B" + Area "C"

Area Name = Reactives		Total Stored Material Volume =	230 gallons
AA' =	16.50 ft	10% or 55 gallons =	55 gallons
BB' =	8.00 ft	AREA "A" =	22.00 cu ft
CC' =	7.00 ft	AREA "B" =	6.67 cu ft
DD' =	2.50 ft	AREA "C" =	10.50 cu ft
FF' =	0.33 ft	change in elevation =	50.67 cu ft
E' =	1.50 ft	less ramp =	3.33 cu ft
D' =	1.00 ft	less pilaster =	0.30 cu ft
		Total Volume =	86.20 cu ft

TEST:

Capacity of Containment (TOTAL):	645 gallons
Capacity of Containment (SUMP):	79 gallons
Volume to be Contained:	55 gallons

Attachment D-1

X) Flammables

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A" +Area "B" + Area "C"

Area Name = Flammables		Total Stored Material Volume =	2560 gallons
AA' =	16.50 ft	10% or 55 gallons =	256 gallons
BB' =	28.00 ft	AREA "A" =	77.00 cu ft
CC' =	28.00 ft	AREA "B" =	23.33 cu ft
DD' =	2.50 ft	AREA "C" =	42.00 cu ft
FF' =	0.33 ft	change in elevation =	177.33 cu ft
E' =	1.50 ft	plus ramp area =	8.89 cu ft
D' =	1.00 ft	less ramp =	4.44 cu ft
		Total Volume =	324.11 cu ft

TEST:

Capacity of Containment (TOTAL):	2425 gallons
Capacity of Containment (SUMP):	314 gallons
Volume to be Contained:	256 gallons

Attachment D-1

XI) PCBs

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A" + Area "B" + Area "C"

Area Name = PCBs		Total Stored Material Volume =	790 gallons
AA' =	6.67 ft	10% or 55 gallons =	198 gallons
BB' =	12.67 ft	AREA "A" =	14.07 cu ft
CC' =	12.67 ft	AREA "B" =	10.56 cu ft
DD' =	2.50 ft	AREA "C" =	28.50 cu ft
FF' =	0.33 ft	change in elevation =	58.06 cu ft
E' =	1.50 ft	less ramp =	5.17 cu ft
D' =	1.50 ft	Total Volume =	106.02 cu ft

TEST:

Capacity of Containment (TOTAL):	793 gallons
Capacity of Containment (SUMP):	213 gallons
Volume to be Contained:	198 gallons

Attachment D-1

XII) Blending/Bulking

Volume of Area "A" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

Volume of Area "A" = $\frac{\text{AA' x FF' x BB'}}{2}$

Volume of Area "B" and "C" = LENGTH x WIDTH x DEPTH
Volume of Area "B" = DD' x BB' x FF'
Volume of Area "C" = E' x CC' x D'

Total Volume = Area "A" + Area "B" + Area "C"

Area Name = Blending		Total Stored Material Volume =	110 gallons
AA' =	16.50 ft	10% or 55 gallons =	55 gallons
BB' =	18.00 ft	AREA "A" =	49.50 cu ft
CC' =	18.00 ft	AREA "B" =	15.00 cu ft
DD' =	2.50 ft	AREA "C" =	27.00 cu ft
FF' =	0.33 ft	change in elevation =	114.00 cu ft
E' =	1.50 ft	less ramp =	3.33 cu ft
D' =	1.00 ft	Total Volume =	202.17 cu ft

TEST:

Capacity of Containment (TOTAL):	1512 gallons
Capacity of Containment (SUMP):	202 gallons
Volume to be Contained:	55 gallons

Attachment D-1

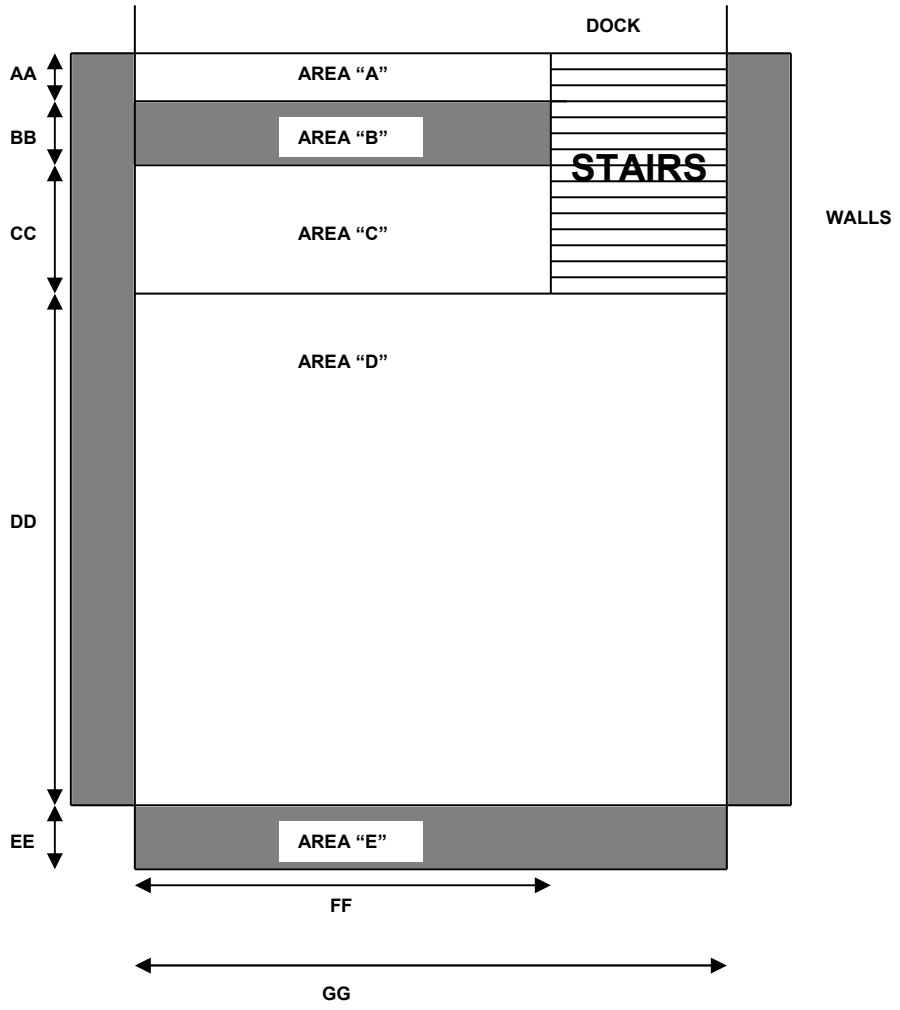
XIII) Formula for determination of loading dock area containment volume

Basis for Area

A = Sloped portion to trench sump
B = Trench sump
C = Sloped portion to trench sump
D = Sloped portion to storm trench
E = Storm trench

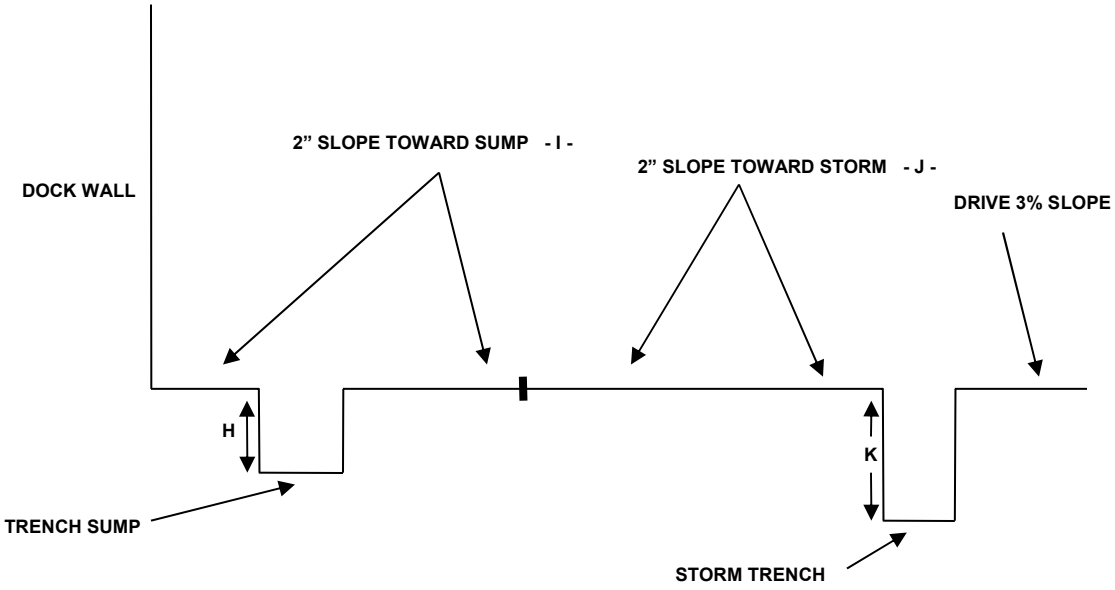
TOTAL = A + B + C + D + E

TOP VIEW



Attachment D-1

SIDE VIEW



Attachment D-1

VOLUME OF AREA "A" AND "C" = $\frac{\text{LENGTH x WIDTH x DEPTH}}{2}$

VOLUME OF AREA "A" = $\frac{\text{AA x FF x I}}{2}$

VOLUME OF AREA "B" AND "E" = LENGTH x WIDTH x DEPTH

VOLUME OF AREA "B" = BB x FF x H

VOLUME OF AREA "C" = $\frac{\text{CC x FF x I}}{2}$

VOLUME OF AREA "D" = ZERO (0) CONTAINMENT DUE TO DRAINAGE TO AREA E

VOLUME OF AREA "E" = EE x GG x K

TOTAL VOLUME = AREA "A" + AREA "B" = AREA "C" + AREA "D" + AREA "E"

AREA NAME = LOADING DOCK

AA =	1 ft		
BB =	0.66 ft		
CC =	3.33 ft		
DD =	10 ft		
EE =	1 ft		
FF =	14.33 ft	Area "A"=	1.15 cu ft
GG =	18.33 ft	Area "B"=	6.24 cu ft
H =	0.66 ft	Area "C"=	3.82 cu ft
I =	0.16 ft	Area "D"=	0 cu ft
J =	0.16 ft	Area "E"=	18.33 cu ft
K =	1 ft	TOTAL VOLUME=	29.54 CU FT

CAPACITY OF CONTAINMENT (TOTAL): 29.54 cu ft x 7.481 = 220.98 gallons

SECTION E –
GROUNDWATER MONITORING AND CORRECTIVE ACTION FOR WASTE MANAGEMENT UNITS

E GROUNDWATER MONITORING AND CORRECTIVE ACTION FOR WASTE MANAGEMENT UNITS

40 CFR 2701.14(c)

The EPSC is not a land-based unit and no solid waste management units or areas of concern have been identified.

SECTION F –

PROCEDURES TO PREVENT HAZARDS

F PROCEDURES TO PREVENT HAZARDS

The Environmental Protection Services Center (EPSC) is operated to minimize exposure of the general public and operating personnel to hazardous and mixed wastes. Access into the active portion of the EPSC is restricted to authorized personnel and escorted visitors. The EPSC is subjected to a rigorous inspection schedule to prevent any conditions which may cause or lead to threats to human health or the environment. This chapter describes those procedures and standards for preparedness and prevention of hazardous waste releases.

F.1 SECURITY

40 CFR 270.14(b)(4) and 40 CFR 264.14(b)

The regulations require that the owner prevent the unknowing entry, and minimize the possibility for the unauthorized entry, of persons into the active portion of the facility.

F.1.a Security Procedures and Equipment

40 CFR 264.14

F.1.a (1) 24 Hour Surveillance System

40 CFR 264.14(b)(1)

The hazardous waste management facility is located within the Environmental Protection Service Center (EPSC). No hazardous waste is stored outside the confines of the EPSC. Accordingly, a 24-hour surveillance system is not necessary. The means defined to control entry are described in the next section.

F.1.a (2) Barrier and Means to Control Entry

40 CFR 264.14(b)(2)

The facility must be readily accessible to authorized EPSC staff, but it is essential that access be effectively controlled. The regulations provide that security can be maintained by either (a) twenty four hour surveillance system or (b) an artificial barrier with a means to control entry. Since Department of Environmental Health and Safety (DEHS) personnel will not be present at the Facility at all times, the latter option is employed to achieve compliance with the regulatory standard.

The building, which is constructed of concrete block and brick, will serve as a perimeter barrier completely surrounding the storage and processing areas. Personnel entrances are limited, with an entry at the office and at the dock area. These entrances are equipped with a key/deadbolt entry system. In addition, entrances and emergency exits are equipped with a magnetic contact burglar alarm system connected to the Department of Public Safety. A perimeter fence with key locked gates surrounds the loading dock and rear drive area. Figure F-1 depicts the location of the perimeter fencing.

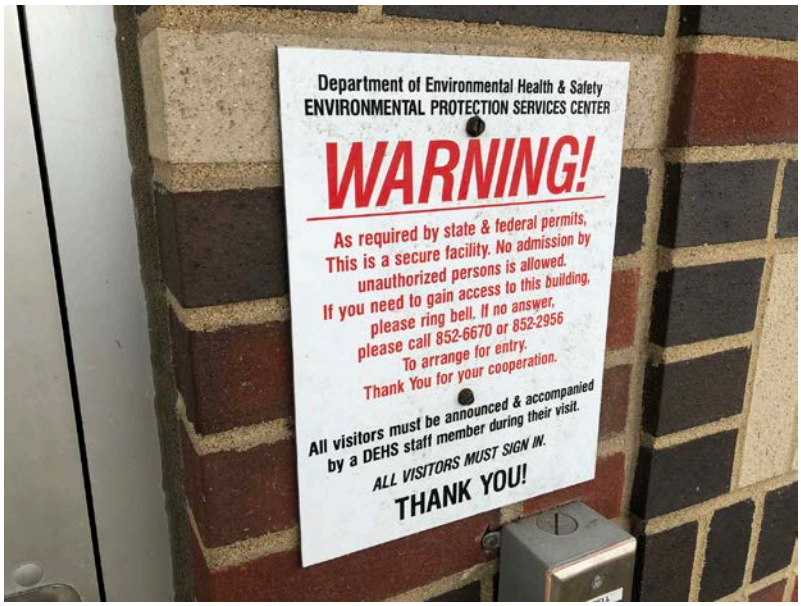
The building is locked at all times with only a small number of authorized DEHS staff having key access to the hazardous waste storage area and alarm system. The fenced area behind the EPSC is gated and this gate is locked at all times, unless the facility is

occupied and in operation. Only DEHS staff members and escorted official visitors are allowed in the facility. A sign-in register is kept to record the names of all visitors, the organization the visitor is representing, and purpose of the visit.

F.1.a. (3) Warning Signs
40 CFR 264.14

The facility is posted with Warning signs at each entrance to the active portion of the facility and each fence gate. The signs are visible from any approach to each entrance to the active portion of the facility. The locations of warning signs are depicted on Figure F-2 “Active Area – Warning Signs”.

EPSC Front Door Signs



Detail of EPSC Front Door Sign

Sign on Fence Surrounding Rear Drive and Loading Dock Areas of EPSC

F.1.b Waiver
40 CFR 264.14(a)

A waiver of the security requirements is not requested.

F.2. INSPECTION SCHEDULE
40 CFR 264.15

The purpose and intent of implementing inspection procedures at the facility are to prevent malfunctions, deterioration, operator error, and/or discharge which may cause or lead to the release of regulated waste to the environment or threats to human health. A system of daily, weekly, and monthly inspections has been implemented. Daily inspections only occur on days when normal UofL operations are running. Daily inspections don't occur on weekends and holidays. The frequency of inspection is based on specific regulatory requirements, and on the rate of possible deterioration of equipment and probability of environmental or human health incidents.

F.2.a General Inspection Requirements: Types of Problems and Frequency of Inspection
40 CFR 264.15(a) and (b)

The inspection plan is intended to detect and prevent system and equipment malfunctions and deterioration, operator errors, and unplanned discharges. The inspection schedules are based on operational experience and engineering knowledge of the facility's systems and equipment, and the rates of their possible deterioration. The inspection schedules of the facility, described in Section F.2.a (2), will be kept at the facility. The inspection schedules specify the type of equipment to be inspected, examples of general problems which may occur, and the frequency of the inspections. General inspection requirements cover facility equipment categorized as safety and emergency, security, and operational equipment that are vital to prevent, detect, and respond to the environment or public health hazards.

Safety and emergency equipment are checked for access and readiness in the event of an emergency. Operational equipment is maintained by regularly scheduled servicing to ensure safe operation. Operation areas and areas where waste is handled such as the laboratory, loading/unloading areas, and container storage area are inspected daily when in use.

Current waste analysis equipment includes a pH meter. The meter is inspected and calibrated prior to each use.

The sumps and secondary containment structures provided for all container storage areas are visually inspected daily (daily is defined as each day the facility is in operation) during operation hours for leakage or accumulated liquids. In this way material can be detected and upon recognition of the material, facility personnel will immediately begin appropriate actions. These actions will include the initial characterization of the material using both process and storage knowledge, chemical data, and surveillance equipment as

appropriate, to determine the proper health and safety risk associated with the removal of these materials. After the characterizations have been performed and proper equipment has been selected, the University personnel will respond to the released material. The Chemical Regulatory Specialist is responsible for implementing the Inspection Plan. The Chemical Regulatory Specialist may delegate responsibility for performing actual inspections to other employees within the DEHS.

F.2.a (1) Types of Problems
40 CFR 264.15

The general inspection schedules, including inspection parameters and frequency, are determined by the types of problems that can potentially occur. The following considerations are pertinent to identification of the types of problems that may occur related to general facility operations:

- Breach of security, either intentional or unintentional, by persons or natural (e.g. climatological) events. Such breach may occur due to damage to doors or locks, or obstruction, damage, or loss of warning signs.

- Unplanned releases not detected by environmental monitoring equipment due to malfunction or failure.

- Health and safety equipment failure, absence, or inaccessibility.

F.2.a (2) Frequency of Inspection
40 CFR 264.15(b)

In accordance with 40 CFR 264.15(c), corrective actions will be taken immediately when the detected problem creates an imminent hazard. The general inspection schedules are based on the facility's operations, potential failure modes, and an assessment of the hazard magnitude posed by a particular malfunction, failure, or discrepancy. Immediate inspections will be performed after each emergency event.

Commented [MK1]: NOD 69

Safety and emergency equipment are checked for access and readiness in the event of an emergency. The facility security system and measures are inspected weekly. Operational equipment is inspected before use to ensure safe operation, and regularly scheduled servicing is completed to maintain the equipment in good operational condition. The daily, weekly, and monthly schedules are shown in Table F-1, Table F-2, and Table F-3, respectively. In general, all corrective actions are expected to be completed within a week following the inspection which detected a problem. If corrective actions require more than a week to complete, the reason for such will be recorded in the operating log. Inspections are conducted using forms specifically designed to contain all pertinent information. Each periodic inspection form includes such significant administrative information as name of the inspector, the date (month, day, year) and time of the inspection.

Attachment F-1 provides examples of daily, weekly, and monthly inspection forms.

TABLE F-1

DAILY INSPECTION SCHEDULE

EQUIPMENT	SPECIFIC ITEMS	TYPES OF PROBLEMS
Safety/Emergency	Safety shower & eyewash	Pressure/leaking
Fire Control	Fire alarm system	Power failure
Container Storage	Container aisle	Improper aisle space/height
	Containers	Leaking/damaged
	Segregation of incompatibles	Storage of incompatibles
	Base, dike	Cracks/deterioration/spills/leaks
	Ramps	Cracks/deterioration/spills/leaks
	Sump area	Cracks/liquids/debris
	Container labels	Damaged/missing
	Container sealing	Open lids/leaking/open bungs
Loading Dock	Base	Cracks/deterioration/spills/leaks
	Ramps	Cracks/deterioration/spills/leaks
	Sump area	Cracks/liquid/debris

NOTE: The daily inspection schedule must be completed immediately after an emergency.

TABLE F-2

WEEKLY INSPECTION SCHEDULE

EQUIPMENT	SPECIFIC ITEMS	TYPES OF PROBLEMS
Safety/Emergency	Spill supplies	Used/need renewal
	Shovels	Out of stock/broken
	55-gallon drums	Damaged, out of stock
	Recovery drums (over packs)	Damaged, out of stock
	PPE	Inoperative, holes, dirty, out of stock
	Emergency lighting system	Inoperative
Fire Control	Fire extinguisher	Needs recharging
	CO_2 system	Inoperative
	Fire alarm system	Power failure
	Combustible gas detection system	Power failure/test readiness
Security Devices	Two-way radios	Transmitter failure

NOTE: The weekly inspection schedule must be completed immediately after an emergency.

TABLE F-3

MONTHLY INSPECTION SCHEDULE

EQUIPMENT	SPECIFIC ITEMS	TYPES OF PROBLEMS
Safety/Emergency	Airpacks (SCBA)	Need recharging/inoperative
	First Aid supplies	Out of stock
Fire Control	Fire alarm system	Power failure
Security Devices	Warning signs	Missing/damaged
	General alarm system	Inoperative
	Operation of locks	Inoperative
	Fence	Damaged/lock missing or damaged

F.2.b Specific Process Inspection Requirements

F.2.b (1) Container Inspection
40 CFR 264.174

40 CFR 264.174 requires that areas where containers are stored must be inspected at least weekly for leaking containers and for deterioration of containers or the containment system caused by corrosion or other factors. The DEHS conducts these inspections each operational day (or a minimum of once per week if there is a facility shut down for greater than seven days).

The containers, containment areas, and sumps are inspected for leaks, spills, accumulated liquids, physical deterioration, corrosion, and coating integrity. Labels on containers are checked to ensure they are visible, legible, and in place. The proper stacking arrangements and aisle spacing and segregation of incompatible wastes are noted. Prior to unloading and storage at the facility, incoming containers are inspected for leaks, proper labeling, and approved storage containers as described in the Waste Analysis Plan (Section C.3).

Commented [MK2]: NOD 25

Containers storing hazardous wastes are labeled in accordance with Environmental Protection Agency (EPA) and Kentucky Division of Waste Management regulations. When a container has been emptied and residues removed in accordance with applicable regulations, the labels are removed.

F.2.c Remedial Action
40 CFR 264.15(c)

40 CFR 264.15(b)(4) requires that an owner conduct inspections frequently enough to identify problems in time to correct them before they harm human health or the environment. 40 CFR 264.15(c) states that where a hazard is imminent or has already occurred, remedial action must be taken immediately.

Should routine inspections reveal problems of a non-emergency nature, the corrective action will be immediately scheduled to prevent potential or continued damage, and reduce the need for emergency repairs. Any corrective action taken will mirror what's specified in the Contingency Plan (Section G), except for Sections 4.1 Notifications, 7.0 Evacuation Plan, and 8.0 Required Reports. If corrective action escalates to an actual emergency incident, the Contingency Plan will be fully implemented.

Commented [MK3]: NOD 16

If a hazard is imminent, or occurs during the course of an inspection, or at any time between inspections, remedial action will be taken immediately. In the event of fire (beyond incipient stage), explosion, and/or release of hazardous material off EPSC property, facility personnel will notify the appropriate authorities in accordance with the Contingency Plan (Section G) and initiate remedial actions. In response to an emergency event involving the release of reportable quantities of hazardous constituents to the environment, efforts will center upon containment of the hazard, clean-up, and packaging

of the waste, and subsequent decontamination of the affected area in accordance with applicable hazardous materials management regulations (e.g. personnel qualifications in accordance with 29 CFR 1910.120. The Contingency Plan provides further detail of specific procedures and actions.

All hazardous waste management equipment exhibiting a potential problem will be taken out of service and repaired immediately. Examples of potential equipment problems, remedial actions, and remedial response are shown in Table F-4.

TABLE F-4

TYPES OF REMEDIAL ACTION

PROBLEM	CORRECTIVE ACTION	TIMING
Crack in dike	Plug dike until repairs can be made.	Immediately
Small spill	Contact trained area personnel for clean-up.	Immediately
Leaking drum	Apply absorbent, transfer the drum to an overpack, or transfer contents into another drum.	As soon as possible
Warning sign misplaced	Replace. Additional supplies may need to be ordered.	As soon as possible
Fence damaged	Write work order for repairs.	Rope-off until repairs are made
Malfunction of any safety device	Discontinue use of equipment until repairs are complete.	As soon as possible
Berm or floor corrosion/erosion	Determine cause, repair damaged area.	Dependent on extent of damage

F.2.d Inspection Log
40 CFR 264.15(d)

A record of all inspections will be maintained in an inspection log for at least three (3) years from the date of the inspection. At a minimum, the records include the date and time of the inspection, the name of the inspector, a notation of the observations made, and the date and description of any repairs or other remedial actions.

F.3 WAIVER OF PREPAREDNESS AND PREVENTION REQUIREMENTS

The University of Louisville does not request a waiver of preparedness and prevention requirements.

F.3.a Equipment Requirements
40 CFR 264.32

F.3.a (1) Internal Communications
40 CFR 264.32(a)

The facility is required to have an internal communications or alarm system capable of providing immediate emergency instruction, by voice or signal, to facility personnel. The EPSC has telephones which can be used to call other University departments or to call outside the University. Emergency response phone numbers for police, fire, ambulance and all parties on the Contingency Plan Notification List (see Section G) are posted near each telephone. Telephones are located in the office and storage areas. The facility is also equipped with emergency buttons and pull boxes.

DEHS utilizes FM radio communication devices which can communicate with University departments (e.g. Public Safety, Physical Plant), as well as within DEHS. DEHS has a base station located in its administrative offices for monitoring during normal working hours. All University Public Safety Officers have FM radio communications which can communicate with one another and with other departments.

The hazardous waste area is equipped with a heat sensor which sends an alarm to Public Safety in the event of an excessive heat buildup. Fire alarms, smoke/heat sensors, combustible gas monitoring, and sprinkler system alarms are also wired into the Department of Public Safety to provide 24-hour surveillance.

F.3.a (2) External Communications
40 CFR 264.32(b)

Section F.3.a (1) also describes the external communication system.

F.3.a (3) Emergency Equipment
40 CFR 264.32(c)

The facility emergency equipment is listed and described in Section 5.0 of the Contingency Plan.

F.3.a (4) Water for Fire Control

40 CFR 264.32(d)

A complete sprinkler system is installed in the majority of the facility. A carbon dioxide (CO_2) system is present in the reactives room in accordance with NFPA 17. The remainder of the system is a wet pipe system and installed in accordance with NFPA 13.

All sprinkler heads except where otherwise noted are approved spray type heads of proper temperature rating for their particular locations. In all areas with suspended ceilings, sprinkler heads are pendant. In areas where there are no hung ceilings, sprinklers are up-right or pendant fusible link chrome type heads without escutcheons. Water for the sprinkler system is provided by Louisville Metro via a fire hydrant. The facility has been designed such that a 20 minute flow from the sprinkler will be contained in the containment system.

The fire protection system in the reactives room is a carbon dioxide gas system. Carbon dioxide is used as the expellant gas. The system is a Total Flooding System which is a supply of CO_2 permanently connected to fixed piping, with fixed nozzles arranged to discharge CO_2 into the enclosed space or enclosure containing the hazard. The system was designed and installed per NFPA 17 and local codes, as required by the authority having jurisdiction. Only equipment that is specifically listed and compatible for use with the extinguishing system is used.

F.3.b Aisle Space Requirements

40 CFR 264.35

Aisle space will be maintained to allow the unobstructed movement of personnel, fire protection equipment, and decontamination equipment to any area of the facility in an emergency. Details of the facility design and requisite aisle space are provided in Section D. A minimum of three feet of aisle space is maintained between rows of drums, and sufficient space to inspect drums is maintained between drums and walls. Figure F-3 represents a typical drum arrangement.

F.4 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT

40 CFR 270.14(b)(8)

This section describes the procedures, structures, or equipment used at the facility to prevent hazards in unloading operations, prevent run-off from hazardous waste handling areas, prevent contamination of water supplies, mitigate effects of equipment failure and power outages, and prevent undue exposures of personnel to hazardous waste.

F.4.a Unloading Operations

40 CFR 270.14(b)(8)(i)

Wastes are transported to the facility in containers via a DEHS vehicle. All loading and unloading operations are conducted at the loading dock. The loading dock is designed to contain the contents of a 55-gallon drum if a leak were to occur. The covered loading dock area for delivery and removal of materials can accommodate semi-tractor trailers and is designed for spill containment. Run-on from precipitation in the loading area is controlled with a storm trench connected to the sewer system. The storm trench is equipped with a manual shut-off valve which is turned to the closed position during any loading or unloading operations. This will prevent run off from the loading and unloading operations entering the storm sewer. Any spillage at the loading dock will be contained in a sump. In addition to the containment at the sump, the valved-off storm trench acts as a secondary containment. The storm trench adds an additional 18.3 cubic feet (or 137.1 gallons) of containment and brings the total containment capacity of the loading dock area up to 221 gallons (See Attachment D-1 of Section D for containment calculations).

No unloading operations will occur during events of heavy precipitation which might cause the area to flood. During all unloading operations, the trench is monitored in the event of a light rain to ensure that no precipitation accumulates in this area.

In the event a spill occurs during unloading operations, existing containment will provide adequate volume to contain a spill, preventing entry into the storm sewer system. Any liquid from a spill will be pumped into an appropriate container. The liquid will be analyzed in accordance with the Waste Analysis Plan. The parameters chosen for analyses would be based upon the chemical composition of materials which were stored in the specific container at the time of the spill or leak. If the circumstances surrounding the spill or leak provide enough evidence about the material spilled (e.g. one drum of known solvent material was punctured), analyses will not be necessary.

Removal of any spilled or leaked liquid will be accomplished using a small portable pump. Typically, corrosive and inorganic materials will be transferred utilizing a plastic hand pump. Organic materials will be transferred using a metal non-sparking hand pump. Containers and pumps will be properly grounded and bonded during these operations. The pump utilized will be compatible with the material which has spilled and will be adequately flushed and decontaminated after use.

If the nature of the spill or the nature of the material does not lend itself to pumping, the spilled material will be absorbed in compatible spill media and the resultant mixture will be containerized. Materials which are powders or solids will be removed by use of brooms, pans, or shovels. All equipment will be constructed of non-sparking materials and will be compatible with the material to be cleaned. Any rinsate generated from the decontamination of equipment, as well as any personal protection equipment, will be managed as a hazardous waste until determined otherwise by sampling and analysis.

The dock is equipped with dock levelers, scissor lift, bumpers, and lighting to minimize the potential for accidents. Facility personnel responsible for unloading waste have been instructed in the proper operational procedures and use of equipment necessary to prevent hazards during these operations.

All containers are inspected for leaks or damage, and pallets, if used, will be inspected for any signs of spilled material. Inspection of containers prior to acceptance at the facility minimizes the potential for spills during waste handling operations. Records accompanying a shipment of containers are reviewed before unloading. The containers will generally be moved to the appropriate compatibility location by hand, drum dolly, or cart.

F.4.b Run-Off

40 CFR 270.14(b)(8)(ii)

All loading, unloading, storage, and treatment of hazardous waste are conducted within containment systems. Section D, Process Information, provides details of the facility containment systems. All waste management activities take place inside a building which greatly reduces the likelihood that any waste material could come into contact with rain water under normal weather conditions. In addition, floors are sloped and bermed to eliminate the possibility of spills interacting or migrating from the unit. Figure F-1 shows the site drainage. Sufficient drainage is provided surrounding the site to prevent run-on into the facility.

F.4.c Water Supplies

40 CFR 270.14(b)(8)(iii)

The facility is designed and is operated to safely contain wastes and to prevent any contamination of water supplies. All water supply piping for the laboratory or treatment fume hoods is equipped with backflow preventors to prevent wastes from entering the water supply should a siphon effect occur. Section D, Process Information, provides detailed design descriptions of the hazardous waste management areas including secondary containment and spill collection systems.

F.4.d Equipment and Power Failure

40 CFR 270.14(b)(8)(iv)

The only operational equipment for which failure could impact hazardous waste activities would be the fume hoods. As all operations conducted under a hood are considered batch, the process would stop immediately if the equipment were to fail. All waste materials would immediately be placed in sealed containers.

In the event of an electrical power failure, all hazardous waste activities will immediately stop and will not restart until the power has been restored. Emergency lighting is provided for approximately two hours by backup battery supply. The operations staff will use this time to safely close down the facility. Equipment will be secured to prevent leaks, spills, or emissions. All power and equipment failures will be recorded in the operating record.

F.4.e Personal Protective Equipment

40 CFR 270.14(b)(8)(v)

Protective clothing and equipment are provided to safeguard employees during normal and emergency operation. Personal protective equipment which is available includes:

- Air purifying Respirators (Full Face)
- Self Contained Breathing Apparatus (SCBA)
- Face Shields
- Coveralls (Chemical Resistant)
- Eye Protection
- Gloves (Chemical Resistant)

The personal protective equipment is stored in the laboratory storage areas and the spill supplies are stored in cabinets in the general storage area as shown in Figure F-2.

Administrative personnel not directly involved with the transfer, storage, or treatment of hazardous waste have restricted access within the active portions of the facility. Protection is provided to prevent undue exposure of facility personnel to hazardous waste. This is accomplished via the facility layout and design, waste management equipment and practices, employee training, and use of proper protective clothing and equipment.

Personnel involved in the handling of hazardous waste undergo training in the management and proper safe handling of hazardous waste as described in Section H. Training sessions include the use, selection, and proper fit of personal protective equipment such as respirators. Training sessions cover hazardous material identification, waste characteristics, and waste compatibility. Each employee is instructed in emergency response procedures in accordance with the Contingency Plan, Section G.

F.5 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES

40 CFR 264.17

F.5.a Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Wastes

40 CFR 264.17(a)
40 CFR 270.17(b)(9)

40 CFR 264.17(a) requires that facilities take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. The regulations require that these types of wastes must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g. from heat producing chemical reactions), and radiant heat. (Note: The Waste Analysis Plan in Section C describes those technical review procedures utilized to determine whether a waste is ignitable or reactive).

Precautions to prevent ignition of ignitable wastes involve separation of wastes from sources of ignition and use of procedures which minimize the potential for accidental ignition. No routine sources of ignition or open flame exist in the facility. Work with ignition or heat sources, if required, is limited, controlled by facility management, and performed in compliance with internal health and safety procedures for elimination of ignition sources. These internal procedures are:

- Prohibit use of open flame equipment when working with flammable liquids.
- Prohibit smoking in the EPSC.
- Require electrical equipment used in flammable or explosive atmospheres to comply with the National Electrical Code, NFPA 70.
- Require use of equipment with automatic, adjustable temperature controls, and high temperature limits switches to prevent overheating.
- Prohibit placement of flammable liquids on hot surfaces.
- Require all static electricity sources to be grounded in areas where ignitable vapors may be present.
- Require bonding of conductive containers when transferring flammable liquids.

Smoking is not allowed inside any U of L facility based on U of L policy as well as local regulations. The HVAC system is not a radiant heat source. All tools which are used to open ignitable waste containers are constructed of non-sparking materials.

Activities which may generate flames or sparks, such as welding or cutting, will be allowed only after an area has been inspected, the atmosphere tested for flammable vapors, and all ignitable materials have been removed or protected. Areas in which ignitable materials are treated or stored are designated as Class I, Group D, electrical service, and are equipped with explosion-proof equipment and lighting.

The EPSC is provided with the ability for the roof and the exterior wall in the flammables, blending/bulking, and reactives rooms to separate from the building under the force of an interior explosion. This was accomplished by using light metal decking and siding material attached to roof joints and wall purlins with bolts and pull-through washers. The washers will fail by pulling through holes in the supporting girts or purlins at a loading of 20 pounds per square foot.

The bolts are capable of safely holding the decking to the supports under wind load pressures of 10 pounds per square foot section on the wall or uplift on the roof. This method has been used on other buildings where solvents are stored. The masonry walls enclosing these rooms are concrete grouted and reinforced with steel rods to resist a

pressure of 40 pounds per square foot, thus assuring that the relieving surfaces as above described will fall away first.

F.5.b General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste

40 CFR 264.17(a) and (b)

Precautions are taken at the facility when handling ignitable, reactive, or incompatible waste to prevent any adverse reaction which has the potential to harm human health or the environment. Ignitable wastes are managed in a manner which protects the waste from sources of ignition or open flame. Ignitable wastes containers are maintained in good condition and inspected daily to minimize the potential for releases that could result in fires. Because of the variety of wastes which may be accepted at the facility, waste segregation procedures are used to prevent the mixing of incompatible wastes.

Chemical wastes stored in the unit are separated by compatibility and hazard class. Before accepting unfamiliar wastes from generators, staff determines the compatibility group for each waste so that wastes may be stored with compatible materials. The Waste Analysis Plan in Section C describes those technical review procedures utilized to determine the compatibility grouping.

As discussed in detail in Section D, the facility is designed so that incompatible materials are adequately separated by berms, distances, and walls to prevent mixing of spilled materials which are incompatible The facility has combustible gas detector systems in the flammables room and blending/bulking room. This detection system will activate an alarm and high volume (25-30 air exchanges per hour) exhaust system in the event of a spill or accumulation of a potentially explosive atmosphere. The flammables and blending/bulking rooms are also equipped with an infrared flame and thermal detector.

Reactive are stored in a separate room with explosion relief walls. Fire extinguishing media consist of carbon dioxide. No water will be introduced into the reactive room to prevent a reaction with water reactive chemicals.

F.5.c Management of Ignitable or Reactive Wastes in Containers

40 CFR 264.176

Containers holding ignitable or reactive waste are located at least 50 feet from the facility's property boundary. Figure F-4 shows an area fifty feet from the outer walls of the ignitable/reactive waste storage areas, as well as an area showing a radius of fifty feet from the outer walls of the building's Main Storage Area. The Loading Dock and the Office Areas are not included in these fifty foot radii.

F.5.d Management of Incompatible Waste in Containers

40 CFR 264.177(a) and (b)
40 CFR 264.17(b) and (c)

This section describes 1) the procedures used to ensure that incompatible wastes and materials are not placed in the same container and 2) the devices used to separate wastes in containers.

Incompatible hazardous wastes are strictly segregated and managed in discrete, separate waste management areas:

- Flammables
- Reactive
- Organic Acids
- Herbicides/Pesticides
- Polychlorinated Biphenyls (PCBs)
- Caustic/Cyanides
- Heavy Metals
- Oxidizers/Peroxides
- Inorganic Acids
- Non-Flammable Organics
- Mixed Waste (or X-RAD)/ hazardous waste with radioactive material*

Following the procedures set forth in Section C.3, Waste Analysis Plan, each waste is evaluated to determine the chemical compatibility group to which it belongs. Technicians are provided with sufficient training such that incompatible wastes are not placed in the same container. Only wastes which have been determined to be compatible through the waste technical review process are blended.

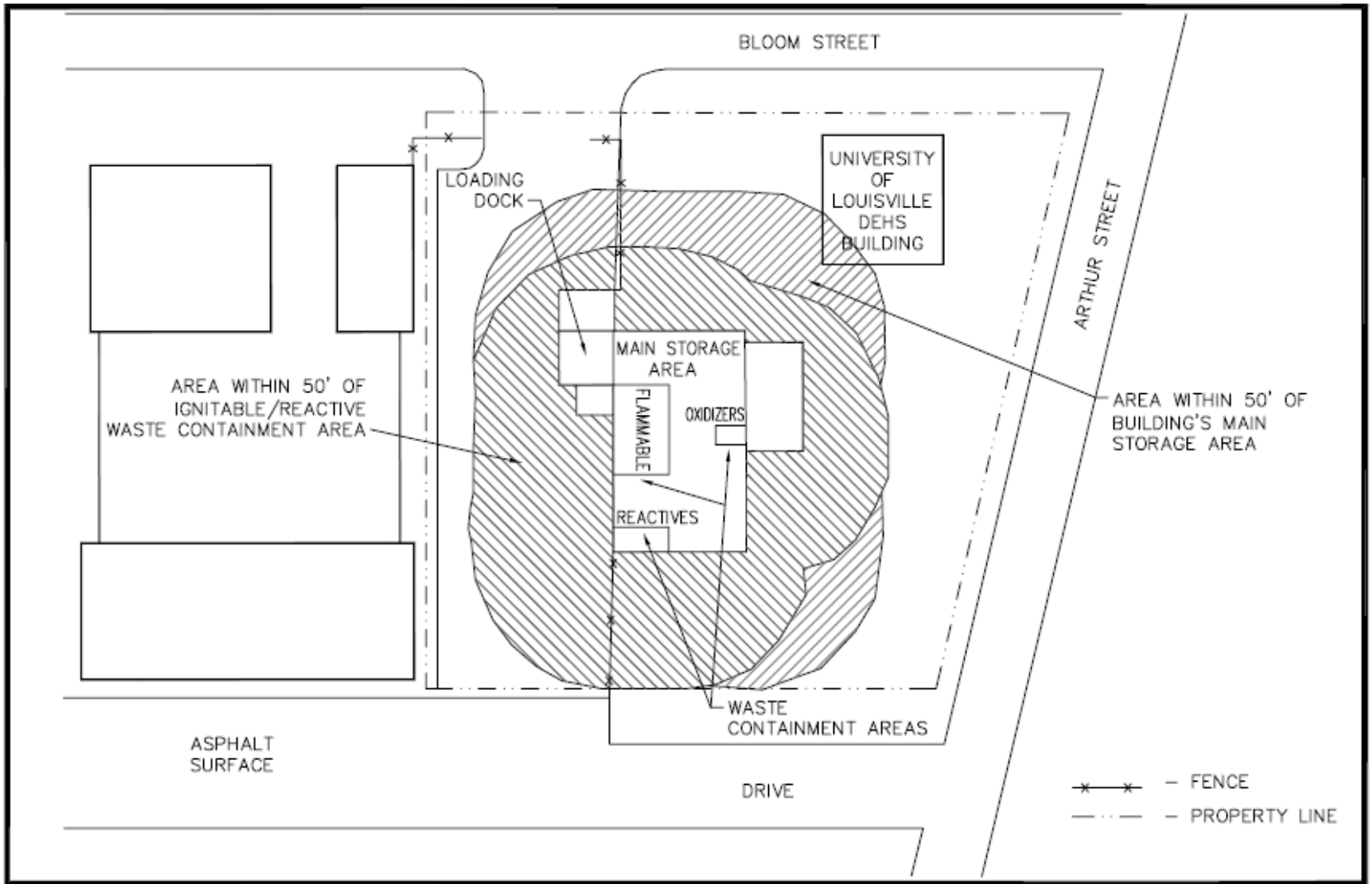
Commented [MK4]: NOD 25

All hazardous waste management areas are designed for spill containment to prevent mixing of incompatible wastes in the event of a spill or leak. The floor of each storage space is lower than the storage building aisle floor. Each containment area is separated from the adjoining space by a berm. The aisles for the transfer of materials throughout the building have a minimum of one percent slope to the center from each outer edge to prevent spills that occur in the aisle from entering the individual storage spaces to prohibit the potential mixing of incompatible wastes.

*The management and segregation of Mixed Waste materials and containers are also in accordance with the procedures set forth in Section C.3, Waste Analysis Plan. Each waste is first evaluated to determine the chemical compatibility group to which it belongs. The Mixed Waste containers are then placed in the specific waste management area to which they belong. (See Section C 9.1 Basis of Compatibility and 9.2 Basis of Segregation in Attachment C-1). Also, each item is managed in accordance with the Kentucky Radiation Control Branch. 902 KAR 100 requires that all materials be shielded to 2 millirems per hour or less at the contact level and as low as reasonable achievable. (This requirement will be achieved and documented by the University's Radiation Safety Office prior to shipment and receipt at the facility). All containers received at the facility provide adequate shielding required by this regulation.

Commented [MK5]: NOD 25

Detailed design descriptions of containment systems can be found in Section D.



UNIVERSITY OF LOUISVILLE ENVIROMENTAL PROTECTION SERVICES CENTER	50' RADIUS FROM IGNITABLE/REACTIVE WASTE	FIGURE F-4

FILE: P:\7362\UOFL-546260000-RCRAPARTBAPPLICATION\CAD-GIS\WASTE

ATTACHMENT F-1

Example EPSC Daily, Weekly, & Monthly Inspection Forms

Daily Inspections Form *(Example)* *Actual inspection log maintained in Access Database*

Inspector	Title	Date	Time	Segregated	Closed	Marked	Good Condition	Aisle Space	Floors/ Sumps	Loading Dock	Safety Showers	Fire Alarm	Comments

Weekly Inspection Form *(Example) Actual inspection log maintained in Access Database*

Date	Time	Inspector	Title	Spill Supplies	Shovels	Drums	Good Condition	Overpack	PPE	Respiratory Equipment	E-Lighting Tested Date/time	Fire Extinguishers in place

Weekly Inspection Form *(Example) - Continued*

Fire Extinguishers Unobstructed	Fire Extinguishers Charged	CO2 System Charged	Fire Alarm Operational	Fire alarm Test Date	LEL System Functioning	LEL System Test date	Two-Way Radios	Safety Showers	Comments

Monthly Inspection Form *(Example) Actual inspection log maintained in Access Database*

Inspector	Title	Date	Time	First Aid Supplies	Fire Alarm	Warning Signs	Alarm System	Locks	Emergency Lighting	Fence	Comments

SECTION G –
CONTINGENCY PLAN

UNIVERSITY OF LOUISVILLE
ENVIRONMENTAL PROTECTION SERVICES CENTER (EPSC) – Bldg. 107A
Part B Treatment, Storage, and Disposal Facility [TSDF]
1810 Arthur St
Louisville, Kentucky 40292
EPA ID: KY0 001 012 012
AI # 48952

CONTINGENCY PLAN

(Attachment G-1 of the Part B Permit Application)

Revision: May 31, 2022

Prepared by:
University of Louisville
Department of Environmental Health & Safety
Louisville, KY

Main Office: 502-852-6670
After Hours: 502-852-6111

CONTINGENCY PLAN

TABLE OF CONTENTS

Section **Page**

1.0 GENERAL INFORMATION 1
2.0 EMERGENCY COORDINATOR 2
3.0 IMPLEMENTATION 2
4.0 EMERGENCY RESPONSE PROCEDURES 4
4.1 Notifications 4
4.2 Identification of Hazardous Materials 5
4.3 Hazard Assessment 6
4.4 Control Procedures 7
4.5 Prevention of Recurrence or Spread of Fires, Explosion, or Releases 9
4.6 Storage and Treatment of Released Material 9
4.7 Incompatible Wastes 11
4.8 Post-Emergency Equipment Maintenance 12
4.9 Container Spills and Leakage 12
5.0 EMERGENCY EQUIPMENT 14
6.0 COORDINATION AGREEMENTS 19
7.0 EVACUATION PLAN 19
8.0 REQUIRED REPORTS 20

Exhibit A Contingency Plan Notification List 22
Exhibit B Letter of Agreement with Emergency Response Agency (Example) 23
Exhibit C EPSC Facility Evacuation Routes 24
Figure D EPSC location 25
Figure E Location of Safety Equipment/Spill Supplies 26
Exhibit F EPSC Quick Reference Guide 27-30

CONTINGENCY PLAN

40 CFR 264 Subpart D

This Contingency Plan is incorporated into the University of Louisville (U of L) Part B Application as Attachment G-1 of Section G. The Contingency Plan is a document setting out an organized, planned, and coordinated course of action to be followed in case of a fire, explosion, or release of hazardous waste or hazardous waste constituent which could threaten human health or the environment.

1.0 GENERAL INFORMATION

40 CFR 264.52

The U of L Environmental Protection Services Center (EPSC) is located at 1810 Arthur Street, Louisville Kentucky, and is the University's storage and treatment of hazardous and other wastes generated from University operations (Exhibit D). The EPSC is an EPA and state permitted treatment, storage, and/or disposal facility (TSDF). EPA Identification Number: KY0 001 012 012, Kentucky Division of Waste Management (DWM) Agency Interest Number 48952. The facility only accepts, and stores waste generated from University operations. The University's Department of Environmental Health and Safety (DEHS) is responsible for the operation of the facility. In the event that an emergency condition occurs with the potential to threaten human health or the environment, the following Contingency Plan will be initialized and maintained until the emergency condition has been stabilized. Any emergency outlined under Section 3.0 arising in the area will be responded to as outlined in this Contingency Plan.

The Contingency Plan will be reviewed and amended immediately, if necessary, whenever regulations are revised which affect the plan, the plan fails in an emergency, the facility's potential for emergency situations increases, the list of emergency coordinators changes, or the list of emergency response agencies changes.

In accordance with 40 CFR 270.42 and 401 KAR Chapter 39:060 Chapter 5, the University will request permit modification procedures found in the referenced regulations. It will be the responsibility of the Emergency Coordinator or his designee, to review the plan and make necessary modifications for submittal to the Division of Waste Management. Permit modifications will be submitted for approval and modifications instituted in accordance with timetables approved in these referenced regulations. Modifications to the Contingency Plan will not be finalized until these permit modification requirements have been met. After these requirements have been met by the University, the Contingency Plan will be modified and sent to applicable reonse agencies for updating.

NOD 70; Morris

A copy of the Plan is posted in the storage area of the EPSC. A copy is also maintained in the DEHS administration offices and the ULPD Office.

2.0 EMERGENCY COORDINATOR

40 CFR 264.55

The DEHS Hazardous Materials & Environmental Manager will be the primary Emergency Coordinator (EC). In his/her absence the Radiation Safety Manager, Biological Safety Manager, or the Hazardous Materials Technician, Sr. within the DEHS will be the alternate Emergency Coordinator. At all times, at least one of the above will be on call to respond to an emergency. The EC may modify the plan in emergency situations to more adequately protect human health or the environment.

In addition, the Contingency Plan Notification List (Exhibit A) contains all emergency notification telephone numbers associated with the plan. The list is kept current at all times and is posted within the EPSC and the DEHS administrative offices.

2.1 Authority to Commit Resources

The Emergency Coordinator is authorized to commit the resources needed to carry out the contingency plan.

3.0 IMPLEMENTATION

40 CFR 264.51

The Contingency Plan is only required for emergency situations involving hazardous waste or hazardous waste constituents. The decision to implement the Contingency Plan depends upon whether or not the emergency situation presents a threat to human health or the environment.

The purpose of this section is to list the contingencies and provide associated decision making criteria for the EC to determine whether or not to formally implement the Contingency Plan.

The Contingency Plan will be implemented in any of the following situations:

A. Fire and/or Explosion

1. A fire causes, or could cause, the release of hazardous waste or hazardous waste constituents.

2. A fire spreads and could possibly ignite hazardous wastes or hazardous waste constituents, or could cause heat-induced explosions.

3. The fire could possibly spread to off-site areas.

4. Use of water or chemical fire suppressant could result in uncontained contaminated run-off.

5. Use of water or available fire suppressant could cause violent reaction or explosion.

6. An imminent danger exists that an explosion could occur.

7. An explosion has occurred.

B. Sudden or Non-sudden Release of Hazardous Waste or Hazardous Waste Constituents

1. A spill occurs on-site, but a potential exists for air, soil, groundwater, or surface water contamination.

2. A spill releases flammable liquids, vapors, gases, or dusts, thus causing a fire or explosion hazard.

3. A spill releases or is expected to release airborne contaminants at levels which could present an imminent health hazard, i.e. above threshold limit values (TLV's) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH), to personnel responding to the emergency.

4. A spill cannot be contained on-site resulting in the potential for off-site soil contamination and/or ground or surface water contamination.

5. The spill enters the sewer system inadvertently.

6. A cloud of toxic gas, vapor, fume, or mist is formed from a release and presents an imminent danger to human health off-site.

7. A spill or release of any material occurs in excess of a reportable quantity limit.

C. Injured or Ill Personnel

An individual who receives an injury or illness due to an exposure to some form of hazardous waste or hazardous material requires outside emergency medical assistance and/or hospitalization. (This would not include an exposure, such as a small splash of material which could easily be washed off by facility personnel.)

4.0 EMERGENCY RESPONSE PROCEDURES

40 CFR 264.56

4.1 Notifications

40 CFR 264.56(a)

The EPSC is required to have an internal communications or alarm system capable of providing immediate emergency instruction, by voice or signal, to facility personnel. The hazardous waste storage area has telephones which can be used to call other University departments or to call outside the University. Emergency response phone numbers for police, fire, ambulance, and the Emergency Coordinator are posted near each telephone. Telephones are located in the office and storage areas. The facility is also equipped with emergency buttons and pull boxes.

DEHS utilizes radio communication devices which can communicate with University departments (e.g. ULPD, Physical Plant), as well as within DEHS. DEHS has a base station located in its administrative offices for monitoring during normal working hours.

All University ULPD Officers have 800 MHz radio communication capabilities to communicate with one another and with other departments. The hazardous waste area is equipped with a heat sensor which sends an alarm to ULPD in the event of an excessive heat buildup. Fire alarms, smoke/heat sensors, and sprinkler system alarms are wired into the ULPD Office.

In the event of an emergency situation as listed in Section 3.0, the EC must be immediately notified. The first person recognizing an emergency must immediately notify either the EC or the ULPD Office.

A. The EC (or alternate) or ULPD Officer (whomever is notified first) will obtain the following information from the caller. The ULPD Office is open 24 hours a day, seven days a week. The telephone number is 852-6111:

1. Name of the person reporting incident and telephone number calling from

2. Time, date, and location of emergency

3. Type of emergency, i.e. fire, spill, or explosion

4. Hazardous wastes and constituents involved (name and quantity, to the extent known)

5. Notification of any injuries or potential for injury

6. Determine if incident threatens other occupants in building or adjacent properties.

B. 1. If the EC is contacted first, he/she or his/her designee will immediately relay all pertinent information to ULPD as well as any specific instructions regarding assistance.

2. If ULPD is notified first, they will likewise immediately contact the EC and relay the information. Both the DEHS and ULPD will have forms readily available for the recording of emergency information. The Emergency Coordinator will, or if not immediately available ULPD, will additionally make any regulatory agency notification necessary in accordance with Section 4.1 and Section 8.0.

C. If the emergency involves any of the following, ULPD will immediately call 911 and report the incident to the appropriate authorities:

1. Fire or fire potential
2. Injury
3. A hazardous material release to the sewer system in any quantity
4. Threat to other occupants in a building or adjacent property
5. An undefined chemical or a chemical over its "reportable quantity" (RQ) value

They will likewise immediately contact the EC and relay the pertinent information.

D. ULPD, if requested by the EC or alerted by the caller that evacuation is necessary, will dispatch security units to block off the area and/or assist in evacuating personnel out of the building.

4.2 Identification of Hazardous Materials

40 CFR 264.56(b)

Whenever there is a release, fire, or explosion, the EC will immediately identify the character, exact source, amount, and area extent of any released material. The spilled waste will be identified by visual inspection, sampling, reference to manifests, and/or by consulting with operations personnel. The facility operating record includes information on the characteristics and management procedures for all types of wastes to be received at the facility. This information will be used to evaluate the chemical characteristics of any spilled material, as well as to ascertain the volume of the release.

Routine identification of wastes and other materials managed by the EPSC is described in Section C.3, Waste Analysis Plan.

NOD 25; Morris

The chemical and physical characteristics of waste accepted at the facility are sufficiently identified by analytical and/or detailed process knowledge provided by the individual generator. This information is necessary to accept, store, treat, and dispose of waste, or for response to spills of these materials.

All pertinent information from generators are entered on Work Orders and stored in a computer waste tracking system. The facility is equipped with a computer terminal for access to that system for emergency situations.

The EC will use chemical information, analytical data, and/or information from the generator regarding the process generating the waste, together with literature reviews and the professional judgment of the reviewer, to determine the character, event source, and approximate amount.

In addition to this information on each waste/material at the facility, the EC can utilize air monitoring and surveillance instrumentation. Such methods include combustible gas and oxygen deficiency meter and mercury vapor meter.

4.3 Hazard Assessment

40 CFR 264.56(c)

Once the spilled/ignited/reacted hazardous waste has been positively identified as described in Section 4.2., it should be possible to determine the extent of the danger posed by the incident.

Individuals performing an assessment will determine both the direct and indirect hazards posed by the incident. Assessment will be made through observations for the following criteria:

- The nature and extent of the incident;
- The intensity or magnitude of fire or explosion;
- The location of the incident;
- What materials are involved;
- The extent of materials released to the air and surrounding area;
- The potential for escalation through subsequent explosions or the spread of fire to other hazardous materials;
- Potential short and long-term effects, with regard to human health and the environment;
- The potential that the fire or explosion could spread to nearby buildings;
- The need for outside assistance and/or evacuation (Note: No firefighting will be attempted by the facility staff if it is believed there could be significant risk or injury to unit personnel).

The proper extinguishing media for the fire will be established by the EC (i.e. foam, dry chemical, water, etc). Based on evaluation of the event, the EC or alternate will determine whether evacuation of the facility is required. If evacuation of buildings in the vicinity of the facility or the entire neighboring area is required, evacuation will be in accordance with Section 7.0.

In the event that the Contingency Plan is activated, the EC will notify the Kentucky Division of Waste Management and the National Response Center. Activation of the appropriate emergency response will be decided by the EC. As additional information on the event becomes available, the classification of the event and the response level will be revised accordingly if necessary.

4.4 Control Procedures

40 CFR 264.56(c,d,e)

A. Fire

1. A person encountering a fire in its incipient stages should attempt to extinguish the fire if a fire extinguisher is readily available and in doing so this does not endanger the health of the person and the person is trained in its proper use. The person should then notify the EC or ULPD. Even if the fire is extinguished, the Louisville Fire Department will still be called as a measure of safety.

2. If the fire has spread, or is too dangerous to fight with facility personnel, activation of the emergency pull button, notification of the EC or ULPD, and evacuation of the building(s) will occur.

3. When the Fire Department is on-scene, the highest ranking fire official will have control of emergency actions relative to mitigating the fire emergency. The EC will act as the University representative providing information as needed and serving in an advisory role.

4. The EC and Fire Department officials will make the determination as to whether or not other response agencies need to be notified (which had not already been notified as required elsewhere within the Contingency Plan) and/or if adjacent properties need to be evacuated.

5. The area will be cleared of all personnel not actively involved in fighting the fire and emergency response efforts.

6. Any injured personnel will be removed, and medical treatment will be administered by qualified emergency medical personnel.

7. Fire officials will consult with the EC when a question arises as to the proper fire extinguishing media to use. The Emergency Coordinator will attempt to have available material safety date sheets (MSDSs), chemical reference books, or other

available information on hazardous materials and wastes involved in an emergency for review to assist in determining appropriate response actions.

8. Fire fighting will not be done when it is determined that the risk of injury is too great for persons fighting the fire. In such cases, fire officials and other response agencies may decide to evacuate a larger area.

B. Sudden or Non-sudden Releases of Hazardous Waste or Hazardous Wastes Constituents

1. The DEHS has, in the general EPSC storage area and facility office, an ample supply of emergency response equipment. Section 5.0 lists all emergency equipment and includes a physical description and capabilities for responding to hazardous materials incidents. Additionally, personnel within the DEHS have received specialized training regarding hazardous wastes/materials handling and emergency response. For these reasons, it is foreseeable that any spills or releases occurring can be safely handled by University personnel unless severe in magnitude.

2. Any spills or releases will be immediately reported to the EC. The EC will determine what actions are to be taken as a result of his/her assessment.

3. Personnel, when discovering a spill or release, should attempt to contain the material to prevent contamination spread if this can be done safely, and then evacuate the building and await instructions from the EC.

4. If the EC determines that University personnel can mitigate the spill/release, then personnel from the DEHS will clean up the spill/release. The EC will instruct personnel as to the proper emergency response procedures including what personnel protective equipment to don based upon the hazardous wastes/materials involved and a review of available MSDSs or other chemical hazard resource material.

5. If the EC determines that evacuation of the entire building and/or adjacent properties is necessary, then evacuation will take place in accordance with Section 7.0.

6. If the EC determines that outside emergency response assistance is needed, then the appropriate agencies will be contacted as listed in Section 6.0

C. Injured Person

1. Any personnel injured as a result of exposure to hazardous wastes or materials will receive appropriate medical attention. If a person has a hazardous material splashed in the eyes, the person should immediately go to an emergency eye wash station or other source of clean water and rinse the eyes for 15 minutes. If a

person has skin contact with a hazardous material which can be injurious via contact with the skin, the person should immediately wash off the skin with clean water, removing clothing if necessary.

2. Any injury as a result of exposure to hazardous materials will be reported to the EC and outside emergency medical assistance will be summoned (if required).

3. A person who has suspected fractures, neck, or back injuries should never be moved until qualified medical assistance arrives, unless the person is in danger where he/she lies, i.e. fire, spill.

4. The EC will make an assessment as to any response actions necessary, other than medical treatment. Any further actions necessary, i.e. spill response, fire hazard, will take place in accordance with Section 4.0

5. The EC will ensure that information regarding the hazardous wastes/materials involved is relayed to the medical authorities for proper treatment of injured personnel.

4.5 Prevention of Recurrence or Spread of Fires, Explosion, or Releases

40 CFR 264.56(e)

The EC will take whatever steps are necessary to prevent the recurrence or spread of fires, explosions, or releases in any emergency situation. This may include the stopping of processes and operations, collection and containment of released hazardous materials/waste, and/or isolating containers. The EC will, in an emergency situation, continually monitor for signs of leaks, pressure buildup, gas generation or ruptures in valves, pipes, or other equipment, where applicable.

4.6 Storage and Treatment of Released Material

40 CFR 264.56(g)

When the emergency has been brought under complete control and the threat to human health and the environment has been stabilized or neutralized, the EC or his/her designee will immediately initiate the following remedial actions in order to restore the facility to operational readiness. If needed, a contract remediation contractor will be used to perform these tasks.

A. Monitoring of the Cleanup Actions

1. The EC or his/her designee will continue to monitor the area during the remedial cleanup operations.

2. The entire area involved in the emergency will be cordoned off and only operations directly related to the remedial cleanup will be allowed in the affected area.

3. The EC will ensure that all remedial operational personnel are properly equipped with necessary personal and respiratory protective equipment. The EC will use available information such as MSDSs, process knowledge, or other available information to make this determination.

4. If flammable materials are involved, all sources of ignition will be eliminated, and only explosion-proof or non-sparking equipment will be used during the cleanup.

B. Storage, Treatment, or Disposal of Released Material

1. All recovered waste, contaminated soil, absorbent liquids, or other liquid or solid material resulting from the incident will be collected, containerized in DOT-approved containers, if required, and stored for off-site disposal when the remedial cleanup is complete.

2. The EC or his/her designee will make arrangements for the treatment, storage, or disposal of recovered waste material, contaminated soil, surface water, or any other contaminated material resulting from the emergency.

3. All disposable personal protective equipment (e.g. gloves, chemical suits and jackets, etc.) will be collected and placed in DOT-approved containers for off-site disposal.

C. Sampling of Affected Area to Determine if Remedial Cleanup was Successful

As necessary, the EC or his/her designee will perform appropriate sampling and analysis of the affected area to determine if the spill material has been satisfactorily removed and no further contamination exists. The sampling will be performed as follows when warranted:

1. The sampling will be performed in accordance with all Environmental Protection Agency and Kentucky Department for Environmental Protection guidelines and acceptable methodologies. A sampling plan will be developed prior to the sampling and reviewed with the appropriate agency (if needed) to ensure the sampling event meets all objectives. Sample type and number will depend on the materials released and the extent of the release.

2. All sample analysis will be performed in accordance with accepted analytical procedures utilizing acceptable quality assurance and quality control.

3. All required notifications and written reports will be made to the appropriate agencies of the results of the cleanup efforts and analytical results.

4.7 Incompatible Wastes

40 CFR 264.56(h)(1)

After an emergency, the EC or his/her designee will ensure that no waste that may be incompatible with released material is treated or stored in the affected area until cleanup procedures are completed. Wastes from cleanup activities will be managed in the same manner as all other wastes. Incompatible wastes will not be placed in the same container. Containers will be placed in storage areas appropriate for their compatibility class.

Since not all wastes are compatible with each other, the mixture of two or more chemicals (wastes) may produce undesirable or uncontrolled reactions resulting in adverse consequences (i.e. fire, explosion, toxic gas generation, etc.).

Incompatible wastes and chemicals will be physically separated, while items of similar nature and characteristics can be placed together or in close proximity. Section 9.0 of the Waste Analysis Plan (Attachment C-1 of Section C) describes EPSC procedures in determining compatibility and segregation of wastes.

Using all information available, including information from the waste tracking computer system, container labels, and literature searchers, the EC and the technical staff will evaluate the waste characteristics. Using professional training/education and waste management experience, the compatibility group most closely related to the waste will be selected.

Stored containerized cleanup wastes will be segregated with respect to ignitability, compatibility, and considerations for ultimate treatment and/or disposal. Each waste will be placed in storage according to its compatibility group.

The containment system for each compatibility group in the EPSC is required to have sufficient capacity to contain ten percent of the volume of containers or the volume of the largest container, whichever is greater. Containers that do not contain free liquids do not need to be considered in this determination; however, the EPSC has been conservatively designed with the assumption that all containers will contain free liquids.

The storage areas which will hold ignitable or reactive wastes are located greater than fifty feet from the facility property line. The general storage area has discrete management areas/rooms with individual secondary containment structures. Ignitable and reactive wastes are managed in self-contained explosion proof rooms. The rooms are provided with explosion proof equipment and lighting. Containers of flammable materials are bonded and grounded during all opening/transfer operations. Each area managing flammable materials has LEL detectors which will activate an emergency ventilation system should a potentially dangerous situation occur.

Cleanup of spills where wastes or materials are incompatible will follow special containment and treatment requirements. Berms of inert materials will be utilized to contain the waste or material.

4.8 Post-Emergency Equipment Maintenance

40 CFR 264.56(h)(2)

Any emergency response equipment that is used in an emergency or cleanup operation will be decontaminated or replaced so that it will be in operable condition. Supplies will be fully stocked as before the emergency. The EC or his/her designee will ensure that this is completed through an inspection prior to the resuming of normal operations. University personnel will wear disposable personal protective equipment whereby decontamination consists of removal of clothing and placement in DOT-approved containers for proper disposal. If equipment or property (i.e. floor surfaces, walls, fixed equipment) requires decontamination, spill pads, absorbent, cleaning solutions, or a combination thereof will be used.

Example procedures for cleaning equipment are as follows:

- All dry chemical extinguishers will be washed and wiped clean and then refilled as soon as it is practical. The wash water will be collected and managed as appropriate (to be determined through testing).

- If a fire truck is involved, it will be inspected for mechanical or other deficiencies. Steam cleaning and decontamination will occur in-situ; wash water will be collected for off-site disposal.

- All facility fire fighting capabilities, water, dry chemical, and foam will be replenished, where necessary.

- All additional emergency equipment (e.g. backhoes, bulldozers, hand tools) will be washed and cleaned in-situ, and serviced as required after the emergency.

4.9 Container Spills and Leakage

40 CFR 264.56(h)(2)

If a container is leaking, its contents will be transferred to a new or overpack container. Ignitable or reactive wastes will be transferred according to fire safety procedures (e.g. use of non-sparking tools, use of explosion-proof electrical equipment, grounding of containers).

If a container is not leaking, but is of questionable integrity, it will be transferred to an overpack container. All void space in the overpacks will be filled with absorbent material

(e.g., vermiculite). Any waste containers filled as a result of leak response (e.g. overpacks, cleanup residuals) will be labeled and managed in the same manner as other hazardous waste containers.

All operating procedures will be geared to minimize the chance of spills from occurring. In the event of a discharge or spill of hazardous wastes, the immediate objectives are to contain the spill and to properly decontaminate the area prior to resuming operations.

General spill response will include the following:

- Isolate and contain the spill area to prevent further surface contamination.
- Collect the spilled materials by use of pumps and/or absorbent materials for liquids, and by use of shovels or vacuums for solid materials or dust.
- Clean up the spill area by removing the absorbing agents, waste materials, and any contaminated soils. The contaminated soils, absorbing agents, and spilled materials will be consolidated and stored.
- All equipment or hand tools employed during the spill response operations will be cleaned and decontaminated in-situ and returned to their pre-emergency state.

If a container leaks or spills, resulting in a situation which requires implementation of the Contingency Plan, the EC will be notified immediately. De minimus spills or drips caused by routine waste transfer/process operations will be absorbed and cleaned up as part of daily operations and would not require implementation of the Contingency Plan. The following safety precautions and countermeasures will be implemented by the EC or his/her designee during a spill response, as appropriate:

- All unnecessary personnel will be removed from the area.
- Injured personnel will be removed from the area.
- All personnel within the contaminated area will wear protective safety equipment, such as protective clothing, boots, gloves, goggles, and respirators.
- Individuals splashed with spilled materials will flush the exposed area with large quantities of water from the safety shower/eyewash.
- Clothing contaminated by spilled materials will be removed immediately to minimize contact with the skin.

As soon as the spill is under control and contained, the EC or his/her designee will initiate appropriate clean-up activities, such as the following:

- Absorb liquids or pump them into drums or other appropriate containers.

- Shovel solid materials into drums or other appropriate containers.

Removal of liquids from containment systems is described in Section D.1.a (5). The EC or his/her designee will ensure that any equipment used in the spill response will be thoroughly cleaned and decontaminated in-situ before reuse.

General Storage Area

- Alert other personnel who may be endangered, call for backup, use alarm signals.
- Use appropriate protective clothing and equipment.
- Eliminate ignition sources.
- Locate source, attempt to control leak so container can be moved and isolated.
- Notify EC.
- Place container in overpack drum, if necessary.
- Use absorbent materials to contain spill and prevent exposure to incompatible materials.
- Remove or isolate incompatible wastes from the affected area when possible.
- After containment is assured, transfer leaky container contents to another specification container. Spill residues and clean-up materials to be contained as well.
- Contain and prevent further migration of any visible release to the environment outside of containment, and provide for removal and proper disposal of visibly contaminated soil or surface water.

Loading/Unloading Area

- Alert other personnel who may be endangered, call for backup, use alarm signals.
- Immediately notify EC.
- Use appropriate protective clothing and equipment.
- Cut off source, close valves, shut down pumps, eliminate ignition sources.
- Attempt to contain spills or runoff by use of absorbent material or diking with soil/sand, absorbent booms, pillows, and/or pads.
- Remove or isolate incompatible wastes from affected area when possible.
- Contain and prevent further migration of any visible release to the environment outside of containment, and provide for removal and proper disposal of visibly contaminated soil or surface water.
- Pump sumps containing spilled material to appropriate containers.

5.0 EMERGENCY EQUIPMENT

40 CFR 264.32

The EPSC is equipped with the following:

1) Internal communications for providing immediate emergency instruction to facility personnel. Emergency alarms to ULPD are located outside of rooms 107 (lab/storage area), 111(bulk/blend room), and in the receiving area (113, NW wall close proximity to roll-up door). A fire alarm pull station is located by each man-door and within restroom, as well as within the loading dock area.

2) VOIP telephones are located in room 102 (office) and on receiving area desk (113). All phones are immediately available at the scene of operations. Additionally, EPSC staff have access to hand-held two-way radios, capable of summoning immediate emergency assistance from ULPD.

3) Portable fire extinguishers are located inside room 107 (lab/storage), outside room 110 (Reactive waste room), and within room 108 (main waste storage area). Other fire control equipment (including special extinguishing equipment, such as that using foam, inert gas, or dry chemicals) are located outside and inside room 110 (Reactive waste room).

Spill control equipment and decontamination equipment are located within the receiving area (113) and inside room 107 (lab/storage).

(d) The EPSC is equipped with automatic sprinkler systems (wet and dry type),

Listed as follows is the emergency response equipment maintained by the DEHS, including a brief description of equipment capabilities. Safety equipment and spill supplies are maintained in designated storage areas (view Exhibit F for detailed locations):

Chemical Protective Clothing:

- Disposable Tyvek coveralls and jackets - disposable clothing suitable for protection against chemical particulate contamination and for general personal hygiene protection.
- Disposable Saranex-coated Tyvek coveralls – disposable clothing suitable for protection against chemical particulate contamination and for handling of acids, caustics, and limited organic solvents.
- Chemical resistant suits – designed for splash protection with heavy duty PVC fabric; resists oil, grease, and wide range of chemicals.
- Rubber boots – chemical resistant boots which offer protection against wide range of chemical contaminants.
- Nitrile gloves – disposable gloves which offer the broadest range of chemical contaminant protection.
- Vinyl gloves – thin disposable tight-fitting gloves which offer minimal chemical resistant protection and are most suitable for general personal hygiene.

Respiratory Protection:

- Full face air purifying respirators – designed for use with a wide selection of respirator filter cartridges offering varying chemical protection; protection is limited to respirator cartridge limitations; offers chemical splash protection for eyes and face; cannot be used in atmospheres which are deficient in oxygen or in IDLH atmospheres.
- Respirator cartridges to be used with air purifying respirators – approved for protection against organic vapors, chlorine, hydrogen chloride, sulfur dioxide, dusts, fumes, mists, and radionuclides.
- Self-Contained Breathing Apparatus (SCBA)

Additional Personal Protective Equipment:

- Hard hat – designed to offer wearer minimal head protection against bumps and impact objects.
- Safety glasses – designed to offer wearer minimal eye protection from airborne projectiles.
- Safety goggles – designed to offer wearer minimal eye protection from chemical splashes and airborne particulate matter.
- Full face shields – designated to offer wearer minimal face and eye protection from chemical splashes and airborne projectiles.

Air Monitoring and Surveillance Instrumentation:

- Four Gas Meter (combustible gas, lower explosive limit, hydrogen sulfide gas and oxygen deficiency) – measures the percentage of the lower explosive limit (LEL) of a flammable gas/vapor in air and the oxygen content in air.
- Mercury Vapor meter

Spill Response and Emergency Response Equipment:

- First aid kit.
- Mercury vacuum cleaner – for liquid mercury and contaminated particulate pick-up, equipped with a HEPA filter.
- Drums – 55 gallon and 85-gallon DOT drums.
- Absorbent – bags of oil-dry; peatsorb; absorbent booms for various chemical spills.
- Shovel, broom, bung wrench.
- Fire extinguishers – Class A, B, ABC and D fire extinguishers will be available in accordance with 29 CFR 1910.57.
- Granular neutralization materials for acid, base, and organic spills.

Table G-1 lists the types and descriptions of the emergency equipment that will be maintained at the facility.

Table G-1

EPSC Emergency Supplies and Equipment

All supplies and equipment located at 1810 Arthur Street Louisville, KY 40208

EQUIPMENT	DESCRIPTION/USE/CAPABILITIES	LOCATION
Major Spill Equipment:		
Absorbent booms	Liquid absorbent/diking material	Receiving area – Storage shed
Sandbags	Diking material	Outside on dock
Portable pumps	1-3 inch air-powered diaphragm; liquid removal & transfer, disposable type	Bulk/Blend room
Overpack drums	To contain leaking drums, 85-gallons each	Receiving area Storage area
Minor Spill Equipment:		
Absorbent materials	To absorb liquids/diking material	Receiving area, Storage areas, & Response Truck
Pads/pillows/socks	Oil absorbent/water repellent or liquid absorbent	Receiving area, Storage areas, & Response Truck
Shovel, broom	Contain spilled dry solid material	Receiving area & Response Truck
Protective clothing & equipment	Protection from exposure	Receiving area – Storage shed and cabinet
Self-contained breathing apparatus	Full-face, 25-min rescue pack	Response Truck
Fire extinguishers	A, B, D, and ABC	Receiving area, Storage areas, & Response Truck
First-Aid kits	On-site first aid, minor injuries	Facility restroom & Response Truck
Emergency showers & eye wash units	Decontamination, emergency aid	Receiving area, Lab and outside of Bulk/Blend room
Fire hydrants	Fire control water supply	At Bloom Street, south side of 1700 Arthur St. (Harley Davidson Bldg.)
Permanent fire monitor (Infrared sensor)	Aimable nozzle for fire detection	Flammable storage & Bulk/Blend room
Sprinkler systems	Automatic foam or water fire suppression in response to extreme heat	Facility-wide

Table G-1

EPSC Emergency Supplies and Equipment

All supplies and equipment located at 1810 Arthur Street Louisville, KY 40208

EQUIPMENT	DESCRIPTION/USE/CAPABILITIES	LOCATION
Alarm Systems:		
Fire call box	Manually operated fire warning	Facility-wide
Fire alarms	Automatic fire warning; alarm sounds when sprinkler is tripped	Facility-wide
Portable air horn	Manually operated emergency alarm	Facility office area
Internal Communications Systems:		
Handheld Radio	Communication between EPSC personnel & University police	Facility office area
Base stations	Facility-wide communication system	Facility office area
Public Address System	Facility-wide communication system	Facility-wide
Telephones	Facility-wide communication system communication between HM personnel	Facility office area and Receiving area
External Communication Systems:		
Telephone	Communication with emergency response service organizations and emergency planning committees	Facility office area and Receiving area
Hand-held radios	Communication between EPSC personnel and University police	Facility office area
Emergency vehicles:		
Response Truck	Mobile emergency unit for spill response and care of injured personnel	EPSC loading dock

6.0 COORDINATION AGREEMENTS

40 CFR 264.37

The following emergency response agencies have received copies of the Contingency Plan (see Exhibit B for an example Letter of Agreement). If applicable, the EC will obtain documentation of each agency's commitment to respond or refusal to respond to an emergency.

- Louisville Fire Department
- Louisville Fire Department Hazardous Material Unit
- Louisville Police Department
- University of Louisville ULPD Department
- Louisville Emergency Medical Services
- University Hospital
- Norton Hospital Poison Control Center (only for telephone consultation of medical emergencies)
- Louisville Metro Health Department- Hazardous Materials Unit
- Kentucky State Fire Marshall's Office-Hazardous Materials Unit
- Louisville Metropolitan Sewer District
- Kentucky Department for Environmental Protection Emergency Response Team
- Chairman of Kentucky Emergency Response Commission - Disaster and Emergency Services
- Louisville Metro Emergency Management Agency
- Remedial Services Contractor

Whenever any revision is made to the Contingency Plan, the EC will send out update copies of the plan to the agencies and inform them of the specific changes.

7.0 EVACUATION PLAN

40 CFR 264.56(a)(1)(2)

A. When the accumulation area, including the building in which it is located, must be evacuated, the EC, with the aid of ULPD, will ensure proper evacuation. Personnel within the building will be informed that an evacuation is necessary. Exhibit C diagrams the evacuation routes. The safe areas of congregation upon egress will be in the parking area immediately adjacent to the exit door of the facility. When evacuating, personnel will close all doors behind them. Alarm systems include a fire call box, automatic fire alarms, and a portable air horn (see Table G-1).

B. If the EC determines that adjacent and/or surrounding properties are in danger and evacuation is required, the Louisville Fire Department in conjunction with ULPD will be contacted to aid in expediting evacuation of the affected properties.

C. If evacuation of adjacent properties is deemed necessary, adjacent streets will be cordoned off to prohibit vehicular and pedestrian traffic. The EC in coordination with the proper response agencies will determine the area(s) of evacuation.

8.0 REQUIRED REPORTS

40 CFR 264.56(d)(2)

A. Verbal Notification of Off-Site Emergency

In addition to the 911 notification, the following additional notifications will be made when meeting the specified criterion. If the EC determines that an emergency threatens human health or the environment outside of the accumulation area or a release occurs in excess of CERCLA hazardous substance (40 CFR 302.4), the EC or his/her designee will immediately notify the Natural Response Center (800-424-8802), or if a release occurs in excess of a reportable quantity of either an extremely hazardous substance (40 CFR 355) or CERCLA hazardous substance, will immediately notify the state and local emergency response commissions, or if a release occurs in excess of reportable quantities or limits established by regulatory agencies or laws, will notify the KDEP's Emergency Response Team and report the following:

1. Telephone number of person to be contacted for further information.

2. Name and address of facility where release occurred.

3. Time and duration of release and type of incident (e.g. fire, spill).

4. Chemical name or identity of substance involved in the release and an estimate of the quantity of the material(s) involved, to the extent known.

5. An indication of whether the substance is an "extremely hazardous substance" per 40 CFR 355.

6. The extent of injuries, if any.

7. Description of the medium or media into which release occurred (i.e. air, water, soil, storm sewer).

8. The possible hazards to human health or the environment such as known or anticipated acute or chronic health risks associated with the emergency or medical advice for exposed individuals.

9. Proper precautions to take as a result of the release, including evacuation.

B. Written Notification
40 CFR 264.56(h)(2)(i)

Within 15 days after any event requiring the implementation of the Contingency Plan, the EC will submit a written report to the Kentucky Environmental and Public Protection Cabinet. Additionally, where a release occurs in excess of an extremely hazardous substance or CERCLA hazardous substance reportable quantity, a written report will be submitted to the state and local emergency response commission. The report will detail the following:

1. Name, address, and telephone number of the owner or operator and facility.

2. Date, time, and type of incident (i.e. fire, spill, and description of response actions taken).

3. Name and quantity of material(s) involved.

4. The extent of injuries, if any.

5. An assessment of actual or potential hazards to human health or the environment, where applicable.

6. Estimated quantity and disposition of recovered material that resulted from the incident.

C. Other Notification

Before operations are resumed, the EC will notify the Cabinet and appropriate state and local authorities that:

1. No waste that may be incompatible with released materials is treated, stored, or disposed of until cleanup has been completed.

2. All emergency equipment listed in the contingency plan is cleared and fit for its intended use.

All notifications will be made in accordance with applicable city and county laws, regulations, and ordinances.

SECTION G

EXHIBIT A

CONTINGENCY PLAN

NOTIFICATION LIST

University of Louisville

Environmental Protection Services Center

Exhibit A

University of Louisville
All Campuses & Environmental Protection Services Center (EPSC)
Contingency Plan Notification List for Hazardous Material Incidents & Releases
Revised September 2021

U of L DPS Dispatch: To contact DEHS Responders - Initiate text message RAVE alert via HazMat Response Group

U of L DEHS Emergency Coordinators/Responders	Home Address and Telephone
Primary Emergency Coordinator: Cathy Price, Hazardous Materials & Environmental Manager Department of Environmental Health & Safety Office (502) 852-2956 **Cell (502) 314-9629**	4232 Danny Drive New Albany, IN 47150 Cell:(502) 314-9629
Alternate Emergency Coordinator: John Morris, Chemical Regulatory Specialist Department of Environmental Health & Safety Office (502) 852-7138 **Cell (502) 428-6781**	2214 Janlyn Rd Louisville, KY 40299 (502) 428-6781
Alternate Emergency Coordinator: Sarah Hughes, Radiation Safety Manager Department of Environmental Health & Safety Office (502) 852-6146 **Cell (502) 552-5454**	812 Dani Ann way Jeffersonville, IN 47130 Cell:(502) 552-5454
Alternate Emergency Coordinator: Torsten Hopp, Biological Safety Manager Department of Environmental Health & Safety Office (502) 852-2959 **Cell: (281) 782-4373**	4014 Stone Mill Way Crestwood, KY 40014 (281) 782-4373
Emergency Response Agencies	**Telephone Number**
All Emergency Agencies	**911**
Metropolitan Sewer District (MSD)	**(502) 540-6000**
Jefferson County Air Pollution Control District	**(502) 574-6000**
University of Louisville Hospital (Emergency Dept and Trauma Center)	**(502) 562-3015**
Norton Hospital Poison Control Center (Information Only)	**(502) 589-8222**
National Response Center	**1-800-424-8802**
Kentucky Release Reporting Hotline (Hazardous Substance/Environmental Harm)	**1-800-928-2380 24 hr for ERT** (502) 564-7815 SARA Title III
Kentucky Radiation Emergency Number *(Kentucky Emergency Operations Center)*	**(502) 564-3700 (norm.business)** ***1-800-255-2587 (after hrs.)***
Other University Contacts	**Telephone Number**
University of Louisville Police Department/ ULPD	**(502) 852-6111**
Office of News and Public Information	**(502) 852-6171**

SECTION G

EXHIBIT B

CONTINGENCY PLAN

LETTER OF AGREEMENT WITH EMERGENCY RESPONSE AGENCY

University of Louisville

Environmental Protection Services Center

Exhibit B

Letter of Agreement with Emergency Response Agency

EXAMPLE ONLY

Dear _____:

Enclosed please find an emergency preparedness and contingency plan for the University of Louisville Environmental Protection Services Center. The Federal Environmental Protection Agency (EPA) and Kentucky Environmental and Public Protection Cabinet regulations require an emergency contingency plan be prepared and submitted to emergency response agencies, in the event the University could potentially need such service.

Please review the enclosed plan as your agency will be called upon in the event of an emergency requiring your assistance. Should you have any questions or desire a meeting and/or site visit to become better familiarized with hazardous materials management procedures, and/or facility layouts, please do not hesitate to call to arrange for a time at your earliest convenience. We appreciate your cooperation. Thank you.

Respectfully,

Cathy Price, CHMM
Hazardous Materials & Environmental Manager
University of Louisville
Department of Environmental Health and Safety
Desk: 502-852-2956 Cell: 502-314-9629
Email: cathy.price@louisville.edu

SECTION G

EXHIBIT C

CONTINGENCY PLAN

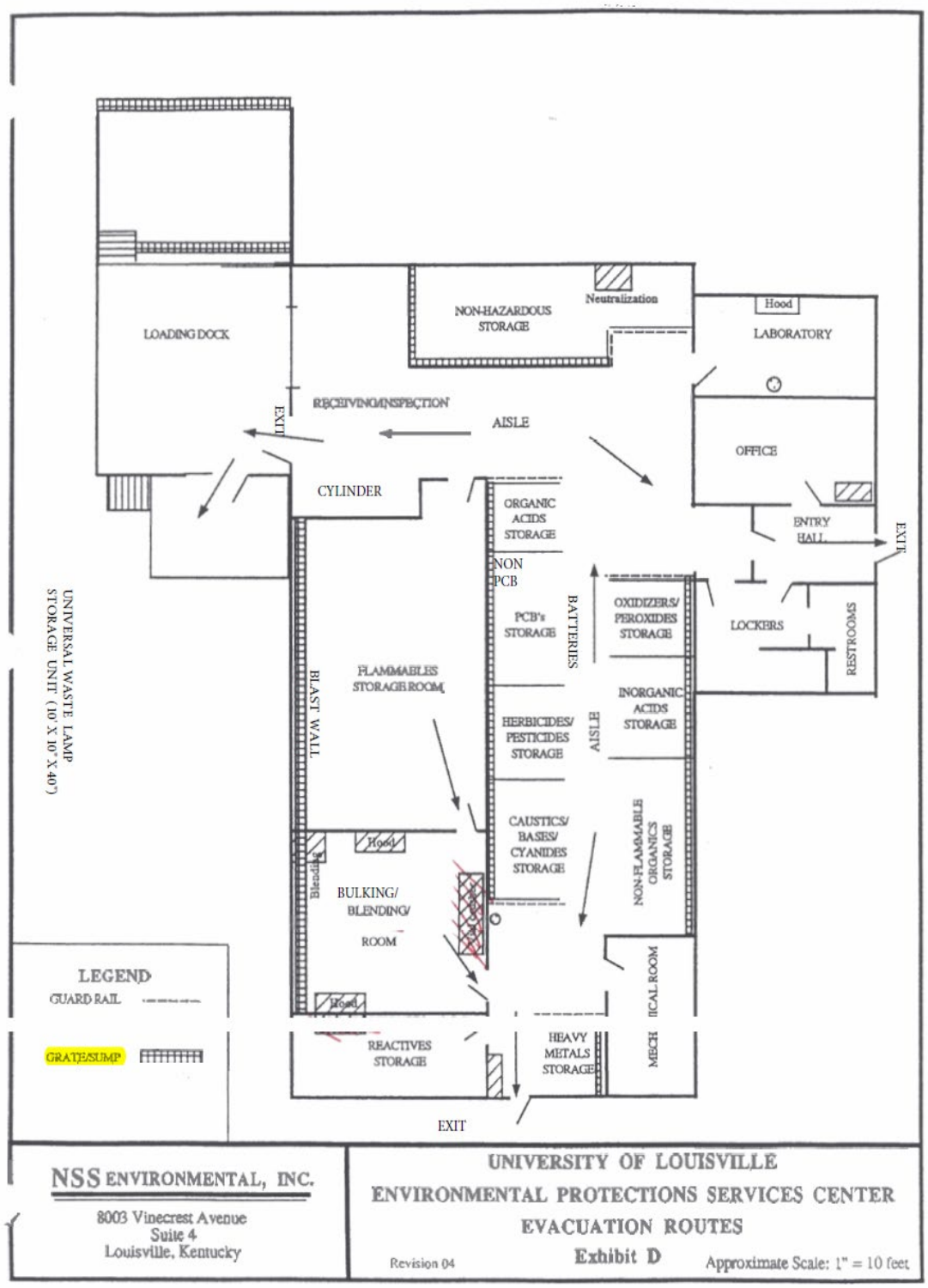
EPSC
EVACUATION ROUTES

University of Louisville

Environmental Protection Services Center

Exhibit C

EPSC Evacuation Routes



SECTION G

EXHIBIT D

CONTINGENCY PLAN

STREET VIEW AND FIRE HYDRANT LOCATION

University of Louisville

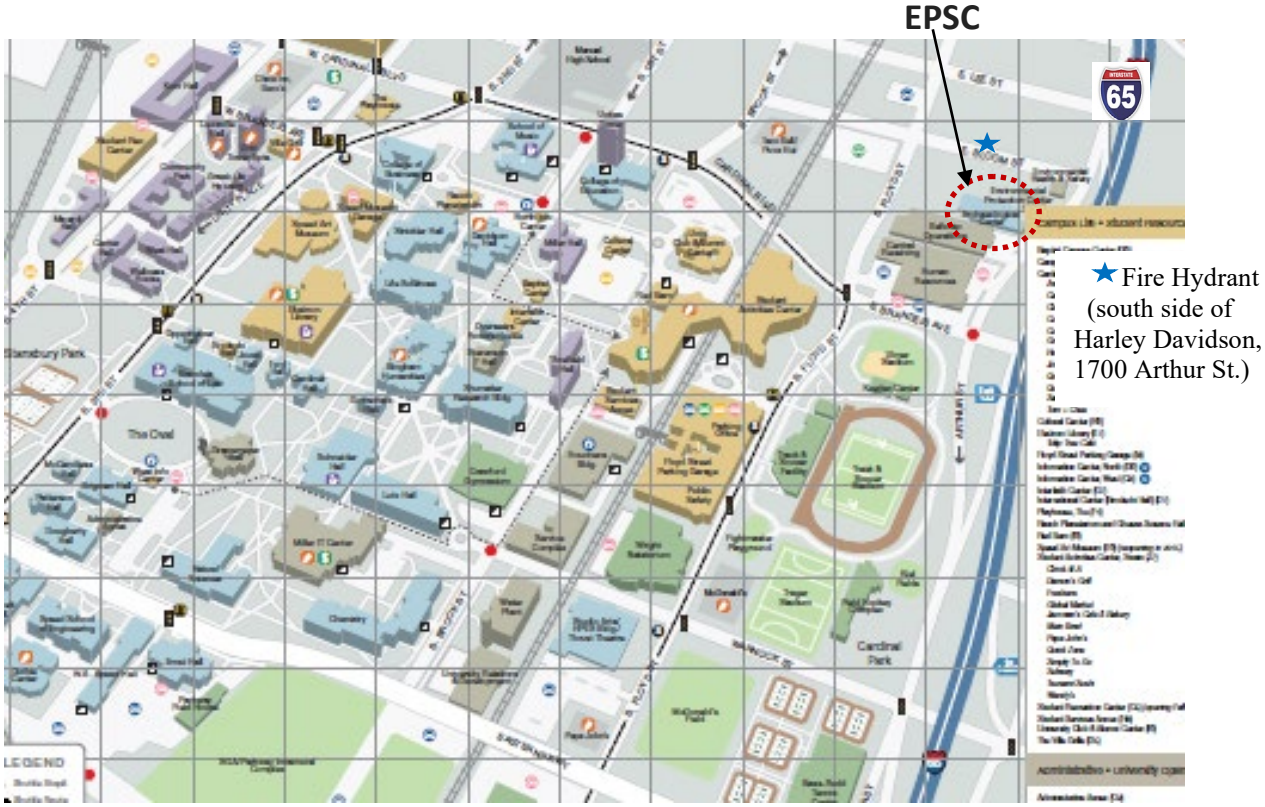
Environmental Protection Services Center

Exhibit D

Belknap Campus/Environmental Protection Service Center (EPSC)
Address: 1810 Arthur Street, Louisville, KY 40208
U of L Bldg Number: 107A

(view from Arthur Street)

Belknap Campus Map



SECTION G

EXHIBIT E

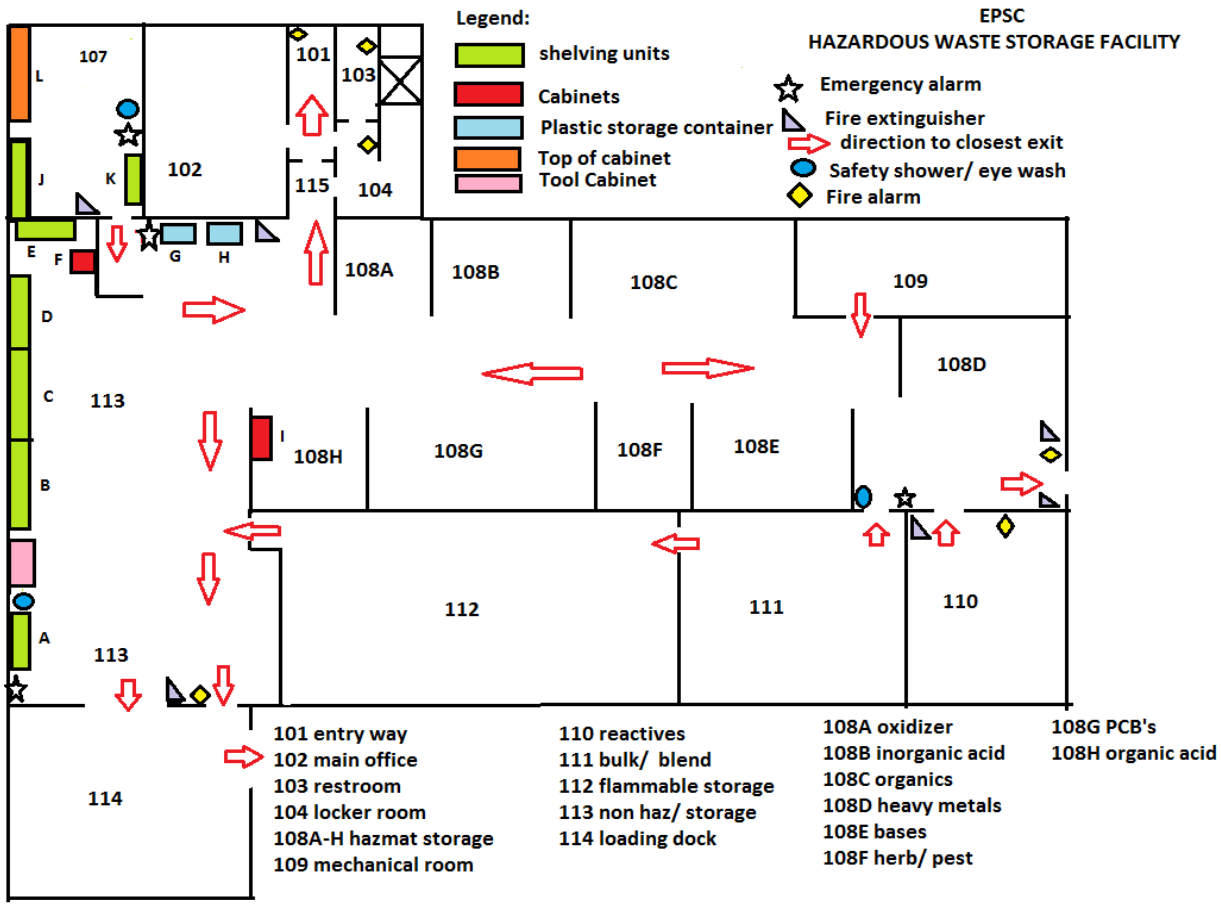
CONTINGENCY PLAN

LOCATION OF SPILL SUPPLIES AND EMERGENCY EQUIPMENT

University of Louisville

Environmental Protection Services Center

Exhibit E
Location of Spill Supplies and Emergency Equipment



Unit A Shelf 1: Peatsorb, Oil Dry
Shelving Shelf 2: Spill-X Acid Eater, Bio-hazard Spill Kits, CI agent (for spill cleanup of petroleum products in water)
(1 bottom, Shelf 3: Peatsorb, Spill-X supplies
4 top) Shelf 4: Spill Pillows and Socks
Unit B Shelf 1: NON HAZ/ NON RCRA Chemical Waste storage
Shelving Shelf 2: NON HAZ/ NON RCRA Chemical Waste storage
(1 bottom, Shelf 3: NON HAZ/ NON RCRA Chemical Waste storage
4 top) Shelf 4: Wypall Towels, General Purpose pads
Unit C Shelf 1: NON HAZ/ NON RCRA Chemical Waste storage
Shelving Shelf 2: NON HAZ/ NON RCRA Chemical Waste storage
(1 bottom, Shelf 3: NON HAZ/ NON RCRA Chemical Waste storage
4 top) Shelf 4: Universal Pads, Oil pads
Unit D Shelf 1: NON HAZ/ NON RCRA Chemical Waste storage
Shelving Shelf 2: NON HAZ/ NON RCRA Chemical Waste storage
(1 bottom, Shelf 3: NON HAZ/ NON RCRA Chemical Waste storage
4 top) Shelf 4: Oil Pads, General Purpose pads, 55 gal Drum Top pads
Unit E Shelf 1: Transport totes
Shelving Shelf 2: Transport totes
(1 bottom, Shelf 3: Sharps containers, Transport totes
4 top) Shelf 4: Transport totes
Unit F Beige File cabinet: Cleaners, Degreasers, Disinfectants, and detergent products; spray bottles, scrub brush
Unit G Mercury spill kits
Unit H Vacuum parts, Yellow drum covers, Vacuum accessories
Unit I Gray Metal cabinet (vicinity of Organic Acid storage area): Mask cartridges, drain protectors, medical supplies, hearing protection, safety glasses, NFPA signs (numbers and letters), Signage, N95 masks, pH paper, Oil test strips, etc.
Unit J Room 107, Shelving Unit: PPE suits and rain boots, Non-mercury thermometers,
Unit K Room 107, Shelving Unit: PPE gloves, Tape, Label ground and air, zip lock bags, scrub brushes, drain protectors, squirt bottles, caution tape,
Unit L Room 107, Counter: TruDefender, weigh scale
Room 112 (Flammable storage) Over pack drums, poly, multiple sizes - 90 gal, 55 gal, 30 gal, 5 gal (corner closest to bulk room)

Facing (L to R)
Outside Modular Building #1:
Empty spare drums, large sharps containers, miscellaneous equipment

Outside Modular Building #2:
Empty 55-gal poly, closed and open-head; 30-gal poly, closed-head

Outside Modular Building #3:
Empty 55-gal poly, closed and open-head; 30-gal poly, closed-head

SECTION G

EXHIBIT F

CONTINGENCY PLAN

QUICK REFERENCE GUIDE FOR EMERGENCY RESPONDERS

University of Louisville

Environmental Protection Services Center

UofL EPSC – Hazardous Waste Storage Facility

Quick Reference Guide for Emergency Responders

U of L DEHS Emergency Coordinators/Responders	Home Address and Telephone
Primary Emergency Coordinator: Cathy Price, Hazardous Materials & Environmental Manager Department of Environmental Health & Safety Office (502) 852-2956 **Cell (502) 314-9629**	4232 Danny Drive New Albany, IN 47150 Cell:(502) 314-9629
Alternate 1 Emergency Coordinator: John Morris, Chemical Regulatory Specialist Department of Environmental Health & Safety Office (502) 852-7138 **Cell (502) 428-6781**	2214 Janlyn Rd Louisville, KY 40299 (502) 428-6781
Alternate 2 Emergency Coordinator: Sarah Hughes, Radiation Safety Manager Department of Environmental Health & Safety Office (502) 852-6146 **Cell (502) 552-5454**	812 Dani Ann way Jeffersonville, IN 47130 Cell:(502) 552-5454
Alternate 3 Emergency Coordinator: Torsten Hopp, Biological Safety Manager Department of Environmental Health & Safety Office (502) 852-2959 **Cell: (281) 782-4373**	4014 Stone Mill Way Crestwood, KY 40014 (281) 782-4373

On-Site Communication

The picture below show the switches on the fire panel (fire panel is on your immediate right when you walk in the front door). In order to communicate with people inside the facility, simply flip the switch up that is labeled "all speakers talk on" and remove the walkie talkie.

Entry into the Facility

The Knox Box directly to the left of the front door possesses two keys that will allow the fire department access to the facility. One will unlock the front door and the other will unlock the door to the hazardous waste storage area.

Hazardous Waste Requiring Special Treatment

The waste below can potentially be stored at the EPSC. However, the total volume of each type won't exceed five gallons per container.

Hydrofluoric Acid – Phenol – Cyanides – Heavy Metals – Acrolein – Osmium Tetroxide – Sodium Azide

Fire Suppression System

The reactive chemical storage area (room 110) has an independent co2 fire suppression system. The cylinders supplying the co2 are braced to the wall in the mechanical room (room 109). The rest of the facilities fire suppression system is a water sprinkler system.

UofL EPSC Street Map and Water Supply

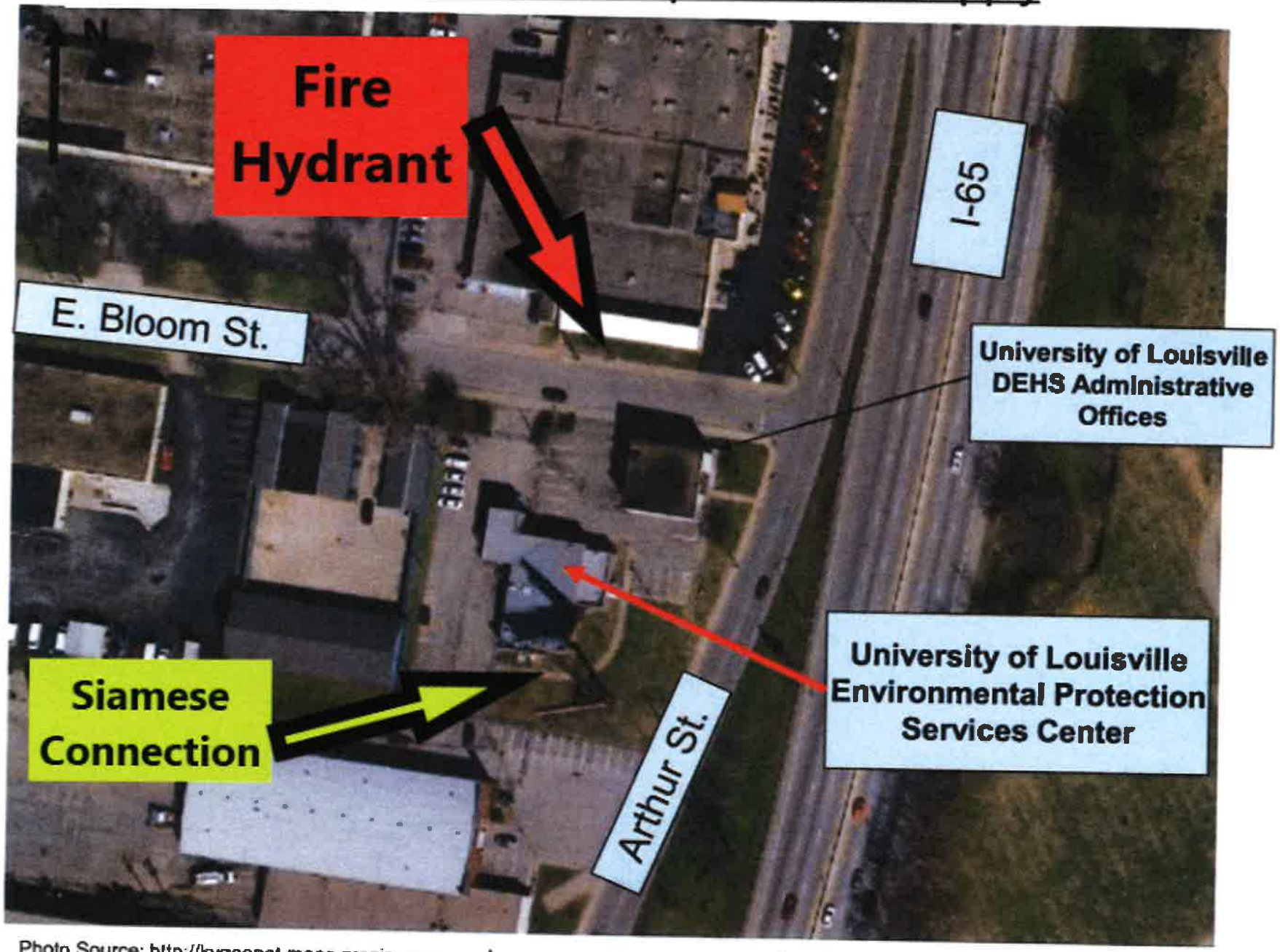
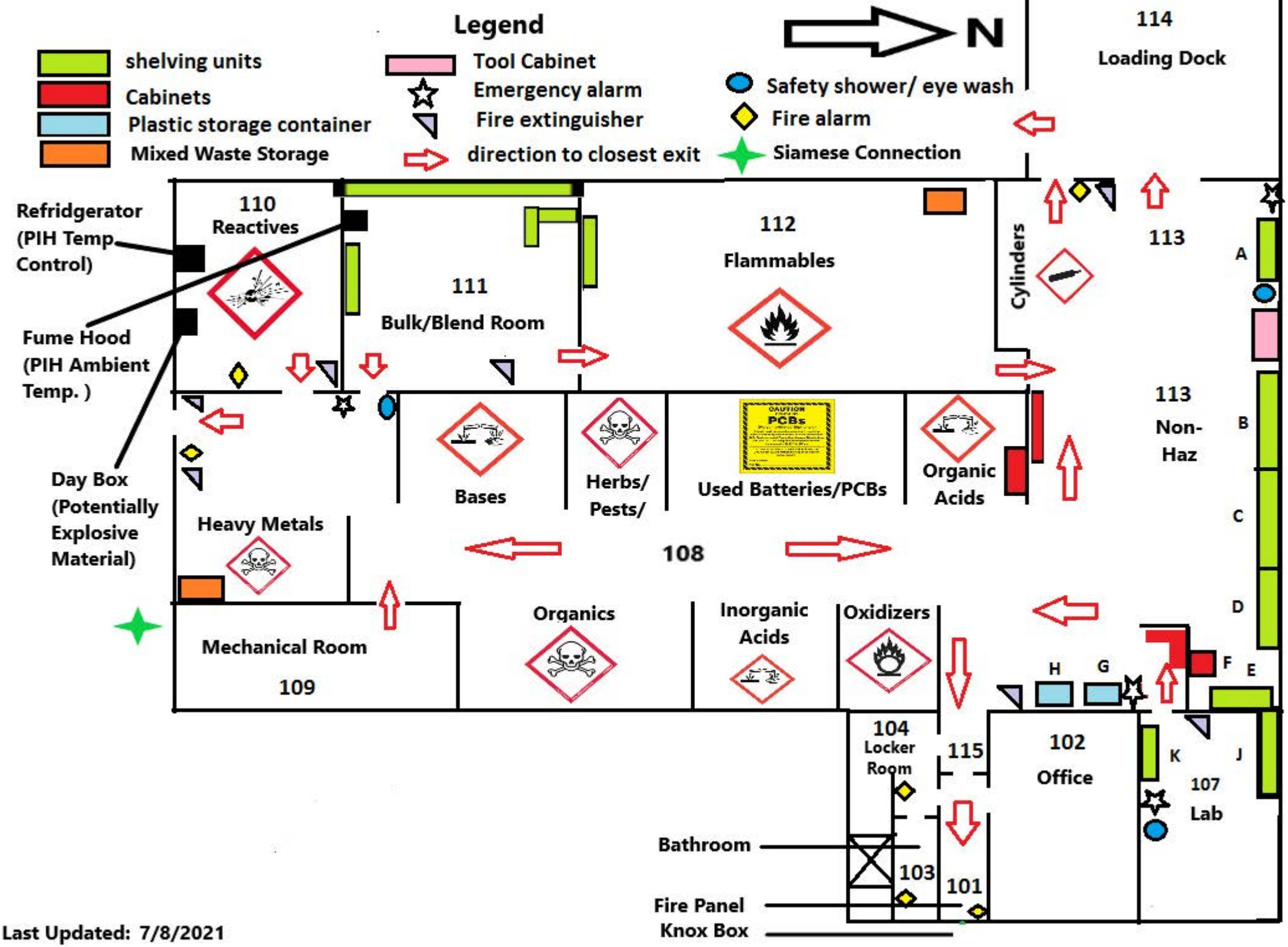


Photo Source: http://kygeonet.maps.arcgis.com
Photo Date: 2012

200 feet

UofL EPSC - Hazardous Waste Storage Facility



Last Updated: 7/8/2021

TABLE D-1
STORAGE AND CONTAINMENT VOLUMES

Area	No. of Drums (x 55 gallons)	No. of Storage Racks[1] (x 120 gallons)	Total Storage Volume[2] (gallons)	Containment Capacity Required[3] (gallons)	Total Containment
Cyanides/Bases	5	3	635	64	317
Oxidizers	2	2	350	55	191
Inorganic/Acids	6	3	690	69	286
Herbicides/Pesticides	3	2	405	55	238
Metals	3	2	405	55	198
Gas Cylinders	Gas cylinders are stored in the EPSC, but containment is not applicable.				
Non-Flammable Organics	14	3	1130	113	458
Organic Acids	2	2	350	55	185
Reactives	2	1	230	55	645
Flammables	40	3	2560	256	2425
PCBs	10	2	790	198[4]	793
Blending	2	0	110	55	1512

[1] Maximum Inventory for each chemical storage rack is 120 gallons.

[2] For areas which are not being operated as storage areas, a minimum inventory of 55 gallons is assumed.

[3] 10% of the total volume stored, or the volume of the largest container, whichever is greater.

[4] 40 CFR 761 requires 25% of the total volume stored, or the volume of the largest container, whichever is greater.

SECTION H –
PERSONNEL TRAINING

H PERSONNEL TRAINING

40 CFR 270.14(b)(12) and 40 CFR 264.16

H.1 OUTLINE OF TRAINING PROGRAM

40 CFR 264.16(a)(1)

This section provides an outline of both the introductory and continuing training programs to prepare the personnel to operate and maintain the EPSC facility in a safe manner and provide experienced employees with progressive on-going training in hazardous waste management.

H.1.a Job Titles and Duties

40 CFR 264.16(d)(1) and (d)(2)

For each employee whose position at the facility is related to hazardous waste management, the following information, described in Attachment H-1, will be maintained at the facility:

- Job Title
- Job Duties
- Job Description

H.1.b Training Content, Frequency and Techniques

40 CFR 264.16(a)(3), (b), (c), (d)(1), (d)(2), (d)(3), (d)(4), and (e)

The training program is directed by a qualified person trained in hazardous waste management procedures and includes instruction which teaches personnel hazardous waste management procedures, including contingency plan implementation relevant to the positions in which they are employed.

Several key areas are addressed in the program. At a minimum, the training program is designed to ensure that personnel are able to effectively implement emergency procedures, emergency equipment, and emergency systems. Facility personnel shall successfully complete the program within six (6) months after the date of their employment or assignment to the facility or to a new position at the facility. Until workers have received adequate training, they shall not work unsupervised in the area. Facility personnel shall take part in an annual review of the initial training.

As part of the training program, the following required documents and records are maintained at the facility:

- Job title and name;

- A written job description, which includes required skills, education, duties, and qualifications that are assigned to the particular position;

- A written description of the type and the amount of initial training which is required for this position;

- A written description of the type and amount of continuing (annual) training which is required for this position;

- Actual records which document training or job experience (in addition to month and year) that will ensure this person is able to respond effectively to emergencies; and

- Qualifications of personnel who act as trainers in hazardous waste management procedures.

All personnel training records will be kept until closure of the facility or for at least three (3) years after the person last worked at the University of Louisville.

Facility personnel successfully complete a program of classroom instruction or on-the-job training that teaches them to respond effectively to emergencies, including where applicable:

- Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment.
- Communication or alarm systems.
- Response to fires or explosions.
- Shutdown of operations.

All new employees receive a general orientation and job-specific introductory training. General orientation training introduces a new employee to the University, the management, and the operations of the facility. Job-specific introductory training is related to the specific duties of each job function. It is uniquely tailored for the position based on the new employee's education, experience, and other qualifications. In addition, every employee involved in the operation of the facility participates in an annual review of the initial training.

H.1.b (1) General Orientation Training

All new employees undergo an 8-hour orientation training session. An outline of the general orientation training is in Table H-1. In summary, the general orientation training includes at least the following:

- An overview including the facility description, storage/treatment processes, and organizational structure of the facility.
- An introduction to local, state, and federal regulations.
- A health and safety orientation including general safety rules, chemical hazard communication training, and an overview of personal protective equipment.
- A general overview of emergency response procedures.

H.1.b (2) Continuing Training

The facility also conducts a continuing training program. Continuing training is designed to maintain proficiency in job skills, increase safety, quality, and compliance consciousness and to teach new skills as necessary.

Continuing training consists of, but is not limited to, the following:

- Annual Hazardous Waste Operations (29 CFR 1910.120) refresher training (8-hour)
- DOT training (only every three years) (16-hours)
- Annual emergency response (contingency plan) updates and reviews (1-hour)
- Annual PPE/Respiratory reviews (29 CFR 1910.134) (1-hour)
- Annual review of initial RCRA compliance training which includes review of any new or revised regulatory requirements (3-hours)

A review of the initial RCRA training content is conducted. This training updates all previous training and includes a review of site operations and the types and characteristics of waste streams handled at the facility. The Contingency Plan performance in emergency response also is reviewed, if appropriate. Changes in pertinent regulations are identified and current compliance status is reviewed, as well as a review of updated University polices and procedures with respect to waste management and amendments.

TABLE H-1

GENERAL ORIENTATION TRAINING

I. Overview

A. Description of the facility
1. Procedures to enter and leave the facility
2. Restricted areas
3. Location of emergency equipment

B. General operation descriptions
1. Waste stream characteristics
2. Waste resources
3. Storage/Treatment processes
4. Disposal procedures

C. Organizational Structure

D. Job Specific Duties and Training Requirements

II. Introduction to local, state and federal regulations

III. Health and safety program

A. General facility safety rules

B. Chemical hazard communication
1. Hazard recognition
2. Safety data sheets (SDS)
3. Labeling – Hazardous material identification system (HMIS)

C. Personal Protective Equipment (PPE) – Overview

IV. Emergency Response (Contingency Plan) Overview

H.1.c Training Director

40 CFR 264.16(a)(2)

The Hazardous Materials and Environmental Manager, DEHS, has the responsibility for ensuring the training program is implemented. The Chemical Regulatory Specialist (CRS) oversees its administration and has direct responsibility for implementing the training. These responsible personnel designate qualified instructors, approve the training program content and format, provide the necessary resources, and ensure training records are maintained. The selection of qualified instructors, use of effective training formats, and establishment of meaningful methods for evaluating employee's learning are described in the following sections.

Training Personnel Qualifications

General orientation training is conducted by the supervisor or a designated representative (this may be an outside consultant). Instructors for some job-specific training modules are in-house experts in the specific field and have broad experience. In some cases, training is performed by off-site experts. An example would be First Aid Training conducted by a certified first aid instructor. The instructor for on-the-job training is a supervisor who is skilled in the current methods of performing the task. Training sessions related specifically to waste management are directed by a person trained in waste management procedures.

Training Format

Training is conducted in meetings, small discussion groups, classroom settings, or inside the facility. Lectures and field demonstrations also are used as training methods. Much of the training is on-the-job training performed at the site, using actual equipment under actual job conditions with close supervision. Programmed instruction such as video tapes or printed materials is sometimes used. For some training, courses and teaching materials developed by experts in the field are used. In addition, some of this training is accomplished by attending seminars, short-courses, or college courses (if available).

Training Effectiveness Evaluation

Qualitative evaluation techniques are used to measure a trainee's proficiency level. Examples of evaluation techniques are the trainee's performance in written and oral exams and careful observation of on-the-job performance. The supervisor determines whether the trainee has mastered the skills necessary to perform the tasks described in the job description. The employee and supervisor evaluate the employee's training requirements at personnel review sessions at least annually. New and useful instructional material is incorporated, as appropriate to improve the quality and effectiveness of the training program. Periodically, employees critique formal training sessions.

H.1.d Relevance of Training to Job Position

40 CFR 264.16(d)(2)

After completing general orientation training, employees receive introductory training relevant to their specific job responsibilities. Some of the job-specific introductory training is a review of topics included in orientation training. The review topics are covered in more detail in job-specific introductory training.

As part of job-specific introductory training, all employees involved in facility operations are instructed in their specific duties and responsibilities related to emergency response. Job-specific emergency response training includes:

- Procedures for using, inspecting, repairing, cleaning, and replacing facility emergency and monitoring equipment.
- Communications or alarm systems.
- Response to fires or explosions.
- Response to spill incidents.
- Shutdown of operations.

The level and amount of training for each employee are geared to the duties and responsibilities of the employee's position and the employee's education, experience, and other qualifications. For example, support and facility management level personnel need broad training in all aspects of waste management. This provides the necessary background and perspective for decision-making activities which can impact both the operation and condition of the facility and the health and welfare of the surrounding community. Facility operations personnel need site-specific training appropriate to their individual job activities. Table H-2 shows the training for each job title.

At a minimum, every employee in the facility operations involving hazardous waste treatment or storage will receive orientation and introductory training in compliance with 29 CFR 1910.120. No employee will be permitted to work unsupervised until this training is complete. Certification of completion of the training will be recorded and the records maintained until closure of the facility, or for three years after the employee leaves the University.

TABLE H-2
TRAINING SUMMARY MATRIX

	Training Element	Training Source	Frequency	Duration (Hours)	Completion Documentation or Duration	HazMat & Env Ops Mgr	Chem Reg Spec	Contractors
1	Hazardous waste management- Generator Specific	DEHS	At time of hire, Annually	2	Certificate	X	X	
2	EPSC Part B Permit Review	DEHS	At time of hire, Annually	2	Document to EPSC operating record	X	X	
a	EPSC Operations, Health & Safety Overview	DEHS	" "	4	" "	X	X	
b	EPSC Emergency equipment maintenance & inspection	DEHS/PP	" "	2	" "	X	X	
c	EPSC Inspections	DEHS	" "	1	" "	X	X	
d	EPSC Contingency Plan	DEHS	" "	1	" "	X	X	
e	EPSC Transportation Security Plan	DEHS	" "	1	" "	X	X	
f	EPSC Bldg Emergency Action Plan (BEAP)	DEHS	" "	1	" "	X	X	X
3	RCRA Refresher	3rd Party	At time of hire, Annually	4	Certificate	X	X	X
a	Hazardous waste regulatory updates	3rd Party/DEHS	" "		" "	X	X	X
b	Waste accumulation	3rd Party/DEHS	" "		" "	X	X	X
c	Waste characterization and compatibility	3rd Party/DEHS	" "		" "	X	X	X
d	Waste Treatment process(es)	3rd Party/DEHS	" "		" "	X	X	X
e	Container management	3rd Party/DEHS	" "		" "	X	X	X
f	Container labeling	3rd Party/DEHS	" "		" "	X	X	X
g	Waste packaging	3rd Party/DEHS	" "		" "	X	X	X
h	E-Manifest	3rd Party/DEHS	" "		" "	X	X	X
i	Waste Minimization	3rd Party/DEHS	" "		" "	X	X	
4	40 Hr OSHA HAZWOPER	3rd Party	At time of hire	40	Certificate	X	X	X
5	8 Hr Refresher for OSHA HAZWOPER	3rd Party	Annually	8	Certificate	X	X	X
6	DoT HazMat Ground	3rd Party	At time of hire, Every 3 years	8	Certificate	X	X	X
7	Fire Safety training	3rd Party/DEHS	Annually	1	Certificate	X	X	X

Commented [MK1]: NOD 17

H.1.e Training for Emergency Response

40 CFR 264.16(a)(3)

The training program is designed so that facility personnel will respond effectively to emergencies and are trained to be familiar with emergency procedures, emergency equipment, and emergency systems. The training shown in Table H-3 is required for personnel designated as EPSC Emergency Coordinators or EPSC response personnel under the Contingency Plan.

H.2 IMPLEMENTATION OF TRAINING PROGRAM

40 CFR 264.16(b)(12) and 264.16

Any new employee, contractor, or employee transferred into a job which falls into one of the training classifications must receive the respective training at the time prior to being placed in an unsupervised capacity. Individuals employed in the University of Louisville Department of Environmental Health and Safety (DEHS) who work in the hazardous waste facility must receive initial training as required in 29 CRF 1910.120 and applicable RCRA training as designated by DEHS.

Note: For managers, supervisors, and possibly technicians or existing employees, it may be demonstrated that this initial training requirement has already been achieved through previous experience and training.

All individuals must have their initial training repeated annually or sooner if subject material changes, i.e. change in emergency response plan or a change in applicable regulations. For individuals employed in the DEHS and working in the hazardous waste facility, they must have annual refresher training as required in 29 CFR 1910.120.

H.2.a Training Subjects

Individuals working within the hazardous waste facility must receive, at a minimum, training on the following subject material:

- Emergency response and contingency plan procedures
- Respiratory protection
- Personal protective equipment
- Medical surveillance (were applicable)
- Hazard communication
- Fire protection
- Operating procedures, i.e. inspection requirements, segregation criteria, waste analysis and verification, permit requirements
- DOT requirements, i.e. manifesting, packaging, labeling.

TABLE H-3
TRAINING FOR EMERGENCY RESPONSE

Item	Emergency Coordinator	Technical Personnel	Responders/Cleanup
Emergency Response Plan/Contingency Plan	X	X	X
Hazardous Waste Worker Training (29 CFR 1910.120)	X	X	X
Key Parameters for Waste/Facility Automatic Cutoff Systems	X	X	X
Communication Devices	X	X	X
Alarm Systems	X	X	X
Response to Fires or Explosion	X	X	X
Shutdown Operations	X	X	X
Use of Fire Extinguisher	X	X	X
Use of Personal Protective Equipment	X	X	X
Risk Identification	X	X	X
Monitoring Equipment	X	X	X
Classification, Identification, Verification of Release/Unknown	X	X	
Control & Containment Techniques	X	X	X
Decontamination Procedures and Requirements	X	X	X
Regulatory Notification	X		
Sampling and Analysis	X	X	

H.2.b Personnel Training Documentation

Individuals employed within the DEHS and working in the hazardous waste storage facility (i.e., this does not include DEHS Administrative staff which will not enter the active areas of the facility) must have personnel training files. At a minimum, each personnel training file must contain the following:

- Job title and job description
- Written description of the type and amount of introductory and continuing training to be received

- Documentation of all initial training received as new employee or new job position
- Documentation of all annual training received
- Documentation of annual respirator fit test (where applicable)
- Documentation of medial surveillance evaluation (where applicable)
- Specialized training/certification, i.e. college diploma/transcript, continuing education courses, first aid/CPR certification, professional certification (if applicable).

Where training is given as it relates to other training classifications (first responder, contractor), such training must always be documented with the date of training, name of the instructor, length of training, and a summary of the subject material covered. All training documentation must be maintained in DEHS or EPSC files.

H.2.c Visitors/Contractors

Visitors and contractors will follow all safety and operational safeguards while in the facility. All visitors and contractors (waste disposal contract personnel) will be required to sign-in and sign-out.

Contractors who will be working at the facility are required to possess the level of training specified in Table H-2. Additional site specific training will be provided by the Chemical Regulatory Specialist or his qualified designee. At a minimum, this training will provide the contractor personnel with sufficient knowledge to familiarize them with the facility's emergency procedures, emergency equipment, emergency systems, and proper response actions in the event of an emergency.

Commented [MK2]: NOD 6

Visitors will be escorted at all times during their visit. If applicable, appropriate safety equipment will be issued at the beginning of the visit.

ATTACHMENT H-1

EPSC

NOD 71

Job Title and Duties Descriptions

ATTACHMENT H-1

JOB TITLE: Chemical Regulatory Specialist

REPORTS TO JOB TITLE: Chemical Regulatory Specialist

DEPARTMENT NAME: Environmental Health & Safety (DEHS)

JOB SUMMARY

Review and maintain in-depth knowledge of all laws, regulations and ordinances pertaining to hazardous materials and waste management. Coordinate and oversee collection of all hazardous waste generated by the University.

DUTIES & RESPONSIBILTIES

Review and maintain in-depth knowledge of all laws, regulations and ordinances pertaining to hazardous materials and hazardous waste management.

Coordinate and oversee the collection, accumulation and disposal of chemical wastes.

Oversee waste disposal contractors while at the University to ensure proper identification, transportation and disposal of waste; and compliance with University contracts.

Direct the preparation and maintenance of records for tracking waste to meet EPA regulations.

Develop and maintain detailed records of composition, containment, origin and storage of waste for input into computer tracking system.

Oversee and direct the maintenance of all technical equipment.

Assist in development and updating of University policies and procedures for proper hazardous materials management and regulatory compliance.

Perform environmental monitoring and maintain appropriate records as required.

KNOWLEDGE, TRAINING & SKILLS

Bachelor's degree in Chemistry, Environmental Science, Biology or related field.

EXPERIENCE

Three years of related experience

ATTACHMENT H-1

JOB TITLE: Hazardous Materials Technician
REPORTS TO JOB TITLE: Chemical Regulatory Specialist
DEPARTMENT NAME: Environmental Health & Safety (DEHS)

I. JOB SUMMARY

Collect, assess, segregate, and transport hazardous liquids and waste. Maintain the Environmental Protection Services Center and vehicle and respond to hazardous materials emergencies at the University

II. ESSENTIAL DUTIES AND RESPONSIBILITIES

- Collect, segregate, package, and label for transport hazardous wastes from university generators.
- Be knowledgeable and able to assess hazardous liquids, determine compatibility, combine compatible waste in approved containers, and prepare for shipping.
- Maintain Environmental Protection Services Center by maintaining safe and organized storage of hazardous liquids and materials, conducting regular inspections, and communicating problems and suggestions to supervisor.
- Maintain hazardous material transportation vehicle to DOT rules regarding hazardous materials transport.
- Handle the university universal waste lamp and battery recycling program.
- Respond to emergencies at the university that require DEHS assistance.
- Provide skilled technical support to other environmental health and safety programs

III. MINIMUM REQUIREMENTS

Specialized training beyond high school with a working knowledge of hazardous materials handling, EPA and DOT regulations, and general mechanical aptitude. Pre-employment physical and valid driver's license required. Four years of related experience; advanced education degree can be considered to combine with years of experience.

IV. PREFERRED QUALIFICATIONS

- CDL with HazMat endorsement
- 40 Hour OSHA HAZWOPER Certification or 24 Hr Hazardous Material Technician Training

V. PHYSICAL REQUIREMENTS

Must be able to pass physical examination and wear personal protective equipment (PPE). Sitting, standing, walking, lifting up to 50 lbs.

The above statements are intended to describe the general nature and level of work being performed by individuals assigned to this job. It is not intended to be an exhaustive list of all duties and responsibilities required of individuals in this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential duties and responsibilities of this job.

ATTACHMENT H-1

JOB TITLE: Hazardous Materials & Environmental Manager

REPORTS TO JOB TITLE: Director, DEHS

DEPARTMENT NAME: Environmental Health & Safety (DEHS)

III. JOB SUMMARY

Oversee operations at the University's Federal and state RCRA Part B permitted Treatment, storage, and Disposal Facility (TSDF) and develop and manage the hazardous materials/waste programs for the University of Louisville. This includes chemical, biological (medical), and mixed radioactive waste and other wastes that are regulated by the federal, State, and/or local governments. Additionally, evaluate, assess and submit required reports for hazardous materials and substances, including contaminated property remediation sites, air emissions, and SARA Title III.

IV. ESSENTIAL DUTIES AND RESPONSIBILITIES

- Review and maintain in-depth knowledge of all laws, regulations and ordinances pertaining to hazardous materials and waste management.
- Develop, publish and distribute guidelines for hazardous and medical/infectious waste management within the University.
- Acts as a primary hazardous material emergency response coordinator.
- Develop and implement university hazardous waste minimization program.
- Manage all of the activities and operations for the Environmental Protection Services Center in compliance with USEPA and KDWM permits. Lead inspections whenever either agency conducts inspections.
- Coordinate the development of RFP's for regulated waste disposal and once awarded oversee the performance of contractors and audit their staff, operations and facilities as appropriate.
- Works collaboratively with university personnel in ensure proper hazardous waste determination for generated waste streams. Provides consultations upon request.
- Assist university personnel in shipment of regulated hazardous materials in accordance with Department of Transportation and Federal Aviation Administration regulations and International Air Transporter's Association guidance. This includes providing technical assistance, actual preparation of package, and completion of required paperwork.
- Prepare and gather required information for annual Title V air emissions inventory and semi-annual air emissions reports. This includes on-site inspection of potential emission source and associated recordkeeping.
- Review and update annually, or as necessary, RCRA, SPCC, and HMPC contingency plans.
- Directs and supervises Hazardous Waste Specialist and/or Hazardous Material Technician.

III. MINIMUM REQUIREMENTS

Bachelor's degree in Biology, Chemistry, Environmental Science or related field and seven years of experience in hazardous waste and/or environmental program management . Extensive training and knowledge of EPA (RCRA, TSCA) and DOT regulations, hazardous materials emergency response activities and sampling techniques. An equivalent combination of education, training and/or experience may be substituted for the requirements noted.

IV. PREFERRED QUALIFICATIONS

- Certified Hazardous Materials Manager
- 40 Hour OSHA HAZWOPER Certification or 24 Hr Hazardous Material Technician Training

V. PHYSICAL REQUIREMENTS

Must be able to pass physical examination and wear personal protective equipment (PPE). Sitting, standing, walking, lifting up to 50 lbs.

The above statements are intended to describe the general nature and level of work being performed by individuals assigned to this job. It is not intended to be an exhaustive list of all duties and responsibilities required of individuals in this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential duties and responsibilities of this job.

JOB TITLE: Director, Department of Environmental Health & Safety

POSITION NO: 06424

REPORTS TO JOB TITLE: Vice President for Operations, Chief Operating Officer

DEPARTMENT NAME: Environmental Health and Safety

I. JOB SUMMARY

a. Responsible for leading the environmental health and safety programs and department and providing leadership and day-to-day support to staff. Also, responsible for budget planning and control; administrative supervisory responsibilities; policy, procedure and goal development and implementation; and interaction with regulatory agencies.

II. ESSENTIAL DUTIES AND RESPONSIBILITIES

a. Develop, implement, and, as necessary, review and revise policies, procedures and programs necessary to maintain a safe and healthy environment for students, faculty, staff, visitors, and the surrounding community and ensure that University operations are in compliance with relevant local, federal, and state environmental health and safety codes and regulations

b. Maintain a current and comprehensive knowledge of regulatory and safety standards and requirements; keep University leadership apprised of regulatory issues and environmental health and safety risks and personnel exposures and engage University leadership in decisions to address issues and risks in an effective and timely manner

c. Serve as key liaison between the University and the external stakeholders with regard to environmental health and safety issues; coordinate reviews, inquiries and audits by external agencies and oversee the University's response to findings of reviews, inquiries and audits; represent the University, as appropriate, in communications and interactions with federal and state regulatory agencies.

d. Develop effective working relationships and communication with members of the UofL community, including principal investigators, deans, directors and key committee chairs and serve on Institutional Biosafety Committee, Radiation Safety Committee and Institutional Animal Care and Use Committee

e. Provide oversight and control of DEHS annual budget and office operations including expenditures, staff salaries, staff development, purchases, equipment purchases and DEHS facilities maintenance

f. Ensure appropriate supervision and professional development of staff and appropriate delegation of DEHS assignments and responsibilities

III. MINIMUM REQUIREMENTS

a. Bachelor's degree in either physical or biological sciences or engineering and a Master's degree in management or a related scientific, health or safety field. Ten (10) years of progressive experience in the management of comprehensive environmental health and safety programs, preferably at an academic – medical

institution is required. Experience must include a minimum of five (5) years in a leadership position or managing a major environmental health and safety unit or department.

IV. PREFERRED QUALIFICATIONS

a. Certified Hazardous Materials Manager (CHMM)
b. Certified Safety Professional (CSP)

V. PHYSICAL REQUIREMENTS

a. Sitting, standing, walking, lifting under 25lbs

The above statements are intended to describe the general nature and level of work being performed by individuals assigned to this job. It is not intended to be an exhaustive list of all duties and responsibilities required of individuals in this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential duties and responsibilities of this job.

SECTION I –

CLOSURE PLAN, POST-CLOSURE PLAN, AND FINANCIAL REQUIREMENTS

I CLOSURE PLAN, POST-CLOSURE PLAN, AND FINANCIAL REQUIREMENTS

This section provides a general description of all steps necessary for the closure of the hazardous waste management facility at the University of Louisville (U of L), Environmental Protection Services Center (EPSC). The hazardous waste management facilities which are to be closed at the end of the intended life include container storage areas.

Section I.1, describes in detail the procedures to be used to close the facility so as to minimize the need for future maintenance and minimize or eliminate any future release of hazardous waste, leachate, or contaminated rain fall, to the air, ground, water, surface water, or surrounding land. The Closure Plan is designated to be a "stand alone" document for ease of the operator of the facility and is contained herein as Attachment I-1.

I.1 CLOSURE PLAN

40 CFR 270.14(b)(13)

This section identifies all steps necessary for closure of the EPSC hazardous waste management facility. The hazardous waste management facilities (units) to be closed at the end of the intended life include container storage areas. The Closure Plan is submitted in accordance with all present requirements of 40 CFR 264.111 and 112.

Procedures for partial closure of the EPSC are provided in this section. It is not the U of L's intention to close any of the storage areas until such time as the entire hazardous waste management operation is closed. Furthermore, a post-closure plan is not provided because the EPSC is not classified as a disposal facility and no hazardous waste residues will remain at the site upon closure. The EPSC Closure Plan is provided as Attachment I-1.

I.1.a Closure Performance Standards

40 CFR 264.111; 40 CFR 264.112(b)(1)

The purpose of the Closure Plan is to present the procedures that the facility will follow so as to minimize the need for post-closure care and maintenance. In addition, procedures established in the Closure Plan minimize or eliminate threats to human health and the environment and avoid releases of hazardous waste, hazardous waste constituents, leachate, contaminated rain fall, or waste decomposition products to the ground, ground water, surface water, or atmosphere.

Closure of the hazardous waste facility will be accomplished by the removal of all waste from the site followed by thorough cleaning and decontamination of all structures and equipment which had stored or had come into direct contact with hazardous waste. In addition, verification analyses will be performed to ensure that decontamination procedures were effective. Implementation of the Closure Plan will eliminate any need for post-closure monitoring or maintenance.

I.1.b Partial Closure and Closure Activities

40 CFR 264.112(b))

While partial closure of the facility is not anticipated, a single area or structure of the facility may be closed during the active life and these partial closure activities will be performed in accordance with the Closure Plan. The Closure Plan found in Attachment I.1 addresses in detail all facility conditions and removal of inventory, decontamination of equipment and structures, verification analyses, closure certification, and estimated cost of closure activities by a third party. Any modifications to the facility, equipment, structures, instruments, and procedures relating to hazardous waste management after permit approval will result in the U of L revising the Closure Plan and adjusting the closure cost estimate accordingly.

It is anticipated that the EPSC will be maintained and used in the current form through the indefinite life of the U of L. The hazardous waste management areas in the facility will be closed in a four step process. Step 1 includes removal of all hazardous waste in containers from the site within 90 days after the receipt of the final volume of hazardous waste to the facility. Step 2 includes the decontamination activities, with Step 3 comprising verification of decontamination and waste removal effectiveness. Step 4 will provide certification of the closure activities.

The hazardous waste management facility closure will require 180 days to complete and will include decontamination or disposal of all contaminated equipment, structures, and soil. The 180-day closure schedule will begin with the receipt of the last shipment of off-site and/or on-site generated waste.

The U of L and an independent Kentucky registered engineer will inspect all the hazardous waste management facilities for completion of closure and certify that the facilities have been closed according to the approved Closure Plan. Within 60 days of the completion of the final closure activities, the closure certification will be submitted by registered mail to the Director of the Division of Waste Management.

I.1.c Maximum Waste Inventory

40 CFR 264.112(b)(3)

The EPSC will store/treat hazardous waste in containers in segregated secondary containment storage/treatment areas. These areas and associated waste volume capacities are given in Table I1-1 “Maximum Waste Inventory” of Attachment I-1.

The maximum potential hazardous waste inventory that can be in storage/treatment operations at the EPSC is estimated at 7660 gallons + 2000 pounds. The maximum waste inventory has been determined by utilizing the conservative assumption that all available storage areas are completely full to their maximum working capacity. This inventory is the compilation of all storage capacity and containers as well as all residues from the facility auxiliary equipment. The maximum waste inventory has been broken out in subgroups for computing. Volumes of waste and waste residue are expressed in units of gallons for free flowing liquids, cubic yards for solids (or materials that have no free

liquids), and pounds for gas cylinders. Table I1-1 lists the maximum waste inventory for each storage/treatment area at the facility.

I.1.d Schedule for Closure, Time Allowed for Closure, and Extension of Closure Time

40 CFR 264.112(b)(6); 113(a) and (b), and 401 KAR 39:090 Sec 8(8)

The scheduled closure for each of the hazardous waste management areas is described in the Closure Plan (Attachment I-1). The U of L will notify the Division of Waste Management in writing at least 45 days prior to the date final closure is expected to begin. Partial closures will be performed during facility operations as needed. The U of L has estimated that it will require approximately 180 days to complete final closure activities of the entire facility. The University may wish to apply for a new permit for the facility at the end of each approved permit period thus extending the life of the facility. However, as an estimate, the University has anticipated final closure to begin in January, 2046 and to be completed by the end of June, 2046. Figure I1-4 in Attachment I-1 illustrates the time allowed for each of the steps in the closure process.

All hazardous wastes will be treated or removed off-site within 90 days from receipt of the final volume of waste. The maximum amount of waste that will be stored, treated, or disposed of at the facility is designated in the Part A Application and the Closure Plan.

If necessary, a request for permit modification to extend the closure period will be made to the Director per requirements in 40 CFR Part 264.113(a) and (b). One of the following will be demonstrated by the University.

- Closure activities require longer than 180 days (or the facility has the capacity to receive additional wastes).
- There is a reasonable likelihood that the owner or operator will re-commence operations of the site.
- Closure would be incompatible with continued operation.
- Demonstrate that all steps have and will be taken to prevent threats to human health and the environment from an unclosed but inactive facility.

I.1.e Inventory, Disposal, Removal, or Decontamination of Equipment

40 CFR 264.112(b)(4) and 401 KAR 39:090 Sec (8)1

Closure of the EPSC includes the removal of all hazardous waste materials and waste residues from management areas, and decontamination of all equipment and storage areas. The waste materials will be shipped off-site for treatment or disposal at an off-site authorized RCRA facility. No equipment used in the closure activities will be removed from the facility until it has been decontaminated and verified clean. All decontamination will be completed by scraping and cleaning using one or more combination of methods of: high-pressure water, steam cleaning, emulsifying detergent, or caustic type industrial

cleaning solution, or other appropriate methods. Decontamination will continue until equipment and materials show no visible evidence of contamination. Selection of the decontamination method and/or type of cleaning solution will be based on the previous contents and physical condition of the units at the time of decontamination procedures. The Closure Plan (Attachment I-1) discusses decontamination and verification sampling for determining effectiveness of cleaning in more detail.

I.1.e(1) Closure of Containers

40 CFR 264.178 and 264.112(b)(3)

Closure of container storage areas will be in accordance with the facility Closure Plan (see Attachment I-1). All the containers in the storage areas will be inventoried prior to beginning closure. Where possible, drum contents will be blended prior to drum shipment off-site to an approved RCRA facility. Following removal of inventories, the containment pads will be inspected and decontaminated to remove any waste or waste residues. Verification sampling will be performed to demonstrate facilities have been closed in accordance with closure performance standards. For more detail on closure of containers, see Closure Plan, Attachment I-1.

I.1.f Closure Certification

40 CFR 264.115 and 264.280

An independent registered professional engineer will monitor closure activities to ensure they are conducted in accordance with the approved Closure Plan. Closure activities to be monitored by the independent engineer include inventory elimination, secondary containment (concrete) decontamination, and soil and concrete sampling and analysis. The engineer will visit the facility at least weekly during the closure activities. These independent engineer inspections will be part of the facility operating record. The independent third-party registered professional engineer will be registered in the State of Kentucky.

Within sixty (60) days of completion of final facility closure, the U of L will submit, by registered mail, a certification that closure is complete in accordance with specifications contained in the approved Closure Plan. Certification will be signed by the U of L and an independent Kentucky registered professional engineer.

I.2 POST CLOSURE PLAN

40 CFR 270.14(b)(13) and 264.117 through 264.120

The EPSC Closure Plan is designed to not require post-closure maintenance and care. These closure procedures will minimize or eliminate threats to human health and the environment and avoid releases of hazardous waste, hazardous waste constituents, leachate, contaminated rain fall, or waste decomposition products to the ground, ground water, surface water, or atmosphere. Furthermore, a post-closure plan is not provided because the EPSC is not classified as a land disposal unit and no hazardous waste or waste residues will remain at the site upon completion of closure activities.

I.3 NOTICES REQUIRED FOR DISPOSAL FACILITIES

40 CFR 270.14(b)(14) and 264.119

The EPSC does not have hazardous waste disposal units as part of its waste management operations. Therefore, notices to the local land authority or property deed notices are not required.

I.4 CLOSURE COST ESTIMATES

40 CFR 270.14(b)(15) and 264.142

The EPSC closure cost estimates reflect an estimate of the cost of facility closure at a point when the extent and manner of its operations would make closure the most expensive. This "maximum waste inventory" includes all storage/treatment areas identified in Table I1-1 (Attachment I-1). The total estimated cost for closure of the facility for the maximum waste inventory for 2021 is $524,821.14. Table I2-1 of Attachment I-1 provides a breakdown of this estimate. Included are closure costs for each hazardous waste management area or process described in the facility's Part A Permit Application. These costs are based on current value of the dollar as of the most recent version of this Closure Plan. Background cost data to support the estimates are provided in the Closure Plan (Attachment I-1).

Commented [MK1]: NOD 18,19,20,21

During the operating life of the facility, the U of L will adjust the closure cost estimates annually to take inflation into account. Adjustments will be made by recalculating closure costs in current dollars, or by using an inflation factor as specified in 40 CFR Part 264.142(b). The adjustment may be made by recalculating the closure cost estimate current dollars or by using the inflation factor derived from the most recent Implicit Price Deflator for Gross National Product published by the US Department of Commerce in its "Survey of Current Business".

I.5 FINANCIAL ASSURANCE MECHANISM FOR CLOSURE

40 CFR 270.14(b)(15); 264.143; 264.151
401 KAR 39:090 Sections 1 and 7

The U of L, being property of the Commonwealth, is exempt from the above requirement as stated in 40 CFR 264.140(c).

I.6 POST-CLOSURE COST ESTIMATE

40 CFR 270.14 (b)(16); 264.144

The EPSC does not have any land treatment or disposal facilities which would require a post-closure plan or contingent post-closure plan. Also, the Closure Plan is designed so that all waste and waste residues are removed at the time of closure, therefore no post-closure plan or post-closure cost estimate is required.

I.7 FINANCIAL ASSURANCE MECHANISM FOR POST-CLOSURE

40 CFR 270.14(b)(16); 264.145; 264.151; 401 KAR 39:090 Section 7

The EPSC will not have any land treatment or disposal facilities which would require a post-closure plan or contingent post-closure plan. Also, the Closure Plan is designed so

that all waste and waste residues are removed at the time of closure, therefore no post-closure plan or post-closure cost estimate is required.

I.8 LIABILITY REQUIREMENTS

40 CFR 270.14(b)(17); 264.147

The U of L, being property of the Commonwealth, is exempt from the above requirement as stated in 40 CFR 264.140(c).

ENVIRONMENTAL PROTECTION SERVICES CENTER
Louisville, Kentucky

Closure Plan
Attachment I-1 of the
Part B Permit Application

June 2022

Prepared by:

University of Louisville
Department of
Environmental Health & Safety
Louisville, Kentucky

TABLE OF CONTENTS

SECTION **PAGE**
I1.0 CLOSURE PLAN 1
I1.1 FACILITY DESCRIPTION 2
I1.1.a Description of Operation 3
I1.1.b Scope of Wastes Accepted 4
I1.2 CLOSURE PERFORMANCE STANDARDS 4
I1.3 PARTIAL CLOSURE ACTIVITIES 6
I1.4 MAXIMUM WASTE INVENTORY 7
I1.5 CLOSURE ACTIVITIES 10
I1.5.a Container Storage Area Closure Procedures 10
I1.5.1 Inventory Elimination 10
I1.5.2 Decontamination Procedures 11
I1.5.2.a Personnel/Personal Protective Equipment 12
I1.5.2.b Decontamination of Container Storage and Containment Areas and other Process Equipment Dikes and Pads 13
I1.5.2.c Equipment Decontamination 13
I1.5.2.d Decontamination Rinsate Management 14
I1.5.3 Sampling and Analysis 16
I1.5.3.a Containment Pad Rinsate Sampling and Analysis 16
I1.5.3.b Containment Pad Concrete Sampling and Analysis 17
I1.5.3.c Soil Sampling and Analysis: Background Soils 17
I1.5.3.d Soil Sampling and Analysis: Hazardous Waste Management Area 18
I1.6 CLOSURE SCHEDULE 20
I1.6.a Closure Schedule-Container Storage Areas 20
I1.7 CLOSURE CERTIFICATION 21
I2.0 CLOSURE COST ESTIMATE 21
I2.1 REGULATORY REQUIREMENTS 21
I2.2 UNITS COSTS FOR CLOSURE ACTIVITIES 24
I2.3 INVENTORY ELIMINATION COSTS 24
I2.4 FACILITY DECONTAMINATION COSTS 25
I2.5 SAMPLING AND ANALYTICAL COSTS 26
I3.0 CLOSURE PLAN AMENDMENTS AND ANNUAL COST UPDATES AND ADJUSTMENTS TO CLOSURE COST ESTIMATES 27
I3.1 PLAN AMENDMENT 27
I3.2 CLOSURE COST ESTIMATE ADJUSTMENTS 28
I4.0 FINANCIAL ASSURANCE 28
I5.0 LIABILITY REQUIREMENTS 28

LIST OF TABLES

I1-1 Units Included in Maximum Waste Inventory
I1-2 Volumes Included in Maximum Waste Inventory
I1-3 Anticipated Treatment and Disposal Methods for Waste Inventory
I1-4 Decontamination Rinsate Management

TABLE OF CONTENTS (continued)

I1-5 Proposed Sampling & Analysis Plan
I2-1 Cost Estimates Reflecting Closure at Maximum Waste Inventory

LIST OF FIGURES

I1-1 Facility Location Map
I1-2 Operational Layout
I1-3 Containment Area Detail
I1-4 Final Closure Schedule

LIST OF EXHIBITS

Exhibit A Closure Unit Cost Assumptions

UNIVERSITY OF LOUISVILLE
CLOSURE PLAN AND CLOSURE COST ESTIMATES

40 CFR 264 Subparts G & H

I1.0 CLOSURE PLAN

40 CFR 270.14(b)(13)

The Resource Conservation and Recovery Act of 1976 (RCRA) and the Hazardous and Solid Waste Amendments of 1984 (HSWA), and Chapter 40 of the Code of Federal Regulations (CRF) Part 264 Subpart G and H require owners and operators of a hazardous waste management facility to submit a written Closure Plan. Accordingly, this Closure Plan was prepared to comply with the applicable regulations for the University of Louisville (U of L) Environmental Protection Services Center (EPSC) facility located at 1810 Arthur Street in Louisville, Jefferson County, Kentucky. The Closure Plan describes closure procedures to close the facility with respect to removal of inventory, decontamination of equipment and structures, and verification sampling and analysis to meet the closure objectives.

Closure activities will be performed in accordance with 40 CFR 264 Subparts G and H. The closure requirements for container storage apply to this facility.

The EPSC closure plan contains the following:

- Section I1.1 Facility Description
- Section I1.2 Closure Performance Standards
- Section I1.3 Partial Closure Activities
- Section I1.4 Maximum Waste Inventory
- Section I1.5 Closure Activities (including inventory elimination, decontamination procedures, and sampling and analysis).
- Section I1.6 Closure Schedule
- Section I1.7 Closure Certification

I1.1 FACILITY DESCRIPTION

The U of L is a multifaceted research, teaching, and medical treatment facility serving the Commonwealth. There are three campuses: Health Sciences Center, Belknap, and ShelbyHurst campuses. As a result of these operations, amounts of hazardous wastes are produced and must be managed in accordance with applicable regulations. The purpose of this Closure Plan is to insure complete closure as required per 40 CFR 264 for the storage facility.

Facility Identification:

Name:	University of Louisville Environmental Protection Services Center (EPSC)
Location Address:	1810 Arthur Street Louisville, Kentucky 40292 Jefferson County
Telephone No.:	(502) 852-2956 or (502) 852-6670
Fed EPA ID#:	KY0 001 012 012
KY DEP Agency Interest #:	48952
Contact for Closure:	Cathy Price
Telephone No.:	Office: (502) 852-2956
Contact Mailing Address:	University of Louisville Department of Environmental Health & Safety 1800 Arthur Street Louisville, Kentucky 40292

I1.1.a Description of Operation

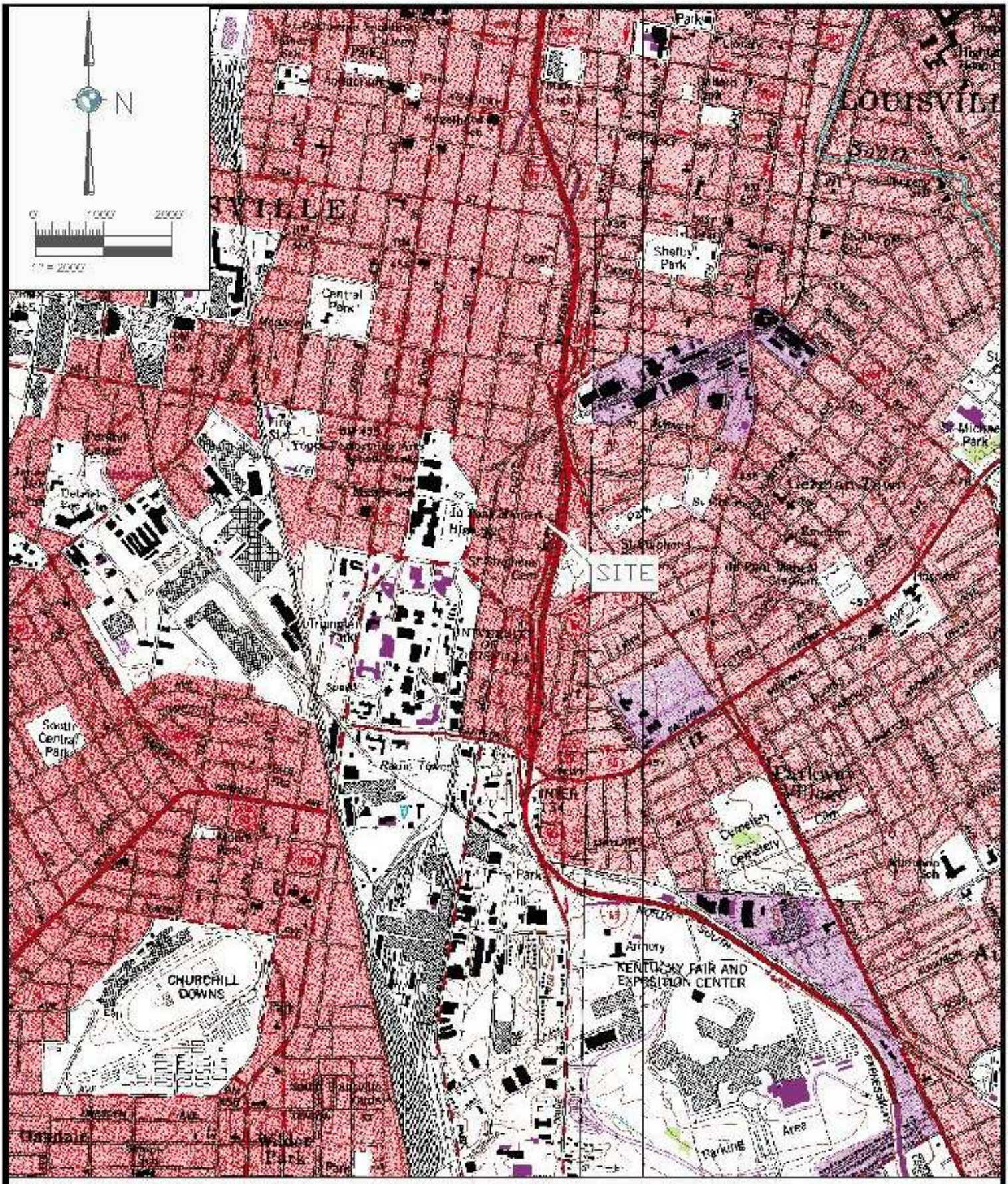
The U of L Department of Environmental Health and Safety (DEHS) operates the EPSC at 1810 Arthur Street, Louisville, Jefferson County, Kentucky. The EPSC serves as an accumulation area for the University's hazardous waste generation from its Belknap, ShelbyHurst, and Health Sciences Center. The facility receives waste from each of the campuses and stores it for eventual shipment to an off-site treatment, storage, or disposal facility. Typically, waste generation is from research laboratories, chemistry teaching laboratories, and some routine maintenance operations conducted at these campuses. Figure I1.1 shows the location of the EPSC.

The facility consists of a composite steel and brick building with a concrete containment floor. The facility is divided into several small rooms with one large open area used for general waste storage. The rooms are used for blending, reactive storage, and the segregation of flammable materials. Figure I1.2 shows the operational layout. The dimensions of the entire facility approximate 48 feet x 82 feet.

To prevent migration of any spills, no floor drains exist in the facility for waste storage. Concrete berms are designed to prevent the release of a spill should one occur. The concrete floor contains a sealer.

Operations at the facility emphasize safe handling and containment. The facility is designed to properly segregate materials to prevent incompatible reactions and provides secondary containment for all containers.

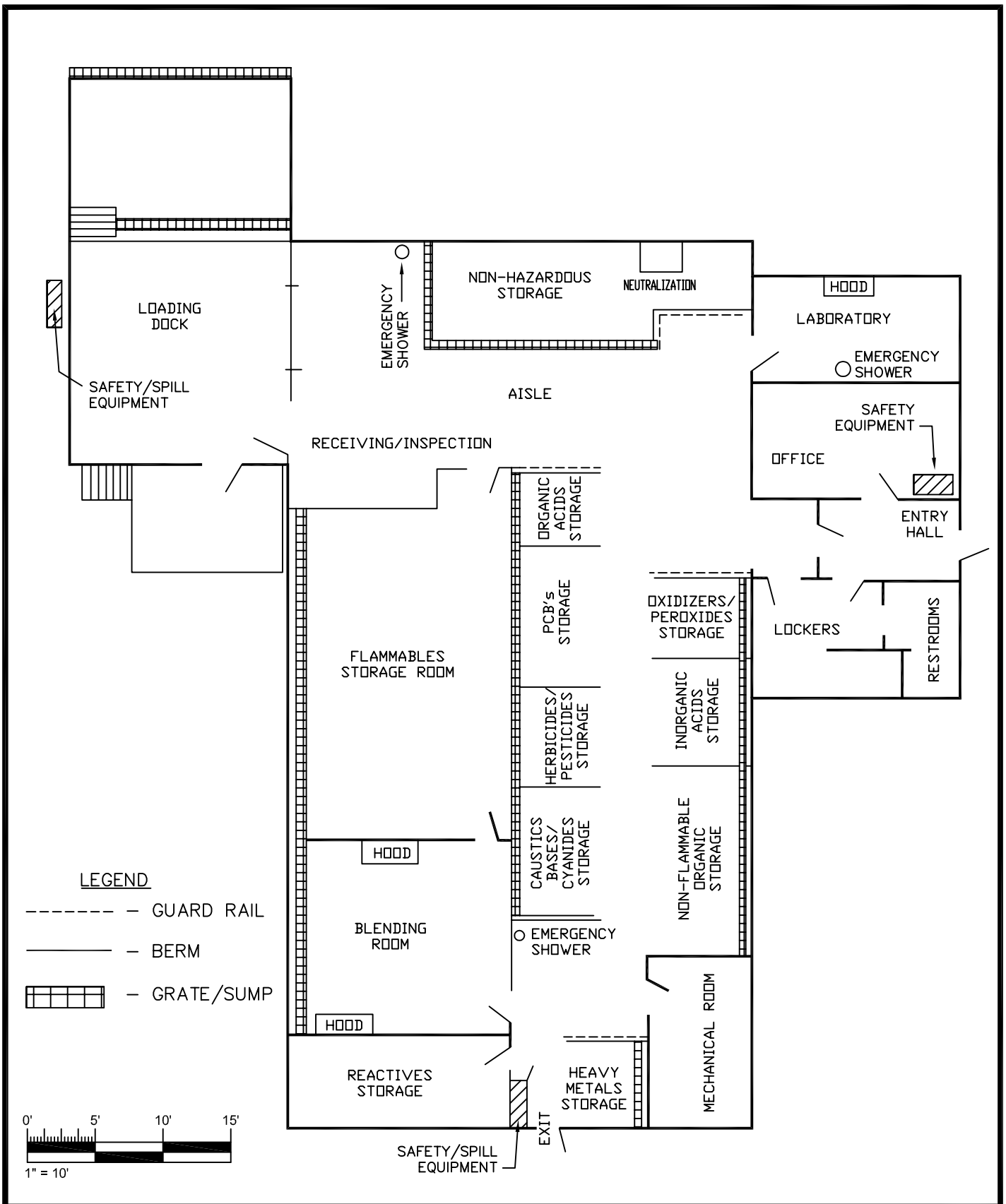
Storage containers range from small containers to 55-gallon drums. In addition to the requirements that each container be in good condition, each container is surrounded by secondary containment. The smaller containers are placed inside containment trays on shelves based on their chemical and physical compatibility grouping. Should a container break or leak, the contents would be contained by these trays. Figure I1-3 shows a layout of the containment system.



REF: USGS TOPOGRAPHICAL QUADRANGLE LOUISVILLE EAST KY AND LOUISVILLE WEST KY

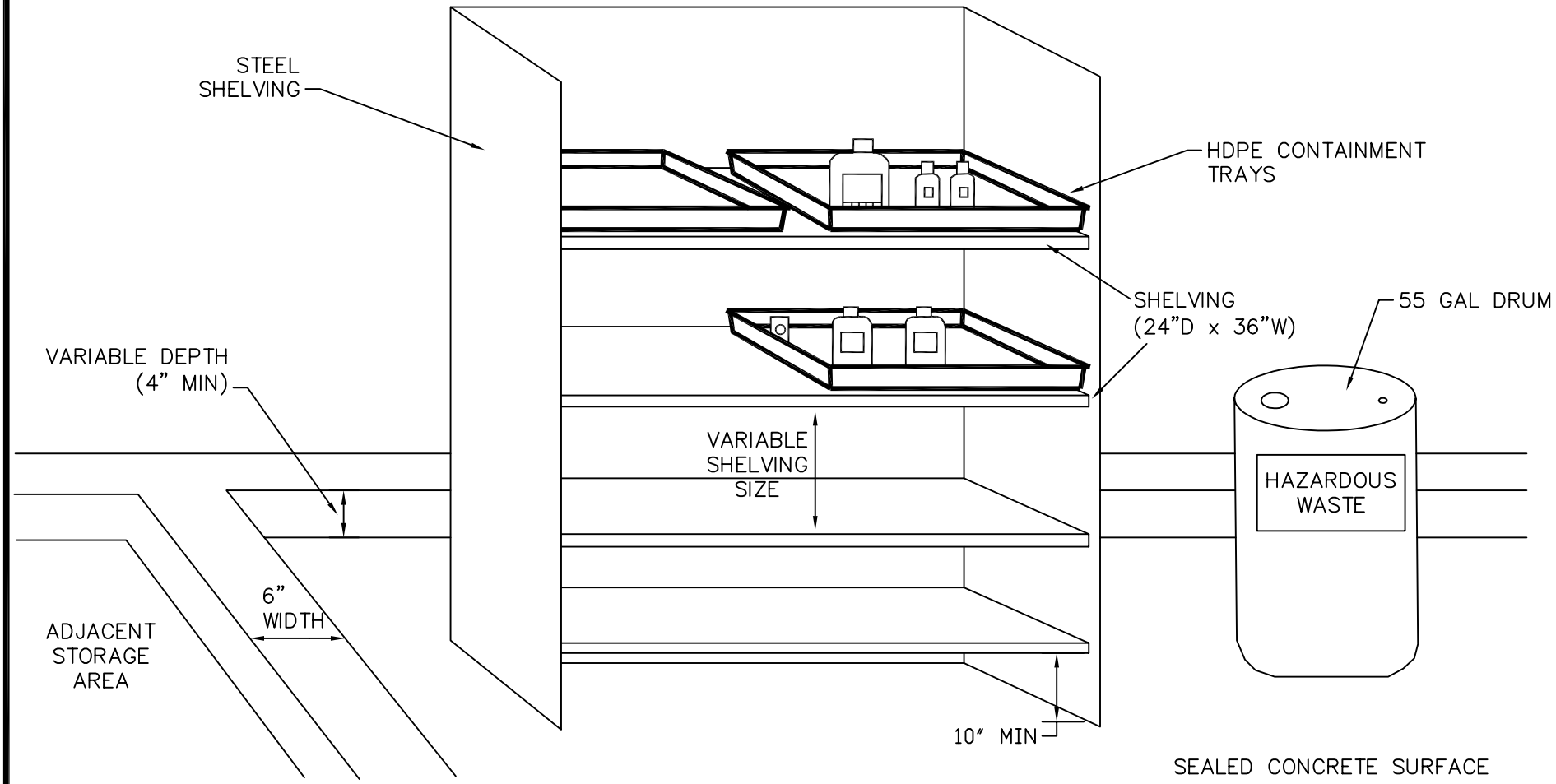
UNIVERSITY OF LOUISVILLE ENVIRONMENTAL PROTECTION SERVICES CENTER	USGS TOPOGRAPHICAL QUADRANGLE	FIGURE I1-1

FILE: P:\7362\UOFL-546260DOC-RCRAPARTBAPPLICATION\CAD-GIS\USGSTOPO



UNIVERSITY OF LOUISVILLE ENVIRONMENTAL PROTECTION SERVICES CENTER	ENVIRONMENTAL PROTECTION SERVICES CENTER	FIGURE I1-2

FILE: P:\7362\UOFL-546260000-RCRAPARTBAPPLICATION\CAD-GIS\SITE

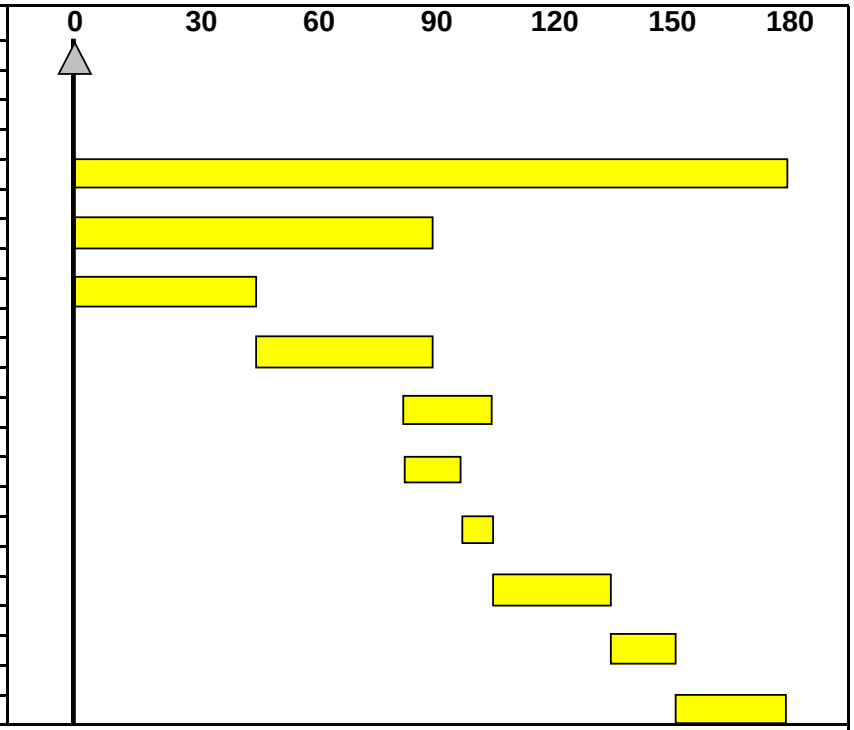


UNIVERSITY OF LOUISVILLE ENVIROMENTAL PROTECTION SERVICES CENTER	TYPICAL WASTE STORAGE DETAIL	FIGURE I1-3

FILE: P:\7362\UOFL-546260000-RCRAPARTBAPPLICATION\CAD-GIS\WASTE

University of Louisville
Environmental Protection Services Center
Closure Activity Schedule
FIGURE I1-4

Task Name	Duration (Days)
Closure Plan Approved by KDWM	0
Written notification of intent to close	135
Duration of Closure Activities	180
1. Inventory Elimination	90
a) waste stream approvals, contracting, bids	45
b) container areas	45
2. Decontamination Activities	22
a) container areas	15
b) rinsate disposal	7
3. Sampling & Analysis	30
4. Complete remaining closure activities	15
5. Final certification of closure	30



I1.1.b Scope of Wastes Accepted

The EPSC, by design, is a repository for a wide variety of both hazardous and non-hazardous wastes from U of L operations only.

It is practically impossible to determine in advance all the potential wastes or waste mixtures for which "pick up" requests will be filed. Equally impossible to determine in advance is an accurate description of the potential waste characteristics and hazard designations considering the multitude of chemicals used in chemical and research laboratories and the even further multitude of chemical experiments and reactions.

Each and every potential waste stream is evaluated using the information from the generating location along with any analytical test results, specific information on the experiment or process generating the waste, Material Safety Data Sheets (MSDS), telephone conversations, etc.

The facility's Part A Application specifically lists the RCRA-designated "hazardous wastes" considered acceptable by the facility. In addition, several examples of non-hazardous wastes which are commonly stored and/or treated at the facility include:

- Asbestos
- Polychlorinated Biphenyls
- Wastes Oils
- Pesticides/Herbicides not specifically listed or characterized in 40 CFR 261
- Off-spec or out-dated pharmaceuticals
- Off-spec or out-dated chemicals not specifically listed in 40 CFR 261 or not characteristically hazardous.

I1.2 CLOSURE PERFORMANCE STANDARDS

40 CFR 264.111, 264.112(b)(1)

Closure activities at the EPSC are designed to meet Federal and State of Kentucky closure performance standards. The closure activities will:

- Minimize the need for further maintenance.
- Control, minimize, or eliminate to the extent necessary to protect human health and the environment, post closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground, surface water, groundwater, or the atmosphere.
- Return the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous hazardous waste activity.

Due to the inherent characteristics of the hazardous waste management units (i.e., storage versus disposal), these standards will be met by the following methods. The method of closure will be to treat or process all hazardous wastes and waste residues in storage and

treatment units at the facility and decontaminate and remove all contaminated equipment, containment system components, structures, and soil. Where possible, on-site equipment and hazardous waste processing units will be utilized to achieve this goal. The method will be applicable to the closure of all of the container storage areas. No post closure care activities will be provided for the units as all waste and waste residues will be removed to levels protective of human health and the environment.

Other closure policies and procedures follow:

- A copy of the approved Closure Plan, and subsequent authorized amendments, will be maintained at the facility until closure is complete and certified by an independent registered professional engineer.
- At all times during closure, activities will be conducted in accordance with the approved Closure Plan. Any changes in facility plans, operations, or scheduling may result in an amended Closure Plan. Amended versions will be submitted to the Division of Waste Management (DWM) with a written request for a permit modification as identified in 40 CFR 264.
- U of L will notify DWM in writing at least 45 days prior to the date final closure is expected to begin.
- At no time during closure will hazardous waste inventory and hazardous waste residues generated as a result of closure activities exceed the facility's permitted capacity.
- U of L will notify DWM at least seven days prior to any background or closure performance sampling events.
- During closure, all hazardous wastes within the facility and hazardous waste management units will be processed in the same manner as they would be under normal operating circumstances.
- During closure, hazardous wastes and process residues will continue to be segregated and stored according to their compatibility in the container storage building.
- U of L will use trained employees or contractors for closing the various facility units. However, facility closure cost estimates are based on third party costs.
- All required daily, weekly, and monthly inspections will be performed until facility closure is complete.
- The facility will remain fenced and/or security procedures will be followed during closure activities.
- The required and applicable standard operating procedures for proper hazardous waste management and for worker health and safety will be followed during closure.
- The required and applicable permit conditions, and Federal, State, and local rules and regulations for proper waste management will be followed during closure.
- All hazardous waste container storage, associated equipment, and instrumentation will be either decontaminated and salvaged or dismantled and disposed of off-site at an authorized facility. An "authorized off-site facility" is a facility which has all permits or authorizations in accordance with all applicable rules and regulations for the receipt of the subject waste or material. The type of facility will be

determined by the applicable regulatory requirements for each waste or material. Shipments of materials which are classified as hazardous wastes will be sent to a RCRA permitted facility. Shipment of materials which are not classified as hazardous wastes may be sent to any "authorized" facility which can accept the material for disposal or salvage.

- All equipment used to process or handle hazardous wastes will be cleaned, decontaminated, and re-used or salvaged, and/or disposed of off-site at an authorized facility. Success of the decontamination efforts will be verified by sampling and analysis of the rinsate from the decontamination process for applicable analytical parameters.
- The requirements of the Department of Transportation (DOT) 49 CFR will be followed for transporting hazardous wastes or other equipment or materials off-site.
- In areas where there is removal or decontamination of hazardous waste management units, equipment, soils, hazardous wastes or residues, or other materials, removal or decontamination procedures are designed to ensure that the levels of hazardous waste or hazardous waste residues do not exceed the following:
  - Levels for hazardous wastes that are harmful to human health or the environment managed at the facility which are listed under discarded chemical products or hazardous waste sources or is designated by the hazardous waste characteristics of.
- Decontamination residues and contaminated soil generated from closure activities will be handled as required by applicable regulations.
- An independent registered professional engineer will monitor closure activities to ensure they are conducted in accordance with the approved Closure Plan. Closure activities to be monitored by the independent engineer include inventory elimination, secondary containment (concrete) decontamination, and soil sampling and analysis. The engineer will visit the facility at least weekly during the closure activities. These independent engineer inspections will be part of the facility's operating record.
- U of L will submit to DWM certification that final closure of the facility has been conducted in accordance with specifications of the approved Closure Plan. This certification will be signed by both U of L and an independent registered professional engineer. The certification will be submitted to DWM within 60 days after completion of final closure.

I1.3 PARTIAL CLOSURE ACTIVITIES

Partial closures will be performed during facility operations as needed. These partial closures will meet all the specifications and procedures as described in this Plan.

I1.4 MAXIMUM WASTE INVENTORY

40 CFR 264.112 (b)(2) & (3)

This section describes the maximum waste inventory which may require closure during facility operations. The maximum waste inventory is based on the total capacity of all container storage areas on-site as described in the facility Part A Application. Equipment which is used for the collection of wastes or waste residues is included in the maximum waste inventory. This inventory is the compilation of all storage capacity in containers as well as all residues from the facility ancillary equipment. The maximum waste inventory has been broken out in subgroups for computing.

Volumes of waste and waste residues are expressed in units of gallons for free flowing liquids and cubic yards for solids (or materials which have no free liquids). Gas cylinder storage is represented in pounds. Table I1.1 lists the maximum inventory for each waste management area.

Various sizes of containers of hazardous waste are stored at the facility. All container storage areas have adequate secondary containment for the materials stored. The total possible combined volume of the container storage is 7660 gallons and 2000 pounds of gas cylinders.

TABLE I1-1 UNITS INCLUDED IN MAXIMUM WASTE INVENTORY

Storage/Treatment Area Description	Area (sq ft)	Storage Capacity* (gallons)
Oxidizers	72.3	350
Inorganic acids	108.5	690
Organic acids	67.7	350
Nonflammable organics	174	1130
Caustic, bases, cyanides	116	635
Heavy metals	72.5	405
Flammables	560	2560
Reactives	160	230
Herbicides/pesticides	87	405
PCBs	122.5	790
Non-Hazardous	162	0
Blending	360	110
Loading dock	277.5	0
Receiving/inspection/aisles	1365.2	0
Gas cylinders	46	2000 pounds
Laboratory	180	5
Totals	3969.24	7660 gallons + 2000 pounds
TOTAL MAXIMUM WASTE INVENTORY		7660 Gallons + 2000 Pounds

*** This volume is based on the combined volume of drums and small containers in each segregation area and 5 gallons of waste being generated from the laboratory at the time of closure. Assumes 120 gallons of waste per storage rack.**

TABLE I1-2 VOLUMES INCLUDED IN MAXIMUM WASTE INVENTORY

A. DRUM CONTAINERS		
Container Storage Area	**Maximum # of drums stored***	**Volume or Weight of Waste**
Bulk/Containerized Wastes	**108(1)**	**5,910 gallons (2)**
B. OTHER CONTAINERS		
Lab Packs	**70 (55 gallon drums)**	**1,750 gallons (2)**
Lab Packs (gas cylinders)	**10 (55 gallon drums)**	**2000 pounds**
TOTAL MAXIMUM HAZARDOUS WASTE INVENTORY 7,660 GALLONS + 2,000 POUNDS		
*** Drum numbers are used in calculating closure cost estimate**		

(1) 5910 gallons equals approximately 108 drums
(2) Total inventory is 7,660 gallons. Assume 36.7% of inventory can be bulked into 55 gallon drums

I1.5 CLOSURE ACTIVITIES

This section describes closure activities for the hazardous waste management units at the EPSC. A summary of the closure procedures by unit is followed by Section I1.5.1, a description of the Inventory Elimination processes. Decontamination of the facility is described in Section I1.5.2. Section I1.5.3 contains the Sampling and Analysis Plan.

Closure of processing equipment which may contain hazardous waste residues will be conducted in accordance with procedures used to decontaminate tank systems. Examples of such processing equipment units include the following: shelving, storage cabinets, polyethylene containers, hand carts, hand pumps, and safety equipment.

I1.5.a Container Storage Area Closure Procedures

40 CFR 264.178; 264.112(b)(3)

Waste inventory will be removed within 90 days after operations cease in the container storage areas and properly disposed of at an off-site authorized facility. Empty drums will be salvaged, reconditioned, or disposed of in accordance with applicable regulations and normal operating procedures (i.e. triple-rinsed and salvaged or disposed).

Once all containers have been removed, decontamination of the containment pads, loading/unloading areas, curbing, drains, and sumps will be performed and verified as described in Section I1.5.3 (Sampling and Analysis). If a containment pad cannot be successfully decontaminated, it will be removed and disposed at an authorized off-site facility. The containment pads may be broken into manageable pieces prior to decontamination and/or disposed of at an authorized off-site facility.

After the containment pads have been decontaminated or removed, rinsate and soils will be sampled and analyzed for contamination as described in Section I1.5.3, (Sampling and Analysis). Any soil found to be contaminated will be treated on-site or removed, and disposed of at an authorized off-site facility. Clean fill will replace any excavated soil or concrete and final grading will be performed.

I1.5.1 Inventory Elimination

40 CFR 264.112

This section is a summary of the various treatment and disposal methods that will be used to eliminate waste inventory at closure.

Hazardous waste inventory will be removed from containers once the final volume of waste has been received. Wastes will be processed during closure in accordance with normal operating procedures. Waste segregation, compatibility determinations, and

sampling and analysis will be performed in accordance with facility operational procedures and applicable regulations.

For the purpose of estimating closure cost, U of L assumed the waste inventory will be treated and disposed in accordance with the facility's normal operating procedures. The method of treatment and disposal for the maximum waste inventory is listed in Table I1-3.

TABLE I1-3 ANTICIPATED TREATMENT AND DISPOSAL METHODS FOR WASTE INVENTORY

Description of Waste Inventory	Volume	Treatment/Disposal Method
A. CONTAINER STORAGE		
Bulk containers/Containerized Waste	**5,910 gallons**	**Incineration Fuel Program Recycle**
B. OTHER		
Lab Packs	**1,750 gallons**	**Incineration/ Neutralization/ Stabilization**
Gas Cylinders	**2,000 pounds**	**Incineration/Recycle**
Contaminated safety equipment & decontamination supplies	**20 cubic yards**	**Landfill**

I1.5.2 Decontamination Procedures

40 CFR 264.112 (b)(4), 264.114

This section describes the decontamination procedures that will be used to close the EPSC. The decontamination policies and requirements listed below are based on federal and state regulations, US EPA closure guidance manuals, and the facility's standard operating procedures.

- No equipment used in closure activities will be removed from the facility until it is decontaminated and verified clean.

- All equipment, including movable equipment and moving equipment, which has come in contact with hazardous waste constituents during closure activities, will be decontaminated, or disposed of at an authorized off-site facility.

- Any residues generated during decontamination activities will be handled in accordance with all applicable requirements. Decontamination rinsate will be treated appropriately off-site at an authorized RCRA facility.

- All decontamination will be completed by scraping and cleaning using one or a combination of the following methods: high-pressure water, steam cleaning, emulsifying detergent or a caustic-type industrial cleaning solution, or other appropriate methods. Decontamination will continue until equipment and materials show no visible evidence of contamination. Selection of the decontamination method and/or type of cleaning solution will be based on the previous contents and physical condition of the units at the time of decontamination.

- Where possible, the decontamination level will be achieved using minimal water and cleaning solution rinses. Special care and precautions such as wind screens and temporary dikes will minimize the spread of any waste residues during closure. Records describing all material generated during closure will be kept.

- All ancillary equipment will be decontaminated or disposed of at closure. The containment surfaces and the collection sumps of all hazardous waste management units including the container storage areas and the associated loading/unloading pads also will be decontaminated or disposed of at closure. Additionally, all equipment used for closure activities will be decontaminated or disposed of off-site at an authorized facility. The containment pads also will serve as decontamination staging areas during closure. Decontamination procedures for the hazardous waste management units and the decontamination equipment are described below:

I1.5.2.a Personnel/Personal Protective Equipment

Personnel conducting decontamination will be trained in the proper methods and associated hazards of decontamination of hazardous waste units. All facility operational safety procedures will be followed during closure activities.

During the decontamination process, appropriate personal protective equipment will be used. On-site supervising personnel will prescribe the necessary equipment for the task to be performed. All safety and personal protective equipment which becomes contaminated during the closure activities will be decontaminated or disposed of in accordance with all applicable requirements.

I1.5.2.b Decontamination of Container Storage and Containment Areas and other Process Equipment Dikes and Pads

This section describes the decontamination procedures for facility containment surfaces including, but not limited to, the container storage areas.

The facility has an inspection program to ensure that cracks or gaps in containment pads are repaired during facility operation. At closure, all containment pads will be inspected prior to initiating decontamination activities. Cracks or gaps (if any) where run-off could carry rinsate to the underlying soil will be filled and sealed to avoid contamination of the underlying soil prior to starting decontamination activities. The crack sealant will be resistant to both water and any cleanser designated for use in the area.

Areas which show visual signs of previous spillage will receive a preliminary cleaning with a wire brush or equivalent method. The containment pads then will be rinsed with a high pressure wash and/or an appropriate cleaning solution (e.g. a caustic-type industrial cleaner or emulsifying detergent). Based on US EPA guidance for containment system decontamination, rinsate is estimated to be generated at approximately 0.5 gallons per square foot. (See Final Report Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H). Volume III: Unit Costs, Pope-Reid Associates, Inc., St. Paul, Minnesota for U.S. EPA, Washington, D.C.). This amount of rinsate may vary depending upon the type of waste managed in each containment system, decontamination rinse method, and containment system size.

Rinsate and cleaning residue from washings will be managed as hazardous waste. All rinsate will be collected in the existing sump systems and removed with a pump, vacuum truck, or other equivalent means. Rinsate and cleaning residues from incompatible containment areas will not be commingled. The collected rinsate will be appropriately sent off-site for treatment and disposal at an authorized facility.

I1.5.2.c Equipment Decontamination

All equipment used for closure activities will be decontaminated via rinsing before transport off-site. Scraping and high-pressure washing will be used to decontaminate all other equipment used for closure.

The final secondary containment areas to be decontaminated within the container storage building will be decontaminated as described below. Final decontamination efforts for a portion of the secondary containment will not occur until U of L has confirmation of the successful decontamination of other portions of the secondary containment area. This allows this portion of the secondary containment area to act as a decontamination staging area for other decontamination areas, if necessary.

Visqueen or an equivalent protective material will be placed around the exposed perimeter of the secondary containment area, to protect against overspray during

decontamination and to provide a working surface during the final steps of decontamination. The visqueen or equivalent will be lapped over the inside edge of the containment area to prevent releases between the visqueen and the containment area. Any additional sheets of visqueen required to surround a containment area will be overlapped in a manner that prevents releases due to liquid flow across the overlapped sheets. A temporary berm will be formed along the outer edges of the visqueen to keep rinsate within the hazardous waste management area.

Decontamination rinsate from high-pressure washing will be collected by vacuum truck and sent off-site to an authorized facility for treatment or disposal. After high-pressure washing has been completed and decontamination rinsate collected, the visqueen or equivalent material will be removed for disposal at an off-site authorized facility.

During the final decontamination stage, a small temporary decontamination area (approximately 10 feet by 20 feet) may be established on-site after concrete containment areas have been decontaminated. The temporary decontamination area will be used for decontamination of sampling equipment, personal protective equipment, and other miscellaneous small equipment used during decontamination and sampling activities. High density polyethylene (HDPE) ground cover, or equivalent, will be placed as described above to prevent releases from the temporary decontamination area. Decontamination rinsate and other materials will be managed at an authorized off-site facility.

I1.5.2.d Decontamination Rinsate Management

Rinsate from closure decontamination activities will be collected and treated off-site. Closure and decontamination of hazardous waste management units and secondary containment areas will be phased to maximize treatment capabilities. Rinsate generated by the final decontamination of the hazardous waste containment systems will be shipped off-site for treatment at an authorized facility. Rinsing of containment systems and all process equipment will take place within the secondary containment system or temporary containment areas. Table I1-4, Decontamination Rinsate Management, describes the quantity of rinsate anticipated to be generated.

TABLE I1-4 DECONTAMINATION RINSATE MANAGEMENT

AREA/EQUIPMENT NAME	RINSATE(1) GENERATED (GALLONS)	RINSATE(2) TREATMENT/DISPOSAL METHOD
Rinsate from secondary containment areas:		
Container storage areas (4100 ft^2) (includes aisles, sumps, berms, etc.)	**2050**	**Off-site treatment**
Rinsate from process equipment cleaning:		
Miscellaneous equipment (blending, hoods, shelves, etc.)	**250**	**Off-site treatment**
Total rinsate requiring off-site treatment/disposal =	**2,300 gallons**	

(1) Rinsate generated at a rate of 0.5 gallons per square foot of surface area, per estimate methods provided in EPA's *Final Report Guidance Manual: Cost Estimates for Closure and Post Closure Plans (Subparts G and H) Volume III-Unit Costs*, and contractor process knowledge.

(2) Rinsate generated from decontamination activities will be treated and disposed off-site. Applicable treatment method will depend on concentration of contaminants. All treatment will be performed off-site at an authorized RCRA facility.

I1.5.3 Sampling and Analysis

40 CFR 264.112 (b)(4), 264.114(e)

This section describes the sampling and analysis procedures to be used for closure activities at the EPSC. A proposed sampling and analysis plan is provided in Table I1-5. Design of the EPSC minimizes the risk of a release of hazardous wastes to soils.

I1.5.3.a Containment Pad Rinsate Sampling and Analysis

The facility's operation procedures are established to minimize the risk of a release of hazardous waste or hazardous waste constituents into the environment. If spills occur during facility operations, spills are contained immediately and the spill area is cleaned. The facility operating record documents clean up activities and any sampling results, if necessary. Engineered barriers and facility operation procedures that minimize the risk of spillage include: secondary containment around waste management areas and decontaminating equipment before leaving a contaminated area.

Sampling procedures necessary to verify closure are designed and will be implemented in areas most likely to have experienced a release (i.e. a sump or low areas). If contamination is discovered as a result of sampling in these areas, then additional sampling will be performed to establish the concentration and extent of any contamination. Remedial actions, if necessary, will be completed as part of closure activities.

The concrete surface of the containment pads and related areas will be rinsed to decontaminate the areas. The rinsate of the concrete surface of the containment pads and related areas will be sampled and analyzed to verify that the decontamination procedures are successful. In addition, several surface concrete samples will be taken to verify decontamination (see Section I1.5.3.b)

Rinsate samples will be analyzed for constituents of waste historically managed within each particular containment area, using analytical methods described in US EPA SW-846. If analyses indicate that decontamination is not complete for the containment area, high-pressure washing may be repeated for that area until rinsate analyses indicate sufficient decontamination. Steam cleaning or a blasting technique may be used as an alternate method for additional cleaning to decontaminate the secondary containment area.

As an alternative to further decontamination, sampling, or analysis, a containment pad may be demolished prior to decontamination, and disposed as hazardous waste at an authorized off-site facility. If the levels of hazardous waste constituents in the pad do not exceed designated levels for hazardous waste under applicable regulations, the off-site disposal facility may be a sanitary landfill provided all necessary permits are in place.

I1.5.3.b Containment Pad Concrete Sampling and Analysis

The concrete surface of the containment pads will be rinsed to decontaminate the areas. After rinsing, the concrete surface of each of the containment areas and/or related sumps and aisles will be sampled and analyzed to verify that the decontamination procedures are successful. Concrete chips will be collected to a depth of ½ inch for the containment pad surface at base and random sampling locations, as described below. Samples to be analyzed will pass through a No. 4 sieve. Sample collection, documentation and handling will be in accordance with standard procedures described in US EPA SW-846 and by methods described in EPA 600/2-80-018.

A total of twenty five (25) concrete chip samples will be analyzed for constituents of waste historically managed within each particular containment area, using analytical methods described in US EPA SW-846. If analyses indicate contamination is present in a particular portion of the containment area, high-pressure washing or other appropriate cleaning methods may be repeated for that area until concrete chip sample indicate sufficient decontamination of the containment pad.

I1.5.3.c Soil Sampling and Analysis: Background Soils

The facility is underlain by silt, sand, and clays. On-site background soil samples will be obtained from locations outside the active area of the facility, but within the property boundaries.

Alternatively, background soil samples may be taken from an off-site location in the vicinity of the facility. In this case, off-site background samples would be taken from an area considered representative of original soils in the vicinity, e.g., from an area determined to be unaffected by EPSC activities.

A minimum of five background soil samples will be obtained from random locations in the area selected for background soil sampling. Each sample will be collected at a depth of one to two feet below the existing surface or at the same depth of the soils below the secondary containment, using either hand augers or shallow test pits. Sample collection, documentation, and handling will be in accordance with standard procedures described in US EPA SW-846. Wherever possible, background soil samples will be obtained from the same stratigraphic horizon from which closure soil samples will be taken.

Background samples will be analyzed for constituents of waste historically managed within each particular area to provide as much information as possible for comparison of background soil characteristics and soil samples taken during unit closure. Background soil sampling and analysis will be completed before closure. Analytical results of the background soil samples will be provided to the Division of Waste Management.

I1.5.3.d Soil Sampling and Analysis: Hazardous Waste Management Area

Once decontamination of secondary containment pads and sumps is verified, the underlying soil will be sampled and analyzed to confirm that there is no residual contamination. Soil samples will be taken at a total of 25 locations during closure. Soil from all sampling locations will be tested for the presence of compounds characteristic of the wastes managed in those areas. The soil sampling and analysis scheme is described below.

Samples will be collected at a shallow depth, through holes bored in the overlying concrete containment systems. Samples will be collected using either hand augers or other hand tools. Sample collection, documentation, and handling will be in accordance with standard procedures described in US EPA SW-846. Soils beneath all sumps in secondary containment areas will be sampled. Sumps would be the most likely location for collection and longer-term residence of any contaminants. Areas showing cracks or stains in the secondary containment system will also be sampled. Visual observation of past repair locations and repair records maintained as part of the facility's operating log will be used to determine selective locations for soil sampling during closure. For the purpose of estimating closure costs, U of L estimated that a total of three locations will be tested due to the presence of cracks or stains. A total of 15 soil samples will be taken.

An evaluation of soil sampling data will be performed to determine if results indicate levels protective of human health and the environment. If levels in the soil are below background, the closure will be determined complete. In addition, levels which may be above background levels but are protective of human health and the environment will also meet the closure performance objectives. Where necessary, subsequent actions to investigate and/or remediate the extent of any contamination which may be present in soils under the units will be completed. The Division of Waste Management will be provided with all analytical results and included in discussions to determine when closure has been completed.

TABLE I1-5 PROPOSED SAMPLING & ANALYSIS PLAN

ITEM DESCRIPTION	TYPE OF SAMPLE	NUMBER OF SAMPLES	ANALYSES*
Container storage area & equipment	Rinsate	5	➢ Volatiles ➢ Semi-volatiles ➢ Total metals ➢ Cyanide & sulfides ➢ Ignitability ➢ PCBs ➢ pH ➢ pesticides ➢ herbicides
Container storage area	Concrete	25	
Background	Soil	5	
Container storage area	Soil	15	
Selected cracks or stains, or sumps (estimated)	Soil	5	

*** SW-846 Methods**

I1.6 CLOSURE SCHEDULE

40 CFR 264.112 (b)(6), (7)

This section discusses the schedule for the final closure of the EPSC.

The schedule for closure of each of the hazardous waste management areas is described below. The U of L will notify the Division of Waste Management in writing at least 45 days prior to the date final closure is expected to begin. Partial closures will be performed during facility operations as needed.

The U of L has estimated it will require approximately 180 days to complete final closure activities for the entire facility. The University may also wish to apply for a new permit for the facility at the end of each approved permit period thus extending the life of the facility. However, as an estimate the University has anticipated final closure to begin in January, 2046 and to be completed by the end of June, 2046. Figure I1-4 illustrates the time allowed for each of the steps in the closure process.

All hazardous wastes will be treated, and/or removed off-site within 90 days from receipt of the final volume of wastes. The maximum amount of waste that will be stored or treated at the facility is designed in Section I1.4.

All closure activities will be completed within 180 days from receipt of the final volume of waste. If facility conditions change during the partial or final closure activities which would make it necessary for an extension of time, a request for a permit modification to extend the closure period will be made to the Director. One of the following will be demonstrated by the University:

- Closure activities require longer than 180 days (or facility has capacity to receive additional wastes).
- There is reasonable likelihood that a person other than owner or operator will re-commence operation of the site.
- Closure would be incompatible with continued operation.
- Demonstrate that all steps have and will be taken to prevent threats to human health and the environment from an unclosed but inactive facility.

I1.6.a Closure Schedule-Container Storage Areas

Closure of the EPSC will require 180 days. U of L estimates removal of hazardous wastes in containers will be completed in 90 days. Subsequent steps in the closure process (pad

decontamination and soil sampling and analysis) will take approximately 8 weeks (see Figure I1-4, Closure Activity Schedule).

The proposed schedule for closing container storage buildings at the facility is shown below. The closure schedule is based on estimated quantities of hazardous waste under maximum inventory conditions and conservative shipment and laboratory turnaround times.

Inventory Elimination (Includes waste stream approval, contracting, bidding)	90 days
Building Pad Decontamination	7 days
Rinsate and Soil Sampling	5 days
Analysis of Soil and Rinsate Samples	25 days
Completion of any remaining activities	15 days
Final Certification	30 days
	180 days total

I1.7 CLOSURE CERTIFICATION

40 CFR 264.115

Within sixty (60) days of completion of final facility closure, Uof L will submit, by registered mail, a certification that closure is complete in accordance with specifications contained in the approved Closure Plan. The certification will be signed by U of L and an independent registered professional engineer. Sampling results will be included in the closure certification report.

I2.0 CLOSURE COST ESTIMATE

40 CFR 270.14(b)(15), 264.142

This section presents the closure cost estimates for the EPSC. The cost estimates are based on current unit costs for inventory elimination, decontamination, and sampling as described in Section I1.0, Closure Plan. Included are closure costs for each hazardous waste management unit described in the facility's Part A Permit Application.

I2.1 REGULATORY REQUIREMENTS

The closure cost estimates, as required by 40 CFR 264.142(a)(1) must reflect an estimate of the cost of facility closure at a point when the extent and manner of its operations would make closure the most expensive. This "maximum waste inventory" includes all of the areas identified in Table I1-1. The total estimated cost for closure of the facility for the maximum waste inventory for 2021 is $524,821.14. Table I2-1 provides a breakdown

Commented [MK2]: NOD 18.19,20,21

of this estimate. Cost assumptions are discussed in Sections I2.3 through I2.5. Annual adjustments to the closure cost estimate use the appropriate GNP Implicit Price Deflator for the total estimate, not the individual cost items in Table I2-1.

These costs are based on the current value of the dollar as of the most recent revision of this Closure Plan. Background assumptions to support these estimates are provided in Exhibit A, Unit Cost Assumptions.

During the operating life of the facility, U of L will adjust the closure cost estimates annually to take inflation into account. The adjustments will be made by recalculating closure costs in current dollars or by using an inflation factor as specified in 40 CFR 264.142(b)(i) and (b)(ii). (See Section I3.0 Closure Plan Amendments, and Annual Cost Updates and Adjustments to Closure Cost Estimates).

The inflation adjustment will be made by the anniversary date of the prior closure plan amendment. The cost estimates also will be revised if a change in the Closure Plan increases the cost of closing the facility. The cost revision will be made within 30 days after agency approval of the change.

TABLE I2-1 COST ESTIMATES REFLECTING CLOSURE AT MAXIMUM WASTE INVENTORY

ITEM DESCRIPTION	COST (2021$)
Inventory elimination (containerized/lab packed wastes)	252,018
Ancillary equipment decontamination and removal	12,412
Secondary containment structures decontamination	18,712
Heavy equipment decontamination	3,648
Rinsate treatment and disposal	34,960
Sampling/analysis (rinsate & soils)	129,318
Personal protective equipment	10,537
Engineering certification	15,507
Subtotal	477,112
Contingency (10%)	47,711
TOTAL	524,823
MAXIMUM WASTE INVENTORY CLOSURE COST ESTIMATE	$ 524,823

Commented [MK3]: NOD 18

I2.2 UNITS COSTS FOR CLOSURE ACTIVITIES

The unit costs associated with closure of the EPSC are based on the following:

- The unit costs for all closure activities are based on the cost of hiring a third party to close the facility. A third party is someone other than the parent or subsidiary of the owner or operator. However, it is intended that trained site personnel will be used to conduct closure activities to the greatest extent possible in order to maintain continuity of facility operation.

- Cost estimates using third party costs include those for labor, equipment, and engineering certification. Specific examples of third party contractors which may be used for closure include contractors for off-site treatment and disposal of hazardous wastes at a RCRA permitted facility, facility and equipment decontamination, sampling and analysis of concrete and soil, and monitoring of all closure activities by an independent registered professional engineer. Examples of qualifications for third party contractors include hazardous waste site workers trained in compliance with OSHA standards (29 CFR Part 1910.120(e)) and job-specific training for their particular task, and outside consultants (including engineers) with demonstrated experience in closure of hazardous waste facilities and cleanup of hazardous waste sites.

- Unit costs were obtained, where possible, from actual operating costs and experience at similar facilities. Other sources used include EPA's Final Report Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H), and contractor estimates.

- Unit cost assumptions for facility decontamination and sample collection are listed in Exhibit A.

I2.3 INVENTORY ELIMINATION COSTS

The costs for treatment and disposal of the remaining inventory off-site are included in this section. The inventory elimination cost estimate is based on the maximum waste inventory and is given in Table I2-2.

The assumptions involved in determining the unit costs for the elimination of these wastes are discussed below along with other identified means for determining unit costs.

- It is assumed that all waste streams will be treated off-site. Off-site treatment costs will reflect current treatment costs using third party labor.

- Unit transportation costs used for estimating inventory elimination costs (as necessary) are based on contractor estimates for transporting bulk and containerized solids and bulk liquids to an off-site RCRA-permitted disposal facility.

- Unit disposal costs are based on estimates from off-site facilities.

- Closure activities will be conducted in a sequential manner to maximize the use of on-site treatment equipment in order to minimize the off-site disposal of wastes or cleaning residues.

TABLE I2-2 INVENTORY ELIMINTATION COSTS[1]

Description	Quantity	Unit Cost[2]	Total Cost (2021$)
Bulk/Containerized Drums	5910 gallons (108 drums)	$1,012.49/drum	$ 109,349
Lab Pack Drums	1,750 gallons (70 drums)	$1,488.97/drum	$ 104,228
Gas Cylinders	2,000 pounds (10 drums)	$1,786.7/drum	$ 17,867
Contaminated Solids	20 cubic yards	$1,028.7/yd	$ 20,574
TOTAL INVENTORY ELIMINATION COST			**$ 252,018**

Commented [MK4]: NOD 19

[1] includes loading transportation, and treatment/disposal

[2] Total inventory is 7,660 gallons. Assume 36.7% of inventory can be bulked into 55 gallon containers. Other remaining volume will be lab-packed at 25 gallons/drum.

I2.4 FACILITY DECONTAMINATION COSTS

The bases for closure costs for decontamination and removal of facility equipment and waste management units are included in this section. Specifically, the closure cost estimate includes decontamination/removal of the following:

- Treatment units
- Secondary containment structures
- Facility ancillary equipment
- Heavy equipment and other mobile equipment used during closure.

Hazardous waste management units, secondary containment structures, and heavy equipment will be decontaminated by rinsing with a high-pressure washer. Table I2-3 provides details of the closure cost estimate for decontamination.

TABLE I2-3 FACILITY DECONTAMINATION COSTS

Description	Calculation	Total Cost (2021$)
Secondary Containment Structure Decontamination	• Container Storage Area = 4,100 ft^2 x $3.08/$ft^2$ (pressure washing) = $12,628 • 4,100 ft^2/(400 ft^2/hr) x 1 person = 102.5 hours labor • 102.5 hours labor x $59.36/hr = $6,084	$18,712
Heavy Equipment Decontamination	• Forklift decontamination cost: $65.52/piece + labor at $59.56/hr x 1 hr/piece = $125.08/forklift x 1 forklift = $125.08 • Loader decontamination cost: $178.67/piece + labor at $59.66/hr x 3 hrs/piece = $357.65 • Backhoe decontamination cost: $190.59/piece + labor at $59.56/hr x 3 hrs/piece = $369.27 x 1 backhoe = $369.27 • Mobilization/demobilization cost: $932.29/piece of equipment; assume three pieces from off-site or $932.29 x 3 = $2796.87	$3,648
Ancillary Equipment Dismantlement, Decontamination, & Removal	Lump Sum = $12,412	$12,412
Rinsate Treament & Disposal	2,300 gallons x $15.2/gallon = $34,960	$34,960

Commented [MK5]: NOD 20

I2.5 SAMPLING AND ANALYTICAL COSTS

Items requiring sampling and analysis include secondary containment areas, background soils, and soils under hazardous waste management units. Costs for sample collection and analysis are summarized in Table I2-1 and Table I2-4. Plans for sample collection and analysis are described in detail in the Closure Plan Section I1.5.3, “Sampling and Analysis”.

TABLE I2-4 SAMPLING 7 ANALYTICAL COSTS

Description	Quantity	Unit Cost	Total Cost (2021$)
Rinsate samples-collection	5 samples	$391.87/sample	$1,959.35
Rinsate samples-analysis	5 samples	$1,959.36/sample	$9,796.8
Concrete samples-collection	25 samples	$391.87/sample	$9,796.75
Concrete samples-analysis	25 samples	$1,959.36/sample	$48,984
Soil samples-collection	• Background: 5 samples • Container areas: 15 samples • Cracks, stains, sumps: 5 samples	$391.87/sample	• $1,959.35 • $5,878.05 • $1,959.35
Soil samples-analysis	• Background: 5 samples • Container areas: 15 samples • Cracks, stains, sumps: 5 samples	$1,959.36/sample	• $9,796.8 • $29,390.4 • $9,796.8
Total Sampling & Analysis Cost			**$129,318**

Commented [MK6]: NOD 21

I3.0 CLOSURE PLAN AMENDMENTS AND ANNUAL COST UPDATES AND ADJUSTMENTS TO CLOSURE COST ESTIMATES

40 CFR 264.112(c), 264.118(d) 270.14(b)(13), 264.142, 264.144

This section describes the methods the U of L will use to amend the Closure Plan to make necessary adjustments to the cost estimates.

I3.1 PLAN AMENDMENT

The Closure Plan can be amended at any time during the life of the facility. At a minimum, these plans will be amended whenever changes in the facility affect the Closure Plan. Whenever the U of L requests a permit modification to authorize a change in the facility which affects the Closure Plan, a request to modify the Closure Plan will be submitted at the same time (if necessary).

I3.2 CLOSURE COST ESTIMATE ADJUSTMENTS

During the active life of the facility, the U of L will adjust the closure cost estimate for inflation by the anniversary date of the initial Closure Plan Estimates (Year 0=1995). The adjustment may be made by recalculating the closure cost estimate in current dollars, or by using an inflation factor derived from the most recent Implicit Price Deflator for Gross National Product as published by the U.S. Department of Commerce in its "Survey of Current Business". The adjustments will be made by the following formulas:

First Adjustment:

$$\text{(Closure cost estimate)} \times \frac{\text{(most recent deflator)}}{\text{(previous year deflator)}} = \text{Adjusted cost estimate}$$

Subsequent Years:

$$\text{(Adjusted Closure cost)} \times \frac{\text{(most recent deflator)}}{\text{(previous year deflator)}} = \text{New adjusted cost estimate}$$

In addition, U of L will revise the closure cost estimate no later than thirty (30) days after a revision to the Closure Plan increases the cost of closure.

I4.0 FINANCIAL ASSURANCE

40 CFR 264.143
401 KAR 34:090

The U of L, being property of the Commonwealth, is exempt from financial assurance requirements as stated in 40 CFR 264.140(c).

I5.0 LIABILITY REQUIREMENTS

40 CFR 264.147; 40 CFR 270.14(b)(17)

The U of L, being property of the Commonwealth, is exempt from liability requirements as stated in 40 CFR 264.140(c).

EXHIBIT A
UNIT COST ASSUMPTIONS

The assumptions and procedures used to develop unit costs for closure cost estimates are as follows:

1. Cost estimates include all activities associated with closure of the hazardous waste management units and the general facility. Costs associated with treatment of hazardous waste inventories through the individual waste management units also are included as part of the cost estimate.

2. Sequential closure of the hazardous waste management units and operations will be followed for closing the entire facility. The wastes will be processed through the individual waste management units in a logical and orderly fashion.

3. The processing of the hazardous wastes within the facility and individual waste management units will be performed using the same procedures as the facility would normally use to process the wastes if the facility were not being closed.

4. The cost of removing non-RCRA regulated units is included where removal is required to allow complete closure of RCRA units to continue.

5. Supplies and equipment will be salvaged to the extent possible. However, salvage value has not been incorporated into the closure cost estimate.

6. Costs for decontaminating sampling equipment between samples are considered to be negligible.

7. Costs for concrete and contaminated soil removal are excluded because it is not anticipated that the facility will undergo corrective action prior to closure, and it is assumed that no further contamination will exist and no contingent closure plan has been completed.

8. Estimated man-hours needed to perform closure activities and unit cost estimates are based on U of L's previous experience and best estimates and on the EPA guidance document: Final Report Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H) Volume III-Unit Costs.

SECTION J –
OTHER FEDERAL AND STATE LAWS

J OTHER FEDERAL AND STATE LAWS

40 CFR 270.14(b)(20)
40 CFR 270.3

This section provides a general description of other federal, state, or local laws which may impact facility operation. Federal and state regulations require that the permitting agency follow the procedures under certain federal laws before granting or denying the Resource Conservation and Recovery Act (RCRA) permit. The discussion which follows provides a description of how these laws currently apply to operations at the U of L Environmental Protection Services Center (EPSC).

J.1 WILD AND SCENIC RIVERS ACT

The EPSC does not affect any river designated under the Wild and Scenic Rivers Act.

J.2 NATIONAL HISTORIC PRESERVATION ACT OF 1966

Structures within the EPSC site are not listed or eligible for listing on the Natural Register of Historic Places.

J.3 ENDANGERED SPECIES ACT

National threatened or endangered species are not known to exist on the facility site or within the area adjacent to the site. EPSC operations do not affect other critical habitat areas where endangered species might be present.

J.4 COASTAL ZONE MANAGEMENT ACT

The EPSC is not located within a shoreline area as designated in the Coastal Zone Management Act.

J.5 FISH AND WILDLIFE COORDINATION ACT

The U of L does not impound, divert, control, or modify any body of water in the vicinity. Storm-water drainage control measures at the site do not appreciably affect the flows to any stream in the area.

J.6 CLEAN WATER ACT

The EPSC has no wastewater discharges and therefore no wastewater discharge permit is required.

Discharges of storm water are to a combined sewer system that leads to a Publicly Owned Treatment Works (POTW), and all operations (including storage) at the facility are conducted inside, therefore a storm water discharge permit is not required for this facility.

J.7 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980

Facility design and operating procedures minimize or eliminate releases into the environment. The University's procedures require strict compliance with required actions in the event of a spill or release at the facility. Procedures for reporting and cleanup have been established in compliance with the requirements of this statute. The facility Contingency Plan (Section G) provides detailed procedures for reporting spills and/or releases.

J.8 EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986

The nature of the materials handled at the facility preclude the facility from making notifications under Title III, with the exception of materials that would exceed reportable quantities that are not waste materials. Under the Emergency Planning and Community Right-to-Know Act of 1986, hazardous wastes are not included in emergency planning and notification requirements. Therefore, the facility does not make these notifications. If other materials that may be handled at the site would meet notifications requirements, the facility will make necessary notifications under this Act.

J.9 POLLUTION PREVENTION ACT OF 1990

Under the Pollution Prevention Act of 1990, it is directed that pollution should be reduced at the source whenever feasible. Pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible. Pollution that cannot be prevented or recycled should be managed in an environmentally safe manner whenever feasible, and disposal or releases into the environmental should be employed only as a last resort and should be conducted in an environmentally safe manner. The purpose of the EPSC is to provide the University with opportunities for both source reduction and recycling capabilities for its waste generated as a result of its research and other activities. By utilizing the EPSC, the University will be able to greatly reduce the volumes of materials requiring disposal and will provide methods to either reuse or recycle materials at the University versus off-site management of the materials.

J.10 CLEAN AIR ACT OF 1990

Due to the small volumes of materials and limited handling operations at the facility, potential emission sources do not exceed levels necessary for permitting under the Act. However, the U of L has documented the calculations necessary to show potential emissions and retains them for submission upon request to the Louisville Metro Air Pollution Control District (APCD) for their review.

J.11 OIL POLLUTION ACT OF 1990

The EPSC does not store, handle, or transfer oil in volumes that would be regulated under this law.

J.12 SAFE DRINKING WATER ACT

The EPSC is designed to prevent any releases from the facility which may affect any underground source of drinking water. Pipe, solder, and flux used in the installation of drinking water supplies in the facility were lead-free. The facility does not employ any underground injection of waste or waste residues as part of waste management processes.

J.18 TOXIC SUBSTANCES CONTROL ACT

The EPSC properly manages two materials that fall under the Toxic Substances Control Act. These materials include polychlorinated biphenyl's (PCBs) and Asbestos Containing Materials (ACM). Storage and handling of these materials are in accordance with all applicable regulations. The University only manages PCB and asbestos wastes which are from its Belknap Campus, Health Science Center, ShelbyHurst Campus, and other University operations. This facility is not a commercial facility for either PCB or asbestos waste materials.

Under the 40 CFR 761 (PCB) regulations, this facility does not meet the definition of a commercial storage facility of PCB waste. The facility does not store PCB waste generated by others. This facility only stores waste materials from University operations and at no time will exceed 500 liquid gallons of PCBs at the facility. Therefore, permitting under 40 CFR 761 is not required.

Storage is in accordance with 40 CFR 761 requirements, in which all PCB waste materials are stored in an area with adequate roof and walls to prevent rainwater from contacting PCBs or PCB items. The facility is designed with an adequate floor with a minimum of six (6) inch high curbs around all areas in which PCBs are stored. The floor and curbing provide containment volume equal to at least two times the volume of the largest PCB container, or 25% of the total internal volume of all PCB containers stored in the facility, or whichever is greater. There are no drain valves, floor drains, expansion joints, sewer lines, or other openings in the PCB storage area that would permit liquids to flow from the area. The floors and curbing are constructed of continuously smooth and impervious materials.

Asbestos materials are stored in enclosed containers or wrapped prior to shipment for disposal. Storage and handling of asbestos materials will be in accordance with all APCD regulations.

J.19 FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT

The EPSC is not designated as a manufacturer, commercial applicator, or user of any federal classified insecticides, fungicides, or rodenticides. Materials received at the facility may be waste insecticides, fungicides, or rodenticides. However, these materials are not applied, and therefore requirements of FIFRA do not apply to this facility. Proper management and storage of these materials will be in accordance with the RCRA regulatory system.

J.20 OCCUPATIONAL HEALTH AND SAFETY ACT

The EPSC is operated and managed to minimize or eliminate exposures from hazardous materials and wastes to all facility personnel. Facility personnel receive training with respect to hazardous materials management in accordance with 29 CFR 1910.120. Design and operation of the facility is intended to achieve compliance with all OSHA and industry standards found in 29 CFR 1910.

J.21 HAZARDOUS MATERIALS TRANSPORTATION ACT

The EPSC does not transport hazardous materials in commerce. Therefore, requirements of the Hazardous Materials Transportation Act do not apply to this operation, except during loading and transport of wastes to off-site TSDFs. Shipping papers and manifests are addressed under RCRA requirements.

J.22 LOUISVILLE/JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT REGULATIONS

The EPSC does not discharge wastewater from its operations. Therefore, the facility does not require a discharge permit. In addition, the EPSC operational procedures ensure reporting and compliance with the hazardous materials spill ordinance under MSD requirements.

J.23 LOUISVILLE METRO AIR POLLUTION CONTROL DISTRICT REGULATIONS

The emissions from the EPSC are extremely small, therefore, permitting of the facility under the APCD is not required. However, the U of L has documented the calculations necessary to show potential emissions and retains them for submission upon request to the APCD for their review.

J.24 JEFFERSON COUNTY HAZARDOUS WASTE CITING ORDINANCE

The Jefferson County Hazardous Waste Citing Ordinance is not applicable to this facility.

SECTION K –
WASTE MINIMIZATION

K WASTE MINIMIZATION

RCRA Section 1003[b]

K.1 REGULATORY BASIS

The Hazardous and Solid Waste Amendments of 1984 to RCRA require that, whenever feasible, the generation of regulated hazardous waste be reduced or eliminated as expeditiously as possible. Section 3002(b) of RCRA requires certification of the following:

- The generator of the hazardous waste has in place a program to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable.

- The proposed method of treatment, storage, and/or disposal is that practicable method currently available to the generator that minimizes the present and future threat to human health and the environment.

In accordance with 40 CFR 262.27(a), this chapter provides the means to certify that a waste minimization program is in place for the U of L.

K.2 WASTE MINIMIZATION METHODS

The following methods and practices are employed by the U of L to reduce the volume and toxicity of waste generated by the U of L.

- Purchasing of new chemicals that are already available as surplus is avoided by maintaining and distributing to all chemical users a list of surplus chemicals that would be available for their use. This practice reduces the volume of chemicals that could eventually enter the waste disposal process by allowing them to be redistributed within the U of L.

- Surpluses of chemicals that may eventually enter the waste disposal process are avoided by working with the Purchasing Department and the laboratories using chemicals to encourage them to buy only the quantities that will actually be needed. Many times chemical companies offer special or lower prices for their larger sizes and even though the researcher may not use the entire amount of a chemical contained in the larger size, it "appears" more economical to purchase the larger size. When disposal costs of the unused/unwanted portions of these more "economical" containers are considered, the total cost is higher than it would be if a smaller size that was completely used (i.e. no surplus) had originally been purchased.

- The U of L is attempting to virtually eliminate land disposal as a disposal method for its wastes. The majority of wastes are being recycled, incinerated, or treated

by the permitted off-site TSD prior to final disposal. These two methods greatly decrease the volume and/or toxicity of the wastes.

- Experiments and processes are reviewed to determine if it is possible to replace a hazardous reagent or solvent with one that is less hazardous. Wastes that are produced may be much less toxic and possibly non-hazardous.

  Example: Research and instructional laboratories are encouraged to use one of several commercial laboratory detergents for cleaning glassware in lieu of the toxic and corrosive chromic acid solutions that are commonly used for this purpose.

- Experiments are reviewed to determine if it is feasible to perform laboratory destruction (as part of the experiment) of the chemical used in or produced by the experiment that would otherwise become waste.

The U of L also houses the Kentucky Pollution Prevention Center which has staff with expertise in waste minimization.

The WAP discusses in detail the scope of wastes to be accepted by the EPSC, the waste descriptions, hazard characteristics, and the basis for hazard designations.

K.3 CHEMICAL REDISTRIBUTION

NOD 72; Morris

Not all the chemicals picked up by DEHS are a waste. Many are only partially used and have not exceeded their shelf life or been altered in any way. Others are unused and still in the original sealed container. In some cases, these chemicals can be used by someone else at the U of L. Reusable chemicals collected by DEHS are brought to the facility, recorded, segregated, and held for redistribution instead of disposal.

The redistribution chemicals are handled with all the same safety precautions as hazardous wastes. The redistribution chemicals (many are "hazardous materials") are stored and segregated with the wastes for fire and incompatibility safety. The redistribution chemicals are appropriately marked/labeled to designate them separately from the wastes in storage.

DEHS uses periodic distribution of a list of these chemicals throughout the U of L for review by faculty or staff who use various chemicals for teaching, research or other support functions. To request chemicals from this list, the faculty or staff will contact DEHS by phone or email to request specific chemicals. DEHS will research the redistribution chemicals list and if the requested chemicals are in stock, DEHS will make arrangements to deliver them.

SECTION L –

PERMIT APPLICATION SIGNATURES AND CERTIFICATION

L PERMIT APPLICATION SIGNATURES AND CERTIFICATION

40 CFR Part 270.11

All permit applications, reports required by permits, and other information requested by the Cabinet shall be signed by a person described in 40 CFR Part 270.11 or by a duly authorized representative. The authorization must be made in writing and by the individual or position having responsibility for the overall operation of the facility.

SECTION L

CERTIFICATION OF PART B APPLICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed _____ Date: 06/01/2022

Cheri L. Hildreth
Director,
Department of Environmental Health and Safety