

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No.
TOX_P304_Version 1

Approved by:
Lab Director

Effective Date:
07182024
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Page 1 of 15

TABLE OF CONTENTS

- 1.0 [Training Overview](#)
 - 2.0 [Laboratory Introduction](#)
 - 3.0 [Sample and Evidence Control](#)
 - 4.0 [Fundamental Scientific Knowledge](#)
 - 5.0 [Applied Scientific Knowledge](#)
 - 6.0 [Laboratory Analysis](#)
 - 7.0 [Reports and Notifications](#)
 - 8.0 [Legal Knowledge](#)
 - 9.0 [Final Evaluation](#)
 - 10.0 [Authorization](#)
- [Appendix I: Readings](#)
[Appendix II: Training Questions](#)

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No.
TOX_P304_Version 1

Approved by:
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Effective Date:
07182024
Status: Active

Page 2 of 15

1.0 Training Overview

1.1. Training Purpose and Description

1.1.1. Purpose and Goals

The purpose of this training program is to provide a uniform training process for analysts in the Toxicology Section at the Vermont Forensic Laboratory (VFL). This program is designed to ensure and document that those individuals who will be working as analysts are knowledgeable and competent to perform their technical, analytical, and legal duties.

1.1.2. Scope

This training manual should be completed in conjunction with TOX_P300_Intro to Toxicology Training Manual and with the associated sub-discipline specific training manuals (TOX_P301, TOX_P302). Training will concentrate on impairment, physiology, pharmacology, and pharmacokinetics as it relates to expert witness testimony provided by qualified analysts at the VFL and will culminate in a competency test(s). This program is designed for new employees or current employees without prior toxicology experience. A trainee with previous experience in forensic or other toxicological analysis may not require all modules or steps; it is the responsibility of the Toxicology Section Supervisor to determine the duration and scope of the training program for a trainee with previous experience. Similarly, the module content may be tailored as applicable to anticipated job responsibilities.

1.1.3. Documentation

The trainee will compile all documentation associated with completed training work. These files may include, but are not limited to, affidavits, reports, and review sheets. The trainer will review these materials and document completion of required training components. Documentation of training will be maintained at the laboratory.

1.2. Trainee Responsibilities

1.2.1. Instructions for Trainee

The length of time needed to complete the training program will vary and is left to the discretion of the trainer and supervisor. The trainee will be provided access to any required or suggested readings and will be exposed to cases and situations expected to be encountered during routine work in the Toxicology Section. The trainee will keep records, where appropriate, of how training tasks were accomplished (e.g. who did the trainee observe testify in court, what additional papers

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No. TOX_P304_Version 1	Approved by: Lab Director	Effective Date: 07182024 Status: Active	Page 3 of 15
--------------------------------	------------------------------	---	---------------------

not listed in Appendix I did the trainee reference, etc.). At the conclusion of training, the trainee will evaluate the effectiveness of the training program and suggest any improvements to the section supervisor.

1.2.2. Required Training Modules

The trainee, trainer, and section supervisor shall discuss which portions of the training manual are to be completed by the trainee based on the trainee’s anticipated job responsibilities and prior experience. This section may also be used to outline re-training requirements for current employees if needed. The requirements for the trainee are outlined below:

	Required?		Completed?	
	Yes	No	Date	Trainer
1. Training Overview	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
2. Laboratory Introduction				
3. Sample and Evidence Control				
4. Fundamental Scientific Knowledge				
5. Applied Scientific Knowledge				
5.1 Alcohol Calculation Theory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
5.2 Alcohol Impairment Theory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
6. Laboratory Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
7. Reports and Notifications				
7.1 Retrograde Extrapolation Affidavits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
7.2 Case Specific IR Affidavits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
7.3 Case Review	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
7.4 Mock Cases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
8. Legal Knowledge				
8.1 Expert Testimony	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
9. Final Evaluation				
9.1 Competency Tests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
9.2 Mock Trial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
10. Authorization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

1.3. Trainer Responsibilities

The trainer is responsible for instructing the trainee in the operations of the laboratory and the processes and procedures that will ultimately comprise the trainee’s job duties. The trainer will ensure that the trainee is exposed to all relevant topics within the training program. The trainer will

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No. TOX_P304_Version 1	Approved by: Lab Director	Effective Date: 07182024 Status: Active	Page 4 of 15
--------------------------------	------------------------------	---	--------------

provide cases for the trainee to review and/or practice scenarios and will meet with the trainee periodically to monitor progress, review work, and provide feedback. The trainer will assist the trainee in preparing for any assessments, which will include a competency test(s) and may include a mock trial. At the conclusion of training, the trainer will evaluate the effectiveness of the training program and suggest any improvements to the section supervisor.

1.4. Acknowledgement of Training Plan

The signatures of the trainee, trainer(s), and section supervisor below indicate that the expected responsibilities and required training modules have been discussed and agreed upon.

Trainee: _____ Date: _____

Trainer (s): _____ Date: _____

Trainer (s): _____ Date: _____

Section Supervisor: _____ Date: _____

2.0 Laboratory Introduction

Refer to TOX_P300_Intro to Toxicology Training Manual.

3.0 Sample and Evidence Control

Refer to TOX_P300_Intro to Toxicology Training Manual.

4.0 Fundamental Scientific Knowledge

Refer to TOX_P300_Intro to Toxicology Training Manual.

5.0 Applied Scientific Knowledge

This training module will ensure that the trainee has received appropriate education and training to apply relevant scientific principles to the testing performed and cases reviewed at the VFL.

5.1. Alcohol Calculation Theory

The trainee will develop and demonstrate a working knowledge of alcohol absorption, distribution, metabolism, and elimination as well as methods for retrograde extrapolation, forward estimations, determining the minimum number of drinks consumed, and other typical situations evaluated at the VFL.

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No. TOX_P304_Version 1	Approved by: Lab Director	Effective Date: 07182024 Status: Active	Page 5 of 15
--------------------------------	------------------------------	---	--------------

Task	Trainee	Trainer	Date Completed
I have reviewed case files showing the relation back of alcohol test results.			
I have read and understand the required readings outlined for this section in Appendix I.			
I have answered the questions outlined for this section in Appendix II and received feedback on my answers.			

5.2. Alcohol Impairment Theory

The trainee will develop and demonstrate a working knowledge of alcohol impairment.

Task	Trainee	Trainer	Date Completed
I have read and understand the required readings outlined for this section in Appendix I.			
I have answered the questions outlined for this section in Appendix II and received feedback on my answers.			

6.0 Laboratory Analysis

The trainee should have completed the relevant manuals prior to, or in conjunction with, this one.

Task	Trainee	Trainer	Date Completed
I have completed TOX_P301.			
I have completed TOX_P302.			

7.0 Reports and Notifications

7.1. Retrograde Extrapolation Affidavits

The trainee will become familiar with the policies, procedures, and documentation requirements for generating retrograde extrapolation (aka relation back) affidavits. The calculations performed for training will include a range of scenarios encompassing those which may be expected to be encountered in casework. The trainee and trainer will document this by both initialing the boxes below. Lists of training cases will be attached.

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No. TOX_P304_Version 1	Approved by: Lab Director	Effective Date: 07182024 Status: Active	Page 6 of 15
--------------------------------	------------------------------	---	---------------------

Prior to completing training affidavits, the trainee will observe a qualified analyst(s) complete a breath and blood affidavit. At minimum, the calculations performed for training will include the following:

Breath:

1. Performed under the general supervision of an experienced analyst, 5 breath relation back affidavits from previously completed relation back affidavit requests.
2. Performed independently, 5 breath relation back affidavits from previously completed relation back affidavit requests.

Blood:

1. Performed under the general supervision of an experienced analyst, 5 blood relation back affidavits from previously completed relation back affidavit requests.
2. Performed independently, 5 blood relation back affidavits from previously completed relation back affidavit requests.

Task/Procedure	Initials & Date Observed	Initials & Date Performed Under Supervision	Initials & Date Performed Independently
Breath alcohol affidavits			
Blood alcohol affidavits			
I have answered the questions outlined for this section in Appendix II and received feedback on my answers.			

7.2. Case Specific Infrared (IR) Affidavits

The trainee will become familiar with the policies, procedures, and documentation requirements for generating case specific infrared affidavits. The cases reviewed for training will include a range of scenarios encompassing those which may be expected to be encountered in casework. The trainee and trainer will document this by both initialing the boxes below. Lists of training cases will be attached.

Prior to completing training affidavits, the trainee will observe a qualified analyst(s) complete a case specific IR affidavit. At a minimum the training will include the following:

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No. TOX_P304_Version 1	Approved by: Lab Director	Effective Date: 07182024 Status: Active	Page 7 of 15
--------------------------------	------------------------------	---	---------------------

1. Performed under the general supervision of an experienced analyst, 2 case specific IR affidavits from previously completed requests.
2. Performed independently, 2 case specific IR affidavits from previously completed requests.

Task/Procedure	Initials & Date Observed	Initials & Date Performed Under Supervision	Initials & Date Performed Independently
Case specific IR affidavits			
I have answered the questions outlined for this section in Appendix II and received feedback on my answers.			

7.3. Case Review

The trainee will become familiar with the policies, procedures, and forms for technical, administrative, and director review of affidavits.

Task	Trainee	Trainer	Date Completed
I am familiar with the technical review requirements as outlined in the QA and Expert Opinions and Affidavits for DUI Cases Manuals.			
I have observed the technical and administrative review of relation back breath affidavits by an experienced analyst.			
I have observed the technical and administrative review of relation back blood affidavits by an experienced analyst.			
I have observed the technical and administrative review of case specific IR affidavits by an experienced analyst.			
I have performed “pre-review” technical review(s) of affidavits.			
I have observed the director review of affidavits			

7.4. Mock Cases

The trainer or designee will prepare at least two mock cases for the trainee using previously completed cases. The trainee will process these cases, perform appropriate calculations, and

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No.
TOX_P304_Version 1

Approved by:
Lab Director

Effective Date:
07182024
Status: Active

Page 8 of 15

prepare affidavits. The trainer will perform reviews of these cases and the trainee will revise the case files as needed to pass review.

Task	Trainee	Trainer	Date Completed
I have prepared case specific IR and relation back affidavits, generated case files, and had these files reviewed for at least two breath cases. Case Numbers:			
I have prepared relation back affidavits, generated case files, and had these files reviewed for at least two blood relation back affidavit requests. Case Numbers:			

8.0 Legal Knowledge

8.1. Expert Testimony

The trainee will develop and demonstrate knowledge of the responsibilities of expert witnesses and strategies for effective expert testimony. Training will include, but is not limited to, preparation of mock questions and answers for direct and cross-examination and observation of courtroom testimony given by a qualified analyst. Transcripts may be reviewed in lieu of live testimony. The trainee should practice direct and cross-examination with more than one qualified analyst (analysts may or may not be from the Toxicology section) to receive greater experience and a variety of feedback. Training may also include prearranged or impromptu question and answer sessions.

Task	Trainee	Trainer	Date Completed
I have read and understand the required readings outlined for this section in Appendix I.			

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No. TOX_P304_Version 1	Approved by: Lab Director	Effective Date: 07182024 Status: Active	Page 9 of 15
--------------------------------	------------------------------	---	---------------------

I have answered the questions outlined for this section in Appendix II and received feedback on my answers.			
I have observed an experienced analyst testify in court as an expert witness on the subject of retrograde extrapolation.			
I have observed an experienced analyst testify in court as an expert witness on the subject of alcohol impairment.			
I have practiced direct and cross-examination testimony on the subject of retrograde extrapolation.			
I have practiced direct and cross-examination testimony on the subject of alcohol impairment.			

9.0 Final Evaluation

At the completion of this training program, the trainee’s ability to perform the duties of an expert witness will be assessed. The nature of final assessment and evaluation may differ based on the trainee’s experience and anticipated job responsibilities. The section supervisor is responsible for determining what assessment and evaluation is necessary for the trainee and documenting this.

9.1. Competency Tests

The trainee will pass all applicable competency tests, as determined and documented by the section supervisor prior to beginning work as an analyst. Competency testing includes a written exam as well as the completion of mock cases which will undergo technical, administrative and director reviews. Satisfactory completion of a competency test is required for all analysts regardless of previous experience. The nature of the competency test should be sufficient to cover the anticipated spectrum of assigned duties and to evaluate the individual’s ability to perform proper testing methods.

Task	Trainee	Trainer	Date Completed
I have successfully completed a written examination pertaining to retrograde extrapolation and have received feedback on my results.			
I have successfully completed a written examination pertaining to alcohol impairment and have received feedback on my results.			
I have completed all breath alcohol competency tests which have passed appropriate reviews.			

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No. TOX_P304_Version 1	Approved by: Lab Director	Effective Date: 07182024 Status: Active	Page 10 of 15
--------------------------------	------------------------------	---	---------------

I have completed all blood alcohol competency tests which have passed appropriate reviews.			
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9.2. Mock Trial

The trainee will understand that each case or sample set examined has the potential to require them to offer testimony as an expert witness. As such, the trainee will demonstrate their knowledge of toxicology testing methods and ability to testify as an expert witness by participating in a mock trial, including both direct and cross-examination. The trainee will be evaluated for aspects of performance to include testimony content, response to cross-examination, demeanor, and attire. The mock trial will take place prior to the trainee completing any casework.

The trainee will testify to a competency test case, a fabricated case, or a case which has been completed by a qualified analyst. The case selected will be agreed upon by the trainee and trainer and approved by the section supervisor.

The mock trial will include, but is not limited to, questions on qualifications, impairment, physiology, pharmacology, pharmacokinetics, and pharmacodynamics of alcohol and the technical aspects of the case at hand. Questioning by both the prosecutor and defense attorneys should be relevant and realistic. The atmosphere of the trial will be formal. It will be conducted in the same manner as a real courtroom. This will include conduct and protocol, and the trainee should present themselves accordingly. The outcome of the mock trial evaluation will be satisfactory or unsatisfactory. If it is determined that the trainee's performance was not satisfactory the section supervisor will determine what corrective action must be taken. The trainee will need to complete a mock trial with satisfactory performance before beginning work as a qualified analyst. Participants in the mock trial shall provide feedback for the trainee regardless of whether performance was satisfactory or unsatisfactory.

If the trainee has previous testimony experience or is expected to perform a limited scope of duties, this requirement may be modified at the discretion of the section supervisor. This modification will be documented. If a mock trial is not required, an alternate form of oral examination must be selected by the section supervisor.

Task	Trainee	Trainer	Date Completed
I have offered testimony in mock court, including both direct and cross-examination on the topic of alcohol impairment.			

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No. TOX_P304_Version 1	Approved by: Lab Director	Effective Date: 07182024 Status: Active	Page 11 of 15
--------------------------------	------------------------------	---	----------------------

Mock case number:			
I have offered testimony in mock court, including both direct and cross-examination on the topic of retrograde extrapolation.			
Mock case number:			

10.0 Authorization

Completion of training modules will be documented in section 1.2.2. At the completion of training, the section supervisor shall provide written documentation authorizing the trainee to conduct independent casework analysis as a qualified analyst.

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No. TOX_P304_Version 1	Approved by: Lab Director	Effective Date: 07182024 Status: Active	Page 12 of 15
--------------------------------	------------------------------	---	---------------

Appendix I: Readings

A: Required Readings

The resources listed below are provided to give the trainee the necessary information to perform their duties. Depending on the trainee's education and experience they may not need to complete every reading in its entirety. The location of various training tools such as readings, videos, or websites are included for convenience. If file locations change or links break, alternative training materials may be used. Supplemental documents are available through the laboratory's shared drive under the training folder, but are not required unless designated as such by the section supervisor. The trainee should be familiar with the readings provided in the TOX_P300 manual in order to assist them in answering the questions in Appendix II.

5.0 Applied Scientific Knowledge

5.1. Alcohol Calculation Theory

- Expert Opinions and Affidavits for DUI Cases (TOX_P400) and all associated documents
- Pharmacokinetics and Dynamics portion of the VFL Toxicology Reference Library
- Wigmore, James G. *Wigmore on Alcohol: Courtroom Alcohol Toxicology for the Medicolegal Professional*. Toronto: Irwin Law, 2011. Print.
- ASB Best Practice Recommendation 122, Performing Alcohol Calculations First edition 2023.

5.2. Alcohol Impairment Theory

- Alcohol impairment portions of VFL Toxicology Reference Library
- Getting to Zero Alcohol-Impaired Driving Fatalities A Comprehensive Approach to a Persistent Problem (ALCOHOL > Reference Library)
- Dubowski chart
- Moskowitz, H. *Effects of Low Doses of Alcohol on Driving-related Skills: A Review of the Evidence*. NHTSA, 1988.
- Moskowitz et al. *Driver Characteristics and Impairment at Various BACs*. NHTSA, 2000.
- Moskowitz and Fiorentino. *A Review of the Literature on the Effects of Low Doses of Alcohol on Driving-related Skills*. NHTSA, 2000.

8.0 Legal Knowledge

8.1. Expert Testimony

- Vermont DUI Laws: Title 23, Chapter 13
- Vermont Department of Public Safety Breath and Blood Alcohol Analysis Rule effective 03292013
- ASB Standard 037 Guidelines for Opinions and Testimony in Forensic Toxicology

B: VFL Toxicology Reference Library

Analysts are expected to be familiar with the contents of the VFL Toxicology Reference Library and be alert for articles and/or references that can be added. Updated references should be added to the VFL Toxicology Reference Library during the review period, when they become available, or when new methodologies or technologies are incorporated into the laboratory protocols.

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No.
TOX_P304_Version 1

Approved by:
Lab Director

Effective Date:
07182024
Status: Active

Page 13 of 15

Appendix II: Training Questions

Questions listed below are intended to be answered by trainees. Headings are numbered in accordance with the section numbering in the body of this manual.

5.0 Applied Scientific Knowledge

5.1. Alcohol Calculation Theory

1. Explain in detail the ADME process with regards to ethanol.
2. How do absorption and elimination impact an estimated alcohol concentration at a given time?
3. Explain the concept of Volume of Distribution (Vd).
4. What is retrograde extrapolation?
5. Can you perform a relation back for a test result of 0.017?
6. What information is required to perform a retrograde extrapolation calculation?
7. What is the elimination rate used in relation back calculations at the VFL? Why?
 - a. Cite a few literary references that support these opinions.
8. What is the significance of a subject consuming alcohol within 2 hours prior to, or after, operation of a vehicle?
9. What is the Widmark equation? What is it used for?
10. What is a standard drink? Why is it preferred to have specific drinking information rather than use a standard drink?
11. Under what circumstances would relation back calculations be required in a court case?
12. What are the limitations of retrograde extrapolation and Widmark estimates, and what assumptions are made during their calculation?

5.2. Alcohol Impairment Theory

1. What is impairment?
2. Can a person be impaired but not intoxicated?
3. What is the difference between impairment and intoxication?
4. By what mechanism does ethanol impair CNS function?
5. Is there a BAC level at which ethanol impairment begins?
6. Is there a relationship between someone's BAC and their level of impairment?
7. What is the Dubowski chart and how is it used in impairment cases?
8. What are the stages of ethanol impairment?
9. Give some examples of symptomology you may see at the various stages of impairment.
10. What is the significance of 0.08 BAC?
11. In your opinion, would a person be impaired at a 0.05 BAC? What about 0.200 BAC?

7.0 Reports and Notifications

7.1. Retrograde Extrapolation Affidavits

1. Who typically requests a relation back affidavit?
2. Why might someone request a relation back affidavit?
3. How are the results of a relation back request communicated to the customer?
4. What if someone other than the submitter requests a copy of your affidavit?

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No.
TOX_P304_Version 1

Approved by:
Lab Director

Effective Date:
07182024
Status: Active

Page 14 of 15

5. Do all relation back calculations need to be documented in the form of an affidavit?
6. Can you prepare a relation back affidavit for a defense attorney?
7. What are some common assumptions made in preparing an affidavit and why is it important to clarify the significance of these assumptions?

7.2. Case Specific Infrared (IR) Affidavits

1. What information is required in order to complete a case specific infrared affidavit?
2. What is the “generic IR affidavit”?
3. Give some examples of why a customer would request a case specific IR affidavit?
4. What types of records are reviewed as part of a case specific IR request?
5. How is the review of these records documented?

8.0 Legal Knowledge

8.1. Expert Testimony

1. May notes (case file, etc.) be referred to during testimony? If so, how must this be done?
2. Describe characteristics that make an expert witness more effective.
3. While asking you a question a prosecutor makes a statement that is incorrect. What do you do?
4. How should one approach being asked to perform calculations on the stand?
5. Define the following terms using language you would use when speaking to a jury.
 - a. Absorption
 - b. Elimination Rates
 - c. Retrograde Extrapolation
 - d. Impairment and Intoxication
 - e. Accreditation

VERMONT FORENSIC LABORATORY

Expert Witness Testimony Training Manual

Doc. No.
TOX_P304_Version 1

Approved by:
Lab Director

Effective Date:
07182024
Status: Active

Page 15 of 15

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7/18/2024	1	Lab Director	New document; content previously part of ALC P300