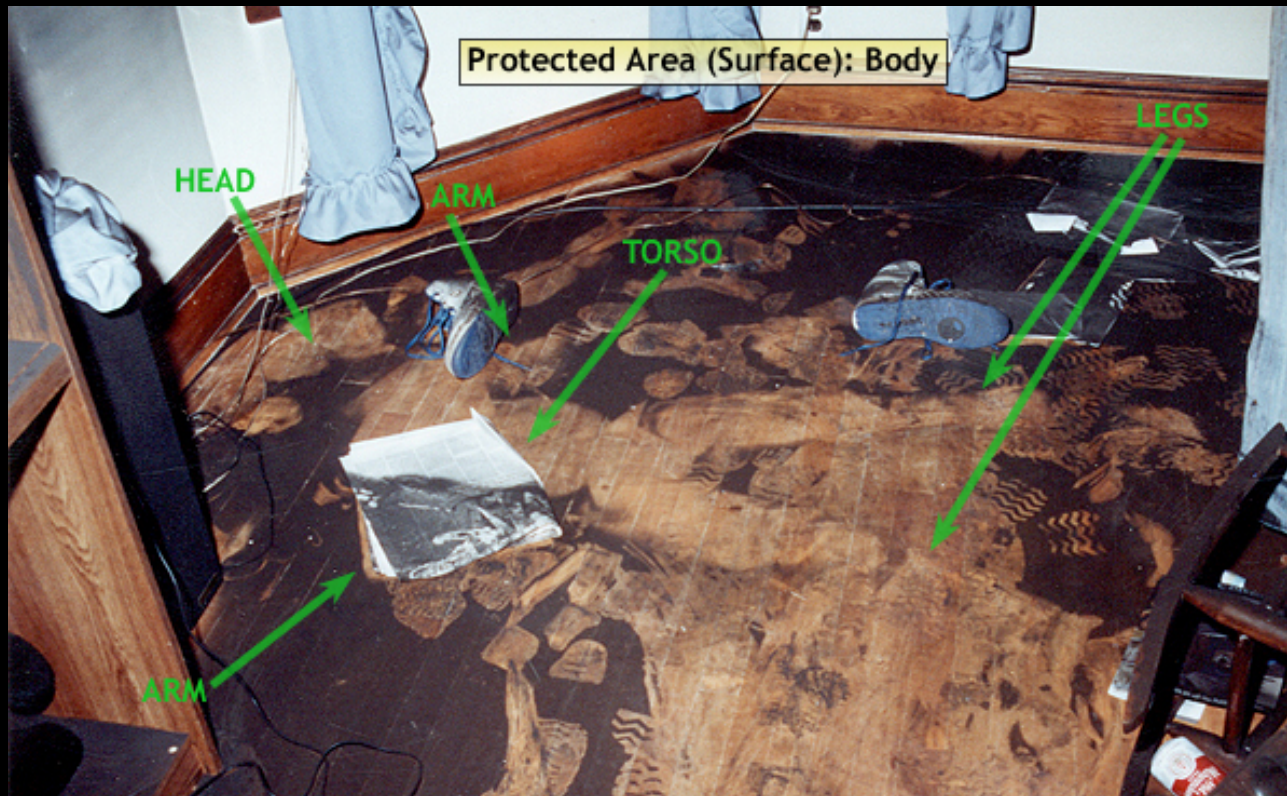


# Fire Related Fatality/Injury Investigation



# Mechanics of death and injury

- Carbon Monoxide
- Hydrogen Cyanide
- Other inhalation toxins
  
- Anoxia
  
- Irritant gases

- Smoke particles
  - Visual obstruction
    - Psychological barrier to moving forward?
  - Respiratory compromise

- Hyperthermia
  - Temperature
  - Humidity
  - Duration

- Skin burns
  - Heat flux vs skin temperature
  - Values
    - 1 kW/m<sup>2</sup> – Pain
    - 4 kW/m<sup>2</sup> – Blister
    - 10 kW/m<sup>2</sup> – pain after 5 seconds
      - Likely to ignite clothing quickly
      - Melt synthetics

- Explosion related injuries
  - Blast pressure
  - Shrapnel
  - Thermal
  - Building collapse

# Scene documentation

- Determination of artifact location is critical.
  - Victims are artifacts for investigative purposes
- Document EXACT body location
  - Correlate to furnishings
  - Compartment boundaries
  - Ventilation openings

# Documentation of scene

- Questions will arise later
  - Exacting detail allows others to visit scene later
  - Collection of evidence facilitates understanding fire dynamics
    - Identify wall coverings
    - Furnishing materials
    - Clothing
    - Fuel packages



What was the victim doing?

Before the incident

During the incident

That may contributed to death or injury

# Human Behavior

- Identify factors of human behavior as they apply to situations presented
- Were actions taken reasonable?
- Did the individual have physical limitations?
- Cognitive limitations?

## Evidence used to test hypothesis

- Surveillance video
- Witness interviews
- Artifacts present
- Settings of items in area
- Transactions
- Habits

# Familiarity with the setting

- What changed with:
  - Presence of flame
  - Smoke presence

# Human actions that affect fire spread

- Vent openings
- Change in interior barriers – open doors
- Attempts to fight fire?

- Sift debris within proximity of body
  - At least within arm's reach
  - Recommend assuring all items are recovered from the compartment
  - What could the victim have been doing before and during the fire?

Determine

## Escape factors

- Identifiability of escape routes
- Distance to means of escape
- Fire conditions at the time of escape
- Presence of dead end corridors
- Blocked egress (obstacles or people)
- Physical abilities of the victim



# Fire alarm system

- Location
- Operation
- Limitations of the system
- Did the system operate?
  - Was the operation adequate for performance standards?

# Fire suppression systems

- What agent was discharged?
- Did that affect escape?

# Maintenance and operation

- Equipment
- Facilities
- Arrangement
- Observe Housekeeping

# Products

- What was present?
- Did it contribute to the fire?
- Contribute to the injury / death?
- Warnings, labels and instructions

# Document and consider preserving/collecting

- Appliances in the area
  - Regardless if this is the area of fire origin
    - Audio device on?
    - Television on?
    - Ear buds in?
    - Could they hear the smoke detector?
- PRESERVE or COLLECT ITEMS PROPERLY

## Actions taken by victim

- Ignore the problem
- Investigate
- Fight the fire
- Give alarm
- Rescue or aid others
- Re-enter after successful escape
- Escape
- Remain in place

# Compare Conditions to Fire Dynamics

# Information from survivors or others

- Pre-fire conditions
- Fire and smoke development
- Victims activities before, during and after discovery of fire
- Actions taken by survivors resulting in survival
- Decisions made and reasons for those decisions
- Critical fire events
  - Flashover
  - Structural failure
  - Etc...



Comments?