

STATE FIRE MARSHAL'S OFFICE

Firefighter Fatality Investigation



Investigation Number FY 07-01

Firefighter Phillip Townsend

Denison Fire Department
December 30, 2006

Texas Department of Insurance
Austin, Texas

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ACKNOWLEDGEMENTS

The State Fire Marshal's Office wishes to thank the following entities for their assistance in preparing this report:

- Denison Fire Department
- Dallas Fire Department
- Austin-Westlake Fire Department
- Texas Fire Chiefs Association
- Texas Commission on Fire Protection
- Texas State Association of Fire Fighters
- Dallas County Medical Examiner's Office
- National Institute for Occupational Safety and Health

Executive Summary

An awning collapse during a commercial property fire claimed the life of a Denison, Texas, firefighter, Phillip Townsend. The fire occurred at a strip mall building located at 900 South Crockett Avenue inside the city limits of Denison, Texas. The property was partially occupied, housing an appliance repair business, the property owner's office space, and a vacant self-service laundry.

Firefighter Phillip Townsend and Fire Chief Weger, were operating a hand line fire stream onto rolls of roofing materials on the building that were producing heavy smoke, when the overhang collapsed, pinning both men.

Following the collapse, most firefighters on the scene went to the location of the collapse to assist with rescue efforts. The firefighters used saws to remove parts of the wood overhang and Fire Chief Weger was freed approximately ten minutes after the collapse. He was able to crawl out from underneath the overhang on his own. Firefighter Townsend was extricated approximately two minutes later, but was unresponsive. Rescuers began resuscitative efforts and he was transported to the Texoma Medical Center, where continued resuscitative efforts were unsuccessful.

Fire Chief Weger was treated and released from Texoma Medical Center for minor injuries.

Firefighter Townsend was pronounced dead at 09:51 AM. The cause of death, as determined by the medical examiner, was attributed to blunt force injuries.

Firefighter Phillip Townsend, a 31-year-old, first-year firefighter of the Denison Fire Department, is survived by three children.

Introduction

On Saturday, December 30, 2006, Denison Fire Department Fire Marshal John Weda notified the State Fire Marshal's Office of a firefighter fatality in the City of Denison.

Fire Marshal Weda advised that firefighter Phillip Townsend had been injured at the fire and had been pronounced dead at Texoma Medical Center. Townsend's body had been moved to the Dallas County Medical Examiner's Office for autopsy.

The State Fire Marshal's Office (SFMO) commenced the firefighter fatality investigation under the authority of Texas Government Code Section 417.0075. The statute requires SFMO to investigate the cause and origin of the fire, the condition of the structure, and the suppression operation, to determine the factors that may have contributed to the death of the firefighter. The State Fire Marshal is required to coordinate the investigative efforts of local government officials and may enlist established fire service organizations and private entities to assist in the investigation.

Fire Marshal Weda requested the assistance of the SFMO in investigating the fire involving a partially occupied commercial building. State Fire Marshal Investigator Ed Cheever was assigned to conduct the initial assessment of the scene and assist the Denison Fire Department. Fire and Arson Investigations Supervisor Jay Evans, Investigator Dean Shirley, Accelerant Detection Canine Officer Tommy Pleasant, Fire Safety Inspections Inspector Larry Youngblood, Inspector Belinda Ambrose, and Inspector Debra VanReenen were dispatched to respond. Investigator Shirley was assigned as the SFMO fatality investigation Incident Commander.

The investigation began with the initial assessment and survey of the involved property and a review of the records of the incident at the Denison Fire Department on December 30, 2006. Periodic updates regarding the incident were given to the Incident Commander as investigation team members responded to the incident location.

A briefing conducted on December 31, 2006, with the Investigation Team established an action plan with assignments and objectives for the investigation. Cheever was assigned as the Origin and Cause Investigation Group Supervisor. VanReenen was assigned as Building Structures and Systems Group Supervisor. Fire Marshal Weda, Denison Fire Department Investigator Dennis Maness, and City of Denison Senior Building Inspector Rick Christenson, Sr., assisted during the building evaluation.

The SFMO Incident Commander contacted the Texas Fire Chiefs Association and requested assistance on examining and assessing fire ground tactics. Westlake Fire Department Fire Chief Gary Warren responded. Additionally, City of Dallas Fire Department Battalion Chief Ray Reed was dispatched by the Texas Metro Chiefs. Chief Warren serves in the Travis County Emergency Service District 9, a department in a community roughly the same size as Denison. Chief Reed is the Safety Officer for Dallas Fire Rescue.

Robert Manley, of the Texas Commission on Fire Protection (TCFP), assisted in the evaluation of the personal protective equipment of the firefighter. The National Institute for Occupational Safety and Health (NIOSH) Fire Fighter Fatality Investigation and Prevention Program was notified.

Building Structure and Systems

The structure was a one-story commercial occupancy built in 1963, consisting of three separate suites, including an appliance store that conducted regular sales, repair and testing of used appliances; a center suite occupied by the owner and used for his real estate office and storage; and a laundry facility on the south end of the building that was not being used for regular business but was being used for storage. There were no fire sprinkler or fire alarm systems for the building. There are no building plans, construction history, or inspection records available from the City of Denison. Businesses were closed and the structure was unoccupied at the time of the fire.

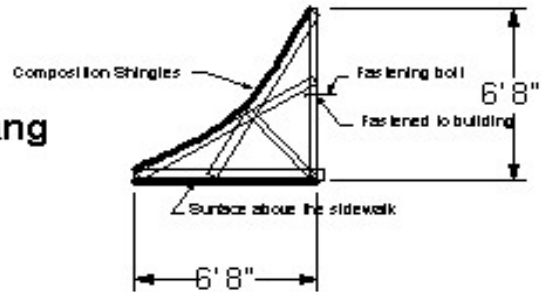
The structure was of NFPA Type III construction and consisted of a combination of poured concrete, masonry block and steel, measuring approximately 131 feet in length and 45 feet wide, on a concrete slab foundation. Interior walls were constructed of two-inch by four-inch (2 x 4) wood framing covered by light wood paneling. The roof consisted of wood decking under tar and roofing paper, supported by a pin-connected open web truss system spaced at 32 inches on center.

The front of the structure faced west toward South Crocket Avenue. The front wall was a combination steel I-beam, supported by steel pipe columns, masonry block, wood siding, aluminum frame windows, and glass doors. An awning over the sidewalk along the length of the front extended from the wall approximately 6 feet, 8 inches wide and 6 feet, 8 inches high, forming an open, triangular space. It was constructed of two-inch by six-inch (2 x 6) wood joists and two-inch by four-inch (2 x 4) wood framing. It was nailed to a 2 x 4 wood ledge that was bolted to the lower edge of the I-beam. The back of the awning assembly was attached to the concrete block wall above the I-beam with one-half inch diameter by 13 inch long steel bolts ($\frac{1}{2}$ " x 13"). The roof of the awning was curved with one-inch-thick plywood under composition shingle roofing and measured nine feet from the top to the front fascia. **(Figures 1 and 2)**



Figure 1. Collapsed awning (Photo by Denison FD)

Cross-section of the overhang



Falling Action in Cross-section

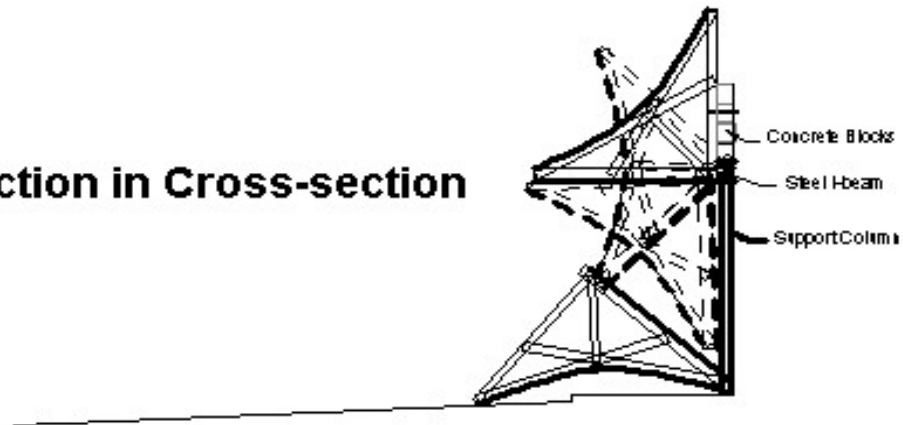


Figure 2. Awning construction (By DSFM E. Cheever)

The truss system was attached to the masonry block at the east (rear) side by eight, two-inch nails per anchor assembly. Fire and collapse damage prevented inspection and determination of the method for attachment of the truss system to the west (front) side. The truss system extended from west to east in the attic space. **(Figure 3)**



Figure 3. Roof truss attachment to east wall (Photo by SFMO)

The structure had a gutter system that was attached to the roof and the top of the masonry block wall on the east (rear) side of the structure. The gutter, flashing, and truss anchors were all attached to the top of the masonry wall.

There was electrical service established for the appliance repair suites and the real estate office suite. Electrical service for the laundry facility was disconnected prior to this incident; however, the lines up to the meter at the south end were still active. There were five separate gas connections at the rear, with piping capped on all units except for the appliance store. The [gas] meter was pulled prior to the investigation.

All suites had drop ceilings and the attic space between the roof deck and the drop ceiling was approximately 36 to 42 inches, with no fire separation in the attic space.

Origin and Cause Investigation

The origin and cause investigation began on December 31, 2006. The roof system of the structure, which consisted of a pin-connected open web truss under plywood sheathing with a layered tar cover, was completely destroyed and collapsed into the structure. On December 30, 2006, the north wall and portions of the west wall were pulled down for personnel safety during overhaul operations and to minimize further danger of collapse. Fire Marshal Weda prevented further demolition of the structure to preserve the remaining structure for examination by investigators.

Statements obtained from first arriving firefighters, witnesses, and the entry team indicated that there was smoke with no visible fire. Captain Troy Baker entered the center office area to retrieve property of the owner and reported that he did not initially see any fire.

The building had a dropped ceiling, without fire separation between compartments to prevent heat and smoke spread. The exposed roof system was a pin-connected open web truss of tubular webbing and solid steel pins secured in unprotected two-inch by four-inch (2 x 4) wood chords. There were no indications that fire retardant or insulation was used on any of the exposed wood surfaces of the truss system or the roof decking. **(See Figure 4.)**



Figure 4. Remains of truss (Photo by SFMO)

The examination of the scene revealed that the roof structure collapsed and was consumed, leaving the tubular webbing of the truss system unsupported by the wood chords. This loss of the truss system allowed for the lateral movement of the front wall supporting the awning.

The fire investigation revealed that the fire originated above the concealed space of the owner's office and storage room near the center of the building. The undivided area of the roof system allowed for the development and spread of the fire, while remaining hidden. Forcible entry into the laundry at the south end of the building by the initial response team and the opening of the door into the center office area allowed the southwest wind of approximately seven mph to add air to the ventilation-starved fire, which aided rapid fire spread across the concealed area of the roof system. (See Figure 5.)

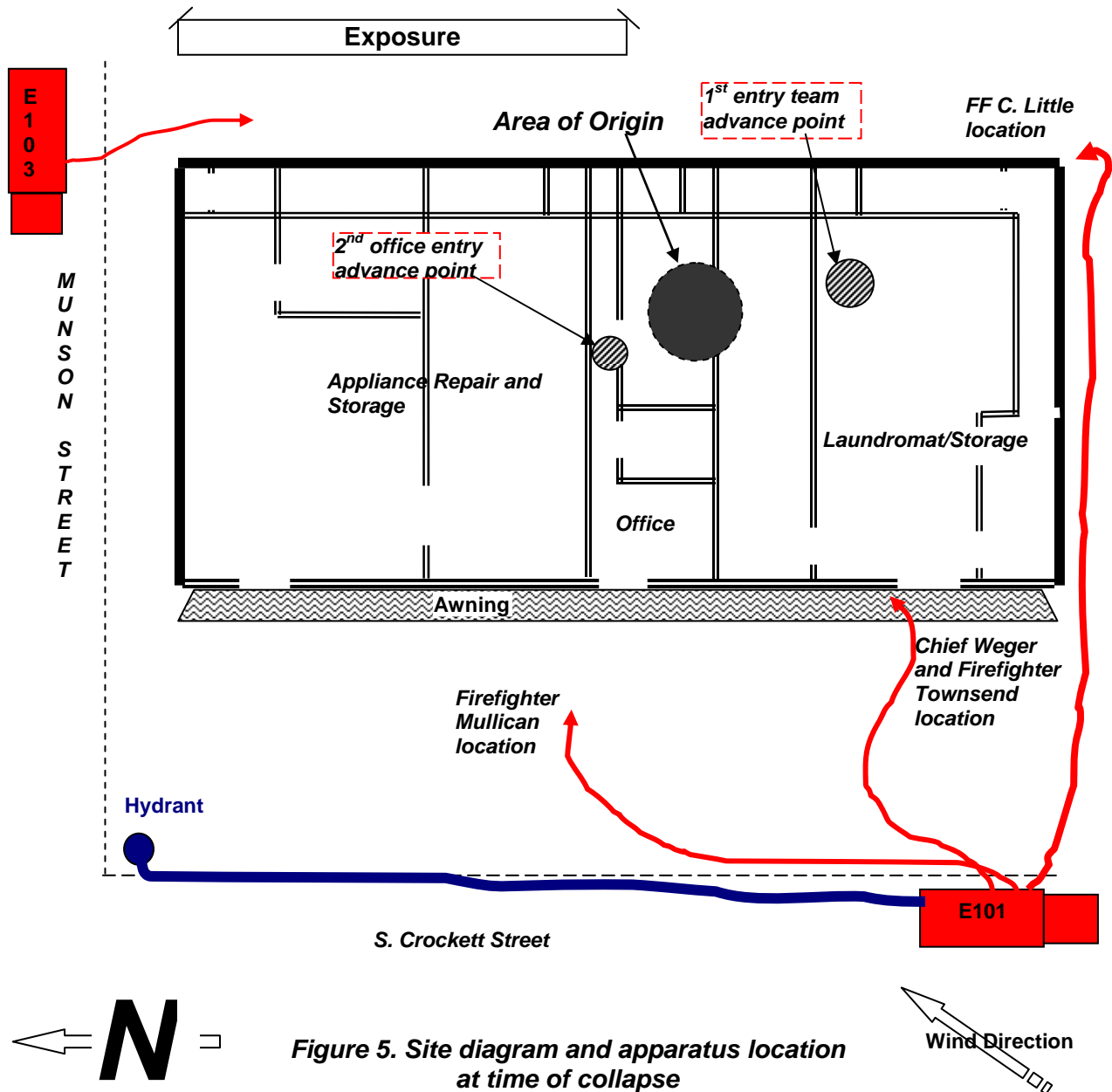


Figure 5. Site diagram and apparatus location at time of collapse

The extensive fire damage to the electrical circuits, junction boxes, and lighting fixtures mounted in the concealed space and above the dropped ceiling prevented identification of the initial ignition source or first material ignited. No other identifiable ignition source was found. The cause of this fire remains undetermined.

Fire ground Operations

NOTE: *The following sequence of events was developed from known times of events based on radio transmissions and firefighter witness statements. Those events with known times are identified. Events without confirmed times are approximated in the sequence of events based on firefighter statements regarding their individual actions and observations at the fire.*

On December 30, 2006, at 0841 hours, the Denison Fire Department received reports of a fire in a commercial building in the 900 block of South Crockett Avenue. Initial companies were dispatched at 0842 hours. Engine 101 arrived on scene at 0847 hours and reported out with, "Smoke showing, heavy smoke." Engine 101 was staffed with two officers, Captain Troy Baker and Lt. Bruce Geilhausen, and two firefighters, Clinton Little and Larry Townsend. Engine 103 arrived at 0848 hours with firefighters Roy Kuykendall and Jake Reynolds. Ambulance 301 also arrived at 0848 hours with firefighters Jimmy Mullican and Phillip Townsend. Captain Baker served as the Incident Commander and Larry Townsend performed the duties of pump operator. Assistant Chief Don Coley and Fire Chief Weger, who were dispatched at 0850 hours, responded from their residences prior to the collapse. A Command Post was not identified, and the Incident Commander was not stationary.

Captain Baker ordered Engine 103 to lay a 4½-inch supply line from the hydrant at the corner of Crockett and Munson to Engine 101. Lt. Geilhausen and firefighter Little pulled a 200 foot, 1¾-inch pre-connected hose line and made their way to the south suite of the building, where they had to force entry through the doorway. Upon entry they made their way to the interior, toward the north of the building, searching for the fire. They described visibility as six or eight feet with very little heat. Firefighters Mullican and Phillip Townsend made their way to the front of the building to assist. They entered and followed the hose line to the other two firefighters. Firefighter Mullican exited the building to get a thermal imager, re-entered the structure and gave the imager to firefighter Little.

As these four firefighters searched for the fire, the owner of the building arrived and requested that he be allowed to enter his office to retrieve some papers. His office was the compartment at the center of the building just north of where the initial team entered. IC Baker took the keys and unlocked the office, entered and removed papers from the desk and exited without seeing any visible fire. Baker allowed the owner to enter with him the second time and removed papers from a file cabinet, after which Baker told the owner not to enter again because there were now flames down the hallway toward the rear of the occupancy.

As the initial team of Lt. Geilhausen, Mullican, Phillip Townsend, and Little searched for the seat of the fire, conditions suddenly deteriorated as the heat intensified and thick black smoke dropped to floor level. They could hear the fire overhead and directed the hose stream to the ceiling but did not believe that it was penetrating the ceiling. Lt. Geilhausen ordered the team to withdraw, and they followed the hose line out of the structure.

As Lt. Geilhausen's initial team was inside the south compartment, Kuykendall and Reynolds, firefighters from Engine 103, were pulling another 1¾-inch hose line from Engine 101. They reached the front of the building about the time the initial team was withdrawing from the occupancy on the south end. Fire had spread down the hallway of the office compartment to the front of the building just north of the occupancy where the initial attack team exited. Firefighters Reynolds and Kuykendall knocked down the fire in the office. Lt. Geilhausen, Mullican and Kuykendall entered the office and made their way down the hallway. They found

intense fire in the rear office space, and after directing the hose line to it without any apparent effect, Lt. Geilhausen ordered them to withdraw.

Once outside the building, Lt. Geilhausen told the other five firefighters that they were changing to a defensive mode and that no one was to go back inside the building. He attempted to communicate the tactic change but a radio malfunction prevented the message from being communicated over the air to Captain Baker or the fire personnel arriving to the scene. Lt. Geilhausen did verbally instruct firefighters Reynolds, Kuykendall, Phillip Townsend, and Little, who were operating hose lines from the front exterior, to move back outside the potential collapse zone. Captain Baker stated that he was able to visually account for all six firefighters outside the front of the building but no personnel accountability report (PAR) was communicated over the radio about the change from an offensive to a defensive mode. Incident Command notified base that there were on-going radio problems on scene.

Assistant Chief Don Coley, who responded from home, reported on scene by radio at 0859 hours. He checked in with Captain Baker, the IC, and advised him that he was going to check the rear of the building for exposures. Chief Coley directed Lt. Geilhausen to assist him, leaving Townsend and Mullican at the front of the building operating the hose lines from the parking lot. Assistant Chief Coley radioed to Command just a few minutes later informing the IC that they had an exposure problem in the rear and requested assistance. Captain Baker assigned firefighters Kuykendall and Reynolds to move Engine 103 to the northeast corner of the building, report to Assistant Chief Coley, and put a line in place to protect the house and garage to the east of the building on fire.

Command then called for a 2½-inch line to be laid to the southeast corner of the building for exposure protection. Firefighter Little went to Engine 101 to pull this line, and found that pump operator Larry Townsend had already pulled the line from the engine. Little advanced the line around the south end of the building to the southeast corner.

Lt. Geilhausen made his way to the northeast corner where he and Assistant Chief Coley searched a house just east of the building on fire. Finding no one inside he went back out, and noticing a power line overhead, moved firefighter Reynolds back away from it. He then proceeded to the southeast corner of the building where he assisted firefighter Little on the 2½-inch line.

Fire was now showing through the roof and out of the rear of the building. Command called for Ladder 100 to the scene. Assistant Chief Coley requested that dispatch call Sherman Fire Department to send an engine to standby at Central station. IC Baker ordered pump operator Larry Townsend to charge the deck gun. IC Baker climbed atop Engine 101 and began operating the deck gun. Firefighter Mullican was operating a 1¾-inch hose line from the exterior at the center of the building and firefighter Phillip Townsend was operating a second 1¾-inch line just to the south.



**Figure 6. Firefighter Mullican's position during defensive mode
(Photo from Denison FD)**

Fire Chief Weger arrived on the scene, conferred briefly with Assistant Chief Coley at the rear of the building, and then made his way to the front. He did not report on scene by radio, nor did he check in with the Incident Commander; therefore, the exact time of his arrival is not recorded. He found Phillip Townsend operating the line on the exterior of the building. Chief Weger assisted Townsend on the line and told him to advance to the front of the building where rolls of roofing paper were producing heavy smoke. Firefighter Townsend was wearing all of his PPE and was operating on air with his SCBA. Chief Weger was not wearing his PPE. Townsend's low air alarm began sounding and Chief Weger instructed him to change out his air cylinder.

Chief Weger continued to operate the hose line while Phillip Townsend went to Engine 101 to replenish his air supply. Pump operator Larry Townsend changed his cylinder for him. As Phillip Townsend got back on the nozzle and Chief Weger stepped behind him to back him up, the awning in front of the building collapsed without warning, trapping both men underneath.



Figure 7. Chief Weger performing firefighting operations prior to the collapse. (Photo from Denison FD)



Figure 8. At the moment of collapse Firefighter Mullican starts toward Weger and Townsend's position. (Photo from Denison FD)

Captain Baker and Larry Townsend yelled that they had men down. Assistant Chief Coley radioed dispatch that they had men down and requested an ambulance to the scene. He also told dispatch to have the Sherman Fire Department engine respond directly to the scene.

Most of the firefighters on the scene went to the location of the collapse and began initiating rescue efforts. Just a few minutes later, Assistant Chief Coley notified dispatch that he was assuming Command, and that Captain Baker was in charge of the rescue efforts. They used power saws to cut an opening in the plywood structure, being careful not to cut where they thought the men were located.



**Figure 9. Locations of Chief Weger and Phillip Townsend after collapse
(Photo by Denison FD)**

Denison Police Officer Tim Murrin arrived in patrol unit at 0915 hours and went to assist in the rescue. Firefighter Flippo arrived on Ladder truck L100 at 0919 hours, just after the collapse of the awning. His first act was to lay a line to supply L100 and he then went to assist in the rescue and extrication. Firefighters Oates and Floyd arrived on Ambulance A101 at 0919 hours and went to assist in rescue and extrication.

Firefighter Townsend was located near the wall of the building in a sitting position, pinned between the collapsed overhang and the masonry wall. Firefighters attempted to provide first air from his SCBA and later oxygen to him. He was unresponsive from the first time firefighters reached him. Firefighters Little, Mullican, Kuykendall, Flippo, Oates, Floyd, and Denison Police Officer Murrin all report hearing firefighter Townsend's PASS sounding when reaching him.

After an initial cut, Chief Weger was located and another cut was made to free him. According to radio transmissions, he was freed approximately ten minutes after the collapse. He crawled out on his own. Firefighter Townsend was removed approximately two minutes later. Resuscitative efforts were started on Townsend and he was quickly transported to Texoma Medical Center. Further resuscitative efforts were unsuccessful.

Fire Chief Weger was transported to Texoma Medical Center where he was treated and released for shoulder and head injuries.

Firefighter Townsend was pronounced dead at 0951 hours by Emergency Room Physician Dr. Dippel. Cause of death as determined by the Dallas County Medical Examiner was attributed to blunt force injuries.

Units from Sherman Fire Department and Pottsboro Fire Department along with the Denison fire fighters continued to work the fire. Command communicated a “loss stop” report to dispatch at 1024 hours. Units were on the scene most of the rest of the day conducting overhaul activities.



Figure 10. South view of collapse (Photo by Denison FD)

Personal Protective Equipment Evaluation

The SFMO IC requested that the Texas Commission on Fire Protection (TCFP) conduct an evaluation of firefighter Townsend's personal protective equipment for performance and compliance with TCFP rules for regulated fire departments.

The protective equipment was evaluated by TCFP Compliance Officer Robert Manley for compliance with Texas Administrative Code Title 37, Part 13, Chapters 435.1, *Protective Clothing* and 435.3, *Self-Contained Breathing Apparatus* and NFPA standards adopted by TCFP. Photographs taken during the examination are on file at the Texas Commission on Fire Protection. The TCFP report is located in the reference materials of the SFMO investigation file.

The examination of the protective equipment took place at the Denison Fire Department in the Fire Marshal's Office on January 11, 2007. The gear was secured in a locked area maintained by the Denison Fire Marshal.

- Records indicate that breathing air is tested quarterly as required.
- Records indicate that gear issued to Phillip Townsend was manufactured October 2006 and issued in November 2006.
- Records were provided to confirm Phillip Townsend's continuing education.
- Department presented all required Standard Operating Guidelines.
- Records indicate that Phillip Townsend's SCBA Mask was tested and passed on 12/13/2005.
- Documentation indicates that SCBA duty period inspection was performed on December 30, 2006.

Townsend's helmet, hood, bunker coat and pants, self-contained breathing apparatus, and mask were inspected. Photographs of the equipment were taken to document the condition.

- Helmet – No apparent damage.
- Hood – No apparent damage.
- Self-Contained Breathing Apparatus – SCBA frame was damaged due to apparent impact of falling structural overhang.
- SCBA Mask – No apparent damage.
- Boots – No apparent damage.
- Structural Coat – The outer shell and liner of the coat were damaged due to removal by medical personnel. No apparent damage from fire or the collapse.
- Structural Pants – No apparent damage.
- Boots – No apparent damage.
- Gloves – No apparent damage.



Figure 11. Firefighter Townsend's PPE (Photo by TCFP)



Figure 12. Photograph of the SCBA frame damage illustrating the cracked bracket (Photo by TCFP)

Inspection of the Personnel Alert Safety System (PASS) revealed that the device was 'On' and in a good working condition.

It was determined that firefighter Townsend donned his personal protective clothing properly and that it was not a contributing factor in his death.

Recommendations

These recommendations are based on nationally recognized consensus standards and safety practices for the fire service and the Standard Operating Guidelines (SOG) of the Denison Fire Department. All fire department personnel should know and understand nationally recognized consensus standards, and all fire departments should create and maintain SOGs and SOPs to ensure effective, efficient, and safe firefighting operations.

FINDING 1: Accountability at the scene was not complete. The arriving Fire Chief did not check in with the Incident Commander (IC) and initiated operations without consulting the IC.

Recommendation 1: Firefighter Accountability

- Fire departments must provide an accountability system that will provide for a rapid accounting of all personnel on the fire ground. All personnel arriving at the fire ground must check in with the Incident Commander for accountability purposes.
 - **Reference:** Texas Commission on Fire Protection Standards Manual for Fire Protection Personnel, Chapter 435, Section 435.13, part b, paragraphs 3 and 4 state *“The accountability system shall: 3. require that all fire protection personnel operating at an emergency incident to actively participate in the accountability system; and 4. require that the Incident Commander be responsible for the overall personnel accountability system for the incident.”*
 - **Reference:** Denison Fire Department SOG – “INCIDENT COMMAND SYSTEMS – IMS” section 4, part B, paragraph 5 states *“At no time is any unit or person to be operating at an emergency scene or drill without properly logging into the scene.”*

FINDING 2: The Fire Chief and firefighter Phillip Townsend operated inside a collapse danger zone after firefighters withdrew from the building interior and a defensive attack was initiated.

Recommendation 2: Establishment of Safety Zones

- Fire Departments should establish safety zones whenever defensive mode of attack has been declared to protect firefighter safety during operations. The designated Safety Officer should monitor the collapse zone to ensure that no firefighting operations take place within this area as part of the defensive operations.
 - **Reference:** Denison Fire Department SOG – “INCIDENT COMMAND SYSTEMS – IMS” section 3, part N, subpart 2, states *“The decision to operate in a defensive mode indicates that the offensive attack strategy has been abandoned for reasons of personnel safety, and the involved structure has been conceded as lost. The announcement of a change to a defensive mode will be as emergency traffic and all personnel will withdraw from the structure and maintain a safe perimeter. Shift Commanders will account for the safety of all personnel. Interior Lines will be withdrawn (or abandoned, if necessary) and repositioned when changing to a defensive mode. Lines should not be operated directly into doorways or windows, but should be backed away to positions which*

will protect exposures. All exposures, both immediate and anticipated, must be identified and covered.”

FINDING 3: The Fire Chief conducted operations at the fire scene and directed personnel without notifying the Incident Commander.

Recommendation 3: Adherence to an accepted Incident Command System

- Fire Departments should always operate under an accepted incident command system when responding to an emergency. All emergency responders to an emergency situation should participate unconditionally within the command structure dictated by the responsible jurisdiction’s adopted incident command system.
 - ***Reference:*** Denison Fire Department SOG – INCIDENT COMMAND SYSTEM – IMS, section 3, part N, subpart 4 states *“Our department has implemented the IMS to ensure the safety of all firefighters on the fire ground. It is necessary for the IC to account for all personnel assigned to or working at the scene of an emergency. Generally personnel will respond to an incident in the department vehicle they are assigned but occasionally off-duty personnel called back for duty will respond in their private vehicles. We must ensure that all personnel, regardless how they arrived will be accounted for in case of a change in firefighting strategies, a building collapse, or any circumstance that may require an accounting for all personnel at the scene.”*
 - ***Reference:*** Denison Fire Department SOG – CHAIN OF COMMAND states *“All orders given to an “Attack Team” or “Sector” should come from the “Team Leader” or “Sector Commander”. In those cases when orders to an individual or “group: are issued by superior personnel, and when the individual or group is operating on a previous assignment, the supervisor issuing the order shall be told of the existing order and who issued the order. If the officer still directs that the new order be obeyed, it shall be his immediate duty to inform the original issuing officer of the change in assignment.”*

FINDING 4: No Incident Safety Officer was appointed by the Incident Commander.

Recommendation 4: Incident Safety Officer

- An Incident Safety Officer or Accountability Officer, independent from the Incident Commander, should be appointed and on scene early in the incident to assure that accountability is accomplished, a rapid intervention crew is established, and hazard zones are monitored.
 - ***Reference:*** The Incident Safety Officer (ISO) is defined by NFPA 1521 as *“an individual appointed to respond to or assigned at an incident scene by the incident commander to perform the duties and responsibilities specified in this standard. This individual can be the health and safety officer or it can be a separate function.”*
 - ***Reference:*** NFPA 1500, Chapter 6, paragraphs 6.1.8, 6.2.2 and 6.2.3 regarding accountability, rapid intervention crews, and hazards including collapse potential.
 - ***Reference:*** NFPA 1521, Section 2, paragraph 1.4.1 states that *“an incident safety officer shall be appointed when activities, size, or need occurs.”*
 - ***Reference:*** Denison Fire Department SOG – SAFETY, section B, paragraph 1 states *“The Maintenance Lieutenant shall be the Safety Officer for the Denison Fire Department. The Safety Officer shall have the authority to alter, suspend, or*

terminate those activities which are judged to be unsafe. The Safety Officer should report directly to the Fire Chief and/or Incident Commander. When the Safety Officer is not on the fire ground, the Incident Commander may appoint any member of the Department to serve as the Safety Officer.

FINDING 5: The shift from offensive to defensive attack was not announced by the Incident Commander on the radio system, and units enroute, but not yet on the scene, were not notified of the change of strategy. No air horn signal was used to signal the shift in attack strategies. No Personnel Accountability Report (PAR) was ordered when the attack shifted from offensive to defensive.

Recommendation 5: Fire Ground Communication

- Fire Departments should make every effort to clearly communicate all incident command decisions that can directly affect the safety of the emergency responders on the scene. These decisions may include: who is taking Incident Command, location of the Command Post, mode of fire attack, changes in mode of fire attack, calling for PAR when attack mode is changed, etc.
- All Department portable radio batteries should be maintained to a level of readiness that would preclude an inordinate number of radio failures during the time span of an average structure fire event.
 - ***Reference:*** Denison Fire Department SOG – INCIDENT MANAGEMENT SYSTEM – IMS, section 4, part C, paragraph 7 states *“An open communication line must be maintained so that firefighters working inside the structure can be notified of changing conditions and tactics, and they can notify persons outside the structure of problems found inside.”*
 - ***Reference:*** Denison Fire Department SOG – INCIDENT MANAGEMENT SYSTEM – IMS, section 3, part J states *“When a structure is deemed unsafe and collapse is imminent, a radio order by the Incident Commander, Safety Officer, Sector Officer and/or any member of the Denison Fire Department to abandon the building will be transmitted along with a long, steady blast on an air horn. Company roll call (PAR) will be done by Command to account for all personnel.”*

FINDING 6: Not all fire department personnel operating in hazardous areas at the fire wore personal protective equipment (PPE).

Recommendation 6: Required Use of PPE on the Fire Ground

- Fire Departments should require all emergency responders at the emergency scene to don all the components of their Personal Protective Equipment (PPE) if they are to operate in the fire ground area.
 - ***Reference:*** Texas Commission on Fire Protection Standards Manual for Fire Protection Personnel, Chapter 435, section 435.1, part a, paragraph 1 states *“A complete set of protective clothing shall consist of garments including bunker coats, bunker pants, boots, gloves, helmets, and protective hoods worn by fire protection personnel in the course of performing fire fighting operations.”*
 - ***Reference:*** NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, Chapter 7, Protective Clothing and Protective Equipment, Paragraph 7.1.2 states *“Protective clothing and protective equipment shall be*

used whenever the member is exposed or potentially exposed to the hazards for which it is provided.”

FINDING 7: The tasks assigned exceeded the resources available on the scene.

Recommendation 7: Safe and Effective Utilization of Fire Ground Resources

- Fire Departments should determine how to appropriately approach a structure fire based on the resources available at the scene.
 - ***Reference:*** Texas Commission of Fire Protection Standards Manual for Fire Protection Personnel, Chapter 435, section 435.15, part b, paragraph 1 states *“The standard operation procedure shall: specify an adequate number of personnel to safely conduct emergency scene operations.”*
 - ***Reference:*** NFPA 1710 Chapter 5, paragraph 5.2.1.1: On-duty fire suppression personnel shall be comprised of the numbers necessary for fire-fighting performance relative to the expected fire-fighting conditions. These numbers shall be determined through task analyses that take the following factors into consideration:
 1. Life hazard to the populace protected
 2. Provisions of safe and effective fire-fighting performance conditions for the fire fighters
 3. Potential property loss
 4. Nature, configuration, hazards, and internal protection of the properties involved
 5. Types of fire ground tactics and evolutions employed as standard procedure, type of apparatus used, and results expected to be obtained at the fire scene

Finding 8: The failure of the truss roof assembly in the building led to a partial building collapse, detaching the awning, which collapsed on firefighter Phillip Townsend and the Fire Chief.

Recommendation 8: Identify Fire Ground Hazards Associated with Roof and Floor Truss Systems

Fire Departments

Ensure that fire fighters are trained to identify different types of roof and floor truss systems and the hazards associated with each.

- Conduct pre-incident planning and inspections to identify structures that contain truss construction.
- Develop and implement standard operating procedures (SOPs) to combat fires safely in buildings with truss construction.
- Ensure that the incident commander conducts an initial size-up and risk assessment of the incident scene before beginning interior fire-fighting operations.

- Ensure that fire fighters performing fire-fighting operations under or above trusses are evacuated as soon as it is determined that the trusses are exposed to fire (not according to a time limit).
- Establish a collapse zone when operating outside a burning building, since truss roof collapses can push out on the walls, causing a secondary collapse of the exterior walls.
- Use defensive overhauling procedures after fire extinguishment in a building containing truss construction. Use outside master streams to soak the smoldering truss building and prevent rekindling.
- Consider becoming involved in the building code development and enforcement process.
 - **Reference:** NFPA 1001 Chapter 5 paragraph 3.3 and chapter 6 paragraph 5.1 regarding established work zone area operations and pre-incident surveys.

Firefighters

- Use extreme caution when operating on or under truss systems.
- Immediately open ceilings and other concealed spaces whenever a fire is suspected in a truss system.

Understand that fire ratings may not be truly representative of real-time fire conditions.

The following excerpt from National Institute for Occupational Safety and Health (NIOSH) Publication No. 2005-132: *Preventing Injuries and Deaths of Fire Fighters Due to Truss System Failures*. <http://www.cdc.gov/niosh/docs/2005-132/pdfs/2005-132.pdf> provides guidance to fire departments and fire fighters to increase safety on the fire ground.

Engineered building components may provide adequate strength under normal loading; but under fire conditions, these truss systems can become weakened and fail, leading to the collapse of roofs, floors, and possibly the entire structure. Truss systems are usually hidden, and fires within truss systems may go unnoticed for long periods of time, resulting in loss of integrity. Structural design codes often do not factor in this decreased system integrity, as fire degrades the structural members. Fire fighters typically rely on warning signs to indicate imminent truss failure such as roofs and floors that feel spongy or are visibly sagging. Quite often, these warning signs are not good predictors of truss system failures.

Fifteen separate incidents investigated by National Institute for Occupational Safety and Health (NIOSH) identified at least 20 fatalities and 12 injuries that have occurred from 1998-2003 during fire-fighting operations in buildings containing truss systems.

TIME LINE

Denison Fire Department December 30, 2006

Time line was developed from a transcript supplied by the Denison Fire Department, which included dispatch time stamp of calls received and radio transmissions, and from review of audible recordings of radio transmissions between dispatch and personnel on the scene. In some cases, there is a one- to two-minute difference in the time stamp and the time given by the dispatcher when a transmission is acknowledged.

- 0841 First call to dispatch reporting fire in 900 block of Crockett.
- 0842 Dispatch "tones out" companies to respond.
- 0845 Engine 101 reports enroute.
- 0846 Engine 103 reports enroute.
- 0847 Engine 101 on scene reporting "smoke showing, heavy smoke."
- 0848 Ambulance 301 on scene. Command advises Engine 103 to "bring a line."
- 0849 Command advises Lieutenant to force entry and check for fire in SE corner of building.
- 0850 Command requests dispatch to notify Chief, Assistant Chief and Fire Marshal.
- 0855 Several radio transmissions between 0850 and 0900 between Command and firefighters on scene, many of which are unintelligible because of radio problems. Command advises that he cannot understand transmissions either.
- 0859 Assistant Chief (C2) reports on scene.
- 0902 C2 requests someone to turn gas off and requests "anybody extra" to the rear. Advises command that a highline pole is on fire and a garage is catching and requests TXU. Command relays request for TXU to dispatch.
- 0903 Command advises C2 that he is sending Engine 103 to his location in the rear. C2 also requests Lone Star Gas.
- 0907 Command requests dispatch to have ambulance crew bring Ladder 100 to scene.
- 0909 C2 radios dispatch to request Sherman FD to send unit to standby at Central.
- 0910 Ladder 100 enroute.
- 0911 C2 directs Ladder 100 to lay a line from Hull and Crockett to the front of the building.
- 0913 There are radio transmissions from two different individuals reporting "Men down. Men down." It is unsure who is transmitting. The second appears to be from the IC, Captain

Baker. C2 then requests an ambulance to the scene, requests that Sherman FD engine come directly to the scene, and reports that he has “men down.”

- 0914 Ambulance 101 responds to fire scene.
- 0915 C2 requests dispatch notify Pottsboro FD for assistance.
- 0917 C2 notifies dispatch to have Life Star (medical helicopter) to standby.
- 0919 Ambulance 101 arrives on scene. C2 calls for B105 to scene, but dispatch advises they have no one available to drive it.
- 0922 C2 announces that he is assuming Command.
- 0923 Command advises dispatch that one man is “out and walking.”
- 0924 Sherman Engine 85 and Ambulance 81 on scene. Dispatch advises Command that Life Star is not available.
- 0925 Command advises dispatch to notify TMC (Texoma Medical Center) that “they are coming in with a Code.”
- 0926 Command requests a PAR from all personnel.
- 0929 A101 reports enroute to TMC.
- 0933 A101 reports out at TMC.
- 0937 Pottsboro E31 arrives on scene.
- 0951 C2 advises dispatch that he is turning Command back over to Captain Baker.
- 1023 Command advises dispatch of Loss Stop.

DOCUMENT LOG

| Document Number | Source | Description |
|-----------------|----------|---|
| 07-156-12-D-01 | DFD | Fire Alarm Report |
| 07-156-12-D-02 | DFD | Denison Fire Department Reports |
| 07-156-12-D-03 | DFD | Personal Protection Equipment Checklist, P. Townsend |
| 07-156-12-D-04 | DFD | SCBA Inspection Checklist, P. Townsend |
| 07-156-12-D-05 | DFD | Denison FD Standard Operating Guidelines |
| 07-156-12-D-06 | TMC | Texoma Medical Center Medical Records |
| 07-156-12-D-07 | ME | Medical Examiner's Report |
| 07-156-12-D-08 | DFD | Denison FD December 30, 2006 Duty Roster |
| 07-156-12-D-09 | DFD | Statement of Captain Troy Baker, Incident Commander, E101 |
| 07-156-12-D-10 | DFD | Statement of Lt. Bruce Geilhausen, Shift Lieutenant, E101 |
| 07-156-12-D-11 | DFD | Larry Townsend Interview Form, Pump Operator, E101 |
| 07-156-12-D-12 | DFD | Statement of Roy Kuykendall, E103 |
| 07-156-12-D-13 | DFD | Statement of Jake Reynolds, E-103 |
| 07-156-12-D-14 | DFD | Statement Clinton Little, E-101 |
| 07-156-12-D-15 | DFD | Statement of Jimmy Mullican, A301 |
| 07-156-12-D-16 | DFD | Statement of Asst. Fire Chief Donald Coley |
| 07-156-12-D-17 | DFD | Fire Chief Gordon Weger Interview Form |
| 07-156-12-D-18 | DFD | Michael Flippo Interview Form, L100 |
| 07-156-12-D-19 | DFD | Rex Oates Interview Form, A101 |
| 07-156-12-D-20 | DFD | Charles Floyd Interview Form, A101 |
| 07-156-12-D-21 | DFD | Roger Ervin Interview Form, Ambulance |
| 07-156-12-D-22 | DFD | Michael Morrison Interview Form, A7 |
| 07-156-12-D-23 | DPD | Patrol Officer Wesley Bounds Interview Form |
| 07-156-12-D-24 | DPD | Patrol Officer Tim Murrin Interview Form |
| 07-156-12-D-25 | DPD | Patrol Officer Danny Neumann Interview Form. |
| 07-156-12-D-26 | DFD | Witness Statement of Adrian Fatan |
| 07-156-12-D-27 | DFD | Witness Statement of Paul Fagan |
| 07-156-12-D-28 | DFD | Witness Statement of Billy Mitchell |
| 07-156-12-D-29 | DFD | Witness Statement of Larry Smith |
| 07-156-12-D-30 | DFD | Witness Statement of James Clay |
| 07-156-12-D-31 | DFD | Sherman FD Firefighter Bobby Hunt, Medic 85 |
| 07-156-12-D-32 | DFD | Sherman FD Firefighter Jeremy Gardner, E85 |
| 07-156-12-D-33 | DFD | Sherman FD Firefighter Michael Early, Medic 85 |
| 07-156-12-D-34 | DFD | Sherman FD Firefighter Jeffrey Kenney, Ambulance |
| 07-156-12-D-35 | DFD | Sherman FD Firefighter Donnie Glenn |
| 07-156-12-D-36 | DFD | Sherman FD Firefighter Jason Whaley |
| 07-156-12-D-37 | DFD | Pottsboro FD Firefighter Keith Bates, E31 |
| 07-156-12-D-38 | DFD | Pottsboro FD Firefighter Tom Sharp, E31 |
| 07-156-12-D-39 | DFD | Pottsboro FD Firefighter Emons Morris, E31 |
| 07-156-12-D-40 | DFD | Preston Volunteer Emergency Services Allen Vols |
| 07-156-12-D-41 | Internet | Weather Service Information |

