MDH – Laboratories Administration
DIVISION OF ENVIRONMENTAL SCIENCES

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Laboratory:	The Division of Environmental Sciences
Author / POC:	molly.molloy@maryland.gov erinna.kinney@maryland.gov

QA Office	Molly Molloy Signature	6/28/19 Date
Manager Environmental Sciences	 Signature	6/28/19 Date
Chief, Division of Environmental Sciences	 Signature	06/28/2019 Date

REVISION RECORD

Revision	Date	Changes	Made By	Effective Date
9.3	11/15/2012	Global review and revision record implemented. Previous document 9.2	DEC & DEM Division Chiefs	11/15/2012
9.4	09/11/2013	Revised Org Chart of Microbiology; revised preservatives in tables on pp. 19 and 21	J. Razeq & P. Kassim	10/01/2013
9.5	01/25/2016	Updated contact information Administration Relocation	P. Kassim M. Saunders	04/01/2016
9.6	07/13/2017	Changed the title of the State and division. Updated chemistry and microbiology collection and preservation requirements. Update organizational charts.	M. Saunders	1/4/2018
9.7	06/26/2019	Updated organization chart, contact information and microbiology methods.	M. Molloy	07/01/2019

PREFACE

The Laboratories Administration's mission is to promote, protect, and preserve the health and well-being of the people in Maryland from the consequences of communicable diseases and from unsafe food, drugs, and consumer products by promoting and enforcing standards of care and quality in cooperation with both public and private agencies at the local, state, and federal levels. This mission shall be accomplished with maximum public benefit at a minimum cost to the people of Maryland.

This Enviroguide helps accomplish this mission by listing both general sampling procedures and laboratory services available to and needed by local, county, and State public health and environmental officers and departments that are responsible for enforcement of regulations and standards and for ongoing surveillance of the environment and the food supply. The integrity of the sample and the quality of laboratory test data are greatly enhanced if one follows the instructions in the Enviroguide on sample requirements, preservation and transport.

The operational philosophy of the Laboratories Administration is to promote programs and laboratory services that improve health and prevent diseases against which the citizens of Maryland cannot protect themselves.

If you should have any suggestions to improve the usefulness of this Enviroguide, they will be gratefully received.

Robert A. Myers, Ph.D.
Director
Laboratories Administration

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1.0 CONTACT INFORMATION

1.1 Division of Environmental Sciences

❑ Administrative

● Chief	Vacant	(443) 681-
● Manager	Vacant	(443) 681-
➢ Supervisor, Inorganics Analytical Lab	Shahla Ameli	(443) 681-3855
➢ Supervisor, Air Quality & Asbestos Lab	Shahla Ameli	(443) 681-3855
➢ Supervisor, Chemical Emerg. Prep. & Resp.	Sadia Muneem	(443) 681-3857
➢ Supervisor, Organics Analytical Lab	Sadia Muneem	(443) 681-3857
➢ Supervisor, Metals Lab	Wuernisha Tuerxun	(443) 681-4596
➢ Supervisor, Radiation Lab	Wuernisha Tuerxun	(443) 681-4596
➢ Supervisor, Water & Dairy Microbiology Lab	Erinna Kinney	(443) 681-3948
➢ Quality Assurance Officer	Molly Molloy	(443) 681-3856

❑ Technical

● Air Quality Section	Lara Phillips	(443) 681-3863
● Food Chemistry Testing	Sadia Muneem	(443) 681-3857
● General Chemistry Section	Lara Phillips	(443) 681-3863
● Nutrients Section	Cynthia Stevenson	(443) 681-3863
● Radiation Section	Vacant	(443) 681-
● Environmental Metals Section	Syed Haq	(443) 681-3864
● Semi-Volatiles Section	Albert Woody	(443) 681-3857
● Trace Organics Section	Vacant	(443) 681-
● Water Laboratory	Erinna Kinney	(443) 681-3948 / 3960
● Dairy Laboratory	Erinna Kinney	(443) 681-3948 / 3960
● Food and Shellfish Laboratory	Erinna Kinney	(443) 681-3948 / 3960
● Media Prep & Support Services	Molly Molloy	(443) 681-3856

Division's Office Fax: (443) 681-4507

2.0 MISSION STATEMENT

The mission of the Division of Environmental Sciences is to provide a wide array of chemical and microbiological testing and technical services in support of programs and policies essential to the environmental quality and public health of the citizens of the State of Maryland.

3.0 INTRODUCTION

The purpose of this guide is to familiarize users of the services provided by the Division of Environmental Sciences with all their analytical capabilities and to facilitate the use of these services.

The ***Enviroguide*** is organized into three parts: **Part I** describes Environmental Chemistry; **Part II** Environmental Microbiology, and **Part III** shows the Tests Directory**.** Parts I and II give a brief description of each area and their respective laboratories, including tables of all the tests performed by each section. These tables provide information on the required containers, sample size/volume, preservation techniques, holding time, and prescribed analytical method for each test. Part III, Test Directory, contains the list of tests and the name of the laboratory which performs the test. The users are encouraged to consult the guide to help in their planning prior to sampling. The proper collection, handling and preservation of samples are critical in order to produce accurate and defensible data. If specific analyses are requested, the appropriate laboratories should be consulted in advance.

Phone numbers for all areas in the Division are included on the *Contact* pages. Users of the services are strongly encouraged to call the appropriate testing area for any additional information. Users of these services are also strongly encouraged to visit the Laboratories Administration's web site to obtain detailed relevant information https://health.maryland.gov/laboratories/Pages/home.aspx Personal visits to the related laboratories could be very informative.

The users are encouraged to consult the guide to help in their planning prior to sampling. The proper collection, handling and preservation of samples are critical in order to produce accurate and defensible data.

4.0 SAMPLING GUIDELINES

4.1 General Procedures

The Laboratories Administration analyzes samples to protect the environment and human health. It is therefore of great importance that all samples/specimens submitted for laboratory analysis are collected and preserved according to prescribed procedures. Failure to do so may result in rejection of the samples or in the invalidation of the test data. For information on established and prescribed procedures for collecting, preserving and transporting samples, consult the part of the *Enviroguide* which describes the particular test of interest. Field personnel are responsible for providing and preparing the appropriate sample containers, preservatives, and laboratory pure water for field and trip blanks for samples. Field personnel should not hesitate to consult the appropriate laboratories for information on sampling procedures for routine or non-routine analysis.

Each sample submitted should be accompanied by a Laboratory Analysis Request

Form with the following information completely filled out:

- Collector's name and phone number
- Source and location of sampling
- Bottle / Container number / sample ID #
- Date and time of collection
- Type of preservation used
- Test(s) required
- Description of sample, if applicable
- Other pertinent sample / specimen information
- Where test results should be sent

4.2 CHAIN-OF-CUSTODY SAMPLES

There are instances when the results of an analysis may be used in criminal or civil litigation. In such cases, the samples are considered physical evidence and special procedures must be strictly followed:

- The sample must be legally obtained.
- There must be a full description of how the sample was collected.
- A complete identification must be placed on the sample container and any shipping containers.
- Each sample must be securely sealed to prevent leakage, spills, or co-mingling of individual items.
- A Chain-of-Custody Record Form must accompany each sample or a batch of samples. The document will contain the name and signatures of all individuals handling the samples and the dates and time the samples were in their custody. Use the Division of Environmental Sciences' Chain-of-Custody Record Form for environmental chemistry samples and the Laboratories Administration's Chain-of-Custody Form for microbiology samples.
- When the samples are not under the direct control of any individual, they must be placed in a secured area.

State of Maryland
MDH - Laboratories Administration
DIVISION OF ENVIRONMENTAL SCIENCES
1770 Ashland Avenue
Baltimore, MD 21205

CHAIN OF CUSTODY RECORD

Collector: _____ **Sample Source:** _____ **Project:** _____

Agency & Address: _____

Phone No.: _____ **Fax No.:** _____

Program Supported: ☐ NPDES ☐ RCRA ☐ CERCLA ☐ SDWA ☐ CAA

☐ Biomonitoring
☐ Chemical Terrorism
☐ Other _____

Lab No.	Sample Identification	Date	Time	Sample Matrix	No. of Containers	Preservative Used						Remarks
						Tests Requested						

I, the undersigned, hereby certify that the sample submitted in this case and listed above, while in my custody, remained and was delivered in essentially the same condition as when I received it, except that material or portion thereof consumed in the analytical process at the laboratory, and that I received and delivered it to the person indicated on the date and time stated.

Collected/Relinquished by: (1)	**Date:**	**Time:**	**Received by:**
Relinquished by: (2)	**Date:**	**Time:**	**Received by:**
Relinquished by: (3)	**Date:**	**Time:**	**Received by:**
Relinquished by: (4)	**Date:**	**Time:**	**Received by:**
Special Instructions (i.e., sample released to, storage condition, etc.):		**Send Reports to:**	

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APPENDIX B

MARYLAND DEPARTMENT OF HEALTH

Laboratories Administration
1770 Ashland Avenue
Baltimore, Maryland 21205
Robert A. Meyer, Ph.D., Director

CHAIN OF CUSTODY LOG

1. DELIVERING AGENCY	2. DATE COLLECTED	3. MBBT LAB NO.
4. COUNTY	7. COLLECTED BY	6. BT LAB NO.
7. SAMPLE DESCRIPTION (Quote pertinent labeling, firm name and address, pkg., etc.)		

I, the undersigned, hereby certify that the sample submitted in this case and listed above, while in my custody, remained and was delivered in essentially the same condition as when I received it, except that material or portion thereof consumed in the analytical process at the laboratory, and that I received and delivered it to the person indicated on the date and time stated.

8. SAMPLE ACKNOWLEDGEMENT Sample received from	Date/time	Sample received by	Date/Time	Remarks

9. SAMPLE RELEASED TO:

Name:_____ Date:_____ Time:_____

Address:_____

Received by:_____ Date:_____

Witnessed by:_____ Date:_____

10. SAMPLE STORAGE CONDITIONS

TEMPERATURE CONTROL °C

MDH 4281 11/17

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5.0 PART I: ENVIRONMENTAL SCIENCES CHEMISTRY

5.1 PROGRAM SERVICES

The Division of Environmental Sciences - Chemistry area provides analytical data for environmental, human and consumer product samples that is comprised of multi-media matrices such as drinking water, wastewater, sediments, soils, sludge, indoor air from worksites, ambient air, aquatic tissues, pharmaceuticals, foods, and dairy products, human blood and urine, and forensic unknowns. Tests are performed for trace metals, non-metallic inorganic compounds, volatile and semi-volatile organic compounds, asbestos, PCBs, pesticides, industrial solvents, radionuclides, direct and indirect food additives, nutritional labeling, consumer product tampering, forensic investigations, and metabolites of chemical warfare agents. The laboratories serve as a resource for the Maryland Departments of the Environment (MDE), Health (MDH), and Natural Resources (DNR), counties and Local Environmental Health departments, MDH-Division of Food and Milk Controls, other state agencies, citizens and special interest groups.

5.1.1 *Operational Format* – page 7

5.1.2 *Accreditation / Certification*

The professional staff possesses a broad range of experience in the performance of environmental chemical analyses in a variety of matrices. The laboratories involved in the analysis of drinking water and wastewater are certified by the USEPA for metals, volatile organics, pesticides, inorganics, and radiation. The Air Quality Laboratory is certified for particulate matter in ambient air and maintains NVLAP accreditation for the analysis of bulk asbestos in building materials. The Chemical Emergency Preparedness & Response Section is also certified by CLIA for the analysis of pesticides, trace metals, cyanide, volatile organic compounds, and metabolites of selected chemical warfare agents in human urine and blood. The laboratory is also ISO/IEC 17025 accredited through A2LA (American Association for Laboratory Accreditation).

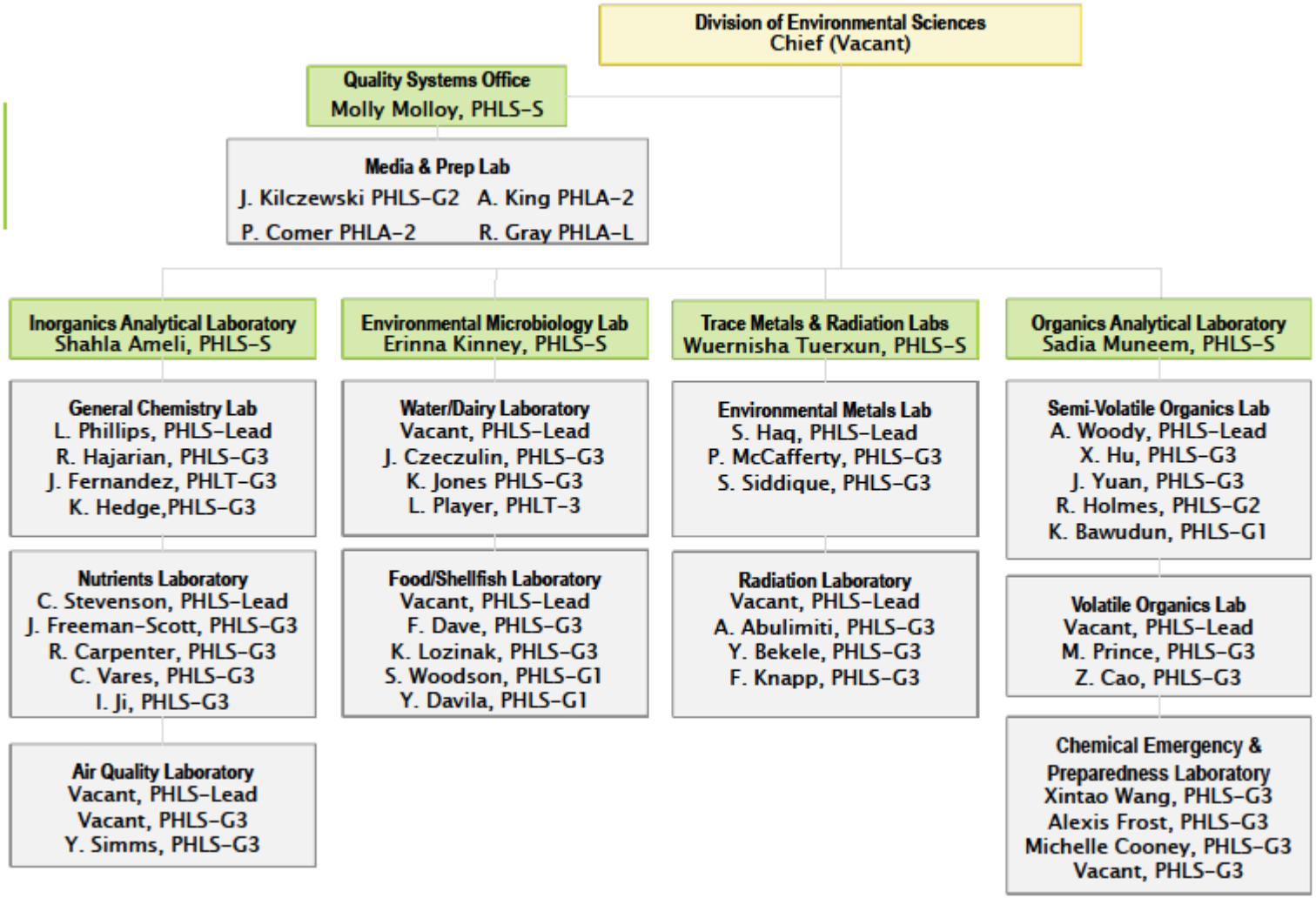
5.1.3 *Quality Assurance Program*

The Quality Assurance Program manages, coordinates and monitors the division's quality assurance/quality control activities and laboratory safety protocols; serves as a liaison between federal and state regulatory agencies and the laboratory staff for advice on technical and QA/QC issues; promotes bi-directional communication with the various workstations in the Sections; develops and implements data quality objectives and tracks the status of the various projects; and evaluates the overall analytical performance of the laboratory.

5.1.4 *Sample Management Area*

The Sample Management Area provides a centralized area that ensures all samples received are collected, preserved, and transported as specified by standard procedures and regulations; performs sample log-in

OPERATIONAL FORMAT



registration, chain-of-custody, storage and distribution to the respective laboratories for chemical analysis; communicates with the laboratories about sample results and other pertinent information; mails all completed laboratory reports to sample submitters and appropriate program agencies and maintains files of all completed reports; tracks each laboratory's productivity by monitoring daily workload, backlog, inquiries, and complaints; serves as the central clearing house for tracking all samples submitted for chemical analysis with bi-directional communication with the laboratories / Sections.

The normal turnaround time for sample analysis is 2 - 10 working days from receipt of the samples. Turnaround times, however, may vary depending on the type of test(s) requested, number of samples, and the regulatory criteria. In emergencies, rush/priority sample analysis can be performed with the consent of the Division Chief or the appropriate Laboratory Manager.

All sampling must be consistently performed using accepted methodologies. Analysis of samples must be performed within a specific time frame after sampling and preservation in order to minimize the effect of biological or chemical processes on sample quality. This is to ensure that the analytical results are representative of the actual concentration of a contaminant at the time of sampling. Regulatory agencies such as the US EPA have specified holding times allowed for each sample type and corresponding analytical parameters. See chart under each section.

The Laboratories Administration has a contracted courier service available to pick-up samples from designated local environmental health departments throughout the State. The courier delivers the samples to the Laboratories Administration Sample Receiving Area located at 1770 Ashland Avenue, Baltimore, MD 21205 on the First Floor Room 129 (Loading Dock Receiving, Mondays through Fridays between the hours of 8:00 a.m. to 6:00 p.m. During the working hours, Mondays through Fridays, submitters deliver samples to first floor loading dock receiving (Room 129) or directly to the laboratory. Upon arrival at the loading dock, submitters (or courier) sign in the "Courier Sign-in Sheet". A laboratory staff member picks up and transports the coolers that are delivered to Room 139 Accessioning Lab, the samples are then logged in and distributed to their respective laboratories. For samples delivered after working hours, a laboratory staff member receives the samples from the first floor loading dock (Room 129) and delivers the coolers to the walk-in refrigerator in Room 143. Each morning a laboratory staff member picks up the samples and transports them to Accessioning Lab located in Room 139 for processing. Upon completion of processing of the samples, the laboratory staff member notifies the respective laboratory to pick up the samples. All empty coolers are returned to the Empty Cooler Pick-up Room 141.

Follow the information regarding collection, preservation, and holding times for the samples you are collecting. This information is summarized under each laboratory.

5.2 ANALYTICAL SERVICES

5.2.1 *Air Quality Section*

The AIR QUALITY SECTION provides analytical and technical services in the evaluation of air quality in Maryland. This section performs analysis of the measurement of respirable dust on micro filters and the analysis of bulk asbestos in building materials and airborne particulates. *Test Chart on page 12.*

5.2.2 *Chemical Emergency Preparedness & Response Section*

The CHEMICAL EMERGENCY PREPAREDNESS & RESPONSE SECTION supports the State of Maryland's Chemical Terrorism Preparedness program by maintaining a state of readiness to respond immediately to a chemical terrorism incident. It also supports the State's efforts to monitor the exposure of the citizens to toxic environmental contaminants in their communities. This laboratory analyzes human urine and blood specimens from people potentially exposed to different classes of toxic industrial compounds such as heavy metals, organochlorine pesticides, and metabolites of organophosphate and pyrethroid pesticides. Also performs the analysis of the metabolites of organophosphorus nerve agents and heavy metals in urine, and cyanide and volatile organic compounds in human blood. Environmental and consumer product samples suspected of tampering, adulteration or posing a public health threat are also tested. *Test Chart on page 13.*

5.2.3 *Food Safety Chemistry Section*

The FOOD SAFETY CHEMISTRY LABORATORY analyzes food for compliance, monitoring, adulteration, labeling, unknown (forensic) samples and consumer products for possible tampering.

Analysis of samples is performed using HPLC, pH meter, analytical and pan balances, automated extraction instrument, moisture analyzer, stereo microscope with camera, UV-VIS spectrophotometer, inductively coupled plasma - mass spectrometer equipped with DRC technology, refractometer, selected test strips and a water activity meter. *Test Chart on page 14.*

5.2.4 *General Chemistry Section*

The GENERAL CHEMISTRY SECTION provides analytical and technical services in the testing of samples for physical and aggregate properties, non-metallic inorganic compounds and organic aggregate constituents to help determine the suitability of drinking water for human consumption, effectiveness of wastewater treatment systems, and the quality of the Chesapeake Bay and its tributary waters. It also analyzes samples suspected of having toxic or hazardous effects. The testing is performed using a variety of wet chemistry instrumentation.

This section also measures the chlorophyll content of water collected from the Chesapeake Bay and its tributaries. The chlorophyll content of water is an important indication of the activity of algae and other organisms whose growth has harmful effects on water and wildlife. *Test Chart on page 15.*

5.2.5 *Trace Metals Laboratory*

The TRACE METALS LABORATORY performs the analyses of trace metals in drinking water, wastewater, groundwater, aquatic tissues, hazardous wastes, soils, sediments, sludges, leachates, and in consumer products for possible tampering or adulteration.

Analysis of multi-media samples is carried out using inductively coupled plasma spectrometer (ICP), inductively coupled plasma-mass spectrometer (ICP-MS), and cold vapor atomic absorption spectrophotometer (CVAA). *Test Chart on page 16.*

5.2.6 *Nutrients Section*

The NUTRIENTS SECTION provides analytical and technical services to determine the suitability of drinking water for human consumption and/or effectiveness of wastewater treatment systems. Nitrogen and phosphorus testing help to determine the quality of the Bay waters and support the evaluation of the effectiveness of the nutrient reduction strategies used in the Chesapeake Bay recovery efforts

The testing is performed using spectrophotometers and automated flow injection analyzers (FIA). *Test Chart on page 17.*

5.2.7 *Semi-Volatile Organics Section*

The SEMI-VOLATILE ORGANICS SECTION performs the analyses of pesticides, herbicides, semi-volatile organic compounds and polychlorinated biphenyls (PCBs) in drinking water, wastewater, groundwater, aquatic tissues, hazardous wastes, soils, sediments, sludges, leachates, and in consumer products for possible tampering or adulteration.

Analysis of multi-media samples is carried out using capillary column gas chromatographs equipped with electron capture detectors (GC/ECD) or mass spectrometers (GC/MS), and high performance liquid chromatographs (HPLC) equipped with fluorescence detectors. *Test Chart on page 18.*

5.2.8 *Radiation Section*

The RADIATION SECTION performs the analysis of radionuclides in drinking water, raw water, wastewater, groundwater, aquatic tissues, soils, sediments, milk wipes, beverages, juice, grains and vegetation.

Analysis of samples is performed using gamma isotopic spectrometer, low background alpha / beta counter, and liquid scintillation spectrophotometer. *Test Chart on page 19.*

5.2.9 *Volatile Organics Section*

The VOLATILE ORGANICS SECTION performs the analyses of volatile and semi-volatile organic compounds in drinking water, wastewater, groundwater,

hazardous wastes, soils, sediments, sludges, leachates, and in consumer products for possible tampering or adulteration. This laboratory also performs the analyses of haloacetic acids in drinking water.

Analysis of multi-media samples is carried out using purge and trap introductory systems attached to capillary column gas chromatographs equipped with electron capture detectors (GC/ECD) or mass spectrometers (GC/MS). *Test Chart page 20*.

AIR QUALITY LABORATORY

TEST / MATRIX	CONTAINER	SAMPLE SIZE	PRESERVATION	HOLDING TIME	METHOD
PM_{10}	Teflon filter	4 L air	4 °C□	30 days*	EPA 454/R-98-005
$PM_{2.5}$	Teflon filter	24 L air	4 °C	30 days*	EPA 454/R-98-005
Asbestos (bulk)	Screw cap plastic or glass vials	3 - 4 sq.in. floor tiles or 1 $in.^3$ loose-fill insulation	na	na	EPA 600/M4-82-020 and 600/R.93-116
Particle Identification	Screw cap plastic or glass vials	1 in^3	na	na	na

na = not applicable

***** From pre-sampling weight to final exposed weight. Exposed filters unrefrigerated are stable for 10 days

CHEMICAL EMERGENCY PREAPAREDNESS & RESPONSE SECTION

TEST / MATRIX	CONTAINER*	SAMPLE SIZE	PRESERVATION	HOLDING TIME	METHOD
Human Urine					
‣ Chlorinated pesticides	Sterile specimen cup	100 mL	-20 °C, 6 hrs after collection	na	CDC, etc.
‣ Metabolites of Organophosphate pest.	Sterile specimen cup	100 mL	-20 °C, 6 hrs after collection	na	CDC, etc.
‣ Metabolites of pyrethroid pesticides	Sterile specimen cup	100 mL	-20 °C, 6 hrs after collection	na	CDC, etc.
‣ Toxic metals panel	Sterile specimen cup	100 mL	-20 °C, 6 hrs after collection	na	CDC
‣ Abrine / Ricinine	Sterile specimen cup	100 mL	-20 °C, 6 hrs after collection	na	CDC
‣ Tetramine	Sterile specimen cup	100 mL	-20 °C, 6 hrs after collection	na	CDC
‣ Metabolites of Organophosphate nerve agents	Sterile specimen cup	100 mL	-20 °C, 6 hrs after collection	na	CDC
Whole Blood/Serum					
‣ Cyanide	Purple capped vacutainer w/EDTA	4 mL	4 °C, 6 hrs after collection	na	CDC
‣ Volatile Organic Compounds	Grey top vacutainer w/pot oxalate & sodium flouride	4 mL	4- °C, 6 hrs after collection	na	CDC
‣ Metabolites of Organophosphate nerve agents	Purple capped vacutainer w/EDTA	4 mL	4 °C, 6 hrs after collection	na	CDC
‣ Toxic metals panel	Purple capped vacutainer w/EDTA	4 mL	4 °C, 6 hrs after collection	na	CDC

FOOD SAFETY CHEMISTRY SECTION

TEST / MATRIX	CONTAINER	SAMPLE SIZE	PRESERVATION	HOLDING TIME	METHOD
Preservatives, Sweeteners & Additives in beverages	P / G / C	> 40 mL	na	na	
Organic acids in beverages	P / G / C	> 40 mL	na	na	
Acidity (pH)	P / G / C	> 40 mL	na	na	
Refractive index	P / G / C	> 40 mL	4 °C	Immediately	AOAC
Ammonia	P / G / C	100 mL	4 °C	Immediately	AOAC
Brix %, sugar	P / G / C	100 mL/100g	4 °C	Immediately	AOAC
Blood, presumptive	P / G / C	100 mL	4 °C	Immediately	AOAC
Chlorine	P / G / C	100 mL	4 °C	Immediately	AOAC
Condition of product	P / G / C	100 mL	4 °C	Immediately	AOAC
Cyanide	P / G / C	100 mL	4 °C	Immediately	AOAC
Fat, %	P / G / C	100 mL/100g	4 °C	Immediately	AOAC
Filth in baked foods	P / G / C	100g	4 °C	Immediately	AOAC
Foreign / Extraneous matter	P / G / C	100g	4 °C	Immediately	AOAC
Insect identification	P / G / C	100g	4 °C	Immediately	AOAC
Moisture content	P / G / C	100 mL/100g	4 °C	Immediately	AOAC
Microscopic examination	P / G / C	100 mL/100g	4 °C	Immediately	AOAC
Organoleptic	P / G / C	100 mL/100g	4 °C	Immediately	AOAC
Toxic organics	P / G / C	500 mL/100g	4 °C	Immediately	AOAC
Toxic metals	P / G / C	500 mL/100g	4 °C	Immediately	AOAC
Physical exam (tampering, etc.)	P / G / C	500 mL/100g	4 °C	Immediately	AOAC
Salt, %	P / G / C	500 mL/100g	4 °C	Immediately	AOAC
Sulfates / Sulfites	P / G / C	100 mL	4 °C	Immediately	AOAC
Thermometer calibration	na	na	na	na	AOAC
Water activity	P / G / C	100 mL/100g	4 °C	Immediately	AOAC

P = Plastic; G = Glass; C = Cans; na = not applicable

GENERAL CHEMISTRY SECTION

Test	Container	Sample Size	Preservation	Holding Time	Method
Alkalinity	Plastic	500 mL	4 °C	14 days	SM 2320 B
Bioch. oxygen demand	Plastic	1000 mL	4 °C	48 hours	SM 5210 B
Carbon					
‣ Total organic	Plastic	500 mL	4 °C, HCl/H_2SO_4 pH < 2	28 days	SM 5310 B
Chloride	Plastic	500 mL	None	28 days	SM 4500 Cl E
Chlorophyll	Filter	na	- 20 °C, lt. protect.	28 days	EPA 10200 H
Color	Plastic	500 mL	4 °C, lt. protect	24 hours	SM 2120 B
Conductance, specific	Plastic	500 ml	4 °C	28 days	SM 2510 B
Corrosivity	Glass	8 oz	4 °C	24 hours	EPA 846/9040-C/D
Cyanide					
‣ Amenable (free)	Plastic	500 mL	4 °C, NaOH, pH >12*	14 days	SM 4500 CN (C,G,E)
‣ Free	Plastic	500 mL	4 °C, NaOH, pH >12*	14 days	SM 4500 CN F
‣ Total	Plastic	500 mL	4 °C, NaOH, pH >12*	14 days	QuikChem 10-204-00-1-X
Fluoride	Plastic	1L	None	28 days	SM 4500-FC
Ignitability	Glass	8 oz	4 °C	14 days	EPA 846/1020
MBAS (detergents)	Plastic	500 mL	4 °C	48 hours	EPA 425.1
Oil and Grease	Glass, Teflon cap	1 L	4 °C, H_2SO_4, pH <2	28 days	EPA 1664A
pH	Glass	8 oz	4 °C	Immediately	EPA 150.1
Phenol	Glass, Teflon cap	1L	4 °C, H_2SO_4, pH <2	28 days	QuikChem 10-210-00-1-X
Solids (residue)					
‣ Dissolved	Plastic	500 mL	4 °C	7 days	SM 2540 C
‣ Total suspended	Plastic	500 mL	4 °C	7 days	SM 2540 D
‣ Total	Plastic	500 mL	4 °C	7 days	SM 2540 B
‣ Volatile	Plastic	500 mL	4 °C	7 days	SM 2540 E
Sulfate	Plastic	500 mL	4 °C	28 days	EPA 375.2
Total Petroleum Hydrocarbons	Glass	1 L	4 °C, H_2SO_4 or HCl, pH <2	28 days	EPA 1664
Turbidity	Plastic	500 mL	4 °C	48 hours	EPA 180.1

na = not applicable. * Ascorbic acid (if chlorine present), lead acetate (if sulfide present)

TRACE METALS LABORATORY

TEST / MATRIX	CONTAINER	SAMPLE SIZE	PRESERVATION TIME	HOLDING	METHOD
Aluminum	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Antimony	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Arsenic	Plastic	1 L	HNO_3, pH <2	6 month	EPA 200.7 / 200.8
Barium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Beryllium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Cadmium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Calcium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7
Chromium, hexavalent	Plastic	300 mL	4 °C, no acid	48 hours	USGS I-1230-85
Chromium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Cobalt	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Copper	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Iron	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7
Lead	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Magnesium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7
Manganese	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Mercury	Plastic	1 L	HNO_3, pH <2	28 days	EPA 245.1
Mercury	Plastic	1 L	HNO_3, pH <2	28 days	EPA Method 200.8
Molybdenum	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Nickel	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Potassium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7
Selenium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Silver	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Sodium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7
Thallium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7/200.8
Uranium	Plastic	1 L	HNO_3, pH <2	6 months	EPA Method 200.8
Vanadium	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Zinc	Plastic	1 L	HNO_3, pH <2	6 months	EPA 200.7 / 200.8
Fish	Foil (Al)	na	Freeze	na	US FDA
Soils/Sediments	Glass	50 g	4 °C	na	SW-846 / 3051A
TCLP (Liquid)	Plastic	1 L	4 °C, no acid	24 hours	SW-846 / 1311
TCLP (Solid)	Glass	300 g	4 °C	6 months	SW-846/1311

L=liter; mL=milliter; HNO_3=conc. nitric acid (Ultra pure); na = not applicable

NUTRIENTS SECTION

TEST / MATRIX	CONTAINER	SAMPLE SIZE	PRESERVATION	HOLDING TIME	METHOD
Chemical oxygen demand	Plastic	500 mL	4 °C, H_2SO_4 pH <2	28 days	EPA 410.4
Hardness	Plastic	500 mL	H_2SO_4 or HNO_3 pH <2	6 months	EPA 130.1
Nitrogen					
‣ Ammonia	Plastic	1 L	4 °C, H_2SO_4, pH <2	28 days	EPA 350.1
‣ Nitrate + Nitrite	Plastic	1 L	H_2SO_4, pH <2	28 days	EPA 353.2
‣ Nitrite	Plastic	1 L	4 °C	48 hours	EPA 353.2
‣ Total Kjeldahl	Plastic	1 L	4 °C, H_2SO_4, pH <2	28 days	EPA 351.2
Phosphorus					
‣ Ortho	Plastic	1L	4 °C	48 hours	EPA 365.1
‣ Total	Plastic	1L	4 °C, H_2SO_4, pH <2	28 days	EPA 365.4

na = not applicable

SEMI-VOLATILE ORGANICS SECTION

TEST / MATRIX	CONTAINER*	SAMPLE SIZE	PRESERVATION	HOLDING TIME	METHOD
Drinking Water					
‣ EDB & DBCP	Glass vial (no headspace)	40 mL	4 °C, sodium thiosulfate	14 days	EPA 504.1
‣ Chlorinated pesticides & PCBs	Glass amber bottle	1 L	4 °C, sodium thiosulfate	7 days	EPA 508
‣ Chlorinated acids Herbicides	Glass amber bottle	60 mL	4 °C, sodium thiosulfate	14 days	EPA 515.3
‣ Semi-volatile pesticides	Glass amber bottle	1 L	4 °C, sodium sulfite pH <2 (with 6N HCl)	14 days	EPA 525.2
‣ Carbamate pesticides	Glass amber bottle	60 mL	4 °C, potassium dihydrogen citrate & sodium thiosulfate pH <4. Mix samples in the field for 1 min.	28 days	EPA 531.2
‣ Haloacetic acids	Glass amber bottle	60 mL	4 °C, 6 mg NH_4Cl	14 days	EPA 552.2
Wastewater					
‣ Chlorinated pesticides & PCBs	Glass amber bottle	1 L	4 °C, sodium thiosulfate	7 days	EPA 608
Hazardous Wastes					
‣ Chlorinated pesticides & PCBs	Glass amber bottle	1 L	4 °C, sodium thiosulfate	7 days	EPA 8081
	Glass jar (soil)	8 oz	4 °C	14 days	EPA 8081

***** Glass vials must have PTFE-lined septum caps; glass bottles must have PTFE-lined caps

RADIATION SECTION

TEST / MATRIX	CONTAINER	SAMPLE SIZE	PRESERVATION	HOLDING TIME	METHOD
Gross alpha & beta (air)	Pump head	50 m^3	na	6 months	EPA 900.0
Gross alpha & beta (water, diss)	Plastic	1 L	HNO_3, pH <2	6 months	EPA 900.0
Gross alpha & beta (water, susp)	Plastic	1 L	na	72 hours	EPA 900.0
Gross alpha & beta (wipes)	Coin envelope	100 cm^2	na	variable*	EPA 900.0
Gamma isotope (air particle)	Pump head	50 m^3	na	6 months	HASL
Gamma isotope (fruit, juices, beverages, etc.)	Plastic/glass	4 L	na	na	HASL
Gamma isotope (water)	Plastic	4 L	HNO_3, pH <2	3 months	HASL
Gamma isotope (milk)	Plastic	4 L	4 °C, formaldehyde	3 months	HASL
Gamma isotope (oyster)	Polybag	100 cm^3	Freeze	2 weeks	HASL
Gamma isotope (sediment/sand)	Polybag/plastic bag	4000 cm^3/4L	Freeze	months	HASL
Gamma isotope (soil)	Polybag	1000 cm^3	na	variable*	HASL
Gamma isotope (wipes)	Coin envelope	100 cm^2	na	variable*	HASL
Gamma isotope (vegetation)	Polybag	4000 cm^3	4 °C	2 weeks	HASL
I-131 (charcoal filter)	Pump head	50 cm^3	na	8 days	
Strontium 90 & 89 (water)	Plastic	4 L	HNO_3, pH <2	6 months	EPA 905.0
Strontium 90 & 89 (milk)	Plastic	4 L	4 °C, formaldehyde	6 months	AOAC/EPA 905.0
Tritium (water)	Plastic	1 L	na	6 months	EPA 906.0
Radon 222 (water)	Boro glass vial	15 mL	4 °C	3 days	EPA 913.0
Liquid scint. (wipes)	Coin envelope	100 cm^2	na	variable*	EPA 906.0
Radium 226 (water)	Plastic	4 L	HNO_3, pH <2	6 months	EPA 903.1
Radium 228 (water)	Plastic	4 L	HNO_3, pH <2	6 months	EPA 904.0

na = not applicable
Variable* = the maximum holding time as determined by isotope and sensitivity desired

VOLATILE ORGANICS SECTION

TEST / MATRIX	CONTAINER*	SAMPLE SIZE	PRESERVATION	HOLDING TIME	METHOD
Drinking Water					
‣ Volatile organics	Glass vial No air bubbles or sediments	40 mL	4 °C, 1:1 HCl, pH <2 ascorbic acid Preserve trip & field blanks as samples	14 days	EPA 524.2
‣ Trihalomethanes	Glass vial No air bubbles or sediments	40 mL	4 °C, 1:1 HCl, pH <2 ascorbic acid or sodium thiosulfate Preserve trip & field blanks as samples	14 days	EPA 524.2
Wastewater					
‣ Volatile organics	Glass vial	40 mL	4 °C, 1:1 HCl, pH <2 ascorbic acid	14 days	EPA 624
‣ Base Neutral / Acid extractable organics (semi-volatile organics)	Glass amber bottle	1 L	4 °C	7 days	EPA 625
Hazardous Wastes					
‣ Volatile organics	Glass vial	40 mL	4 ° C, 1:1 HCl, pH <2 ascorbic acid	14 days	EPA 8260
	Glass jar (soils)	8 oz	4 °C	14 days	EPA 8260
‣ Base Neutral / Acid extractable organics (semi-volatile organics)	Glass amber bottle	1 L	4 °C	7 days	EPA 8270
	Glass jar (soils)	8 oz	4 °C	14 days	EPA 8270

***** Glass vials must have PTFE-lined septum caps; glass bottles must have PTFE-lined caps

6.0 PART II: ENVIRONMENTAL SCIENCES MICROBIOLOGY

6.1 PROGRAM SERVICES

The Division of Environmental Sciences Microbiology area analyzes samples originating from diversified environmental resources. At Central Laboratory, the Division is divided into two analytical sections – *Dairy and Water Microbiology and Food/Shellfish*.

The two Regional Laboratories - *Eastern Shore Regional Laboratory (ESRL)* and *Western Maryland Regional Laboratory* (WMRL) - all perform water microbiology analysis. The WMRL also analyzes dairy samples and the ESRL performs analysis of shellfish growing water samples.

6.1.1 *Organizational Chart* - see *Page 7*

6.1.2 *Quality Assurance*

Quality Assurance is a set of operating principles to ensure production of data of known and defensible quality. To accomplish these goals, each laboratory has a written Quality Control plan that outlines the procedures to be followed in sample collection, transport, and analysis. Corrective action procedures, which are a part of the Quality Assurance Plan, are instituted to address possible deviations.

6.1.3 *Sample Management*

At Central Laboratory, food and water samples should be delivered to the loading dock. Dairy product samples are to be transported to the Accessioning Lab located in Room 139 for processing. For further information, contact the individual laboratory at (443) 681 - 3948 (Water Laboratory), (443) 681- 3948 (Dairy Laboratory), and (443) 681 - 4573 (Food/Shellfish Laboratory).

For sample management procedures at the regional laboratories, contact the specific laboratory.

- Eastern Shore (410) 219 - 9005 / (410) 749 -1174
- Western Maryland (301) 777 - 2115 or 2116

6.1.4 *Sampling Procedures*

For sample collection protocols please refer to the specific methods or contact the appropriate laboratory.

6.2 ANALYTICAL SERVICES

The Environmental Sciences Microbiology Program responds to client requests for laboratory support in the areas of environmental and consumer products compliance monitoring. The functions of the program are performed in three testing units at the Central Laboratory and integrated into the functions of two regional laboratories.

These functions summarize the mission of the Laboratories Administration: to provide accurate and reliable data that can be used to support the public health goals of the State's monitoring agencies.

6.2.1 *Water Microbiology*

The WATER MICROBIOLOGY LABORATORY'S primary function is to analyze public and private drinking waters, sewages, streams, dairy waters, and recreational waters which include natural bathing areas, swimming pools, and spas, for organisms indicative of fecal contamination and bacterial densities. This laboratory is certified by the U.S. Environmental Protection Agency (EPA) for the analysis of drinking waters.

6.2.2 *Food and Shellfish Microbiology*

The FOOD/SHELLFISH LABORATORY analyzes food and shellfish suspected of being associated with potential food borne illness. The laboratory analyzes food, commercially prepared crabmeat, seasonal harvested and imported shellfish, seasonal apple cider, ice cream and a plethora of food matrices. As well, the laboratory performs testing for outbreak samples for the State; and participate in multistate national outbreak. The Food Lab is a member of the Food Emergency Response Network (FERN) which responds to emergencies involving biological, chemical, and radiological contamination of food. Regulatory and contract food samples also collected from FDA where specific pathogenic organism of interest is requested for testing which could be qualitative or quantitative analysis. The Shellfish laboratory performs testing of shellfish growing waters and shellstock in support of the State's monitoring and enforcement activities. Pathogens analyzed within the Food and Shellfish Microbiology include Aerobic Plate Count, Total Coliforms, Fecal Coliforms, *Escherichia coli*, *Staphylococcus aureus*, *Salmonella*, *Listeria monocytogenes*, *Bacillus cereus*, *Escherichia coli O157:H7*, *Campylobacter*, *Clostridium perfringes, and Staphylococcal Enterotoxin*. The Food and Shellfish Microbiology Laboratory is certified by the U.S. Food and Drug Administration (FDA). The Food Microbiology Laboratory is accredited under ISO 17025: 2017.

6.2.3 *Dairy Microbiology/Chemistry*

The DAIRY MICROBIOLOGY LABORATORY tests a variety of dairy products to determine compliance with State and Federal laws and regulations. The laboratory performs microbiological tests such as HPC (total microbial counts), coliform counts, and listeria identification. The other tests performed in this laboratory include inhibitor testing (antibiotic concentration) and somatic cell counts. This laboratory is certified by the U.S. Food and Drug Administration (FDA).

The DAIRY CHEMISTRY LABORATORY is a regulatory laboratory that analyzes milk and milk products to ensure complete pasteurization and to monitor quality standard by physical and chemical methods. The testing is in accordance with Pasteurized Milk Ordnance (PMO) compiled by U.S. FDA Milk Program which the State of Maryland has adopted. This document provides for the safe handling of milk to prevent the transmission of disease and prevents the mislabeling and adulteration of milk products. This laboratory is certified by the U.S. Food and Drug Administration (FDA).

Sample Test	Analytical Test	Sample Size	Sample Container Specifications	Turnaround Time	Transport Conditions	Holding Time
Wastewater effluents	Fecal coliforms	100 mL	Sterile 250 mL 8 oz. bottle containing 0.8 mL of a combination of sodium thiosulfate & EDTA	24 hrs	Water Samples should be transported in coolers containing crushed ice filled no higher than the shoulders of the water containers in order to hold the temperature of the samples between 1.0 °C to 10 °C from the time of collection to the time of examination. Use of "Cool-Pack" alone without ice is not sufficient to maintain the required temperature. Water containers should be protected with barriers so as to be transported in upright positions and not be submerged in ice or slush.	6 hrs.
Stream samples	Fecal coliforms; *Escherichia coli*; Enterococci, Pseudomonas	100 mL	Sterile 150 mL 4 oz. bottle containing 0.1 mL of a 10% sodium thiosulfate solution.	24 hrs		6 hrs.
Swimming pool and/or man-made tanks	Total coliforms; *Escherichia coli,* Heterotrophic plate count (HPC), Simplate, Pseudomonas	150 mL		24-48 hrs		6 hrs.
Bathing beach areas, quarries and other natural bathing areas	Fecal coliforms; *Escherichia coli*; Enterococci, Pseudomonas	100 mL		24 hrs		6 hrs.
Private & other public drinking waters	Total Coliforms & *Escherichia coli*	105 mL		24 hrs		30 hrs.
Public drinking water	Total coliforms; Heterotrophic plate count (HPC), Simplate	105 mL		48 hrs		30 hrs. 8 hrs. (HPC)
Potable and Non-Potable Water Systems	Legionella	1L	In sterile container	12 days		72 hrs (or Refrigeration)
Bottled water	Total & Fecal coliforms; *Escherichia coli*; Standard plate count, Simplate, Pseudomonas,	100 mL	In original, unopened container	72 hrs	Un-iced.	N/A

Sample Type	Analytical Test	Sample Size	Sample Container Specifications	Turnaround Time	Transport Conditions	Maximum Allowable Holding Time
Food	Sterility, Aerobic Plate Count, Coliforms, Fecal Coliforms, E.coli, Staphylococcus aureus, Salmonella, Listeria monocytogenes, Bacillus cereus, E.coli O157:H7; Campylobacter, Staphylococcal Enterotoxin, Clostridium perfringes	200 g (1/2 lb. per analyte to be tested). E coli 0157 will be 400 grams or more depending on sample matrix. Campy and 0157:H7 may involve whole carcasses for raw meat.	COC seal kept intact for all samples. Make sure to have the seal accompany each sample Original unopened container. Clean, dry, leak-proof, wide-mouth, sterile container of a size suitable for samples, e.g., plastic jars, plastic bags with suitable closures, or metal cans. Do not use felt pen on plastic for identification markings because the ink might penetrate the container. Canned goods other food sample at room temp	10 days*	In ice/water medium on racks in sample chest. 0-4 °C. temp. should be maintained. Maintained at ambient temp	36 hrs
Crabs (cooked)	Total & Fecal Coliform; *E. coli*; Standard Plate Count; *Staphylococci; Listeria Monocytogenes*	100 g		10 days*	0 – 4 °C	24 hrs

Shellfish (routine)	Total & Fecal Coliform; *E. coli*; Standard Plate Count; *Listeria monocytogenes*; *Vibrio spp.*	Shellstock: 12-15 live animals (approx. 200 g of shell, liquor, and meat)	Shellstock- Clean, sterile containers, e.g., plastic bags, tin cans with tight lids leak-proof Shellfish-sterile wide-mouth jars.	10 days*	Shellstock-kept in dry storage at a temperature above freezing but lower than 10 °C (0-10 °C). Shellstock should not come in contact with ice. Shucked shellfish-kept refrigerated by packing in crushed ice. Data logger will accompany each sample	24 hrs
Shellfish Water	Fecal coliforms	110-120 mL	Shellfish water-Sterile wide-mouth plastic containers (150 mL IDEXX bottle).	3 days	0-10 °C on racks in sample chest in cooler filled with ice around upright bottles, but not covered	30 hrs

***** Additional time may be required

Sample Type	Analytical Test	Sample Size	Sample Container Specifications	Turnaround Time	Transport Conditions	Maximum Allowable Holding Time
Temperature Control		100 mL	Container similar to samples in size and product type.	none	Transport under same conditions as samples.	none
Raw milk	Petrifilm Aerobic Count, Inhibitory substances, DMSCC(as appropriate)	50 mL	Must be in sterile container, at least 50 mL volume	5 days	Transport in coolers containing crushed ice filled to the shoulder of container. Each cooler accompanied by a temperature control	48 hrs
Pasteurized milk and cream	Petrifilm Aerobic Count, Petrifilm Coliform Count, High Sensitivity Coliform Count, Inhibitory substances; Phosphatase	100 mL	Must be in a sterile, unopened, container with appropriate sample size.	5 days		60 hrs
Pasteurized flavored milk and cream	Petrifilm Aerobic Count, Petrifilm Coliform Count, High Sensitivity Coliform Count,	100 mL		5 days		60 hrs
Ultra-pasteurized products	Petrifilm Aerobic Count, Petrifilm Coliform Count, High Sensitivity Coliform Count, Inhibitory substances;	100 mL		5 days		60 hrs
Cultured products	Petrifilm Coliform Count, High Sensitivity Coliform	100 mL		5 days		60 hrs
Acidophilus milk	Petrifilm Coliform Count, High Sensitivity Coliform; Inhibitory substances;	100 mL	Must be in a sterile, unopened, container with appropriate sample size.	5 days	Must be transported in cooler containing crushed ice. Avoid complete submersion of container. Must be accompanied by temperature control.	60 hrs

Frozen desserts	Petrifilm Aerobic Count, High Sensitivity Coliform Count	100 g		5 days	Must be transported in cooler chest accompanied by dry ice. Temperature control not necessary.	60 hrs
Frozen dessert mixes or soft-serves	Petrifilm Aerobic Count, Petrifilm Coliform Count, High Sensitivity Coliform Count	100 g	Must be in a sterile, unopened, container with appropriate sample size.	5 days	Must be transported in coolers with crushed ice and accompanied by temperature control. May not be frozen.	60 hrs.
Powdered Milk	Petrifilm Aerobic Count, Petrifilm Coliform Count, High Sensitivity Coliform Count	100 g	Submitted in Division of Milk Control approved plastic bags.	5 days	Room temperature	60 hrs
Soft frozen desserts	Petrifilm Aerobic Count, Petrifilm Coliform Count, High Sensitivity Coliform Count Phosphates	100 mL/g	Original container or sterile container	5 days	Must be transported in cooler with crushed ice and accompanied by temperature control. May not be frozen	60 hrs
Empty containers	Residual bacterial count & residual coliform count	NA	NA	5 days	Room temperature.	48 hrs*

Under ideal conditions, analysis of the samples should begin within 24 hours and, in most cases, no later than 48 hours after original collection

7.0 PART III: TEST DIRECTORY

7.1 Abbreviations

Laboratory/Section	Abbreviation
AIR QUALITY SECTION	AQS
CHEMICAL EMERGENCY PREPAREDNESS & RESPONSE SECTION	CEPRS
DAIRY MICROBIOLOGY	DM
DAIRY CHEMISTRY	DC
FOOD CHEMISTRY SECTION	FCS
FOOD MICROBIOLOGY	FM
GENERAL CHEMISTRY SECTION	GCS
TRACE METALS LABORATORY	TML
NUTRIENTS SECTION	NS
SEMI-VOLATILE ORGANICS SECTION	SVOS
RADIATION SECTION	RS
VOLATILE ORGANICS SECTION	VOS
WATER MICROBIOLOGY	WM

7.2 Index

Bis (2-chloroethyl) methane	VOS
Bis (2-chloroisopropyl) ether	VOS
Bis (2-ethylhexyl) adipate	SVOS
Bis (2-ethylhexyl) phthalate	SVOS, VOS
Blood, presumptive test	FCS
Bottled water	FCS
Botulism	FM
Brix, % sugar	FCS
Bromoacetic acid	VOS
Bromobenzene	VOS
Bromochloroacetic acid	VOS
Bromochloromethane	VOS
Bromodichloromethane	VOS
Bromoform	VOS
Bromomethane	VOS
4-Bromophenylether	VOS
Butachlor	SVOS
2-Butanone (MEK)	VOS
n-Butylbenzene	VOS
sec-Butylbenzene	VOS
tert-Butylbenzene	VOS
Butylbenzyl phthalate	VOS
2,4,6-*sec*-Butyl-dinitrophenol	VOS

C

Cadmium	TML, CEPRS
Caffeine	FCS
Calcium	TML
Campylobacter identification	FM
Canned foods	FM, FCS
Carbon, total organic	GCS
Carbon tetrachloride	VOS
Cesium	CEPRS
Chemical oxygen demand (COD)	NS
Chemical terrorism (CT)	CEPRS
Chemical warfare agent (CWA)	CEPRS
Chlordane	SVOS, VOS
Chloride	GCS
Chlorinated hydrocarbons	VOS, SVOS
Chloroacetic acid	VOS
Chlorobenzene	VOS
Chloroethane	VOS
2-Chloroethyl vinyl ether	VOS
Chlorophyll	GCS

Chloroform	VOS
Chloromethane	VOS
4-Chloro-3-methylphenol	VOS
2-Chloronaphthalene	VOS
2-Chlorophenol	VOS
4-Chlorophenyl phenyl ether	VOS
0rtho-Chlorotoluene	VOS
para-Chlorotoluene	VOS
Chlorpyrifos (dursban)	SVOS
Chromium	TML
Chrysene	VOS, SVOS
Citric acid	FCS
Clostridium botulinum (toxin assay)	FM
Clostridium perfringens (identification)	FM
Clostridium perfringens (count)	FM
Cobalt	TML, CEPRS
Coliform count (pasteurized milk)	DM
Coliform, total & fecal, MPN (drinking water)	WM
Coliform, total & fecal, MPN (food)	FM
Coliform, total & fecal MF (water sewage)	WM
Coliform, total & fecal, ONPG-MUG (water recreational)	WM
Coliform, total & fecal, ONPG-MUG (water, stream)	WM
Coliform, total & fecal, P-A (water, farm/dairy)	WM
Coliform, total & fecal, P-A (water, other)	WM
Color	GCS
Commercial sterility (canned foods)	FM
Conductivity	GCS
Copper	TML
Corn (canned)	FCS
Corrosivity / pH	GCS
Crabs (decomposition)	FCS
Crabmeat (decomposition)	FCS
Cyanide, amenable to chlorination	GCS
Cyanide, blood	CEPRS
Cyanide, total	GCS
Cyclosarin (GF)	CEPRS

D

Dalapon	SVOS
2,4-DB	SVOS
DDD	SVOS, VOS
DDE	SVOS, VOS
4,4′-DDE	CEPRS, VOS
4,4′-DDT	CEPRS, VOS

delta-BHC	VOS
DDT	SVOS
2,4-DDT	CEPRS, VOS
Diazinon	SVOS
Dibenzo (a,h) anthracene	SVOS, VOS
Dibromoacetic acid	VOS
Dibromochloromethane	VOS
1,2-Dibromo-3-chloropropane	VOS
1,2-Dibromoethane (EDB)	VOS
Dibromomethane	VOS
Dicamba	SVOS
Dichloroacetic acid	VOS
1,2-Dichlorobenzene	VOS
1,3-Dichlorobenzene	VOS
1,4-Dichlorobenzene	VOS
Dichlorofluoromethane	VOS
1,2-Dichloroethane	VOS
cis-1,2-Dichloroethene	VOS
trans-1,2-Dichloroethane	VOS
1,1-Dichloroethylene	VOS
trans-1,2-Dichloroethylene	VOS
Dichlorofluoromethane	VOS
1,1-Dichloroethene	VOS
2,4-Dichlorophenol	VOS
2,6-Dichlorophenol	VOS
1,1-Dichloropropene	VOS
Diphenylamine	VOS
Di-methylaminoazobenzene	VOS
1,2-Dichloropropane	VOS
1,3-Dichloropropane	VOS
2,2-Dichloropropane	VOS
cis-1,3-Dichloropropene	VOS
trans-1,3-Dichloropropene	VOS
Dichlorodifluoromethane	VOS
Dieldrin	SVOS, CEPRS
Diethyl dithiophosphate (DEDTP)	CEPRS
Diethyl phosphate (DEP)	CEPRS
Diethyl phthalate	VOS
Diethyl thiophosphate (DETP)	CEPRS
Difluoromethane	VOS
7,12-Dimethylbenz(a)anthracene	VOS
Dimethyl dithiophosphate (DMDTP)	CEPRS
2-4-Dimethyphenol	VOS
Dimethyl phosphate (DMP)	CEPRS

Dimethyl phthalate	VOS
Dimethyl thiophosphate (DMTP)	CEPRS
Di-n-butyl phthalate	VOS
Di-n-octyl phthalate	VOS
2,4-Dinitrophenol	VOS
2,4-Dinitrotoluene	VOS
2,6-Dinitrotoluene	VOS
4,6-Dinitro-2-methylphenol	VOS
1,3 Dinitrobenzene	VOS
Dinoseb	SVOS
1,2-Diphenyl hydrazine	VOS
Diphenyl nitrosamine	VOS
Di-isopropyl ether (DIPE)	VOS
Drinking water (private, public supplies)	VOS, GCS, NS, SVOS, RS, TML

E

E. coli Count, MPN (shellfish)	FM
E. coli O157:H7 Identification	FM
Endosulfan I	VOS
Endosulfan II	VOS
Endosulfan sulfate	VOS
Endrin	SVOS, VOS
Endrin aldehyde	VOS
Endrin ketone	VOS
Enterobacteriaceae identification (canned food)	FM
Ethion	SVOS
Ethylbenzene	VOS
Ethylene dibromide (EDB)	SVOS
Ethyl-*tert*-butyl-ether (ETBE)	VOS
Extractable organics	VOS
Extraneous material (food)	FCS

F

Fat, (percent)	FCS
Filth (food)	FCS
Finfish (heavy metals)	TML
Fluoranthene	VOS, SVOS
Fluorene	VOS
Fluorescein dye	GCS
Fluoride	GCS
Fly ash	AQS
Food quality, adulteration	FCS
Foreign material (food)	FCS
Forensic drugs	CEPRS

Formaldehyde	RS
Fourier transform infrared spectrometer (FTIR)	CEPRS
G	
Gamma emitting isotopes	RS
Gasoline	VOS
Glass (foods)	FCS
Gravimetric	FCS
H	
Haloacetic acids	VOS
Hardness	NS
Heavy metals	TML
Heptachlor	SVOS, VOS
Heptachlor epoxide	SVOS, VOS, CEPRS
Herbicides, chlorinated acids	SVOS
Hexachlorobenzene (HCB)	SVOS, CEPRS, VOS
Hexachlorobutadiene	VOS
Hexachlorocyclopentadiene	SVOS, VOS
Hexachloroethane	VOS
2-Hexanone	VOS
Hexachloropropylene	VOS
Hydrocarbons (chlorinated)	VOS, SVOS
I	
Identification	GCS, CEPRS
Ignitability	GCS, AQS
Indeno (1,2,3-ed) pyrene	VOS, SVOS
Infant botulism (anaerobe culture)	FM
Inhibitory substances	DM
Inhibitory substances (powdered milk)	DM
Iodine-131 (air)	RS
Insect identification	FCS
Isophorone	VOS
Isopropylbenzene	VOS
para-Isopropyltoluene	VOS
Iron	TML
J	
K	
Kjeldahl, total nitrogen (TKN)	NS
L	

Lead	TML, CEPRS
Lindane (gamma BHC)	SVOS, VOS, CEPRS
Liquid scintillation (wipes)	RS
Listeria identification (foods, environmental)	FM

M

Maggots (foods)	FCS
Malathion	SVOS
Manganese	TML
Magnesium	TML
Methylene blue active substances (MBAS)	GCS
2-Methylphenol	VOS
3-Methylphenol	VOS
4-Methylphenol	VOS
Methapyrilene	VOS
Meat (speciation of uncooked meat)	FCS
Mercury	TML
Mercury (fish)	TML, FCS
Metals, dissolved	TML
Metals, total	TML, FCS
Methoxychlor	SVOS
Methyl parathion	SVOS
4-Methyl-2-pentanone (MIBK)	VOS
Methyl-*tert*-butyl ether (MTBE)	VOS
Methylene chloride	VOS
Methylene diphenyl isocyanate	RS
Metolachlor	SVOS
Metribuzin	SVOS
Mirex	CEPRS
Moisture (percent)	DC
Molybdenum	TML, CEPRS
Monobromoacetic acid	VOS
Monochloroacetic acid	VOS

N

Naphthalene	VOS, SVOS
Nerve agent (metabolites)	CEPRS
Nickel	TML
Nitrobenzene	VOS
Nitrogen, ammonia	NS
Nitrogen, nitrate-nitrite	NS
Nitrogen, nitrite	NS
Nitrogen, total kjeldahl	NS
Nitrophenol	VOS

4-Nitrophenol	VOS
4-Nitroquinoline-N-oxide	VOS
trans-Nonachlor	CEPRS

O

Oil & grease	GCS
Organic chemical (stream sample)	VOS
Organochlorine pesticides	CEPRS
Organoleptic analysis (food)	FCS
Organophosphate pesticides (metabolites)	CEPRS
Organophosphorus nerve agent (metabolites)	CEPRS
Oxalic acid	FCS
Oxamyl (vydate)	SVOS
Oxychlordane	CEPRS
Oyster	FCS, TML, FM

P

pH	GCS
$PM_{2.5}$	AQS
PM_{10}	AQS
Particulates (industrial pollution)	AQS
Pentachlorobenzene	VOS
Pentachloronitrobenzene	VOS
Pentachlorophenol	SVOS, VOS
Percent fat	FCS
Pesticides	SVOS, VOS
Pesticides (food)	FCS, SVOS
Phenacetin	VOS
Phenantherene	VOS
Phenols	VOS
Phenolics, total recoverable	GCS
3-Phenoxybenzoic acid (3PBA)	CEPRS
4-Fluoro-3-phenoxybenzoic acid (4F3PBA)	CEPRS
Photon emitters	RS
Phosphatase (alkaline)	DC
Phosphatase (microbial)	DC
Phosphatase (reactivated)	DC
Phosphorous, ortho	NS
Phosphorous, total	NS
Phosphorus, total dissolved	NS
Physical condition (food)	FCS
Picloram	SVOS
Platinum	CEPRS
Polychlorinated biphenyl (PCB)	SVOS

Polynuclear aromatic hydrocarbons (PAH)	VOS, SVOS
Potassium	TML
Presumptive blood test	FCS
Priority pollutants	VOS, SVOS
Propachlor	SVOS
n-Propylbenzene	VOS
Purgeable aromatics	VOS
Purgeable halocarbons	VOS
Pyrethroid pesticides	CEPRS

Q

Quartz (filters)	AQS

R

Radiological tests	RS
Radium	RS
Radon (water)	RS
Residual bacterial count	DM
Residual bacterial count (molded containers)	DC
Russian VX (SVX)	CEPRS

S

Salt (percent in meCEPRS)	FCS
Sarin (GB)	CEPRS
Sediment	GCS
Selenium	TML, CEPRS
Semi-volatile organic compounds	VOS
Silver	TML
Silvex (2,4,5-TP)	SVOS
Simazine	SVOS
Shellfish	FCS
Sodium	TML
Solids, settleable	GCS
Solids, total	GCS
Solids, total dissolved	GCS
Solids, total suspended	GCS
Soman (GD)	CEPRS
Somatic cell counts (dairy products)	DM
Speciation of uncooked meat	FCS
Standard plate count	WM, FM, DM
Staphylococcus count	FM
Strontium (milk, water)	RS
Styrene	VOS
Succinic acid	FCS

Sulfate	GCS
T	
Tartaric acid	FCS
2,4,5-TP (silvex)	SVOS
tert-amyl-methyl-ether (TAME)	VOS
tert-butyl alcohol (TBA)	VOS
1,2,4,5 Tetrachlorobenzene	VOS
1,1,1,2-Tetrachloroethane	VOS
1,1,2,2-Tetrachloroethane	VOS
Tetrachloroethene	VOS
2,3,4,6-Tetrachlorophenol	VOS
Thallium	TML, CEPRS
Thermometer calibrations	FCS
Toluene	VOS
Total petroleum hydrocarbons	GCS
Total suspended particulates	AQS
Toxaphene	VOS, SVOS
1,2,3-Trichlorobenzene	VOS
1,2,4-Trichlorobenzene	VOS
1,1,1-Trichloroethane	VOS
1,1,2-Trichloroethane	VOS
Trichloroethene	VOS
Trichlorofluroomethane	VOS
2,4,6-Trichlorophenol	VOS
1,2,3-Trichloropropane	VOS
Trihalomethanes, total	VOS
1,2,4-Trimethybenzene	VOS
1,3,5-Trimethylbenzene	VOS
Tritium (water)	RS
Tungsten	CEPRS
Turbidity	GCS
U	
Uranium	TML, CEPRS
V	
Vanadium	TML
Vibrio cholera identification	FM
Vibrio parahaemolyticus count	FM
Vinyl chloride	VOS
Volatile organic compounds	VOS
Volume	FCS

VX	CEPRS

W

Water	VOS, SVOS, GCS, RS, NS, TML, WM

X

ortho-Xylene	VOS
meta-Xylene	VOS
para-Xylene	VOS
Total xylenes	VOS

Y

Yersinia identification	FM

Z

Zinc	TML