



Residential House Fire Claims the Life of One Career Fire Fighter— Florida

SUMMARY

On November 25, 2000, a 30-year-old career male fire fighter (the victim) died in a residential house fire. At 0135 hours, fire fighters received a call of a reported structure fire. Engines 5, 2, 1, Ladder 11, and Rescue 32 responded to the early morning call. At 0141 hours, Engine 5 arrived on the scene and the Captain assumed incident command (IC). The IC reported to dispatch that they had a well-involved, single-story house fire. He then decided to send a search team inside the structure because it was unclear if the homeowners had exited. The victim from Engine 5, and the Captain and the Lieutenant from Rescue 32, teamed up to enter the house and complete the search. The victim, Captain, and Lieutenant advanced a 1¾-inch handline through the front door as the Captain and Lieutenant from Ladder 11 were ordered to set up a positive pressure ventilation (PPV) fan at the front door and then back up the search crew. The Lieutenant and a fire fighter from Engine 1 advanced a second line to the rear of the structure to attack the fire. The victim, and the Captain and Lieutenant from Rescue 32, advanced their line down a hallway

and into a bedroom when the Captain noticed heavy fire in a room off to their right. The Captain requested that the victim pass him the nozzle because there was heavy fire in an adjacent room in the rear of the structure and he was afraid it was going to flash. The Lieutenant responded, saying that they could not locate the nozzle. In fear of a possible flashover, the Captain ordered the victim and Lieutenant to exit immediately. As the three attempted to exit, the hallway became heavily involved with fire. The Lieutenant and Captain fell over debris and the victim became disoriented. The Captain and Lieutenant exited the structure but the victim did not exit. The IC immediately ordered exterior crews to enter the structure and search for the missing victim. Approximately 56 minutes later, fire fighters found the victim. He was pronounced dead at the scene.

NIOSH investigators concluded that, to minimize the risk of similar occurrences, fire departments should

- **ensure that the department's standard operating procedures (SOPs) are followed**



Photo courtesy of the Fire Department

Incident Site: Single-Story Residential Home

The **Fire Fighter Fatality Investigation and Prevention Program** is conducted by the National Institute for Occupational Safety and Health (NIOSH). The purpose of the program is to determine factors that cause or contribute to fire fighter deaths suffered in the line of duty. Identification of causal and contributing factors enable researchers and safety specialists to develop strategies for preventing future similar incidents. The program does not seek to determine fault or place blame on fire departments or individual fire fighters. To request additional copies of this report (specify the case number shown in the shield above), other fatality investigation reports, or further information, visit the Program Website at

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- *ensure that when entering or exiting a smoke-filled structure, fire fighters follow a hoseline, rope, or some other type of guide and refresher training is provided to reinforce the procedures*
- *ensure that a rapid intervention team(s) (RIT) is established when fire fighters enter an immediately dangerous to life and health atmosphere, and the RITs be properly trained and equipped*
- *consider providing all fire fighters with a personal alert safety system (PASS) integrated into their self contained breathing apparatus*
- *consider increasing the number of fire fighters on engine companies to perform in accordance with NFPA standards*
- *consider providing all fire fighters with portable radios or radios integrated into their face pieces.*

Additionally, dispatchers and emergency call takers should

- *obtain as much information as possible from the caller and report it to the responding companies.*

INTRODUCTION

On November 25, 2000, a career male fire fighter (the victim) died in a residential house fire. At 0135 hours, the victim responded to the call and became a part of the interior search crew. The crew stretched their line to the rear of the structure before being forced to exit due to fire conditions. During their exit, the victim became disoriented and did not exit. The victim was located and pronounced dead at the scene at 0250 hours.

On November 27, 2000, the U.S. Fire Administration and the International Association of Fire Fighters (IAFF) notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On December 14, 2000, two safety and occupational health specialists from the NIOSH Fire Fighter Fatality Investigation and Prevention Program investigated this incident.

Meetings and interviews were conducted with the Chief, Battalion Chiefs, the Safety Officer, fire fighters who were involved in the incident, the fire department's Fire Marshal, a representative with the local police department, and a representative from the IAFF. Investigators visited the incident site, and took photographs and completed drawings of the incident site. Additional photographs and drawings were obtained from the local police department. NIOSH investigators also reviewed witness statements, a copy of the dispatch tape and transcribed notes, the victim's training records, the fire department's training procedures and standard operating procedures, the victim's autopsy report and video footage of the incident site.

The fire department involved in this incident is comprised of 137 uniformed personnel. The department serves a population of approximately 60,000 in a geographical area of 25.9 square miles. The department requires all new fire fighters to complete a City orientation program, Fire Fighter Level I and Fire Fighter Level II (in accordance with NFPA standards), and a physical agility exam. Refresher training is provided periodically. The refresher training consists of courses such as search and rescue, blueprint reading, high angle and confined space rescue, and fire origin and cause. The victim's training records were reviewed by NIOSH investigators and appeared



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to be sufficient. The victim had approximately 4 years of experience as a fire fighter.

The structure involved in this incident was a single-story residential home (Photo 1). The structure measured approximately 52 feet by 59 feet. The structure had an attached roof on side C, measuring approximately 19 feet by 21 feet, which served as a carport. The fire's origin was determined to be in the kitchen (see Diagram). The fire was declared as accidental due to cooking.

INVESTIGATION

On November 25, 2000, at 0135 hours, fire fighters received the call of a reported structure fire. Engine 5 (a Captain, an acting Lieutenant, and a fire fighter [the victim]), Engine 2 (a Captain, a Lieutenant, and a fire fighter), Engine 1 (an acting Captain, an acting Lieutenant, and a fire fighter), Ladder 11 (an acting Captain and an acting Lieutenant), and Rescue 32 (an acting Captain and an acting Lieutenant) responded to the call. At 0141 hours, Engine 5 arrived on the scene and the Captain assumed incident command (IC). He reported to dispatch that they had a well-involved, single-story house fire (Photo 1 and Diagram). The majority of the fire fighters interviewed stated that they recalled seeing heavy smoke and fire extension from side C of the structure, indicating that the fire was self-venting through the rear of the structure. The IC ordered dispatch to get the utility (power) company en route and ordered all other responding companies to stand by for their assignments. Within the next 1½ minutes, all first-alarm companies reported as on the scene. The IC ordered his fire fighter (the victim) to pull a 1¾-inch preconnect handline off their engine and stretch it to the front door. He then radioed the Captain and Lieutenant from Rescue 32 to team up with the victim, make entry through the front door, and search for possible

occupants. *Note: Due to the time of the call, the IC was concerned that the structure might be occupied.*

The IC then attempted to complete a walk-around size-up of sides A, B, C, and D before ordering the Captain and Lieutenant from Ladder 11 to set up their positive pressure ventilation (PPV) fan in the front door. *Note: The IC could only size up sides A, B, part of C, and D, because of a fence which cut off the rear.* After setting up the PPV fan, the Captain and Lieutenant were ordered to enter the structure, follow the hoseline taken in by the search crew, and assist in the search for occupants. The IC ordered dispatch to strike a second alarm and Engine 3 and Ladder 16 were dispatched to the scene at 0143 hours. The IC then ordered Engine 1 to pull a second 1¾-inch preconnect handline off of Engine 5 and advance it through the front door for fire attack, and to back up the search crew. Unclear of the order, the Captain from Engine 1 ordered his fire fighter to stretch a 1¾-inch handline to the B/C corner of the structure for fire attack (Photo 2 and Diagram). The Lieutenant from Engine 1 met up with the fire fighter and assisted in advancing the hoseline to the rear of the structure. The crew from Engine 2 was ordered to pull a 5-inch main supply line from Engine 5 and hook it into a nearby fire hydrant. After making their hookup, the IC ordered them to pull a 1¾-inch preconnect off their engine, hook it up to Engine 5, and protect the D exposure.

The search crew (the victim and the Captain and Lieutenant from Rescue 32) advanced their handline through the front door and down the cluttered hallway toward the rear of the structure (Photo 3 and Diagram). *Note: Fire fighters stated that there was debris and furniture throughout the hallway.* The Captain and Lieutenant from Ladder 11 positioned the PPV fan in front of the



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front door and fed additional hoseline to the search crew. The interior crews stated that there was no visible fire, but heavy smoke when they entered the structure.

The Lieutenant and the fire fighter from Engine 1 opened their line up on a trailer with lawn equipment, which was burning in the rear. After knocking down most of the lawn equipment fire, they opened up a straight stream and applied it to the heavy fire emitting from the eaves of the partially collapsed carport (B/C corner) (Photo 4). *Note: The Lieutenant stated that he never received a direct order of operation and was unaware that any fire fighters were inside the structure at this time.* Shortly thereafter, the Lieutenant and the fire fighter from Engine 1 turned their hoseline to a small, burning shed, to the left of the covered carport. The Captain and Lieutenant from Rescue 32 stated that the victim, who was on the nozzle, entered a bedroom near the rear of the structure (Photo 5 and Diagram). The Lieutenant stood at the door of the room as the Captain remained in the hallway. The Captain and the Lieutenant stated that at this time the PPV fan was clearing up the heavy smoke conditions. The Captain from Rescue 32 stated that he looked into a room toward the D side of the structure (a room in front of the kitchen where the fire started) and saw a large amount of fire through the kitchen doorway. He yelled at the Lieutenant from Rescue 32, requesting the nozzle in fear that the room would flashover. The Lieutenant responded to the Captain's request stating that they could not locate the nozzle. With the heat intensifying, the Captain ordered the victim and Lieutenant to exit the structure immediately. At this point, the Lieutenant and fire fighter from Engine 1, who were on the B/C corner, recalled seeing the roof over the kitchen begin to collapse. The Captain from Rescue 32 stated that the Lieutenant turned and went in front of him toward the front door

and the victim turned and was face to face with him. The Captain then turned, which placed the victim behind him, and attempted to exit. The Lieutenant stood and began to run toward the exit before falling over heavy debris (clothing, furniture, and paper products). At approximately 0147 hours, the Captain stated that heavy fire filled the hallway and he also fell to the floor. He then told the Lieutenant that they had to go through the fire to exit the structure. The Captain then proceeded to pass the Lieutenant and exit the structure. The Lieutenant exited the structure shortly after. The Captain did not see the victim exit, but assumed the victim was right behind him. He asked the Lieutenant if the victim had exited and the Lieutenant could not recall if he did.

At this point the Captain and the Lieutenant from Ladder 11 recalled seeing fire emitting from the front door and the Captain then shut down the PPV fan. The IC reported seeing a civilian in the road, just in front of the house, stating that her husband was going to need an ambulance for smoke inhalation. The IC radioed dispatch for an ambulance at 0149 hours. The Captain from Rescue 32 approached the IC reporting that the victim did not exit the structure. The Lieutenant from Engine 1, who was still on the B/C corner, broke out the rear window on the B side wall (Photo 2). He recalled being able to see fire on the interior D-side wall. The IC ordered the Captain and Lieutenant from Ladder 11 to enter the structure with the line that the crew from Engine 2 were using for exposure control, and search for the victim. The Captain from Rescue 32 told the IC that the victim should be in the rear of the structure, in a room on the left. The Captain and Lieutenant from Ladder 11 advanced the line down the hallway. As they advanced their line, they stated that the line taken inside by the search crew was damaged and water was free-flowing. The Captain and Lieutenant reported



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that they encountered fire in a room near the kitchen (Diagram). They hit the fire three times with a fog stream and stated that the fire was quickly knocked down, but not completely extinguished. Given the information that the victim was in a room off to their left, they retreated and entered the doorway of the room on their left and recalled seeing a small fire. They opened their line on this fire and the Lieutenant's low-air alarm sounded. Noticing that all fire fighters on the scene were occupied, the IC radioed dispatch at 0150 hours requesting a second ambulance, Engine 6, and Rescue 36. Engine 3 arrived on the scene at 0152 hours and was ordered to pull a handline from their engine and protect the D exposure.

Over the next 40 minutes, several fire fighters took part in the search, which consisted of following the initial hoseline taken inside by the search crew. The fire fighters stated that they had reached the nozzle and the victim was not near it. The fire fighters stated that the search was hampered by a large amount of debris, clothing, and furniture, which was throughout the structure (Photo 5). The fire fighters continued the search for the victim, thinking that he could have been under some of the debris. At 0234 hours, the crew from Engine 1, along with a Captain reported to be in the rear (C side), stated that a section of the roof near the kitchen was down, and they were attempting to knock down some hot spots and search that area. As the crew from Engine 1 hit the hot spots, the Captain searched through the burned-out debris in the rear, C side. At 0245 hours, the Captain was searching in the kitchen, near the doorway which led into the room off of the kitchen, and located the victim (Photo 6 and Diagram). The victim was found in his full array of personal protective equipment, lying on his left side with his head

toward the doorway and his feet toward the C side. *Note: His personal alert safety system (PASS) was severely damaged in the fire and was not sounding.* The Captain radioed the IC reporting that the victim was found and they would need a paramedic in the rear. Soon after, a paramedic arrived at the rear of the structure and pronounced the victim dead at 0250 hours.

CAUSE OF DEATH

The medical examiner listed the cause of death as asphyxia due to smoke inhalation and carbon monoxide poisoning. A positive carbon monoxide reading of 69.5 percent was recorded.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Fire departments should ensure that the department's standard operating procedures (SOPs) are followed.^{1,2}

According to the department's SOPs, the following should take place:

- *Ensure that when the IC orders an interior fire attack or search, the fire fighters follow the SOPs for an interior attack.*

Department SOPs state that when the IC initiates an interior attack or a search for civilians, the fire fighters should follow the SOPs for an offensive attack. The offensive attack should consist of fire fighters advancing one hoseline to the interior for a fast, aggressive attack, provide support activities (e.g., ventilation), complete a primary search, advance a second hoseline to the interior to back up the first hoseline, pump water, and quickly evaluate success. The SOPs should be followed to avoid simultaneous offensive and defensive attacks in the same area.

- *Ensure that fire fighters do not oppose hoselines.*

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If a defensive or exterior attack is being performed while fire fighters are inside a structure performing an interior or offensive attack, the fire, smoke, and heat can be driven back into the structure, placing the interior crew(s) at risk. Additionally, when an interior or offensive attack takes place, the SOPs state that ventilation should take place and positive pressure should be injected into the unburned section of the structure to force the smoke and heat to the burning or ventilated section. Fire fighters should avoid attacking the fire from the exterior, burning side of the structure. Attacking the fire from the exterior burning side can possibly drive the heat, smoke, or fire back into the structure eliminating the positive pressure ventilation.

- ***Ensure that crews stay together at all times.***

The department's SOPs state that crews should stay together at all times. The company officer is responsible for keeping his/her crew intact at all times and should provide the crew with the direction ordered by the IC.

- ***Ensure that all orders given by the Incident Commander (IC) are followed and all tasks being performed are communicated to the IC.***

The Incident Command System (ICS) is used to facilitate the completion of the tactical priorities. The Incident Commander (IC) is in overall charge of the incident and will be responsible to direct all assignments to achieve the tactical priorities. The IC is also responsible for the safety, accountability, and welfare of all personnel on the scene. The ICS is being used by many fire departments throughout the fire service and has proven to ensure fire ground organization. To ensure that the ICS is effective, all fire fighters and officers should complete the assignments given by the IC.

It is also important that the IC is aware of all tasks being performed on the fireground. Since the IC initiates all tasks to be performed, he assumes that they will be carried out. If at any time, the task is altered or aborted, the IC must immediately be notified of the change.

Recommendation #2: Fire departments should ensure that when entering or exiting a smoke-filled structure, fire fighters follow a hoseline, rope, or some other type of guide and refresher training is provided to reinforce the procedures.³

Fire fighters should always try to maintain a sense of direction when performing interior fire fighting operations. When structures become smoke-filled and the visibility is poor, fire fighters can become easily disoriented. A hoseline, rope, or some other type of guide or reference point can assist fire fighters in maintaining a sense of direction in case an evacuation becomes necessary. Fire fighters should always make a mental note of the location of the closest hoseline, rope, or other type of a guide or reference points in case conditions change.

Recommendation #3: Fire departments should ensure that a rapid intervention team(s) (RIT) is established when fire fighters enter an immediately dangerous to life and health atmosphere, and the RIT be properly trained and equipped.⁴

A RIT should consist of at least two fire fighters and should be available for rescue of a fire fighter or a team if the need arises. The RIT should be fully equipped with the appropriate protective clothing, protective equipment, SCBA, and any specialized rescue equipment that might be needed, given the specifics of the operation underway. Once the RIT is established, they should remain the RIT throughout the operation.

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They should constantly survey the fireground operations and be in communication at all times with the IC and companies on the fireground. As fireground operations continue, the RIT team should observe the following:

- where fire fighters are entering and exiting
- how many fire fighters are inside
- where the fire fighters are operating
- what operations are taking place
- the layout of the structure
- the structure (e.g., trussed roof, metal roof, etc.) and hazards that could exist with the structure (e.g., possible collapse areas, etc.)
- hazards they might encounter (e.g., chemicals, tanks, etc.)
- the fire's condition (e.g., fire spread, fire in the roof, etc.)
- if an emergency occurs, what will be their best route to enter or exit
- what equipment they will need if an emergency occurs (e.g., airbags, hydraulic jacks, additional air bottles, etc.)

Each incident is different and additional concerns should also be taken into consideration. There are many functions expected from the RIT members during an incident. If an emergency occurs, the RIT should be rested, have full air bottles, a good understanding of the overall situation, and be able to respond in a safe manner to perform the search or rescue. If the RIT is used for an emergency operation, a second RIT should be put in place in case an additional emergency should occur. *Note: Fire departments should ensure that they have assessed all risk factors when making the decision to send a RIT into a structure that has already been the scene of an emergency evacuation, search, or rescue.* When a RIT enters a structure, they generally will use a rope or some type of guide to enter and exit. When more than one RIT enters at the same time, more than one rope would

be taken into the structure. If multiple ropes are taken into the structure they could possibly get entangled and cause confusion. If multiple ropes are used for search and rescue, a plan of action should be put into place to avoid confusion, or to prevent the ropes from being entangled.

Recommendation #4: Fire departments should consider providing all fire fighters with a personal alert safety system (PASS) integrated into their self-contained breathing apparatus.⁵

PASS devices, which are electronic devices worn by the fire fighter, emit a loud and distinctive alarm if the fire fighter becomes motionless for more than 30 seconds. Fire fighters entering hazardous areas should be equipped with a PASS device. There are several types of PASS devices available. One device that could be used is the PASS that is integrated into the SCBA. PASS devices integrated into the SCBA will be activated when the SCBA air cylinder is turned on. Manual PASS devices are also used throughout the fire service. These devices require the fire fighter to manually turn on the device each time they use it.

- ***Fire fighters should manually activate their PASS device whenever they become lost or in distress.***

When fire fighters become lost or in distress, they should immediately make an attempt to notify the IC or other fire fighters to assist them. If the fire fighter is equipped with a portable radio they should make an attempt to send an emergency transmission. In some instances, the fire fighter who needs assistance may not be equipped with a portable radio to make an emergency transmission and should activate the manual PASS device. The loud audible tone will assist other fire fighters in determining the location of the fire fighter who is in distress or lost.



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Recommendation #5: Fire departments should consider increasing the number of fire fighters on engine companies to perform in accordance with NFPA standards.^{4,6}

The NFPA Appendix A-6-4.4 recommends several response options and states in part “It is recommended that a minimum acceptable fire company staffing level should be 4 members responding on or arriving with each engine and each ladder company responding to any type of fire. The minimum acceptable staffing level for companies responding in high-risk areas should be 5 members responding or arriving with each engine company and 6 members responding or arriving with each ladder company.” When structural fire fighting takes place, it is recommended that backup personnel, a RIT team, and other fire fighters be in place to perform any operations needed (i.e., stretch lines to protect exposures, vertical ventilation, horizontal ventilation, forcible entry to secondary exits, etc.). If the personnel are not available, the operations and tactics can be hindered or delayed.

Recommendation #6: Fire departments should consider providing all fire fighters with portable radios or radios integrated into their face pieces.^{7,8}

Communication on the fireground between fire fighters and Incident Command is paramount. Fire fighters will enter buildings as a pair or team, and generally a company officer will accompany them. In most fire departments, the company officer or one of the fire fighters will be equipped with a portable radio to maintain a line of communication with Incident Command. All other fire fighters who enter a hazardous condition should also be equipped with a portable radio so, if the officer or fire fighter with the portable radio becomes separated from his partner or crew, voice

contact can still be maintained. Additionally, fire fighters can maintain fireground communications to avoid confusion of plans or strategies.

The following recommendation applies to dispatchers or emergency call takers.

Recommendation #7: Dispatchers or emergency call takers should obtain as much information as possible from the caller and report it to the responding companies.³

Dispatchers or emergency call takers should always try to obtain all information available from the caller. This would include any information regarding the structure (e.g., house, warehouse, plant, etc.), occupancy, injuries, the fire or emergency condition, the possible location of the fire, the use of the structure, address of the incident, nature of the emergency, call-back numbers, and any names. Because of the time of this incident, fire fighters suspected that the structure could have been occupied. However, the fire was reported by one of the structure’s owners after they had vacated the structure. The fire fighters were unaware that the structure was vacant.

REFERENCES

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INVESTIGATOR INFORMATION

This incident was investigated by Frank C. Washenitz II and Thomas P. Mezzanotte, Safety and Occupational Health Specialists, Division of Safety Research, NIOSH.



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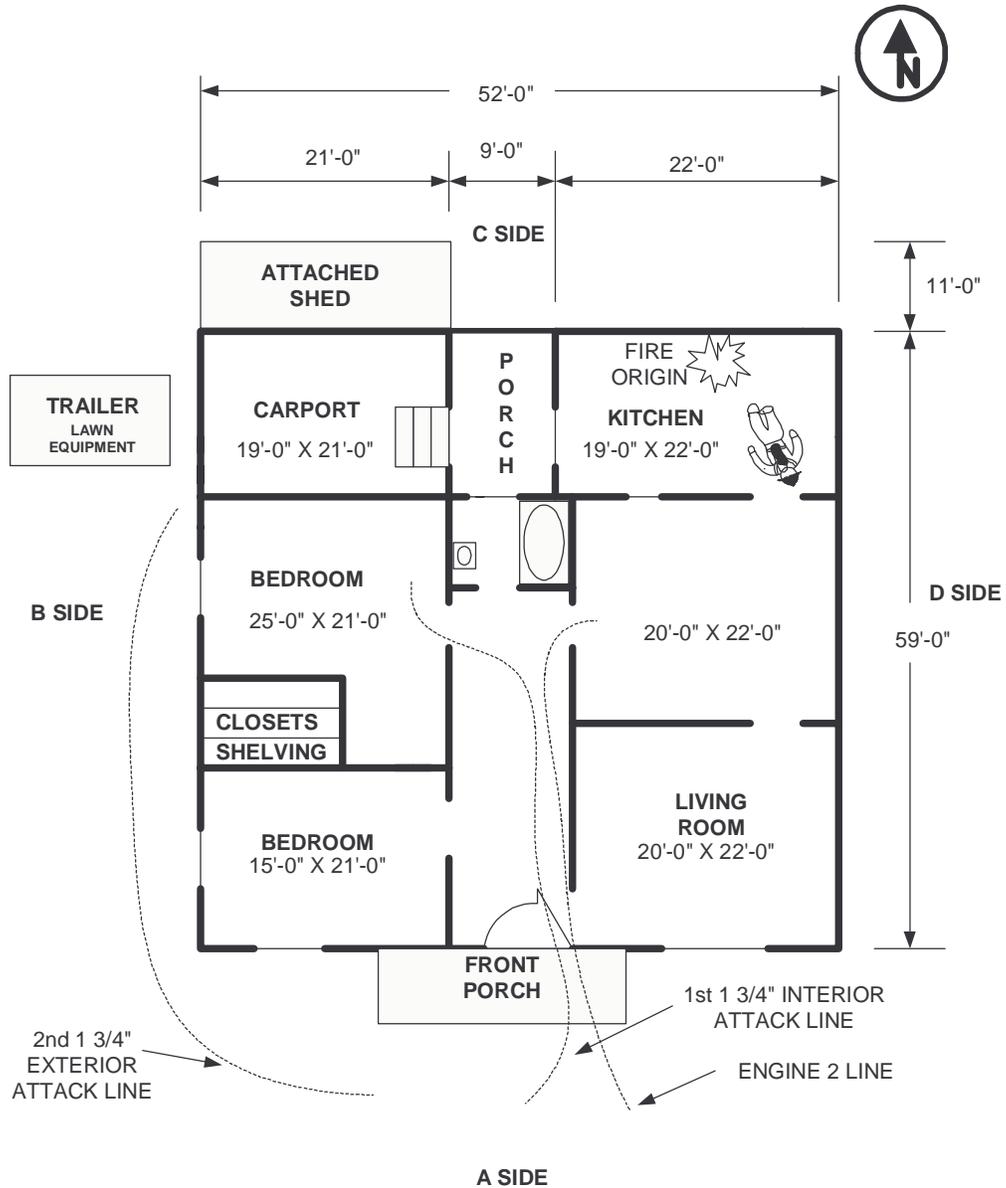


Diagram. Floor Plan



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Photo courtesy of the Fire Department

Photo 1. Single-Story Residential Home

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Photo courtesy of the Fire Department

Photo 2. B/C Corner of Structure



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Photo courtesy of the Fire Department

Photo 3. Interior Hallway

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Photo 4. Carport/Kitchen Area on B/C Corner



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Photo courtesy of the Fire Department

Photo 5. Bedroom

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Photo courtesy of the Fire Department

Photo 6. Victim's Position