San Luis Obispo Sheriff's Office – Presenter 2440
Forensic Fire Death Investigation – Course 30183
Expanded Course Outline
40-hour Course

STATEMENT OF PURPOSE:

The purpose of this course is to provide training on the various aspects of fire-related death investigations, as well as common approaches to process each scene appropriately. Participants will learn a systematic process for handling the crime scene, from the initial approach, through scene documentation, and appropriate evidence collection techniques. Additionally, participants will see how the latest technology and forensic sciences can assist in investigations. This intense 40-hour forensic fire death investigation course is geared toward the seasoned Public Fire Investigator and Law Enforcement Investigator (Coroner/CSI/Detectives). There will be three days of classroom instruction including case preparation and presentation and two days dedicated to fatal fire scene examination in the field.

Monday – Classroom Day 1

I. **Orientation & Expectations**
- A. Introduction
- B. Announcements
- C. San Luis Obispo Fire Investigation Strike Team, Inc.(SLO FIST Inc) Harassment Policy
  1. Discrimination
  2. Sexual Harassment

II. **Fundamentals of Fatal Fire Investigations**
- A. Pit falls prejudging fires and fire deaths
  1. Relationships/Connections
  2. Three Investigations:
     a) What caused the fire?
     b) What caused the death?
     c) What was the connection?
  3. Linkage between the fire and the death investigation
  4. Prejudging
- B. Fatal Fire Investigations
  1. Two individual investigations conducted *simultaneously*

2. NFPA 1033
3. NFPA 1033: 1.3.8 The fire investigator shall remain current in the topics listed in 1.3.7 by attending formal education courses, workshops, and seminars and/or through professional publications and journals.

C. Fire Chemistry
   1. What is *fire*?
   2. Fire Triangle
   3. Fire Tetrahedron
   4. Elements of Tetrahedron
   5. What is heat?

D. Thermodynamics
   1. Law of Conservation of Energy
   2. What is heat transfer?
   3. Heat/Energy Transfer
   4. Conduction
   5. Convection
      a) Types of convection
      b) Convection heat vs humans
   6. Radiation heat transfer by way of electromagnetic energy

E. Types of fuels
   1. What is burning?
      a) Solids
      b) Gasses
      c) Liquids
   2. Solid fuels
   3. Liquid fuels
   4. Gaseous fuels

F. Phases of Fire
   1. Ignition Phase
   2. Growth Phase
   3. Fully Developed
   4. Decay Phase
   5. Transition to fully developed

G. Scene investigation
   1. Fire Scene Investigation
      a) Documentation
      b) Time sensitivities
   2. The "Scientific" method-A Systematic Approach
   3. Fire Fatalities
      a) Fire and Explosion Deaths and Injuries
      b) Team Investigation
   4. Pre-event preparation
   5. Build Your Team

6. Prior to Investigation:
    a) Minimizing On-Scene Contamination
    b) Do ***not*** bring ignitable liquid residues into scene.
    c) Decontamination line
    d) Consider gas powered equipment
    e) Change gloves *between* samples
    f) Use clean or disposable tools
7. Fire Responsibility (Cause)
    a) What started the fire?
    b) Fuel first ignited
    c) Competent heat source
    d) How the two came together to start the fire
8. Fire Investigations
    a) Origin
    b) Cause
    c) Ignition sequence
    d) Fire spread

H. Considerations
1. Scene investigation
2. Exterior scene Investigation
3. Interior examination
4. Consider: Security and Surveillance (Interior/Exterior)
5. Processing the Area
6. Searching the decedent area
7. Fire Scene Investigations
8. The Most Important Information is ***AT THE SCENE***
9. Scene Investigations: Other Considerations

I. Origin Determination: Fire Patterns
1. Fire patterns
    a) Artifacts left by the fire
    b) Fingerprints of the fire
    c) Noted and documented
    d) Part of data collection process
    e) Red Flags = myths
    f) No science until the 1970's
2. Collecting Data/Analyzing Data Steps

3. Fire Dynamics
    a) Witness Information and/or Electronic Data
    b) Fire Patterns
    c) Heat (Movement/Intensity) Patterns
    d) Fire Effects (Heat, Deposition, Consumption)
    e) Combination of Patterns

4. Heat vs. Dry Wall Surfaces
    a) Clean Burn
    b) Point and Arrow (Directional) Patterns
    c) V-PATTERN
    d) Other Types of V- Patterns
    e) Lines of Demarcation
5. Heat vs. Concrete Surfaces
6. Heat vs. Metals
7. Irregular fire Patterns Flammable liquids
8. Crazing and Melting of Glass

J. Fire Cause Determination
1. Cause Determinations
    a) Accidental
    b) Incendiary
    c) Undetermined
    d) Natural
    e) Incident Classification "Classifying fire incident requires application of a common language through a classification system."
2. Examples of accidental Ignition Sources
3. Spontaneous heating
4. Heat produced in three ways
    a) Chemical reaction
    b) Oxidation
    c) Fermentation
5. Common Places
6. Self-Heating or Deliberate Ignition?
    a) Incendiary: Arson Indicators
    b) Ignitable Liquids
7. Undetermined

K. Post-Mortem Examination of Fire Victims
1. What kills people in fires?
2. Smoke Inhalation
3. Post-Mortem Toxicology
4. Post-Mortem Repositioning
5. Post- mortem examination of fire victims
6. Recovery of Burned Remains
7. SHC: Spontaneous Human Combustion
8. Alive or deceased at the time of the fire?
    a) Post-mortem examination of fire victims
    b) Full decedent X-rays when situations warrant
    c) Dental X-Rays

d) X-rays of anatomic features
e) Broken bones, wounds

L. Evidence Collection, Packaging, and Considerations
1. Types of Evidence
2. Best Evidence to Collect from a Fire Scene
3. Packaging
4. Evidence from Suspects: Residues
5. Physical Evidence
6. Evidence Packaging: Molotov Cocktail

M. Appendix
1. Rate of Heat Release, typical heat release rates:
a) Smoldering cigarette: 5W
b) Kitchen match or cigarette lighter: 50W
c) Candle: 50 -80 W
d) Office wastebasket w/paper trash: 50-150kW
e) Small chair with padding: 150-250kW
f) Modern armchair (PU foam/synthetic fabric): 35-750kW (typical) up to 1.2MW
g) Recliner (modern): 500-1000kW(1MW)
h) Sofa (modern – synthetic fabric and PU foam): 1-3MW
i) Pool of gasoline (2 qts on concrete): 1MW
j) Christmas tree (dry, Scotch pine) : 1-2MW up to 5MW
k) Living room or bedroom) 3-10MW
2. Spalling
3. Sustained Combustion

III. **Multi-disciplinary Approach to Fire Investigations**

A. The purposes of this class
1. Understanding of the responsibilities of ALL players so we can work together towards the SUCCESSFUL conclusion of a fire related homicide case.
2. Why is this course needed?
3. Case Killers
4. Fatal Fire Statistics

B. Fire Death-Multidisciplinary Approach
1. Teamwork Demonstration
2. Team Members
a) Fire Investigator
b) Police Detective
c) Medical Examiner/Coroner
d) Pathologist
e) Toxicologist
f) Radiologist

g) Odontologist
h) Forensic Entomologist
i) Crime Scene Investigators
j) Private Fire Investigators/Insurance SIU Fatal Fire Investigations

3. The Nature of the Investigation - Simultaneous
4. What is a Fatal Fire Investigation?
5. Presumptions
6. Built-in Contradictions
7. Examples
   a) Stag Hotel Fire– April 2012 (from the Santa Cruz Sentinel)

C. Fire Death Investigations-Arson Task Forces and Roles
1. Is a Team Approach Suggested or Required?
2. Fire Fatalities
3. Team Approach-Fire Investigation Task Force
   a) Fire
   b) Police (Arson and CSI)
   c) Crime Lab (Experiments)
   d) Prosecutors assigned
   e) ATF
   f) Consumer Product Safety Commission
   g) Dept. of Insurance
   h) SO Bomb/Hazmat Tech
4. Police Responsibilities
5. Scene Security
6. Police Investigations

D. Fire Responsibility
1. What started the fire?
2. Fire Investigations
   a) Origin
   b) Ignition sequence
   c) Cause
   d) Fire spread
   e) Responsibility for incident
   f) Incendiary Devices
3. Arson Indicators
4. Fire Suppression Education
5. Private Fire Investigators
6. Medical Examiner/Coroner Investigators
7. Death Investigation
8. Role of the Medical Examiner
   a) Identity of victim
   b) Cause of death

c) Documentation of injuries and diseases
d) Help establish time of death
e) Help establish manner of death (scene investigation very important)
f) Job duties are different - cooperation is paramount

9. Attending the Autopsy
10. The team approach for processing the scene is the best practice

E. Fire Death Investigations – Documentation
1. Don't disturb debris
2. Photograph the decedent movement
3. Videotape can also be beneficial (Sound)
4. Document the area where the decedent was removed from, taken again when placed in the decedent bag, and before the clothing is removed
5. Photograph burns
6. Close-ups should be taken with a scale in the photo
7. Deceased
a) Height/Weight
b) Skull
c) Skin Splits
d) Pugilistic posture
e) Protected areas
f) Burn Marks
g) Signs of trauma
h) Face position (up, down, left, right)
8. Physical Limitations?
9. Cognitive Limitations (alcohol, drugs, mental handicap)?
10. Victim familiar with the surroundings?
11. Number of escape/exit routes?
12. Victim's activity prior to the fire
13. Relationship of the victim to other objects, fuel load, collapsed and protected areas, and other victims.
14. Clothing Patterns
15. Relationship between death and the fire should be investigated. Not all fire related deaths are from heat, flame and smoke.
16. Conditions preventing victim's escape
a) Was the victim conscious
b) Barred windows
c) Inadequate marked exits
d) Mental confusion (age, alcohol, drugs)
e) Physical constraints or disabilities
f) Carbon monoxide confusion
g) Heavy smoke (obscuration)

h) Fear/Panic

17. Relationship between the death and the fire should be investigated and documented.

18. Who to speak with –
    a) Individual discovering the victim(s)
    b) Last individual in the area of origin of the fire
    c) Individual discovering the fire
    d) Last one to see the victim(s) alive
    e) If possible, document any fire and/or life insurance the victim(s) may have.
    f) Interviews

F. Fire Death Investigations-Legalities
    1. Voir Dire
    2. Fire Dynamics - Voir Dire
    3. Frye standard
    4. Daubert.
    5. Built-in Contradictions
        a) With most crimes, probable cause that a crime has occurred is initially evident.
        b) With fire investigations, the cause of a fire cannot be stated until one cause is identified and all other possible causes are eliminated.
        c) Police Investigators are trying to prove their case "Beyond a Reasonable Doubt."
        d) Fire investigations, findings are "Probable" or "Possible."
    6. Negative Corpus, No physical evidence

G. Multidiscipline Approach is Key
    1. Ego
    2. Build relationships early
    3. Train together
    4. Celebrate successes together

IV. <u>Insect Evidence and Fire Death Investigations</u>

A. Questions most Frequently asked of Forensic Entomologists
    1. When did an event occur?
    2. Who was present during an event?
    3. Origins or location of an event?
    4. Why are insects not present?
    5. Significance of a particular arthropod?

B. Two Great Sources of Answers to Timing Questions:
    1. Community Ecology and Succession – aging insect communities
    2. Ecological Physiology and Developmental biology – aging insects

3. The PI (what the Entomologist estimates)

C. Developmental States of Flies
   1. Complete life cycle
   2. The Critical First Task: Anchor Oldest Development State to a Point in Time
   3. Larvae (Maggots): Three Stages- Called "Instars"
   4. Pupae
   5. Development as a function of temperature

D. Species name- the link to biological facts: including development rate
   1. Calliphoridae- Blow flies, Bottle flies
   2. Sarcophagidae- flesh flies
   3. House fly relatives

E. Forensic Entomology and Fire
   1. Example: Kern county "pistol-whipping" homicide

F. History, Forensic Entomology and Fire Death Investigation- three possible histories in fire-homicide cases
   1. Homicide, immediate burn, later discovery
   2. Homicide, Later Burn, Even Later Discovery (Kern Case)
   3. Homicide, Later Burn, Followed by Immediate Discovery

G: The First Experiment and general goals:
   1. Answer the questions previously posed!
      a) Pre and post burn pre-infestation periods?
      b) Infestation delay following burn?
      c) Pre and post burn infestation evidence?
      d) Evidence of prior infestation?
      e) Survival of prior infestation?
      f) Location of prior infestation?
      g) Distinguish prior and post burn infestations?
      h) Probative value?
   2. Experimental Design
      a) Includes elements of both previously described cases
      b) A typical road-side discarding of body
      c) Followed later by burning (perpetrator returns to scene)
      d) Followed even later by discovery
      e) Wounding: S&W 40 cal automatic 30 in away
      f) Two rounds to chest (center mass)
      g) One round to center forehead
   3. Schedule of Events
      a) Exposure on Day one
      b) Fire on Day three
      c) "Discovery" on Day Six
   4. Answers to Preliminary Questions.

a)
Pre and post burn pre-infestation periods.
b) Characteristic additional infestation delay following burn- there does not appear to be.
c) Evidence of Prior Infestation, yes- cohorts of maggots in two of three burned decedents.
d) Survival of prior infestation possible, yes.
e) Location of prior infestation, protected locations within skull- ear canals and under remains in cracks in ground
f) Distinguish prior and subsequent infestations, yes- temporal separation of prior and post burn cohorts
g) Estimation of the timing of death and the fire possible

G. Collecting and preserving the evidence
1. Insects
2. Temperatures

H. Before Body Removal
1. Above remains
a) Aerial and sweep insect nets
b) Killing jar- ethyl acetate, etc
c) Useful but least important sample
d) Ageing adult flies not possible
2. On and around remains
a) Collect as many as possible, all kinds and stages
b) Oldest developmental stages
c) Collect and record by location Head-eyes, ears, mouth, nose, neck
d) Wounds and lesions
e) Axial regions
f) Tools: forceps and plastic spoons

I. During Removal
1. Immediately below on or in substrate
a) In purge materials, debris under body
b) Cracks and crevices in soil
c) Clothing
d) Same tools as on remains plus:
e) Aspirators- not sucking
f) Blowing- venturi Mechanical
2. Record temps, times or duration of:
a) Bagging
b) Transport
c) Arrival
d) Refrigeration

J. During Autopsy

1. Collect locations not possible in the field
2. Record temps, times or duration of:
    a) Refrigerated Storage
    b) Autopsy
    c) Storage of living insects

K. Care of the Evidence: Soft bodied insects, maggots
1. Kill soonest after collection- record time
2. Kill in boiling water best - hard to arrange
3. Immediately preserve in 70% ethyl or isopropyl alcohol

L. Care of the Evidence: Hard bodied insects
1. Kill in killing jar or freezer
2. Store dry in layers of tissue
3. In cardboard or paper layering boxes- allow to dry
4. In plastic layering boxes
5. In a pinch- put everything in alcohol
6. Dry on pins – requires skills

M. The Important Points
1. Sample decedent in situ, after removal, at autopsy
2. Sample locations separately; record location
3. Collect a lot, all kinds and stages
4. Focus on oldest developmental stages
5. Immediately kill and preserve sample; record preservative
6. Record temperatures

V. **<u>Evidence Mapping: UAS's in Fire Investigations</u>**

A. What is a UAS (Drone) ?
1. Unmanned Aircraft Systems
2. UAS encompasses the complete system supporting and managing the UAV
3. Kinds of UAS

B. How can a UAS help in Fire Investigation?
1. Mapping
2. Modeling
3. Burn Patterns
4. Evidence Collecting
5. Situational Awareness

C. What Does your department need in order to fly a UAS?
1. FAA 107 Pilot
2. Certificate of Waiver of Authorization--COA

D. Before Flight Actions
1. Weather Check
2. Air Space
3. Risk Assessment

4. Preflight of UAS
5. Flight Plan
6. Debrief with Flight Crew

E. What to do with the collected files after UAS flight?
F. What other Equipment can we use to document a scene?
G. Questions?

Tuesday – Field/Classroom Day 1

FIELD EXERCISES

Summary. Students and staff deploy to the field site Wednesday morning. Following an Ops and Safety briefing, students divide into their preassigned teams of six, each previously assigned to one of 10 fire-death scenarios. They observe demonstration burns, evaluate their own assigned scenarios, circulate around to each scenario (Round Robin) where they receive a briefing from each Scenario Proctor on the nature of their Scenario. Students are then released to actively work their assigned scenario, which will run through Thursday afternoon.

VI. **Ops and Safety Briefing**
- A. Review of IAP (Safety Policy)

VII. **Demonstration Burns**
- A. Room Fire and Radiant Heat Demonstration
  1. Furnished, open-faced fire booth
  2. Compare and contrast sequence of changes in the decedents
  3. Observe development of the fire from the point of ignition through flashover.
- B. Vehicle Fire Demonstration
  1. Typical vehicle fire scenario
  2. Similar changes to the decedent as those observed in the room fire and radiant heat demonstration
  3. Observation of fire building and development
- C. Burn Barrel and Grave Site Demonstration
  1. Decedent or decedent parts in a burn barrel
  2. Typical attempt to completely destroy a human decedent or parts
  3. Opened grave site containing uncovered remains of completely burned decedent
     a) Decedent burned in a fire pit
     b) Then covered over with soil
     c) Archeological techniques employed in recovering burned bone
     d) Materials confused with bone seeded in the grave

VIII. **Team evaluations of their assigned scenarios**

A. Students discuss scene and scene processing
B. Designate group tasks

IX. **Effects of Combustion on Human Remains**

A. Introduction
   1. Research from observations of heat-related changes to the human body in different types of fire scenes (vehicular, structural, and outdoor).
   2. Course disclaimer about graphic images from casework and fatal fire research
   3. SLO FIST Inc. use of non-embalmed human cadavers donated for law enforcement training.
   4. Introduction and objectives: Normal heat-related changes to soft tissues and bones

B. Burned human remains examined at the Medical Examiner's Office:
   1. Manners of Death
   2. Cause of Death
   3. What investigators see at the fire scene and at the morgue is the result of a dynamic process produced by heat & flames, and in some cases, it may be difficult to determine the manner of death as either accidental or homicide in an extensively burned body.
   4. Indicators of vitality- was the victim alive or not before the fire
   5. Presence or absence of soot in the airways -slide examples
   6. Carbon monoxide levels in blood
   7. Incapacitated or unconscious- activities prior to fire- medical event/heart attack
   8. Activities prior to the fire- dead or medical event
   9. Presence and absence of soot in the airways

C. Early heat-related changes to the layered tissues of the human body
   1. Skin: Outer layer
   2. *Old Fatal Fire Myth: "Blisters indicate vitality"*
   3. Muscular layers are insulation around bone.
   4. Pugilistic Posture
   5. Protection vs. exposure

D. Classification System for Thermally Damaged Human Remains by Body Segment for the Arms stages 1-6.
   1. Upper arm (humerus), lower arm (radius and ulna) protected within unique musculature.
   2. Splaying of the fingers

3. Flexion into the pugilistic posture and heat-related color changes for the upper and lower arm, hand, and wrist.
4. Sequence of the pugilistic posture for the arm
5. Normal burn patterns of the fingers, hand and wrist (natural heat-related fracture of the wrist)
6. Natural heat-related fracture of the wrist occurs when extensor tendons have burned away
7. Hand and wrist drawn into the forearm muscles
8. Heat-related color changes in bone and heat-related fractures in the surface of bone.
9. Evidence of the fracture occurring during the fire along with examples of what it looks like after the fire with the hand detached from the forearm.

E. Introduction to the Classification System for Thermally Damaged Human Remains by Body Segment for the Legs stages 1-6
   1. Anatomy of the leg
      a) The upper leg (femur), lower leg (tibia and fibula) is protected within unique musculature.
      b) Individual factors- body size and weight of the victim prior to the fire.
      c) Unique burn patterns associated with the leg: soft tissue and skeletal changes.
      d) Heat-related movements, flexion, and raising of the legs during the fire
      e) Flexion of the knees and creation of the ballerina pose with the legs spread and toes pointed downward.
      f) Burn patterns of the foot and ankle
   2. Myth that the arms, legs, and head are consumed during the fire
   3. Overview of the general burn sequence
      a) Fleshed orientation
      b) Exposed bone
      c) Color progression
      d) Heat fractures

F. Introduction to traumatic injuries in soft tissues and alterations to the burning sequence.
   1. Stab wound with deeper muscle structures of wound.
   2. Gunshot wounds- pre-fire openings in the skin and soft tissues.
   3. Blunt force injuries to long bones

G. Introduction to the Classification System for Thermally Damaged Human Remains for the Head 1-6
   1. Anatomy of the head and face
      a) Protective soft tissue of the face, head, and neck.
      b) Myth that the tongue protrudes as an indicator of vitality

c) Burn patterns of the skull
d) Protection of the posterior dentition and the oral autopsy
e) Empty tooth sockets mean looking for loose teeth
f) Dental restorations
g) Delamination: normal heat-related fracture of the skull: separation of the outer table from the diploe. With examples of delamination.
h) Normal heat-related fracture production in the skull= shrinking

2. Traumatic fractures from ballistic injuries burn differently than intact cranial bones: Ballistic head injuries
3. Blunt force trauma
4. Myth of the "Exploded Skull"
5. Suppression: The effects of pressurized water

H. Introduction to the Classification System for Thermally Damaged Human Remains by Body Segment for the Torso
1. Largest mass of the body and is the last section of the body to burn from its large size, mass, and tissue densities, including organs.
a) Variable body fat and the individual -age, sex, health history
b) Subcutaneous fat of the torso
c) Original body weight vs. postmortem weight.
2. Myth of Spontaneous Human Combustion
3. Ignitable liquids

I. Structure Fires
1. Variables:
a) Interior Square Footage of Room(s)
b) Layout- Hallways, Rooms, Levels, etc.
c) Different Fuel Types & Fuel Loads.
d) Single Level, Double Story, Manufactured Home, Multistory (Apartments), Shed/Garage
e) Number & Sizes of Openings: Windows, Doors, etc.
2. Various Combustible Fuels, Types, and Amounts
3. Body lying on the floor of a room during fire.
a) Examples of bodies burning lying on the floor.
b) Burn patterns of exposed and protected surfaces
c) Pugilistic posture
d) Post-fire locations of burned bones around the body at the fire scene.
4. Recliner and couch fires
5. Mattress fires
6. Correlating burn patterns on the body with conditions at the fatal fire scene.

7. Collapse of the burned floor under the body in a structure or manufactured home.
8. Collapse of the body into the basement/lower level and collapse of fire debris around and onto the body after it has fallen through the floor into a lower space.

J. Confined space fires
1. Small and tight space: burn barrel, wood stove, trunks, dumpsters, etc.
2. Restricts movements & the pugilistic posture.
3. Body mass occupies majority of space.
4. Imported fuels (wood stove, burn barrel, fireplace) or fuels present (trunk of a car or dumpster).
5. Moderate attendance of the fire: refueling
6. Hours if attended –adding fuels, stoking, stirring, crushing, refueling, etc.
7. Hours to days if left unattended.
8. Debris layer wicks & burns rendered fat.
9. Burned tissues, bones, and teeth smolder in the embers and stratified in the fire debris.
10. Field technique of water separation of the fire debris.

K. Human vs. animal bone
1. Shape and size differences of long bones and skull.
2. It is more difficult to distinguish when burned bones are fragmentary pieces.
3. Differences in the shapes and organizations of human bone structures vs. non-human bone structures.

L. Outdoor criminal fire scenes
1. Unlimited airflow, size & duration of fire
2. Fuel types and amounts: branches/logs, wood pallets, tires, furnishings, ignitable liquids, etc.
3. Landscape: open/secluded
4. Body's location within debris pile
5. Examples of passively and intentionally burned
6. Example of intentionally burned: refueled, stoked, crushed

M. Vehicle fires
1. Small, enclosed metal container with fuels of plastics, fabrics, carpet, foam cushions, personal items, etc.
2. Variable interior space: sedan, SUV, truck, minivan, sportscar, etc.
3. Ignition source(s) & origin of the fire within the vehicle: engine, passenger compartment, trunk.
4. Body's position & location within the vehicle
5. Type of internal metal framework of seat under the body
6. Body in front passenger seats

7. Body in the back seats
8. Body in trunk

N. Surgical implants and devices for personal identification

O. Post-fire examination of the body
1. Post-fire damage from the original scene to viewed at the Coroner or Medical Examiner's Office
2. Suppression and foot traffic in the scene
3. Overhaul and search activities
4. Burned bones camouflaged in fire debris
5. Preservation within fire debris

P. After the body is found
1. Do not touch or approach the victim's body
2. Do not move or drag the body outside the scene
3. Notify chain of command
4. Teamwork approach with fire investigators, law enforcement, coroner or death investigator, CSI, forensic anthropologists, etc.
5. Photography and documentation of the body in situ position within fire scene before handling or removal
6. Photographs of burned tissues after extinguishment

Q. Mapping, diagrams, and preparations for excavation of fire debris
1. Systematic removal of fire debris layer by layer around body based on quadrants of the grid

R. Vehicle scene processing: where to start excavation
1. Problems with fusion of burned tissues to metal frameworks, glass, and plastics
2. Post-fire damage from grabbing wrists and ankles to move the victim
3. Handling and removal from the scene
4. Evidence documentation, preservation, and packaging of burned bones and fragments
5. Evidence: clothing or materials protected under body- testing for DNA/blood, ignitable liquids, etc.
6. Body in body bag- photography outside of the scene in good lighting on white sheet/blue tarp background for contrast and not on a black background (poor contrast)
7. General to specific for each region of the body

S. Preparing the body for transport
1. Evidence preservation vs. destruction
2. Problems with flexible body bags with burned remains

T. The value of the postmortem examination of burned human remains at the morgue

U. Conclusions

Wednesday – Classroom/Field Day 2

X. **Autopsy in Fire Deaths: Understanding the Forensic Process**

- A. Overview: role of autopsies, types of fire deaths, and key findings from fire-related fatalities.
  1. Importance of Autopsy in Fire Deaths:
  2. Why autopsies are critical in fire-related deaths and the investigative process.
  3. Objectives: A roadmap of the key points to be addressed.
- B. Understanding Fire-Related Fatalities
  1. What is a Fire Death?:
  1. Fire Death Statistics: Global and national data on fire fatalities and autopsies.
  2. Common Causes of Fire Deaths
  3. Types of Fire-Related Deaths
     a. Thermal burns
     b. Non-thermal deaths (e.g., from inhalation).
  4. The Role of Forensic Pathologists in Fire Deaths
- C. Fire and the Body
  1. Burns and Their Impact on the Body: How burns affect the body's systems.
  2. Thermal Injuries: Classifications of burns
  3. Effect of Heat on Organs
  4. Carbon Monoxide Poisoning: How inhalation of carbon monoxide during a fire leads to death.
  5. Smoke Inhalation and Asphyxiation: Effects of smoke inhalation and lack of oxygen on the body.
- D. Autopsy Findings in Fire Deaths
  1. Signs of Burn Injuries: Common signs and patterns of burn-related deaths.
  2. Internal Damage from Fire: How fire affects the lungs, heart, and other internal organs.
  3. Smoke Inhalation Markers: How forensic pathologists detect smoke inhalation.
  4. Carbon Monoxide Poisoning Identification: Identifying elevated carbon monoxide levels in the blood.
  5. Injuries Related to Trauma: Impact of traumatic injuries (e.g., falls or explosions) during a fire.
- E. Types of Evidence Collected in Fire Deaths
  1. Physical Evidence from the Scene
  2. Blood and Tissue Samples
  3. Clothing and Personal Effects
  4. Soot and Smoke Residue

5. Blood Alcohol and Drug Testing

F. Forensic Techniques Used in Fire Death Autopsies
   1. Postmortem Toxicology
   2. Histopathology
   3. Microscopic Examination
   4. DNA Testing

G. Forensic Evidence in Different Types of Fire Deaths
   1. Accidental Fires
   2. Suicide by Fire
   3. Homicidal Fire Deaths
   4. Arson Investigations
   5. Cases of Multiple Fatalities

H. Autopsy Procedures in Different Fire Scenarios
   1. House Fires
   2. Vehicle Fires
   3. Industrial Fires
   4. Wildfires

I. Case Studies of Fire Death Autopsies
   1. Case Study 1: Residential Fire
   2. Case Study 2: Arson
   3. Case Study 3: Wildfire Fatality
   4. Case Study 4: Homicidal Fire

J. Challenges in Fire Death Autopsies
   1. Decomposition and Fire Damage
   2. Burned Bodies and Identification
   3. Determining Cause of Death
   4. The Role of Fire Dynamics.

K. Legal Aspects of Fire Death Autopsies
   1. Role in Legal Investigations
   2. Coroner's Report
   3. Testifying in Court
   4. Fire Deaths in Mass Casualties

L. Prevention and Fire Safety
   1. Lessons Learned from Autopsies
   2. Fire Safety Awareness
   3. Conclusion

XI. **<u>Forensic Anthropology & Analysis of Burned Human Remains</u>**

A. What is Forensic Anthropology?
   1. Application of anthropology in a legal context
   2. When do you need an anthropologist?
   3. Typical Situations

4. American Board of Forensic Anthropology
http://www.theabfa.org
5. Faculty & Staff

B. Forensic Anthropology and Death Investigation
1. Identification of medicolegal significance
2. Osseous vs. Non-Osseous Materials
3. Nonhuman vs. human remains
4. Ancient/historic vs. recent
5. Sex Estimation
6. Age Estimation a Multi-disciplinary Approach
7. Ancestry
8. Stature
9. Time since death
10. Personal Identification
11. Trauma analysis

C. Acknowledgements

XII. **Search and Recovery Protocols for Fatal Fire Victims**

A. Presentation Outline
1. Fire Scene Protocols
2. Search and Recovery Strategies
3. Bone Identification in the Field
4. Lessons Learned

B. Forensic Archaeology
1. Definition: "Forensic archaeology is mostly defined as the use of archaeological methods and principles within a legal context." (Groen et al. 2015)
2. Goals
a) Maximize data collection effort at the scene
b) Interpret forensic context, including the taphonomic context

C. Archaeological Context
1. What can we learn using forensic archaeological methods?
a) Reconstruct position of the body
b) How it got into position it is in
c) Collection of remains by anatomical region
d) Assess remains in situ (in their original context)

D. Vegetation signs

E. Determination of Forensic Significance
1. Surface Stripping
2. Grave Cut
3. Context and Recovery

F. Mapping Methods- Mapping by Trilateralation
1. 1st Datum

2. 2nd Datum
3. Compass and distance
4. Item

G. Case Studies:
1. Buried & Burned Remains
2. Excavating Burned Vehicles
3. Small Scale Mass Fatality Events: San Bruno Pipeline Explosion
4. Orland I-5 Bus Crash
5. Wildfire Scene Recovery: Camp Fire (Camp Creek Rd.): Paradise, Magalia, and Concow

H. Fatal Fire Scene Protocols
1. Victim remains typically difficult to detect, recover, handle.
2. Burned material at scene- biological tissue, often modified
3. Bones become discolored, brittle, and highly fragmented.
4. Remains often missed, disturbed, altered, or destroyed during scene processing with existing protocols

I. Fatal Fire Scene Recovery Protocols
1. Phase 1: Organization and overall scene documentation
2. Phase 2: Rapid, Systematic Large Scale Search
3. Phase 3: Evidence of Human Remains Found, Rapid Large-Scale Excavation
4. Phase 4: Fine Detailed Excavation in the Immediate Vicinity of Human Remains
5. Phase 5: Mapping and Collection of Evidence and Human Remains
6. Phase 6: After Comprehensive Documentation and Collection: Removal and Transport

J. The Process
1. Team Composition
2. Gear Preparation & Deployment
3. Team Assignments and Callouts
4. Search Strategies
5. Human Remains Recovery: Excavation
6. Human Remains Recovery: Dry & Wet Screening
7. Photography, Documentation, Mapping, and Transfer of Custody

K.. Bone Identification in the Field
1. Materials often confused with bone
2. Building materials

l. Lessons Learned
1. Team Composition
2. Search Operations
3. Recovery of Remains
4. Health & Safety concerns

M. Large-Scale Fire Scene Team Composition

1. Need for well-trained forensic anthropologists with fire-scene experience
2. Team size flexibility
3. Team must be embedded with a coroner's team

N. Search
1. Need for more training with all personnel on distinguishing remains from fire debris
2. Need for consistent search methodology of a structure among all teams
3. Initial search is nondestructive and limited in personnel
4. Priority of search patterns:
   a) Perimeter walks
   b) Small number walks through interior
   c) More thorough search with tools
   d) Search stops at each step if suspected remains are identified
5. Understanding bias towards use of cadaver dogs

O. Recovery of Remains
1. Team Consistency
2. Completeness of body collection should be a priority

P. Health & Safety Concerns

Q. Wildfire Mass Fatality Scene Recovery Protocols
1. Phase 1: Organization and overall scene documentation
2. Phase 2: Rapid, Systematic Large-Scale Search
3. Phase 3: Evidence of Human Remains Found, Rapid Large-Scale Excavation
4. Phase 4: Fine Detailed Excavation in the Immediate Vicinity of Human Remains
5. Phase 5: Mapping and Collection of Evidence and Human Remains
6. Phase 6: After Comprehensive Documentation and Collection: Removal and Transport

R.. Wildfire Mass Fatality Scene Recovery Protocols
1. Phase 1: Perimeter Walk Around Burned Structure
2. Phase 2: Evidence of Human Remains Found, Rapid Large-Scale Excavation
3. Phase 3: Fine Detailed Excavation in the Immediate Vicinity of Human Remains
4. Phase 4: Collection: Removal and Transport

I. **<u>Preservation and Transport of Fire Damaged Human Evidence</u>**

A. Challenges of Fire Scenes
1. The remains may be:
   a) Extremely burned and fragmented

b) Difficult to recognize as human
c) Commingled remains cases hard to recognize

2. Fire Scene Considerations

B. Preservation and transport of fire-damaged human remains
1. Fire Suppression
2. Search & Location
3. Evidence Preservation
4. Recovery: Excavation & Screening
5. Packaging of Burned Remains
6. Transport & Storage of Human Remains
7. Case Studies

C. Fire suppression
1. Fire suppression efforts can damage and fragment burned human remains and associated evidence.

D. Search & location of human remains
1. Moving debris on or near remains may cause additional damage and fragmentation
2. Avoid the use of rakes in the debris pile
3. Minimize the number of searchers inside the structure footprint

E. Evidence preservation
1. Avoid stepping on or near the remains
2. Kneel (with kneepads) and work toward the remains
3. Identify skeletal elements as you process the scene

F. Recovery: excavation & screening
1. Causes further fragmentation of remains
2. Use small hand tools
3. Minimize damage to the fire victim

G. Evidence preservation
1. Fragile burned bones can be placed in labeled paper bags
2. Separated by anatomical region
3. Skull fragments, dentition and any orthopedic or other surgical devices should be bagged separately

H. Evidence preservation alternatives
1. Alternately, burned remains can be wrapped loosely in aluminum foil
2. Protect from further fragmentation
3. These can be placed in labeled evidence bags or cardboard boxes

I. Condition of Remains
1. Evidence Preservation

J. Transport & Storage of Human Remains
1. Paper bags & foil pouches
2. Placed in hard containers that minimize the jostling of remains in transit

3. Bodies on gurneys should be loosely strapped to avoid further crushing damage
4. Preserving Evidence: Burned Vehicles Case 1
5. Burned Vehicle Recovery: Case 2

K. Questions?

FIELD EXERCISES

XIV. **Team evaluations of their assigned scenarios**

A. Students discuss scene and scene processing
B. Designate group tasks

XV. **Scenarios Overview (Round Robin)**

A. Proctor stays at their respective scenario
1. Gives a summary of their scenario
2. Mindful not to give too much away.
3. Reinforce what has been learned in class.

XVI. **Scenario Investigations** ***See Lesson Plan for full scenario details***

Scenario #1

Scenario Overview:

Unhoused encampment with homicide: Location is an open field located on top of a hillside approximately 300 yards behind a fire station. Approximately 500 yards to the north at the bottom of the hill is primarily commercial with single story businesses lining a major street. To the south is single family house located approximately 500 yards away, with a view obstructed by the hillside and large trees.

Scenario Objectives:

1. Work as a team, look for witnesses and take statements.
2. Work as a team to devise strategy to process scene.
3. Identify evidence within the scene.
4. Identify the area of the fire's origin.
5. Identify all potential causes of the fire.
6. Identify the cause of the fire and rule out other potential causes.

For this scenario, the FFDIC students should observe the following:

1. Regarding the fire:
   a. Identify the use of an ignitable liquid as an accelerant.
   b. Rule out possibilities of accidental and natural causes of the fire.
   c. The fire's origin is near the victim's body.
   d. Identify shell casings related to GSW's in victims' body as evidence.
   e. Document the scene, witness statements and findings.
   f. Work together to identify each other's roles and responsibilities in an effort to improve teamwork.
   g. Request appropriate information from autopsy related to cause/manner of death.
2. Regarding the victim
   a. Identify through examination or forensic lab request two GSW's to victim.
   b. Determine any trauma to victim and determine pre/post fire trauma.
   c. Determine the degree and percentage of burns to victim's body.
   d. Interpret laboratory and toxicology reports. Students should reasonably
   e. Conclude that the victim died post ignition of the fire however was agonal breathing.
   f. Students will remove and examine victim, package and deliver to MERI van after the scenario.

With this information, the students should conclude the following:

1. *Mode of death (cause):* Gunshot wound to the head
2. *Manner of death: Homicide*
3. *Fire Cause: Intentionally set fire by open flame to vapors from gasoline to combustibles located around TA.*
4. *Students will be expected to provide on-going update to proctor during the field scenario prior to making their conclusions.*

Scenario #2

Scenario overview:

This scenario is a domestic violence, arson, and murder for hire case. The murder takes place in a boat that is moored in a marina boat slip. The husband is murdered by the boyfriend of his wife. The husband was working on his boat when attacked and strangled to death. The wife convinced the boyfriend to murder her husband so they could be together. After strangling the husband, the boyfriend pours gasoline on the victim and in the boat and sets it on fire to cover up any evidence

Scenario Objectives:

1. Simulate and practice safe tactics while investigating a fire while a boat is floating in the water at a marina (simulated).
2. Follow the scientific method to determine the origin and cause of the fire.

3. Conduct a thorough investigation into the circumstances surrounding the identification of the boat, the victim and next of kin if any.
4. Identify and collect any evidence related to the fire and explain how the evidence would be collected.
5. Identify any suspects in this case and determine what crime was committed based upon the facts.

In this scenario, the FFDIC students are expected to observe the following:

1. Regarding the Victim
   a. A deceased male in the boat with severe burns.
   b. X rays of the victim show a broken hyoid bone in his neck indicating strangulation.
   c. Lab report indicating the victim was dead before the fire.
2. Regarding the fire:
   a. Arson set fire to cover up murder

With this information, the students should conclude the following:

1. *Mode of death (cause): Strangulation*
2. *Manner of death: Homicide*
3. *Fire Cause: Arson*
4. *Students will be expected to provide on-going update to proctor during the field scenario prior to making their conclusions.*

Scenario #3

Scenario Overview:

Structure fire inside a studio apartment. The location is occupied by a male tenant. Fire is discovered burning at the location and the fire department is called. Upon arrival the fire is extinguished, and a victim is found deceased on the floor, face up, next to the bed.

Scenario Objectives:

1. Determine the area of origin and the general point of origin(s) of the fire.
2. Identify all potential ignition sources for the fire such as, electrical components/outlets, appliances, matches, lighters etc.
3. Develop & test hypotheses regarding the origin and cause of the fire.
4. Work with medical professionals to determine cause and manner of death.
5. Incorporate cause and manner of death into hypotheses, select final fire origin and cause hypothesis if able.

In this scenario, the FFDIC students are expected to observe the following:

1. Regarding the fire:
   a. Fire originated in the mattress area of the mattress.
   b. The ignition scenario will be ignition of ordinary combustibles in close proximity to the mattress.

c. Appliances will be plugged in, including the oven. Combustibles will be near the appliances.
d. There are multiple potential ignition sources for the fire.
e. Contact witnesses and elicit their observations.

2. Regarding the victim:
   a. There is a victim deceased within the studio apartment.
   b. The appearance of the victim including any *obvious* injuries, and the degree and percentage of burns. Once victim is removed, students are expected to observe the carpet under the victim is unburned or less burned indicating the victim was in place at or near the time of ignition.
   c. The circumstances that led to the victim being unable to escape (intoxication, etc.?)
   d. There are physical burns to the victim.
   e. There are alcohol/beer bottles that could provide information on the state of the victim at the time of the fire (intoxication).

For this scenario, the FFDIC students should conclude the following:

1. The most likely history of the scenario leading to conditions observed at the time of discovery:
   a. Fire originated on the mattress.
   b. The victim was engaged in the solicitation of prostitutes and an altercation occurred after inviting one to his residence.
   c. During the altercation, the victim was stabbed in the neck which led to his death.
   d. A fire was started in order to attempt to cover up the crime.
   e. The oven was turned on and set to 500 degrees in an attempt to make the fire/death look accidental.
   f. The suspects took the victim's Apple Macbook and 1969 Pontiac Firebird as they fled the scene.
2. Mode of death (cause): Sharp Force Injury
3. Manner of death: Homicide

Scenario #4

Scenario Overview:

Mobile-home fire with a single human fatality: This is a re-creation of an actual homicide in California City, CA, using gasoline, wood, & trash to ignite an outside fire that extends into a mobile home to conceal a murder. The occupant of the structure is an elderly female victim who is partially disabled due to a previous stroke and is wheelchair-bound. The victim is well known to police and fire due to frequent medical calls for possible 5150 (due to medication), sickness, and "fall" type injuries. The victim's Husband has been known to travel to Venezuela for several days at a time leaving the victim to fend for herself leaving her without food and power while gone. APS was called

on several occasions due to her inability to care for herself, but little to no action was taken by APS. The victim and her husband would routinely argue while EMS was on-scene, the husband would routinely try to prevent her from being transported to the hospital. Most of the domestic issues were due to the victim's burden upon the husband.

Scenario objectives:

In this scenario, the FFDIC students are expected to observe the following:

1. Skull fracture consistent with blunt force trauma
2. Arm fracture consistent with blunt force trauma
3. Cause of Death due smoke & CO
4. Burn margins consistent with pre-fire trauma and damage
5. Fire patterns consistent with an outside fire, transitioning under the structure, and then into the structure from underneath.
6. Ignitable liquid use
7. Lack of edible food in the fridge
8. Previous history of suspicious injuries to the victim.
9. Rule out premeditated ignitable liquid usage to start the fire
10. Rule out Electrical, Propane, appliance cause
11. Contact witnesses and elicit their observations.

For this scenario, the FFDIC students should conclude the following:

1. Regarding the Structure fire:
    a. The Point of origin for the fire is the BBQ ring, which fire spreads to the inside of the trailer due to nearby brush and gasoline. Ventilation flow path causes fire to extend inside the structure and easily ignitable materials.
    b. The true ignition source is a match.
    c. Students should note the multiple cigarette ashtrays, a propane bottle stored inside, and cigarette packs to identify chain-smoking behavior for accidental causes.
    d. Students should also note history by the police department, APS, hospital, and EMS for 51/50 and various medical issues. The victim is suspected to be a victim of physical and mental abuse due to medical Hx.
2. Regarding the victim (Jane Johansen)
    a. Students will determine the degree and percentage of burns and identify any injuries.
    b. Students will interpret laboratory and toxicology reports. Students should reasonably conclude that the report are consistent with previous history of fractures and probable abuse and death due to smoke & CO. SEE scene requirements Evidence/Lab requirement section below.
    c. Students should research the medical history of the victim including medications. (Medical reports will be provided from police, fire, EMS, and hospital reports).

d. Students should conduct witness/relative interviews about the victim.
e. Students should collect physical evidence such as the gas can, and ignitable liquid samples, etc.
f. Students should confirm ignitable liquids use via laboratory reports.
g. Students will remove and examine victim, package and deliver to MERI van after the scenario.
h. Students should identify fractures on the body of the occupant and relate damage to course teachings.

With this information, the students should conclude the following:

1. *Cause of death: Smoke and Carbon Monoxide*
2 *Manner of death: (Victim is dead before the fire)*
2. *Students will be expected to provide on-going update to proctor during the field scenario prior to making their conclusions.*

Scenario #5

Scenario Overview:

A vehicle has been abandoned and burned in a very remote area. Local volunteer firefighters were dispatched for smoke in the area and arrived to find a vehicle consumed by fire. Surrounding vegetation and the remainder of the vehicle was extinguished. During suppression efforts, fire crews identified a subject in the rear seat of the vehicle with major burn injuries. You are part of a local Task force assigned to assist with the investigation with city and county resources due to an ongoing investigation of possible homicide in the city limits.

Scenario Objectives:

1. Work with cooperating investigators and LE to determine the cause and classification of the fire and determination of death.
2. Obtain vehicle and owner information
3. Cooperate with the local municipal department for the location and type of crime committed
4. Identify the area of origin and ignition source
5. Collect evidence within the vehicle and surrounding area
6. Identify the decedent

Students are expected to observe the following

1. There is a burned one-story home with 2 fire fatalities located The vehicle was brought to this location
2. Rule out other potential ignition sources
3. Locate Bullet casing
4. Identify the rocks used to break windows inside the vehicle (ventilation)

With this information, the students should conclude the following:

1. *A drug deal took place with the murder of the subject taking place in the vehicle.*
2. *Identify vehicle and owner*
3. *Identify decedent*
4. *Identify ignition sequence Ignition source, materials first ignited, act or omission*
5. *Rule out other ignition sources*
6. *Identify origin of the fire(engine, passenger, cargo compartment)*
7. *Elements of the crime/ sequence of events*
8. *Cause of death: Head Injury, Gunshot*
9. *The cause of the fire was Arson: the vehicle was ignited to conceal the crime.*
10. *Manner of death – homicide.*

Scenario #6

Scenario Overview:

The fire is called in by a neighbor when they hear glass breaking. Upon arrival of the fire department primary fire attack discovers one victim in the recliner. Making further entry they find the second victim in a bed. Both victims were dead as a result of the fire. There was a lot of discarded smoking material throughout the structure. Investigator was called out as part of the initial response. The location was secured, and the Police and Fire Investigators were notified to respond.

Scenario Objectives:

1. Describe the appearance of the victim including any *obvious* injuries, and the degree and percentage of burns. Once victim is removed, students are expected to observe the carpet under the victim is unburned or less burned indicating the victim was in place at or near the time of ignition.
2. Determine the area of origin and the general point of origin(s) of the fire.
3. Identify all potential ignition sources for the fire such as smoking materials, electrical components/outlets, appliances, matches, lighters etc.
4. Locate evidence of cigarettes, matches, and alcohol leading to the circumstances surrounding victim's death.

In this scenario, the FFDIC students are expected to observe the following:

1. There are 2 victims deceased within the house.
2. The circumstances that led to the victim being unable to escape (victim completely inebriated and unconscious). Victim 1 in recliner, victim 2 in bed.
3. Fire originates from the kitchen.
4. An ignition scenario will be the ignition of ordinary combustibles near the coffee maker.
5. Appliances will be plugged in including the heater, toaster, coffee maker and microwave Combustibles will be near the appliances.
6. There are multiple potential ignition sources for the fire.

7. There are physical burns and/or injuries to the victim.
8. Students are to notice the alcohol bottles, Drug paraphernalia consider state of victim at the time of the fire.
9. Contact witnesses and elicit their observations.

For this scenario, the FFDIC students should conclude the following:

1. Regarding the structure fire:
   a. The area of origin of the fire is from the kitchen.
   b. The ignition source(s) of the fire is ordinary combustibles in/around coffee maker.
   c. Appliances "energized" and in the "ON" positions.
   d. There are multiple potential ignition sources to consider and eliminate.
2. Regarding the victim
   a. Students will determine the degree and percentage of burns and identify any injuries.
   b. Students will interpret laboratory and toxicology reports. Students should reasonably conclude that ignitable liquids were not present at the scene.
   c. Students should research the medical history of the victim.
   d. Students should conduct witness/relative interviews about the victim.
   e. Students will remove and examine victim, package, and deliver to MERI van at the conclusion of the scenario.

With this information, the students should conclude the following:

1. *Cause of death: Inhalation of smoke, carbon monoxide.*
2. *Manner of death: Accidental*
3. *Students will be expected to provide on-going update to proctor during the field scenario prior to making their conclusions.*

Scenario #7

Scenario Overview:

Murder-suicide with incendiary fire: This scenario is a simulation of an actual murder suicide with incendiary fire inside a residence in Shasta County, CA. The location is a semi-rural residential neighborhood in a bedroom community east of Redding, CA. The affected structure is a triple-wide mobile home sitting 75' off the paved county roadway.. On January 7, 2018, at approximately 17:07 hours a 911 report of a residential structure fire came into 911. Fire department units were dispatched to suppress the fire and conduct a fire investigation. The first arriving engine was Engine 33 staffed with volunteer firefighters. Two decedents, 72-year-old, Teresa Smith and 70-year-old Gary Smith, husband and wife, were located, seated in recliners facing the south wall facing the wall mounted television. A .380 semi-automatic handgun was in the lap of Teresa Smith. The suspect, 72-year-old Teresa Smith shot her husband, and sat in the chair next to him and committed suicide with a self-inflicted GSW to the right

side of her head. Teresa Smith was the only decedent in the residence with elevated carboxyhemoglobin levels, indicating she was alive while the fire was burning inside. The origin of the fire was in the northwest bedroom on a chair near the center of the room. The steel chair frame was entirely exposed and all combustible material materials on the chair were fully consumed by the fire. The floor around the chair was weakened by the fire. The floor had burned through in at least two places. Due to the consumption of all combustible materials on the chair no ignition source was located. The cause of fire is incendiary (arson).

Scenario Objectives:

1. Utilize a multi-disciplinary approach to processing the scene.
2. Work as a team, identify and interview witnesses.
3. Determine a crime scene.
4. Look for, identify, and collect all evidence inside the residence.
5. Thoroughly process the residence and determine fire cause.
6. Remove the victim and suspect. The autopsy will determine who was alive at the time of the fire.
7. Document the entire scene.
8. Prepare a report and present to the class

In this scenario, the FFDIC students are expected to observe the following:

1. Fire:
    a. The origin area was determined to be in a chair/recliner and is incendiary.
    b. The fire spread from the chair to other combustibles in the room and flashed over.
    c. Eliminate accidental causes.
2. Regarding the suspect (Teresa Smith seated in the chair)
    a. Students will determine the degree and percentage of burns and identify any injuries.
    b. Students will interpret laboratory and toxicology reports. Students should reasonably conclude that Teresa Smith was alive at the time of the fire and committed suicide with a handgun while the fire was burning.
    c. Students should research the medical history of the victim including medications.
    d. Students should conduct witness/relative interviews about the suspect.
    e. Students will remove and examine victim, package, and deliver to MERI van after the scenario.
3. Regarding the victim (Leroy Smith)
    a. Students will determine the degree and percentage of burns and identify any injuries.
    b. Students will interpret laboratory and toxicology reports. Students should reasonably conclude that Leroy Smith was deceased at the time of the fire.

c. Students should research the medical history of the victim including medications and drug use.
d. Students should conduct witness/relative interviews about the victim.
e. Students will remove and examine victim, package, and deliver to MERI van after the scenario.

For this scenario, the FFDIC students should conclude the following:

1. Regarding fire:
   a. The area of origin of the fire is at the doorway leading into the bathroom. The fire spreads from the doorway into the bathroom (air entrainment).
   b. The ignition source(s) of the fire is a road flare. The first fuel ignited is ordinary combustibles and the fire extends to the rest of the house and into the bathroom.
2. Regarding the victim (Ima Missing)
   a. Students will determine the degree and percentage of burns and identify if there are any injuries.
   b. The students should examine various accidental ignition sources in the bathroom (candles, hair dryer, outlets, etc.)
   c. There will be any autopsy and toxicology findings for this victim (elevated CO in the blood and soot present in the lungs).
   d. Students should research the medical history of the victim including medications. (Medication list will be provided).
   e. The students should discuss victimology and various behaviors of person under stress.
   f. Students should conduct witness/relative interviews about the victim.
   g. Students will remove and examine victim, package and deliver to MERI van after the scenario.

With this information, the students should conclude the following:

3. *Mode of death (cause): Victim was killed with a semi-automatic handgun by Teresa Smith.*
4. *Manner of death: Murder / Suicide*
5. *Fire Cause: Incendiary fire set inside the northwest bedroom by Teresa Smith to draw attention to the scene.*
6. *Students will be expected to provide on-going update to proctor during the field scenario prior to making their conclusions.*

Scenario #8

Scenario Overview:

Structure fire inside a studio apartment. The location is occupied by a male or female tenant. A fire is discovered burning at the location and the fire department is called. Upon arrival the fire is extinguished, and a victim is found deceased on the floor

between the stove and door to the outside. The victim is located underneath a large piece of furniture as a concealment of crime. The victim was dead before the fire. The mattress of the bed is offset and appears to have been moved prior to the fire. Victim was using the mattress to stash the marijuana. The location was secured, and the Police and Fire Investigators were notified to respond. The victim sustained head trauma from being physically assaulted prior to the fire and the autopsy reveals a significant skull fracture. The investigation also reveals a small Butane Honey Oil (BHO) operation is also at the location.

Scenario Objectives:

1. Characterize the appearance of the victim including any *obvious* injuries, and the degree and percentage of burns.
2. Once the victim is removed, observe the carpet under the victim and determine whether or not the victim was in place at or near the time of ignition.
3. Determine the area of origin and the general point of origin(s) of the fire.
4. Identify all potential ignition sources for the fire such as smoking materials, electrical components/outlets, appliances, matches, lighters etc.
5. Locate and characterize evidence of the homicide and butane honey oil operation.

Students are expected to observe the following:

1. There is a victim deceased within the studio apartment.
2. The circumstances that led to the victim being unable to escape (dead prior to the fire).
3. Fire originates from the gasoline trailer leading to the stove area.
4. Ignition scenario will be ignition of ignitable liquid vapors from the gasoline.
5. Stove will be in the "ON" position.
6. There are multiple potential ignition sources for the fire including evidence from BHO lab.

For this scenario, the FFDIC students should conclude the following:

1. Regarding the structure fire:
    a. The area of origin of the fire is from the door to the stove area.
    b. The ignition source(s) of the fire is vapor ignition from the gasoline trailer.
    c. Stove is in the "ON" position.
    d. There are multiple potential ignition sources to consider and eliminate
2. Regarding the victim
    a. Students will determine the degree and percentage of burns and identify any injuries.
    b. Students will interpret laboratory and toxicology reports. Students should reasonably conclude that ignitable liquids, THC, and Isobutane were present at the scene. See scene requirements Evidence/Lab requirement section below.

c. Students should research the medical history of the victim.
d. Students should conduct witness/relative interviews about the victim.
e. Students will remove and examine victim, package and deliver to MERI van at the conclusion of the scenario.

3. Mode of death (cause): Major trauma to skull.
4. Manner of death: Homicide
5. Fire Cause: The area of origin of the fire is from the door to the stove area. The ignition source(s) of the fire is vapor ignition from the gasoline trailer

Scenario #9

Scenario Overview:

A vehicle is set on fire to cover up homicide. Fire investigation reveals flammable liquids on and around the female victim and the vehicle. Autopsy will reveal the victim has multiple injuries and was deceased prior, due to GSW. A citizen walking his dog in the area noticed the vehicle on fire and called 911. The fire department arrives and during the fire suppression they locate the deceased victim in the passenger/cargo space of the vehicle. This scenario is designed to incorporate the CHP training aid in the auto vs pedexperiment into a fire scene. A vehicle is set on fire to cover up homicide.

Scenario Objectives:

Students will successfully conduct an origin and cause investigation that will culminate in determining:

1. the cause of the fire
2. the origin of the fire
3. the cause of death
4. the manner of death.

In this scenario, the FFDIC students are expected to observe the following:

1. There is a suspicious vehicle fire with a deceased victim in the front passenger seat or bed.
2. The location of the fire is mostly limited to the vehicle.
3. The fire originates on and around the victim's decedent and vehicle.
4. The bike auto vs ped experiment will be placed in close proximity to training area.
5. Skid marks near the entry to the training area will need to be documented.
6. The victim has GSW injuries and injuries consistent with being hit be a vehicle.
7. Contact witnesses and elicit their observations and additional possible evidence.
8. Determine that a homicide has occurred and attempt to determine who the suspect(s) responsible forthe crime is/are.

9. If a pick-up truck is used, the TA will be located in the bed of the truck!

For this scenario, the FFDIC students should conclude the following:
Regarding the vehicle fire:
1. The area of origin of the fire is the passenger space of the vehicle.
2. The ignition source of the fire is a lighter.
3. Need to rule out auto recalls.

Regarding the victim:
1. Students will determine the degree and percentage of burns and identify any injuries.
2. Students will interpret laboratory and autopsy reports. Students should conclude that the victim was deceased prior to the fire and that her injuries are the result of being struck by a vehicle and then shot.
3. Students will identify the scene as a crime scene and follow appropriate steps to secure the scene, process and collect related evidence.
4. Students should conduct witness/acquaintance interviews regarding the victim and any possible suspect(s).
5. Students will remove and examine victim, package, and deliver to MERI van after the scenario.

With this information, the students should conclude the following:
1. *Cause of death: GSW to the head.*
2. *Manner of death: Homicide.*
3. *Fire Cause: Arson.*
4. *Students will be expected to provide on-going update to proctor during the field scenario prior to making their conclusions*.

Scenario #10

Scenario Overview:

Structure fire inside a studio apartment. The location is occupied by a male or female tenant. A fire is discovered burning at the location and the fire department is called. Upon arrival the fire is extinguished, and a victim is found deceased on the floor, face down, near the door to the outside. The victim was dead as a result of the fire. Alcohol bottles and discarded smoking materials are scattered throughout the apartment, bed, and floor. The location was secured, and the Police and Fire Investigators were notified to respond. The victim sustained no injuries.

Scenario Objectives:
1. Describe the appearance of the victim including any *obvious* injuries, and the degree and percentage of burns. Once victim is removed, students are expected to observe the carpet under the victim is unburned or less burned indicating the victim was in place at or near the time of ignition.

2. Determine the area of origin and the general point of origin(s) of the fire.
3. Identify all potential ignition sources for the fire such as smoking materials, electrical components/outlets, appliances, matches, lighters etc.
4. Locate evidence of cigarettes, matches, and alcohol leading to the circumstances surrounding victim's death.

Students are expected to observe the following

1. There is a deceased victim within the studio apartment.
2. The circumstances that led to the victim being unable to escape (victim completely inebriated and unconscious). Victim face down on floor.
3. Fire originates from the mattress.
4. Ignition scenario will be ignition of ordinary combustibles in close proximity to the mattress.
5. Appliances will be plugged in including the heater. Combustibles will be near the appliances.
6. There are multiple potential ignition sources for the fire.
7. There are physical burns and/or injuries to the victim.
8. Students are to notice the alcohol bottles and consider state of victim at the time of the fire.
9. Contact witnesses and elicit their observations.

For this scenario, the FFDIC students should conclude the following:

1. Regarding the fire:
   a. The **area of origin of the fire** is from the mattress.
   b. The **ignition source(s) of the fire** is ordinary combustibles in/around mattress.
   c. Appliances "energized" and in the "ON" positions.
   d. There are multiple potential ignition sources to consider and eliminate.
2. Regarding the victim:
   a. Students will determine the degree and percentage of burns and identify Students will determine the degree and percentage of burns and identify any injuries.
   b. Students will interpret laboratory and toxicology reports. Students should reasonably conclude that ignitable liquids were not present at the scene.
   c. Students should research the medical history of the victim.
   d. Students should conduct witness/relative interviews about the victim.
   e. Students will remove and examine victim, package, and deliver to MERI van at the conclusion of the scenario.

With this information, the students should conclude the following:

1. <u>Mode of death (cause):</u> Smoke inhalation

2. Manner of death: Accidental
3. Fire Cause: Accidental

Students will be expected to provide on-going update to the proctor during the field scenario prior to making their conclusions.

Scenario #11

Scenario Overview:
This is a domestic violence case.

Homicide occurs while getting the kids ready for school as usual.. The wife hits the husband with a bat to the back of the head. She then places male clothing in a line from the victim to the front door. (this constitutes a trailer for a set fire to follow) She then pours isopropyl alcohol on the trailer and ignites it. She then leaves to take the kids to school and comes back to find the fire department on scene.

There are 2 video cameras, one at the front of the house and the other at the school.

The wife can be seen leaving the house with a bat and dropping it off at the school in some bushes. The coroner's report indicates blunt force trauma to the back of head, no soot in lungs. Once the FFDIC students have figured out the trailer and have processed their scene, the videos which were recovered from surveillance can be shown to them together with the coroner's report.

Scenario Objectives:

1. Work as a team, look for witnesses, and get good statements from first responders, spouse,
2. Look for all possible evidence inside and outside of the vehicle.
3. Thoroughly process the scene for all possible fire causes.
4. Remove the victim with care as only an autopsy can rule out foul play.
5. Document the entire scene as indicated by classroom training/knowledge received.
6. Determine the fire origin.
7. Determine the cause of the fire. The fire investigator should take a joint lead with the LE officer as he/she is not experienced in fire scene processing.

Students are expected to observe the following:

1. That the clothes are adult male clothing and not children's clothing
2. That the clothing is configured as a trailer for fire to follow
3. Remnants of the trailer
4. Gas can which is present has nothing to do with the incident.
5. *Correctly* interpret autopsy findings and toxicology reports.
6. *Correctly determine the cause of the fire, mode, and manner of death*

Proctor Responsibilities:

1. Review student work experience with the group before scenario begins.
2. Conduct safety briefing at the location and tour scenario site. Provide information of items that are "out of play" located in, or nearby, their scenario. Examples of out of play would be miscellaneous discard debris on the ground.
3. Emphasize eye and hand protection
4. Disseminate information-clues in a logical pre-determined manner to keep students engaged but not complete the scenario until all appropriate fire and death investigation needs have been met.
5. Challenge students to ensure they are on the path to success prior to making their final conclusions by developing hypotheses throughout the scenario per NFPA 921-1033 and FFDIC classroom curriculum.
6. Ensure all photos and videos are provided to students for review and Friday presentations.
7. *The Proctor must ensure that students provide a reasonable and logical explanation of how the scenario occurred, the cause of the fire and the mode and manner of death.*

Student Responsibility:

1. Investigate the Origin and Cause of the fire
2. Investigate the Mode and Manner of death using all available resources.
3. Provide on-going updates to proctor during the field scenario.
4. Examine training aid, package for delivery to MERI van after the scenario is complete.
5. *Provide final conclusions to proctor with the final determination of fire cause and the mode and manner of death.*
6. Complete PROCTOR EVALUATION before leaving training site.
7. Create Power Point presentation for Friday student presentations.

Regarding the victim:

1. Students will determine the degree and total percentage of burns.
2. Students will physically examine the training aid before and after they remove the training aid from the vehicle.
3. Students will identify any injuries and the instrument that caused the injury.
4. The body position of the victim at the time of the injury.
5. Students will explain medical history (No known hx)
6. Students will interpret laboratory/toxicology reports, X-rays and autopsy reports.
7. Students will provide a final hypothesis of the mode/manner of death.

Regarding the fire:

Sample Questions for Students During Scenario
Using the Guidelines of NFPA 921 and NFPA 1033

1. Explain the area and point of origin.

2. Explain the potential ignition sources for the fire and which ignition source is most probable and valid.
3. Determine if there is evidence of an accelerant used or suspected.
4. Explain the fire growth, path of fire and smoke spread.
5. Explain toxic fire gases created by this fire.
6. Provide an **INITAIL** hypothesis for the fire cause during the scenario.
7. Provide a **FINAL** hypothesis and cause of the fire at the conclusion of the scenario.

Students should conclude the following:
The most likely history of the scenario leading to conditions observed at the time of discovery:

Regarding the fire:

1. The area of origin of the fire is near the doorway.
2. The point of origin of the fire near the doorway.
3. The ignition source for the fire in unknown but should be opined based on the trailer.
4. There is a trailer of adult male clothing between furniture items and to the front door.
5. Students will **explain the ignition source(s)** of the fire as well as the spread of the fire.

Regarding the victim:

Using the Guidelines of NFPA 921, NFPA 1033, Lecture Material and Expertise:

1. Explain the degree and percentage of burns on TA.
2. Explain how injuries occurred to the TA, what instruments inflicted these wounds.
3. Explain all laboratory reports associated with TA autopsy.
4. Explain an **INITAIL** hypothesis for the death.
5. Provide a **FINAL** mode and manner of the death and how the fire and death are linked together.
6. Mode of death (cause): Blunt force to facilitate appearance of suicide
7. *We expect students to provide on-going updates to proctor during the field scenario prior to making their conclusions*

Advanced Class Scenario

Scenario Overview:

(Present day/time.) Firefighters from Station 17 observed a small header coming from the apartment complex across the street during shift exchange. Engine 17 self-dispatch to the fire, pulling the hook while enroute. Engine 17 (Captain Hannan) arrives at 0605 hours and begins to scout the apartment complex. Firefighter Jackson (E17)

discovers smoke coming from a small window of unit 9. Firefighters forced entry and extinguished the small fire, discovering a burned body (female or male) sitting up on the sofa within the living room. The fire victim was determined to be deceased. Fire Investigators were requested upon locating the decedent.

Reportedly, unit 9 was used as an office by the owner of the apartment complex. Neighbor Bob Jones (unit 3) was contacted by firefighters and provided the information. The owner of the property was identified as Tom Brown.

Officer Kim Thomas was first to arrive and initially secure the scene after receiving a briefing from Captain Hannan (E17). While his guys pulled hose lines and forced entry, Captain Hannan secured the power to the involved unit. Reportedly, circuit # 3 has tripped. All circuits were placed in the OFF position. Jim Knox responded from the Gas Department and shut off the gas. The power company gave a 2-hour ETA.

Contact and interview with Officer K. Thomas revealed suspicious circumstances were observed concerning the interior of the apartment. Looking through the window, it looks like the apartment may have been ransacked. A records check concerning the alleged Victim indicates the Victim has a current license and no recent criminal history. CNI indicates a different home address and appears he may be married. A possible home address and phone number will be provided to the investigative team. Additionally, an adjacent neighbor looked to have a camera mounted in the direction of the unit involved. No one answered at the time, it was still dark. Might check back with them.

A call was received from a concerned citizen who is a realtor who says she last saw and spoke to Tom Brown on Friday afternoon. Amy Bragg left her contact information. Also, the separated spouse (Tracy Brown) called the police to report Tom missing. She called back several hours later and said she received an alert from one of Tom's credit card companies to call back regarding suspicious activity. She is very concerned.

Chris Boyd (Unit 10) was later identified as the owner of the surveillance camera. Video footage captures limited video which is believed to be motion activated. Several interesting pieces of information were observed as being directly related to this investigation:

1. A subject was observed walking away from unit 9 at 0539, prior to the fire.
2. A similar subject was observed walking towards unit 9, from unit 11 at 2111 hours the day before the fire.
3. A similar subject was observed two days prior to the fire stepping into unit 9.
4. The victim has not been seen on surveillance footage since Saturday, at 1423 hrs. and it appears as if he was with another female.

In the meantime, an autopsy has been completed on Tom Brown's body. The Medical Examiner (Dr. Feelgood) has requested both the fire investigators and homicide detectives to her office for an update. In the meeting, a baffled M.E. explains that the victim (Tom Brown) did not die as a result of the fire. Furthermore, a gunshot wound was discovered to his torso during the autopsy, but testing suggests that the gun shot was not the cause of death. An end-organ perfusion test indicates the victim died prior to being shot. The M.E. indicates that the victim died several days before he was

discovered in the fire. Additional testing has been completed, and results should arrive soon before declaring a cause of death.

The man in the video is identified as Matt Clark, the Victim's next-door neighbor. A records check indicates Matt Clark was recently released from prison and is on Parole for robbery.

Scenario Objectives:

1. During the course of this investigation:
   a. Students will respond and conduct a site safety inspection.
   b. Students will wear personal protective equipment as needed.
   c. Students will work together to conduct the investigation.
2. The Investigation:
   a. Conduct systematic approach utilizing the scientific method
   b. Survey the scene's exterior and interior
   c. Identify the fire's area of origin
   d. Process the scene for possible causes, ignition sources, arc mapping, and examine the structure's gas, electrical and fire protection systems.
   e. Conduct Witness interviews
   f. Thoroughly process the decedent; to include diagrams of the body's location and documentation of burn injuries. Or any other injury observed.
   g. Identify, collect, and package all applicable evidence
   h. Document all aspects of fire investigation; to include photographs, video, diagrams, internet searches, autopsy reports, etc.
   i. Present case to the District Attorney's office in support of the filing.
3. Students will answer the following:
   a. Was a crime committed?
   b. If so, what applicable crimes were committed in this case?
   c. Who committed the(se) crime(s)?

Students are expected to observe the following:

<u>Regarding the Fire:</u>

1. Identify fire's origin – *How was it identified? Fire Patterns/Effects, Fire Dynamics, Witness statements, Video footage, etc.*
2. Identify all ignition sources - Document
3. Identify all applicable evidence – *Location found, how collected, tested etc.*
4. Identify all witnesses – Obtain statements

<u>Regarding the Victim:</u>

1. Identify and examine the decedent - *Observations*
2. Document all findings - *Include body positioning, location, observations, degree, and depth of burns etc.*
3. Review Coroner's report and Toxicology results – *Any additional testing requests?*

Students should conclude the following:
(*Based on a systematic approach utilizing NFPA 921 and 1033 standards***)**
Prefire/postfire conditions

A. Fire patterns/effects, window and door positions pre/post fire if possible
B. Presence of Smoke Detector/Alarm, if any
3. The area of origin *(Fire originated on the right side of couch.)*
4. The Victim's injuries and explanation
5. The storied event as told by Witnesses
6. Obtain medical history of victims if possible
7. Should evaluate/examine outlets, space heater, lamp(s) as ignition sources
8. Conduct consumer search for recalls or open campaigns on electrical sources
9. Identify camera across the street which caught Suspect on video
10. Develop, test, and select the final hypotheses based on totality of the investigation

Final Conclusions:

1. Conclude ***Fire Cause*** was incendiary (positive for ignitable liquids)
2. Conclude what if any charges the suspect may be responsible for concerning gunshot wound.
3. Conclude the ***Cause of Death*** (*Natural Causes– As per M.E.'s opinion*)
   a. (Death prior to fire: No soot in the Victim's trachea – Tox screen confirms HIGH amounts of depressant – Ativan, and x-ray confirms fracture of Hyoid bone in neck.)
4. Conclude the ***Manner of Death*** is Natural
5. Identify applicable California Penal Code violations

XVII. **Debrief and Clean-up**

A. Content Covered
   1. Questions and clarification
B. Site breakdown

Thursday – Field Day 2

FIELD EXERCISES continued

XVIII. **Ops and Safety Briefing**

A. Review of IAP (Safety Policy)
   1. Review daily activities

XIX. **Scenario Investigations**

A. Specific Group Assignments

1. Reports

XX. **Debrief and Clean-up**

A. Content Covered

1. Questions and Clarification

B. Site Breakdown

XXI. **Student Case Presentation Development**

A. Group Presentation Workshop

1. Large group workshop
2. Small Group workshop

Friday – Classroom Day 3

XXII. **Final Examination**

A. Students complete the final course exam

1. Final examination review

XXIII. **Student Case Presentations**

A. Investigative Team Reviews

1. Scene Findings
2. Exhibits
3. Evidence

B. Instructor Reviews

1. Scene Findings
2. Exhibits
3. Evidence

XXIV. **Course Closure**

A. Evaluations

1. Verbal feedback discussion

2. Written evaluations

B. Certificate Distribution