

FORENSIC CHEMISTRY

TOXICOLOGY SECTION BLOOD ALCOHOL TRAINING MANUAL

Maine Health and Environmental Testing Laboratory – Forensic Chemistry

Introduction

This procedure details the training requirements that must be completed before any new employee in the Toxicology Section may be allowed to analyze case specimens without close supervision (i.e., independent casework). Prior to completion of the modules within this manual new employees may work with case specimens as a part of their training, but may do so only if assisted and supervised by a more experienced analyst or supervisor.

Documented completion of each module within this manual, and completion of the safety training, satisfies all training requirements, and will allow the analyst to obtain the required State Certification for analysis of blood alcohol samples.

Following completion and authorization the Forensic Lab Director, any new analyst is allowed full access to all case specimens within the laboratory and may contribute to the completion of a case in any way necessary, including case / batch technical review.

During the training period, if a trainee's performance is unacceptable in any specific section, the Training Coordinator shall notify the trainee and Forensic Lab Director / Quality Manger that performance is/was unacceptable. Notification of the unacceptable performance will be retained in the training binder along with all documentation indicating the trainee 'repeated the section'.

The Forensic Lab Director/Quality Manager may require the trainee to repeat the failed section, and/or augment the training material in the specific section, and/or take other appropriate action as management deems necessary (i.e., disciplinary). Appropriate documentation will be retained in the training binder. Subsequent failures, of either the original or additional modules during the training period will be brought to the attention of higher management by the Forensic Lab Director/Quality Manager.

MODULE 1:

Administrative Procedures and Orientation

Objectives:

Completion of this module will provide the trainee with relevant knowledge in the following administrative areas:

- Administrative policies and procedures for the State of Maine
- Administrative policies and procedures for the Health and Environmental Testing Laboratory: Forensic Chemistry Section

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Required Tasks:

1. New employees will be processed through the State Of Maine / Health and Environmental Testing Labs administrative offices prior to reporting to the Forensic Chemistry Laboratory.
2. The trainee will be given a tour of the HETL building, and specifically the Forensic Chemistry Lab, and introduced to lab personnel.
3. Assigned Training Coordinator will provide the trainee with an explanation of the purpose of the training program, the expected course of events and outcomes, instructions on maintenance of a training notebook / binder, and a copy of the approved training plan. Trainee will also have the opportunity to ask any questions related to training, and what is expected from all parties.
4. Trainee and Training Coordinator will meet with the Forensic Lab Director to discuss items outlined in the completion checklist below, and to answer any questions.
5. Trainees will be required to complete reading or viewing of the following materials:
 - a. Laboratory Quality Manual
 - b. Laboratory Standard Operating Procedures Manual
 - c. Relevant sectional Procedural Manuals
 - d. Forensic Chemistry Safety Program Manual, which includes sections on blood borne pathogens (SharePoint)
 - e. Chemical Hygiene Plan
 - f. American Academy of Forensic Sciences Code of Ethics
 - g. American Board of Forensic Toxicology Code of Ethics
 - h. ANAB Guiding Principles of Professional Responsibility
 - i. Current version of ANAB manual under which the laboratory is currently accredited.
6. It should be noted that the Trainee may be working on multiple modules at the same time. Some modules, or requirements within a module may take a short time to complete, but other items may require more extensive practice and time for the trainee to master.

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Checklist: Orientation and Administration

1. Trainee has completed New Employee Processing

Trainee	Training Coordinator	Date
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2. Trainee has completed State of Maine / HETL New Employee Orientation

Trainee	Training Coordinator	Date
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3. Trainee has read the HETL Safety Program Manual. Trainee has toured the facility and is familiar with the location of fire extinguishers, emergency routes and exits, and the evacuation meeting locations. Trainee has discussed with the Forensic Lab Director the concept of Universal Precautions and the expectations for the proper use of PPE and safety equipment within the laboratory. Trainee understands the HETL policy for Hepatitis vaccinations.

Trainee	Training Coordinator	Date
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4. Trainee has been provided an explanation of the training program, competency testing, instructions on maintenance of a training notebook, and a copy of the approved training plan.

Trainee	Training Coordinator	Date
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5. Trainee has met with the Forensic Lab Director and discussed the following issues:

- Laboratory mission, structure, organization, and capabilities
- Types of casework commonly encountered
- ANAB procedures and oversight
- Aspects of the Toxicology Laboratory Quality Assurance Program
- Instrument maintenance and documentation
- Technical and administrative review of batch and case files
- Preparation, use, and documentation of calibrators/controls
- Proficiency Testing Program
- Forms currently in use in the laboratory

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- Hours of operation
- Time and attendance, requests for time off
- Annual and sick leave
- Continuing education and travel requests
- Supply ordering and annual budget process
- Policies regarding confidentiality and reporting of results, including documentation of case communications, telephonic results, and inquiries from the press or other media
- Policies regarding testimony
- Request for pre-trial meetings or depositions in a criminal case
- Request to testify in a grand jury proceeding or preliminary hearings
- Providing lab reports to other agencies
- Discussing the results/conclusions of another analyst's work or the work performed in another section
- Discussing details regarding an on-going investigation, and DHHS policy regarding HIPPA
- Disclosure of case details or comments regarding HETL or HETL Toxicology section via current social networking means (such as: forensic websites, forums, Facebook, internet blogs, chat rooms, etc)
- The potential for re-examination of evidence
- Membership dues and attendance at professional meetings

Trainee

Forensic Lab Director

Date

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6. Trainee has completed reading of the following materials:

	Completion Date:	Trainee Initial
Quality Manual		
Standard Operating Procedures Manual		
Blood Alcohol Procedures Manual		
American Academy of Forensic Sciences Code of Ethics		
American Board of Forensic Toxicology Code of Ethics		
ANAB Guiding Principles of Professional Responsibility		
Current ANAB Manual and Board Interpretations		

Trainee

Training Coordinator

Date

Administrative Matters and Procedures documented, completed, and reviewed.

Trainee

Training Coordinator

Date

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Module 2:

Handling and Documentation of Physical Evidence

Objectives:

After completion of this module, the trainee will have the requisite knowledge, skills, and abilities involved in:

- Preservation of hard copy chain-of-custody for physical evidence
- Use of the laboratory LIMS system to document service requests and evidence receipt, and return.
- Compliance with Toxicology Laboratory policies regarding security, handling, packaging, labeling, and preservation of evidence to prevent loss, deterioration, or cross-contamination, including:
 - Security systems in place
 - Verification and documentation of evidence received
 - Sealing of evidence
 - Procedures in the event of receiving unsealed evidence
 - Procedures in the event of receiving an expired blood kit
 - Marking of evidence
 - Evidence storage
 - Final disposition of evidence
- Examination documentation to include:
 - Initials or signature of analyst and toxicology laboratory case number
 - Procedures for strikethrough and interlineation
 - Detailed information on condition and description of the evidence
 - Analyses/examinations performed
 - Composition and disposition of case files

Required Tasks:

- The trainer will discuss the topics listed in the objectives as they relate to evidence handling, packaging, labeling, and preservation, chain of custody, and examination documentation.
- The trainee will observe utilization of the laboratory LIMS system to document service requests and evidence transfer.
- The trainee will observe the physical receipt, transfer, storage, and return of evidence, and the corresponding documentation of hard copy chain of custody.
- The trainee will observe the marking or labeling of physical evidence.
- When the trainee is comfortable with and understands the submission process, the training coordinator will pretend to be a customer submitting evidence, and the trainee shall receive said evidence, completing the contract for lab services and chain of custody documents. No labels printed, and this case will not be entered into StarLims.

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- The trainee is required to read the relevant sections of the Quality Manual and Evidence Manual dealing with chain of custody, receipt and return of evidence.

Study Questions (Answer in writing):

- Explain the chain of custody system used by the Toxicology section.
- How is access to the building, the laboratory, and toxicology evidence controlled, secured, and documented?
- Define a proper seal.
- Discuss the proper marking/labeling of evidence
- Who has access to the secured refrigerator in the laboratory?
- What information should be included on each page of your case file?
- How are spelling or other errors handled in note-taking?
- What documentation should be included in a case file?
- How are case files stored within the laboratory?
- How is batch and QC data stored within the laboratory?
- What is the final disposition of evidence when individual casework is completed?

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Checklist/Evaluation for Handling of Physical Evidence

1. The trainee has met with the training coordinator and discussed the topics listed in the objectives as they relate to evidence handling, packaging, labeling, preservation, chain of custody, evidence disposition, and security.

Date	Trainee	Training Coordinator
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2. Trainee has observed/assisted in receiving, transferring, and returning evidence and documenting on chain of custody form.

Date	Trainee	Training Coordinator
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3. Trainee has observed/assisted in preserving and storing evidentiary materials.

Date	Trainee	Training Coordinator
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4. Trainee has observed/assisted in marking of evidence, and description of evidence materials if warranted.

Date	Trainee	Training Coordinator
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5. Trainee has provided satisfactory answers to oral study questions.

Date	Trainee	Training Coordinator
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6. Trainee has demonstrated proficiency in use of the LIMS system and completed the exercise with the training coordinator and the submission of evidence.

Date	Trainee	Training Coordinator
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7. Trainee has completed the required reading of the following:

Manuals to Read:	Completion Date:	Trainee Initial
Evidence Manual		

Date

Trainee

Training Coordinator

Handling and Documentation of Physical Evidence documented, completed, and reviewed.

Date

Trainee

Training Coordinator

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Module 3:

Blood Alcohol

Objectives:

After completion of this module, the trainee will have the requisite knowledge, skills, and abilities involved in:

- GC Headspace maintenance and preparation for the run
- Sample check-in to validate accurate information such as names, case #, etc
- Prepare Internal Standard Solution used in Blood Alcohol assay
- Prepare Calibration curve and completing associated forms
- Sample, standard and control preparation
- Developing a sequence list and running samples
- Analyzing the data generated and completing associated forms
- Uncertainty of Measurement
- Creating final report for customer

Required Reading:

- Blood alcohol procedures manual.
- Stability of Ethanol in Blood and Urine Samples: Slavka Mandic-Radic, Gordana Dzingalasevic, Nevena Lukovic. *Journal of Molecular Biology*, 2007: 26 (3)
- Stability of Ethanol in Human Whole Blood Controls: An Interlaboratory Evaluation. Dubowski, Kurt M., Gadsden, Sr., Richard H., Poklis, Alphonse. *Journal of Analytical Toxicology*, Vol. 21, October 1997.
- Long-Term Blood Alcohol Stability in Forensic Antemortem Whole Blood Samples. Tiscione, Nicholas B., Vacha, Ruth E., Alford, Ilene., Yeatman, Dustin Tate, and Shan, Xiaoqin. *Journal of Analytical Toxicology*, 2015;39: 419-425.
- The Effect of Temperature on the Formation of Ethanol by *Candida Albicans* in Blood. Chang, Joyce., and Kollman, S. Elliot. *Journal of Forensic Sciences*, Vol 34, No. 1, Jan. 1989, pp.105-109.
- Comparison Among Plasma, Serum, and Whole Blood Ethanol Concentrations: Impact of Storage Conditions and Collection Tubes. Penetar, David M., McMeil, Jane F., Ryan, Elizabeth, and Lukas, Scott. *Journal of Analytical Toxicology*, Vol. 32, Sept. 2008.
- Garriott's Medicolegal Aspects of Alcohol, (5th Edition or later). Due to the size of this volume, it is not required that the trainee read every page of every chapter at this time. However, it is important that the trainee review the book and gain a simplistic understanding regarding the value of this one book and that it addresses almost all aspects of alcohol related issues. The trainee is encouraged to spend free time reading this book.

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Required Tasks:

- The trainer will discuss the topics listed in the objectives as they relate to the blood alcohol assay
- The trainee will observe the entire process as it is performed by the trainer (calibration, case preparation and analysis, completion of all associated forms, entering data into LIMS, and report writing.
- The trainee is required to read and follow the Blood Alcohol Procedures and demonstrate the ability to follow that method and generate results.
- The Trainee will prepare a lot of Internal Standard Solution with the trainer and test that it is suitable for use.
- The Trainee will discuss PerkinElmer instrument maintenance requirements and observe how to perform maintenance tasks.
- The Trainee will practice pipetting using the Hamilton Diluter until trainee feels comfortable using the device.
- After watching the calibration procedure, the Trainee will prepare and successfully complete a minimum of 5 Calibration Curves with minimal assistance from the trainer. Trainee will complete all paperwork / forms and submit to Trainer for review.
- The Trainee will prepare and successfully complete a full volatiles calibration curve, complete all paperwork/forms, and submit to Trainer for review.
- The trainee will watch the Trainer complete the process of sample preparation and analysis, including all associated QC samples (standards, whole blood and serum controls), completion of all paperwork and forms, preparation of individual case folders, and writing of reports in StarLims.
- After watching the Trainer complete the analysis process, the Trainee will successfully complete the process of sample preparation and analysis using proficiency test samples reserved for training purposes. Trainee will successfully complete **at least 3** batches (each batch having a minimum of 36 samples/controls), with all associated QC samples, complete all paperwork/forms, and submit to Trainer for review. The first batch performed by the Trainee will be observed by the Trainer, and the remaining subsequent batches will be performed independently. Mock reports will be created for 3 samples, having the Trainee demonstrate the ability to report the correct result and calculate the UoM for that result.
- The trainee is required to watch and assist in the creation of BAC reports using StarLims. There is no minimum established as it is recognized that mastering the StarLims software package may be quick, or lengthy depending on the computer literacy of the trainee.

Study Questions (Answer in writing):

- Explain the process of GC Headspace maintenance, including frequency.

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- How are samples checked once analysis starts?
- Describe the pipetting process and the use of the Hamilton Diluter
- Describe the process of creating a sequence and running samples.
- Describe the requirements a calibration curve must meet before being used for casework
- Describe the requirements / acceptance criteria for duplicates and replicates of casework samples
- Describe the theory of uncertainty of measurement, and the specific uncertainty of measurement that is applied to blood alcohol samples?
- How is data reviewed and then how are results entered into StarLims

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Checklist/Evaluation for Blood Alcohol Analysis

8. The trainee has met with the training coordinator and discussed the topics listed in the objectives as they relate to Blood Alcohols.

Date	Trainee	Training Coordinator
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9. Trainee has read the Blood Alcohol Procedures Manual and other required readings, along with knowing the location of Garriott’s Medicolegal Aspects of Alcohol within the laboratory.

Date	Trainee	Training Coordinator
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10. Trainee has prepared Internal Standard Solution, performed at least 5 calibrations that meet acceptance criteria, and completed all associated forms/paperwork for a complete calibration file.

Date	Trainee	Training Coordinator
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11. Trainee has completed the Blood Alcohol process while under close supervision of the trainer.

Date	Trainee	Training Coordinator
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12. Trainee has successfully prepared and analyzed 3 batches.

Date	Trainee	Training Coordinator
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13. Trainee has provided satisfactory answers to oral/written (circle one) study questions.

Date	Trainee	Training Coordinator
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14. Trainee has demonstrated proficiency in use of the LIMS system, including the creation of reports.

Date

Trainee

Training Coordinator

Blood Alcohol: completed, and reviewed.

Trainee

Training Coordinator

Date

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MODULE 4:

Criminal and Civil Law, Procedures, and Testimony

Objectives:

Completion of this module will provide the trainee with relevant knowledge in the following areas of criminal and civil law and procedures:

- The structure of the court system in the state of Maine
- Current Maine Rules of Evidence concerning relevancy of forensic evidence and expert testimony
- Current Maine statues regarding impaired driving
- Brady and Giglio material, analyst malfeasance

Completion of this module will also provide the trainee with the requisite knowledge, skills, and abilities to provide effective testimony regarding the analysis of forensic evidence, including courtroom procedures involving:

- Oath and subsequent direct examination, including
 - Qualifications and voir dire
 - Recognition and identification of evidence
 - Chain of Custody
 - Toxicology reports
 - Explanation of examinations and conclusions
- Cross examination and redirect
- Use of visual aids or presentation materials

Required Reading Materials:

The trainee is required to complete reading or viewing of the following materials / websites related to The Criminal Courts within the State of Maine and Brady / Giglio issues.

- Maine Court Systems (by County): http://www.courts.maine.gov/maine_courts/
- Current Rules of Evidence in Maine:
http://www.courts.maine.gov/rules_adminorders/rules/text/mr_evid_2015-9-1.pdf
- Maine OUI Laws: <http://www.maine.gov/dps/bhs/impaired-driving/laws.html>
- Brady Disclosure: https://en.wikipedia.org/wiki/Brady_disclosure
- Practical Guide to Brady Motions:
<http://www.ncids.org/Defender%20Training/2008%20New%20Felony%20Defender%20Training/BradyHandout.pdf>
- Bullcoming vs. New Mexico: <https://www.supremecourt.gov/opinions/10pdf/09-10876.pdf>

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- Mitchell V. Wisconsin: https://www.supremecourt.gov/opinions/18pdf/18-6210_2co3.pdf
- Giglio vs. United States: https://en.wikipedia.org/wiki/Giglio_v._United_States
- U.S. Justice Department Policy on Giglio: <https://www.justice.gov/archives/ag/policy-regarding-disclosure-prosecutors-potential-impeachment-information-concerning-law>

Required Tasks:

1. Observe a minimum of 2 courtroom testimonies for a court qualified examiner in the discipline, and one testimony of a qualified examiner from another discipline within the Forensic Chemistry Section. Discuss the testimony with the appropriate examiner/analyst.
2. Trainee will meet with the Forensic Lab Director / Quality Manager after reviewed the required reading to discuss violations of Brady / Giglio, as well as general analyst malfeasance in the Forensic Sciences.

Study Questions (Answer in writing):

- Who acts as the “gatekeeper” in determining the relevance and reliability of scientific evidence?
- List the criteria used by the Courts to determine if scientific evidence is reliable
- Briefly describe the structure of the Maine court system
- What is a Brady violation?
- Explain the difference between uncertainty of measurement and error rate.
- Define the following terms:
 - Voir dire
 - Direct examination
 - Cross examination
 - Redirect
 - Chain of custody
 - Expert witness

Exercises:

- The trainee will prepare an up-to-date curriculum vitae
- The trainee will prepare written answers to the following questions:
 - Could you please introduce yourself to the jury?
 - How are you currently employed?
 - How long have you been employed by the State of Maine as a Chemist in the Tox section?
 - What are your duties/responsibilities as a Chemist in the Toxicology section?

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- Are you certified by the State of Maine, Dept of Health and Human services (DHHS) as a Blood Alcohol analyst?
 - What exactly does that mean, and how do you gain such certification?
 - Can anyone gain this certification?
 - Did you have to complete any training before getting this certification?
 - Can you tell us about that training? Who provided it and what did it cover?
 - How were you employed before this position?
 - Can you tell us a little about your educational background?
 - Are you a member of any professional societies?
 - You already described your basic duties/responsibilities a Chemist in the Toxicology section, but can you elaborate on the type of testing that is conducted with the toxicology section? Meaning how does the lab receive samples? From whom? How do they get to the lab and how do they move thru the lab?
 - And you, on behalf of the laboratory, issue a report that details your findings?
 - Does anyone in the lab review your findings before they are released? Who and how is that accomplished?
 - Do all blood samples submitted to the lab contain alcohol?
 - What happens if you examine a sample that is supposedly from an OUI suspect, but you don't find any alcohol?
 - Can you tell us what a proficiency test is?
 - Are you required to work 'proficiency tests'?
 - How often?
 - Are results from proficiency tests reviewed? By whom?
 - What happens if you 'fail' a proficiency test?
 - Have you ever failed a proficiency test?
 - Can you explain (in lay-terms) what a GC-Headspace system is, and how it determines the amount of alcohol in a blood sample?
 - How do you know the result is just ethanol and not other chemicals and ethanol?
- The trainee will satisfactorily complete a mock trail scenario(s), to include the following sections:
 - Qualifying information
 - Recognition and introduction of physical evidence
 - An explanation of the examinations conducted and their results, using visual aids and presentation materials as applicable
 - Conclusions and interpretations

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Checklist: Criminal and Civil Law, Procedures, and Testimony

- The trainee has observed at least 2 courtroom testimonies of a court qualified examiner within HETL, and at least 1 being in the toxicology discipline. Trainee has discussed the testimony with the analyst who testified after the case is completed.

Date	DA	Witness	Defendant	Court/Charge

_____ _____ _____
 Trainee Training Coordinator Date

- The trainee has satisfactorily prepared an up-to-date curriculum vitae.

_____ _____ _____
 Trainee Training Coordinator Date

- The trainee has prepared satisfactory written answers to the outlined qualifying questions.

_____ _____ _____
 Trainee Training Coordinator Date

- The trainee has provided satisfactory written/oral (circle one) answers to the study questions.

_____ _____ _____
 Trainee Training Coordinator Date

- The trainee has met with the Forensic Lab Director / Quality Manager to discuss Brady and Giglio issues, and analyst malfeasance in general.

_____ _____ _____
 Trainee Training Coordinator Date

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6. The trainee has successfully completed mock trial(s) covering the following areas (attach documentation):

	Completion Date	Trainee Initials
Qualifications		
Recognition/ introduction of evidence		
Examination/results/presentation materials		
Conclusions and interpretations		

Trainee

Training Coordinator

Date

7. The trainee has completed required reading/viewing of the following materials:

	Completion Date	Trainee Initials
Maine Court Systems		
Current Rules of Evidence in Maine		
Maine OUI Laws		
Brady Disclosure		
Practical Guide to Brady Motions		
Giglio vs. United States		
U.S. Justice Department Policy on Giglio		
Mitchell V. Wisconsin		
Bullcoming vs. New Mexico		

Trainee

Training Coordinator

Date

Criminal and Civil Law, Procedures, and Testimony documented, completed, and reviewed.

Trainee

Training Coordinator

Date

BAC Training Manual Completed:

Training Coordinator

Forensic Lab Director

Date