

# Fire Behavior Case Study










## Incident Timeline


This timeline is provided to provide a general sequence and flow of operations and may differ slightly from the events as they occurred.



The clock icon is used to identify events for which the NIOSH Death in the Line of Duty Report (2010) identified a specific time. Events which were estimated based on the narrative, photographic evidence, or other information are shown in italic text.




Figure 1. Incident Timeline



Fire Behavior Indicators & Conditions	Time	Response & Fireground Operations
<i>Ignition of the initial fuel package (likely the male occupant's chair).</i>		
<i>Black smoke and flames from underneath the chair that the male occupant was sitting in.</i>	2055	 The local dispatch center receives a 911 call from a resident stating that her paralyzed husband's chair was on fire
	2056	
	2057	 The local dispatch center dispatches E534, T1220, A564, E1340, T1145, S440, and Chief Officer
	2058	 E-534 & A-564 en route
Substantial fire involvement of the addition and garage (on Side C)	2059	 S-440 en route Police officer on-scene reports that the house was "fully-engulfed"
Flames visible from Side C (E-534)	2100	 T-1145 & E-1340 en route Police officer reports that the male occupant is still inside the house <i>E-534 crew discussed use of a 2-1/2" handline due to the volume of fire visible from the C-Side of the dwelling</i>

Fire Behavior Indicators & Conditions	Time	Response & Fireground Operations
<p>Bi-directional air track with dark gray smoke pushing with moderate velocity from the upper level of the doorway on Side A (point of entry), Neutral plane at the doorway and upper layer interface in the living room were approximately 3' (0.9 m) above the floor (T-1220B)</p>	<p>2101</p>	<p> T-1220 on-scene reporting a one-story, single family dwelling involved.</p> <p><i>Police and bystanders advised T-1220 that the trapped civilian was last seen within the family room of the house.</i></p> <p>E-534 on-scene, the company officer assumed command and reported heavy fire showing.</p> <p>A-564 on-scene</p>
	<p>2102</p>	<p><i>The crew of E-534 removed the 1-3/4" skid load which was connected to the 2-1/2" hoseline and stretched the 2-1/2" equipped with a solid stream nozzle to the door on Side A.</i></p> <p><i>Command assists T-1220B in forcing the door on Side A.</i></p> <p><i>T-1220B (Firefighter and Apparatus Operator) initiate primary search, entering the door on Side A and beginning a left hand search.</i></p> <p><i>Command assigned A-564 and the E-534 Firefighter to advance the 2-1/2" hoseline into the dwelling to support T-1220B in their search and to control the fire.</i></p>
	<p>2103</p>	<p> E-1340 on-scene</p> <p><i>Command performs reconnaissance on Side B towards Side C and then returns to a fixed command position at the E-534 Apparatus.</i></p> <p><i>E-534 Apparatus Operator, assisted by a Firefighter from T-1220, stretched a 5" supply line to the hydrant at the corner of Lincoln Avenue and Hawthorne Road.</i></p>

Fire Behavior Indicators & Conditions	Time	Response & Fireground Operations
<p><i>The level of the upper layer dropped towards the floor, smoke darkened, and temperature was increasing significantly from when crews first made entry (T-1220B, A-564, and E-534 Firefighter)</i></p> <p><i>Ventilation of the dwelling increased due to tactical horizontal ventilation of windows in the Kitchen (Side B and possibly C) and Bedroom 2 (Side D).</i></p>	<p>2104</p>	<p><i>A-564 and the E-534 Firefighter made entry and stretched the 2-1/2" hoseline approximately 12' to the kitchen</i></p> <p><i>Command assigned E-1340 to assist T-1220 with vertical ventilation, horizontal ventilation on Sides B and D, and protection of Exposure D and D2.</i></p> <p><i>After searching the Kitchen and Utility Room, T-1220B passed the hoseline crew as they continued their search through the living room towards Side D.</i></p> <p><i>The E-1340 Officer stretched a 1-3/4" line to protect the D Side Exposures while crew member assisted T-1220 on the roof and others vented windows on Side Bravo (and possibly Side C at the C/B corner) and Side Delta.</i></p>
<p><i>Flames were beginning to breach openings in the wall on Side C of the dwelling and thick, black smoke had banked down to within several inches (&lt;0.15 m) of the floor (T-1220B)</i></p>	<p>2105</p>	<p> Command advised the local dispatch center that primary search was underway, crews were beginning to vent and requested response of the utility company.</p> <p>Command requested upgrade of the assignment to provide an additional engine and ambulance to serve as a Rapid Intervention Team (RIT), and chief officer to serve as the Incident Safety Officer.</p> <p><i>The E-534 Firefighter had a problem with his hood, handed the nozzle f Firefighter Carey (A-564), instructing him to open and close the nozzle quickly, and withdrew along the hoseline to the door on Side A.</i></p>

Fire Behavior Indicators & Conditions	Time	Response & Fireground Operations
	2106	<p> T-1145 on-scene S-440 on-scene</p> <p><i>T-1220 and the Firefighter from E1340 were unable to complete roof cutting and opening of the roof vent due to smoke conditions and thickness of the roofing material.</i></p> <p><i>T-1220B began search of the bedrooms on Side D (T-1220B heard A-563 operating the nozzle as they searched)</i></p>
<p><i>Flames moving through the upper layer from Bedroom 2 and Bathroom into the hallway leading between the living room to the bedrooms on Side D (T-1220B)</i></p> <p><i>Rapid temperature increase and severe thermal conditions in the kitchen (A-564, Firefighter Kopas)</i></p>	2107	<p> Mutual aid dispatch center took control of incident communications upon dispatch of additional resources.</p> <p><i>Upon observation of rollover from Bedroom 2 and the Bathroom into the hallway between the bedrooms and living room, T-1220B immediately moved into the living room and followed E-534's 2-1/2" hoseline to the door on Side A. As they moved towards the exit, they yelled to the crew operating the hoseline to get out.</i></p>
<p><i>Transition to fully developed fire conditions in the living room (T-1220B; A-564, Firefighter Kopas; and observations from the exterior) and extremely high temperature in the Kitchen (A-564, Firefighter Kopas)</i></p>	2108	<p><i>T-1220B exited through the door on Side A as the living room lit up. Firefighter Kopas (A-564) yelled to Firefighter Carey (A-564) with no response, and then followed the hoseline towards the doorway.</i></p>

Fire Behavior Indicators & Conditions	Time	Response & Fireground Operations
	2109	<p> Command ordered the ventilation team (T-1220 and Firefighter from E-1340) off the roof.</p> <p>Approximately 4' (1.2 m) from the front door, the knees of Firefighter Kopas's protective clothing melted into the carpet and she was unable to exit on her own. The crew of T-1220B re-entered and pulled her out the door on Side A.</p> <p>Firefighter Kopas advised T-1220B and Command that Firefighter Carey was still inside.</p> <p>Command (E-534) advised the dispatch center that the building flashed, with one firefighter down and a search was commencing.</p> <p>Command and the E-534 apparatus operator stretched a 1-3/4" line to the door on Side A. T-1220B took this line and re-entered the building to find Firefighter Carey.</p>
	2110	<p>Both local and mutual aid dispatch centers asked Command if he had a Mayday with no reply.</p>
	2111	<p> The mutual aid dispatch center began the process of upgrading the fire to a greater alarm due to the missing firefighter and Command requested a first alarm EMS response (EMS Box).</p> <p>T-1220B controlled the fire in the living room with a direct attack and advanced along E-534's 2-1/2" line, finding that it had burst.</p>
	2112	
	2113	<p> A-2101 en route</p> <p>T-1220B located Firefighter Carey tangled in the 2-1/2" hoseline in the kitchen/utility area without his helmet or facepiece and quickly removed him from the house.</p>

Fire Behavior Indicators & Conditions	Time	Response & Fireground Operations
	2114	 The mutual aid dispatch center dispatched the upgraded fire and EMS response.
	2115	<p><i>T-1145 provided medical care to Firefighter Carey and observed that while he was not wearing his facepiece and protective hood, the facepiece was still connected to the regulator.</i></p>
	2116	
	2117	<p><i>Firefighter Carey became apneic and then pulseless.</i></p>
	2118	
	2119	 A-2101 on-scene
		<p><i>Firefighters Carey and Kopas were transported to local hospitals.</i></p>