Idaho State Police
Forensic Services

Fire Evidence Training Plan

History Page

Revision No.	Issue Date	History	Author
0	10-15-1999	Original Issue.	S. C. Williamson
1	03-07-2006	Update of references, addition of headspace sampling.	S.C. Williamson

Approval

Discipline Leader _____ Date: 3-7-06
David A. Laycock

Issuance

QA Manager _____ Date: 3-17-2006
Richard D. Groff

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TABLE OF CONTENTS

Section 1
INTRODUCTION

This manual is intended as a guide to introduce a forensic analyst to the many aspects of fire evidence and its analysis. The manual first addresses issues such as how fire evidence must be packaged and sealed prior to entry into our evidence tracking system. Next, the training plan addresses appropriate safety measures. This is followed by a review of relevant principles of general and organic chemistry. In order to understand and correctly interpret the analytical data generated, various sections also address the chemistry and physics of fire and petroleum refining. For the fire chemist to effectively communicate with fire investigators, the manual has sections dealing with fire scene processing. The remaining sections of this manual serve to prepare the analyst to recover and identify ignitable liquids in fire related evidence. This includes the methods for the recovery of ignitable liquids from fire evidence, instrumental methods of analysis, classification of ignitable liquids, and the interpretation of detected ignitable liquids. Upon completion of appropriate sections, competency testing, supervised performance of analysis on case material and the preparation and presentation of courtroom testimony, including mock courtroom testimony, completes the training process.

Section 2
EVIDENCE HANDLING

2.1 Fire Evidence Packaging

2.1.1 Describe the types of containers ideal for the proper packaging of non-liquid fire evidence samples. What are the important characteristics of these containers?

2.1.2 Describe the advantages and disadvantages of fire evidence storage containers.

2.1.3 Describe the proper packaging of liquid samples recovered from fire scenes.

2.1.4 Describe the requirements for proper sealing of fire evidence collection containers.

2.2 Fire Evidence Submittal

2.2.1 Discuss the intake process for fire evidence samples into the laboratory.

2.2.2 Describe types of situations which would support fire evidence being returned to the agency to correct a packaging discrepancy.

2.2.3 Describe considerations for fire evidence storage prior to analysis. The discussion should include how evidence said to contain substrate materials likely to contribute to the degradation of petroleum products such as manure, vegetation and/or soil, should be stored prior to analysis.

2.3 Fire Evidence Agencies

2.3.1 The trainee should demonstrate an understanding of the agencies served along with the programs and organizations that a fire chemist is involved with.

2.4 Required Reading

2.4.1 Idaho State Police Forensic Services Procedure and Quality Manual.

2.4.2 ASTM E 1459-92 (Reapproved in 1998) Standard Guide for Physical Evidence Labeling and Related Documentation.

2.4.3 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Case Management*.

2.4.4 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Collection and Packaging of Evidence.*

2.4.5 Rynearson, J.M. *The Arson Scene*, in: Evidence and Crime Scene Reconstruction, 5th ed., National Crime Investigation and Training: California, 1997.

Section 3
SAFETY ISSUES

3.1 Solvent Use

The analyst must have a through understanding of necessary safety measures to protect against the hazards associated with the use of carbon disulfide, hexane and pentane.

3.2 Required Reading

3.2.1. Material safety data sheets (MSDS) for carbon disulfide and pentane.

3.2.2 Idaho State Police Forensic Services Health and Safety Manual.

3.2.3 ATF Laboratories/NFSTC, Basic Fire Debris Course

3.2.4 Prudent Practices in the Laboratory, National Research Council, 1995.

Section 4
REVIEW OF RELEVANT PRINCIPLES OF CHEMISTRY

4.1 Terminology, Nomenclature and Structures

4.1.1 Describe the major organic constituents in petroleum.

4.1.2 Draw the major organic constituents in petroleum.

4.1.3 Discuss the relative boiling temperatures of n-hexane, 3-methylpentane and cyclohexane. What is the major consideration?

4.1.4 Draw the basic structure for alkanes, alkenes, alcohols, ketones, and aldehydes.

4.1.5 Discuss the origin of terpenes. What are some commonly encountered terpenes?

4.1.6 Describe the basic process for the production of *addition* and *condensation polymers.*

4.1.7 Describe the major substitution reactions that benzene undergoes?

4.2 Required Reading

4.2.1 Basic Current Organic Chemistry Text

4.2.2 Basic Current College Chemistry Text

4.2.3 Olah, G.A. and Molnar, A., *Hydrocarbon Chemistry,* Wiley-Interscience, New York, 1995.

Section 5
CHEMISTRY AND PHYSICS OF FIRE

5.1 Familiarization with the Basic Elements of Fire Behavior.

5.1.1 The trainee should demonstrate an understanding of the following:

5.1.1.1 The concept of a fire triangle versus fire tetrahedron.

5.1.1.2 The three modes of heat transfer.

5.1.1.3 The phases of the burning process.

5.1.2 Define the phenomenon of fire, describe each of the four classifications of fire.

5.2 Fire Chemistry Terminology

5.2.1 Define the terms flammability range, explosive range, and ignition temperature. Describe the interdependence of these terms.

5.2.2 Define the terms flash point, fire point, ignitable liquid and British thermal unit (BTU).

5.2.3 Describe the phenomena of flashover and a back draft explosion.

5.3 Pyrolysis Products

5.3.1 The trainee should discuss the concept of pyrolysis and the resulting pyrolysis products produced at the fire scene.

5.4 Required Reading

5.4.1 DeHaan, J.D., Elementary Chemistry of Combustion, Chapter 2 pp. 9-19. *in*: Kirk's Fire Investigation, 5th edition, Prentice Hall: New Jersey, 2002.

5.4.2 DeHaan, J.D., The Nature and Behavior of Fire, Chapter 3 pp. 21-53. *in*: Kirk's Fire Investigation, 5th edition, Prentice Hall: New Jersey, 2002.

5.4.3 DeHaan, J.D., Combustion properties of Liquid and Gaseous Fuels, pp. 54-82. *in*: Kirks's Fire Investigation, 5th edition, Prentice Hall: New Jersey, 2002.

5.4.4 Combustion Properties of Liquid and Gaseous Fuels, Chapter 4 pp. 66-88. *in*: Kirks's Fire Investigation, 4th edition, 1997.

5.4.5 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Chemistry and Physics of Fire.*

5.4.6 DeHaan, J.D. and Bonarius, K. *Pyrolysis Products of Structure Fires,* J. For. Sci Soc, 28(5/6):299-309, 1988.

5.4.7 Clodfeller, R.W. and Hueske, E.E. *A Comparison of Decomposition Products from Selected Burned Materials with Common Arson Accelerants*, J. For. Sci, 22(1): 116-118, 1977.

5.4.8 Stauffer, E., *Concept of pyrolysis for fire debris analysts*, Sci & Justice, 43(1):29-40, 2003.

5.4.9 Stauffer, E., Sources of Interference in Fire Debris Analysis, pp. 191-225. *in*: Fire Investigation, Daéid, N.N ed, CRC Press:Boca Raton, 2004.

5.4.10 Daéid, N.N., An Introduction to Fires and Fire Investigation - Chapter 1, pp. 1-12. *in*: Fire Investigation, Daéid, N.N ed, CRC Press:Boca Raton, 2004.

5.4.11 Daéid, N.N., Fires from Causes Other Than Electrical malfunctions: Theory and Case Studies - Chapter 2, pp. 13-59. *in*: Fire Investigation, Daéid, N.N ed, CRC Press:Boca Raton, 2004.

5.4.12 Quintiere, J.G., Chapters 2 though 4, pp. 23 - 65. *in:* Principles of Fire Behavior, Delmar Publishers: Albany, 1998.

5.4.13 Icove, D.J. and DeHaan, J.D., Basic Fire Dynamics - Chapter 2, pp. 36-68. *in:* Forensic Fire Scene Reconstruction, Prentice Hall: New Jersey, 2004.

Section 6
THE REFINING OF PETROLEUM

6.1 Refinery Processes

6.1.1 The trainee will be familiar with petroleum refinery operations and processes.

6.1.2 The trainee will have an understanding of the relationship between the refinery processes and the petroleum products that are produced.

6.1.3 Describe the molecular types found in petroleum.

6.2 Required Reading

6.2.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Petroleum Refinery.*

6.2.2 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section Covering *Petroleum Products.*

6.2.3 Basic Current Organic Chemistry Text.

6.2.4 Olah, G.A. and Molnar, A. *Hydrocarbon Sources and Separation,* pp. 4-8, *in*: Hydrocarbon Chemistry, Wiley-Interscience, New York, 1995.

6.2.5 Olah, G.A. and Molnar, A. *Petroleum Refining and Upgrading,* pp. 10-11, *in*: Hydrocarbon Chemistry, Wiley-Interscience, New York, 1995.

6.2.6 Olah, G.A. and Molnar, A. *Hydrocarbons from Petroleum and Natural Gas,* pp. 28-55. *in*: Hydrocarbon Chemistry, Wiley-Interscience, New York, 1995.

Section 7
FIRE SCENE PROCESSING

7.1 Cause and Origin

7.1.1 What is NFPA 921?

7.1.2 Discuss the approach fire investigators take in the determination of cause and origin.

7.1.3 Describe the factors and indicators used by fire investigators when determining the origin of a fire.

7.1.4 Discuss the potential causes of a fire that are considered by the fire investigator.

7.2 Protection of Fire Scene Indicators

7.2.1 Define what is meant by *overhaul* of a fire scene. Discuss why selective overhaul by fire personnel is crucial for reconstruction purposes.

7.2.2 Discuss potential sources of contamination by ignitable liquids at the fire scene and ways to prevent or minimize them.

7.3 Ignitable Liquid Recovery

Discuss the factors affecting the potential to recover an ignitable liquid from a fire scene.

7.4 Required Reading

7.4.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section covering **Cause and Origin.**

7.4.2 DeHaan, J.D., Sources of Ignition, Chapter 6, pp. 115-156. *in*: Kirk's Fire Investigation, 5th edition, Prentice Hall: New Jersey, 2002.

7.4.3 DeHaan, J.D., Structure Fires and Their Investigation, Chapter 7, pp. 160-247. *in*: Kirk's Fire Investigation, 5th edition, Prentice Hall: New Jersey, 2002.

Section 8
METHODS FOR THE RECOVERY OF IGNITABLE LIQUIDS

8.1 Historical Perspective

8.1.1 Trainee must demonstrate an appreciation of historical development of ignitable liquid recovery techniques.

8.1.2 Required Reading

8.1.2.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Historic Evolution of Fire Debris Analysis.*

8.2 Headspace Sampling Recovery Technique

8.2.1 Demonstrate an understanding of a Maxwell-Boltzmann distribution of kinetic energies for an ignitable liquid.

8.2.2 Discuss the process of condensation and evaporation in a closed container at a constant temperature.

8.2.3 Define the term *vapor pressure* and discuss any effect temperature, volume of liquid, and space above the liquid, has on vapor pressure?

8.2.4 Discuss the limitations and the applications of headspace sampling for fire evidence analysis.

8.2.5 Discuss how and why the headspace sampling temperature and sampling volume should be optimized.

8.2.6 Demonstrate a working knowledge of ASTM E 1388-05, Standard Practice for Sampling of Headspace Vapors from Fire Debris Samples.

8.2.7 Discuss the headspace sampling process outlined in the fire evidence analysis SOP section 1.4.1.

8.2.8 Describe the quality assurance measures associated with this technique.

8.2.9 Required Reading

8.2.9.1 ASTM Method E 1388-05, Standard Practice for Sampling of Headspace Vapors from Fire Debris Samples.

8.2.9.2 Separation of Ignitable Liquid Residues from Fire Evidence Samples by Headspace Sampling *in:* ISP-Forensic Services Standard Operating Procedure, Section 1.4.1: Recovery, Analysis and the Identification of Ignitable Liquid Residues from Fire Evidence Samples, 2006.

8.2.9.3 Arson Accelerant Detection Course Materials. Presented at the Alcohol, Tobacco & Firearms. Rockville, Maryland, May, 1983.

8.2.9.4 Laboratory Fire Standards and Protocols Committee Scientific Working Group for Fire and Explosions, Initial Assessment of Evidence, page 3, 8.1.5.

8.2.9.5 DeHaan, J.D., Laboratory Services (Sample Handling and Isolation of Volatile Residues) - Chapter 14, pp. 442-443. *in*: Kirk's Fire Investigation, Prentice Hall: New Jersey, 5th edition, 2002.

8.2.9.6 Newman, R., Modern Laboratory Techniques involved in the Analysis of Fire Debris Samples - Chapter 5, pp. 139-142. *in*: Fire Investigation, Daéid, N.N ed, CRC Press:Boca Raton, 2004.

8.2.9.7 Section covering the properties of liquids in a College Chemistry text.

8.3 Charcoal Strip Static Adsorption Technique

8.3.1 Includes an understanding of the principle of static adsorption, the limitations of, and the applications of this recovery technique.

8.3.2 Through knowledge of ASTM E 1412-00 (2005), Standard Practice for Separation and Concentration Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration with Activated Charcoal.

8.3.3 Define the following terms as they apply to this technique: Adsorption, Desorption.

8.3.4 Describe the forces and mechanism involved with the physical adsorption process.

8.3.5 Discuss the parameters that affect the physical adsorption recovery process.

8.3.6 Discuss the use of charcoal strips as outlined in the fire evidence analysis SOP.

8.3.7 Describe the quality assurance measures associated with this technique.

8.3.8 Required Reading

8.3.8.1 ASTM E 1412-00 (2005), Standard Practice for Separation and Concentration of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration with Activated Charcoal.

8.3.8.2 Section 1.4.2: Separation of Ignitable Liquid Residues from Fire Evidence Samples by Passive Headspace Concentration with Activated Charcoal. *in:* ISP-Forensic Services Standard

Operating Procedure, Section 1.4.1: Recovery, Analysis and the Identification of Ignitable Liquid Residues from Fire Evidence Samples, 2006.

8.3.8.3 Arson Accelerant Detection Course Materials. Presented at the Alcohol, Tobacco & Firearms. Rockville, Maryland, May, 1983.

8.3.8.4 DeHaan, J.D., Chapter 14 - Laboratory Services (Sample Handling and Isolation of Volatile Residues). pp. 442-443. *in*: Kirk's Fire Investigation, Prentice Hall: New Jersey, 5th edition, 2002.

8.3.8.5 Newman, R., Modern Laboratory Techniques involved in the Analysis of Fire Debris Samples - Chapter 5, pp. 139-147. *in*: Fire Investigation, Daéid, N.N ed, CRC Press:Boca Raton, 2004.

8.3.8.6 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Adsorption 101*.

8.3.8.7 NFSTC Advanced Fire Debris Analysis Course Student Manual, section covering *Analysis Protocols and Proficiency Testing in Fire Debris Analysis.*

8.4 Solvent Extraction Recovery Technique

8.4.1 Knowledge to include an understanding of the principle of solvent extraction, the limitations of, and the applications of this recovery technique.

8.4.2 Thorough comprehension of ASTM E E1386-00 (2005), Standard Practice For Separation and Concentration of Ignitable Liquid Residues from Fire Debris Samples by Solvent Extraction.

8.4.3 Discuss the solvent extraction process outlined in the fire evidence analysis SOP section 1.4.3.

8.4.4 Discuss the adage "*Like-Dissolves-Like*" as it applies to fire evidence analysis and the resulting solvent extract.

8.4.5 Describe the quality assurance measures associated with this technique.

8.4.6 Required Reading

8.4.6.1 ASTM Method E 1386-00 (2005), Standard Practice for Separation and Concentration of Ignitable Liquid Residues from Fire Debris Samples by Solvent Extraction.

8.4.6.2 Section 1.4.3: Separation and Concentration of Ignitable Liquid Residues from Fire Evidence Samples by Solvent Extraction. *in:* ISP-Forensic Services Standard Operating Procedure, Recovery, Analysis and the Identification of Ignitable Liquid Residues from Fire Evidence Samples, 2006.

8.4.6.3 Arson Accelerant Detection Course Materials. Presented at the Alcohol, Tobacco & Firearms, Rockville, Maryland, May, 1983.

8.4.6.4 DeHaan, J.D., Chapter 14 - Laboratory Services (Sample Handling and Isolation of Volatile Residues). pp. 442-443. *in*: Kirk's Fire Investigation, Prentice Hall: New Jersey, 5th edition, 2002.

8.4.6.5 Newman, R., Modern Laboratory Techniques involved in the Analysis of Fire Debris Samples - Chapter 5, pp. 151. *in*: Fire Investigation, Daeid, N.N ed, CRC Press:Boca Raton, 2004.

8.4.6.6 Section covering the properties of solutions in a College Chemistry text.

Section 9
INSTRUMENTAL METHOD OF ANALYSIS: GAS CHROMATOGRAPHY - MASS SPECTROMETRY

9.1 Basic theories of gas chromatography and mass spectrometry

The trainee will discuss their working understanding of the theories associated with gas chromatography and mass spectrometry.

9.2 General Instrument Operation and Maintenance

The trainee will discuss and demonstrate their ability to operate and maintain the gas chromatograph equipped with a mass selective detector (GC/MSD). This is to include a working knowledge of the operating software, MSD source and GC inlet maintenance and troubleshooting techniques.

9.3 GC/MSD in Fire Evidence Analysis

9.3.1 Discuss the advantages of GC/MS over GC/FID for fire evidence analysis.

9.3.2 Define the characteristic major ion fragments used for extracted ion profile for each compound type.

9.4 Familiarization with and use of Extracted Ion Profile (EIP) Macros.
Demonstrate the ability to execute macro programs used to generate extracted ion profiles and rescaling of total ion chromatograms.

9.5 Required Reading

9.5.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section covering *Mass Spec Overview.*

9.5.2 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section covering *Mass Spectrometry Theory.*

9.5.3 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section covering *Instrumental Methods of Analysis.*

Section 10
CLASSIFICATION OF PETROLEUM PRODUCTS/IGNITABLE LIQUIDS

10.1 Ignitable Liquid Classification System

10.1.1 Discuss each class of the E1618 classification system.

10.1.2 Discuss the carbon ranges and representative products in each ignitable liquid class.

10.1.3 Describe how to deal with ignitable liquids which fall between classes of ignitable liquids.

10.2 Required Reading

10.2.1 ASTM E 1618-06, Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry.

10.2.2 ASTM E 1387-01, Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography.

10.2.3 Newman, R., Gilbert, M. and Lothridge, K., *GC-MS Guide to Ignitable Liquids*, CRC Press: New York, 1998.

10.2.4 ATF Laboratories/NFSTC, Basic Fire Debris Course, section covering *Mass Spec Overview.*

10.2.5 NFSTC Advanced Fire Debris Analysis Course Student Manual, section covering *Mass Spectrometry Data Interpretation.*

Section 11
INTERPRETATION OF DATA AND PRACTICAL EXERCISES

11.1 Data Interpretation

11.1.1 Describe the minimum criteria that must be met to characterize an extract as containing a particular class of ignitable liquid, for each of the classes of ignitable liquids.

11.1.2 Discuss the general approach to the interpretation of GC/MSD data.

11.1.3 Discuss how data from samples indicating a significant amount of terpene compounds should be approached.

11.1.4 Discuss how data indicating the presence of oxygenates in a sample should be approached.

11.2 Interpretation of Data Practical Exercises

11.2.1 Trainee must successfully complete interpretation exercises.

11.3 Required Reading

11. 3.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Analysis of Real World Samples.*

11.3.2 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Chromatographic Interpretation.*

11.3.3 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section Covering *Practical Exercise #3, Real World Samples.*

11.3.4 ASTM E 1618-06, Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry.

11.3.5 Newman, R., Gilbert, M. and Lothridge, K., *GC-MS Guide to Ignitable Liquids*, CRC Press: New York, 1998.

11.3.6 Stauffer, E., *Concept of pyrolysis for fire debris analysts*, Sci & Justice, 43(1):29-40, 2003.

11.3.7 Trimpe, M.A., *Turpentine in Arson Analysis*, J. Forensic Sci., 36(4):1059-1073, 1991.

Section 12
CASEWORK DOCUMENTATION

12.1 Examination Documentation

12.1.1 Discuss the information and/or data which must be included in examination documentation casefile.

12.1.2 Discuss what items can be centrally stored versus being placed in the casefile.

12.1.3 Describe the information which must be on examination documentation.

12.1.4 Describe the labeling requirements for administrative documentation.

12.1.5 Describe the requirements for using abbreviations and symbols in examination documentation.

12.2 Required Reading

12.2.1 Idaho State Police Forensic Services Procedure and Quality Manual.

Section 13
PRACTICE SAMPLES

13.1 Upon the completion of training, the trainer must provide the trainee with a minimum of six samples for the trainee to independently process and analyze prior to completing competency testing.

Section 14
COMPETENCY TESTING

14.1 Upon the completion of training, the trainee must complete a competency test consisting of ≥six (6) specimens.

14.2 Required Reading

14.2.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Proficiency Testing*

14.2.2 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section Covering *Analysis Protocols and Proficiency Testing in Fire Debris Analysis.*

14.2.3 Idaho State Police Forensic Services Procedure and Quality Manual.

Section 15
PERFORMANCE OF ANALYSIS ON CASE MATERIAL

15.1 Upon successful completion of competency testing, the Trainee should complete no less than 5 case samples under close supervision.

15.2 For purposes of this process, close supervision is at the discretion of the Trainer.

15.3 The Trainer will cosign involved case reports.

15.4 A listing of the co-signed case samples should be compiled and included in training records.

15.5 Required Reading

15.5.1 Idaho State Police Forensic Services Procedure and Quality Manual.

Section 16
PREPARATION AND PRESENTATION OF COURTROOM TESTIMONY

16.1 Courtroom Decorum

16.1.1 Discuss appropriate eye contact, gestures, voice volume, and approach for visual aides during testimony.

16.2.2 Describe proper attire for courtroom appearances.

16.2 Admission of Evidence

16.2.1 Discuss the ramifications of *Daubert v. Merrell Dow Pharmaceutical and Frye v. United States.*

16.2.2 List the factors that help assure a scientific testing procedure to be established as reliable.

16.3 Moot Court

The trainee will participate in moot court with laboratory personnel serving as the prosecuting and defense attorneys

16.4 Required Reading

16.4.1 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section Covering *Expert Testimony/ Preparation for Testimony.*

16.4.2 Sannito, T., *Nonverbal Communications in the Courtroom*, Champion, Sept.-Oct., 1985.

16.4.3 DeHaan, J.D., Chapter 17 -Other Investigative Topics (The Expert Witness). pp. 553-561. *in*: Kirk's Fire Investigation, Prentice Hall: New Jersey, 5th edition, 2002.

Idaho State Police
Forensic Services

Fire Evidence Training Plan Completion Sign-off

Section 2
Evidence Handling

2.1 Fire Evidence Packaging

2.2 Fire Evidence Submittal

2.3 Fire Evidence Agencies

Date of Completion _____ Trainee _____

Trainer _____

Section 3
Safety Issues

3.1 Solvent Use

Date of Completion _____ Trainee _____

Trainer _____

Section 4
Review of Relevant Principles of Organic Chemistry

4.1 Terminology, Nomenclature and Structures

Date of Completion _____ Trainee _____

Trainer _____

Section 5

Chemistry and Physics of Fire

5.1 Familiarization with the Basic Elements of Fire Behavior

5.2 Fire Chemistry Terminology

5.3 Pyrolysis Products

Date of Completion

Trainee

Trainer

Section 6

The Refining of Petroleum

6.1 Refinery Processes

Date of Completion

Trainee

Trainer

Section 7

Fire Scene Processing

7.1. Cause and Origin

7.2 Protection of Fire Scene Indicators

7.3 Ignitable Liquid Recovery

Date of Completion

Trainee

Trainer

Section 8

Methods for the Recovery of Ignitable Liquids from Fire Evidence Exercise

8.1 Historical Perspective

8.2 Headspace Sampling Recovery Technique

8.3 Solvent Extraction Recovery Technique

8.3 Charcoal Strip Static Adsorption Technique

Date of Completion _____ Trainee _____

Trainer _____

Section 9

Instrumental Method of Analysis: Gas Chromatography - Mass Spectrometry

9.1 Basic Theories of Gas Chromatography and Mass Spectrometry

9.2 General Instrument Operation and Maintenance

9.3 GC/MSD in Fire Evidence Analysis

9.4 Familiarization With and Use of Extracted Ion Profile (EIP) Macros.

Date of Completion _____ Trainee _____

Trainer _____

Section 10

Classification of Petroleum Products/Ignitable Liquids

10.1 Ignitable Liquid Classification System

Date of Completion _____ Trainee _____

Trainer _____

Section 11

Interpretation of Data and Practical Exercises

11.1 Data Interpretation

Date of Completion _____ Trainee _____

Trainer _____

11.2 Interpretation of Data Practical Exercise

Date of Completion _____ Trainee _____

Trainer _____

Section 12

Casework Documentation

12.1 Examination Documentation

Date of Completion _____ Trainee _____

Trainer _____

Section 13

Practice Samples

Date assigned: _____ Date completed: _____

Trainee _____

Trainer _____

Section 14
Competency Testing

Date assigned: _____ Date completed: _____

_____
Trainee

_____
Trainer

Section 15
Performance of Analysis on Case Material

Number of Cases: _____

_____ _____
Date of Completion Trainee

_____
Trainer

Section 16
Preparation and Presentation of Courtroom Testimony

15.1 Courtroom Decorum.

15.2 Admission of Evidence

15.3 Moot Court

_____ _____
Date of Completion Trainee

_____
Trainer