

Idaho State Police
Forensic Services

Fire Evidence Training Plan



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History Page

Revision	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
2	03-21-2011	Updated introduction including approach to training language. Created Administrative section including new quality requirements which require that each training plan include sections on ethics and general knowledge of "other" areas of forensic science. Created substrate analysis section. Created Criminal Justice System Section, Formatting changes made.	S.C. Williamson

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TABLE OF CONTENTS

Section One	Training Objectives
Section Two	Administrative Issues
Section Three	Evidence Handling
Section Four	Safety Issues
Section Five	Review of Relevant Principles of Chemistry
Section Six	Chemistry and Physics of Fire
Section Seven	Refining of Petroleum
Section Eight	Fire Scene Processing
Section Nine	Methods for the Recovery of Ignitable Liquids from Fire Evidence
Section Ten	Instrumental Method of Analysis: GC/MSD
Section Eleven	Classification of Petroleum Products/Ignitable Liquids
Section Twelve	Interpretation of Data and Practical Exercises
Section Thirteen	Casework Documentation
Section Fourteen	Substrate Samples
Section Fifteen	Practice Samples
Section Sixteen	Competency Testing
Section Seventeen	Supervised Casework
Section Eighteen	Criminal Justice System Fundamentals
Section Nineteen	Relevant Idaho Statutes: Arson
Section Twenty	Preparation and Presentation of Courtroom Testimony
Section Twenty-One	National Center for Forensic Science Training Program



Section One

TRAINING OBJECTIVES

1.1 Introduction

This training plan is intended as a guide to introduce a forensic analyst to the many aspects of fire evidence and its analysis. It is designed to provide the analyst with the background necessary to process fire evidence to recover, identify and classify ignitable liquids. In addition to discipline specific training, the new analyst must receive training in the ethics involved in forensic science and obtain a general knowledge of forensic science as a whole. After general administrative requirements, this training plan addresses issues such as how fire evidence must be packaged and sealed prior to entry into the 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, products generated from substrate materials and petroleum refining. For the fire chemist to effectively communicate with fire investigators, fire scene processing and the Idaho Statutes pertaining to arson are addressed. The plan then covers material 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. To prepare for legal proceedings, fundamentals of the criminal justice system and the preparation and presentation of courtroom testimony, including mock courtroom testimony are included. When the trainee has established competence by successfully completing training plan elements, supervised performance of analysis on case material completes the training process.

1.2 Approach to Training

1.2.1 To address training plan subject matter, the cited references, or equivalent, must be consulted if the Trainee is not familiar with the subject matter. The training references provided or a newer edition should be used. Both the education and work experience of the Trainee must be considered; however, at a minimum, a verbal review of material must be done to the satisfaction of the Trainer.

1.2.2 In order to establish that the trainee has demonstrated competency in training plan subject matter, answers to training plan questions may be provided verbally and/or in written form. This choice is at the discretion of the trainer.

- 1.2.3 Although all training does not have to proceed in the order used in this training plan, Section 2 must be signed-off prior to pursuing additional sections.
- 1.2.4 Upon completion of sections one through seventeen and approval by the quality manager, the trainee will perform supervised casework.
- 1.3 Hands-on Analysis during Training Defined
- 1.3.1 As part of the training process, the Trainee will perform hands-on analysis only on simulated case samples and “old” proficiency tests.
- 1.3.2 The trainee will observe the trainer performing casework and can assist the trainer with preparation for analysis. This includes such tasks as reference material preparation as well as data analysis print-out (non-interpretive) but until the Trainee has successfully completed all relevant training, the required competency test and signed off by the quality manager, no supervised case work will be performed.
- 1.4 Continual Awareness of Relevant Literature
The new or experienced analyst is reminded that this training plan only addresses the core of training for fire evidence analysis. After the completion of training, the analyst is responsible for keeping their knowledge current through continual literature review. This must include relevant journals, newsletters, textbooks and national data bases.

Section Two

ADMINISTRATIVE ISSUES

- 2.1 The Analyst in Training must be familiar with relevant sections of the **Idaho State Police Employee Handbook**.
- 2.2 The Analyst in Training must be knowledgeable of the content and application of the **Idaho State Police Forensic Services ISO/IEC 17025:2005 Compliant Quality/Procedure Manual**. ISP Quality/Procedure Manual Exam must be successfully completed prior to pursuing additional training.
- 2.3 The Analyst in Training must be well informed in the content and application of the **Idaho State Police Forensic Services Health and Safety Manual**. The Health and Safety Manual Exam must be successfully completed prior to pursuing additional training.
- 2.4 The new analyst must review and understand the **ASCLD/LAB Guiding Principles of Professional Responsibility for Crime Laboratories and Forensic Scientists**.
- 2.5 The new analyst shall successfully complete the currently approved ethics course as described in **Idaho State Police Forensic Services ISO/IEC 17025:2005**

Compliant Quality/Procedure Manual.

- 2.6 If the new toxicology analyst has not had coursework in other areas of forensic sciences, the analyst will be assigned general reading about other disciplines and may be assigned to work with analysts in other disciplines.
- 2.7 Background Reading
- 2.7.1 Idaho State Police Employee Handbook (<http://intranet/.htm> or equivalent)
- 2.7.2 Idaho State Police Forensic Services ISO/IEC 17025:2005 Compliant Quality/Procedure Manual. (<I:\International Management System>)\
- 2.7.3 Idaho State Police Forensic Services Health and Safety Manual. (<I:\International Management System>)\

Section Three

EVIDENCE HANDLING

- 3.1 Fire Evidence Packaging
- 3.1.1 Describe the types of containers ideal for the proper packaging of non-liquid fire evidence samples. What are the important characteristics of these containers?
- 3.1.2 Describe the advantages and disadvantages of fire evidence storage containers.
- 3.1.3 Describe the proper packaging of liquid samples recovered from fire scenes.
- 3.1.4 Describe the requirements for proper sealing of fire evidence collection containers.
- 3.2 Fire Evidence Submittal
- 3.2.1 Discuss the intake process for fire evidence samples into the laboratory.
- 3.2.2 Describe types of situations which would support fire evidence being returned to the agency to correct a packaging discrepancy.
- 3.2.3 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.
- 3.3 Fire Evidence Agencies
- The trainee should demonstrate an understanding of the agencies served along with the programs and organizations that a fire chemist is involved with.

3.4 Background Reading

- 3.4.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Case Management*.
- 3.4.2 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Collection and Packaging of Evidence*.
- 3.4.3 Rynearson, J.M. *The Arson Scene*, in: Evidence and Crime Scene Reconstruction, 5th ed., National Crime Investigation and Training: California, 1997.

Section Four

SAFETY ISSUES

4.1 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.

4.2 Background Reading

- 4.2.1. Material safety data sheets (MSDS) for carbon disulfide and pentane.
- 4.2.2 Idaho State Police Forensic Services Health and Safety Manual
- 4.2.3 ATF Laboratories/NFSTC, Basic Fire Debris Course
- 4.2.4 Prudent Practices in the Laboratory, National Research Council, 1995.

Section Five

REVIEW OF RELEVANT PRINCIPLES OF CHEMISTRY

5.1 Terminology, Nomenclature and Structures

- 5.1.1 Describe the major organic constituents in petroleum.
- 5.1.2 Draw the major organic constituents in petroleum.
- 5.1.3 Discuss the relative boiling temperatures of n-hexane, 3-methylpentane and cyclohexane. What is the major consideration?
- 5.1.4 Draw the basic structure for alkanes, alkenes, alcohols, ketones, and aldehydes.
- 5.1.5 Discuss the origin of terpenes. What are some commonly encountered terpenes?

- 5.1.6 Describe the basic process for the production of *addition* and *condensation polymers*.
- 5.1.7 Describe the major substitution reactions that benzene undergoes?
- 5.2 Background Reading
 - 5.2.1 Basic Current Organic Chemistry Text
 - 5.2.2 Basic Current College Chemistry Text
 - 5.2.3 Olah, G.A. and Molnar, A., *Hydrocarbon Chemistry*, Wiley Interscience, New York, 1995.

Section Six

CHEMISTRY AND PHYSICS OF FIRE

- 6.1 Familiarization with the Basic Elements of Fire Behavior
 - 6.1.1 The trainee should demonstrate an understanding of the following:
 - 6.1.1.1 The concept of a fire triangle versus fire tetrahedron.
 - 6.1.1.2 The three modes of heat transfer.
 - 6.1.1.3 The phases of the burning process.
 - 6.1.2 Define the phenomenon of fire; describe each of the four classifications of fire.
- 6.2 Fire Chemistry Terminology
 - 6.2.1 Define the terms flammability range, explosive range, and ignition temperature. Describe the interdependence of these terms.
 - 6.2.2 Define the terms flash point, fire point, ignitable liquid and British thermal unit (BTU).
 - 6.2.3 Describe the phenomena of flashover and a back draft explosion.
- 6.3 Pyrolysis Products

The trainee should discuss the concept of pyrolysis and the resulting pyrolysis products produced at the fire scene.
- 6.4 Background Reading
 - 6.4.1 DeHaan, J.D., *Elementary Chemistry of Combustion*, Chapter 2 pp. 9-19. in: *Kirk's Fire Investigation*, 5th edition, Prentice Hall: New Jersey, 2002.
 - 6.4.2 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.

- 6.4.3 DeHaan, J.D., Combustion properties of Liquid and Gaseous Fuels, pp. 54-82. *in: Kirk's Fire Investigation*, 5th edition, Prentice Hall: New Jersey, 2002.
- 6.4.4 Combustion Properties of Liquid and Gaseous Fuels, Chapter 4 pp. 66-88. *in: Kirk's Fire Investigation*, 4th edition, 1997.
- 6.4.5 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Chemistry and Physics of Fire*.
- 6.4.6 DeHaan, J.D. and Bonarius, K. *Pyrolysis Products of Structure Fires*, J. For. Sci Soc, 28(5/6):299-309, 1988.
- 6.4.7 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.
- 6.4.8 Stauffer, E., *Concept of pyrolysis for fire debris analysts*, Sci & Justice, 43(1):29-40, 2003.
- 6.4.9 Stauffer, E., Sources of Interference in Fire Debris Analysis, pp. 191-225. *in: Fire Investigation*, Daéid, N.N ed, CRC Press:Boca Raton, 2004.
- 6.4.10 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.
- 6.4.11 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.
- 6.4.12 Quinter, J.G., Chapters 2 though 4, pp. 23 - 65. *in: Principles of Fire Behavior*, Delmar Publishers: Albany, 1998.
- 6.4.13 Icové, 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 Seven

THE REFINING OF PETROLEUM

7.1 Refinery Processes

- 7.1.1 The trainee will be familiar with petroleum refinery operations and processes.
- 7.1.2 The trainee will have an understanding of the relationship between the refinery processes and the petroleum products that are produced.

- 7.1.3 Describe the molecular types found in petroleum.
- 7.2 Required Reading
- 7.2.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Petroleum Refinery*.
- 7.2.2 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section Covering *Petroleum Products*.
- 7.2.3 Basic Current Organic Chemistry Text.
- 7.2.4 Olah, G.A. and Molnar, A. *Hydrocarbon Sources and Separation*, pp. 4-8, in: *Hydrocarbon Chemistry*, Wiley-Interscience, New York, 1995.
- 7.2.5 Olah, G.A. and Molnar, A. *Petroleum Refining and Upgrading*, pp. 10-11, in: *Hydrocarbon Chemistry*, Wiley-Interscience, New York, 1995.
- 7.2.6 Olah, G.A. and Molnar, A. *Hydrocarbons from Petroleum and Natural Gas*, pp. 28-55. in: *Hydrocarbon Chemistry*, Wiley-Interscience, New York, 1995.

Section Eight

FIRE SCENE PROCESSING

- 8.1 Cause and Origin
- 8.1.1 What is NFPA 921?
- 8.1.2 Discuss the approach fire investigators take in the determination of cause and origin.
- 8.1.3 Describe the factors and indicators used by fire investigators when determining the origin of a fire.
- 8.1.4 Discuss the potential causes of a fire that are considered by the fire investigator.
- 8.2 Protection of Fire Scene Indicators
- 8.2.1 Define what is meant by *overhaul* of a fire scene. Discuss why selective overhaul by fire personnel is crucial for reconstruction purposes.
- 8.2.2 Discuss potential sources of contamination by ignitable liquids at the fire scene and ways to prevent or minimize them.
- 8.3 Ignitable Liquid Recovery
Discuss the factors affecting the potential to recover an ignitable liquid from a fire scene.

- 8.4 Background Reading
- 8.4.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section covering **Cause and Origin.**
 - 8.4.2 DeHaan, J.D., Sources of Ignition, Chapter 6, and pp. 115-156. *in:* Kirk's Fire Investigation, 5th edition, Prentice Hall: New Jersey, 2002.
 - 8.4.3 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 Nine

METHODS FOR THE RECOVERY OF IGNITABLE LIQUIDS

- 9.1 Historical Perspective
- 9.1.1 Trainee must demonstrate an appreciation of historical development of ignitable liquid recovery techniques.
 - 9.1.2 **Background Reading**
 - 9.1.2.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Historic Evolution of Fire Debris Analysis.*
- 9.2 Headspace Sampling Recovery Technique
- 9.2.1 Demonstrate an understanding of a Maxwell-Boltzmann distribution of kinetic energies for an ignitable liquid.
 - 9.2.2 Discuss the process of condensation and evaporation in a closed container at a constant temperature.
 - 9.2.3 Define the term *vapor pressure* and discuss any effect temperature, volume of liquid, and space above the liquid, has on vapor pressure?
 - 9.2.4 Discuss the limitations and the applications of headspace sampling for fire evidence analysis.
 - 9.2.5 Discuss how and why the headspace sampling temperature and sampling volume should be optimized.
 - 9.2.6 Demonstrate a working knowledge of ASTM E 1388-05, Standard Practice for Sampling of Headspace Vapors from Fire Debris Samples.
 - 9.2.7 Discuss the headspace sampling process outlined in the fire evidence analysis analytical method.
 - 9.2.8 Describe the quality assurance measures associated with this technique.

- 9.2.9 **Background Reading**
- 9.2.9.1 ASTM Method E 1388-05, Standard Practice for Sampling of Headspace Vapors from Fire Debris Samples.
 - 9.2.9.2 Current version of fire evidence analytical method addressing Headspace Sampling.
 - 9.2.9.3 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section covering Headspace Sampling.
 - 9.2.9.4 Laboratory Fire Standards and Protocols Committee Scientific Working Group for Fire and Explosions, Initial Assessment of Evidence, page 3, 8.1.5.
 - 9.2.9.5 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.
 - 9.2.9.6 Newman, R., Modern Laboratory Techniques involved in the Analysis of Fire Debris Samples - Chapter 5, pp. 139-142. *in*: Fire Investigation, David, N.N ed, CRC Press:Boca Raton, 2004.
 - 9.2.9.7 Section covering the properties of liquids in a College Chemistry text.
- 9.3 Charcoal Strip Static Adsorption Technique
- 9.3.1 Includes an understanding of the principle of static adsorption, the limitations of, and the applications of this recovery technique.
 - 9.3.2 Through knowledge of ASTM E 1412-07, Standard Practice for Separation and Concentration Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration with Activated Charcoal.
 - 9.3.3 Define the following terms as they apply to this technique: Adsorption, Desorption.
 - 9.3.4 Describe the forces and mechanism involved with the physical adsorption process.
 - 9.3.5 Discuss the parameters that affect the physical adsorption recovery process.
 - 9.3.6 Discuss the use of charcoal strips as outlined in the fire evidence analysis analytical method.

- 9.3.7 Describe the quality assurance measures associated with this technique.
- 9.3.8 **Background Reading**
- 9.3.8.1 ASTM E 1412-07, Standard Practice for Separation and Concentration of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration with Activated Charcoal.
- 9.3.8.2 Current version of fire evidence analytical method addressing Passive Headspace Concentration with Activated Charcoal.
- 9.3.8.3 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.
- 9.3.8.4 Newman, R., Modern Laboratory Techniques Involved in the Analysis of Fire Debris Samples - Chapter 5, pp. 139-147. *in*: Fire Investigation, Daed, NIN ed, CRC Press:Boca Raton, 2004.
- 9.3.8.5 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Adsorption 101*.
- 9.3.8.6 NFSTC Advanced Fire Debris Analysis Course Student Manual, section covering *Analysis Protocols and Proficiency Testing in Fire Debris Analysis*.
- 9.4 Solvent Extraction Recovery Technique
- 9.4.1 Knowledge to include an understanding of the principle of solvent extraction, the limitations of, and the applications of this recovery technique.
- 9.4.2 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.
- 9.4.3 Discuss the solvent extraction process outlined in the fire evidence analysis analytical method.
- 9.4.4 Discuss the adage “*Like-Dissolves-Like*” as it applies to fire evidence analysis and the resulting solvent extract.
- 9.4.5 Describe the quality assurance measures associated with this technique.
- 9.4.6 **Background Reading**
- 9.4.6.1 ASTM Method E 1386-00 (2005), Standard Practice for Separation and Concentration of Ignitable Liquid Residues

from Fire Debris Samples by Solvent Extraction.

- 9.4.6.2 Current version of fire evidence analytical method addressing Solvent Extraction.
- 9.4.6.3 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section covering Solvent Extraction.
- 9.4.6.4 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.
- 9.4.6.5 Newman, R., Modern Laboratory Techniques involved in the Analysis of Fire Debris Samples - Chapter 5, pp. 151. *in: Fire Investigation*, Daéid, N.N ed, CRC Press:Boca Raton, 2004.
- 9.4.6.6 Section covering the properties of solutions in a College Chemistry text.

Section Ten

**INSTRUMENTAL METHOD OF ANALYSIS: GAS CHROMATOGRAPHY -
MASS SPECTROMETRY**

- 10.1 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.
- 10.2 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.
- 10.3 GC/MSD in Fire Evidence Analysis
Describe the characteristic major ion fragments used for extracted ion profiles for each compound type (alkanes, aromatics, cycloparaffins and alkenes, naphthalene, indane).
- 10.4 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.
- 10.5 Background Reading
 - 10.5.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section covering *Mass Spec Overview*.

- 10.5.2 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section covering *Mass Spectrometry Theory*.
- 10.5.3 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section covering *Instrumental Methods of Analysis*.

Section Eleven

CLASSIFICATION OF PETROLEUM PRODUCTS/IGNITABLE LIQUIDS

11.1 Ignitable Liquid Classification System

- 11.1.1 Discuss each class of the E1618^{e1} classification system.
- 11.1.2 Discuss the carbon ranges and representative products in each ignitable liquid class.
- 11.1.3 Describe how to deal with ignitable liquids which fall between classes of ignitable liquids.

11.2 Background Reading

- 11.2.1 ASTM E 1618-06^{e1}, Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry.
- 11.2.2 ASTM E 1387-01, Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography.
- 11.2.3 Newman, R., Gilbert, M. and Lothridge, K., *GC-MS Guide to Ignitable Liquids*, CRC Press: New York, 1998.
- 11.2.4 ATF Laboratories/NFSTC, Basic Fire Debris Course, section covering *Mass Spec Overview*.
- 11.2.5 NFSTC Advanced Fire Debris Analysis Course Student Manual, section covering *Mass Spectrometry Data Interpretation*.

Section Twelve

INTERPRETATION OF DATA AND PRACTICAL EXERCISES

12.1 Data Interpretation

- 12.1.1 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.
- 12.1.2 Discuss the general approach to the interpretation of GC/MSD data.
- 12.1.3 Discuss how data from samples indicating a significant amount of

terpene compounds should be approached.

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

12.2 Interpretation of Data Practical Exercises

- 12.2.1 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section Covering *Practical Exercise #3, Real World Samples*.
- 12.2.2 Casework data examination and interpretation.

12.3 Background Reading

- 12.3.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Analysis of Real World Samples*.
- 12.3.2 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Chromatographic Interpretation*.
- 12.3.3 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section Covering *Practical Exercise #3, Real World Samples*.
- 12.3.4 ASTM E 1618-06, Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry.
- 12.3.5 Newman, R., Gilbert, M. and Lothridge, K., *GC-MS Guide to Ignitable Liquids*, CRC Press, New York, 1998.
- 12.3.6 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 Thirteen

CASEWORK DOCUMENTATION

13.1 Examination Documentation

- 13.1.1 Discuss the information and/or data which must be included in examination documentation casefile.
- 13.1.2 Discuss what items can be centrally stored versus being placed in the casefile.
- 13.1.3 Describe the information which must be on examination documentation.

- 13.1.4 Describe the labeling requirements for administrative documentation.
- 13.1.5 Describe the requirements for using abbreviations and symbols in examination documentation.

Section Fourteen

SUBSTRATE SAMPLES

- 14.1 The trainee will analyze commonly encountered substrate materials. Representative samples of the following materials must be analyzed both burnt and unburnt. The data from each substrate will be examined and characterized.
- 01. Carpet (nylon, wool, olefin, polyester, acrylic, jute)
 - 02. Foam rubber carpet pad (multicolor, waffle-type)
 - 03. Plastic containers (milk, soft drink, gasoline)
 - 04. Plastic bags (shopping, ziplock, garbage)
 - 05. Plastic pipe (PVC, PP, PE, ABS)
 - 06. Wood (pine, oak, cedar, redwood, particle board, plywood)
 - 07. Paper (newspaper, magazine, cardboard, office)
 - 08. Fabric (terrycloth, acrylic, polyester, cotton)
 - 09. Shoes (leather, vinyl, canvas).
 - 10. Flooring materials (linoleum, vinyl, manufactured wood)

Section Fifteen

PRACTICE SAMPLES

- 15.1 Upon the completion of training, the trainer must provide the trainee with a minimum of six samples potentially spiked with an ignitable liquid for the trainee to independently process and analyze prior to starting on competency testing.

Section Sixteen

COMPETENCY TESTING

- 16.1 Upon the completion of training, the trainee must complete a competency test consisting of \geq six (6) specimens.
- 16.2 Background Reading
- 16.2.1 ATF Laboratories/NFSTC, Basic Fire Debris Course, Section Covering *Proficiency Testing*
 - 16.2.2 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section Covering *Analysis Protocols and Proficiency Testing in Fire Debris Analysis*.

Section Seventeen

SUPERVISED CASEWORK

- 17.1 Upon successful completion of competency testing, the Trainee should complete no less than 5 case samples under close supervision.
- 17.2 For purposes of this process, close supervision is at the discretion of the Trainer.
- 17.3 The Trainer will initial involved case reports.
- 17.4 A listing of the co-signed case samples should be compiled and included in training records.

Section Eighteen

CRIMINAL JUSTICE SYSTEM FUNDAMENTALS

- 18.1 The Trainee must possess a practical understanding of the major branches of US federal and state government.
- 18.2 The trainee must describe which two branches of the US government have the authority to define what a crime is. Describe how the processes for each branch differ.
- 18.3 The trainee must be aware of which branch of US government law enforcement falls under.
- 18.4 The Trainee must possess a practical understanding of the organizational structure of the criminal justice system.
- 18.6 Describe the difference between being charged with an infraction, misdemeanor, or felony type offense.
- 18.7 Describe the differences between criminal and civil proceedings including how the evidence is evaluated.
- 18.8 What are the three ways that a person can be charged with a criminal offense? Discuss the differences.
- 18.9 Describe the subpoena process. What is the purpose of a subpoena? What does the words “duces tecum” mean when added to the subpoena?
- 18.10 Describe the Discovery Process. What does the Discovery Process hope to prevent?
- 18.11 Define the following terms:
 - 1. Plaintiff
 - 2. Defendant

3. Counsel

- 18.12 Who has the burden of proof, the plaintiff or defendant?
- 18.13 Describe the role and functions of the following criminal justice system components:
1. Judge
 2. Prosecutor
 3. Defense Attorney
 4. Expert Witness
 5. Jury
 6. Bailiff
 7. Court Reporter
- 18.14 Discuss the following questions:
1. What is a deposition?
 2. What are the key differences between a *court* versus a *jury* trial?
- 18.15 Describe the steps or events that take place in the course of a trial.
- 18.16 Discuss the difference between direct, cross and rebuttal testimony?
- 18.17 Answer the following questions:
1. What objections are made by attorneys during a trial?
 2. What is the difference between an objection being sustained versus overruled?
- 18.18 Describe how an analyst is qualified to testify as an expert witness. What is *voir dire* as it relates to the testimony of an expert witness?
- 18.19 Describe possible outcomes of the trial process.
- 18.20 Discuss the ramifications of *Daubert v. Merrell Dow Pharmaceutical* and *Frye v. United States*.
- 18.21 List the factors that help assure a scientific testing procedure is established as reliable.
- 18.22 Recommended Background Reading
- 18.22.1 Schmallegger, F.J., *Criminal Justice: A Brief Introduction*. Ninth Edition, Prentice Hall:New Jersey, 2011 (paperback).
 - 18.22.2 Matson, J.V., *Effective Expert Witnessing*. Second Edition, Lewis Publishers:Boca Raton, 1994.
 - 18.22.3 Kurmack, N.T., *Legal Aspects of Forensic Science – Chapter 1*, pp. 1-27. *in: Forensic Science Handbook*, Saferstein, R. ed, Prentice-Hall:New Jersey, 1982.

- 18.22.4 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.

Section Nineteen

RELEVANT IDAHO STATUTES: ARSON

- 19.1 The Trainee must be familiar with Idaho Statutes covering the crime of arson.
- 19.2 Define the crime of arson based on Idaho Code §18-801.
- 19.3 Describe the key elements for being charged with arson in the first (§18-802), second (§18-803) and third degree §18-804).
- 19.4 Describe what events took place for a person to be charged under §18-805, aggravated arson.
- 19.5 Recommended Background Reading
Idaho Code Title 18, Crimes and Punishments, Chapter 8, Arson: §18-801, §18-802, §18-803, §18-804 and §18-805.

Section Twenty

PREPARATION AND PRESENTATION OF COURTROOM TESTIMONY

- 20.1 Courtroom Decorum
- 20.1.1 Discuss appropriate eye contact, gestures, voice volume, and approach for visual aids during testimony.
- 20.1.2 Describe proper attire for courtroom appearances.
- 20.2 Review of Case Record and Relevant Issues
- 20.2.1 Discuss how a case record is reviewed prior to court.
- 20.2.2 Discuss what should take place during a pre-trial conference.
- 20.2.3 Discuss what technical material should be consulted prior to trial.
- 20.3 Mock Court
The trainee will participate in mock court with laboratory personnel serving as the prosecuting and defense attorneys.
- 20.4 Background Reading
- 20.4.1 NFSTC Advanced Fire Debris Analysis Course Student Manual, Section Covering *Expert Testimony/ Preparation for Testimony*.

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

Section Twenty-One

NATIONAL CENTER FOR FORENSIC SCIENCE (NCFS) TRAINING COURSE

Within 2 years of starting training in fire evidence the analyst must successfully complete the NCFS Fire Debris Analysis Course (or equivalent). The NCFS course is web-based requiring participation in online activities along with completion of online assessments. This is followed by a 4-day course on site.

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Idaho State Police
Forensic Services

Fire Evidence Training Plan Completion Sign-off

Section Two

Administrative Issues

- 2.1 Read and understood relevant sections of **Idaho State Police Employee Handbook**. This step is fulfilled with a verbal examination.

Date of Completion

Trainee

Trainer

- 2.2 Read and understood the content and application of the **Idaho State Police Forensic Services ISO/IEC 17025:2005 Compliant Quality/Procedure Manual**. This step is fulfilled by the successful completion of written examination.

Date of Completion

Trainee

Trainer

- 2.3 Read and understood the content and application of the **Idaho State Police Forensic Services Health and Safety Manual**. This step is fulfilled by the successful completion of written examination.

Date of Completion

Trainee

Trainer

- 2.4 Read and understood the **ASCLD/LAB Guiding Principles of Professional Responsibility for Crime Laboratories and Forensic Scientists**. This step is fulfilled with a verbal examination.

Date of Completion

Trainee

Trainer

Section Two

Administrative Issues

- 2.5 Completion of the currently approved ethics course as described in **Idaho State Police Forensic Services ISO/IEC 17025:2005 Compliant Quality/Procedure Manual**. This step is fulfilled by the successful completion of written examination.

Date of Completion

Trainee

Trainer

- 2.6 General knowledge of forensic science disciplines other than toxicology. This step is fulfilled with a verbal examination.

Date of Completion

Trainee

Trainer

Section Three

Evidence Handling

- 3.1 Fire Evidence Packaging

- 3.2 Fire Evidence Submittal

- 3.3 Fire Evidence Agencies

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Four

Safety Issues

- 4.1 Solvent Use

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Five

Review of Relevant Principles of Organic Chemistry

5.1 Terminology, Nomenclature and Structures

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Six

Chemistry and Physics of Fire

6.1 Familiarization with the Basic Elements of Fire Behavior

6.2 Fire Chemistry Terminology

6.3 Pyrolysis Products

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Seven

Refining of Petroleum

7.1 Refinery Processes

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Eight

Fire Scene Processing

- 8.1. Cause and Origin
- 8.2. Protection of Fire Scene Indicators
- 8.3. Ignitable Liquid Recovery

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Nine

Methods for the Recovery of Ignitable Liquids from Fire Evidence Exercise

- 9.1. Historical Perspective
- 9.2. Headspace Sampling Recovery Technique
- 9.3. Solvent Extraction Recovery Technique
- 9.4. Charcoal Strip Static Adsorption Technique

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Ten

Instrumental Method of Analysis: Gas Chromatography - Mass Spectrometry

- 10.1. Basic Theories of Gas Chromatography and Mass Spectrometry
- 10.2. General Instrument Operation and Maintenance
- 10.3. GC/MSD in Fire Evidence Analysis
- 10.4. Familiarization With and Use of Extracted Ion Profile (EIP) Macros

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Eleven

Classification of Petroleum Products/Ignitable Liquids

11.1 Ignitable Liquid Classification System

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Twelve

Interpretation of Data and Practical Exercises

12.1 Data Interpretation

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Thirteen

Casework Documentation

13.1 Examination Documentation

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Fourteen

Characterization of Substrate Samples

Competency Verified by: Examination of Data Verbal Examination

Date of Completion

Trainee

Trainer

Section Fifteen
Practice Samples

Competency Verified by: Examination of Data Verbal Examination

Date Assigned

Date of Completion

Trainee

Trainer

Section Sixteen
Competency Testing

Competency Verified by: Successful Completion

Date Assigned

Date of Completion

Trainee

Trainer

Section Seventeen
Supervised Casework

Competency Verified by: Successful Completion

Laboratory Numbers

1. _____ 2. _____ 3. _____
4. _____ 5. _____

Date of Completion

Trainee

Trainer

Section Eighteen

Criminal Justice System Fundamentals

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Nineteen

Relevant Idaho Statutes: Arson

Competency Verified by: Written Examination Verbal Examination

Date of Completion

Trainee

Trainer

Section Twenty

Preparation and Presentation of Courtroom Testimony

20.1 Courtroom Decorum

20.2 Review of Case Record and Relevant Issues

Competency Verified by: Examination of Data Verbal Examination

Date of Completion

Trainee

Trainer

20.3 Mock Court

Competency Verified by: Successful Completion

Date of Completion

Trainee

Trainer

Section Twenty-One

National Center for Forensic Science Training Program

Fire Debris Analysis

Competency Verified by: Successful Completion, Refer to Training Certificate.

Date of Completion

Trainee

Trainer

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