

CORTLAND INCIDENT

Multi - Agency Serious Accident Review Team

S.A.R.T.

Investigation Report

Fresno Fire Department



March 29, 2015

1310 E. Cortland

Fresno, CA

CA - FRN – 5017063

**Multi – Agency
Serious Accident Investigation Team**



**Cortland Fire
Final Report**



**Fresno Fire Department
March 29, 2015
CA – FRN – 5017063**

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Documentation

Dumont Printing



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The Cortland Incident Serious Accident Review Team (SART) would like to acknowledge the hard work and professionalism of the following entities:

The preliminary accident investigation team:

The initial actions on the Cortland Incident were conducted in a clear and systematic manner. This team produced a comprehensive factual document that was well organized and set the tone for the external SART to review and evaluate. Their tireless efforts were very apparent and displayed the passion and professionalism of the Fresno Fire Department.

Fresno Fire Chief:

In the aftermath of the accident, the Fire Chief had the courage and the wisdom to establish an outside SART to ensure a full, impartial investigation was conducted. She made it clear to the Team that we had the authority to investigate as thoroughly as necessary in order to identify any and all associated factors, with the full understanding that the process may be disruptive to the organization and uncomfortable for her. She, along with the SART, recognized the opportunity as well as the obligation to affect positive change within the Fresno Fire Department, and the American Fire Service.

The Rescue Efforts at the Cortland Incident:

It was apparent that several on scene members performed above and beyond in applying their skills during the extraction and rescue of the fire captain. It was the aggressive and immediate actions of the firefighters whom recognized and engaged in the recovery efforts that allowed a quick extraction and rapid treatment of the fire captain. The result was an effective rescue and the prevention of a Line-of-Duty-Death.

The external Cortland SART honors your courage and effort with pride and appreciation.





ACKNOWLEDGEMENT OF FIRE CHIEFS

Fresno Fire Department would like to thank and acknowledge the following Fire Chiefs for providing members of their fire departments to assist with the SART process for the Cortland Incident.

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Overview

The Fresno Fire Department (FFD) was established in 1877 and is one of the oldest fire departments in the United States. FFD provides fire prevention, suppression and investigation services, airport fire and rescue, urban search and rescue, response to medical emergencies (EMS), and response to hazardous materials incidents. The FFD service area consists of 335 square miles and is comprised of the City of Fresno, and includes extra-territorial services via contracts to provide services to two fire districts (Fig Garden Fire Protection District (FGFPD) and North Central Fire Protection District (NCFPD)), Fresno Yosemite International Airport, and surrounding areas through mutual aid and automatic aid requests. The region served by FFD (including the two contract districts) consists of 110 square miles within the City of Fresno, 0.69 square miles in Fig Garden Fire Protection District, 217 square miles in North Central Fire Protection District, and 7.3 square miles in the Fresno County contract area. The Department's service area includes a population of approximately 525,000 residents and encompasses college / university campuses, an international airport, farm land, and rural communities.

FFD also occasionally provides services outside of its boundaries through several mutual aid agreements with other surrounding fire districts, including the City of Clovis, and honors the automatic aid agreement between Fresno County FPD and NCFPD. FFD responds to wildland fires and gets reimbursed from the State for strike team assignments and incidents outside its jurisdiction.

Staffing

Fresno Fire Department's 24 stations are divided into three battalions—two within the City and one that covers NCFPD. The Department has 313 authorized sworn safety positions, with 293 filled. Additionally, there are 15 sworn non-safety authorized positions, with 14 filled. Daily FFD sworn firefighter staffing within the City of Fresno and the FGFPD (an island in the middle of the City) consists of 73 members. The FFD staffing for the NCFPD is an additional 12 members, for a total of 85 FFD members on duty each day, covering 335 square miles. Specialized teams within FFD include Urban Search and Rescue (USAR), Aircraft Rescue and Fire Fighting (ARFF), Hazardous Materials Response Team (HMRT), and a Communication Team.

The FFD USAR Team provides special rescue operations for the City of Fresno and within Region 5 of the California Emergency Management Agency (CalEMA). Certified as a Type-1 Heavy Rescue and Type-1 Water / Flood rescue resource, the District's USAR team members hold the following certifications: Rescue Systems 1, Rescue Systems 2, Low Angle Rescue, Confined Space Operations, Trench Rescue, Swiftwater Rescue Unit-1, Swiftwater Rescue Advanced, Swiftwater Rescue Boat Operator, Basic SCUBA, Public Safety SCUBA, and Supplied Air Diving Operations. Nineteen members of FFD hold Fire Control 5 certifications and comprise the District's ARFF team, which is located at the Department's Station No. 24. The ARFF Team provides services for airport emergency response, hazardous materials incidents, first responder calls, and all structure fires within the Fresno Yosemite International Airport boundaries.

In response to the presence of these transportation corridors for hazardous materials, the City has developed its HMRT and a comprehensive approach to hazardous materials emergencies. FFD's HMRT consists of approximately 58 members of the Department who are trained as hazardous materials technicians and/or specialists. Fresno's staffing has significantly been reduced, due to budget cuts; however over the past two years, the City has added two new companies, resulting in an additional seven firefighters on duty each day within the City (current 73 on duty).

OVERVIEW OF FRESNO FIRE DEPARTMENT

Facilities and Capacity

The Fresno Fire Department operates out of 24 stations, a fire apparatus shop and a supply section.





Executive Summary

On March 29, 2015, while performing vertical ventilation on a residential garage fire, a Fresno Fire Department truck company captain, due to penetration of “roof decking burn-through” with direct flame impingement of the lightweight truss, fell into the well involved fire compartment. The Truck Captain sustained critical burn injuries, but fortunately survived.

On April 6, as a result of this incident, the Fire Chief assembled a “Serious Accident Review Team” (SART). The Chief authorized the team to review the incident. In her words, “the primary purpose of this report is to educate and prevent any future injury or death to the department members.” Additionally, and to her credit, she directed the SART to look anywhere the research led us.

The review timeline spanned a seven month period. The process included conducting interviews, reviewing policies and procedures, researching laws, standards, and industry best practices, as well as regular meetings of the SART to analyze, comprehend, organize, and assemble the data into report form.

As the team began to investigate the incident, it became evident that the contributory and causal factors were not unique to this incident. In fact, many of the factors and recommendations have appeared for years in NIOSH Firefighter injury and fatality reports. These factors include: *Personal Protective Equipment and Safety Gear, Independent Action and Freelancing, Leadership and Safety, Stationary Incident Command Post, Accountability and Procedures, Size-Up and 360, Incident Action Plan, Transfer of Command, OSHA 2 In / 2 Out Guidelines, Vertical Ventilation, Organizational Expectations, Risk Management Process, General Safety Guidelines, Recognition of Modern Fire Science, Fire Stream Tactics, Training, Communications, and Emergency Medical Service.*

The SART, feeling frustration as a group, began to ask why. Why, with these factors being common in so many serious injury and LODD reports do we choose to ignore them as an industry? Or worse yet, why do we acknowledge them but fail to act? We have years of these investigative reports with documented factors, recommendations, as well as more scientifically proven, modern firefighting methods, that can and do make this profession safer for our people, yet we continue with business as usual, or simply write firefighting off as just being a dangerous profession.

Clearly, while this accident review and report focuses on the Fresno Cortland incident, it is in fact, much bigger than the Fresno Fire Department. This incident, with the associated video, has been seen across the nation. We all gasped as we watched the brave Captain disappear beneath the roof. However, because of the wide reaching exposure of this tragic event, we have an opportunity to effect national change.

This report is not intended to be critical of the Fresno Fire Department or to place blame on any specific person(s). The issues are far too common across the country to simply focus on one organization. The issues are those of the American Fire Service.

As you review this report, it is the hope of this SART that each of you will take a critical look at your organization, as well as yourselves. Fire departments are made up of individuals. A fire department cannot change its culture, and as a result improve the safety of its employees without the commitment of each individual collaboratively working together, regardless of rank or status, and certainly regardless of affiliation with labor or management.

Yes, fighting fires will always be a dangerous occupation. However, we must change the common practice of simply accepting the causes of the injuries we suffer as just being part of the job, or the cost of doing business. How many

EXECUTIVE SUMMARY

times do we have to read these reports and not change our behavior? When do we say enough is enough? We have the necessary information, and we have the power and ability to make the necessary changes that will prevent future injuries to the brave firefighters of “Our” American Fire Service. It is the hope and vision of this Team that this Fresno report become the benchmark, or wake-up call, we all need to finally effect positive cultural change to our proud profession!

The following is an overview of the NIOSH Review Report (Appendix C, page 144) in which the Cortland SART performed on fire fatalities from the past 10 years. SART utilized reports from NIOSH that identified interior structural firefighting. This was to determine the common factors that were identified in the Cortland Incident as related to incidents across the American Fire Service. It should be noted that the occurrences are comparing LODD’s to this severe injury incident and that there are hundreds, if not thousands, of undocumented incidents with common factors where there was no injury or the injuries sustained are not documented in a way for a SART to evaluate. The following list depicts the NIOSH factors that were identified at the Cortland Incident and which have been widely documented and shared with the fire service for the past decade.

The items below are those that were found to be factors at the Cortland Incident that required recommendations by the SART. These same items were found and documented in the 70 (of 77) NIOSH Reports that were reviewed. The number next to the item references how many NIOSH Reports the Item was documented in. This is another illustration of the fire service continuing to make the same mistakes over and over again.

- Personal Protective Equipment / Safety Gear (16)
- Independent action and Freelancing (18)
- Leadership and Safety (5)
- Incident Command Post (12)
- Accountability of Procedures (28)
- Size Up and 360 (27)
- Incident Action Plan (17)
- Transfer of Command (15)
- OSHA 2 In / 2 Out Guidelines (15)
- Vertical Ventilation (5)
- Organizational Expectations (28)
- Risk Management Process (27)
- General Safety Guidelines (18)
- Recognition of Modern Fire Science (4)
- Fire Stream Tactics (11)



- Training (90)
 - Residential Garage Fire Policy
 - Training Plan
 - Flow Path/Modern Fire Behavior Updates/Ventilation Profile
 - Building Construction Identification and Training
 - Hose and Ladder Training
 - Roof Operations
 - Forcible Entry Training
 - Leadership Training
 - Professional Growth and Development – Promotional Orientation
 - Training Division Staffing
- Communications (60)
 - Systems and Technology
 - Human Error / Knowledge of equipment and use
- Emergency Medical Services (13)
 - Medical Treatment
 - ALS Guidelines and Response (Ambulance Transport)





Building Construction

Overview

The structure involved at the Cortland Incident is a 1,377 square foot (s.f.) one story single family residence with an attached 400 s.f. garage. The structure was built in 1970, and had the following building construction components at the time of the incident:

- 2" x 4" stud and stucco exterior walls
- 1/2" dry wall within the residence
- No dry wall in the garage, except for the firewall between the residence and garage
- 2" x 4" gang nail truss roof
- 1/2" plywood roof sheeting
- One layer of roofing paper and five layers of composition roof shingles



Fig. 1

SITE INFORMATION

- Structure was re-roofed in 1993
- Fresno building department approved the re-roofing over the existing roof which accounts for the 5 layers of shingles
- Roof is a 4' x 12' pitch
- Metal two car garage door
- Garage had a man door which exited through an exterior wall; there was no door directly into the residence from the garage

The original construction of the residence was in 1970, during this era developers just started to utilize gang nail truss roof construction on residential units. This structure had the potential to be either the early version gang nail trusses or conventional cut and stack roof construction. From the exterior of the structure there were a couple of indicators of possible truss roof construction; 2" x 4" fascia board running from the eave up to the ridgeline and 2" x 4" boxed eaves.

The interior of the garage was not used for vehicle storage, it was used for general storage and a make-shift living area with a refrigerator, couch, wood pallets and small furniture.

The interior of the residence was a series of bedrooms and make-shift cubicles for numerous occupants.



Fig. 2





Fig. 3

SITE INFORMATION

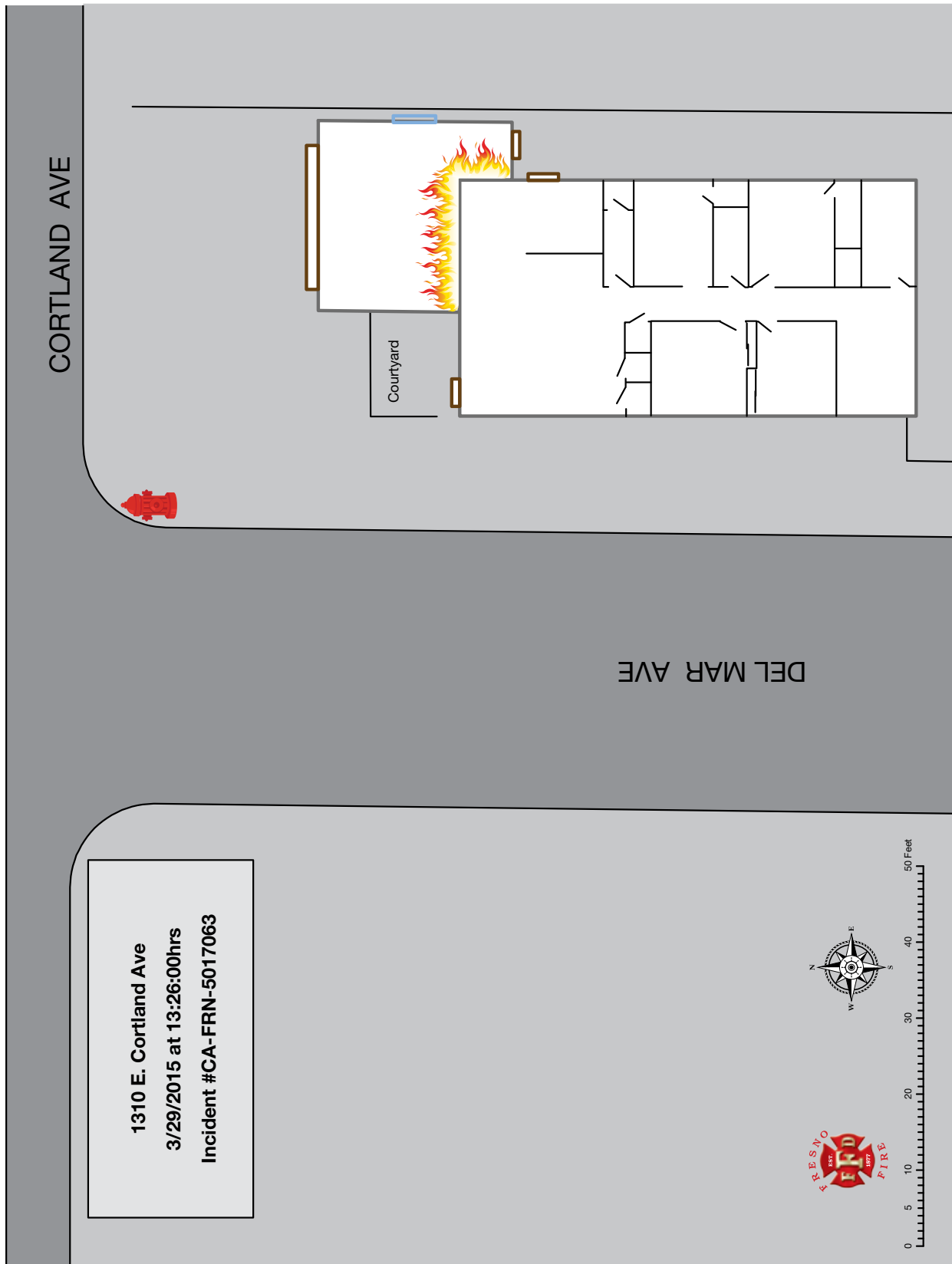


Fig. 4





Incident Overview

At 1322 hours on March 29, 2015, the Fresno Police Dispatch Center received a 911 call reporting a residential fire at 1310 E. Cortland Ave., Fresno, CA. At 1324, Fresno Fire Dispatch dispatched Engines 4, 9, 20, Truck 4, 11, Battalion 3 to 1310 E. Cortland Ave. Engine 5 was just clearing a call a few blocks from the Cortland address and was added to the dispatch. Engine 4 was cancelled. Battalion 1 was also nearby and was added, Battalion 3 was cancelled. The dispatch now consisted of Engines 5, 9, 20, Truck 4, 11, Battalion 1.

Engine 5, with a crew of four was first on scene at 1326 hours. The captain from E-5 assumed Incident command (IC) and gave a size up, reporting heavy smoke showing, possibly in the attic. E-5 had secured their own water supply from a hydrant in front of the residence. E-5 FF1 advanced a 1 1/2" handline to the front door of the residence on the D side of the structure, E-5 FF2 followed with an inside ladder and a rubbish hook. The inside ladder was left near the front door and both firefighters proceeded inside the residence. The IC advised the second arriving engine to assist with fire attack. Fresno Dispatch informed the IC that they had reports of people still inside the structure. The IC had a face to face with one of the occupants and confirmed that everyone was out of the structure, reported on Fire 1 that "everybody has evacuated the structure". Dispatch acknowledged that everyone was out of the structure. The IC gave direction on Fire 1 for the first in truck to "take ventilation", and the third in engine to "go ahead and take utilities".

Fire Attack (E-5 FF1) proceeded through the residence to an exterior door on the B side of the structure with the hoseline, he observed heavy fire and smoke coming from the man door of the attached garage. At 1328 hours he applied water into the garage for 11 seconds but was short of hose. E-5 FF2 and the IC assisted pulling hose through the front door of the residence. E-5 FF2 proceeded to pull ceiling and check for extension.

Engine 20 (E-20) arrived on scene with a crew of three and assumed fire attack. The captain from E-20 sent one firefighter in to assist firefighters 1 and 2 from E-5 with fire attack, the captain and engineer stayed outside to establish Two Out. E-20 captain started to make a 360 around the structure, but it was not completed. The IC assigned Engine 20, to "take" Fire Attack and Two Out. The E-20 Captain replied, "Copy, assist Fire Attack and Two Out." IC reports most of the fire is in the garage with possible extension into the attic.

Fire Attack (E-5 FF1) reports the bulk of the fire is knocked down in the garage and the fire does not appear to have extended into the attic.

Engine 9 (E-9) arrived on scene with a crew of four and secured utilities. Captain of E-9 took independent action to create an opening on the roll up garage door with hand tools.

Truck 11 (T-11) arrived on scene with a crew of four and staged. T-11 crew prepared for assignment in front of their apparatus.

Battalion Chief 1 (BC-1) arrived on scene and proceeded to the IC's location.

Truck 4 (T-4) arrived on scene with a crew of four and asked, "Command, Truck 4, do you want vertical vent?" No response from command.

From the B side man door and window the smoke conditions showed pressurized turbulent brown and gray smoke exiting the door. Fire Attack (E5 FF1) applied water in a fog pattern to the ceiling area of the garage for an additional four more seconds.

INCIDENT OVERVIEW

Fire Attack (E5 FF1) reported to the IC that it appears there are multiple rooms in the garage and the fire is not knocked down. Fire Attack (E5 FF1) moved the hoseline into the residence. E-20 Captain reported on the radio that Two Out is established.

IC stated on the radio, “we’re working on attempting to open the front of the garage at this time and the truck is going to ventilate.” IC stated, “Truck 4 do you copy to ventilate the garage?” IC verbalizes that utilities are secure.

T-4 proceeded to ladder the residential portion of the structure on the D side, the crew had two chainsaws at the base of the ladder with rubbish hooks.

T-4 captain donned his SCBA face piece at the base of the ladder and proceeded up the ladder with a rubbish hook. Once on the roof, he sounded the roof with his rubbish hook as he quickly advanced from the ladder to the ridge line of the roof, also moving north towards the garage area. T-4 FF1 also donned his SCBA and followed the captain up the ladder with a chain saw. T-4 FF1 was behind the captain approximately 10-12 feet. T-4 Engineer 1 was at the base of the ladder attempting to start the second chainsaw. T-4 engineer 2 was also at the base of the ladder.

At this point, the fire in the garage was pushing heavy amounts of pressurized turbulent brown and dark gray smoke through all portions of the garage including the roof line, attic vent, doors, windows, and eaves.

At 1332 hours the captain from T-4 was “sounding” his way toward the roof of the garage through moderate to heavy smoke. T-4 FF1 with the chainsaw was approximately 10-12 feet behind the captain. The captain “sounded” the roof right over the area of the fire wall between the attached garage and the residence approximately 12-18 inches to his right and a little forward of his right foot. He stepped forward and immediately fell through the roof into the garage into heavy fire conditions. This took place eight minutes after dispatch. Flame impingement to the unprotected structural members of the roof is estimated to have been approximately 12-15 mins. Per the IC, T-4 FF1 remained on the roof, T-4 engineer 1 made access to the roof and assisted with ventilation over the residence.

The IC (E-5) and Battalion 1, who had not taken command yet, were both on the front lawn and witnessed the captain go through the roof. They both nearly simultaneously broadcasted a Mayday for a fire fighter through the roof of the garage. BC-1 stated, “Mayday, Mayday, Mayday we have a Firefighter in the Garage...start an EMS unit.”

Fire Attack (E-5 FF1) heard civilians screaming outside of the front door. He repositioned his hoseline back outside the front door and applied water toward the hole created in the roof. E-20 captain (Two Out) retreats from the front porch area, leaving the 1.5" hose behind, picking up a second hoseline near the roll-up garage door and applies water through a small opening in the garage roll up door.

At 1333 hours, using axes and manpower the roll up garage door was removed and additional water was directed into the garage.

Battalion 3 arrived on scene and assigned E-20 captain to RIC 1 Group face to face. He assigned T-11 to become the RIC team. At 1334 Battalion 3 requested an ambulance through dispatch.

Fire Attack (E-5 FF1) applied water for nine seconds through the man door on the B side of the garage and then E-5 FF1 and E-F FF2 made entry into the garage and made contact with the T-4 captain. At the same time, T-11 FF made his way through the residence to the man door of the garage where he observed two firefighters attempting



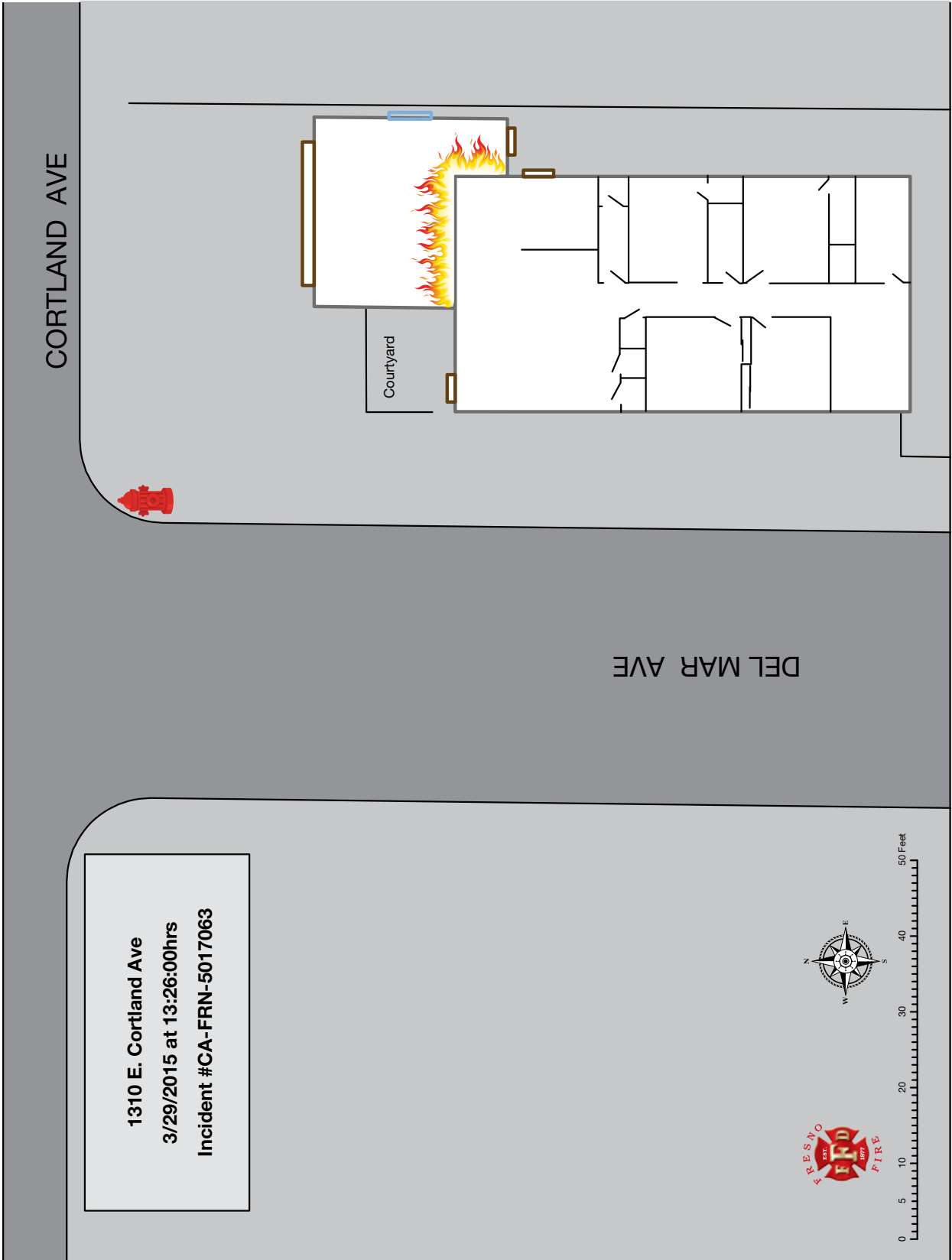
to remove the injured captain. He made entry into the garage and assisted with the rescue, lifting the captain over a pallet and other debris, and exited the garage through the man door.

BC-1 assumed command of the incident from E-5 captain and a second alarm was requested.

E-9 FF1 made access through the removed roll up door and by independent action, assisted with the rescue of the T4 Captain. The three firefighters removed the captain from the garage at 1335 hours. He was moved onto the driveway where cooling measures were initiated while waiting for the ambulance unit.

At 1337 hours the ambulance was on scene and the injured captain was transported to the hospital at 1340 hours. From the time of the accident until arrival at the hospital was approximately 15 mins.

INCIDENT OVERVIEW



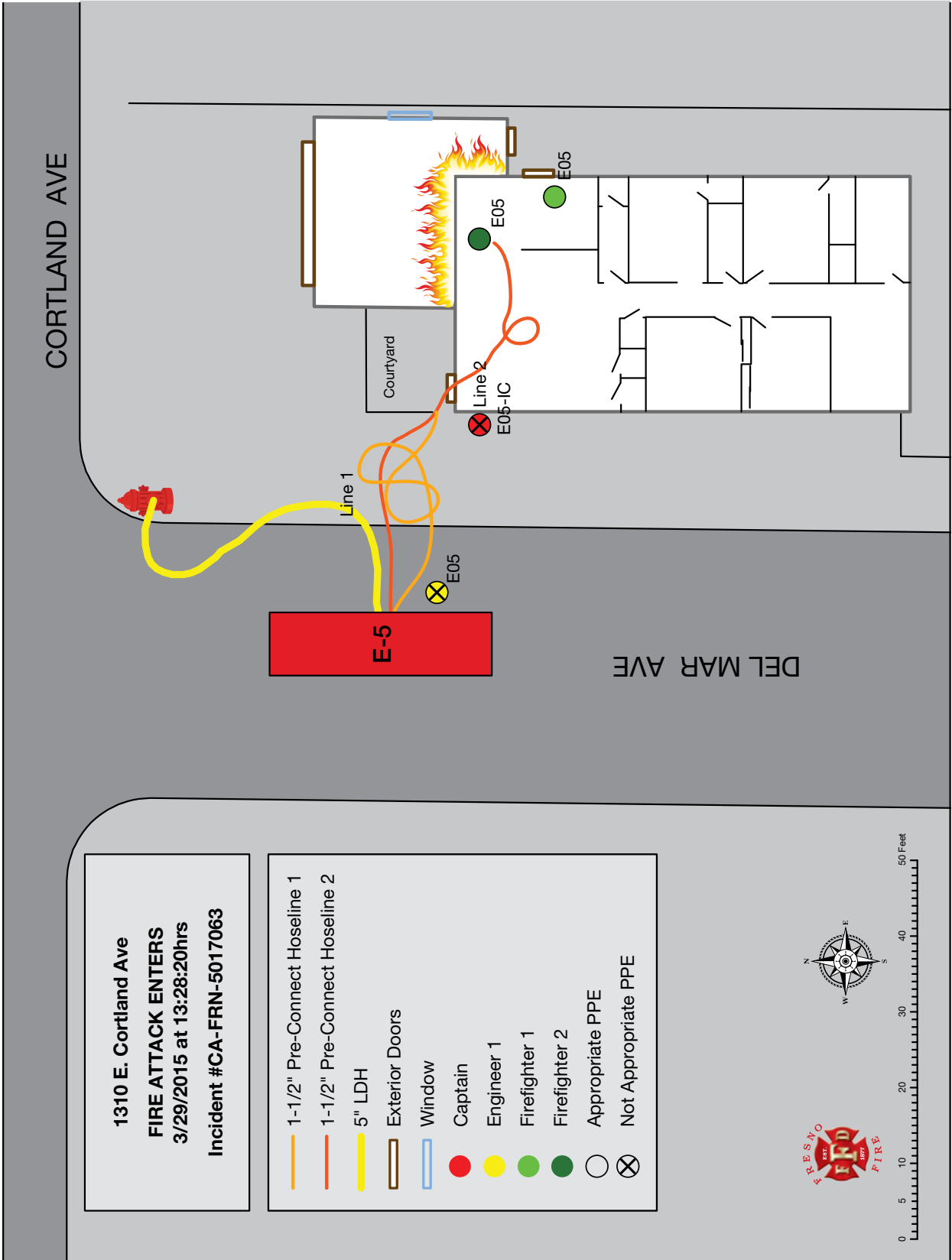
Pre-Arrival



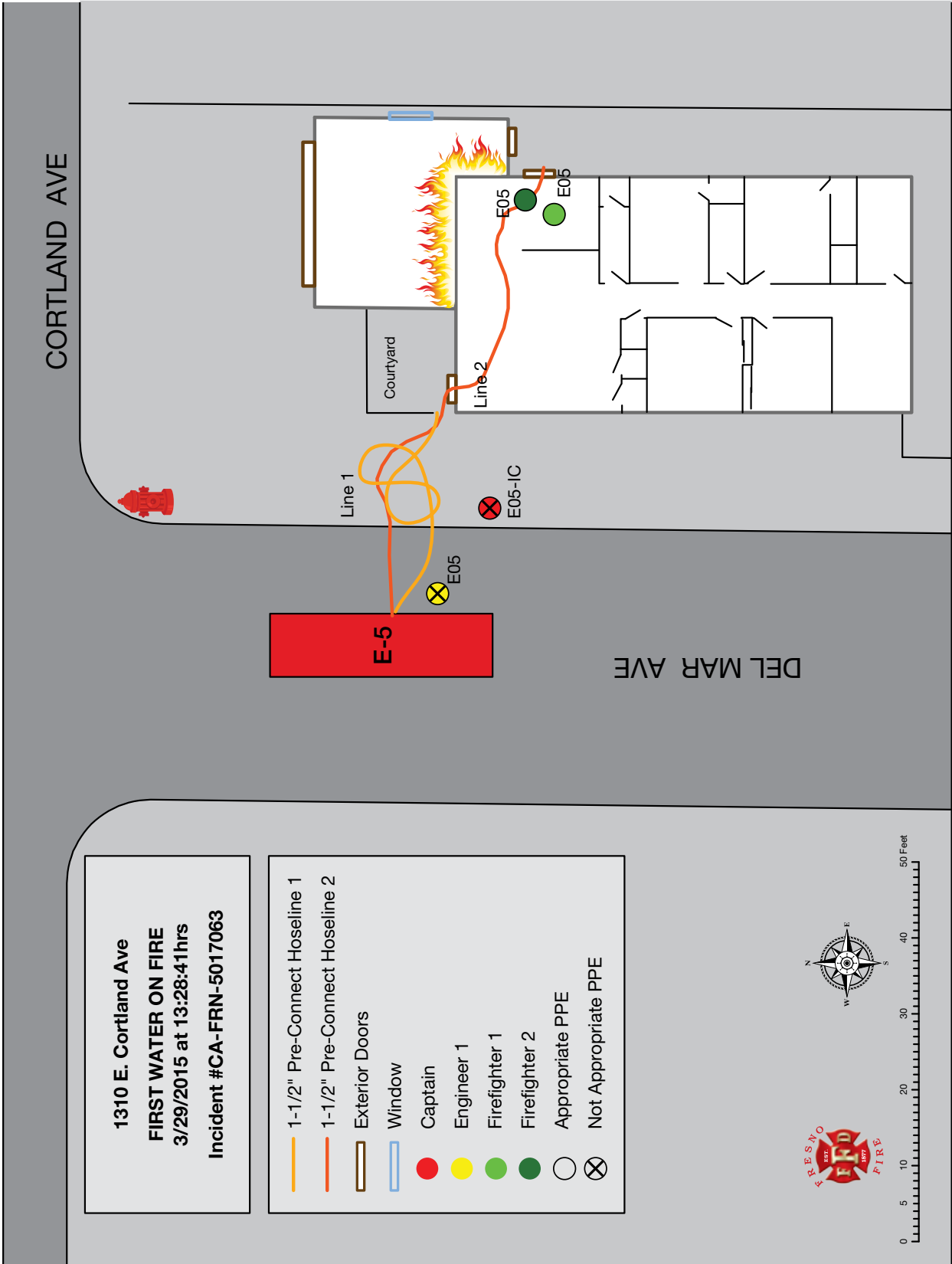
INCIDENT OVERVIEW



INCIDENT OVERVIEW



INCIDENT OVERVIEW



1st Water



INCIDENT OVERVIEW







Incident Timeline

The information for this timeline was gathered through analysis of the dispatch audio, VisiCAD information, helmet camera footage, fire and police reports, and witness statements. Due to the multiple sources utilized to construct the timeline, all times are approximate.

March 29, 2015

- 13:22:00 Fresno Police Department Dispatch receives a 911 call from the occupants at 1310 E. Cortland Ave. regarding a fire in the garage. The call originates from the land line inside the home. The call is transferred to Fresno Fire Communications at 13:23.
- 13:23:34 Phone pick-up at Fresno Fire Communications.
- 13:24:19 CAD: Case Entry Complete: Structure Fire, flames seen and occupants of the house are evacuating. Multiple 911 calls.
- 13:24:13  Dispatch of first alarm assignment: Fresno Fire Communications dispatches a residential structure fire response to 1310 E Cortland Ave. that consists of E-4, E-20, E-9, T-11, T-4 and BC-3. <https://drive.google.com/open?id=0Bwa97LadhSs1Q1FEWWVQLWlodzA>
- 13:25:03 E-5 cleared a call at 619 E Fountain Way, added themselves to the Cortland Incident. As a result E-4 was cleared from the incident. BC-1 canceled BC-3 due to his proximity to the call.
- 13:25:15 OPERATIONS managed on radio channel "FIRE 1."
- 13:25:55 Law enforcement enroute; traffic control Cortland between Del Mar and San Pablo.
- 13:26:26 Reporting Party (RP) states possible somebody inside. Also making it sound like arson – heard somebody talk about fire. (CAD Entry, Not Verbalized)
- 13:26:28 Engine 5 (E-5) arrived on scene with a crew of four. (Source: CAD)
- 13:26:43 Reporting Party leaving area. (CAD Entry, Not Verbalized)
- 13:27:33  E-5 gives a size up reporting heavy smoke showing that appears to be moving into the attic and informs all incoming units that they have secured their own water source with a 5" feeder line. E-5 FF1 pulls a 1.5" attack line and E-5 FF2 brings an attic ladder and a rubbish hook, the attic ladder is left at the front door. E-5 pulls the second 1.5" attack line to the front door. The IC gives direction on the radio for the 2nd arriving engine assist with fire attack. <https://drive.google.com/open?id=0Bwa97LadhSs1My1QUjJDVjJ1SVk>
- 13:27:49 Dispatch reports possible occupants still inside the structure.
- 13:28:09  E-5 reports on FIRE 1 that everyone has evacuated structure. Communications acknowledges everyone out of the structure. <https://drive.google.com/open?id=0Bwa97LadhSs1cG5DQ2xUYWJuYjg>

INCIDENT TIMELINE

- 13:28:25  Incident Commander (E-5 captain) gives direction on FIRE 1 for the first arriving truck company to “take ventilation”, and the “third in engine go ahead and take utilities”.
<https://drive.google.com/open?id=0Bwa97LadhSs1VDdBck93LUp5a0k>
- 13:28:50 E-5 Firefighter 1 exited the kitchen door to the exterior of the structure on the Bravo side. The adjacent exterior garage man-door was compromised by the fire and had flames coming through the upper half of the door. Firefighter 1 applied an 11 second burst of water into garage.
- 13:28:50 Engine 20 (E-20) arrived on scene with a crew of three, assumes fire attack. E-20 FF makes entry into structure with a pike pole and thermal imaging camera and meets up with the two E-5 firefighters. E-20 captain began 360 degree lap of the structure. (360 was not completed)
- 13:29:00  IC (E-5) assigns E-20 to “take” Fire Attack and Two-Out, captain E-20 replies “copy assist Fire Attack and Two-Out”. IC reports most of the fire is in the garage with possible extension into the attic. <https://drive.google.com/open?id=0Bwa97LadhSs1RjhXcUJHVHlnSGc>
- 13:29:31  Fire Attack (E-5 FF1) reports the bulk of the fire is knocked down in the garage and the fire does not appear to have extended into the attic.
<https://drive.google.com/open?id=0Bwa97LadhSs1R0hVdkhZVTN2THM>
- 13:30:12 Engine 9 (E-9) arrived on scene with a crew of four and secures utilities. Captain E-9 took independent action to create an opening on the garage door.
- 13:30:58 Truck 11 (T-11) arrived on scene with a crew of four and stages. Truck 11 crew prepares for assignment in front of their apparatus.
- 13:31:08 Battalion Chief 1 (BC-1) arrived on scene and proceeds to the IC (E-5) position.
- 13:31:11  Truck 4 (T-4) arrived on scene with a crew of four. T-4 captain prompts IC “Command, Truck 4, Do you want vertical vent? (No Answer from Command)
<https://drive.google.com/open?id=0Bwa97LadhSs1Y3oyUmZYZ01Rek0>
- 13:31:15 Fire Attack (E-5 FF1) reports that there appears to be multiple rooms in the garage and the fire is not knocked down.
- 13:31:16 E-20 captain reports on the radio that “Two-Out” is established.
- 13:31:25  IC advised “we’re working on attempting to open the front of the garage at this time and the truck is going to ventilate.”
<https://drive.google.com/open?id=0Bwa97LadhSs1SEl1aUVyU0hTMHc>
- 13:31:32 IC states “Truck 4, do you copy to ventilate the garage?”
- 13:32:07 IC verbalizes that utilities are secure.
- 13:32:07 Pacific Gas & Electric (PGE) notified and will call back with Estimated Time of Arrival (ETA). (CAD)



- 13:32:26  **T-4 captain's penetration of the roof due to "Roof Decking Burn Through" with direct flame impingement of the lightweight truss construction.**
<https://drive.google.com/open?id=0Bwa97LadhSs1ekt6djZPd2FrbUE>
- 13:32:31  IC broadcasts on "FIRE 1" that "Firefighter in garage, firefighter down", "we got mayday". BC-1 states "Mayday Mayday, we have a Firefighter in the Garage...start an EMS unit."
(radio transmission cuts off)
<https://drive.google.com/open?id=0Bwa97LadhSs1eVdmSTE2WWJpY0E>
- 13:32:40  Emergency tone – Firefighter down in the garage starting EMS code 3.
<https://drive.google.com/open?id=0Bwa97LadhSs1WVNudy02Q2lsd3M>
- 13:32:44 BC-1 states "all units on the fireground, we have a firefighter in the garage, firefighter in the garage."
- 13:33:01 Fire Attack (E-5 FF1) retreated from the interior attack and relocated at the front door where water was applied to the roof hole created by the captain falling through. E-20 (Two-Out) also applied water to the same hole with a 1.5" hoseline.
- 13:33:05 E-20 captain (Two-Out) retreats from the front porch leaving the 1.5" behind, picking up a second 1.5" hoseline near the roll-up garage door and applying water through a small opening.
- 13:33:26 Vehicle door removed from garage, allowing horizontal ventilation and RIC team access.
- 13:33:37 BC-3 assigned E-20 captain to RIC 1 Group face to face.
- 13:33:43 Fire Attack (E-5 FF1) repositioned to the garage man-door and applied water for nine seconds (est. 14.2 gal of water) and then made entry into the garage.
- 13:33:50 E-5 Firefighters (Fire Attack) made contact with T-4 captain lying on the floor in the garage. E-9 Firefighter took independent action and made contact with T-4 captain and assisted in the extrication.
- 13:33:58 Incident Command transferred from E-5 captain to BC-1.
- 13:34:08 Incident Command requested a 2nd alarm.
- 13:34:36 BC-3 requesting EMS to Del Mar and Cortland.
- 13:35:12 T-4 captain had been removed through the garage man-door on the Bravo side, by the Fire Attack crew. Once out of the garage, he was carried to the driveway on the Alpha side.
- 13:35:34 2nd alarm assigned E-4, E-5, T-10
- 13:36:33 Correction to 2nd alarm assignment to E-4, E-6, T-19.
- 13:37:29 EMS #123 (Paramedic/EMT Unit) arrived on scene.
- 13:37:37 A reporting party states (to 911 Call Taker) a woman possibly set house on fire; she lives in garage; she tried to set it on fire yesterday.
- 13:38:46 EMS #123 (Paramedic/EMT Unit) makes patient contact.

INCIDENT TIMELINE

- 13:39:19 Engine 6 (E-6) arrived on scene.
- 13:39:40 Local 753 President advised via Voice Mail.
- 13:40:02 Engine 4 (E-4) arrived on scene.
- 13:40:46 EMS #123 (Paramedic/EMT Unit) departs the scene with T-4 captain on-board, enroute to Fresno Regional Medical (RMC) Burn Center. Two firefighters on-board assisting paramedic.
- 13:41:08 Critical Incident Stress Management team notified of serious injury.
- 13:42:35 Dispatch announces 15-minute on scene time check.
- 13:42:58 Fire Shop personnel advised air bottles and App 100 – enroute to scene.
- 13:43:20 All overhead notifications completed. Chief 1 (C-1), Chief 2 (C-2) enroute to RMC, Chief 3 (C-3) enroute to the Cortland Incident.
- 13:43:37 Fire Attack reports all clear on primary search.
- 13:44:27 Truck 19 (T-19) arrived on scene.
- 13:51:44 C-3 advised and enroute with a 20 minute ETA, and is available by cell.
- 13:52:28 Request made for BC-5 and BC-6 (Personnel Chief & Training Chief) to call BC-1 (Incident Commander) on scene.
- 13:55:00 C-3 arrived on scene.
- 13:58:05 30-minute time check.
- 13:58:13 Incident Commander reports fire under control.
- 14:04:28 Police Department has suspect in custody at Shields and Blackstone; will be bringing suspect back to Cortland address to meet Fire Investigator.
- 14:12:36 BC-1 requesting one engine code 2 to begin replacing first alarm assignment.
- 14:22:50 The Fire Department's Safety and Wellness Officer responding to incident.
- 14:44:06 A personnel recall was issued for two engine companies to cover first alarm assignment during CISD.
- 14:44:00 City Emergency Preparedness Officer was notified.
- 16:14:37 Recall of personnel completed for two engine staffing.
- 16:15:54 Taking radio traffic back to "Metro" fire channel.
- 16:46:41 Red Cross notified; three adults displaced. Red Cross 10 – 15 minutes.
- 17:45:18 Incident cleared of fire apparatus.





CAUSAL / CONTRIBUTORY / NON RELATED FACTORS

Causal Factor - Any behavior, omission or deficiency that if corrected, eliminated or avoided, probably would have prevented the injury.

Contributing Factor - Any behavior, omission, or deficiency that sets the stage for an accident or increases the severity of injuries.

Non-Related Factors - Elements discovered as part of the investigation that did not have a direct or indirect effect on the outcome of the accident but does deserve scrutiny.



CAUSAL / CONTRIBUTORY / NON RELATED FACTORS

Items Determined to be Causal Factors	Items Determined to be Contributing Factors	Items Determined to be Non-Related Factors
• Leadership/Safety Culture • Vertical Ventilation Over Unprotected Structural Members • Ventilation Training • Risk Management Identification and Procedures • Lack of Residential Garage Fire Policy • Hose Deployment Techniques • Nozzles, Settings, and Water Application Techniques • Failure to Recognize and Announce Critical Changes in Fire Conditions. • Recognizing Modern Fire Behavior and Ventilation Limited Fires	• Donning PPE • Cultural Need to Hurry, Freelancing • Leadership • Accountability and Enforcement of Policies • Size Up/360 • Incident Action Plan • Independent Action • Company Level Supervision • OSHA 2 Out Guidelines • Organizational Expectations • Procedure Accountability • FFD General Safety Guidelines Procedure • FFD Protective Clothing Procedure • Industry Standard Updates • Truck Operations Manual • Flow Path-Ventilation Profile • Building Construction Manual and Training • Forcible Entry Training • Failure to Properly Operate Portable Radios • Fire Ground Communications • Portable Radio Training • Radio field unit procedures • Ambulance dispatched to a working fire • General safety practices • Medical Treatment	• Establishing an Incident Command Post • Transfer of Command • Incident Command Worksheet • Training Division Staffing • FFD Training Policy Manual Section 300 • Library Inventory • Training Lesson Plans • Training Policy Sections 315-316 • Training Plan • Training And Equipment Manual • Hose and Ladder Training • Leadership Training • Training for Newly Appointed Captains and Chief Officers • Radio System Narrow Banding • Portable Radio Repair and Maintenance • Analyzing and Conditioning of HT Radio Batteries • Limited Budget for Radios and Batteries • Selection of Transmitter • Multiple Types of Radios • Radio Technicians • Media Devices • Line of Duty Death / Critical Injury Procedure • Notification to Family • Safety Committee Meetings • FFD Accident Review Team • Rules of Air Management





CULTURE AND SAFETY

Fire Service Culture

OVERVIEW

Culture: “The sum of attitudes, customs, and beliefs that distinguishes one group of people from another. Culture is transmitted, through language, material objects, ritual, institutions, and art, from one generation to the next”.

Fire Department Culture: Cultural values and attitudes influence many factors within a fire department, particularly in relation to health and safety. Organizational culture is very difficult to define and measure, although certain characteristics tend to be easily recognizable. Organizational culture is the product of a particular combination of influences including leadership, traditions, experiences, peer pressure, and discipline. These cultural factors may have a positive or negative impact on health and safety within the organization, by supporting and strengthening certain values or by weakening and compromising others.

Fresno Fire Department Culture

OVERVIEW

The following information was gathered by the SART personnel through interviews, videos, and other Fresno Fire incidents on social media.

The Fresno Fire Department was established in 1877 and has a long history of fire service tradition and culture. From 2001 to approximately 2007 the department experienced a period of growth. New stations were built, over 100 employees were either hired or promoted, and a bordering fire agency was incorporated into the Fresno Fire Department. This period of growth was followed by a financial downturn for the City of Fresno which led to numerous apparatus unstaffed, command and support staff reduced, and a contract imposed upon the local labor association by the City. Over the same time period, the department had numerous changes in leadership, including five Fire Chiefs. Also during this time, many senior Captains within the department retired. Traditionally, senior truck Captains at two-company firehouses trained newly promoted Captains to take on their new leadership role. After the un-staffing of apparatus, two company houses were no longer a reality.

The department has not experienced a Line of Duty Death or near fatal accident since 1979. The majority of the department personnel have never experienced the impact of such an incident, or the review process following an extended incident investigation. All of these factors have helped contribute to riskier behavior and a developing culture of consistently “bending the rules” without correction by department leaders.

“Normalization of risk” Ref. NASA Doc., (when an organization slowly accepts dangerous behavior when immediate severe consequences do not develop following the behavior). Field level operating procedures rely on tradition and department culture, many times in direct opposition to department policy. (Appendix D, page 203)

FINDINGS AND RECOMMENDATIONS: CULTURE AND SAFETY

During our interviews it was stated many times by several department members that, “we are the Fresno Fire Department, we fight a lot of fire”. This statement was not said in a bragging manner, but as a statement of fact in their opinion. The resulting culture, is one of over confidence and a feeling of not really needing any leadership. Statements were made that, “when we get on scene we just go to work”.

It is common place for violations of the department’s policies and procedures to take place on the fire ground. The most serious violations include, not wearing required P.P.E., and the lack of enforcement of these safety requirements by Captains and Chief Officers, i.e.: it is generally felt that hoods are optional. There is also an overall feeling for the need to “hurry, hurry, and hurry,” which can allow critical safety steps to be missed.

Culture dominates the daily operations above established department policies and procedures. Battalion Chiefs routinely do not assume command on residential structure fires. During one interview a Battalion Chief stated that, “the Captains won’t let us take the fire.”

When dealing with department policies and procedures, it is quite apparent that the membership at all levels is picking and choosing which ones they are willing to follow, including when the policy states, you “shall”. The culture of the leadership at all levels has resulted in the lack of enforcement and accountability. Department members have stated during interviews that, “providing more policies and sending them out with no demonstrated effective leadership and or accountability will not fix the problem”. Many of the policies the department utilizes are well written but not followed-up on to ensure a change of behavior.

It is not easy to change a fire department’s culture. Changing culture is measured in months and years, but it is not impossible. The negative side of a department’s culture results in serious safety issues. Too many firefighters are still suffering and dying across the country due to simple things like not wearing seat belts or not wearing proper P.P.E. on the emergency scene.

Changing culture must be supported and mandated from the top down by both department and labor union executive staffs collaboratively. Trust and accountability by all officers within the chain of command will be critical to any success. Department leaders at all levels of the organization must make expectations clear. The desired change must be explicitly communicated, and those in positions of authority at all levels must be held accountable to support and enforce these expectations.

As stated in the Executive Summary, this culture of overconfidence and acceptance of predictable injuries is not unique to the Fresno Fire Department. In fact, it is sadly prevalent throughout the American Fire Service.

When will we finally take action to change this dangerous culture?

ITEM(s):

Leadership and safety culture within the organization

FACTOR(s):

Causal



FINDING(s):

When dealing with department policies and procedures, it is apparent the membership at all levels is picking and choosing which ones they are willing to follow, including when the policy states, you “shall”. The culture of the leadership has resulted in the lack of enforcement and accountability.

DISCUSSION:

Throughout the interview and review process, there was a noted variance in the perception of compliance to safety practices, policies and procedures among the membership and administration.

RECOMMENDATION(s):

- Develop an “Imperative for Safety” within the organization.
- All command, staff, and executive meetings should consist of a review of injuries or close calls when appropriate.
- Any unsafe act shall be stopped immediately, by all members in the organization, this action should be rewarded and reinforced by leadership.
- Develop a formal “Risk vs. Gain” procedure and tactical work-sheet for decision making and provide training for a change in behavior.
- Conduct annual Overall Department Risk Assessments and utilize results for strategic planning.
- Ensure open and frank communications between ranks with regards to the overall safety message and ongoing safety threats and opportunities.
- Develop an overall core belief that all accidents are preventable with an organizational goal, of zero accidents.

ITEM(s):

General Safety Practices

FACTOR(s):

Contributing

FINDING(s):

During the interviews, it was determined that:

Appropriate PPE is not donned prior to responding.

Seat belts are not routinely worn.

FINDINGS AND RECOMMENDATIONS: CULTURE AND SAFETY

Helmet shrouds are not routinely worn.

Helmet panels – Magnetized panel that attaches to the sides of helmets, used to identify the company and assignment of members while on duty or at an emergency scene not being used or not being updated upon reassignment.

FFD policies and Procedures for PPE are routinely not enforced by FFD staff and members.

DISCUSSION:

It is common fire service practice to don the turnout pants, boots, hood and jacket before getting on the apparatus when responding to reported structure fires. The FFD routinely dons their appropriate PPE after getting on the apparatus. This has resulted in putting on the PPE while responding code three (3) to the incident. Because of this, safety belts are not being worn, and head sets are removed. As a result FFD members are unable to meet State and FFD safety belt policies and potentially missing vital communications. Many personnel are under the impression that wearing full PPE is at the discretion of the member or the Captain. Violations of the existing policy are common place and are not being corrected when observed by Captains and Chief Officers.

It is the responsibility of leadership and all members to ensure proper PPE is donned prior to entering the cab of apparatus before emergency response.

SART provided a memo of Identified Safety Concerns to FFD Fire Chief.

RECOMMENDATIONS:

- Establish and enforce department policy for donning turnout pants, boots, hood around the neck, and turnout coat before responding to an emergency.
- Enforce and hold members accountable to existing policies regarding the wearing of PPE, seat belts and head sets.
- Consider adding helmet shrouds to policy of full PPE to be worn.

NOTE:

The Letter of SART Identified Safety Concerns, and a memo with expectations was emailed by FFD Fire Chief to members of the Fresno Fire Department on May 21, 2015. (Appendix I, page 266)

ITEM(s):

Cultural need to hurry, and freelancing

Fresno Fire Policy 202.2

FACTOR(s):

Contributing



FINDING(s):

Assignments are provided prior to arrival to incident. Companies will perform work at incidents prior to be assigned.

Policy 202.2 states during attack mode, unless otherwise directed, continue response, report arrival to the incident commander, and be prepared to effect one or more of the following assignments.

DISCUSSION:

In interviews conducted with members, it was identified that there is a need to assign incoming resources as quickly as possible or the resources will freelance. This was evident at the Cortland incident.

RECOMMENDATION(s):

- Enforce Policy 202.2 Residential Structures or establish a singular policy on staging for incidents.

ITEM(s):

Leadership

FACTOR(s):

Contributing

FINDING(s):

It was stated in several interviews by department members, that in general, they do not require and or receive supervision by superior officers.

There is not a continuing personnel evaluation system within the Fresno Fire Department.

DISCUSSION:

Captains and Chief Officers, in general, are failing to correct safety violations when observed. There is very little respect for department authority and a feeling of separation and mistrust between company officers, battalion chiefs, and staff.

There is not a formal personnel evaluation process beyond the rank of recruit, which would allow for written expectations, correction and praise.

RECOMMENDATION(s):

- Leadership and skill development training for all members, specifically for Captains and Chief Officers with an annual review of progress.

FINDINGS AND RECOMMENDATIONS: CULTURE AND SAFETY

- Accountability and enforcement of policies by company officers and battalion chiefs with full demonstrated support and leadership by staff.
- Consider implementing a personnel evaluation system.

ITEM(s):

Fresno Fire Policy 201.1 Incident Command

FACTOR(s):

Non Related

FINDING(s):

It was determined in interviews that battalion chiefs do not regularly take command of incidents.

Fresno Policy 201.1 Incident command states:

Upon arrival the first battalion chief shall assume command of the incident.

DISCUSSION:

Policy 201.1 clearly states for the first battalion chief to assume command, Fresno's culture directly violates the policy on a regular basis.

RECOMMENDATION(s):

- Enforce and hold Battalion Chiefs accountable to set-up an Incident Command post at every multi-unit response in accordance with Fresno Policy 202.1.
- Establish within policy 202.1 for the training of company officers to command incidents.

ITEM(s):

Accountability and enforcement of new, or updates to policies.

FACTOR(s):

Contributing

FINDING(s):

New and updated policies are delivered through a Learning Management System (LMS).



DISCUSSION:

Each member of the department is to identify that they have read, or complete a test on the new or updated policy through the LMS. The members are completing, or not completing the LMS, however there is no enforcement, accountability or discussion on the new or updated policy.

RECOMMENDATION(s):

- Establish a procedure for providing training on any new policy which effects field operations within 30 days of issuance. Develop and enforce a review procedure to ensure learning objectives were achieved and policy has been implemented across the department with a change in behavior.

ITEM(s):

Policies containing the word “Shall”

FACTOR(s):

Contributing

FINDING(s):

Shall is in numerous policies that range from high risk to a very low or no risk of personnel safety.

DISCUSSION:

High risk policies that contain shall, are imperatives for safety.

A low risk shall, as in thermostat settings are of no risk for safety of personnel.

If all policies that state shall are not strictly enforced, the culture then becomes the norm not to follow the policy whether the policy be of a high or no risk for personnel safety, creating a “cultural choice” of which “shall” policies are followed.

RECOMMENDATION(s):

- Review all policies and consider removing the phrase “shall” (or similar language) from any policy that is a non-safety imperative guideline or may bring discredit towards the department, or consider developing and applying a risk management process of identifying risk associated with varying policies.
- Consider separating strict policies concerning operational safety and employment procedures from “Guidelines” that cover normal business and procedural operations.

ITEM(s):

Safety Committee Meetings

FINDINGS AND RECOMMENDATIONS: CULTURE AND SAFETY

FACTOR(s):

Non Related

FINDING(s):

Since the Cortland Incident FFD has held monthly safety meetings, whereas prior there were quarterly meetings.

DISCUSSION:

Monthly safety meetings provide for timely information and progress updates for ongoing projects.

RECOMMENDATION(s):

- Safety Committee Meetings should be reviewed at the executive level.
- Develop a process for tracking decisions and recommendations to their completion or implementation by executive staff and safety committee.



COMMAND AND CONTROL

OVERVIEW

FIREScope, or *F*irefighting *RE*Sources of *C*alifornia *O*rganized for *P*otential *E*mergencies, identifies standard operating guidelines that should be employed in establishing command, and should be considered as the Standard of the Industry in the California Fire Service. The system provides effective management of personnel and resources providing for the safety and welfare of personnel. It also establishes guidelines for implementation of all components within ICS for structural / fire operations.

REVIEW

All incident command policies and procedures were reviewed for compliance and consistency regarding the Cortland Incident. Additionally, FFD's command and control policies, procedures, and practices were referenced to FIREScope.

SUMMARY

It is recommended that the FFD develop and adopt a philosophy of Command and Leadership. This philosophy should include best practices of the industry, reinforcement of current policies and procedures, and mentorship programs that support the vision of the FFD, which is to be "Recognized as a Standard of Excellence in the Fire Service."

ITEM(s):

Size-Up

FACTOR(s):

Contributing

FINDING(s):

The first arriving officer at the Cortland Incident conducted an arrival report that described the building and conditions that is consistent with FFD procedure. During the size-up process, no 360 degree walk around assessment was performed by the Incident Commander or any other officer throughout the incident.

DISCUSSION

One of the most critical tasks to be conducted at an early stage of a structure fire is the performance of a 360 degree walk around. For safety, a 360 degree walk around, which is part of a quick size-up obtained from all four sides of a structure, attempts to gain as much intelligence about the structure as possible. The 360 degree walk around is a critical component in gathering sufficient factual information to conduct an initial Risk Analysis, as well as the

FINDINGS AND RECOMMENDATIONS: COMMAND AND CONTROL

initial Incident Action Plan. The size-up process must continue throughout the incident to ensure a viable, current incident action plan is in place.

FFD Incident Command Procedure 201.1 identifies the need for a 360 degree walk around assessment to be completed in item 4 of the “Incident Commander Responsibilities”.

RECOMMENDATION(s):

- Provide department wide training on FFD Incident Command Procedure 201.1
- Executive staff shall provide and enforce clear expectations to ensure a 360 degree walk around assessment has been completed or attempted.
- Reference FIREScope Incident Command System: ICS-SF
<http://www.firescope.org/ics-guides-and-terms-/ICS%20SF.pdf>
- Ensure that language referencing a 360 degree walk around assessment, as part of an initial and on-going size-up process is consistent in all procedures, and remove the term “consider” from the policy.
- Re-enforce the importance of the Incident Commander not becoming engaged at the Task level.

ITEM(s):

Incident Action Plan

FACTOR(s)

Contributing

FINDING(s):

No clear “Incident Action Plan” (IAP) was communicated or understood.

DISCUSSION

During the investigation the majority of personnel on the fire ground stated that they were not aware of the Incident Action Plan. Those that said they were aware stated, the Plan was to, “put the fire out.”

RECOMMENDATION(s):

- Provide additional training to all personnel on Fresno Fire Department SOP’s 201.1 and 202.2, in relation to Incident Command.
- Consider adding to the SOP’s the importance of verbalizing the Incident Action Plan to all personnel on the emergency scene initially, and whenever the IAP is adjusted.



FINDINGS AND RECOMMENDATIONS: COMMAND AND CONTROL

- Executive Staff shall provide and enforce clear expectations on developing and communicating Incident Action Plans.
- Reference Firescope Incident Command System: ICS-SF

ITEM(s)

Incident Command Worksheet

FACTOR(s):

Non Related

FINDING(s):

The current incident command worksheet does not contain the incident priorities, strategies, or mode of operation.

There is not a standard command board for battalion chiefs or company officers.

There is not a standard command board for all chief vehicles.

DISCUSSION

To effectively manage an incident, a standard command board or worksheet should be utilized by all incident commanders. These command boards or worksheets should be strategically oriented with the components of an Incident Action Plan, in addition to being simply tactically oriented.

RECOMMENDATION(s):

- Add, modify or create a standard command worksheet that includes, incident priorities, strategies, mode of operation, and tactical objectives.
- The command worksheet created should be standard for all incident command.
- All chief vehicles should have a command board that mirrors the company officer command worksheet.
- Update FFD Policy 106.60 to reflect recommended changes.

Reference:

- NFPA 1561 Standard on Emergency Services Incident Management System

ITEM(s)

Incident Command Post

FINDINGS AND RECOMMENDATIONS: COMMAND AND CONTROL

FACTOR(s)

Non Related

FINDING(s):

FFD personnel deviated from portions of the Incident Command Policy 201.1 that references the need to establish an Incident Command Post.

DISCUSSION

An “Incident Command Post” (ICP) was not initially set up by the first arriving Chief Officer. FFD Policy 201.001 states: “The incident commander shall take a position at the command post, to observe operations, receive reports, and consult with cooperating officials of other departments or agencies. Upon temporarily leaving the command post, the IC shall assign an aide to the command post.”

The first priority listed by FIREScope under ICS-SF, is to assume command and establish an effective operating position. (ICP)

RECOMMENDATION(s):

- Provide additional training to All Chief Officers on Fresno Fire Department’s SOP 201.1 in reference to establishing an ICP.
- Strictly enforce FFD SOP 201.1
- Consider referring to “Best Industry Practices” including but not limited to “FIREScope Incident Command System: ICS-SF,” and “Command 1A: Command Operations for the Company Officer (California Edition)” to update and enhance Fresno Fire Department SOP’s 201.1 and 202.2. Develop and adhere to a Command and Control Policy; outline the formal command process in how to establish, assume and transfer command.
- Recognize NFPA 1561: Standard on Emergency Services Incident Management System and Command Safety.

ITEM(s):

Transfer of Command

FACTOR(s):

Non Related

FINDING(s):

No transfer of command took place during the initial phase of the incident or upon arrival of the battalion chief.



DISCUSSION:

FFD Incident Command Procedure 201.1 states: “The battalion chief will normally assume the position of Incident Commander at all multi-company operations.” It is standard practice for FFD to allow company officers to maintain command throughout the incident on residential fires. The sequence of events and timeframe during the Cortland incident from the time the first battalion chief arrived to when the injured fire captain fell through the roof was within minutes. No formal transfer of command was attempted before the event.

Note:

The SART recognizes the benefits of a chief officer allowing a company officer to remain as the Incident Commander during routine incidents, while the chief officer acts in an advisory role. However, it is important that this takes place at an established Incident Command Post, with the advising chief officer having full knowledge of the current Incident Action Plan, and the ability to step in when necessary.

RECOMMENDATION(s):

- Executive Staff to provide and enforce clear expectations on the Transfer of Command as outlined in FFD procedure 201.1 and FIREScope Incident Command System: ICS-SF
- Ensure the language relating to transfer of command is consistent throughout all policies and procedures. Procedures 201.1 and 201.2 are conflicting.

ITEM(s):

Freelancing and Independent Action

FACTOR(s):

Contributing

FINDING(s):

Through the investigation it was found that independent action was taken by several members and companies during the Cortland Incident. The actions taken were not clearly communicated to the IC and as a result, personnel accountability suffered.

The initial IC felt pressured to issue tactical assignments quickly in order to prevent independent action. As a result, a 360 degree assessment of the structure was not accomplished by the initial IC.

DISCUSSION

Freelancing and independent action are described as when individuals or companies work independently, and commit to tasks without the expressed knowledge or consent of the incident commander.

FINDINGS AND RECOMMENDATIONS: COMMAND AND CONTROL

Personnel accountability is critical on the fire ground and is hampered by freelancing and independent action. FFD addresses personnel accountability in Procedure 203.003, and the Fresno Operational SOG's. While independent actions carried out by some members and companies during the Cortland Incident proved to be instrumental with the successful rescue, the lack of communication to the supervisors and the IC created a dangerous environment.

Through the interview process, several company and chief officers stated that they routinely witness independent action and freelancing on the fire ground. Companies routinely engage prior to receiving tactical direction by the Incident Commander.

RECOMMENDATION(s):

- Provide a systematic process for Fresno Fire Department apparatus to respond into position, and receive assignments at emergency incidents.
- A comprehensive staging policy will ensure that the IC will have time to evaluate, plan and deploy resources more effectively.
- Staging will prevent congestion, allow proper placement of resources, provide a central location to order and deploy resources, reduce radio traffic, and improve fire ground accountability.
- Reinforce the importance of accountability in reference to individual and company independent actions.

ITEM(s):

Company Level Supervision

FACTOR(s):

Contributing

FINDING(s):

Through the investigation it was found that the initial fire attack crews made entry into the structure and operated without a company officer. This action resulted in a lack of direct supervision where critical task level decisions were taking place. Firefighters found it necessary to interrupt tasks at the tactical level to perform command level functions. The nozzle firefighter had to interrupt his tasks several times in an attempt to communicate with the incident commander. When critical decisions were needed, no company officer was present in the interior of the home.

DISCUSSION:

Industry best practice dictates that command level supervision is a critical component on the fire ground. The experience and expertise of the Fresno company officers should not be discounted and should be utilized with all fire ground operations. Command level supervision during tactical assignments ensures the assigned tactical objectives are achieved safely and efficiently.



RECOMMENDATION(s):

- Fresno Fire Department should ensure that company officers are assigned to crews during tactical assignments, whenever possible.
- Company Officers will maintain radio communications with Command allowing crews to perform tactical assignments.

ITEM(s):

Two-Out Guidelines

FACTOR(s):

Contributing

FINDING(s):

Upon review FFD personnel deviated from portions of the Fresno Operational Area Rapid Intervention Standard Operating Guideline. “Two-Out was not established prior to making entry by the attack team on the Cortland Incident. The initial IC did not declare “Rescue Mode” and “Immediately Dangerous to Life and Health” (IDLH) conditions did exist as structural members were involved with fire. Two-Out was assigned but it was not in place prior to making entry.

DISCUSSION:

FFD has adopted an operational area guideline that states: “Two-Out will be designated for firefighter safety as the first step towards the progression of a Rapid Intervention Group. Two-Out will be in place at the point of entry and established over the radio prior to any interior operations of an IDLH environment.”

RECOMMENDATION(s):

- Provide department wide training and give clear expectations on the adopted Fresno Operational Area Rapid Intervention Standard Operating Guideline.
- Establish a “Rules of Engagement” Policy.
- Develop and adopt an exception form that meets the CAL-OSHA requirement for exceptions to the Two Out.
- When the second in engine is assigned to back up fire attack and provide for “Two-Out”, the second in captain should go inside to provide leadership and communications for the fire attack team.

ITEM(s):

Vertical ventilation over unprotected structural members

FINDINGS AND RECOMMENDATIONS: COMMAND AND CONTROL

FACTOR(s):

Causal

FINDING(s):

Through the investigation it was found that vertical ventilation was attempted over unprotected structural members.

DISCUSSION

Any roof assembly where structural members are unprotected by sheetrock should be considered extremely dangerous under fire conditions. Rapid deterioration of these structural members' strength will occur and may result in loss of structural integrity.

RECOMMENDATION(s):

- Develop and adopt a Roof Operations Policy to include the expectation that vertical ventilation will not knowingly be attempted over clear span unprotected spaces.
- Provide training to all FFD personnel on roof construction and the associated strategies and tactics for vertical ventilation.

ITEM(s)

Fresno Fire Department Accident Review Team

FACTOR(s):

Non Related

FINDING(s):

The Accident Review Team (ART) completed an initial investigation.

The Accident Review Team provided a binder and thumb drive of information to the SART.

DISCUSSION

By creating this team, the FFD was able to gather critical initial information which has been instrumental to the completeness of this SART report. However, the ART was created at the time of the incident. An on-going ART in place and exercised on a regular basis would be an asset to the organization in regards to future accidents and significant injuries.



RECOMMENDATION(s):

- Continue to utilize the same, or a similar type of ART for future accidents and significant injuries, i.e.: similar to a type three (3) incident management team.
- Create a team, and or identify members within the department who have specific skills to work in the capacity of those positions.
- Create a policy with templates and expectations of each member and function of the team.
- Provide ongoing training and development for the team.

ITEM(s):

Organizational Expectations

FACTOR(s):

Contributing

FINDING(s):

As a result of the investigation it was found that organizational expectations are not clearly communicated, understood, or enforced throughout the department. Several members of all ranks could not recall fire ground, administrative, or leadership expectations given to them by their supervisors. It was also determined that the supervisory/management level for span-of-control purposes has been significantly reduced over the last several years.

DISCUSSION

Defining expectations, effectively communicating those expectations and setting clear goals are critical components of leadership. Clear expectations promote efficient and effective operations, work place safety, and respect for leadership.

RECOMMENDATION(s):

- Provide additional training for Executive Leadership, Command Staff, and Suppression Personnel on creating and communicating organizational expectations.
- Provide and communicate clear organizational expectations from top to bottom and continuously reinforce those expectations.
- Establish written organizational expectations for all positions.
- Adopt an annual evaluation system that supports written expectations.
- Supervisors reinforce expectations through regular mentoring and coaching that support the mission of the organization.

FINDINGS AND RECOMMENDATIONS: COMMAND AND CONTROL

- Asses the current supervisory/management span-of-control level for effectiveness, and plan/budget for necessary increases.

ITEM(s):

Procedure Accountability

FACTOR(s):

Contributing

FINDING(s):

Through the investigation it was found that several adopted procedures were deviated from during the Cortland Incident. It was also discovered that at all levels of the organization, employees and supervisors are aware of procedures routinely deviated from, with little to no consequences.

DISCUSSION

Fresno Fire Department has a thorough and well written library of adopted policies, rules and regulations, and standard operating procedures. The term “Shall” is written in many procedures that are known to be deviated from. Policies and Procedures are the strategic link between the organization’s vision, mission, and daily operations. Well-written policies and procedures ensure employees clearly understand their roles and responsibilities within predefined limits. Without accountability and enforcement, policies and procedures are ineffective.

RECOMMENDATION(s):

- Create a culture of performance management and accountability.
- Provide accountability through the SIMPLE acronym.
 - Setting Expectations
 - Inviting Commitment
 - Measuring Progress
 - Providing Feedback
 - Listing Consequences
 - Evaluating Effectiveness
- Complete an ongoing comprehensive review of all policies and procedures to ensure validity and organizational support.



TRAINING

OVERVIEW:

The training division resides in the Headquarters compound which includes a training classroom and other divisions and sections that carry out the day to day business of the fire department. Fresno Fire has a training tower and additional classrooms located at Fire Station 3, 1406 Fresno Street. This facility has a flashover container, multi-story tower, and ancillary props to support housing the entry level firefighter academy.

The Training Division is responsible for the delivery of all training materials, recommendations, and needs by way of standards, mandates, and identified areas of improvement. They coordinate the development of lesson plans, recruit assistance for drills, committees, and cadres related to the delivery of training within the division. The division is staffed with one battalion chief, one EMS Officer (emergency medical service), two training officers (rank of Captain,) one Engineer (Driver/Operator Program development) and one training specialist (civilian educator) for the oversight and training of 293 uniformed personnel performing all-risk services.

Over the past two years; the organization has identified, through a needs and gap analysis, the importance of adopting and following a training plan. This plan would extend past the month to month scenario based training which was being scheduled. This plan would account for the education, practice, evaluation of the performance standard, and testing in each discipline identified on the schedule. This plan was introduced in late 2012.

REVIEW:

For the purpose of this report, FFD Training Program was reviewed to evaluate the culture of the organization as it relates to training with a specific emphasis on items related to structural firefighting. This includes policy, training bulletins, calendars, manuals, recognized publications, books, or other related materials in administering a training program. This is in recognition to aid the FFD in the prevention of injury and loss of life. This report does not attempt to evaluate other areas of training including those that may be legally mandated.

This investigation noted that the FFD has numerous policies, reference and goals established. Its program is recognizing NFPA and OSHA standards and in many cases providing the publication, chapter and sub-section. FFD requires State Fire Training courses for promotional exams; however, the testing process, department best practices, or the recognized materials have not been institutionalized culturally, or set into practice, through education and training with applied fire ground operations.

The majority of the disciplines taught from the entry level academy through career development and promotional mentoring is “this is how we do it,” or “this is the way we have always done it”. A common phrase regarding training on hose, ladders and live fire updates was, “We are Fresno Fire, we fight a lot of fire; why do we have to train on it.” This statement was not said in a bragging manner, but as a statement of fact in their cultural opinion. There is no set department standard on Engine or Truck Company Operations, Command and Control, or Strategy and Tactics that are practiced under a risk management philosophy.

The overall review would suggest that the training delivery methods and current practices in the FFD had casual and contributing factors in the Cortland Incident. The training plan has not recognized structural firefighting updates and industry trends to enhance firefighter safety and injury prevention. This includes the education

FINDINGS AND RECOMMENDATIONS: TRAINING REVIEW

and training on: the time temperature curve, fire chemistry, fire behavior related to petrochemical materials, the dynamic effects of ventilation, and UL / NIST Flow Path. A consistent skills maintenance program should include, but not limited to, hose handling, ladders and the proper use of tools and equipment safely. The program shall also include residential and commercial forcible entry tactics.

The FFD is not accurately documenting the minimum industry standard (NFPA) of 240 hours of training on an annual basis. Like many organizations, it is understood that many trainings are conducted; however, the hours are not properly recorded. It is further noted that even with the acknowledgement of unrecorded hours, many of the department's personnel are not getting the minimum annual training hours. This is especially concerning when it comes to the recognized need in suppression firefighting disciplines, tactics, and tasks.

The Training Division has a process in place to identify training needs which identifies tasks, activities, knowledge, skills, and abilities required to deal with the demands of training its personnel. They, the training division, understand the risk and requirements of providing all-risk services under emergency conditions, yet have not been able to fully implement the identified needs in their training plan.

The critical components that impacted the casual and contributing factors include:

- Lack of implementing a Risk Assessment / Analysis Program.
- Challenges in sustaining a consistent adult learning environment for all members and ranks. This is required in professional development and skills maintenance: Identified factors were funding, constant changes to the training plan, and understanding the trends that affect firefighter safety.
- Lack of staffing and a revolving training staff that, if corrected, would improve and set department expectations through an approved education and training plan. This would display an investment in personnel, and provide the ability, to achieve and maintain the required proficiencies in suppression firefighting.

ITEM(s):

FFD Training Policy Manual Section: 300

FACTOR(s):

Non Related

FINDING(s):

The Fresno Fire Department currently has a list of comprehensive policies and procedures for standard operating guidelines with expectations in conducting business within the department that are related to training and safety.

DISCUSSION:

In our research, there are numerous policies that identify best industry practices, standards, and mandates. It is concluded that the current policies are not reviewed and followed if in place. These policies should be reviewed



FINDINGS AND RECOMMENDATIONS: TRAINING REVIEW

on a regular basis, updated as industry standards change, and added or deleted as reviewed. This should include a committee of labor and management with final approval at the executive staff level.

It was further concluded that there is no set expectation in the enforcement of these policies. The Fresno Fire Department culture dictates the actions and behavior of personnel rather than the policy or procedure. A lack of accountability of policies and procedures supports the culture with an increased risk and liability to the department.

RECOMMENDATION(s):

- Create a committee that reviews current policy:
 - a) The committee will provide recommendations on updates to current policy; recommend new policies with a needs analysis and justification, or deletion of a no longer utilized policy with a justification statement.
 - b) This will allow policies to be reviewed on a known cycle and then distributed to the field for review and expectations within the organization.
- Consider a system that analyzes “should vs shall” and level of importance within the structure of policies. For example; high, medium and low.
- Set clear expectations:
 - a) Leadership and management staff shall educate and set expectations of policies and ensure they are known and followed.
 - b) All members of the organization shall be held accountable to the organizations policies as they are not optional, but define its mission, vision, and values.
- Maintain the Fire Department Policy Manual to provide direction and understanding of expectations while conducting business, emergency and non-emergency. This manual should be a staple in daily operations for supporting the Core Mission and Values.

ITEM(s):

Policy: 206.5 – Library Inventories (October 2007)

FACTOR(s):

Non Related

FINDING(s):

The Fresno Fire Department has a list of publications that are required to be in every work-place as outlined in their policy.

FINDINGS AND RECOMMENDATIONS: TRAINING REVIEW

DISCUSSION:

During the investigation, it was found that station and work-place libraries are not up to date or complete. These publications aid in the recognition of important functions of job responsibility and the organizations emphasis on the subject matters that are required in remaining educated and preparing for promotional exams.

RECOMMENDATION(s):

- Update the policy to reflect electronic files (e-files) and what is recognized by the organization.
- Provide updated copies of the publications to emphasize the importance of industry standards as published and updated.
- Conduct LMS self-study training modules to aid in the importance of learning and being accountable for the knowledge, skills, and abilities of the subject matter.
- Check the station or work-place library during annual station visits and assure accountability of the material.

ITEM(s):

Training Policy Sections

315: Company Performance Evolutions

316: Individual Performance evolutions

FACTOR(s):

Non Related

FINDING(s):

These policy sections identify individual and company performance evolutions for performance standards and evaluation.

DISCUSSION:

During the interview process, it was unanimously communicated that these policies are there for reference and not practiced, evaluated or tested. Some companies or battalion chiefs carry out battalion level training that is self-delivered or maybe directed by the training division. There is no monitoring department wide of who completes it, maintains proficiency standards, testing, performance plans, or re-testing, to identify minimum proficiency issues. Even when assignments are given or directed to the field, there is no time or staff to follow up on completion or make-ups once issued.



Reference:

- NFPA 1001 – Standard for Fire Fighter Professional Qualifications
- NFPA: Fundamentals of Fire Firefighter Skills
- FFD Training and Equipment Manual, Section 300

RECOMMENDATION(s):

- Adopt a policy for the monitoring, review, administration and evaluation of these sections.
- Schedule and deliver a skills maintenance program within the training divisions two year plan.
- Add a time element to the proficiency standards.

ITEM(s):

Risk Management Identification and Process

FACTOR(s):

Causal

FINDINGS:

The Fresno Fire Department and the City of Fresno do not have a policy for Risk Management.

DISCUSSION:

There is no standard risk management process in addressing the hazards associated with fire department operations. Firefighters, no matter what rank, must be trained on the identification of hazards. These hazards will require a risk benefit analysis in how, or if, to conduct work. All operations will require mitigation and safety options associated with the emergency; the amount of risk that is acceptable, ways to mitigate such risk, or the ability to take no action at all, must be set expectations within fire department culture.

RECOMMENDATION(s):

- The California Code of Regulations (CCR) Title 8 section 3203 mandates a conclusion that the department is required to train all its personnel in every aspect of their job which involves risk. Develop a Risk Management Policy that is governed under city policy within the City of Fresno Risk Management Division.
- Evaluate known programs and data provided to the fire service; IAFF 10 Rules of Engagement, Risk Matrix by IAFF and Recognition of Prime Decision Making (RPDM). This policy should address Go / No-Go options in all operations while managing and analyzing risk.

FINDINGS AND RECOMMENDATIONS: TRAINING REVIEW

- Develop a serious training program; with exercises on risk assessment and the ability to make decisions in all-risk situations for Go / No-Go options. This should be in situations that are high risk and low frequency for fire agencies.

Reference:

- IAFF 10 Rules of Engagement for Structural Firefighting: increasing firefighter survival, Safety, Health and Survival Section, International Association of Fire Chiefs: 2011.
- Gordon Graham's High Risk Low Frequency Events in the Fire Service.
- CCR: General Duty Clause and General Industry Safety Orders.

ITEM(s):

Policy: 203.001 – General Safety Guidelines

Policy 205.007 – Protective Clothing

FACTOR(s):

Contributing

FINDING(s):

During the investigation process it was determined that the department does not follow or hold accountable to policies in regards to PPE and requirements for use in IDLH environments.

DISCUSSION:

An evaluation of the Personal Protective Clothing (PPE) that was properly donned by firefighter's on scene of the Cortland Incident identified that numerous employees did not comply with this policy. It was further determined that many did not know of the policy, the policy update and provided statements that "the culture dictates what PPE to wear and when to wear it", a culture that the policy is optional. It is clear that the outcome of injury and death will have a direct correlation to when PPE is worn correctly under a comprehensive maintenance, inspection and cleaning program. The PPE policy shall be enforced and accountability set in all fire department actions, emergency and non-emergency alike.

RECOMMENDATION(s):

- Provide a training program that has policy review on a regular basis. Set clear expectations that policies are for creating standard and safe work environments for employees and service delivery to the community. These policies shall not be considered or viewed as optional. The organizational expectation is to follow and enforce all department policies.



FINDINGS AND RECOMMENDATIONS: TRAINING REVIEW

- All Fresno Fire Department personnel shall don their department issued or approved for use PPE during all emergency and non-emergency incidents governed under these policies.

ITEM(s):

Policy Sections stating “No Content at This Time.”

FACTOR(s):

Non Related

FINDING(s):

There are numerous policies identified within FFD 300 series: Training and Equipment Manual, which state “No Content at this Time.” These categories are related to training, evaluation and testing of Fresno Fire Department work force for competency and standard performance for promotional positions. During the interviews, it has been determined that there are not programs in place for training and proficiency standards of probationary employees when promoted.

DISCUSSION:

It has been identified through policy and interviews that the Fresno Fire Department has identified numerous areas of concern with the delivery and content of material in the training staff. Policies related to topics, current industry standards (recognized through learning mediums), a recognized plan, and testing standards are not followed or developed. There are no recognized manuals for promotional positions, engine company evolutions, truck company evolutions, evaluations and testing.

As outlined in many publications, many departments do an adequate job at entry-level firefighting and EMS training. However, there is an inconsistent delivery of training for higher level specialty training and promotional training to meet state and federal requirements in worker safety and risk of liability while achieving professional performance standards.

RECOMMENDATIONS:

- Develop a comprehensive training plan that is supported by staff. The training plan shall follow NFPA standards, as listed in current policy, and best industry standards in publications that provide data and learning points in modern fire and rescue disciplines. The detailed plan shall illustrate and validate industry standards, learning domains, and behaviors that support safe service delivery.
- Training plan shall provide for a positive adult learning environment, allow for discussion, question and answer, and the ability to practice performance for meeting expected learning objectives. These learning objectives shall be evaluated and tested during an annual performance cycle.

FINDINGS AND RECOMMENDATIONS: TRAINING REVIEW

- Establish and deliver training that is specific to each rank, and position. These trainings shall further evaluate the knowledge, skills, and abilities that the position shall hold in recognition to industry best practices and standards.

ITEM(s):

Industry Best Practices and Standards Updates in Suppression Firefighting

FACTOR(s):

Contributing

FINDING(s):

The Fresno Fire Department has not conducted a fire behavior class update for continued education or live fire training in more than a decade.



Fig. 5



DISCUSSION:

With the numerous changes in the industry that are related to structural firefighting, continued education is paramount to, maintain proficiency, recognize hazards, command and control of the incident, perform tasks under sound strategy and tactics, and maintain a safe working environment, based on knowledge, skill, and ability for each duty or position. It has been recognized that outside of the entry level firefighter hiring academy (Drill School), there is no structured training in fire behavior or live fire training. There have been changes to Personal Protective Equipment, Building Construction, Fuel Loading, Fuel Composition, Burn Characteristics, Ventilation Profile, Fire Behavior, and Reading Smoke to name many of the issues plaguing the modern fire ground suppression activities. It is imperative that organizations remain vigilant at industry standards, updates, and reports that acknowledge the inherent dangers that injure and kill our first responders.

RECOMMENDATION(s):

- Implement a continuing education program that consist of updates on fire behavior, building construction, ventilation profile, and an NFPA 1403 compliant live fire program within the overall training plan.
- Recognize the Underwriter's Laboratory (UL), National Institute of Standards and Technology (NIST), Firefighter Safety Research Institute (FSRI) and NFPA standards on an on-going basis.
- Provide lesson plans on all related topics when applied in a manipulative training environment.
- Maintain a library of material and websites that support learning of modern fire service efforts for safety, risk management, and career development at all levels.

ITEM(s):

Ventilation Training

FACTOR(s):

Causal

FINDING(s):

The last time the Fresno Fire Department conducted formal, agency wide, ventilation training was in 2010. During this training, the delivery was a reinforcement of current accepted practices of the Fresno Fire Department.

DISCUSSION:

The standard operating practices of the FFD is strongly based on vertical ventilation methods. There was no emphasis to building construction recognition, go / no-go decision making process under a risk analysis, or an update to the references used for best industry practices. During interviews members of the organization were asked about how operations change between conventional and light-weight construction, the majority of the answers comprised of "time." "You need to get the job done faster because you don't have as much time to conduct the vertical ventilation operation".



Fig. 6

It was stated that an attempt to do ventilation training was conducted in December of 2014, but it was cancelled. The training was made available as company level training in which not all members attended, nor was there a standardized delivery method for evaluation or lessons learned to be reviewed. It was driven by vertical ventilation techniques giving the task as a priority over reading the ventilation profile and addressing the proper ventilation tactic in a coordinated effort.

RECOMMENDATION(s):

- When department wide training is funded and scheduled, ensure the objectives are carried out in a manner to improve safety, knowledge, skills and ability in an effort to maintain organizational readiness and standardization. Adjust the calendar in a manner to accomplish all training related needs with balance and support.
- Assure that high risk training disciplines, such as vertical ventilation, are conducted on a regular cycle with variations in the decision making process. This should include Go / No-Go scenarios with the different ventilation methods, different building construction types and different stages of fire in each.



Fig. 7

- The FFD shall update department policy related to truck company operations and develop a manual on Truck Operations / Procedures.

Reference:

- UL/NIST: Vertical Ventilation Study, NFPA, Mittendorf: Truck Company Operations

ITEM(s):

Modern Fire Behavior / Ventilation Limited Fires

FACTOR(s):

Causal

FINDING(s):

The Fresno Fire Department does not recognize the study on Vertical Ventilation produced by UL.

FINDINGS AND RECOMMENDATIONS: TRAINING REVIEW

DISCUSSION:

Starting in 2006, UL produced a scientific study and analysis on the effects of Vertical Ventilation which references the Modern Time Temperature Curve, Light-Weight Construction, Governor's Island Project, and how the traditional thought process on vertical ventilation changes fire behavior based on what fuel is burning and more air / ventilation without coordinated suppression, causes fire growth and heat levels to increase. On the Cortland incident, there was a failure to recognize and announce critical changes in fire behavior and scene conditions, with the tasks that were being performed indicated by the lack of coordination and tactical priorities under strategic objective(s.)

RECOMMENDATION(s):

- Review and provide training on new material and data that is scientifically proven to aid in job function, safety, service delivery, and the prevention of firefighter injury or death. This would include, but not be limited to, the UL study on Flow Path.
- Review the UL Study on Light Weight Construction
- Review the UL Study on Vertical Ventilation

ITEM(s):

Nozzles, Settings and Water Application Techniques

FACTOR(s):

Causal

FINDING(s):

The FFD has a department culture of applying 95 gallons per minute (gpm), as well as using a fog nozzle for water application during initial attack on residential structural fires. This is not consistent with NFPA Standards.

DISCUSSION:

Building construction and furnishings have changed dramatically over the last thirty years. The use of plastics and synthetics has replaced the cellulose based materials of the past. These fuels burn hotter faster, and tend to not physically break down as quickly as cellulose fuels. The amount of heat and the rate at which that heat is released is what challenges today's fire service. An escalating occurrence of flashover and rapid fire spread is a direct result of these modern materials. This fire behavior requires higher flow rates which provide for an increased margin of safety and more efficient water delivery in controlling fire behavior.

It was determined that there was insufficient continued water application into the fire compartment, (garage) during the Cortland Incident.

Correct water application is needed for cooling an atmosphere while recognizing and controlling fire behavior, heat levels, and ventilation within a fire environment, for firefighter safety and victim survivability.



RECOMMENDATION(S):

- Adopt NFPA standard 1410 which recommends a minimum of 300 gpm shared between the first and second hoselines at a residential fire.
- Evaluate current hose and nozzles standards and compare to industry standards.
- Provide training on the use of water application, pattern and gpm, into a compartment or structure. The survivability profile and application of water applied will have an impact on the desired outcome of cooling and controlling fire behavior, and how it reacts when performing coordinated ventilation tactics.
- Provide training for an understanding of the need to recognize an exhaust vs. an intake with the knowledge of flow path and controlling the fire environment within a compartment or building.
- Provide testing of current nozzles to evaluate accurate flow rates.
- Establish a nozzle maintenance program.

ITEM(s):

Residential Garage Fire Policy

FACTOR(s):

Causal

FINDING(s):

FFD currently does not have a policy or procedure specific to residential garage fires.

FFD members routinely ventilate over garage fires without a proper risk analysis to the benefits of the actions taken or type of construction.

DISCUSSION

Residential garage fires pose unique challenges and risks to firefighters. The typical fire load in a garage may cause rapid fire spread to the main residence or exposures. Fire loading can include flammable liquids, motor oil, transmission fluid, auto batteries, household cleaners, various chemicals, and vehicles. Construction may include large clear spans that have no interior walls that support the roof assembly and may contain unprotected structural members for the roof assembly. There is an increased risk of catastrophic collapse and deterioration of structural members when exposed to fire (Roof Decking Burn Through).

During interviews, it was discovered that the FFD does not have a policy for fighting fires in structures with unprotected roof members exposed to fire, specifically garages. Some indicated they have, and would continue to ventilate the roof over a garage fire, while others stated they would not continue this tactic.



Fig. 8

In 2010 the Fresno Fire Department participated in an accident review process for the Modesto Fire Department “Coston” incident. In this incident, serious injuries resulted from a roof operation accident eerily similar to the Cortland Incident. As a result of participating in that process, little or no change occurred in reference to roof operations in the Fresno Fire Department.

RECOMMENDATION(s):

- Develop and adopt a Residential Garage Fire Policy that addresses building construction, ventilation profile, and fire behavior.
- Establish, communicate, and enforce clear expectations of FFD personnel when operating at residential garage fires.
- Establish and provide training for ventilation of all fires involving unprotected structural members, in particular garage fires.
- Review, establish and train FFD on roof decking burn through.

ITEM(s):

Training Plan

FACTOR(s):

Non Related

FINDINGS:

There is no standard for compliancy in completing assignments including missed assignments, or following up when there is a deficiency that is recognized. The training division is trying to keep up with industry standards without creating a safety issue, by providing materials that are misunderstood, or being able to support effective training, such as UL and NIST studies.

The Fresno Fire Department Training Division does not currently follow a formal training plan despite the efforts to develop, coordinate and administer a formal training plan.

DISCUSSION:

The FFD was attempting to follow an annual training plan that was updated to a two year projection in 2013-2014. The attempt to institute a formal two year training plan has been challenged due to having seven different training chiefs in eight years. This lack of continuity and stability within the section has not allowed the vision to be carried forward. The section has attempted to set training priorities based on the latest industry updates, risk and FFD training needs by identified importance, however, the topics are frequently changed due to funding issues or other priorities put forward by Executive Staff. The other addition to aid in funding was to regionalize training in the greater Fresno area through Regional Training with the City of Clovis and the Fresno-Kings Unit of CAL-FIRE. This has proven to be beneficial in, topic delivery, budget constraints, and auto-aid relationships, as displayed in the recent RIC, and High Rise roll out courses.

The attempted plan covers local state and federal mandates; then it fills in other topics of interest or identified needs. A benefit to this two year plan, is that each time a formal course has been delivered; the section has put forth and filed a lesson plan and Incident Action Plan.

RECOMMENDATION(s):

- Develop, fund and institutionalize a formal training plan.
- Assure industry standards are being recognized, trained on, and followed in the training plan.
- Build a method of flexibility for adjusting topics and aiding in fiscal impact.
- Provide for delivery methods at different levels of supervision, company training, battalion training, and department training. Identify the difference between skills maintenance, evaluation and testing. Provide training / evaluation for each rank and identify frequency for training / evaluation.

FINDINGS AND RECOMMENDATIONS: TRAINING REVIEW

- Continue to develop and expand the regional concept; this will aid in funding/cost sharing, practice area policies, and build relationships in emergency response.

Reference:

- OSHA: Fire Departments must train all employees to perform safely in hazardous job activities and must train them to state-mandated or nationally recognized “industry standards.
- NFPA: 1500 – Standard on Fire Department Occupational Safety and Health Program.
- NFPA: 1021 – Standard for Fire Officer Professional Qualifications. NFPA: 1026 – Standard for Incident Management.
- Personnel Professional Qualifications. Paper: Training Mandates Study for the California Fire Service, David Schoonover and Mike Dowdle, November 2007.

ITEM(s):

Rules of Air Management (ROAM)

FACTOR(s):

Non Related

FINDING(s):

Fresno Fire does not have a ROAM Policy

DISCUSSION:

Although air management specifically was not an issue at the Cortland Incident, ROAM is required under NFPA 1404.

RECOMMENDATION(s):

- Consider developing and implementing a ROAM Policy

ITEM(s):

Flow Path – Ventilation Profile

FACTOR(s):

Contributing



FINDING(s):

The FFD does not recognize, deliver or train on the latest studies conducted by UL and NIST on understanding Flow Path.

DISCUSSION:

Safety is obtained through the 360 of a building, and how it provides valuable situational awareness in reading openings as air intake, exhaust or both, after locating the fire. Reading flow path will allow firefighters to predict and compensate for how the fire behavior will change and how rapidly conditions change based on the amount of air the fire draws in.

RECOMMENDATION(s):

- Adopt the principles provided in the UL study in 2006 on the Modern Time Temperature Curve.
- Provide training to assure understanding of the concept of flow path in the openings of a structures windows and doors.
- Provide training to recognize and understand terminology in the industry that supports flow path and communicating tactical priorities for applying a risk matrix in the actions taken on the fire ground.

ITEM(s):

Hose and Ladder Evolutions Training

FACTOR(s):

Causal

FINDING(s):

The Fresno Fire department does not have a regular schedule training program on hose handling, hose evolutions, or ladder evolutions; wet or dry. The agency does not have a program that evaluates or tests for proficiency in basic core skills.

DISCUSSION:

The Cortland Incident specifically, it was evident that the hose handling skills were insufficient for mitigating the incident in an expedient manner.

FINDINGS AND RECOMMENDATIONS: TRAINING REVIEW



Fig. 9

RECOMMENDATIONS:

- Implement a skills maintenance program that addresses core skills maintenance and can be tested for proficiency. All professional standards have a continued education requirement to include training, evaluation and proficiency testing.
- Consider assigning firefighter positions to assist with hose handling within a structure.

ITEM(s):

Truck Operations Manual

FACTOR(s):

Contributing





Fig. 10

FINDING(s):

During the interviews with all ranks of FFD members, it was apparent that the level of knowledge in overall Truck Company Operations is vague when dealing with roof operations, forcible entry and building construction.

Crews attempted to force entry of the roll up garage door unconventionally with hand tools.

There is little or no recent department training utilizing burn time charts and/or videos for direct flame impingement on fires with unprotected and protected roof structures.

DISCUSSION:

It appears that the roof operations training is very limited in regards to recognizing the indicators of light weight roof construction, and what the differences are between light weight roof construction and a conventional constructed roof, in regards to roof operations. It was also unclear how much company level roof training is conducted.

During interviews FFD personnel stated they had received limited forcible entry training, and the training they did receive was based on commercial structures, all at the company level.



Fig. 11

There were no clear statements by any FFD members as to the importance of time and the possibility in which direct flame impingement on the unprotected members of the gang nail truss affected the roofs integrity.

RECOMMENDATION(s):

- Establish a Truck Operations Manual, refer to other fire department manuals as resources.
- Establish and support company level drills, with special attention to overall roof operations, recognizing the indicators for all types of roof construction, proper ventilation techniques, coordination, and selecting the proper location of the ventilation hole. Additionally, all stations should be issued a Truck Operations Manual once approved for distribution.

ITEMS(s):

Leadership Training



Fig. 12

FACTOR(s):

Non Related

FINDING(s):

FFD does not have continuing leadership training for its members, specifically Company and Chief Officers.

DISCUSSION:

During the interviews it became evident that improvement is needed within the area of leadership and accountability. It was stated that there is a lack of trust and respect between the executive staff and the field personnel. Several Battalion Chief's stated that they feel like "they're on an island" between headquarters and the fire stations, representative of the many years of developed culture within Fresno Fire Department.

RECOMMENDATION(s):

- Establish and support continuing leadership and accountability training for all members of FFD, specifically Company and Chief Officers.

FINDINGS AND RECOMMENDATIONS: TRAINING REVIEW

ITEM(s):

Training and Orientation for newly appointed Captains and Chief Officers

FACTOR(s):

Non Related

FINDING(s):

During the interviews it was stated that for the last ten (10) years, that there hasn't been training or orientation classes for newly appointed Captains or Chief Officers.

DISCUSSION:

When members are promoted into new positions as Captains and Chief Officers there has not been orientation classes or expectations provided. These classes and specifically expectations, would enable them to perform their new duties and responsibilities in the most efficient manner.

RECOMMENDATION(s):

- Provide training for newly appointed Battalion Chiefs and Captains, with an emphasis on leadership and accountability with expectations.

ITEM(s):

Training Division Staffing

FACTOR(s):

Non Related

FINDING(s):

Due to budget cuts over the past several years the Training Division has had very limited staffing.

DISCUSSION:

With the extremely limited staffing assigned to the Training Division it is very difficult to provide the necessary training to FFD members, including implementing the recommendations listed in this report.

The Training division has had four training chiefs in the past five years.

During interviews, it was stated that regularly the training division is directed towards what staff believes to be "higher priority" requests.



RECOMMENDATION(s):

- Provide additional staffing to the Training Division or detail field personnel into the Training Division to establish and implement specific recommendations in this report.
- Establish a review process for when the Training Division is directed with “higher priority” requests or directives.
- Consider establishing a committee of training and field personnel to review, update, create, and present standardized training to all FFD members.
- Personnel assigned to field positions may also be used to implement recommendations in their areas of expertise.

ITEM(s):

Training Division Lesson Plans

FACTOR(s):

Non Related

Finding(s):

During interviews with members of the Training Division, it was stated that lesson plans have only been required for classes during the past 2 years, not all classes have had a lesson plan on file.

DISCUSSION:

Per FFD Policies and Procedures, lesson plans are required with any instruction provided through the Training Division. Lesson Plans should be referenced to Industry Standards Best Practices.

RECOMMENDATION(s):

- Require properly referenced lesson plans for all training. These lesson plans should be kept on file in the Training Division for future training, updating and audits.
- Continue the process of evaluating the minimum qualifications for instructors and Subject Matter Experts.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal Protective Equipment

Overview

On March 29, 2015 all of the Personal Protective Equipment (PPE) ensembles worn by the fire captain at the Cortland Fire were taken into custody by members of the Fresno Fire Accident Investigation Team. Notes were made regarding the location of the PPE found in the garage. The PPE was photographed and secured in a locked room at the Fresno Fire Headquarters building. A preliminary inspection of the PPE was completed by members of the Fresno Fire Accident Investigation Team and a brief report was compiled which included photographs of the PPE. The injured fire captain was wearing FFD approved cotton T-Shirt and shorts under his FFD PPE.

The Structural Firefighting Protective Garments (turnouts) were issued in January of 2015 following a 2 phase formal bid process which was conducted in 2011. The garments met the requirements of NFPA 1971, STANDARD ON PROTECTIVE ENSEMBLE FOR STRUCTURAL FIRE FIGHTING, (2013)

The following NFPA compliant PPE was listed for the inventory:

- Turnout Coat Shell: Glove Advance Gold, Model: GXCEL Jacket, Style #D2755G10, Serial #4836396, Date 01/2015
- Turnout Coat Liner: Glove Glide Gold 2-Layer, Model: GXCEL Jacket, Style #D2755G10, Serial # 483696, Date 01/2015.
- Turnout Trousers: Glove Advance Gold., Model GXCEL Trouser, Style#E2755G10, Serial # 4836425, Date 01/2015
- Turnout Trousers Thermal Liner: Glove Glide Gold 2-Layer, Model: GC+XCEL Trouser Style #E2755G10, Serial # 4836425, Date 01/2015.
- Boots: Pro Warrington, Model: 4200, Manufactured 01/2011, Labeled: Cert Mod, NFPA 2007 Edition
- Hood: PGI Cobra Ultimate, Style # 3049298
- Gloves: Pro Tech 8 Fusion, Model #PT-8SC
- Helmet: Cairns 1010
- MSA Firehawk M7 Air Mask, 4500 PR14, Serial # LAF338671 with attached high pressure cylinder
- MSA Facepiece Ultraelite Full Face, Medium, Serial #334
- MSA MMR-4500

All PPE is provided by the Fresno Fire Department with exception to safety boots. The employee is provided a uniform allowance and the employee purchases protective footwear from a pre-approved list. Note: Approximately five years ago Local 753 negotiated an increase to their uniform allowance (\$300) so the members could purchase their own safety boots.





Fig. 12

FINDINGS AND RECOMMENDATIONS: PERSONAL PROTECTIVE EQUIPMENT (PPE)

On April 7, 2015 the SART received a briefing regarding the PPE from the Fresno Fire Department which included a description of the PPE, inventory, photographs, location the PPE was found in the garage, policies, and a visual inspection of the PPE in the secured facility. The SART recommended that a subject matter expert review components of the PPE.

On May 7, 2015 components of the PPE were shipped to the National Personal Protective Technology Laboratory (NPPTL) a division of NIOSH in Morgantown, West Virginia.

The Protective Technology Program is to prevent work-related injury, illness, and death by advancing the state of knowledge and application of personal protective technologies (PPT).

NIOSH has established an internal team of researchers, scientists, and management personnel to lead the strategic planning activities, program development, and monitoring to sustain the PPT Program.

The NPPTL division of NIOSH was provided the following expectations for inspection and control of the PPE:

- Evaluate and document damage to the PPE.
- Identify if the PPE met the compliancy expectations of the NFPA Standards.
- Identify how well the PPE held up under the fire conditions.



Fig. 13



FINDINGS AND RECOMMENDATIONS: PERSONAL PROTECTIVE EQUIPMENT (PPE)

- If possible, photograph the degradation of materials with corresponding referencing information.
- Maintain chain of custody of PPE and complete the FFD property Evidence Report.
- Not to allow any destruction of the PPE or outside testing without prior approval from the FFD.
- No information, reports or photographs are allowed to be shared without prior approval of the FFD.
- Submit findings to the Serious Accident Response Team through the FFD.
- Return the PPE to the FFD.

A chain of custody form was created and sent to NIOSH regarding the following PPE:

- 1) Turnout Coat Shell: Glove Advance Gold, Model: GXCEL Jacket, Style #D2755G10, Serial #4836396, Date 01/2015
- 2) Turnout Coat Liner: Glove Glide Gold 2-Layer, Model: GXCEL Jacket, Style #D2755G10, Serial # 483696, Date 01/2015.
- 3) Turnout Trousers: Glove Advance Gold, Model GXCEL Trouser, Style #E2755G10, Serial # 4836425, Date 01/2015
- 4) Turnout Trousers Thermal Liner: Glove Glide Gold 2-Layer, Model: GC+XCEL Trouser, Style #E2755G10, Serial # 4836425, Date 01/2015
- 5) MSA Firehawk M7 Air Mask, 4500 PR14, Serial # LAF338671
- 6) MSA Facepiece Ultraelite: Medium, Serial #334
- 7) MSA MMR 4500
- 8) Hood: PGI cobra Ultimate, Style #3049298
- 9) Gloves: Pro Tech 8 Fusion, Model #PT-8SC

Summary and Conclusions from the NIOSH report

Based on the inspection, the protective clothing ensemble performed as intended for a single catastrophic event and ensemble elements are not believed to have contributed to the injuries of this incident. Although the protective clothing ensemble performed as intended and is not believed to have contributed to the injuries, it was noted that the protective gloves and hood did not appear to have been worn at the time of the incident.

1. Protective Gloves (Refer to Figures 1-9 in Appendix II)

Manufacturer: Protec * Fusion Model No: PT8SC
Size: XL

- Substantial thermal damage and shrinkage to both gloves.



Fig. 14

FINDINGS AND RECOMMENDATIONS: PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Indentations visible in fingers and charring that extends over an inch inside the wristlets of both gloves suggest that the gloves were secured by a glove strap and in a stowed position at the time of the incident.
- Leather glove strap appeared shrunk and the width of the glove strap matches the indentation seen in gloves.
- Thermal break open visible at the interface between the glove liner and outershell of left glove.
- Glove labels were thermally destroyed and not legible.
- Thermal protective strip on the back of right glove was completely destroyed.

2. Protective Hood (Refer to Figure 10 in Appendix II)

Manufacturer: PGI, Inc. Style No: 3029298

Date of Manufacture: 11/2014 Lot No: 93024 Size: Universal

- Certified to NFPA 1971-2013 Edition.
- Hood is in pristine condition with no signs of damage.
- Condition of hood with respect to the rest of the clothing suggests that the hood was not worn at the time of the incident.

3. Protective Coat #1

- Certified to NFPA 1971-2013 Edition.
- Both arms of coat were cut.
- Thermal damage to front reflective trim.
- Throat tab was cut and is missing.
- Thermal damage to Velcro loops on left side of coat at collar.
- Thermal damage to Velcro loops on the inside of the coat along the zipper.
- Substantial thermal damage on cuffs and wristlets.
- Thermal break open on both arms of coat.
- Substantial thermal damage to the back of coat on the left side.
- Drag/Rescue device (DRD) was properly installed and not deployed.
- Dye sublimation visible on the DRD strap.
- Substantial thermal damage to the moisture barrier side of the coat liner.
- Visible cuts in both arms of the coat liner.
- Minor to moderate thermal damage to face cloth of the thermal liner.
- SCBA cylinder appeared to have been positioned on the right side back of coat as evidenced by a visibly cleaner, undamaged area on that side.



Fig. 15

4. Protective Pants

- Certified to NFPA 1971-2013 edition.
- Substantial thermal damage to front and back areas of the pants including reflective trim.
- Suspenders were cut.
- Seam failure in seat of pants.
- Thermal break open on inside of left leg.
- Substantial thermal damage to both cuffs and reflective trim of outershell.
- Interface of left leg (where snaps are located) is missing.
- Back of pants are brittle to the touch.
- Substantial thermal damage in seat and cuff areas on the moisture barrier side of the thermal liner.
- Minimal thermal damage to the face cloth of the thermal liner except for the cuff area.
- Moderate thermal damage to the cuffs on the face cloth side of the thermal liner.
- Knee pads of pants are on the liner and not the outershell.

SCBA Summary and Conclusions

A SCBA unit was submitted to NIOSH/NPPTL by the Severe Accident Response Team on behalf of the Fresno Fire Department for evaluation. The SCBA unit was delivered to NIOSH on May 14, 2015 and extensively inspected on May 18, 2015. The unit was identified as a MSA model Firehawk M7, 4500 psi, 30-minute, SCBA (NIOSH approval number, TC-13F-5048BRN). The unit had severe heat damage. The cylinder valve, as received, was in the off position. The cylinder did not have any air in it. The cylinder gauge was too burnt to read. The facepiece was included and the regulator was melted and locked into the facepiece. Visibility through the lens was nonexistent due to the heavy fire damage. The unit did have a data logger. The unit was taken to the manufacturer's facility in Cranberry, PA to conduct a download of what the unit stored for this incident. The entire unit was severely damaged by heat. The NFPA approval label was burnt and unreadable. The personal alert safety system (PASS) did function at the manufacturer's facility during the data download.

The Fresno SCBA unit in question, suffered significant heat damage. The damage to the SCBA unit was too extensive, and it was determined unsafe to pressurize.

Data Downloader

This SCBA was equipped with a data logging device that measures several performance parameters during a predetermined time period. This data was downloaded from the SCBA by the Mine Safety Appliances Company personnel and witnessed by members of NIOSH on May 28, 2015.



Fig. 16

FINDINGS AND RECOMMENDATIONS: PERSONAL PROTECTIVE EQUIPMENT (PPE)

The manufacturer was able to download the file for this incident. The seven minutes that were recorded for this incident are shown in NIOSH Figure 1, page 164.

Helmet:

The fire captain was rescued and was found not wearing the helmet. The helmet was located in the garage after the fire was extinguished and was presumed to have fallen off when the fire captain fell into the garage from the roof. The helmet was found to have the chin strap strapped around the rolled up shroud and tightened around the back of the ratchet system. The shroud received extensive thermal damage. The helmet received extensive thermal damage, yet its integrity was intact. The helmet's suspension system was intact and the required reflective stickers were attached with the correct color. NFPA 1971 requires face and eye protection, the helmet must be equipped with either goggles or a face shield. This helmet had flip down eye shields that melted and did not meet the NFPA requirement.



Fig. 17

Hood:

The hood was found to be tucked into the top of the suspension system of the helmet. It appears to have not been worn and there is no damage noted.



Fig. 18

Gloves:

The structure gloves were found in the garage after the fire. They were found bound together as if they were tightened in a velcro strap. A velcro strap was found attached to the turnout coat.



Fig. 19

Annual PPE Testing

It was noted on the 01/17/15 annual inspection form that helmet shroud was identified to be replaced. There was no documentation that the shroud was replaced.

FINDINGS AND RECOMMENDATIONS: PERSONAL PROTECTIVE EQUIPMENT (PPE)

Fit Test Report

On 3/16/15 the fire captain successfully passed the annual respirator fit test using the OSHA 29CFR1910.134 protocol while using the MSA Ultraelite Full Face, Medium Mask Serial # 8038133203.

SCBA Testing

On 11/26/2014 the MSA Firehawk M7 Air Mask, 4500 PR14, Serial # LAF338671 was subjected to annual testing. The testing consisted of visual inspections, functional testing, alarm activation, pressure testing, gauge accuracy and flow testing. The technician noted that the batteries were replaced in the unit and the calibration was up to date when the test was performed. All components passed the annual inspection.

Standards

OSHA:

Title 29 of the code of Federal Regulations (CFR), Part 1910 Subpart 1 and California code of Regulations (CCR), Title 8, Division 1, Chapter 4, subchapter 7, Group 2, Article 10.1 Personal Protective Clothing and Equipment for Firefighters.

NFPA:

National Fire Protection Association Standards has established multiple industry standards effecting the selection, use and training of PPE. NFPA 1851, current edition 2014, is titled Standard on the Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles, and was developed to be a companion document for NFPA 1971, current edition 2013- Standard on Protective Ensemble for Structural Fire Fighting. The other NFPA standard reviewed was NFPA 1500- current edition 2013, Standard on Fire Department Occupational Safety and Health Program.

Fresno Fire Department:

Fresno Fire Department Policies and Procedures are established with the intent to issue PPE and clothing that meets or exceeds the appropriate National Fire Protection Association Standard.

California Labor Code, Section 6401.7

Every employer will establish, implement, and maintain an effective injury and illness prevention program. The program will be in written form and should include, but not be limited to, the following elements:

- Identification of the person responsible for implementing the program.
- The employer's system for identifying and evaluating workplace hazards, including scheduled periodic inspections to identify unsafe conditions and work practices.
- The employer's methods and procedures for correcting unsafe or unhealthful conditions and work practices in a timely manner.

FINDINGS AND RECOMMENDATIONS: PERSONAL PROTECTIVE EQUIPMENT (PPE)

- An occupational health and safety training program designed to instruct employees in general about safe and healthy work practices and to provide specific instructions with respect to hazards specific to each employee's job assignment.
- The employer's system for communicating with employees on occupational health and safety matters, including provisions designed to encourage employees to inform the employer of hazards at the worksite without fear of reprisal.
- The employer's systems for ensuring members comply with safe and healthy work practices, which may include disciplinary action.

Limitations of structural firefighting protective clothing:

Structural firefighters' protective clothing is designed to protect its wearers from the thermal environments experienced during firefighting. This includes protection from thermal radiation, hot gas convection, and heat conducted from hot surfaces.¹

Protective clothing may respond differently to each of these modes of heat transfer (radiation, convection, and conduction). Firefighters may receive serious burn injuries from each of these modes of heat transfer or a combination of them even though they are wearing protective clothing and may be a significant distance from a fire. The reason for this is that protective clothing has definite physical limits, which are measurable. A working firefighter may not recognize these critical limits until he is already experiencing a burn injury.²

With the extensive thermal damage and severe burn injuries to the Fire Captain, the post flashover conditions experienced by the Fire Captain while in the garage far exceeded the design limitations expected of the firefighting turnouts.

The SART recognizes the firefighting turnouts worn by the Fire Captain met the design characteristics and the extensive thermal damage is to be expected with a sustained exposure to the extreme conditions experienced by the Fire Captain.

1. NFPA 1971, Standard on Protective Clothing for Structural Fire Fighting, National Fire Protection Association (NFPA) Quincy, MA, 1991
2. Lawson, J. Randle. "Thermal Performance and Limitations of Bunker Gear." Fire Engineering, August 1, 1998

Policy 203.7 INJURY AND ILLNESS PREVENTION PROGRAM states the responsibility for the safety program is as follows:

Fire Chief – The Fire Chief, as the administrator, has the responsibility for the formulation and administration of the Injury and Illness Prevention Plan for the Department.

Training Chief – The Training Chief has the responsibility for the Injury and Illness Prevention Plan.

Battalion Chiefs – The chief officers supervising shifts are responsible for the day-to-day operation, management, compliance, and enforcement of the Injury and Illness Prevention Plan. Further, they are responsible for the safety and safety training of members assigned to their command.



FINDINGS AND RECOMMENDATIONS: PERSONAL PROTECTIVE EQUIPMENT (PPE)

Captains and Supervisors – Captains are responsible for the safety of members assigned to their companies. Further, all supervisors are required to enforce safety rules and guidelines, provide training in safety practices and procedures on a regular basis, and prevent accidents and injuries to members by correcting known hazards.

All Fire Department Personnel – All members of the Department are responsible for compliance with safety rules and regulations and for participating in training for injury and illness prevention. Unsafe work conditions, equipment, practices, or environments shall be reported by any member who is aware, or made aware, of these conditions.

All members shall adhere to all policies, procedures, and guidelines contained in the Department Rules and Regulations, and training courses provided by the Training Division. Non-compliance by Department members shall be subject to disciplinary action.

FAILURE TO OBSERVE SAFETY RULES, REGULATIONS, POLICIES, PRACTICES, AND PROCEDURES, INCLUDING THE WEARING OF SAFETY EQUIPMENT, MAY BE CAUSE FOR DISCIPLINARY ACTION.

Enforcement – Members acting in a supervisory capacity shall require members working under their supervision to comply with all applicable safety instructions and safe practices.

All firefighters are to wear full protective clothing when exposed to hazardous conditions.



Fig. 20

FINDINGS AND RECOMMENDATIONS: PERSONAL PROTECTIVE EQUIPMENT (PPE)

ITEM(s)

Personal Protective Equipment

FFD Policy 205.7 Protective Clothing

FFD Policy 203.7 Injury and Illness Prevention Program

FFD Policy 203.1 General Safety Guidelines

NFPA 1500

FACTOR(s):

Contributing

FINDING(s):

The Fresno Fire Department has numerous policies and procedures that establish the requirements for an effective injury and illness prevention program including the mandatory use of SCBA and PPE during firefighting operations. Throughout the investigation and interviews it was discovered that compliance with the applicable PPE policies is not followed by some personnel. The culture of the agency appears to have a lax attitude towards wearing the full complement of PPE including the SCBA. It was also discovered that supervisors at the Captain rank and above do not always enforce safety rules and guidelines as outlined in the policies in regards to wearing the appropriate PPE. Seven years prior to this accident the wearing of hoods was optional in policy. During the interviews many personnel still believed wearing hoods was still optional.

DISCUSSION:

The lack of wearing structure gloves, hood, chin strap and rolling up the shroud greatly contributed to the extensive injuries sustained to the fire captain. During the rescue attempt of the fire captain, several personnel were not wearing the appropriate PPE, potentially delaying rescue efforts.

RECOMMENDATION(s):

- Educate all personnel that they all have a shared responsibility in regards to injury prevention.
- Enforce and hold accountable full compliance of FFD policies and regulations regarding the wearing of PPE.
- All personnel need to take accountability for their own actions of wearing PPE and supervisors need to enforce all policies, procedures and guidelines in regards to injury prevention and the wearing of all PPE.



COMMUNICATIONS

Overview

Fresno Fire Department (FFD) communication system is made up of a voter repeater system. There are fifteen (15) receivers and ten (10) transmitter sites throughout the City. FFD uses a simplex, duplex system for operations on the fireground, a typical single family residential structure fire will be assigned a single frequency where both command and tactical operations take place.

Like many fire departments across the nation, FFD has experienced a reduction of fire ground communications capabilities, due to FCC mandated narrow banding requirements. FFD communications system was commissioned in 2011 – 2012 and during that same time, as issues presented themselves, the FFD has made modifications to the Department Communication Policy several times and has made adjustments to the infrastructure, all in the effort to find improvements. The system has not been tested from an outside vendor since the switch to narrow banding. FFD is aware of infrastructure issues and currently has a request for purchase (RFP) to review the City of Fresno's Communications Infrastructure.



Fig. 21

FINDINGS AND RECOMMENDATIONS: COMMUNICATIONS

In 2015 the City set aside \$825,000 specifically for communication infrastructure improvements. Those improvements are being identified by an outside vendor, which was solicited and hired in December 2015; commencing work in January 2016, with a completion date of approximately June 2016.

During Interviews FFD members stated that they are not confident in the current communications system; furthermore, it was determined some FFD members are not proficient with the operation of their hand held radios. It is possible some transmissions at the Cortland Incident may not have transmitted appropriately by either the current communications system or by user error.

ITEM(s):

Motorola HT 1250 Portable Radio

FACTOR(s):

Contributing

FINDING(s):

Failure to properly operate portable radios.

DISCUSSION:

Interviews revealed some FFD personnel could not operate the portable radio assigned to their apparatus. The portable radio is that which connects you to your crew, your adjoining forces and the incident. It is used as a means of emergency notification and / or hazards. FFD Policy 305.002a states, "It is imperative all members are intimately familiar with the components, features, use, maintenance, and troubleshooting of this radio as it becomes a firefighter's lifeline at an emergency scene."

OSHA regulations prohibit entry into immediately dangerous to life and health atmospheres without some means of visual, voice, or signal line communication [29 CFR 1910.134 (g) (3) (ii)].

RECOMMENDATION(s):

- All personnel review policy 305.002a – Motorola HT 1250 Portable Radio.
- Hold company officers accountable to ensure all subordinates are intimately familiar with portable radios on their apparatus.

ITEM(s):

Portable Radio: Repair and Maintenance

FACTOR(s):

Non Related



FINDING(s):

During interviews investigators determined some FFD personnel would regularly find issues (needed repairs) with portable radios and not report them.

DISCUSSION:

As with standard issued PPE, and any tool on fire apparatus, portable radios require regular care and maintenance. It is imperative personnel know the functions and components of their safety equipment (portable radio) in order to recognize when repairs are needed and follow the recommendations of the manufacturer and that of department policy regarding maintenance.

FFD Policy 305.002a states, "It is imperative all members are intimately familiar with the components, features, use, maintenance, and troubleshooting of this radio as it becomes a firefighter's lifeline at an emergency scene."

RECOMMENDATION(s):

- Review policy 305.003 - Repair and Maintenance.
- Hold company officers accountable to ensure all subordinates are intimately familiar with portable radios on their apparatus.

ITEM(s):

Field Unit Procedures

FACTOR(s):

Contributing

FINDING(s):

During interviews investigators determined some FFD personnel do not turn on their portable radio during incidents.

DISCUSSION:

It should go without saying that the portable radio is an intricate piece of safety equipment for firefighters. Company officers should be held accountable to ensure their subordinates are well trained on the components, features and use of the portable radio. Two NIOSH fatality reports, January 11, 2001, in Franklin, Pennsylvania, and March 8, 2001, in Miami Township, Ohio, indicated firefighters died with portable radios in the pocket of their bunker pants and that in both cases the radios were turned off.

FFD Policy 305.002a states, "It is imperative all members are intimately familiar with the components, features, use, maintenance, and troubleshooting of this radio as it becomes a firefighter's lifeline at an emergency scene."

FINDINGS AND RECOMMENDATIONS: COMMUNICATIONS

RECOMMENDATION(s):

- All personnel review policy 204.2c – Field Unit Procedures.
- FFD provide portable radio training to all line personnel with emphasis on functions, limitations and importance of its use. All personnel should be held accountable for proficiency.

ITEM(s):

Communications system

FACTOR(s):

Contributing

FINDING(s):

During interviews investigators determined all FFD personnel interviewed do not have confidence in the current communications system. SART Members are aware of infrastructure issues, however there are personal accountability issues as well regarding knowledge and familiarization of the radio system.

DISCUSSION:

Recently, the Fresno Fire Department is actively pursuing concerns of the communication system limitations. The lack of knowledge and accountability of field personnel of the communications system and its components (portable radios) is an issue that is more concerning to the safety of FFD members.

RECOMMENDATION(s):

- Enforce and hold all members accountable to FFD Communications Policies and Procedures.
- All personnel review policy 305.002a – Motorola HT 1250 Portable Radios.
- All personnel review policy 305.003 - Repair and Maintenance.
- All personnel review policy 204.2c – Field Unit Procedures.
- All personnel review FFD Policies: 305 Communications Components.
- FFD provide portable radio training to all line personnel with emphasis on functions, limitations and importance of its use. All personnel should be held accountable for proficiency following the training.
- FFD perform testing and recommend radio communication infrastructure upgrades and/or complete system replacement.
- SART supports FFD's current request for purchase to review the City of Fresno Communications Infrastructure.



ITEM(s):

Fireground Communications

FACTOR:

Causal

FINDING(s)

During the Cortland Incident, several members failed to recognize and communicate critical changes to the fire behavior. Changes in fire behavior were not communicated to all personnel on scene.

DISCUSSION:

Recognition of key fire behavior indicators is critical for a safe and efficient fire attack. The communication of this information to the incident commander alone is not sufficient. All companies working in the fire environment must be aware of these changes and proactively mitigate this threat through effective fire control and ventilation strategies and tactics. Safety is the responsibility of every member on scene and when critical changes to the fire behavior occur, those changes must be communicated.

RECOMMENDATION(s):

- Enforce and hold all members accountable to FFD Communications Policies and Procedures.
- Provide department wide training on FFD Incident Command Procedure 201.1.
- All personnel review policy 305.002a – Motorola HT 1250 Portable Radios.
- All personnel review policy 204.2c – Field Unit Procedures.
- All personnel review FFD Policies: 305 Communications Components.

ITEM(s):

Narrow Banding

FACTOR(s):

Non Related

FINDING(s):

During a communications presentation, SART Members were notified there is a reduction of communication capabilities on the fireground since the implementation of narrow banding.

FINDINGS AND RECOMMENDATIONS: COMMUNICATIONS

DISCUSSION:

Nationally, FCC mandated narrow banding on all public safety and business industrial land mobile radio systems, on or before January 1, 2013. Interviews with FFD members revealed no confidence in the current communication system utilized by FFD. FFD Members stated prior to narrow banding they experienced adequate and reliable communications. Communications are an integral part to any fire departments operations and also a firefighter's lifeline in time of need.

NFPA 1201 states that fire departments must provide a reliable communications system.

RECOMMENDATION(s):

- SART supports FFD current request for purchase to review the City of Fresno Communications Infrastructure.
- Implement recommendations provided by the review.

ITEM(S):

Analyzing and Conditioning of HT Radio Batteries

FACTOR(s):

Non Related

FINDING(s):

During a communications presentation it was expressed most companies do not analyze / condition portable radio batteries as required by department policy.

DISCUSSION:

FFD members have expressed to SART members issues regarding communications issues specifically with FFD portable radios. FFD has a specific policy regarding analyzing and conditioning portable radio batteries to prolong the life of the battery.

During the communications presentation with FFD communications subject matter experts, it was revealed to the SART most companies do not follow department policy to analyze and condition the batteries monthly.

FFD Policy 305.002a states, "It is imperative all members are intimately familiar with the components, features, use, maintenance, and troubleshooting of this radio as it becomes a firefighter's lifeline at an emergency scene."

RECOMMENDATION(s):

- All personnel review policy 305.002C – ITECH (IQPAC) Battery Analyzer.



ITEM(s):

Portable Radios and Batteries

FACTOR(s):

Non Related

FINDING(s):

Limited budget available to implement a replacement cycle for portable radios or portable radio rechargeable batteries.

DISCUSSION:

FFD communications subject matter experts explained to SART members there is a minimal budget available for replacement of batteries and or portable radios. Portable radios are a firefighter's daily piece of safety equipment. Regular maintenance and care of portable radios and batteries is an essential part of communications. FFD currently maintains 305 in service Motorola 1250 handheld radios. In December of 2012, FFD purchased 200 Motorola 1250 rechargeable Batteries. With-in 30 days of the purchase, 185 of the batteries were distributed. Additional purchases of 40 batteries on 3/15/14, 20 batteries on 9/3/14 and 20 batteries of 5/17/15 were made. In total, 280 batteries were purchased in 2 years and 5 months. FFD's current portable radios, Motorola HT 1250, are 10+ years old.

As portable radios become out-of-service due to maintenance needs or becomes irreparable, a means of replacement needs to be in place for issuance. The FFD FY16 budget included funding to purchase 320 new radios, which is currently in the purchase process.

RECOMMENDATION(s):

- FFD Communications Team and Fresno City Subject Matter Experts prepare and present to FFD Management a replacement program that includes costs associated for replacement of portable radios and rechargeable batteries.
- Communications Team and FFD Management work together to determine a continuous funding source.
- Modify current policy 305.003 – Repair and Maintenance; to specify when rechargeable batteries should be replaced, based on recommendations from the communications team presentation.

ITEM(s):

Portable Radio Training

FACTOR(s):

Contributing

FINDINGS AND RECOMMENDATIONS: COMMUNICATIONS

FINDING(s):

Some FFD members do not take training seriously.

DISCUSSION:

Interviews revealed informal portable radio training occurs once a year. It was also revealed, during portable radio training, some FFD members “don’t pay attention, refuse to take the training seriously, and others just don’t care”. SART members determined there is no accountability by some FFD Company Officers for their subordinates to learn and / or train on the portable radio.

RECOMMENDATION(s):

- Hold FFD Company Officers accountable to train their subordinates on the portable radio uses and functions.
- Hold all personnel accountable for their actions during any training session.

ITEM(s):

Selection of transmitter

FACTOR(s):

Non Related

FINDING(s):

Selection of appropriate transmitter for incident assignments

DISCUSSION:

It was expressed to SART members there is a potential for fire dispatchers to not select the best transmitter for the geographical area of the incident.

RECOMMENDATION(s):

- Research technology and implement a process to reduce the human error factor when dispatching.

ITEM(s):

Multiple brands and models of radios, portable and mobile.



FINDINGS AND RECOMMENDATIONS: COMMUNICATIONS

FACTOR(s):

Non Related

FINDING(s):

During interviews FFD members expressed concern(s) of having multiple radios to learn to operate and utilize. It was expressed to SART members having multiple radios makes it difficult to learn the functions of each radio. FFD currently operates four (4) different model portable radios and three (3) different model mobile radios.

DISCUSSION:

It is known the fire service operates on different frequencies, band widths, and repeater systems. Instant-aid and mutual aid in the fire service is a daily occurrence across the nation. It is essential and a requirement that all agencies operating on the fire ground utilize common communications. Many fire departments like FFD maintain multiple radios to communicate during mutual and instant-aid. It is known that some members of FFD do not know how to properly operate the portable radio utilized by FFD on a daily basis. FFD and its members are not alone with the expectation of being able to operate multiple radios, and utilize such radio for the incident they are assigned. Firefighters are constantly training on current strategy, tactics and methods in all aspects of the job, communications is an essential part of that training.

RECOMMENDATION(s):

- Enforce and hold all members accountable to FFD Communications Policies and Procedures.
- Hold FFD Company Officers accountable to train their subordinates on the portable radio uses and functions.
- FFD Management consider issuing each FFD member a portable radio as part of their safety equipment issuance that travels with them, to instill ownership and accountability.

ITEM(s):

Radio Technicians

FACTOR(s):

Non Related

FINDING(s):

Prior to FFD narrow banding their radio system, the City of Fresno employed several technicians. Due to budget cuts the City of Fresno now employs one radio technician.



FINDINGS AND RECOMMENDATIONS: COMMUNICATIONS

DISCUSSION:

In today's technical world and consistent changing of technology, constant monitoring and maintenance of modern radio systems is required. The City of Fresno currently employs one radio technician for the maintenance and monitoring of the FFD, Fresno P.D., Public Works, etc.

RECOMMENDATION(s):

- Address employing additional radio technicians to maintain a modern and reliable communications system.



MEDIA / PIO

Overview

Within the city limits of Fresno there are several national television stations, including ABC, NBC and FOX. It is common for Fresno Fire Department (FFD) to be on one of the media channels several times a week for incidents they respond to. The FFD currently maintains a 40 hour per week PIO in addition to a 24 hr call back 7 days a week, in which they utilize a pool of eight fire department members with various levels of training.

In recent past, FFD issued a letter that did not allow its members to utilize helmet cameras or other media devices. The letter has since expired. Currently FFD does not have a policy regarding media publications.

ITEM(s):

Media Device Usage – Video Documentation

FACTOR(s):

Non Related

FINDING(s):

There is not a policy that addresses either media devices or a process on how to review, edit, store or publish data.

DISCUSSION:

During the review of data provided, it was determined footage of the Cortland incident was obtained from a helmet camera worn by a firefighter. The general public also provided national coverage footage with cellular phone cameras. This type of information can be valuable and considered legal documentation of the incident. Recorded information can aid in documenting the actions, provide value in training needs or reinforcement, and clear up other media clips that surface during the collection and release of data.

RECOMMENDATION(s):

- Develop a policy that address who, when, source type, and the process to follow in the use and release of data in raw, edited or still picture format. A formal approval process should be included in this policy.
- Consider issuing media devices under stated policy for training officers and safety officers for the documentation process and training support in needs analysis and curriculum development.

ITEM(s):

Line of Duty Death Procedure / Critical Injury Procedure

FINDINGS AND RECOMMENDATIONS: MEDIA / PIO

FACTOR(s):

Non Related

FINDING(s):

The designated Duty Chief on the day of the Cortland incident did not fully implement Policy 114.1 as written.

DISCUSSION:

Fresno Fire Department Policy 114.1, states that the Duty Chief will have an Incident Action Plan developed, designate a Notification Team, a Hospital Liaison Officer, a Public Information Officer, and a Family Support Liaison Officer and other positions.

RECOMMENDATION(s):

- FFD Management review Administrative Policy 114.1, make changes as needed.
- Consider developing a policy and create a response team for future severe injuries, death and major events, i.e.: similar to a type three (3) incident management team.
- Create a team, and or identify members within the department who have specific skills to work in the capacity of those positions.
- Provide ongoing training and development for the team.

ITEM(s):

Notification to family

FACTOR(s):

Non Related

FINDING(s):

Notification procedure was not followed as written in Policy 114.1

DISCUSSION:

Media release and notification did not occur as per policy.

RECOMMENDATION(s):

- Review Policy 114.1 – Line of Duty Death / Critical Injury Procedure, make changes as needed.



MEDICAL

OVERVIEW

The Fresno Fire Department delivers first responder EMS services. All responding personnel are trained to a BLS EMT-D level of training. Advanced Life Support (ALS) Paramedic services and transport are provided by private contract. A two (2) year certification cycle is followed through a continued education program that meets all state and county mandates. The continued learning system is managed by online learning, didactic, and manipulative training.

EMS Timeline

13:32:26 - Fire Captain falls through the roof.

13:34:36 - EMS dispatched Medic 123 priority 1, code 3.

13:35:12 - Fire Captain removed from structure and brought out to front driveway with treatment initiated.

13:37:29 - Medic 123 arrives on scene.

13:40:46 - Medic 123 departs scene for Community Regional Medical Center.

13:47:00 - Medic 123 arrives at Community Regional Medical Center.

ITEM(s)

Medical Treatment

FACTOR(s)

Contributing

FINDING(s)

The initial medical treatment was initiated by the firefighters from the incident on the front driveway. The firefighters removed the personal protective clothing from the injured fire captain and applied sterile water from a burn kit and water from an engine booster line. Oxygen by mask was applied on scene to the injured fire captain. No vital signs were taken on scene prior to moving the injured fire captain to Medic 123 for transport.

Advanced life support was initiated while en-route to the Community Regional Medical Center, which was the nearest receiving center for trauma by Medic 123.

DISCUSSION:

Emergency Medical Services Basic Life Support policy # 510.26 states the treatment for Thermal Burns is as follows:

FINDINGS AND RECOMMENDATIONS: MEDICAL

- A. Put out fire. Remove burned or hot clothing. Do not remove melted clothes or tar like substances off patient.
- B. ABC's-Assessment and treatment
- C. Thermal Burns
 1. Oxygen
 - a) Low flow, 6 liters by cannula if awake, alert, in minimal distress, or burns not involving airway.
 - b) High Flow 15 liters / min by non-rebreathing mask if in severe distress, comatose, or inhalation injury, possible carbon monoxide exposure, burns greater than 15% total body surface area (TBSA) or patient unstable.
 2. Sterile Dressings to Burned Areas.
 - a) Small burns (less than 15% TBSA) may be covered with moist sterile dressings.
 - b) Large burns (greater than 15% TBSA), use dry dressings to avoid hypothermia.
 - c) Do not dress facial burns.
 3. Check for associated injuries.
 4. Treat shock, if present.
 5. Do not apply ice or creams to the burned area.

The administration of copious amounts of water to the fire captain is a deviance from the burns treatment policy.

RECOMMENDATION(s):

- Have all operational personnel review and train on burn treatment and follow established treatment protocols.

ITEM(s):

Ambulance dispatched for working fire

FACTOR(s):

Contributing

FINDING(s):

FFD does not dispatch an ambulance to working fires



DISCUSSION:

At the time of this incident, the Fresno Fire Department did not dispatch an ambulance to residential structure fires unless called for by the incident commander.

RECOMMENDATION(s)

- An ambulance should be included with the initial fire dispatch upon receiving a call for a residential structure fire.

Note:

On May 14, 2015 the Fire Chief sent the following information via email to all personnel.

Effective immediately EMS will be responding to:

- Residential fires upon working fire notification
- Commercial/Apartment upon initial dispatch (as is current practice)
- Large vegetation fires

FIRE INVESTIGATION

Overview

The Fresno Fire Department (FFD) Investigation Team is a dedicated full time specialty team within the FFD. Team members are FFD suppression employees and were originally hired as a probationary Firefighter. All investigation team members are required to achieve and maintain National Fire Protection Association 1033 requirements for a qualified Fire Investigator in addition to achieving and maintaining Certified Fire Investigator recognition from a professionally recognized fire investigations industry organization. All team members are Peace Officer deputized according to California Peace Officers Standards and Training (P.O.S.T.) selection and training. In 2014 FFD responded to 37,881 calls. Of those, 823 were structure fires, 330 were wildland fires and 332 were vehicle fires. Total structure fire losses were estimated at 28.5 million dollars, 2.64 million in loss due to arson. Based on a 10 year average, FFD fire investigation team members investigated 431 fires per year. At the time of the Cortland incident FFD employed one Deputy Fire Marshal and three staff investigators. During the Cortland incident all members of the fire investigation team responded and actively participated in the investigation. Currently FFD employs one Deputy Fire Marshal, three staff investigators and three scene investigators. Additionally there are six reserve positions budgeted, whereas three are in process of reactivation.

Incident Overview

On Sunday March 29, 2015 at approximately 1323 hours Fresno County Dispatch received a 911 emergency call reporting a residential fire at 1310 E. Cortland, Fresno City in the county of Fresno. A full residential fire alarm assignment responded.

This incident involved a structure fire which occurred inside a one story residential structure, located at 1310 E. Cortland. This residence was being used to house multiple tenants, living within different rooms of the structure, and sharing the common living spaces. There were five bedrooms in the residence, and a portion of the living room was partitioned off making another living space/bedroom. There was also a living space sectioned off in the garage, which made a total of seven separate living spaces within the residence. The spaces were occupied with individual renters at the time of the fire.

The fire originated in the interior of the attached garage. The northeast corner of the garage was being used as a living/sleeping area. This living area was partitioned off, from the rest of the garage, using furniture and a large wooden pallet. The fire originated within that living space.

After a complete Scientific Method Fire Scene Origin and Cause investigation the fire was determined to have been caused by an open flame device.





SART Team Process

Cortland Accident Investigation Team Authority

The Cortland Serious Accident Review Team (SART) was given authority under the direction of Fire Chief Kerri L. Donis to conduct the following:

- Recommend actions to prevent injury or death to department members
- Interviews
- Identify factual data
- Record and analyze findings
- Develop and submit a factual report

Team Chronology

Immediately following the Cortland Incident, Fresno Fire Department requested assistance from several agencies to assist with a multi-agency review.

Deputy Chief Tim Henry was selected to be the Fresno Fire coordinator along with Captain Brad Driscoll who would represent Fresno Firefighters Union, Local 753. The other members selected were, Battalion Chief Tim Adams, Anaheim Fire and Rescue, Captain Butch Agosta, Kern County Fire Department, Battalion Chief Vince Bergland CAL FIRE Fresno / Kings Unit, Battalion Chief Greg Casentini, Sacramento Metropolitan Fire District, Operations Division Chief Alan Ernst, Modesto Fire Department, Fire Chief Mike Kraus, Modesto Fire Department, (ret), Battalion Chief Don Stukey, Los Angeles Fire Department, (ret).

April 7, 2015

The SART met at Fresno Fire Department Headquarters with the Fresno Fire Department Fire Chief and staff. All parties were welcomed, followed by a round table of introductions of those present, including the Fresno Fire Department Local 753 President.

The SART was directed by the Fire Chief to investigate the Cortland Incident which occurred on March 29, 2015. The SART was tasked with a primary purpose of the report to educate and prevent any future injury or death to the department members, additionally to provide an outside perspective along with what are we supposed to learn from this, by providing recommendations to FFD. The FFD Fire Chief stated that Fresno Fire would provide full support to the SART during the process and provided authorization for the SART to perform the investigation.

Note:

A Letter of Immunity was drafted and provided to all FFD personnel on April 15, 2015 by the FFD Fire Chief. (Appendix J, page 268)

SART PROCESS

Fresno Fire Department Accident Review Team had performed an internal investigation of the Cortland Incident, and provided a brief description.

Modesto Fire Chief (ret), Mike Kraus discussed the Coston Incident (Modesto Fire Department) and the process used to complete the investigation.

The SART was presented the Green Sheet (Informational Summary) of the incident by power point, followed by a brief discussion.

The SART was provided a brief synopsis of what had transpired since the incident. All SART members were provided a book and a thumb drive that Fresno Fire Department Accident Review Team had comprised to assist the SART.

A discussion with SART members and Fresno Fire Local 753 representative and Local 753 President regarding the incident and the investigation from the membership's perspective.

The SART was then presented a video of the incident compiled by numerous videos, and photos taken of the incident. Directly afterwards the SART was presented the findings of the Accident Review Team.

The book consisted of:

- Informational Summary
- Timeline
- Communications and Equipment
- Site Information
- Personal Protective Equipment (PPE)
- Interviews and Statements
- Fresno Fire Policies
- Media and Public Information Officer (PIO)
- Photos and Photo Logs
- Property History
- Fire Captain Biography
- Audio Video Log
- Fire Captain Training Records
- Dispatch
- PPE Specifications

The thumb drive consisted of:

- Informational summary
- Timeline
- Communications
- Site Information
- PPE
- Interviews and Statements
- Fresno Policies
- Media
- Videos
- Photos



- Employee Training Records

A Fresno Fire Investigator provided a brief description of the arson investigation.

The SART inspected the PPE that was worn by the injured fire captain.

A discussion on Fresno Fire Department communications in regards to their radio system and radios.

The SART visited the site of the incident at 1310 E. Cortland in Fresno. Once the SART returned, Fresno transitioned the investigation to the SART. The SART then worked on developing a format with topics and assigned SART members to perform within those functions.

The next meeting was scheduled for May 5 – 7, 2015.

The SART developed interview questions, with interviews to be performed by SART members April 21 – 24, 2015.

A request was made to interview the injured fire captain during the investigation. The request was not granted.

April 21 – 24, 2015

Interviews were conducted of the first alarm resources.

May 5, 2015

The SART members who performed interviews, updating the remaining members on interviews. FFD Fire Chief spoke with the SART from 1230 – 1300. The SART was invited to watch and listen to the Fresno Fire Safety Discussion and Incident Review attended by Fresno Firefighters at headquarters. Updates from the April 21 – 24 interviews continued. Communications, PPE and seat belt use were key safety items obtained from the April 21 – 24 interviews.

May 6, 2015

SART members conducted interviews. The SART members worked on additional interview questions for Fresno Fire Training and Executive Staff. After noon, the SART was updated on the interviews performed. Fresno Fire Union President visited the SART for an update and provided answers to any questions the SART had. SART members made contact with NIOSH for assistance with the PPE and Self Contained Breathing Apparatus (SCBA) worn by the injured fire captain.

May 7, 2015

SART members conducted interviews with Fresno Fire Administrative Staff, concurrently other SART members conducted interviews with Fresno Fire Training Staff. The PPE and SCBA were sent to NIOSH for a report. The SART then convened and updated all members on the day's interviews. Safety concerns were identified by the SART, the conclusion was to write an Identified Safety Concerns letter to Fresno Fire. The SART scheduled the next meeting for June 8 – 10, 2015. A request to interview the injured fire captain was not granted by doctors. A report of burn injuries was requested by the SART.

May 12, 2015

The SART sent an Identified Safety Concerns Letter to Fresno Fire with recommendations.

Items of concern: (Appendix H, page 264)

- Firefighters not wearing seat belts while responding to emergencies.
- Firefighters not following Fresno Fire Department PPE Policies.
- Radio Communication issues.

June 8, 2015

SART members provided updates on their individual subgroups.

The SART met with Fresno City Communications Subject Matter Experts (SMEs), Training Chief, Fire Engineer, Fresno Regional Communications Manager, and a CAL FIRE Communications Operator, to discuss Fresno Fire Communications. A Fresno Fire Investigator provided an update on the incident. SART members performed a radio check with a Fresno Firefighter at the incident location. SART members continued to work on individual assignments.

June 9, 2015

SART members worked on identifying, maps, graphs and photos to request for the report. SART members continued to work on individual assignments. The next meeting was scheduled for July 15 – 17, as well as a self-imposed deadline for SART members to provide a first draft of the report.

June 10, 2015

SART members continued to work on individual assignments. SART had an open forum discussion with labor Local 753. SART made contact with NIOSH to determine status of their findings. A self-imposed deadline of June 25 was set by SART members to request maps, graphs and photos for the report. A request to interview the injured fire captain was not granted by doctors.

July 9, 2015

SART meeting for July 15-17, 2015 was confirmed and a report of burn injuries for the injured fire captain was received from Fresno Fire Department.

July 15 - 17, 2015

SART was provided an update by Fresno Fire Department. The SART developed a report format for structure and content. A request to interview the injured fire captain was not granted.



August 12 – 13, 2015

SART discussed a NIOSH report compiled by a member, regarding similar factors for incidents spanning ten years. SART met with the FFD Fire Chief and members of her staff to provide an update on the report and narrow down a completion timeline.

September 17, 2015

SART utilized a conference call to discuss items of the report, and schedule a meeting for October.

October 12- 14

SART continued to work on the report with an emphasis on the timeline, contributory and causal factors, references and appendices. The team continues to acknowledge the support of Fresno Fire Department.

October 24, 2015

SART utilized a conference call to discuss items of the report.

October 26, 2015

SART met with FFD Fire Chief and her staff, as well as the Assistant Fresno City Manager. The SART presented an update of the report. The SART and the FFD Fire Chief discussed the completion of the report.

November 9, 2015

SART utilized a conference call to work on the report. SART discussed finalization of the report and editing. SART set a date for review of the team prior to sending the report for edit.

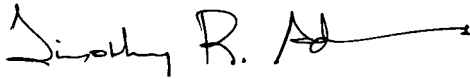


SART PROCESS

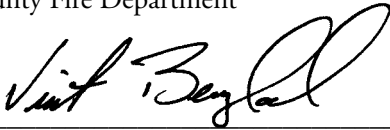


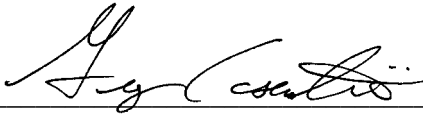


SIGNATURES

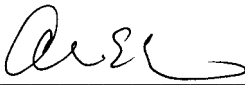
Tim Adams 
Battalion Chief, Anaheim Fire and Rescue

Butch Agosta 
Captain, Kern County Fire Department

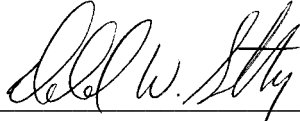
Vince Bergland 
Battalion Chief, CAL FIRE Fresno / Kings Unit

Greg Casentini 
Battalion Chief, Sacramento Metropolitan Fire District

Brad Driscoll 
Captain, Local 753 Representative

Alan Ernst 
Operations Division Chief, Modesto Fire Department

Mike Kraus 
Fire Chief, Retired, Modesto Fire Department

Don Stuke 
Battalion Chief, Retired, Los Angeles Fire Department

FINDINGS AND RECOMMENDATIONS: SIGNATORY PAGE







KERRI L. DONIS, CFO, EFO, MSOL
FIRE CHIEF

Office of the Fire Chief • (559) 621-4002 • FAX (559) 498-4261
Fresno Fire Department • 911 H Street • Fresno, CA 93721-3082

April 6, 2015

Members of the Cortland Accident Review Team:

I would like to take this opportunity to express my extreme gratitude to all the members of this multi-agency accident review team and your respective departments and associations for their dedication of time and energy in the compilation and formation of this report.

As an organization, the Fresno Fire Department is committed to learning from the events of March 29, 2015. The review committee shall bring an objective outside perspective to review the circumstances and actions occurring during the emergency incident. Analysis of the event should result in recommendations for improvement.

The primary purpose of this report is to educate and prevent any future injury or death to the department members.

Respectfully,

Kerri L. Donis,
Fire Chief

"To protect and put service above all else."



Informational Summary



Cortland Incident

Fresno City Fire Department

Residential Structure Fire

3/29/2015

Incident # CA-FRN- 5017063

A Board of Review has not approved this Informational Summary Report. It is intended as a safety and training tool, an aid to preventing future occurrences, and to inform interested parties. Because it is published on such a short time frame, the information contained herein is subject to revision as further investigation is conducted and additional information is developed.



Summary

The Crew of Truck 4 was assigned to ventilate a single-story, single-family residential structure involved in fire. While on the roof assessing the structure for ventilation there was a catastrophic roof failure over the garage. The Fire Captain on Truck 4 assigned to ventilate fell through the roof into the garage. The Truck 4 Captain was extricated by two Firefighters from Engine 5 assigned to Fire Attack, a Firefighter and Engineer from Truck 11 who had no assignment, and a Firefighter from Engine 9 assigned to open the garage door. The Truck 4 Captain sustained significant burn injuries.

Conditions

- **Temperature:** 79° Fahrenheit
- **Wind:** North West at 5 miles per hour (mph)
- **Relative Humidity:** 33%
- **Interactive Map:** <http://wxug.us/1o0ht>

Sequence of Events

At 1323 on 3/29/2015, Fresno Fire Department Dispatch received a 911 call reporting a residential fire at 1310 E. Cortland, Fresno CA. At 1324, Engines 5, 9, 20; Trucks 4 and 11; and Battalion 1 were directed to respond to 1310 E. Cortland. Upon arrival at 1326, Engine 5 assumed command and gave a size-up reporting heavy smoke showing, possibly in the attic and secured a water supply. Engine 5 assigned Truck 4 to ventilation with their crew of four, Engine 20 with two Firefighters from Engine 5 to Fire Attack and Two-Out, Engine 9 with a crew of four to utilities and forcible entry on the garage door, and Truck 11 staged with their crew of four. Battalion 3 was not assigned to the call but was in the area and arrived to assist as needed. The Truck 4 Captain led the way to the roof with a rubbish hook followed by the Truck 4 Firefighter with a saw. The Truck 4 Engineer footed the ladder and the Rescue 4 Engineer prepped the second saw for operation. Truck 4 Captain sounded his way to the ridge, then north towards the garage. As he sounded and walked from over the home to over the garage, the roof experienced a catastrophic failure and he fell into the garage. At 1332, Engine 5 reported a Firefighter down into the garage and initiated a Mayday; Battalion 1 completed the Mayday, called for the emergency alert tones, and assumed command. Battalion 3 assumed RIC Operations and directed EMS to stage on Del Mar and Cortland to receive the Firefighter. The Firefighter on Truck 4, with the assistance of the Rescue 4 Engineer, completed four ventilation holes prior to exiting the roof of the structure. The two Firefighters on Fire Attack from Engine 5 heard the Mayday and repositioned their hoseline to affect a rescue via the rear garage door on the B side of the structure. Truck 11 assumed Rapid Intervention; the Engineer and a Firefighter from Truck 11 followed the hoseline that led to the rear garage man door and assisted the two Firefighters in the process of removing the Truck 4 Captain from the garage. A Firefighter from Engine 9 made entry from the north via the garage door and assisted with the extrication of the Truck 4 Captain. The Truck 4 Captain was removed from the garage via the rear man door on the B side of the structure. His mask was removed and airway confirmed to be clear. He was then moved to the A side driveway, where the remainder of his gear was removed and he was further assessed. EMS arrived and patient care was

transferred to them. Fresno Fire Department sent two riders to the Community Regional Medical Center to assist with patient care.

Injuries:

INJURIES/DAMAGES

- Second and third degree burns to over 65% of Truck 4 Captain

Damage:

- All of Truck 4 Captain's PPE is condemned
- 1 SCBA and Mask
- 1 Motorola Radio, Mic, Holster and Strap
- 1 Rubbish Hook

Key Points For Review

- Communications: Effective sending and receiving of critical information is necessary to execute the complex operations involved on the fire ground.
- Equipment: Appropriate PPE will be worn as indicated by the incident.
- Command: Communication of incident objectives and the mode of operation throughout the incident are imperative for scene management. The early establishment of Two-In/Two-Out expedited the removal of the downed Firefighter.

Incidental Issues/Lessons Learned

- An investigation conducted by an independent Severe Accident Response Team (SART) is under way and will present any improvement opportunities/ lessons learned upon completion of that report.





General location



Specific location



A Side (North)



B Side of garage (East)

APPENDIX B



CB Corner & B Side



C Side (South)



D Side (West)



Aerial view of structure from AD corner



Location of roof failure



Location of ventilation holes

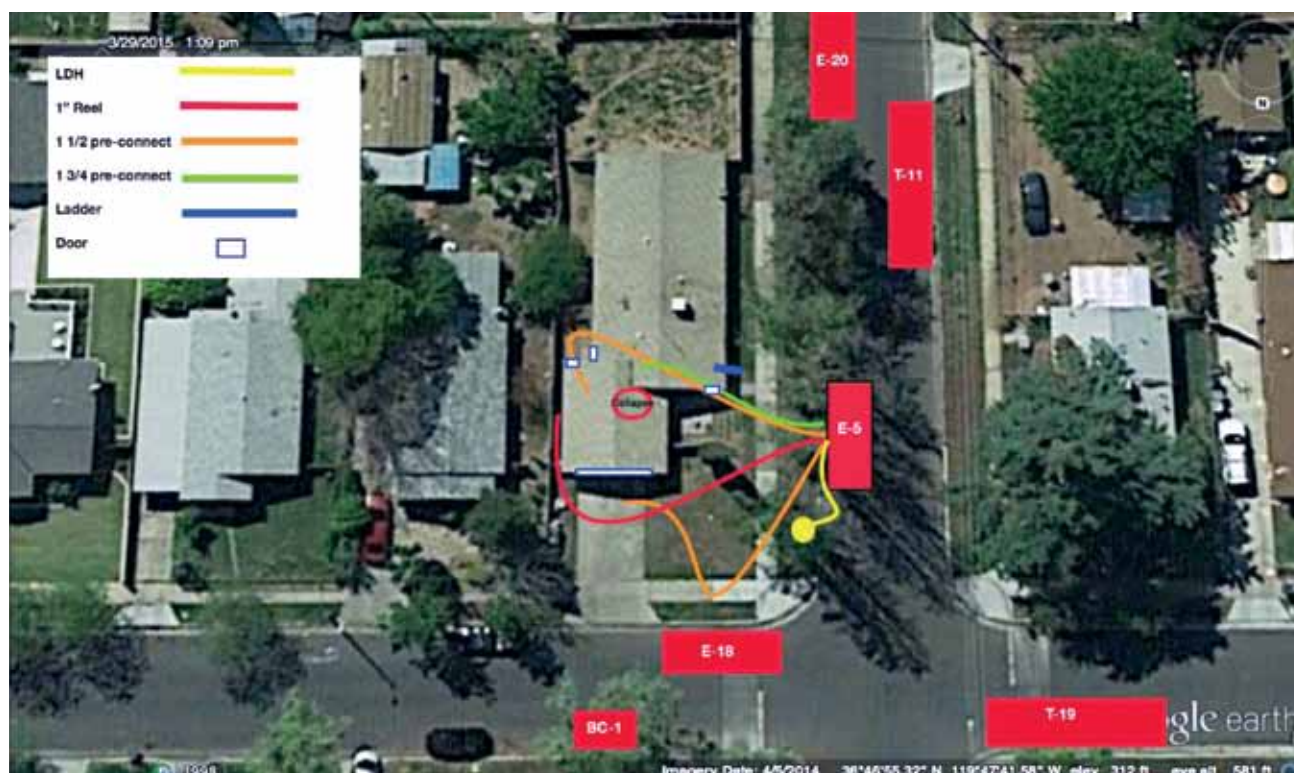




View of roof from the south



Rear garage man door



Apparatus placement on scene at the time of the Mayday

Cortland SART – NIOSH Review

The Cortland SART examined the American Fire Service's culture and emotional response to evaluating, learning, and changing behavior, through lessons learned from firefighter injury and death incidents. After a thorough review of NIOSH reports from the past 10 years, it is clear that the California fire service is not exempt from loss of life or critical injuries. Despite advances in industry technology, testing, standards, and millions of dollars spent in firefighter research; there are very clear trends as to why lives are lost and critical injuries occur. The most significant is a lack of engagement and the use of material provided by, case studies/lessons learned, codes, laws and training recommendations by entities such as UL, NIST and NIOSH. Fresno Fire Department is not alone or unique in their need to review and implement training and recommendations into day-to-day operations based on sound risk assessment, in addition to building a culture of safety within the organization.

It is our hope that this report will lay a solid foundation for firefighters, leaders and agencies, to adopt, practice, and prevent further injury and death. This is best accomplished through policy, performance, and dedication to industry best practices, and a mindset that safety is everyone's responsibility. The priority of the fire service should be to cease any and all actions or behaviors that could result in a preventable accident, near miss, injury or death. Too many firefighters have paid the ultimate price in protecting life, property and the environment across our great nation; it is time we apply sound risk assessment, implement safety cultures, and set clear objectives, strategies and tactics at every incident. The next preventable injury or death could happen in your jurisdiction, and may be avoided through keen situational awareness at all levels.

Every engaged firefighter is a safety officer!

The Cortland SART Team evaluated the following:

- NIOSH reports* directly related to structural firefighting; total reviewed = 77
- NIOSH reports* that had common factors and recommendations; total reviewed = 70

**Cardiac-related incidents were only added if actual suppression-interior firefighting activity was being conducted as described in the executive summary. Fires that involved training were not considered even though factors and recommendations had common denominators and a higher need of education to standards and safety issues.*

Contributing factors that are marked in RED in the following NIOSH report excerpts are points that repeat themselves throughout these reports, but also in the City of Fresno's Cortland Incident. The items in RED are related in topic and do not necessarily have the same condition or action, yet are directly related in topic or discipline. However, they are all points that re-occur and can be improved upon with increased situational awareness and mandated training programs. All authorities having jurisdiction must incorporate these lessons learned, NFPA standards and best industry practices in any changes in fire ground strategies and tactics as well as emotional control during all incidents.



F2014-07:

Career Lieutenant Killed Following a Walkway Collapse While Working to Evacuate a University Student Housing Building

Missouri: February 22, 2014

Contributing Factors

- Deterioration and collapse of concrete walkway
- Awareness of the building condition not communicated to the fire department
- No site pre-planning
- Inadequate caller information influenced dispatch information provided to responding units
- Situational awareness

Key Recommendations

- Higher education facilities, sovereign entities, and authorities having jurisdiction should develop strategies for the inspection and remediation of student housing complexes and have programs in place to immediately address potential hazards
- Dispatch centers should ensure that all information taken by a call taker is clearly understood and provided to or simultaneously reviewed by a dispatcher so that all available information is provided to responding emergency personnel

F2014-04:

Fire Chief Suffers Fatal Heart Attack While Fighting a Residential Structure Fire – Arkansas

January 28, 2014

Contributing Factors

- Conduct exercise stress tests as part of the fire department medical evaluation program for fire fighters at increased risk for coronary heart disease (CHD)
- Provide preplacement and annual medical evaluations to all fire fighters in accordance with NFPA 1582, Standard on Comprehensive Occupational Medical Program for Fire Departments

The recommendations below address general safety and health issues

- Ensure that fire fighters are cleared for return to duty by a physician knowledgeable about the physical demands of firefighting, the personal protective equipment used by fire fighters, and the various components of NFPA 1582



APPENDIX C

- Phase in a mandatory comprehensive wellness and fitness program for fire fighters
- Provide fire fighters with medical clearance to wear a self-contained breathing apparatus as part of the fire department's medical evaluation program
- Conduct annual respirator fit testing
- Ensure fire attack team continuity

F2014-02:

Two Career Fire Fighters Die in a Rapid Fire Progression While Searching for Tenants—Ohio January 26, 2014

Contributing Factors

- Arson
- Risk assessment and Scene size-up
- Resource deployment
- Fire ground tactics
- Inadequate water supply
- Crew staffing
- No full-time safety officer
- No sprinkler system in the building

Key Recommendations

- Fire departments should ensure that the incident commander conducts an initial 360-degree size-up and risk assessment of the incident scene to determine if interior fire-fighting operations are warranted
- Fire departments should integrate current fire behavior research findings developed by the National Institute of Standards and Technology (NIST) and Underwriter's Laboratories (UL) into operational procedures by developing standard operating procedures, conducting live fire training, and revising fireground tactics
- Fire departments should ensure all fireground ventilation is coordinated with fire-fighting operations
- Fire departments should ensure that the incident commander establishes a stationary command post for effective incident management, which includes the use of a tactical worksheet, efficient fireground communications, and a personnel accountability system
- Fire departments should ensure that all companies are staffed with an officer on the fireground



- Fire departments should ensure that the Incident Commander assigns a safety officer as early in the incident as possible as defined by NPFA 1561 Standard on Emergency Services Organization Incident Management System and Command Safety

F2013-17:

Career Fire Fighter Killed by Structure Collapse While Conducting Interior Search for Occupants Following 4th Alarm

Texas: May 20, 2013

Contributing Factors

- Inadequate building construction
- Sprinkler system not working near origin of fire
- Incident command
- Communications
- Inadequate Size-up
- Tactics

Key Recommendations

- Fire departments should ensure that the Incident Commander establishes a stationary command post, maintains the role of director of fireground operations, and does not become involved in fire-fighting efforts
- Fire departments should ensure that the Incident Commander conducts an initial size-up and risk assessment of the incident scene before interior firefighting operations begin
- Fire departments should ensure critical benchmarks are communicated to the Incident Commander
- Fire departments should develop, implement and enforce clear procedures for operational modes. Changes in modes must be coordinated between the Incident Command, the command staff and fire fighters
- Fire departments should ensure the pre-designated Incident Safety Officer assumes that role upon arrival on the fireground
- Fire departments should ensure that fire fighters are trained in situational awareness, personal safety, and accountability
- Fire departments should train on and understand the use and operation of elevated master streams and its effects on structural degradation

APPENDIX C

- Fire departments should ensure that pre-determined assignments are assumed and staffed
- Fire departments should train all firefighting personnel in the risks and hazards related to structural collapse

F2013-164:

Career Fire Fighters Killed and 16 Fire Fighters Injured at Commercial Structure Fire
Texas: May 31, 2013

Contributing Factors

- Fire burning unreported for 3 hours, delayed notification of the fire department
- Building construction
- Wind impacted fire
- Scene size-up
- Personnel accountability
- Fireground communications
- Lack of fire sprinkler system

Key Recommendations

- Based upon fire department procedures, the strategy and tactics for an occupancy should be defined by the organization for fire-fighting operations. The Incident Commander should ensure that the strategy and tactics match the conditions encountered during initial operations and throughout the incident
- Fire departments should review and update standard operating procedures on wind-driven fires which are incorporated into fire ground tactics
- Fire departments should integrate current fire behavior research findings developed by the National Institute of Standards and Technology (NIST) and Underwriter's Laboratories (U.L.) into operational procedures by developing standard operating procedures, conducting live fire training, and revising fireground tactics

F2013-119

Volunteer Fire Fighters and 1 Off-Duty Career Fire Captain Killed by an Ammonium Nitrate Explosion at a Fertilizer Plant Fire – Texas
April 17, 2013



Contributing Factors

- Non-recognition of the hazards associated with ammonium nitrate
- Limited pre-incident planning of commercial facility
- Fire quickly spread to an un-controllable size
- Approximately 40-60 tons of solid ammonium nitrate unexpectedly detonated
- Responders working within blast radius at time of explosion
- Large non-sprinklered, wood construction, commercial structure

Key Recommendations

- Fire departments should conduct pre-incident planning inspections of buildings within their jurisdiction to facilitate development of safe fireground strategies and tactics, especially for high hazard / high risk structures and occupancies
- Fire departments should have a written risk management plan, use risk management principles at all structure fires and especially at incidents involving high risk hazards
- Fire departments should develop, implement and enforce a written Incident Management System to be followed at all emergency incident operations
- Fire departments should ensure that fire fighters wear a full array of turnout clothing and personal protective equipment appropriate for the assigned tasks
- Fire departments should ensure that fire fighters are trained to standards that meet or exceed NFPA 1001 Standard for Fire Fighter Professional Qualifications

Additionally, governing agencies (federal, state, regional, and local municipalities) should:

- Consider requiring automatic sprinkler systems, performing regular fire inspections, and other types of active fire prevention methods in industrial facilities, especially those with high risk / high hazard inventory
- Consider following the most current safe handling procedures for ammonium nitrate fertilizer storage and handling

F2013-07

Career Captain Dies Conducting Roof Operations at a Commercial Structure Fire
Pennsylvania: April 6, 2013

Contributing Factors

- Delay in reporting the fire to the fire department



APPENDIX C

- Fire in a non-sprinklered commercial building
- Building construction and design
- High fuel load and limited access to the fire due to excessive merchandise
- Lack of situational awareness

Key Recommendations

- Fire departments should integrate current fire behavior research findings developed by the National Institute of Standards and Technology (NIST) and Underwriter's Laboratories (U.L.) into operational procedures by developing standard operating procedures, conducting live fire training, and revising fireground tactics
- Fire departments should consider implementing a pre-incident planning program which complies with NFPA 1620, Standard on Pre-Incident Planning
- To enhance situational awareness, consider implementing a critical building information system which is available to responding units
- Based upon department procedures, the strategy and tactics of an occupancy should be defined by the organization for fire-fighting operations
- Fire departments should review procedures on the use and deployment of Rapid Intervention Team(s)
- Ensure all fire fighters and fire officers are trained when to call a "Mayday"
- Fire departments should provide the Incident Commander with a "Mayday" tactical checklist in the event of a "Mayday"

F2013-04

Two Career Lieutenants Killed and Two Career Fire Fighters Injured Following a Flashover at an Assembly Hall Fire—Texas
February 15, 2013

Contributing Factors

- Non-sprinklered commercial building
- Risk management principles not effectively used
- High-risk, low-frequency incident
- Fire ground strategy, tactics, and ventilation
- Rapid fire progression



- Fire burned and spread undetected above the ceiling
- Crew integrity
- SCBA air management
- Fire ground communications
- Flashover

Key Recommendations

- Fire departments should use risk management principles at all structure fires
- Fire departments should ensure that incident commanders and fire fighters understand the influence strategy and tactics (e.g., ventilation) may have on fire behavior and fire fighter safety and consider whether traditional firefighting tactics are appropriate
- Fire departments should ensure that an established incident management system on a fire ground is appropriate and effective as it relates to that specific incident
- Fire departments should ensure that a complete situational size-up is conducted on all structure fires
- Fire departments should ensure that crew integrity is properly maintained by face-to-face contact or radio contact when operating in an immediately dangerous to life and health (IDLH) atmosphere

F2013-02

Volunteer Captain Dies after Floor Collapse Traps Him in Basement – New York
January 22, 2013

Contributing Factors

- Inadequate water supply
- Ineffective fireground communications
- Ineffective incident command
- Inadequate size-up
- Uncoordinated fire attack
- Lack of situational awareness
- Deteriorated structural members

Key Recommendations

- Fire departments should develop, implement and enforce a written Incident Management System to be followed at all emergency incident operations
- Fire departments should ensure that the Incident Commander conducts an initial 360-degree size-up and risk assessment of the incident scene before beginning interior fire fighting operations
- Fire departments should ensure that an adequate water supply is established and maintained
- Fire departments should train fire fighters to communicate interior and exterior conditions to the incident commander as soon as possible and to provide regular updates

F2012-28

Career Captain Sustains Injuries at a 2-1/2 Story Apartment Fire then Dies at Hospital – Illinois
November 2, 2012

Contributing Factors

- Modified building construction with multiple ceilings and a multi-story enclosed rear porch
- Horizontal ventilation contributed to the rapid fire growth
- Fireground communications
- Lack of proper personal protective equipment
- Lack of a sprinkler system in the residential rental building

Key Recommendations

- Ensure that fire ground operations are coordinated with consideration given to the effects of horizontal ventilation on ventilation-limited fires
- Ensure that the Incident Commander communicates the strategy and Incident Action Plan to all members assigned to the incident
- Ensure that the Incident Commander establishes a stationary command post during the initial stages of the incident for effective incident management, which includes the use of a tactical worksheet, enhanced communications, and a personnel accountability system
- Ensure use of risk management principles at all structure fires
- Ensure proper personal protective equipment is worn
- Ensure that communications are acknowledged and progress reports are relayed



- Ensure that Incident Commanders are provided chief aides to help manage information and communication
- Ensure that staffing levels are maintained

F2012-16

Lieutenant Suffers Fatal Heart Attack during a Fire in a Commercial Structure – New York
April 16, 2012

Recommendations to reduce the risk of heart attacks and sudden cardiac arrest among fire fighters at this and other fire departments across the country.

- Perform symptom limiting exercise stress tests on fire fighters at increased risk for coronary heart disease and sudden cardiac events
- Review policies and procedures to ensure appropriate use of respiratory protection on the fire ground
- Consider a more comprehensive annual physical performance (physical ability) evaluation

F2012-13

Career Lieutenant and Fire Fighter Killed and Two Fire Fighters Injured by Wall Collapse at a Large Commercial Structure Fire – Pennsylvania
April 9, 2012

Contributing Factors

- Multi-alarm fire in an vacant/abandoned structure
- Dilapidated building conditions
- High winds
- Collapse zone maintenance, control and compliance
- Fireground communications
- Personnel accountability
- Training on fireground operations
- Situational awareness

Key Recommendations

- Municipalities and local authorities having jurisdiction should develop strategies for the prevention of and the remediation of vacant/abandoned structures and for arson prevention and have programs in place to address abandoned building abatement and demolition
- Fire departments should consider an unsafe building marking system as part of an overall program to address fighting fires in abandoned/vacant/derelict buildings
- Fire departments should ensure that collapse zones are established, marked, maintained and complied with over the length of the fire incident
- Fire departments should ensure critical benchmarks are communicated to the Incident Commander
- Fire departments should ensure an effective personnel accountability system is used to account for all fire fighters and first responders assigned to any incident
- Fire departments should ensure that Incident Safety Officers are adequately trained to recognize hazards such as building collapse and enforce exclusion zones, communicate with division/group supervisors and the Incident Commander
- Fire departments should ensure that fire fighters are trained in situational awareness, personal safety, and accountability

F2012-08

Volunteer Lieutenant Killed and Two Fire Fighters Injured Following Bowstring Roof Collapse at Theatre Fire – Wisconsin
March 4, 2012

Contributing Factors

- Initial arriving units not establishing/performing/implementing an incident management system, an overall incident commander, an incident action plan (IAP), and a 360-degree situational size-up
- Risk management principles not effectively used
- Fireground and suppression activities not coordinated
- Fire ground communications between departments not established
- Incident safety officer (ISO) role ineffective
- Rapid intervention crew (RIC) procedures not followed and/or implemented
- Bowstring roof truss construction not recognized by departments
- Fire burned undetected within the roof void space for unknown period of time



- Uncoordinated master stream operations
- Location of victim following roof collapse not immediately known

Key Recommendations

- Fire departments should ensure that an effective incident management system is established with a designated incident commander not involved with fire suppression activities
- Fire departments should ensure that a complete situational size-up is conducted on all structure fires
- Fire departments should use risk management principles at all structure fires
- Fire departments should work together to develop mutual aid standard operating procedures for fireground operations that support interagency operability and accountability and train on those procedures
- Fire departments should ensure that the incident safety officer (ISO) position, independent from the incident commander, is appointed and effectively utilized at every structure fire meeting the requirements within NFPA 1521 Standard for Fire Department Safety Officer
- Fire departments should ensure that a rapid intervention crew (RIC) is readily available, on scene, and prepared to respond to fire fighter emergencies

F2011-31

Career Fire Fighter Dies during Fire-Fighting Operations at a Multi-family Residential Structure Fire –
Massachusetts
December 23, 2011

Contributing Factors

- Crew integrity
- Delay of initiating fire attack
- Inadequate fire stream application (penciling)
- Inadequate fireground communications
- Lack of a personnel accountability system
- Failure to initiate a “Mayday”
- Lack of annual medical evaluation



Key Recommendations

- Ensure that crew integrity is properly maintained by voice contact or radio contact when operating in an immediately dangerous to life and health (IDLH) atmosphere
- Ensure the Incident Commander communicates the strategy and Incident Action Plan to all members assigned to an incident
- Ensure that engine companies initiate a fire attack based upon scene size-up and the Incident Commander's defined strategy and tactics

F2011-30

Career Fire Fighter Dies and Another is Injured Following Structure Collapse at a Triple Decker Residential Fire – Massachusetts

December 8, 2011

Contributing Factors

- Civilian resident persistently stated another resident was still inside
- Fire burned well over 30 minutes before being brought under control
- Structure reacted to fire conditions in an unexpected manner
- 1890 era balloon-frame wood structure in deteriorated condition
- Instability of cellar wall and surrounding soil due to age and weather conditions
- Structural deficiencies not readily apparent
- Unusual cellar configuration for this type of residential structure
- Building inspection findings not readily available to fire department through city dispatch system

Key Recommendations

- Fire departments and city building departments should work together to ensure information on hazardous buildings is readily available to both
- Authorities having jurisdiction should ensure that hazardous building information is part of the information contained in computerized automatic dispatch systems
- Fire Departments should train all firefighting personnel on the risks and hazards related to structural collapse
- Fire Departments should use risk management principles including occupant survivability profiling at all structure fires



F2011-22

Two Volunteer Fire Fighters Die after an Explosion While Attempting to Extinguish a Fire in a Coal Storage Silo – South Dakota
September 15, 2011

Contributing Factors

- Silo design
- Unique explosive characteristics of coal (Bituminous, Sub-Bituminous including Powder River Basin Coal)
- Fire fighting tactics for silo fires

Key Recommendations

- Fire departments should review, revise and enforce standard operating guidelines (SOGs) for structural fire fighting that address silos containing combustible particles
- Fire departments should train officers and fire fighters on the hazards associated with different types of silos and the appropriate fire fighting tactics including any special hazards posed by the silo contents
- Fire departments should ensure that pre-emergency planning is completed for all types of silos located within fire department jurisdictions

Additionally, governing municipalities, manufacturers, and designers of coal storage silos should:

- Consider requiring that placards with hazard warnings and appropriate fire fighting guidelines be placed on silos
- Ensure that silos are constructed so that the contents flow without becoming trapped (stagnant) and to limit the introduction of air into the silo

F2011-20

Career Lieutenant Dies after Being Trapped in the Attic after Falling Through a Roof While Conducting Ventilation – Texas: August 14, 2011

Contributing Factors

- Hazard assessment/recognition
- Structural roof component-damage from previous fire
- PPE use

APPENDIX C

- Non-sprinkled building

Key Recommendations

- Ensure that the incident commander conducts an initial size-up and risk assessment of the incident scene as outlined in NFPA 1500 before beginning fire fighting operations and continually evaluates the conditions to determine if operations should become defensive
- Ensure that the incident commander establishes a command post, maintains the role of director of fireground operations, does not pass command to an officer not on scene, and does not become involved in fire-fighting operations
- Enforce existing standard operating procedures (SOPs) for structural fire fighting, including the use of self-contained breathing apparatus (SCBA) while conducting roof ventilation operations
- Ensure that a rapid intervention team (RIT) is established and available to immediately respond to emergency rescue incidents

Additionally, municipalities, building code officials, and authorities having jurisdiction should

- Develop a questionnaire or checklist to obtain building information so that the information is readily available to central dispatch if an incident is reported at the noted address
- Consider requiring apartment complexes and associated multiple-family dwellings that have been “retrofitted” into current structural building code requirements also be brought up to current codes for such things as sprinkler systems and adequate structural roof members when requests for permits are made

F2011-18

A Career Captain Dies and 9 Fire Fighters injured in a Multistory Medical Building Fire
North Carolina: July 28, 2011

Contributing Factors

- Arson
- Lack of an automatic fire suppression system
- Multistory/high-rise standard operating procedures not followed
- Air management doctrine not followed
- Reverse stack effect in stairwell
- Inadequate strategy and tactics
- Task saturation of the incident commander



Key Recommendations

- Ensure that the existing standard operating procedures for high-rise fire-fighting operations are reviewed, implemented, and enforced
- Ensure that a deployment strategy for low-frequency/high-risk incidents is developed and implemented
- **Ensure that the incident commander develops an incident action plan**, which is communicated to all fire fighters on scene, and includes effective strategy and tactics for high-rise operations, a timely coordinated fire attack, and a coordinated search plan
- Ensure that the incident commander utilizes division/group supervisors for effective tactical-level management
- Ensure that fire fighters are properly trained in air management
- Ensure that fire fighters are properly trained in out-of-air SCBA emergencies and SCBA repetitive skills training (e.g., buddy breathing and clearing a facepiece)
- Ensure that the incident commander is provided a chief's aide to assist in incident management, including communications and personnel accountability
- **Ensure that the incident commander establishes a stationary command post for effective incident management, which includes the use of a tactical worksheet, enhanced fireground communications, and a personnel accountability system**
- **Ensure that fire fighters are properly trained in Mayday standard operating procedures and survival techniques**

F2011-16

Fire Fighter Suffers Heart Attack during Structural Fire Fighting Operations and Dies 8 Days Later
Kentucky: June 30, 2011

- Provide preplacement and annual medical evaluations to all fire fighters
- Ensure fire fighters are cleared for return to duty by a physician knowledgeable about the physical demands of fire fighting, the personal protective equipment used by fire fighters, and the various components of National Fire Protection Association (NFPA) 1582
- Phase in a comprehensive wellness and fitness program for fire fighters
- Perform a preplacement and an annual physical performance (physical ability) evaluation
- Provide fire fighters with medical clearance to wear self-contained breathing apparatus (SCBA) as part of the Fire Department's medical evaluation program
- Use a secondary (technological) test to confirm appropriate placement of the endotracheal tube



- Perform an autopsy on all on-duty fire fighter fatalities

F2011-15

Paid-on-call Fire Fighter Killed by Exterior Wall Collapse during Defensive Operations at a Commercial Structure Fire

Illinois: June 17, 2011

Contributing Factors

- 96 year-old brick masonry structure degraded by fire burning for over 45 minutes
- Fire fighters with limited experience entered collapse zone to move ground ladder
- Entering collapse zone in close proximity to master stream directed onto roof
- Limited visibility at side and rear of structure may have obscured signs of pending collapse
- Limited training on structure collapse hazards

Key Recommendations

- Establish and monitor a collapse zone when conditions indicate the potential for structural collapse
- Train all fire fighting personnel on the risks and hazards related to structural collapse
- Train on and understand the effects of master streams on structural degradation
- Conduct regular mutual aid training with neighboring departments
- Designate a staging area for all unassigned fire fighters and apparatus
- Implement national fire fighter and fire officer training standards and requirements

F2011-14

Career Fire Fighter Dies in Church Fire Following Roof Collapse

Indiana: June 15, 2011

Contributing Factors

- Initial size-up did not fully consider the impact of limited water supply, available staffing, the occupancy type, and lightweight roof truss system
- Risk management principles not effectively used



- High risk, low frequency incident
- Rapid fire progression
- Offensive versus defensive strategy
- Failure to fully develop and implement an occupational safety and health program per NFPA 1500
- Fire burned undetected within the roof void space for unknown period of time
- Roof collapse

Key Recommendations

- Fire departments should ensure that a complete situational size-up is conducted on all structure fires
- Fire departments should use risk management principles at all structure fires
- Fire departments should conduct pre-incident planning inspections of buildings within their jurisdictions to facilitate development of safe fireground strategies and tactics

F2011-13

A Career Lieutenant and Fire Fighter/Paramedic Die in a Hillside Residential House Fire
California: June 2, 2011

Contributing Factors

- Construction features of the house built into a steep sloping hillside
- Natural and operational horizontal ventilation
- Ineffective size-up
- Fire fighters operating above the fire
- Ineffective fire command communications and progress reporting
- Lack of a personnel accountability system

Key Recommendations

- Ensure that standard operating guidelines (SOGs) for coordinated operations are developed and implemented for hillside structures
- Ensure that an adequate size-up of the structure is conducted prior to crews making entry
- Ensure staffing levels are maintained

APPENDIX C

- Ensure that a personnel accountability system is established early and utilized at all incidents
- Ensure that fireground operations are coordinated with consideration given to the effect horizontal ventilation has on the air flow, smoke, and heat flow through the structure
- Ensure that the Incident Commander is provided a chief's aide at all structure fires
- Ensure that an incident safety officer is assigned to all working structure fires
- Ensure that fire fighters are trained in Mayday procedures and survival techniques

Additionally,

- Continue research and efforts to improve radio system capabilities
- Adopt and enforce regulations for automatic fire sprinkler protection in new buildings and renovated structures

F2011-05

Career Fire Fighter/Paramedic Dies from Injuries Following an Unexpected Ceiling Collapse
California: February 16, 2011

Contributing Factors

- Interior gas-burning fire place not installed and constructed to applicable building and fire codes
- Unique ceiling construction with large void space allowed fire to burn freely and undetected for unknown period of time deteriorating ceiling support members
- Sprinkler system unable to control the fire
- Difficulty in getting water on the seat of the fire
- Unexpected ceiling collapse

Key Recommendations

- Be aware of potential hazards associated with ceiling and roof structural elements that have been exposed to fire or other factors for an extended period of time and acknowledge the potential for a collapse within a structure
- Familiarize and train personnel on unique structures within their jurisdiction (e.g., hazards associated with hillside construction, building design, and modern interior construction)
- Homeowners, contractors, and governing municipalities should ensure compliance with current building and fire codes within their jurisdiction



F2011-02

Volunteer Fire Fighter Caught in a Rapid Fire Event during Unprotected Search, Dies After Facepiece Lens Melts
Maryland: January 19, 20 11

Contributing Factors

- Incident Management System
- Personnel Accountability System
- Rapid Intervention Crews
- Conducting a search without a means of egress protected by a hoseline
- Tactical consideration for coordinating advancing hoselines from opposite directions
- Building safety features, e.g., no sprinkler systems, modifications limiting automatic door closing
- Occupant behavior-leaving sliding glass door open
- Ineffective ventilation

Key Recommendations

- Ensure the first-due arriving officer maintains the role of Incident Commander or transfers “Command” to the next arriving officer
- Ensure that a first-due company officer establishes command, maintains the role of director of fireground operations, does not become involved in fire-fighting operations, and ensures incident command is effectively transferred
- Fire departments should ensure that a separate Incident Safety Officer, independent from the Incident Commander, is appointed at each structure fire
- Ensure fire fighters are trained in the procedures of searching above the fire and are protected by a hoseline
- Ensure that interior search crews’ means of egress are protected by a staffed hoseline
- Ensure that a rapid intervention team or crew is established and available to immediately respond to emergency rescue incidents

F2010-38

Two Career Fire Fighters Die and 19 Injured in Roof Collapse during Rubbish Fire at an Abandoned Commercial Structure

Illinois: December 22, 2010

Contributing Factors

- Lack of a vacant / hazardous building marking program within the city
- Vacant / hazardous building information not part of automatic dispatch system
- Dilapidated condition of the structure
- Dispatch occurred during shift change resulting in fragmented crews
- Weather conditions including snow accumulation on roof and frozen water hydrants
- Not all fire fighters equipped with radios

Key Recommendations

- Identify and mark buildings that present hazards to fire fighters and the public
- Use risk management principles at all structure fires and especially abandoned or vacant unsecured structures
- Train fire fighters to communicate interior conditions to the Incident Commander as soon as possible and to provide regular updates
- Provide battalion chiefs with a staff assistant or chief's aide to help manage information and communication
- Provide all fire fighters with radios and train them on their proper use
- Develop, train on, and enforce the use of standard operating procedures that specifically address operations in abandoned and vacant structures

F2010-30

Seven Career Fire Fighters Injured at a Metal Recycling Facility Fire

California: July 13, 2010

Contributing Factors

- Unknown building contents



- Unrecognized presence of combustible metals
- Use of traditional fire suppression tactics
- Darkness

Key Recommendations

- Ensure that pre-incident plans are updated and available to responding fire crews
- Ensure that fire fighters are rigorously trained in combustible metal fire recognition and tactics
- Ensure that policies are updated for the proper handling of fires involving combustible metals
- Ensure that first arriving personnel and fire officers look for occupancy hazard placards on commercial structures during size-up
- Ensure that all fire fighters communicate fireground observations to incident command
- Ensure that fire fighters wear all personal protective equipment when operating in an immediately dangerous to life and health environment
- Ensure that an Incident Safety Officer is dispatched on the first alarm of commercial structure fires
- Ensure that collapse/hazards zones are established on the fireground

F2010-20

Lieutenant Suffers Sudden Cardiac Death after Structure Fire

Florida: March 26, 2010

- Modify the fire department's policy for conducting member exercise stress tests
- Phase in a comprehensive wellness and fitness program for fire fighters
- Ensure fire fighters are cleared for return to duty by a healthcare provider knowledgeable about the physical demands of fire fighting, the personal protective equipment used by fire fighters, and the various components of National Fire Protection Association (NFPA) 1582
- Perform an annual physical performance (physical ability) evaluation for all members
- Discontinue lumbar spine x-rays as a screening test administered during the pre-placement medical evaluation

F2010-18

A Career Lieutenant and a Career Fire Fighter Found Unresponsive at a Residential Structure Fire
Connecticut: July 24, 2010

Contributing Factors

- Failure to effectively monitor and respond to Mayday transmissions
- Less than effective Mayday procedures and training
- Inadequate air management
- Removal and/or dislodgement of self-contained breathing apparatus (SCBA) facepiece
- Incident safety officer (ISO) and rapid intervention team (RIT) not readily available on scene
- Possible underlying medical condition(s) (coronary artery disease)
- Command, control, and accountability

Key Recommendations

- Ensure that radio transmissions are effectively monitored and quickly acted upon, especially when a Mayday is called
- Ensure that Mayday training program(s) and department procedures adequately prepare fire fighters to call a Mayday
- Train fire fighters in air management techniques to ensure they receive the maximum benefit from their SCBA
- Ensure that fire fighters use their SCBA during all stages of a fire and are trained in SCBA emergency procedures
- Ensure that a separate incident safety officer (ISO), independent from the incident commander, is appointed at each structure fire with the initial dispatch
- Ensure that a rapid intervention team (RIT) is readily available and prepared to respond to fire fighter emergencies
- Consider adopting a comprehensive wellness and fitness program, provide annual medical evaluations consistent with NFPA standards, and perform annual physical performance (physical ability) evaluations for all fire fighters



F2010-16

Volunteer Captain Runs Low on Air, Becomes Disoriented, and Dies While Attempting to Exit a Large Commercial Structure

Texas: July 3, 2010

Contributing Factors

- Lack of scene management and risk analysis
- Inadequate water supply
- Apparatus specifications and equipment
- Ineffective tactics
- Ineffective communications
- Inefficient training concerns
- Rapid intervention team (RIT) not established
- Structure built with little or no protection against fire growth

Key Recommendations

- Ensure that the incident commander conducts an initial size-up and risk assessment of the incident scene before beginning interior fire fighting operations and continually evaluates the conditions to determine if operations should become defensive
- Train fire fighters to communicate interior and exterior conditions to the incident commander as soon as possible and to provide regular updates
- Ensure that an adequate water supply is established and maintained
- Conduct pre-incident planning inspections of buildings to facilitate development of safe fireground strategies and tactics

F2010-14

Volunteer Assistant Fire Chief Dies at a Silo Fire/Explosion

New York: April 11, 2010

Contributing Factors

- Unrecognized hazards associated with a silo fire

- Closing and securing the hatches on top of the silo

Key Recommendations

- Review, revise, and enforce standard operating guidelines (SOGs) for structural fire fighting that include oxygen-limiting silos
- Train officers and fire fighters on the hazards associated with different types of silos and the appropriate fire fighting tactics
- Ensure that pre-emergency planning is completed for all types of silos located within fire department jurisdictions
- Consider requiring that placards with hazard warnings and appropriate fire fighting guidelines be placed on silos
- Consider silos as confined spaces and recognize the dangers associated with confined spaces when responding to silo fires
- Ensure that an Incident Safety Officer is deployed at technical or complex operations

F2010-13

Career Fire Fighter Dies While Conducting a Search in a Residential House Fire
Kansas: May 22, 2010

Contributing Factors

- Fire fighter became ill causing a self-contained breathing apparatus emergency and a separation from his captain
- The location of the victim was not immediately known
- Fire growth contributed heavy smoke, zero visibility and heat conditions

Key Recommendations

- Develop, implement, and train on a procedure that addresses what to do if the self-contained breathing apparatus becomes inoperable due to a clogged nose cup, such as with vomitus
- Ensure that fire fighters are trained on primary search and rescue procedures which include maintaining crew integrity, entering structures with charged hoselines, and following hoselines in low visibility
- Ensure that fire fighters are trained and retrained on Mayday competencies
- Ensure that staffing levels are appropriate to perform critical tasks



Additionally, state and local governments should:

- Adopt and enforce requirements for automatic fire sprinkler protection in new buildings

F2010-10

One Career Fire Fighter/Paramedic Dies and a Part-time Fire Fighter/Paramedic is Injured When Caught in a Residential Structure Flashover

Illinois: March 30, 2010

Contributing Factors

- Well involved fire with entrapped civilian upon arrival
- Incomplete 360 degree situational size-up
- Inadequate risk-versus-gain analysis
- Ineffective fire control tactics
- Failure to recognize, understand, and react to deteriorating conditions
- Uncoordinated ventilation and its effect on fire behavior
- Removal of self-contained breathing apparatus (SCBA) facepiece
- Inadequate command, control, and accountability
- Insufficient staffing

Key Recommendations

- Ensure that a complete 360 degree situational size-up is conducted on dwelling fires and others where it is physically possible and ensure that a risk-versus-gain analysis and a survivability profile for trapped occupants is conducted prior to committing to interior fire fighting operations
- Ensure that interior fire suppression crews attack the fire effectively to include appropriate fire flow for the given fire load and structure, use of fire streams, appropriate hose and nozzle selection, and adequate personnel to operate the hoseline
- Ensure that fire fighters maintain crew integrity when operating on the fireground, especially when performing interior fire suppression activities
- Ensure that fire fighters and officers have a sound understanding of fire behavior and the ability to recognize indicators of fire development and the potential for extreme fire behavior
- Ensure that incident commanders and fire fighters understand the influence of ventilation on fire behavior and effectively coordinate ventilation with suppression techniques to release smoke and heat

- Ensure that fire fighters use their self-contained breathing apparatus (SCBA) and are trained in SCBA emergency procedures

F2009-31

One Fire Fighter Killed and Eight Fire Fighters Injured in a Dumpster Explosion at a Foundry
Wisconsin: December 2009

Contributing Factors

- Wet extinguishing agent applied to a combustible metal fire
- Lack of hazardous materials awareness training
- No documented site pre-plan
- Insufficient scene size-up and risk assessment
- Inadequate disposal/storage of materials

Key Recommendations

- Ensure that high risk sites such as foundries, mills, processing plants, etc. are pre-planned by conducting a walk through by all possible responding fire departments and that the plan is updated annually
- Ensure that specialized training is acquired for high risk sites with unique hazards, such as combustible metals
- Ensure that standard operating guidelines are developed, implemented and enforced
- Ensure a proper scene size-up and risk assessment when responding to high risk occupancies such as foundries, mills, processing plants, etc.
- Ensure a documented junior fire fighter program that addresses junior fire fighters being outside the hazard zone

Additionally, manufacturing facilities that use combustible metals should:

- Implement measures such as a limited access disposal site and container labeling to control risks to emergency responders from waste fires
- Implement a bulk dry extinguishing agent storage and delivery system for the fire department
- Establish a specially trained fire brigade



F2009-23

Career Lieutenant Dies Following Floor Collapse into Basement Fire and a Career Fire Fighter Dies Attempting to Rescue the Career Lieutenant

New York: August 24, 2009

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

- Ensure that all personnel are aware of the dangers of working above a fire, especially a basement fire, and develop, implement, and enforce a standard operating procedure (SOP) that addresses strategies and tactics for this type of fire
- Ensure that the incident commander (IC) receives interior status reports and performs/continues evaluating risk-versus-gain
- Ensure that crew integrity is maintained at all times on the fireground
- Ensure that the incident commander (IC) receives accurate personnel accountability reports (PAR) so that he can account for all personnel operating at an incident
- Ensure that a separate incident safety officer, independent from the incident commander, is appointed at each structure fire
- Ensure that fire fighters use their self-contained breathing apparatus (SCBA) and are trained in SCBA emergency procedures

Additionally, manufacturers, equipment designers, and researchers should:

- Conduct research into refining existing and developing new technologies to track the movement of fire fighters inside structures
- Continue to develop and refine durable, easy-to-use radio systems to enhance verbal and radio communication in conjunction with properly worn self-contained breathing apparatus (SCBA)

F2009-21

Career Fire Fighter Seriously Injured from Collapse of Bowstring Truss Roof

California: May 21, 2009

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

- Ensure that they have consistent policies and training on an incident management system
- Develop, implement and enforce written standard operating procedures (SOPs) that identify incident management training standards and requirements for members expected to serve in command roles
- Ensure that the incident commander conducts an initial size-up and risk assessment of the incident scene before beginning fire fighting operations

APPENDIX C

- Ensure that the first due company officer establishes a stationary command post, maintains the role of director of fireground operations, and does not become involved in firefighting efforts
- Implement and enforce written standard operating procedures (SOPs) that define a defensive strategy
- Ensure that policies are followed to establish and monitor a collapse zone when conditions indicate the potential for structural collapse
- Train all fire fighting personnel on building construction and the risks and hazards related to structural collapse
- Conduct pre-incident planning inspections of buildings within their jurisdictions to facilitate development of safe fireground strategies and tactics

F2009-11

Career Probationary Fire Fighter and Captain Die as a Result of Rapid Fire Progression in a Wind-Driven Residential Structure Fire
Texas: April 12, 2009

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

- Ensure that an adequate initial size-up and risk assessment of the incident scene is conducted before beginning interior fire fighting operations
- Ensure that fire fighters and officers have a sound understanding of fire behavior and the ability to recognize indicators of fire development and the potential for extreme fire behavior (such as smoke color, velocity, density, visible fire, heat)
- Ensure that fire fighters are trained to recognize the potential impact of windy conditions on fire behavior and implement appropriate tactics to mitigate the potential hazards of wind-driven fire
- Ensure that fire fighters understand the influence of ventilation on fire behavior and effectively apply ventilation and fire control tactics in a coordinated manner
- Ensure that fire fighters and officers understand the capabilities and limitations of thermal imaging cameras (TIC) and that a TIC is used as part of the size-up process
- Ensure that fire fighters are trained to check for fire in overhead voids upon entry and as charged hoselines are advanced
- Develop, implement and enforce a detailed Mayday Doctrine to insure that fire fighters can effectively declare a Mayday
- Ensure fire fighters are trained in fireground survival procedures
- Ensure all fire fighters on the fire ground are equipped with radios capable of communicating with the Incident Commander and Dispatch



Additionally, research and standard setting organizations should:

- Conduct research to more fully characterize the thermal performance of self-contained breathing apparatus (SCBA) facepiece lens materials and other personal protective equipment (PPE) components to ensure SCBA and PPE provide an appropriate level of protection

Although there is no evidence that the following recommendation could have specifically prevented the fatalities, NIOSH investigators recommend that fire departments:

- Ensure that all fire fighters recognize the capabilities and limitations of their personal protective equipment when operating in high temperature environments

F2009-07

Volunteer Lieutenant and a Fire Fighter Die While Combating a Mobile Home Fire
West Virginia: February 19, 2009

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

- Ensure that fire fighters use their self-contained breathing apparatus (SCBA) during all stages of a fire due to the potential exposure and health affects of fire-produced toxins
- Ensure that all SCBAs are equipped with an integrated personal alert safety system (PASS) device
- Ensure that all fire fighters are equipped with a means to communicate with fireground personnel before entering a structure fire
- Ensure that the incident commander (IC) does not become involved with fire fighting activities
- Ensure that the incident commander (IC) maintains close accountability for all personnel operating on the fireground and that procedures and training for the use of a personnel accountability report (PAR) are in place
- Ensure that a properly trained incident safety officer (ISO) is appointed at all structure fires
- Ensure that a rapid intervention team (RIT) is established and available to immediately respond to emergency rescue incidents
- Ensure that hoseline operations are properly coordinated so as not to impede search-and-rescue operations
- Develop, implement, and enforce written standard operating procedures (SOPs) for fireground operations
- Ensure that all fire fighters properly wear their department-issued turnout gear and personal protective equipment (PPE) during fire suppression activities
- Develop and maintain a comprehensive respiratory protection program
- Ensure that fire fighters are aware of the dangers involved in fighting mobile home fires

APPENDIX C

- Ensure that policies and procedures for proper inspection, use, and maintenance of self-contained breathing apparatus (SCBA) are implemented to ensure they function properly when needed

F2008-37

Career Fire Fighter Dies After Being Trapped in a Roof Collapse During Overhaul of a Vacant/Abandoned Building
Michigan: November 15, 2008

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

- Ensure that the incident commander conducts a risk-versus-gain analysis prior to committing to interior operations in vacant/abandoned structures and continues the assessment throughout the operations
- Ensure SOPs are developed for fighting fires in vacant/abandoned buildings
- Ensure that the incident commander maintains close accountability for all personnel operating on the fireground
- Ensure that a separate incident safety officer, independent from the incident commander, is appointed at each structure fire
- Ensure that a respiratory protection program is in place to provide for the selection, care, maintenance, and use of respiratory protection equipment, including PASS devices

Additionally, municipalities and local authorities having jurisdiction should:

- Develop strategies for the prevention of and the remediation of vacant/abandoned structures and for arson prevention

Although there is no evidence that the following recommendations could have prevented this fatality, NIOSH investigators recommend that fire departments:

- Ensure that an EMS unit is on scene and available for fire fighter emergency care at working structure fires
- Develop inspection criteria to ensure that all protective ensembles meet the requirements of NFPA 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting
- Be aware of programs that provide assistance in obtaining alternative funding, such as grant funding, to replace or purchase fire equipment that can support critical fire department operations



F2008-34

Volunteer Fire Fighter Dies While Lost in Residential Structure Fire

Alabama: October 29, 2008

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

- Ensure that fire fighters receive essential training consistent with national consensus standards on structural fire fighting before being allowed to operate at a fire incident
- Develop, implement, and enforce written standard operating procedures (SOPs) for fireground operations
- Ensure that fire fighters are trained to follow the two-in/two-out rule and maintain crew integrity at all times
- Ensure that adequate numbers of apparatus and fire fighters are on scene before initiating an offensive fire attack in a structure fire
- Ensure that officers and fire fighters know how to evaluate risk versus gain and perform a thorough scene size-up before initiating interior strategies and tactics
- Develop, implement, and enforce a written incident management system to be followed at all emergency incident operations and ensure that officers and fire fighters are trained on how to implement the incident management system
- Ensure fire fighters are trained in essential self-contained breathing apparatus (SCBA) and emergency survival skills
- Ensure that protocols are developed on issuing a Mayday so that fire fighters and dispatch centers know how to respond
- Ensure that a properly trained incident safety officer (ISO) is established at structure fires
- Ensure that a rapid intervention team (RIT) is established and available at structure fires
- Ensure that properly coordinated ventilation is conducted on structure fires
- Ensure that driver/pump operators receive adequate training to operate and maintain a water supply to hoselines on the fireground
- Ensure that all fire fighters engaged in fireground activities wear the full array of personal protective equipment (PPE) issued to them
- Ensure that fire fighters are trained to react to PASS and SCBA low air alarms, and that procedures are developed to properly shut down and secure a SCBA and its PASS device

Additionally, states, municipalities, and authorities having jurisdiction

- Should consider requiring mandatory training for fire fighters

F2008-26

A Volunteer Mutual Aid Fire Fighter Dies in a Floor Collapse in a Residential Basement Fire

Illinois: July 22, 2008

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

- Ensure that the incident commander (IC) conducts a 360 degree size-up which includes risk-versus-gain analysis prior to committing interior operations and continues risk assessments throughout the operations
- Ensure that standard operating procedures are established for a basement fire
- Ensure that proper ventilation is done to improve interior conditions and is coordinated with the interior attack
- Ensure that interior crews are equipped with a thermal imaging camera
- Ensure that Rapid Intervention Teams are staged and ready

F2008-21

Volunteer Fire Chief Killed when Buried by Brick Parapet Wall Collapse

Texas: July 5, 2008

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

- Ensure the Incident Commander conducts a complete 360-degree size-up of the incident scene including evaluating the potential for structural collapse
- Establish and monitor a collapse zone when conditions indicate the potential for structural collapse
- Train all fire fighting personnel in the risks and hazards related to structural collapse
- Ensure that the Incident Commander maintains the role of director of fireground operations and does not become involved in fire fighting efforts
- Ensure that the Incident Commander conducts an initial size-up and risk assessment of the incident scene before beginning fire fighting operations and continuously re-evaluates the situation
- Ensure that adequate numbers of staff are available to effectively respond to emergency incidents
- Ensure that tactical operations are coordinated and communicated to everyone on the fireground
- Ensure that every fire fighter on the fireground has a portable radio with sufficient tactical frequencies to effectively communicate on the fireground
- Ensure that a separate Incident Safety Officer, independent from the Incident Commander, is appointed at each structure fire



While the following recommendations may not have prevented the death of the fire chief, fire departments should:

- Develop, implement and enforce standard operating procedures (SOPs) or standard operating guidelines (SOGs) covering all aspects of structural fire fighting
- Be prepared to use alternative water supplies to ensure adequate water is available for fire suppression

F2008-09

A Career Captain and a Part-time Fire Fighter Die in a Residential Floor Collapse

Ohio: April 4, 2008

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

- Ensure that standard operating procedures (SOPs) for a 360-degree size-up are followed
- Ensure that fire fighters are sufficiently trained in survival skills
- Develop SOPs and train on the specific hazards of fighting basement fires to include ingress/egress points, flashover, and structure collapse
- Ensure that radio operability guidelines follow best practices recommended by the International Association of Fire Chiefs
- Ensure that thermal imaging cameras (TICs) are used to help assess interior conditions and potential structural damage
- Ensure that SOPs for offensive operations are followed, such as, cutting utilities to the fire structure

Although there is no evidence that the following recommendations would have prevented these deaths, they are being provided as a reminder of good safety practices:

- Ensure that interior attack crews advance with a charged hoseline
- Consider dispatch information regarding the call, such as fire location and if the building's occupants have exited the structure

Additionally, first responder radio manufacturers, research/design facilities and standard setting bodies should continue research and efforts to:

- Improve radio system capabilities
- Refine existing and develop new technology to track the movement of fire fighters inside structures

F2008-08

Volunteer Fire Lieutenant Killed While Fighting a Basement Fire
Pennsylvania: March 5, 2008

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

- Review, revise as necessary, and enforce standard operating guidelines (SOGs) to include specific procedures for basement fires and two-in/ two-out procedures
- Ensure that team continuity is maintained with two or more fire fighters per team
- Ensure that the Incident Commander continuously evaluates the risks versus gain when determining whether the fire suppression operation will be offensive or defensive
- Enforce standard operating guidelines (SOGs) regarding thermal imaging camera (TIC) use during interior operations
- Ensure that a separate Incident Safety Officer, independent from the Incident Commander, is appointed and utilized when incidents escalate in size and complexity
- Ensure that a backup hose line is pulled and in place prior to entry into fire-involved structures
- Ensure that all fire fighters have portable radios and they are operable in the fireground environment
- Ensure that fire fighters are trained on initiating Mayday radio transmissions immediately when they are in distress, and/or become lost or trapped

While the following recommendation may not have prevented the death of the fire lieutenant, fire departments should:

- Ensure periodic mutual aid training is conducted

F2008-07

Two Career Fire Fighters Die and Captain is Burned When Trapped during Fire Suppression Operations at a Millwork Facility
North Carolina: March 7, 2008

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

- Ensure that detailed pre-incident plan information is collected and available when needed, especially in high risk structures
- Limit interior offensive operations in well-involved structures that are not equipped with sprinkler systems and where there are no known civilians in need of rescue



- Develop, implement, and enforce clear procedures for operational modes. Changes in modes must be coordinated between the Incident Command, the command staff and fire fighters
- Ensure that Rapid Intervention Crews (RIC) / Rapid Intervention Teams (RIT) have at least one charged hose line in place before entering hazardous environments for rescue operations
- Ensure that the incident commander establishes the incident command post in an area that provides a good visual view of the fire building and enhances overall fireground communication
- Ensure that crew integrity is maintained during fire suppression operations
- Encourage local building code authorities to adopt code requirements for automatic protection (sprinkler) systems in buildings with heavy fire loads

Additionally, manufacturers, equipment designers, and researchers should:

- Continue to develop and refine durable, easy-to-use radio systems to enhance verbal and radio communication in conjunction with properly worn self-contained breathing apparatus (SCBA)
- Conduct research into refining existing and developing new technologies to track the movement of fire fighters inside structures

F2008-06

Volunteer Fire Fighter and Trapped Resident Die and a Volunteer Lieutenant is Injured following a Duplex Fire Pennsylvania: February 29, 2008

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

- Be prepared to use alternative water supplies during cold temperatures in areas where hydrants are prone to freezing
- Ensure that search and rescue crews advance or are protected with a charged hoseline
- Ensure fire fighters are trained in the tactics of a defensive search
- Ensure that fire fighters conducting an interior search have a thermal imaging camera
- Ensure ventilation is coordinated with interior fireground operations
- Ensure that Mayday protocols are developed and followed
- Ensure the Incident Commander receives pertinent information during the size-up (i.e., type of structure, number of occupants in the structure, etc.) from occupants on scene and that information is relayed to crews upon arrival
- Ensure that fire fighters communicate interior conditions and progress reports to the Incident Commander
- Develop, implement, and enforce written standard operating procedures (SOPs) for fireground operations

Additionally;

- Fire departments and municipalities should ensure that citizens are provided information on fire prevention and the need to report emergencies immediately
- Building owners and occupants should install smoke detectors and ensure that they are operating properly

F2008-03

Nine Fire Fighters from a Combination Department Injured in an Explosion at a Restaurant Fire
Colorado: February 22, 2008

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

- Ensure ventilation techniques are established and executed
- Conduct pre-incident planning and inspections of buildings within their jurisdictions to facilitate development of safe fireground strategies and tactics
- Ensure that standard operating procedures (SOPs) for offensive operations are followed, such as, cutting utilities and checking extension into void spaces
- Ensure that standard operating procedures (SOPs) for a 360-degree size-up are followed
- Ensure that staffing levels are sufficient to accomplish critical tasks
- Ensure that the incident commander has sufficient aides on the fireground and has a visual view of the fire building
- Ensure thermal imaging cameras are used to locate the seat of the fire and monitor fire growth

Although there is no evidence that the following recommendations would have prevented these injuries, they are being provided as a reminder of a good safety practice.

- Ensure that radios are operable in the fireground environment
- Ensure an adequate water supply is established
- Ensure that any offensive attack on a commercial structure is conducted using at least a 2½ hoseline
- Ensure that collapse zones are established when dealing with older commercial structures and worsening fire conditions
- Train on the specific hazards of fighting fires in modified structures to include ingress/egress points, flashover, and structural collapse
- Ensure training requirements are standardized across combination department personnel

In addition, municipalities should



- Establish and enforce building and inspection codes
- Identify/mark buildings on the C-side (rear) when buildings share common walls or are in very close proximity to each other to aid fire fighters in identifying the fire structure

F2007-37

Two Career Fire Fighters Die Following a Seven-Alarm Fire in a High-Rise Building Undergoing Simultaneous Deconstruction and Asbestos Abatement

New York: August 8, 2007

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

- Review and follow existing standard operating procedures on high-rise fire fighting to ensure that fire fighters are not operating in hazardous areas without the protection of a charged hoseline
- Be prepared to use alternative water supplies when a building's standpipe system is compromised or inoperable
- Develop and enforce risk management plans, policies, and standard operating guidelines for risk management during complex high-rise operations
- Ensure that crew integrity is maintained during high-rise fire suppression operations
- Train fire fighters on actions to take if they become trapped or disoriented inside a burning high-rise structure
- Ensure that fire fighters diligently wear their self-contained breathing apparatus (SCBA) when working in environments that are immediately dangerous to life and health (IDLH)
- Train fire fighters in air management techniques to ensure they receive the maximum benefit from their self-contained breathing apparatus (SCBA)
- Use exit locators (both visual and audible) or safety ropes to guide lost or disoriented fire fighters to the exit
- Conduct pre-incident planning inspections of buildings within their jurisdictions to facilitate development of safe fireground strategies and tactics
- Encourage building owners and occupants to report emergency situations as soon as possible and provide accurate information to the fire department
- Consider additional fire fighter training using a high-rise fire simulator

Manufacturers, equipment designers, and researchers should:

- Conduct research into refining existing and developing new technology to track the movement of fire fighters in high-rise structures

APPENDIX C

- Continue to develop and refine durable, easy-to-use radio systems to enhance verbal and radio communications in conjunction with properly worn self-contained breathing apparatus (SCBA)

Municipalities should:

- Ensure that construction and/or demolition is done in accordance with NFPA 241: Standard for Safeguarding Construction, Alteration, and Demolition Operations
- Develop a reporting system to inform the fire department of any ongoing, unique building construction activities (such as deconstruction or asbestos abatement) that would adversely affect a fire response
- Establish a system for property owners to notify the fire department when fire protection/suppression systems are taken out of service

F2007-35

4 Career Fire Fighters Injured While Providing Interior Exposure Protection at a Row House Fire
District of Columbia: October 29, 2007

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

- Ensure adequate size-up, including in exposure buildings, to reduce the risk of fire fighters being trapped
- Ensure that fire fighters are trained on the hazards of operating on the floor above the fire without a charged hoseline, and to follow associated standard operating guidelines (SOGs)
- Ensure ventilation is coordinated with the interior attack
- Provide fire fighters with station/work uniforms (e.g., pants and shirts) that are compliant with NFPA 1975 and ensure the use and proper care of these garments
- Ensure that fire fighters are trained on initiating Mayday radio transmissions immediately when they are in distress, and/or become lost or trapped

F2007-22

After Working Three Consecutive 24-Hour Shifts and Fighting an Extensive Structure, a 47-Year Old Career LT Suffers Sudden Cardiac Death During Physical Fitness Training
California: January 17-20, 2007

NIOSH investigators offer these recommendations to improve upon the FD's already comprehensive health and safety program.

- Use respiratory protection during the entire overhaul operation or until direct reading instruments measure levels of carbon monoxide below occupational exposure limits
- Limit the number of consecutive shifts a FF can work



- Consider using coronary artery disease (CAD) risk factors, rather than age alone, to determine the onset and frequency of exercise stress tests
- Discuss with local union representatives ways to increase participation in the FD's fitness program and how to improve the wellness program
- Perform an autopsy on all on-duty fire fighter fatalities

F2007-19

Career Fire Fighter Dies in Fall from Roof at Apartment Building Fire
New York: June 21, 2007

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

- Stress to fire fighters the importance of exercising caution when working at elevation
- Consider the location and placement of aerial ladders to prevent fire fighters from climbing from different elevations during fireground operations
- Consider the use of portable scissor ladders to facilitate access from an aerial ladder to the roof
- Ensure that fire fighters communicate any potential hazards to one another and ensure that team continuity is maintained during roof operations
- Evaluate the manner in which equipment is harnessed or carried by fire fighters to prevent loss of balance
- Consider reducing the amount of equipment that fire fighters must carry while climbing ladders

Manufacturers of fire service saws should:

- Consider ergonomic design principles to reduce the weight of ventilation saws
- Consider developing improved carrying slings

F2007-18

Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina:
June 18, 2007

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

- Develop, implement and enforce written standard operating procedures (SOPs) for an occupational safety and health program in accordance with NFPA 1500
- Develop, implement, and enforce a written Incident Management System to be followed at all emergency incident operations

APPENDIX C

- Develop, implement, and enforce written SOPs that identify incident management training standards and requirements for members expected to serve in command roles
- Ensure that the Incident Commander is clearly identified as the only individual with overall authority and responsibility for management of all activities at an incident
- Ensure that the Incident Commander conducts an initial size-up and risk assessment of the incident scene before beginning interior fire fighting operations
- Train fire fighters to communicate interior conditions to the Incident Commander as soon as possible and to provide regular updates
- Ensure that the Incident Commander establishes a stationary command post, maintains the role of director of fireground operations, and does not become involved in fire-fighting efforts
- Ensure the early implementation of division / group command into the Incident Command System
- Ensure that the Incident Commander continuously evaluates the risk versus gain when determining whether the fire suppression operation will be offensive or defensive
- Ensure that the Incident Commander maintains close accountability for all personnel operating on the fireground
- Ensure that a separate Incident Safety Officer, independent from the Incident Commander, is appointed at each structure fire
- Ensure that crew integrity is maintained during fire suppression operations
- Ensure that a rapid intervention crew (RIC) / rapid intervention team (RIT) is established and available to immediately respond to emergency rescue incidents
- Ensure that adequate numbers of staff are available to immediately respond to emergency incidents
- Ensure that ventilation to release heat and smoke is closely coordinated with interior fire suppression operations
- Conduct pre-incident planning inspections of buildings within their jurisdictions to facilitate development of safe fireground strategies and tactics
- Consider establishing and enforcing standardized resource deployment approaches and utilize dispatch entities to move resources to fill service gaps
- Develop and coordinate pre-incident planning protocols with mutual aid departments
- Ensure that any offensive attack is conducted using adequate fire streams based on characteristics of the structure and fuel load present
- Ensure that an adequate water supply is established and maintained



- Consider using exit locators such as high intensity floodlights or flashing strobe lights to guide lost or disoriented fire fighters to the exit
- Ensure that Mayday transmissions are received and prioritized by the Incident Commander
- Train fire fighters on actions to take if they become trapped or disoriented inside a burning structure
- Ensure that all fire fighters and line officers receive fundamental and annual refresher training according to NFPA 1001 and NFPA 1021
- Implement joint training on response protocols with mutual aid departments
- Ensure apparatus operators are properly trained and familiar with their apparatus
- Protect stretched hose lines from vehicular traffic and work with law enforcement or other appropriate agencies to provide traffic control
- Ensure that fire fighters wear a full array of turnout clothing and personal protective equipment appropriate for the assigned task while participating in fire suppression and overhaul activities
- Ensure that fire fighters are trained in air management techniques to ensure they receive the maximum benefit from their self-contained breathing apparatus (SCBA)
- Develop, implement and enforce written SOPS to ensure that SCBA cylinders are fully charged and ready for use
- Use thermal imaging cameras (TICs) during the initial size-up and search phases of a fire
- Develop, implement and enforce written SOPs and provide fire fighters with training on the hazards of truss construction
- Establish a system to facilitate the reporting of unsafe conditions or code violations to the appropriate authorities
- Ensure that fire fighters and emergency responders are provided with effective incident rehabilitation
- Provide fire fighters with station / work uniforms (e.g., pants and shirts) that are compliant with NFPA 1975 and ensure the use and proper care of these garments

Additionally, federal and state occupational safety and health administrations should:

- Consider developing additional regulations to improve the safety of fire fighters, including adopting National Fire Protection Association (NFPA) consensus standards

Additionally, manufacturers, equipment designers, and researchers should:

- Continue to develop and refine durable, easy-to-use radio systems to enhance verbal and radio communication in conjunction with properly worn SCBA
- Conduct research into refining existing and developing new technology to track the movement of fire fighters inside structures



APPENDIX C

Additionally, code setting organizations and municipalities should:

- Require the use of sprinkler systems in commercial structures, especially ones having high fuel loads and other unique life-safety hazards, and establish retroactive requirements for the installation of fire sprinkler systems when additions to commercial buildings increase the fire and life safety hazards
- Require the use of automatic ventilation systems in large commercial structures, especially ones having high fuel loads and other unique life-safety hazards

Additionally, municipalities and local authorities having jurisdiction should:

- Coordinate the collection of building information and the sharing of information between building authorities and fire departments
- Consider establishing one central dispatch center to coordinate and communicate activities involving units from multiple jurisdictions
- Ensure that fire departments responding to mutual aid incidents are equipped with mobile and portable communications equipment that are capable of handling the volume of radio traffic and allow communications among all responding companies within their jurisdiction

F2007-16

Career Fire Fighter Dies and Captain is Injured During a Civilian Rescue Attempt at a Residential Structure Fire
Georgia: May 28, 2007

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

- Ensure that their response to structure fires provides adequate numbers of staff and apparatus to immediately respond to emergency incidents and is in accordance with recommended guidelines
- Ensure that the first arriving fire unit conducts an initial size-up that includes as much information as possible to develop a quick initial plan for rescue and fire fighting strategy and tactics
- Ensure that fire fighters are trained in SCBA emergency procedures and fire fighter emergency communications
- Ensure that interior conditions are communicated to the Incident Commander (IC) on a regular and timely basis
- Ensure that an Incident Safety Officer (ISO) is established at structure fires
- Ensure that a Rapid Intervention Team (RIT) is established and available
- Ensure that the Incident Commander does not become directly involved in fire fighting efforts



- Ensure that the Incident Commander maintains close accountability for all personnel operating on the fireground and that procedures and training for the use of a personnel accountability report (PAR) are in place
- Ensure that all fire fighters wear a full array of turnout clothing and personal protective equipment (PPE) appropriate for the assigned task while participating in fire suppression and overhaul activities
- Ensure that department policies and procedures for proper inspection, use, and maintenance of self-contained breathing apparatus (SCBA) are followed to ensure they function properly when needed

Additionally, manufacturers, equipment designers, and researchers should:

- Continue to develop and refine durable, easy-to-use systems to enhance verbal and radio communication in conjunction with properly worn SCBA
- Continue to pursue emerging technologies for evaluating and monitoring the stability of buildings exposed to fireground conditions

Additionally, municipalities should:

- Take into consideration the impact community secession and annexation can have on emergency services response, and should ensure resources are provided to support an appropriate level of community service and responder safety

F2007-12

Career Fire Fighter Dies in Wind Driven Residential Structure Fire
Virginia: April 16, 2007

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

- Ensure that standard operating procedures (SOPs) for size-up and advancing a hoseline address the hazards of high winds and gusts
- Ensure that primary search and rescue crews either advance with a hoseline or follow an engine crew with a hoseline
- Ensure that staffing levels are sufficient to accomplish critical tasks
- Ensure that fire fighters are sufficiently trained in survival skills
- Ensure that Mayday protocols are reviewed, modified and followed
- Ensure that water supply is established and hoses laid out prior to crews entering the fire structure
- Ensure that fire fighters are trained for extreme conditions such as high winds and rapid fire progression associated with lightweight construction

Additionally, municipalities should:



APPENDIX C

- Ensure that dispatch collects and communicates information on occupancy and extreme environmental conditions

Although there is no evidence that the following recommendation could have specifically prevented this fatality, NIOSH investigators recommend that fire departments:

- Ensure that radios are operable in the fireground environment

F2007-08

Career Fire Fighter Dies When Trapped by Collapsed Canopy during a Two Alarm Attached Garage Fire
Pennsylvania: February 4, 2007

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

- Review and follow existing standard operating procedures (SOPs) for structural fire fighting to ensure that fire fighters follow a “2 in 2 out” policy
- Ensure that adequate numbers of staff are available to immediately respond to emergency incidents
- Establish a collapse zone when structures become unstable
- Ensure that the Incident Commander continuously evaluates the risks versus gain when determining whether the fire suppression operation will be offensive or defensive
- Ensure that the first arriving company officer does not become involved in the fire fighting effort after assuming the role of the Incident Commander
- Ensure that a thermal imaging camera is used during size-up
- Ensure that a separate Incident Safety Officer, independent from the Incident Commander, is appointed at each structural fire

F2007-07

Volunteer Fire Fighter Dies After Falling Through Floor Supported by Engineered Wooden-I Beams at Residential Structure Fire
Tennessee: January 26, 2007

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

- Use a thermal imaging camera (TIC) during the initial size-up and search phases of a fire
- Ensure fire fighters are trained to recognize the danger of operating above a fire and identify buildings constructed with trusses or engineered wood I-beams

Additionally, Municipalities and local authorities having jurisdiction should:



- Develop a questionnaire or checklist to obtain building information so that the information is readily available if an incident is reported at the noted address

Additionally, Building code officials and local authorities having jurisdiction should:

- Consider modifying the current codes to require that lightweight trusses are protected with a fire barrier on both the top and bottom

F2007-02

Career Fire Fighter Injured during Rapid Fire Progression in an Abandoned Structure Dies Six Days Later
Georgia: November 23, 2006

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

- Ensure that an initial size-up of the incident scene is conducted before beginning interior fire fighting operations
- Ensure that the first arriving company officer does not become involved in firefighting efforts when assuming the role of incident commander
- Ensure that a Rapid Intervention Team (RIT) is established and in position with a backup hoseline prior to initiating an interior attack
- Ensure that ventilation is closely coordinated with interior fire suppression operations
- Ensure that crew integrity and accountability are maintained during fire suppression operations
- Ensure that all fire fighters are equipped with a radio and trained on how to initiate emergency traffic
- Train fire fighters to recognize the conditions that forewarn of a flashover/flameover and communicate fire conditions to the incident commander as soon as possible
- Train fire fighters on actions to take if they become trapped or disoriented inside a burning structure
- Ensure that fire fighters serving as acting officers are adequately trained

Additionally,

- Fire departments, municipalities, and standard setting bodies such as the National Fire Protection Association (NFPA) should consider developing and implementing a system to identify and mark unoccupied, vacant or abandoned structures to improve fire fighter safety

F2007-01

Career Fire Fighter Dies and Chief is Injured When Struck by 130-Foot Awning that Collapses during a Commercial Building Fire
Texas: December 30, 2006

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

- Establish and monitor a collapse zone for structures that have become unstable due to fire damage
- Train all fire fighting personnel in the risks and hazards related to structural collapse
- Conduct pre-incident planning and inspections of buildings within their jurisdictions to facilitate development of safe fire ground strategies and tactics
- Ensure that adequate numbers of staff are available to immediately respond to emergency incidents
- Ensure that a separate Incident Safety Officer, independent from the Incident Commander, is appointed at each structural fire
- Ensure that the Incident Commander maintains the role of director of fireground operations and does not become involved in fire fighting efforts
- Ensure that switching from offensive to defensive operations are coordinated and communicated to everyone on the fireground
- Ensure that fire fighters wear a full array of turnout clothing and personal protective equipment (i.e. SCBA and PASS device) appropriate for the assigned task while participating in fire suppression and overhaul activities

Additionally, manufacturers, equipment designers, and researchers should:

- Continue to develop and refine durable, easy-to-use systems to enhance verbal and radio communication in conjunction with properly worn SCBA
- Continue to pursue emerging technologies for evaluating and monitoring the stability of buildings exposed to fireground conditions

F2006-28

Career Fire Fighter Dies in Residential Row House Structure Fire
Maryland: October 10, 2006

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

- Ensure that thermal imaging cameras (TIC) are used during initial size-up
- Ensure that ventilation is coordinated with the interior attack



- Ensure that tools such as door wedges are utilized to prevent water flow and escape problems
- Ensure that a Rapid Intervention Crew (RIC) is on scene prior to an attack crew entering a hazardous environment
- Ensure that department policies and procedures are followed

F2006-27

Floor Collapse at Commercial Structure Fire Claims the Lives of One Career Lieutenant and One Career Fire Fighter

New York: August 27, 2006

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

- Consider the possibility of a substandard structure when building information is not available from pre-incident plans
- Consider the live load of water on the structure and go defensive when water load potentially compromises the structural integrity

Additionally, municipalities should:

- Explore means of coordinating information sharing between building and fire departments to increase safety for fire fighters and civilians
- Consider conducting inspections on all commercial structures where a change of occupancy has occurred or renovations are known or suspected, giving special attention to non-sprinklered commercial retail structures

F2006-26

Career Engineer Dies and Fire Fighter Injured After Falling Through Floor While Conducting a Primary Search at a Residential Structure Fire

Wisconsin: August 13, 2006

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

- Conduct pre-incident planning and inspections of buildings within their jurisdictions to facilitate development of safe fire ground strategies and tactics
- Use a thermal imaging camera (TIC) during the initial size-up and search phases of a fire
- Ensure fire fighters are trained to recognize the danger of operating above a fire and identify buildings constructed with trusses

Additionally, building code officials and local authorities having jurisdiction should:



APPENDIX C

- Consider modifying the current building codes to require that lightweight trusses be protected with a fire barrier on both the top and bottom

F2006-24

Volunteer Deputy Fire Chief Dies after Falling Through Floor Hole in Residential Structure during Fire Attack
Indiana: June 25, 2006

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

- Ensure that fire fighters and incident commanders are aware that unprotected pre-engineered I-joist floor systems may fail at a faster rate than solid wood joists when exposed to direct fire impingement, and they should plan interior operations accordingly
- Ensure that the Incident Commander (IC) maintains the role of director of fireground operations and does not become directly involved in fire-fighting operations
- Ensure that risk vs. gain is evaluated during size-up prior to making entry in fire-involved structures
- Ensure that team continuity and accountability is maintained
- Ensure that a rapid intervention team (RIT) is on the scene as part of the first alarm and in position to provide immediate assistance prior to crews entering a hazardous environment
- Use defensive fire-fighting tactics when adequate staff (including command staff), apparatus and equipment for offensive operations are not available or when offensive operations are not practical
- Provide SCBA face pieces that are equipped with voice amplifiers for improved communications
- Establish standard operating procedures (SOPs) regarding thermal imaging camera (TIC) use during interior operations
- Train fire fighters on actions to take while waiting to be rescued if they become lost or trapped inside a structure
- Use positive pressure ventilation properly
- Ensure a back-up radio dispatch system is in place and available when needed

F2006-19

Career Lieutenant Dies in Residential Structure Fire
Colorado: May 14, 2006

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

- Ensure that team continuity is maintained



- Ensure that officers and fire fighters follow established standard operating guidelines regarding SCBA donning on the fireground

Although there is no evidence that the following recommendations could have specifically prevented this fatality, NIOSH investigators recommend that fire departments:

- Ensure that all fire fighters are trained on proper radio discipline and operation to communicate with the Incident Commander (IC)
- Ensure that the Incident Commander receives pertinent information (i.e., location of stairs, number of occupants in the structure, etc.) from occupants on scene and information is relayed to crews during size-up

F2006-09

Fire Fighter Dies After Performing Overhaul at a Fire in a Three-Story Dwelling
Pennsylvania: January 28, 2006

The NIOSH investigator offers the following recommendations to prevent similar incidents and to address general safety and health issues:

- Provide mandatory annual medical evaluations to all fire fighters consistent with the National Fire Protection Association (NFPA) Standard 1582, Standard on Comprehensive Occupational Medical Program for Fire Departments, to determine their medical ability to perform duties without presenting a significant risk to the safety and health of themselves or others
- Consider exercise stress tests for fire fighters at increased risk for coronary artery disease (CAD)
- Develop a wellness/fitness program for fire fighters to reduce risk factors for CVD and improve cardiovascular capacity
- Ensure endotracheal tubes do not become dislodged during patient treatment, transfer, and transport
- Discontinue routine pre-employment/pre-placement exercise stress test for applicants, unless the applicants are at increased risk for CAD
- Discontinue routine screening chest x-rays for HazMat units unless medically indicated
- Ensure fire fighters wear self-contained breathing apparatus (SCBA) when working in a potentially hazardous atmosphere, including overhaul operations

F2006-07

Two Volunteer Fire Fighters Die When Struck by Exterior Wall Collapse at a Commercial Building Fire Overhaul
Alabama: February 21, 2006

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

- Establish and monitor a collapse zone for structures that have become unstable due to fire damage
- Conduct pre-incident planning and inspections of buildings within their jurisdictions to facilitate development of safe fire ground strategies and tactics
- Develop, implement, and enforce written standard operating guidelines (SOGs) or standard operating procedures (SOPs) for all aspects of fire fighting operations
- Train all fire fighting personnel in the risks and hazards related to structural collapse
- Ensure that fire fighters wear a full array of turnout clothing and personal protective equipment (i.e. SCBA and PASS device) appropriate for the assigned tasks while participating in fire suppression and overhaul activities

Also, manufacturers, equipment designers, and researchers should:

- Continue to pursue emerging technologies for evaluating and monitoring the stability of buildings exposed to fireground conditions

F2006-03

Fire Fighter Suffers Sudden Cardiac Death During Fire Fighting Operations
California: November 5, 2005

NIOSH investigators offer the following recommendations to prevent similar incidents, and to address general safety and health issues:

- Provide annual medical evaluations consistent with National Fire Protection Association (NFPA) 1582 to ALL fire fighters to determine their medical ability to perform duties without presenting a significant risk to the safety and health of themselves or others
- Phase in a MANDATORY wellness/fitness program for fire fighters to reduce risk factors for cardiovascular disease and improve cardiovascular capacity
- Perform an annual physical performance (physical ability) evaluation to ensure fire fighters are physically capable of performing the essential job tasks of structural firefighting
- Institute incident scene rehabilitation (rehab) during working structural fires
- Provide a transport ambulance at the scene of working structural fires



- Discontinue lumbar spine x-rays as a screening test administered during the pre-placement medical evaluation

F2005-13

A Volunteer Fire Fighter and Volunteer Assistant Lieutenant Die After a Smoke Explosion at a Town House Complex

Wyoming: April 18, 2005

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

- Develop and enforce standard operating procedures (SOPs) for structural fire fighting that include, but are not limited to, the incident command system, accountability, ventilation, and emergency evacuation
- Ensure that the Incident Commander completes a size-up of the incident and continuously evaluates the risk versus benefit during the entire operation
- Ensure that adequate numbers of staff are available to immediately respond to emergency incidents
- Ensure that the Incident Commander maintains the role of director of fireground operations and does not become directly involved in firefighting operations
- Ensure that the Incident Commander is clearly identified as the only individual with overall authority for management of all activities at an incident
- Ensure that fire fighters are trained to identify truss roof systems and their potential hazards

F2005-09

Career Fire Captain Dies When Trapped by Partial Roof Collapse in a Vacant House Fire

Texas: February 19, 2005

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

- Ensure that the Incident Commander continuously evaluates the risk versus gain when determining whether the fire suppression operation will be offensive or defensive
- Train fire fighters to communicate interior conditions to the Incident Commander as soon as possible and to provide regular updates
- Use thermal imaging cameras (TIC) during initial size-up and search phases of a fire
- Ensure fire fighters open ceilings and overhead concealed spaces as hoselines are advanced
- Ensure that team continuity is maintained during fire suppression operations

APPENDIX C

- Consider using exit locators such as high intensity floodlights or flashing strobe lights to guide lost or disoriented fire fighters to the exit
- Train fire fighters on the actions to take while waiting to be rescued if they become trapped or disoriented inside a burning structure

Additionally, fire departments, municipalities and standard-setting bodies (such as the National Fire Protection Association (NFPA)) should:

- Consider developing and implementing a system to identify and mark dangerous and/or abandoned structures to improve fire fighter safety

Also, manufacturers, researchers, and designers as well as standard setting bodies (such as the NFPA) should:

- Consider ways to improve personal alert safety system (PASS) devices, radios, and other safety equipment to make them more effective in extreme fire conditions

F2005-07

Career Captain Electrocuted at the Scene of a Residential Structure Fire
California: February 13, 2005

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

- Establish, implement, and enforce standard operating procedures/guidelines (SOPs/SOGs) that address the safety of fire fighters when working near downed power lines
- Ensure that fire fighters maintain a safe distance from energized electrical hazards, such as downed power lines, until the conductor is de-energized
- Ensure that fire fighters are aware of the hazard when working around energized electrical conductors and provide barriers or alerting techniques, which are effective and distinguishable under the conditions, to prevent fire fighters from entering an identified danger zone
- Ensure that fire fighter training includes procedures for recognizing and dealing safely with electrical hazards on the fireground
- Ensure that all fireground safety broadcasts are acknowledged and repeated
- Ensure that team continuity is maintained on the fireground during fire suppression operations

Although there is no evidence that the following recommendations could have specifically prevented this fatality, NIOSH investigators recommend that fire departments:

- Ensure that a personnel accountability system is in place and that it includes provisions for, and training on, personnel accountability reporting (PAR) procedures



- Ensure that a clearly marked and monitored collapse zone is established once a defensive fire fighting strategy has been called and a structure has been identified at risk of collapsing

F2005-05

Career Captain Dies after Running Out of Air at a Residential Structure Fire
Michigan: January 20, 2005

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

- Enforce standard operating procedures (SOPs) for structural fire fighting, including the use of self-contained breathing apparatus (SCBA), ventilation, and radio communications
- Ensure that the Incident Commander completes a size-up of the incident and continuously evaluates the risk versus benefit when determining whether the operation will be offensive or defensive
- Ensure that adequate numbers of staff are available to immediately respond to emergency incidents
- Use defensive fire fighting tactics when adequate apparatus and equipment for offensive operations are not available
- Ensure that ventilation is closely coordinated with the fire attack
- Ensure that team continuity is maintained during fire suppression operations
- Ensure those fire fighters who enter hazardous areas, e.g., burning or suspected unsafe structures, are equipped with two-way communications with Incident Command
- Instruct fire fighters on the hazards of exposure to products of combustion such as carbon monoxide (CO) and warn them never to remove their face pieces in areas in which such products are likely to exist
- Ensure that a Rapid Intervention Team is in place before conditions become unsafe
- Use guidelines/ropes securely attached to permanent objects and/or a bright, narrow-beamed light at all entry portals to a structure to guide fire fighters during emergency egress
- Use evacuation signals when command personnel decide that all fire fighters should be evacuated from a burning building or other hazardous area
- Train fire fighters on actions to take while waiting to be rescued if they become lost or trapped inside a structure

Additionally,

- Municipalities should establish dispatch centers that are integrated with fire response functions

F2005-04

Career Fire Fighter Dies While Exiting Residential Basement Fire
New York: January 23, 2005

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

- Ensure that the first arriving officer or incident commander (IC) conducts a complete size-up of the incident scene
- Ensure that fire fighters conducting interior operations provide progress reports to the Incident Commander
- Establish standard operating procedures (SOPs) regarding thermal imaging camera (TIC) use during interior operations
- Ensure that MAYDAY procedures are followed and refresher training is provided annually or as needed
- Ensure that a rapid intervention team (RIT) is on the scene and in position to provide immediate assistance prior to crews entering a hazardous environment
- Educate homeowners on the importance of installing and maintaining smoke detectors on every level of their home and keeping combustible materials away from heat sources

Although there is no evidence that the following recommendation could have specifically prevented this fatality, NIOSH investigators recommend that fire departments should:

- Ensure that fire fighting teams check each other's personal protective equipment (PPE) for complete donning

F2005-03

Career Lieutenant and Career Fire Fighter Die and Four Career Fire Fighters are Seriously Injured during a Three Alarm Apartment Fire
New York: January 23, 2005

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

- Review and follow existing standard operating procedures (SOPs) for structural fire fighting to ensure that fire fighters operating in hazardous areas have charged hoselines
- Ensure that fire fighters are trained on the hazards of operating on the floor above the fire without a charged hoseline and follow associated standard operating procedures (SOPs)
- Ensure that fire fighters conducting interior operations provide the incident commander with progress reports
- Ensure that team continuity is maintained during interior operations



- Review and follow existing standard operating procedures (SOPs) for incident commanders to divide up functions during complex incidents
- Ensure that Mayday transmissions are prioritized and fire fighters are trained on initiating Mayday radio transmissions immediately when they become trapped inside a structure
- Develop standard operating procedures (SOPs) for firefighting operations during high wind conditions
- Provide fire fighters with the appropriate safety equipment, such as escape ropes, and associated training in jurisdictions where high-rise fires are likely

Additionally,

- Building owners should follow current building codes for the safety of occupants and fire fighters

F2005-02

One Probationary Career Firefighter Dies and Four Career Firefighters are Injured
at a Two - Alarm Residential Structure Fire
Texas: December 20, 2004

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

- Ensure that a complete size-up is conducted prior to making an offensive attack
- Ensure that risk vs. gain is evaluated prior to making entry in fire-involved structures
- Develop standard operating procedures (SOP's) for advancing a hose line in high-wind conditions
- Ensure that team continuity is maintained
- Ensure that a backup hose line is pulled and in place prior to entry into fire-involved structures
- Consider using a backup manual personal accountability safety system (PASS) device in combination with self-contained breathing apparatus (SCBA) equipped with integrated PASS devices
- Provide SCBA face pieces that are equipped with voice amplifiers for improved interior communications
- Ensure that hose lines are not pulled from the burning structure when it is possible that a missing firefighter is in the structure
- Train firefighters on initiating emergency traffic (Mayday-Mayday) and manually activating their PASS alarm when they become lost, disoriented, or trapped
- Instruct firefighters to not overcrowd the area of the interior attack team



F2004-37

Volunteer Chief Dies and Two Fire Fighters Are Injured by a Collapsing Church Facade
Tennessee: April 8, 2004

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

- Ensure that Incident Command (IC) continually evaluates the risk versus gain and establishes a strategic plan when deciding on an offensive or defensive fire attack
- Ensure that a collapse zone is established, clearly marked, and monitored at structure fires where there is a risk of collapse
- Use evacuation signals when command personnel decide that all fire fighters should be evacuated from a burning building or other hazardous area
- Ensure that protective clothing and protective equipment is used whenever fire fighters are exposed, or potentially exposed, to the hazards for which it is provided
- Establish and implement written standard operating guidelines (SOGs) regarding emergency operations on the fireground and ensure they are followed
- Develop pre-incident planning protocols and conduct joint training throughout mutual aid departments

Additionally, municipalities should:

- Consider requiring, and owners of commercial buildings should consider modifying, older structures to meet new building codes and standards to improve the safety of occupants and fire fighters

F2004-17

Career Battalion Chief and Career Master Fire Fighter Die and Twenty-Nine Career Fire Fighters are Injured during a Five Alarm Church Fire
Pennsylvania: March 13, 2004

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

- Ensure that an assessment of the stability and safety of the structure is conducted before entering fire and water-damaged structures for overhaul operations
- Establish and monitor a collapse zone to ensure that no activities take place within this area during overhaul operations
- Ensure that the Incident Commander establishes the command post outside of the collapse zone
- Train fire fighters to recognize conditions that forewarn of a backdraft
- Ensure consistent use of personal alert safety system (PASS) devices during overhaul operations



- Ensure that pre-incident planning is performed on structures containing unique features such as bell towers
- Ensure that Incident Commanders conduct a risk-versus-gain analysis prior to committing fire fighters to an interior operation, and continue to assess risk-versus-gain throughout the operation including overhaul
- Develop standard operating guidelines (SOGs) to assign additional safety officers during complex incidents
- Provide interior attack crews with thermal imaging cameras

Additionally,

- Municipalities should enforce current building codes to improve the safety of occupants and fire fighters

F2004-14

Career Fire Fighter Dies and Two Career Captains are Injured While Fighting Night Club Arson Fire
Texas: April 4, 2004

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

- Ensure that the first arriving officer conducts a complete size-up of the incident and evaluates the risk versus gain prior to committing crews to interior operations
- Ensure that fire fighters conducting interior operations provide progress reports to the Incident Commander
- Ensure that fire department standard operating procedures (SOPs) are followed regarding thermal imaging camera (TIC) use during interior operations
- Ensure that all fire fighters and line officers receive annual refresher training regarding structural fire fighting
- Establish and implement an orientation and training program for all newly appointed, promoted, or reassigned officers
- Consider ways to enhance the effectiveness of the personnel accountability system

F2004-10

Career Fire Fighter Dies Searching For Fire In A Restaurant/Lounge
Missouri: February 18, 2004

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

- Conduct pre-incident planning and inspections to facilitate development of a safe fire ground strategy



APPENDIX C

- Review, revise where appropriate, implement, and enforce written standard operating guidelines (SOGs) that specifically address: incident command (IC) duties, emergency evacuation procedures, personnel accountability, rapid intervention teams (RIT) and mutual aid operations on the fireground
- Train on the SOGs, the incident command system, and lost fire fighter procedures with mutual aid departments to establish interagency knowledge of equipment, procedures, and capabilities
- Ensure that the IC maintains the role of directing fireground operations for the duration of the incident or until the command role is formally passed to another individual
- Ensure that the IC conducts a risk-versus-gain analysis prior to committing fire fighters to the interior and continually assesses risk versus gain throughout the operations
- Consider appointing a separate, but systematically integrated incident safety officer
- Ensure that all fire fighters are equipped with radios capable of communicating with the IC
- Ensure personnel accountability reports (PAR) are conducted in an efficient, organized manner and results are reported directly to the IC
- Revise and enforce policies and guidelines regarding activation of personal alert safety systems (PASS) devices
- Ensure that fire fighters train with thermal imaging cameras (TIC) and they are aware of their proper use and limitations
- Ensure that individual fire fighters are trained and aware of the hazards of exposure to carbon monoxide and other toxic fire gases

F2004-05

Residential Basement Fire Claims the Life of Career Lieutenant
Pennsylvania: January 9, 2004

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

- Require, and all officers should enforce the requirement, that all fire fighters wear their SCBAs whenever there is a chance they might be exposed to a toxic or oxygen-deficient atmosphere, including during the initial assessment
- Ensure fire fighters are trained to recognize the danger of operating above a fire
- Ensure that team continuity is maintained with two or more fire fighters per team



SELF-EVALUATION TOOL: KEY LESSONS FROM THE COLUMBIA SHUTTLE DISASTER (ADAPTED TO THE PROCESS INDUSTRIES)

An “Organizational Culture” Question Set for Improving Operational Excellence in HSE Management

Developed by David Jones (Chevron), Walt Frank (ABS Consulting), Karen Tancredi (DuPont), and Mike Broadribb (BP).

Overview

“In our view, the NASA organizational culture had as much to do with this accident as the foam.” CAIB Report, Vol. 1, p. 97

On February 1, 2003, the Space Shuttle Columbia disintegrated during re-entry into the Earth’s atmosphere, killing all seven crewmembers aboard. The direct chain of events leading to the disaster had begun 16 days earlier when the Shuttle was launched. During ascent, 81 seconds after liftoff, a large chunk of insulating foam broke off of the external fuel tank, struck the Shuttle, and damaged critical thermal protection tiles. The tiles subsequently failed when exposed to the intense heat encountered when the shuttle re-entered the atmosphere during its return to Earth.

While the foam strike was discovered during the review of launch videos on the second day of the mission, Shuttle Program management could not be convinced that the event posed a hazard to the mission, the spacecraft, or the crew. Consequently, there was no formal effort put forward to confirm the integrity of the Columbia shuttle before its ill-fated return to Earth. Following the tragedy, the Columbia Accident Investigation Board (CAIB) was formed. After determining that insulating foam debris striking the wing was the most likely physical cause, the Board turned its attention to the organizational culture factors behind the failure. For the purpose of its investigation, the Board offered the following definition of organizational culture:

“Organizational culture refers to the basic values, norms, beliefs, and practices that characterize the functioning of a particular institution. At the most basic level, organizational culture defines the assumptions that employees make as they carry out their work; it defines “the way we do things here.” An organization’s culture is a powerful force that persists through reorganizations and the departure of key personnel.” CAIB Report, Vol. 1, p. 101

In pursuing the investigation beyond immediate causal contributors, the CAIB was trying to understand two issues in particular:

- Why was it that serious concerns about the integrity of Columbia, raised within one day of launch, were not acted upon in the two weeks available between launch and return? With little corroborating evidence, management had become convinced that a foam strike was not, and could not be, a concern.
- Which of the cultural patterns emerging from the Columbia accident were the same as those first identified after the Challenger tragedy (almost exactly 17 years earlier) and why were they still present?

Through its report, the CAIB has provided a service to all organizations that operate facilities handling hazardous materials or that engage in hazardous activities. Although NASA is a unique organization, with a focused mission,

the organizational cultural failures that led to the Columbia disaster have counterparts in any operation with a potential for significant incidents. Key organizational cultural themes emerging from the CAIB report include:

1. **Maintaining a Sense of Vulnerability.** Catastrophic incidents involving highly hazardous materials or activities occur so infrequently that most organizations never have the unfortunate, but educating, opportunity of experiencing one. Operating diligence and management effectiveness can be easily dulled by a sense of false security – leading to lapses in critical prevention systems. Eliminating serious incidents requires constant reminders of the vulnerabilities inherent in hazardous activities.
2. **Combating Normalization of Deviance.** When pre-established engineering or operational constraints are consciously violated, with no resulting negative consequences, an organizational mindset is encouraged that more easily sanctions future violations. This can occur despite well-established technical evidence, or knowledge of operational history, that suggests such violations are more likely to lead to a serious incident.
3. **Establishing an Imperative for Safety.** An organization that is focused on achieving its major goals can develop homogeneity of thought that often discourages critical input. In the case where valid safety concerns are ignored, the success of the enterprise can be put in jeopardy. The CAIB report makes a compelling argument for ensuring strong, independent “sanity” checks on the fundamental safety integrity of an operation.
4. **Performing Valid/Timely Hazard/Risk Assessments.** Without a complete understanding of risks, and the options available to mitigate them, management is hampered in making effective decisions. Organizations that do not actively engage in qualitative and quantitative “what can go wrong?” exercises, or that fail to act on recommendations generated by the risk assessments that are done, miss the opportunity to identify and manage their risks.
5. **Ensuring Open and Frank Communications.** A dysfunctional organizational culture can discourage honest communications, despite formal appearances to the contrary. This is done through established protocol, procedures, and norms that dictate the manner in which subordinates communicate with management, and the manner in which management receives and responds to the information. Barriers to lateral communications (e.g., between work groups) can also impede the free flow of safetycritical information.
6. **Learning and Advancing the Culture.** Organizations that do not internalize and apply the lessons gained from their mistakes relegate themselves to static, or even declining, levels of performance. Safety excellence requires the curiosity and determination necessary to be a learning, advancing culture.

Brief summaries of the above themes, taken from the Columbia report, are offered below. In addition, “question-sets for self-examination” are included as initial, high level guidance should facilities wish, as part of their Operational Excellence integration efforts, to begin identifying and correcting organizational cultural parallels, if any, that may exist between NASA and their own operations.



Maintaining a Sense of Vulnerability

“Let me assure you that, as of yesterday afternoon, the Shuttle was in excellent shape, mission objectives were being performed, and that there were no major debris system problems identified....”

Spoken by NASA official, following Columbia launch, and after a significant debris strike had been identified. CAIB Report, Vol. 1, p. 101

“The Shuttle has become a mature and reliable system ... about as safe as today’s technology will provide.”

Advisory Panel “Kraft Report,” March 1995. CAIB Report, Vol. 1, p. 108

In the 17 years since the Challenger incident, the perception that similar catastrophic events could occur had been diminished by the NASA organizational culture. Shuttle managers were relying heavily on recent past success as a justification for their actions. Specifically, new, unforeseen issues were not subject to thorough technical analysis. For example, the belief that foam strikes did not jeopardize the Shuttle arose from a limited observation that no disasters had resulted from previous foam impacts -- so therefore, no disasters were going to occur in the future. Past success, and incident-free operation do not guarantee future success. Only a continuous focus on the fundamentals of safety management will keep risks to a minimum.

Maintaining a Sense of Vulnerability – Question-Sets for Self-Examination

1. Could a serious incident occur today at one of our facilities, given the effectiveness of our current operating practices? When was the last serious close call or near miss? Do we believe that process safety management (PSM) or other compliance activities are guaranteed to prevent major incidents?
2. Are lessons from related industry disasters routinely discussed at all levels in the organization, with action taken where similar deficiencies have been identified in our operations?
3. Do risk analyses include an evaluation of credible major events? Are the frequencies of such events always determined to be “unlikely?” Have proposed safety improvements been rejected as “not necessary” because “nothing like this has ever happened?” Do risk analyses eliminate proposed safeguards under the banner of “double jeopardy?” (*“Double jeopardy” refers to a mindset, too common to process hazard analysis teams, that scenarios requiring two independent errors or failures need not be considered since they are “so unlikely to occur.”*)
4. Are critical alarms treated as operating indicators, or as near miss events when they are activated? Do we believe that existing safety systems will prevent all incidents?
5. Is the importance of preventive maintenance for safety critical equipment recognized, or is such work allowed to backlog? Are the consequences of failure of such equipment recognized and understood by all?
6. Are there situations where the benefits of taking a risk are perceived to outweigh the potential negative consequences? Are there times when procedures are deviated from in the belief that major outcomes will not be caused? What are these? Are risk takers tacitly rewarded for “successful” risk taking?

Combating Normalization of Deviance

“...Space Shuttle System, including the ground systems, shall be designed to preclude the shedding of ice and/or other debris from the Shuttle elements during pre launch and flight operations that would jeopardize the flight crew, vehicle, mission success, or would adversely impact turnaround operations.”

“...No debris shall emanate from the critical zone of the External Tank on the launch pad or during ascent except for such material which may result from normal thermal protection system recession due to ascent heating.”

*Ground System Specification Book – Shuttle Design Requirements
CAIB Report, Vol. 1, p. 122*

“Debris impact on port wing edge-appears to have originated at the External Tank forward bipod – foam? - if so, it shouldn’t be a problem”

Taken From Shuttle Managers Handover Notes on January 17, 2003. CAIB Report, Vol. 1, p. 142

Ham: “It would be a turnaround issue only?” McCormack: “Right.”

Minutes From Columbia Shuttle Management Meeting, January 24, 2003. CAIB Report, Vol. 1, p. 161

Having lost the sense of vulnerability, the organization succumbed to accepting events that were precluded in the original shuttle design basis. Over the 113 Shuttle missions flown, foam shedding and debris impacts had come to be accepted as routine and maintenance concerns only. Limited or no additional technical analyses were performed to determine the actual risks associated with this fundamental deviation from intended design. Each successful landing reinforced the organization’s belief to the point where foam shedding was “normalized.” As new evidence emerged suggesting that the Columbia foam strike was larger, and possibly more threatening, than earlier foam strikes, this information was quickly discounted by management. The “understanding” that foam strikes were insignificant was so ingrained in the organizational culture that even after the incident, the Space Shuttle Program Manager rejected the foam as a probable cause, stating that Shuttle managers were comfortable with their “previous risk assessments.”

It is significant that a similar “normalization of deviance” had played such a key role in the Challenger disaster seventeen years earlier. While the concept of “normalization of deviance” had been much discussed in the aftermath of the Challenger incident, the NASA culture had not been “cured” of this crucial weakness.

Combating Normalization of Deviance – Question-Sets for Self-Examination

1. Are there systems in operation where the documented engineering or operating design bases are knowingly exceeded, either episodically, or on a “routine” basis? Examples might include flare systems with inputs added beyond the design capacity, process piping or equipment operating at or above the design limits, or systems operated in a significantly different manner than initially intended.
2. Have the systems meeting the above criteria been subjected to thorough risk assessments? Did issues of concern emerge from the risk assessments? Were they addressed appropriately?



3. Have there been operating situations in the past where problems were solved by not following established procedures, or by exceeding design conditions? Does the organizational culture encourage or discourage “creative” solutions to operating problems that involve circumventing procedures?
4. Is it clear who is responsible for authorizing waivers from established procedures, policies, or design standards? Are the lines of authority for deviating from procedures clearly defined? Is there a formalized procedure for authorizing such deviations?
5. What action is taken, and at what level, when a willful, conscious, violation of an established procedure occurs? Is there a system to monitor deviations from procedures where safety is concerned? Can staff be counted on to strictly follow procedures when supervision is not around to monitor compliance?
6. Do we have management systems that are sufficiently discerning and robust to detect patterns of abnormal conditions or practices before they can become accepted as the norm?
7. Are we knowingly accepting practices or conditions that we would have deemed unacceptable 12 months ago? ... 24 months ago?

Establishing an Imperative for Safety

“When I ask for the budget to be cut, I’m told it’s going to impact safety on the Space Shuttle ... I think that’s a bunch of crap.”

Daniel S. Goldin, NASA Administrator 1994. CAIB Report, Vol. 1, p. 106

“...safety personnel were present but passive and did not serve as a channel for the voicing of concerns or dissenting views. Safety representatives ... were merely party to the analysis process and conclusions instead of an independent source of questions and challenges. Safety contractors... were only marginally aware of the debris strike analysis. One contractor did question the Debris Assessment Team safety representative about the analysis and was told that it was adequate. No additional inquiries were made. The highest-ranking safety representative at NASA headquarters deferred to Program managers when asked for an opinion on imaging of Columbia. The safety manager he spoke to also failed to follow up.”

CAIB Report, Vol. 1, p. 170

Whether or not the budget cuts to which Mr. Goldin was referring in the above quote would have actually impacted safety is irrelevant. The impact of such a statement on an organizational culture is significant -- especially when coming from a top official. People at all levels feel less compelled to bring up safety matters if they feel that top management is not interested. Others, at lower levels, begin to mimic the attitudes and opinions that they hear from above.

Over the years at NASA, the safety organization had degraded, and had ultimately been relegated to “rubber stamping” critical safety-related decisions, rather than providing an independent assessment, and strong voice, that would help ensure the management of risks. Most importantly, when safety staff expressed a concern about the safety of an operation, they were often put in the untenable position of having to prove that the operation was unsafe. This reversed the more traditional burden of proof, where engineers and managers are required to defend the safety of the operation.

During the Columbia flight this functional reversal (proving the incident will happen as opposed to proving it will not) extended to the engineering organization, which had concerns about the amount of damage caused by the foam impact. Imaging capabilities existed within the US government that could have provided photographic evidence of whether the shuttle wing had been damaged. Engineers were prohibited from obtaining such critical corroborating evidence of the actual damage because they could not prove that the damage existed... and they could not prove that the damage existed because they could not obtain the photographic evidence.

Establishing An Imperative For Safety – Question-Sets for Self-Examination

1. Is there a system in place that ensures an independent review of major safety-related decisions? Are reporting relationships such that impartial opinions can be rendered? Is there a “shoot the messenger” mentality with respect to dissenting views?
2. Who are the people independently monitoring important safety-related decisions? Are they technically qualified to make judgments on complex process system designs and operations? Are they able to credibly defend their judgments in the face of knowledgeable questioning? Do safety personnel find it intimidating to contradict the manager’s/leader’s strategy?
3. Has the role of safety been relegated to approving major decisions as fait accompli? Do production and protection compete on an equal footing when differences of opinion occur as to the safety of operations?
4. Has the staffing of key catastrophic incident prevention positions (process safety management) been shifted, over the years, from senior levels to positions further down the organization? Are there key positions currently vacant?
5. Does management encourage the development of safety and risk assessments? Are recommendations for safety improvements welcomed? Are costly recommendations, or those impacting schedule, seen as “career threatening” – if the person making the recommendations chooses to persistently advocate them?
6. Is auditing regarded as a negative or punitive enterprise? Are audits conducted by technically competent people? How frequently do audits return only a few minor findings? Is it generally anticipated that there will be “pushback” during the audit closeout meetings?

Performing Valid/ Timely Hazard/Risk Assessments

“A fundamental element of system safety is managing and controlling hazards. NASA’s only guidance on hazard analysis is outlined in the Methodology for Conduct of Space Shuttle Program Hazard Analysis, which merely lists tools available. Therefore, it is not surprising that hazard analysis processes are applied inconsistently across systems, subsystems, assemblies, and components.”

CAIB Report, Vol. 1, p. 188

“Any more activity today on the tile damage or are people just relegated to crossing their fingers and hoping for the best?” “I have not heard anything new. I’ll let you know if I do.”

Email Exchange Between Engineers, January 28, 2002. CAIB Report, Vol. 1, p. 165



The CAIB concluded that a lack of consistent, structured approaches for identifying hazards and assessing risks contributed to the faulty decision-making process at NASA. Many of the analyses that were performed contained subjective and qualitative judgments, using words like “believed” and “based on experience from previous flights this hazard is an Accepted Risk.” Further, many of the action items emerging from these studies were not addressed. As an example, 1000 infrastructure items identified in 2000 as “deplorable” and requiring attention were never fixed, due to a lack of funding.

Audits had repeatedly identified deficiencies in NASA’s problem and waiver tracking systems. Prior safety studies had identified 5396 hazards that could impact mission integrity. Of these, 4222 were ranked as “Criticality 1/1R,” meaning that they posed the potential for loss of crew and orbiter. However, associated safety requirements had been waived for 3233 of these 1/1R hazards and, at the time of the Columbia investigation, more than 36% of those waivers had not been reviewed in the previous 10 year period.

The failure of the risk assessment process is ultimately manifested in the Columbia incident. By the time the Shuttle had launched, there was still no clear technical, risk-based understanding of foam debris impacts to the spacecraft. The management had no solid information upon which to base their decisions. In lieu of proper risk assessments, most of identified concerns were simply labeled as “acceptable.”

Performing Valid/Timely Hazard/Risk Assessments – Question-Sets for Self-Examination

1. Are risk assessments performed consistently for engineering or operating changes that potentially introduce additional risks? Who decides if a risk assessment should be performed? What is the basis for not performing a risk assessment?
2. How are risks for low frequency – high consequence events judged? Is there a strong reliance on the observation that serious incidents have not occurred previously, so they are unlikely to occur in the future? What is the basis for deeming risks acceptable – particularly those associated with high consequence events?
3. Are the appropriate resources applied to the risk assessment process? Are senior level personnel, with appropriate technical expertise, enlisted for the risk assessment? Are the recommendations emerging from the risk assessments meaningful?
4. What are the bases for rejecting risk assessment recommendations?
 1. Subjective judgment, based upon previous experience and observation?
 2. Objective assessment, based upon technical analysis?
5. Are the risk assessment tools appropriate for the risks being assessed? Are qualitative or quantitative tools used to assess risks associated with low frequency – high consequence events? Are the tools deemed appropriate by recognized risk assessment professionals?
6. Do we have a system, with effective accountabilities, for ensuring that recommendations from risk assessments are implemented in a timely fashion, and that the actions taken achieve the intent of the original recommendation?

Ensuring Open and Frank Communications

“In my humble technical opinion, this is the wrong (and bordering on irresponsible) answer ... not to request additional imaging help from any outside source. I must emphasize (again) that severe enough damage ... combined with the heating and resulting damage to the underlying structure at the most critical location ... could present potentially grave hazards. The engineering team will admit it might not achieve definitive high confidence answers without additional images, but, without action to request help to clarify the damage visually, we will guarantee it will not ... Remember the NASA safety posters everywhere around stating, “If it’s not safe, say so?” Yes, it’s that serious.”

Memo to File – Shuttle Engineer, January 22, 2003. CAIB Report, Vol. 1, p. 157

The above memo was never sent. It expresses concern over the fact that NASA management had denied a request to obtain satellite photo images of the Shuttle wing damage. The imaging would likely have shown that potentially catastrophic damage had occurred. The CAIB’s report suggests a number of reasons why the true technical concerns of the engineers were never seriously considered and why accurate and truthful concerns, such as those expressed in the above memo, never left the filing system.

- The management had already settled on a uniform mindset that foam strikes were not a concern. Any communications to the contrary were either directly or subtly discouraged.
- An organizational culture had been established that did not encourage “bad news.” This was coupled with a NASA’s culture that emphasized “chain of command” communications. The overall effect was to either stifle communications completely, or, when important issues were communicated, to soften the content and message as the reports and presentations were elevated through the management chain.
- Engineering analysis was continually required to “prove the system is unsafe” rather than “prove the system is safe” – without any hard data available to support either position.
- The organizational culture encouraged 100% consensus. (The CAIB observed that a healthy safety organization is suspicious if there are no dissenting views). In this environment, general dissention was tacitly discouraged. Participants felt intimidated.

Despite these obstacles, and without encouragement (indeed, in the face of direct discouragement) engineers continued to work nights and weekends to gain a technical understanding of the foam damage. The organizational culture never allowed the strong, heartfelt, and accurate concerns of engineering personnel to surface in the management decisionmaking process.

Ensuring Open and Frank Communications – Question-Sets for Self-Examination

1. How does management encourage communications that contradict pre-determined thoughts or direction? How are contradictory communications discouraged? Is the bearer of “bad news” viewed as a hero, or “not a team player?”
2. Does the organizational culture require “chain of command” communications? Or is there a formalized process for communicating serious concerns directly to higher management? Is critical, safety-related news that circumvents official channels welcomed?



3. Do communications get altered, with the message softened, as they move up the management chain? Why does this happen? Is there a “bad news filter” along the communications chain?
4. Do management messages on the importance of safety get altered as they move down the management chain? Do management ideals get reinterpreted in the context of day-to-day production and schedule realities?
5. Are those bearing negative safety-related news required to “prove it is unsafe?”
6. Has the “intimidation” factor in communications been eliminated? Can anyone speak freely, to anyone else, about their honest safety concerns, without fear of career reprisals?
7. Does the culture prompt a “can do” or “we cannot fail” attitude that overrides a common-sense awareness of what is truly achievable, and stifles opinions to the contrary?

Learning and Advancing the Culture

“... the Board strongly believes that if these persistent, systemic flaws are not resolved, the scene is set for another accident.” CAIB commenting on their conclusion that the organizational deficiencies that caused Challenger had remained to cause Columbia.

CAIB Report, Vol. 1, p. 195

The parallels between the organizational culture deficiencies contributing to the Challenger incident and those contributing to the Columbia incident were frequent and compelling. For example:

- The integrity and potency of the safety oversight function had been allowed to again erode.
- An overly ambitious launch schedule (relative to the capabilities of the organization) was again imposing an undue influence on safety-related decision-making.
- NASA was once again relying on “past performance as a guarantee of future success.”
- Conditions and events totally inconsistent with NASA’s technical basis for mission safety were still being “normalized.”
- Rigid organizational and hierarchical policies were still preventing the free and effective communication of safety concerns. Rank and stature were once again trumping expertise.

NASA had not effectively drawn learnings from the Challenger incident, and its safety culture had not sufficiently advanced in the intervening 17 years. Implementing cultural change can be slow, hard work. It begins by leaders consistently modeling and reinforcing the attitudes and behaviors expected in the new culture. Results would suggest that this had not happened at NASA.

Learning and Advancing the Culture – Question-Sets for Self-Examination

1. Are corporate and site leaders aware of the essential features of a sound safety culture? Do they understand their personal responsibilities for fostering and sustaining the safety culture? Are they meeting these responsibilities?
2. Do leaders consistently model and support the attitudes and behaviors we expect of our culture? Do the workers?
3. Are we monitoring our operations closely enough to detect problems? How do we ensure the objectivity necessary to see those problems for what they are?
4. Do we have systems for reliably learning from our mistakes? Do we willingly and enthusiastically accept those learnings and apply them to improve our systems and procedures?
5. Where are we now vs where we hope to be with respect to our safety culture? Where do we want to be a year from now? ... two years from now? How do we plan to get here?
6. If we are comfortable with where we are now, how do we discriminate between comfort and complacency?

Intention and Limitations of the Question-Sets

The above question-sets summarize lessons from the Columbia incident only, and should not be automatically applied - as is - to other organizations. NASA's experience may or may not be wholly or directly applicable to the unique features of each organizational culture. The question sets are intended to serve only as a starting point in determining the relevancy of the Columbia experience. More importantly, by opening a dialog on this important issue, organizations may be able to further enhance ongoing cultural improvement efforts.

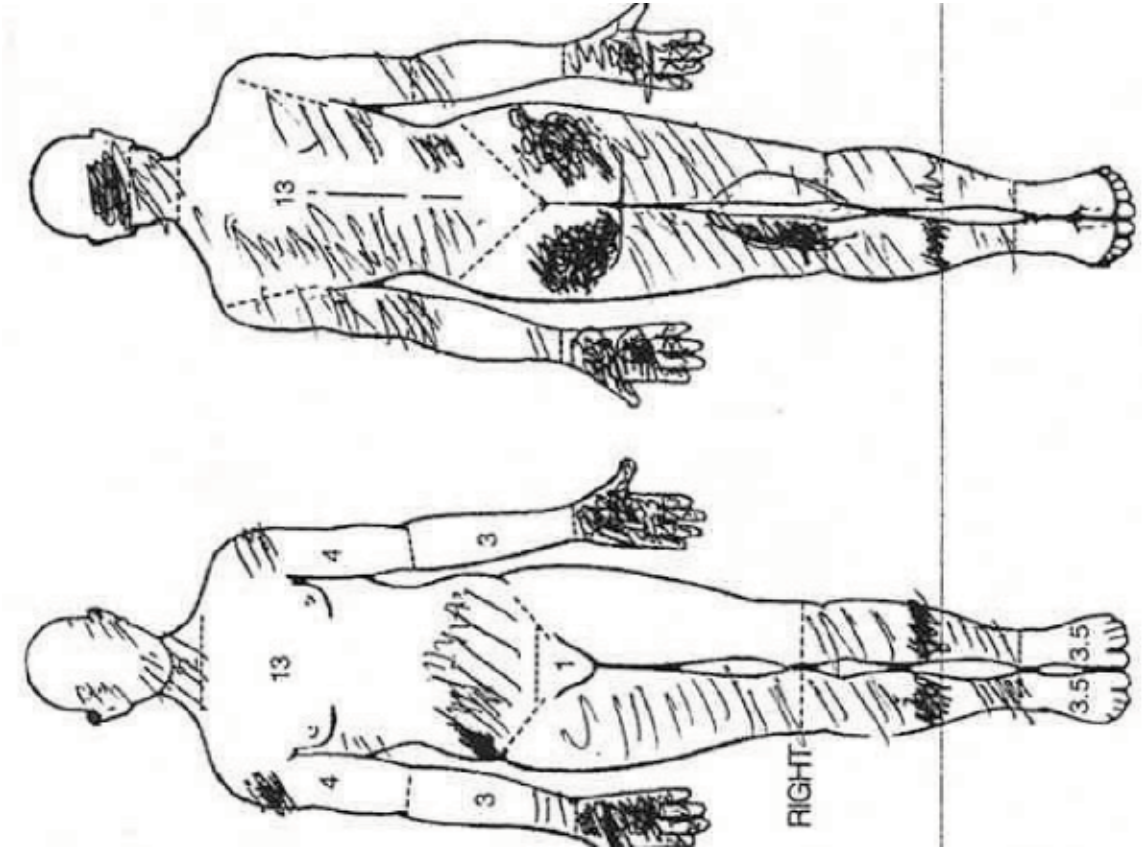
If the process proves valuable, it is anticipated that additional question-sets would be generated, as a means to facilitate different workgroups within the Company in exploring their own organizational cultural weaknesses.

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Burn Chart				
	Degree	Degree	Degree	%
Head	7		4.5	4.5
Neck	2	2		2
Anterior Trunks	13	5		5
Posterior Trunk	13	10		10
Right buttock	2.5		2	2
Left buttock	2.5		2	2
Genitalia	1			0
Right upper arm	4	3		3
Left upper arm	4	2		2
Right lower arm	3	1		1
Left lower arm	3	1		1
Right hand	2.5		2.5	2.5
Left hand	2.5		2.5	2.5
Right thigh	9.5	7.5		7.5
Left thigh	9.5	9.5		9.5
Right leg	6	3	2	5
Left leg	6	3	2	5
Right foot	3.5			3.5
Left foot	3.5			3.5
TOTAL	47		17.5	64.5

Burn Chart
Date: 03/29/15 Time: 1430 hours





***National Personal Protective Technology Laboratory
Evaluation and Testing Branch
Morgantown Testing Team***

**Protective Clothing Evaluation Report of
Fire Fighter Protective Ensemble
Submitted by the
Fresno, CA Fire Department**

NPPTL/PSDB/MTT Evaluation No: NPPTL-PCER-19

June 2, 2015

Deborah C. Sbarra



Investigator Information

Michael McKenna of Michael McKenna & Associates, LLC, a contractor for the National Personal Protective Technology Laboratory (NPPTL), conducted the protective clothing inspections. Mr. McKenna has over 32 years of professional structural fire fighting experience and experience investigating fire fighter protective clothing and SCBAs involved in line of duty deaths or injury accidents. Accompanying Mr. McKenna during the evaluation was Jay Tarley, Physical Scientist, and Deborah C. Sbarra, Industrial Hygienist, members of the Morgantown Testing Team (MTT) and the Policy and Standards Development Branch (PSDB), National Personal Protective Technology Laboratory (NPPTL), National Institute for Occupational Safety and Health (NIOSH) located in Morgantown, WV.

Status Investigation Report of Fire Fighter Protective Ensembles from the Fresno, California Fire Department Submitted to NIOSH / NPPTL NPPTL/PSDB/MTT Evaluation No: NPPTL-PCER-19

Background

With agreement by the fire department, the National Personal Protective Technology Laboratory (NPPTL), Morgantown Testing Team examined and inspected protective ensemble from the Fresno, California Fire Department (FD). At the request of the fire department, an inspection was conducted of the protective ensemble worn by a fire fighter who was injured in the line of duty. This evaluation consisted of visually examining and photographing the ensemble elements to determine if there were any conditions of the protective clothing that may have contributed to the injury. The injuries occurred on March 29, 2015 when a fire fighter fell through the roof while responding to a residential structure fire.

The ensemble elements were delivered via FedEx to the NIOSH facility in Morgantown, WV on May 13, 2015. Upon arrival, the protective gear was brought to the Personal Protective Equipment (PPE) Laboratory (H-1513) and secured in the evidence locker until evaluated on May 26, 2015. Upon completion of the evaluation, the items were placed back in the shipping box and secured in the evidence locker in Lab H-1513 pending return to the Fresno Fire Department.

Protective Clothing Inspection

The protective clothing evaluation was conducted in a manner consistent with Procedure No. SOP-NPPTL-TRB-PCE-0001 - "National Institute for Occupational Safety and Health (NIOSH) Procedure for Conducting Protective Clothing Evaluations for the Fire Fighter Fatality Investigation and Prevention Program (FFFIPP)". The packages were opened on May 13, 2015 for inventory purposes and then placed in the secured evidence locker in the PPE Laboratory. A fax of the inventoried items was sent to the Fresno Fire Department upon request immediately following the inventory. On May 26, 2015, the provided elements were inspected element-by-element in the as received condition and then returned to the evidence locker.

Michael McKenna of Michael McKenna and Associates, LLC performed a complete visual inspection element by element. The visual inspection process was photographed and observations of the elements were noted. The complete ensemble inspection is summarized in **Appendix I**, and **Appendix II contains the images of these items**.

Summary and Conclusions

Based on the inspection, the protective clothing ensemble performed as intended for a single catastrophic event and ensemble elements are not believed to have contributed to the injuries of this incident. Although the protective clothing ensemble performed as intended and is not believed to have contributed to the injuries, it was noted that the protective gloves and hood did not appear to have been worn at the time of the incident.



Appendix I

Protective Clothing Inspection Report



National Personal Protective Technology Laboratory / Policy and Standards Development Branch

Protective Clothing Inspection Report

Evaluation No: NPPTL-PCER -19	Requestor: Fresno California Fire Department
Date Received: May 13, 2015	Date of Evaluation: May 26, 2015
Evaluated By: Michael McKenna	Report By: Deborah C. Sbarra

Components and Observations

NOTE: All references to “right” or “left” are from the user’s perspective.

Protective Clothing Ensemble Condition As Received

* Elements of the structural ensembles provided for evaluation included coat, pants, gloves and hood.

1. Protective Gloves (Refer to Figures 1-9 in Appendix II)

Manufacturer: Protec * Fusion
Size: XL

Model No: PT8SC

- Substantial thermal damage and shrinkage to both gloves.
- Indentations visible in fingers and charring that extends over an inch inside the wristlets of both gloves suggest that the gloves were secured by a glove strap and in a stowed position at the time of the incident.
- Leather glove strap appeared shrunk and the width of the glove strap matches the indentation seen in gloves.
- Thermal break open visible at the interface between the glove liner and outershell of left glove.
- Glove labels were thermally destroyed and not legible.
- Thermal protective strip on the back of right glove was completely destroyed.

2. Protective Hood (Refer to Figure 10) in Appendix II

Manufacturer: PGI, Inc.
Date of Manufacture: 11/2014
Size: Universal

Style No: 3029298
Lot No: 93024

- Certified to NFPA 1971-2013 edition.
- Hood is in pristine condition with no signs of damage.
- Condition of hood with respect to the rest of the clothing suggests that the hood was not worn at the time of the incident.



3. Protective Coat #1 (Refer to Figures 11-24 in Appendix II)

Manufacturer: Globe

Date of Manufacture: 01/2015

Style No: D2755G10

Outershell: Globe Advance Gold

Thermal Liner: Globe Glide Gold 2-layer

Moisture Barrier: Crosstech Black, 2F

Model No: GXCell

Serial No: 4836396

Cut No: F0224C

Size: 44C 39L

- Certified to NFPA 1971-2013 Edition.
- Both arms of coat were cut.
- Thermal damage to front reflective trim.
- Throat tab was cut and is missing.
- Thermal damage to Velcro loops on left side of coat at collar.
- Thermal damage to Velcro loops on the inside of the coat along the zipper.
- Substantial thermal damage on cuffs and wristlets.
- Thermal break open on both arms of coat.
- Substantial thermal damage to the back of coat on the left side.
- Drag/Rescue device (DRD) was properly installed and not deployed.
- Dye sublimation visible on the DRD strap.
- Substantial thermal damage to the moisture barrier side of the coat liner.
- Visible cuts in both arms of the coat liner.
- Minor to moderate thermal damage to face cloth of the thermal liner.
- SCBA cylinder appeared to have been positioned on the right side back of coat as evidenced by a visibly cleaner, undamaged area on that side.

4. Protective Pants (Refer to Figures 25-36 in Appendix II)

Manufacturer: Globe, Inc.

Date of Manufacture: 1/2015

Style No: E2755G10

Outershell: Globe Advance Gold Size: 36 x 32

Thermal Liner: Globe Glide Gold 2-layer

Moisture Barrier: Crosstech Black, 2F

Model No: GXCell

Serial No: 4836396

Cut No: F0224P

- Certified to NFPA 1971-2013 edition.
- Substantial thermal damage to front and back areas of the pants including reflective trim.
- Suspenders were cut.
- Seam failure in seat of pants.

APPENDIX F

- Thermal break open on inside of left leg.
- Substantial thermal damage to both cuffs and reflective trim of outershell.
- Interface of left leg (where snaps are located) is missing.
- Back of pants are brittle to the touch.
- Substantial thermal damage in seat and cuff areas on the moisture barrier side of the thermal liner.
- Minimal thermal damage to the face cloth of the thermal liner except for the cuff area.
- Moderate thermal damage to the cuffs on the face cloth side of the thermal liner.
- Knee pads of pants are on the liner and not the outershell.



Appendix II

Protective Clothing Inspection Report

Protective Clothing from the
Fresno, California Fire Department

NPPTL/PSDB/MTT Evaluation No: NPPTL- PCER-19



Figure 1: Top view of gloves with substantial thermal damage visible on outershell



Figure 2: Palm side view of gloves with substantial thermal damage visible to outershell



Figure 3: Visible indentations around the fingers of both gloves



Figure 4: Alignment of the glove indentations suggest that the gloves were in a stowed position at time of incident



Figure 5: Leather glove strap aligns with indentations on glove (top view)



Figure 6: Leather glove strap aligns with indentations in glove (palm side)



Figure 7: Substantial thermal damage extending to inside wristlet area of gloves



Figure 8: Break open on left glove at interface between liner and outershell



Figure 9. Thermal protective strip on back of right glove completely destroyed



Figure 10: Hood was in good condition and certified to NFPA 1971



Figure 11: Front of coat showing cut areas and overall thermal damage to coat and reflective trim



Figure 12: Neck area of coat showing cut/missing throat tab and thermal damage to Velcro loops on left side



Figure 13: Melted areas on Velcro loops on inside of coat along the front zipper



Figure 14: Substantial thermal damage on right and left cuffs and wristlets of coat



Figure 15: Thermal break open on both arms of coat



Figure 16: Substantial thermal damage on back left side of coat and reflective trim with clean area where the SCBA was positioned

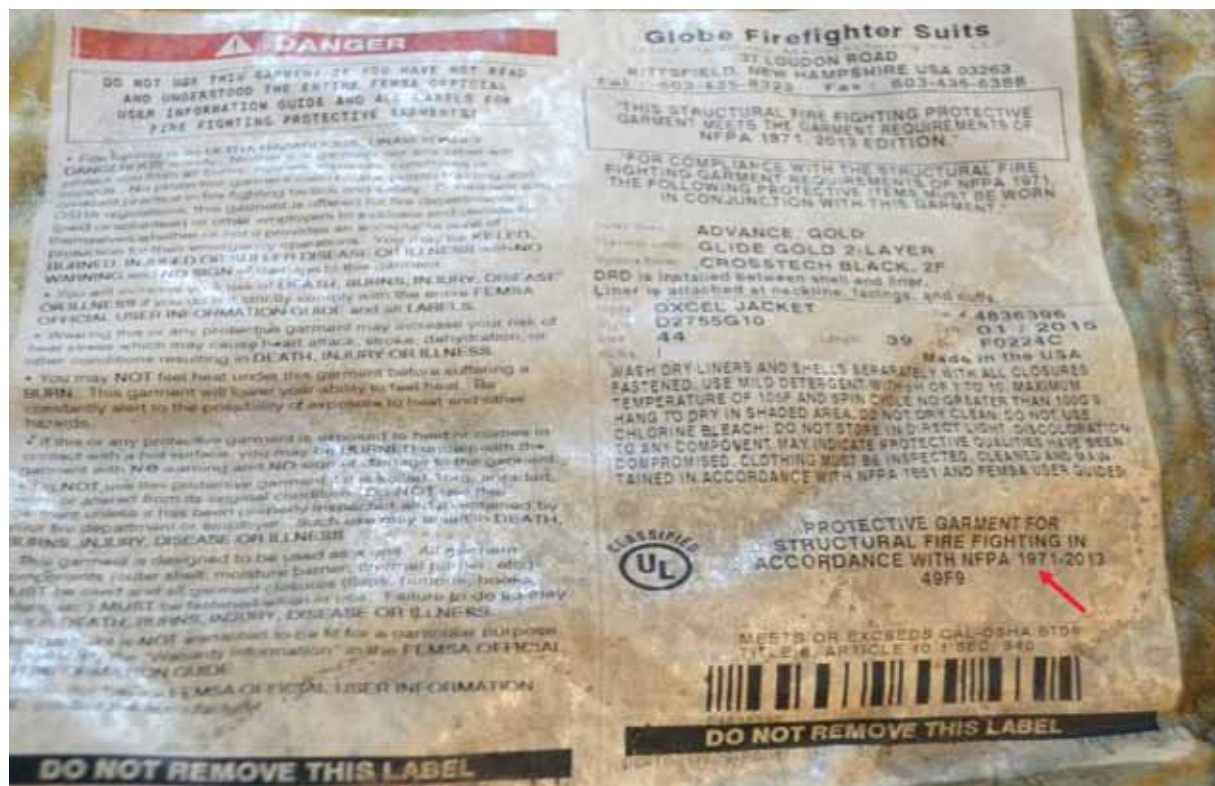


Figure 17: Label of coat showing NFPA certification and other garment information



Figure 18: Coat shell turned inside-out showing the DRD installed properly and thermal break open on sleeves



Figure 19: Close up of thermal break open on both sleeves of coat outershell



Figure 20: Dye sublimation visible on the strap of the DRD



Figure 21: Substantial thermal damage to moisture barrier side of coat liner and visible cuts to both arms



Figure 22: Substantial thermal damage visible on back of coat liner



Figure 23: Liner turned inside out showing minor to moderate thermal damage to face cloth of liner



Figure 24: Close up of thermal damage to face cloth liner



Figure 25: Substantial thermal damage to front of pants including reflective trim



Figure 26: Suspenders were cut and substantial thermal damage visible to back of pants including reflective trim at cuffs



Figure 27: Label from pants showing NFPA certification and other garment information



Figure 28: Seam failure in seat of pants



Figure 29: Thermal break open on inside of left leg and thermal damage to reflective trim on cuff



Figure 30: Substantial thermal damage visible at cuff of right leg and damage to reflective trim



Figure 31: Substantial thermal damage to both pant cuffs and interface on left leg is missing



Figure 32: Outershell of pants turned inside-out showing thermal damage to lower leg and cuffs



Figure 33: Outershell turned inside-out showing thermal damage to seat and cuff areas



Figure 34: Moisture barrier side of pants liner showing thermal damage to cuffs



Figure 35: Thermal damage and break open in the seat of moisture barrier side of pants liner



Figure 36: Liner turned inside-out showing kneepads and moderate thermal damage to cuffs



***National Personal Protective Technology Laboratory
Evaluation and Testing Branch
Morgantown Testing Team***

**Status Investigation Report of a
Self-Contained Breathing Apparatus Submitted by the
Severe Accident Response Team for the
Fresno Fire Department
Fresno, CA**

NIOSH Task Number 20230

May 18, 2015



Disclaimer

The purpose of Respirator Status Investigations is to determine the conformance of each respirator to the NIOSH approval requirements found in Title 42, *Code of Federal Regulations*, Part 84. A number of performance tests are selected from the complete list of Part 84 requirements and each respirator is tested in its “**as received**” condition to determine its conformance to those performance requirements. Each respirator is also inspected to determine its conformance to the quality assurance documentation on file at NIOSH.

In order to gain additional information about its overall performance, each respirator may also be subjected to other recognized test parameters, such as National Fire Protection Association (NFPA) consensus standards. While the test results give an indication of the respirator’s conformance to the NFPA approval requirements, NIOSH does not actively correlate the test results from its NFPA test equipment with those of certification organizations which list NFPA- compliant products. Thus, the NFPA test results are provided for information purposes only.

Selected tests are conducted only after it has been determined that each respirator is in a condition that is safe to be pressurized, handled, and tested. Respirators whose condition has deteriorated to the point where the health and safety of NIOSH personnel and/or property is at risk will not be tested.

Investigator Information

The SCBA performance tests were not conducted due to the damage to the SCBA unit was too extensive. The SCBA inspections were performed by Mr. Jay Tarley, Physical Scientist, and Mr. Mike Commodore, Engineering Technician, and this report was written by Mr. Jay Tarley. The investigators are part of the Evaluation and Testing Branch, National Personal Protective Technology Laboratory, National Institute for Occupational Safety and Health, located in Morgantown, West Virginia.

Status Investigation Report of a Self-Contained Breathing Apparatus Submitted by the Severe Accident Response Team for the Fresno Fire Department

NIOSH Task Number 20230

Background

At the request of the Severe Accident Response Team for the Fresno Fire Department, the National Personal Protective Technology Laboratory (NPPTL) agreed to examine and evaluate a SCBA unit identified as Mine Safety Appliances (MSA) model Firehawk M7, 4500 psi, 30-minute, self-contained breathing apparatus (SCBA).

This SCBA status investigation was assigned NIOSH Task Number 20230. The Severe Accident Response Team for the Fresno Fire Department was advised that NIOSH NPPTL would provide a written report of the inspections and any applicable test results.

The SCBA unit was delivered in a cardboard box to the NIOSH facility in Morgantown, WV on May 14, 2015. The unit was taken to the lower floor of the lab, room 1513 for secured storage. The SCBA unit was then removed for inspection on May 18, 2015, and was placed back into secured storage in room 1513 until the evaluation on May 29, 2015, at the manufacturer's location for data download.

SCBA Inspection

The unit was removed from the packaging in the lower floor of the lab, room 1513, May 18, 2015, by Mr. Jay Tarley, Physical Scientist, and Mr. Mike Commodore, Engineering Technician, NPPTL. The SCBA was identified as the Fresno Fire Department SCBA and was extensively examined, component by component, in the condition received to determine the conformance of the unit to the NIOSH-approved configuration. The unit was identified as the MSA model Firehawk M7, 30 minute, 4500 psi unit, NIOSH approval numbers TC-13F-548CBRN. The visual inspection process was documented photographically.

The complete SCBA inspection is summarized in **Appendix I**. The condition of each major component of the SCBA that was photographed with a digital camera is contained in **Appendix II**.

SCBA Testing

The purpose of the testing was to determine the conformance of the SCBA to the approval performance requirements of Title 42, *Code of Federal Regulations*, Part 84 (42 CFR 84). Further testing was conducted to provide an indication of the conformance of each SCBA to the National Fire Protection Association (NFPA) Air Flow Performance requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for the Fire Service*, 1997 Edition.

NIOSH SCBA Certification Tests (in accordance with the performance requirements of 42 CFR 84):

1. Positive Pressure Test [§ 84.70(a)(2)(ii)].



2. Rated Service Time Test (duration) [§ 84.95].
3. Static Pressure Test [§ 84.91(d)].
4. Gas Flow Test [§ 84.93].
5. Exhalation Resistance Test [§ 84.91(c)].
6. Remaining Service Life Indicator Test (low-air alarm) [§ 84.83(f)].

National Fire Protection Association (NFPA) Tests (in accordance with NFPA 1981, 1997 Edition):

7. Air Flow Performance Test [Chapter 5, 5-1.1].

No testing was conducted as the damage to the SCBA unit was too extensive.

Summary and Conclusions

A SCBA unit was submitted to NIOSH/NPPTL by the Severe Accident Response Team on behalf of the Fresno Fire Department for evaluation. The SCBA unit was delivered to NIOSH on May 14, 2015 and extensively inspected on May 18, 2015. The unit was identified as a MSA model Firehawk M7, 4500 psi, 30-minute, SCBA (NIOSH approval number, TC-13F-5048BRN). The unit had severe heat damage. The cylinder valve, as received, was in the off position. The cylinder did not have any air in it. The cylinder gauge was too burnt to read. The facepiece was included and the regulator was melted and locked into the facepiece. Visibility through the lens was nonexistent due to the heavy fire damage. The unit did have a data logger. The unit was taken to the manufacturer's facility in Cranberry, PA to conduct a download of what the unit stored for this incident. The entire unit was severely damaged by heat. The NFPA approval label was burnt and unreadable. The personal alert safety system (PASS) did function at the manufacturer's facility during the data download.

The Fresno SCBA unit in question, suffered significant heat damage. The damage to the SCBA unit was too extensive, and it was determined unsafe to pressurize. In light of the information obtained during this investigation, NIOSH has proposed no further action on its part at this time. The SCBA unit was returned to storage pending return to the Fresno Fire Department.

If this unit is to be placed back in service, the SCBA must be repaired, tested, cleaned and any damaged components replaced and inspected by a qualified service technician, including such testing and other maintenance activities as prescribed by the schedule from the SCBA manufacturer. Typically a flow test is required on at least an annual basis.

Appendix I

SCBA Inspection Report





National Personal Protective Technology Laboratory / Evaluation and Testing Branch

Respirator Field Problem Incoming Inspection Report Summary

Task Number:	TN-20230	Requestor:	Fresno Fire Department
Date Received:	May 14, 2015		
Date Inspected:	May 18, 2015	Description:	Injury
Manufacturer:	MSA	Inspected by:	Jay Tarley, Mike Commodore
Approval Number:	TC-13F-548 CBRN	SCBA Type:	Open Circuit, Pressure-Demand

The SCBA was received in a cardboard box (refer to **Figures 1 – 2 in Appendix II**).

Contact Agency: NIOSH/NPPTL

As received:

- Cylinder included and empty
- Cylinder valve closed
- By-Pass open $\frac{3}{4}$
- MMR locked into Facepiece due to extensive heat damage
- Facepiece included

Components and Observations

NOTE: All references to “right” or “left” are from the user’s perspective.

Facepiece (Refer to Figures 3 - 6 in Appendix II):

Facepiece assembly; Ultra Elite, Medium

Other markings: MD

- Overall condition is burnt badly
- Lens darkened and crazed
- Hairnet dirty and burnt
- Top strap attachment is broken
- The facepiece interior is in fair condition



APPENDIX G

2. Mask Mounted Regulator with HUD (Refer to Figures 7-8 in Appendix II):

HUD M/N: 10114403 S/N: M102003853

- Secured to low pressure line
- By Pass in 3/4 on
- By pass melted and ¾ way open slightly dirty
- Top locking point of MMR is melted and will not release from facepiece

3. Low Pressure Regulator Hose (Refer to Figures 9 and 10 in Appendix II):

- Overall condition is badly burnt and possibly compromised
- Secured at all attachments points
- Quick disconnect functions, sooty
- Line runs through the shoulder strap to the reducer

4. Pressure Reducer Assembly (Refer to Figures 11 and 12 Appendix II):

Markings/numbers: 10051341, HP LAF338671FS

- MSA barcode marking is present
- Overall condition is fair to good but dirty/Sooty
- All airline connections are secure

5. High Pressure Hose and Cylinder Attachment (Refer to Figures 13 - 15 in Appendix II):

- Knob is burnt
- Cylinder attachments thread clean, threads on and off, “O” ring in place
- Extremely sooty

6. Console Assembly PASS (Refer to Figures 16, 17 in Appendix II):

Console P/N: not visible

- Overall condition is burnt
- Lines good shape—pressure/electrical
- Gauge lens is unreadable
- Protective casing crazed
- SEI Label attached but not readable
- Label #10085251-not sure what for



7. PASS Control Module (Refer to Figures 18, 19 in Appendix II):

Part Number: 10083325

- Has significant heat damage
- Held securely to backframe
- Wire connection connected to PASS device
- Wire held secure to backframe and runs to console assembly
- MSA label present

8. Backframe Assembly (Refer to Figures 20 - 22 in Appendix II):

Other markings: 7-2180-1

NIOSH label: TC-13F-548 CBRN

- Has heat damage
- Shoulder straps were attached to the frame
- Cylinder strap latch is in fair condition dirty but functional
- SEI and NFPA label present but burnt and unreadable
- 11-26-14 in marker
- APP 39 sticker
- FireHawk M7 Air Mask

9. Straps and Buckles (Refer to Figures 23, 24 in Appendix II):

- Overall strap condition is poor with severe heat damage
- One shoulder strap attachment broken from frame
- Hose lines and wires pass through shoulder straps
- All adjustable buckles move and hold in place
- Waist area buckle latches and releases
- Plastic buckle melted
- Lumbar strap in fair condition with some dirt

APPENDIX G

10. Compressed Air Cylinder and Cylinder Valve Assembly (Refer to Figures 25 – 26 in Appendix II):

No information visible until after the cylinder was cleaned. Some DOT and other information:

DOT-E-10915-4500

TC-SU-5134-310

Cylinder M/N: 7-1537-1

MSA logo Luxfer REE 78

L45R-27 30 Minute, 4500 PSIG SN: 3031-241 MSA aprt no: H-30-SL

- Overall condition heat damage
- Gauge is not readable, burnt
- Threads ok
- As received cylinder valve closed with no air remaining
- Rubber bumper at base on cylinder valve is in fair condition
- Rehydro label present: 12/12

11. Auxiliary Hose (Refer to Figures 27, 28 in Appendix II):

- Auxiliary hose and pouch in good condition overall
- Both the male and female fittings are clean



Appendix II

SCBA Inspection Report





Figure 1: SCBA as received in cardboard box.



Figure 2: SCBA unit as received.



Figure 3: Overview of facepiece.



Figure 4: Close up of facepiece lens.



Figure 5: Inside of facepiece.



Figure 6: Close-up of exhalation valve.



Figure 7: Melted bypass knob.



Figure 8: Melted top locking point.



Figure 9: Low pressure hose possibly compromised.



Figure 10: Quick disconnect.



Figure 11: Pressure reducer assembly, top.



Figure 12: Pressure reducer assembly, side.



Figure 13: High pressure line and cylinder attachment.



Figure 14: Cylinder attachment.



Figure 15: Cylinder attachment, o-ring and threads.



Figure 16: Significant heat damage to PASS console.



Figure 17: Retaining strap for PASS console.



Figure 18: Pass control module.



Figure 19: Manufacturer label present.



Figure 20: Overview of backframe assembly.

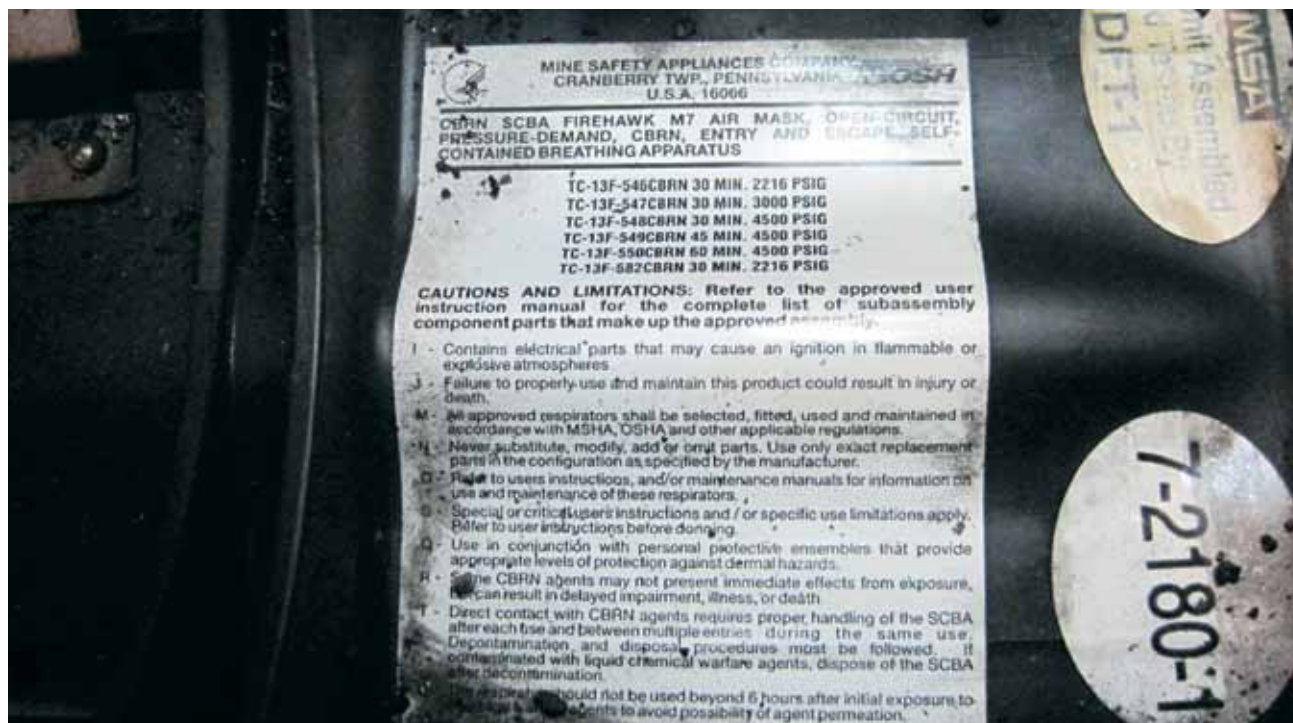


Figure 21: Approval label and other markings.



Figure 22: Model sticker and other markings.



Figure 23: Overview of straps and buckles.



Figure 24: Shoulder straps with hoselines and wires passing through.



Figure 25: Overview of cylinder.



Figure 26: Cylinder label after cleaning.



Figure 27: Auxiliary hose and pouch.



Figure 28: Both auxiliary hose fitting uncapped and clean.

Cortland Incident
Severe Accident Response Team

May 8, 2015

Kerri L. Donis
Fire Chief
Fresno Fire Department
911 H Street
Fresno, CA 93721-3082

Re: Identified Safety Concerns

Chief Donis,

As part of the ongoing investigation into the Cortland incident which occurred on March 29, 2015, the Severe Accident Response Team (SART) has been made aware of several safety concerns while conducting employee interviews. As the investigation continues, the SART wanted to share some initial findings that have been identified. The items are outlined below:

Finding: Several employees stated, they routinely do not don the appropriate Personal Protective Equipment (PPE), prior to responding to emergencies. It was stated; they don PPE enroute to the emergencies and do not wear their seat belts while in a moving apparatus.

- **Recommendation:** Strictly enforce Fresno Fire Department's policies and procedures in relation to seat belt use and California State Law. Provide clear expectations of compliance and accountability.

Finding: Several employees stated they routinely do not follow the PPE Procedures adopted by Fresno Fire Department. The proper use and wear of hoods, structure gloves and chin straps were identified as safety concerns.

- **Recommendation:** Strictly enforce Fresno Fire Department's policies and procedures for PPE use. Provide clear expectation on compliance and accountability.



Finding: It has been identified that radio communication issues are prevalent within Fresno Fire Department. While more information is required to understand the scope of these issues, the knowledge, use, and compliance of equipment operability were identified as safety concerns through the interviews.

- **Recommendation:** Provide additional training and organizational expectations on the knowledge, use, and compliance of the radio equipment and its operability. Complete an independent comprehensive analysis of the radio communication system, addressing the issues known to the organization.

The findings and recommendations outlined in this letter are items the SART team wanted to bring to your immediate attention. The SART team is making good progress and will produce a comprehensive report with additional findings and recommendations to meet your expectations. We have appreciated your support and the support of your organization. The employees have provided valuable information and their level of participation have been greatly appreciated. Please contact us if you have any further questions or concerns.

Sincerely yours,



Butch Agosta

Cortland SART Chair



DATE: May 20, 2015

TO: ALL FIRE SUPPRESSION MEMBERS

FROM: KERRI L. DONIS, Fire Chief 
 PETE FLORES, Fire Captain/President, Local 753 

SUBJECT: SAFETY CONCERNS AS IDENTIFIED BY THE SEVERE ACCIDENT
 RESPONSE TEAM (S.A.R.T.)

As I mentioned in our recent Multi-Company Drill meetings and my recent emails, there will be many lessons learned from the Cortland incident; some requiring immediate changes to our policies and/or approach, while others will be implemented once the final report is complete. The initial feedback from the Cortland S.A.R.T. team stated that the Fresno Fire Department (FFD) has good policies in place; however, some are not being fully implemented or applied. The S.A.R.T. has identified safety practices which require immediate modification to ensure FFD member safety.

Over time, and as an organization, certain behaviors with regard to Personal Protective Equipment (PPE), seatbelt use and equipment have become accepted daily practices. We became comfortable and too willing to trade a degree of safety for the sake of expediency. It is not a question of blame; rather, this is the time to adjust and apply the quality safety practices the Department has in place.

There will be many safety procedures and processes to examine over the upcoming months. As in any professional fire department, deficiencies will be identified, and adjustments and fine tuning will be implemented. However, let me be very clear, your health and safety today, the quality of your health in the future, and the security of your families as it relates to your health and safety are non-negotiable to me.

Our mission statement will guide our actions in that we will protect and serve the community, as well as each other, above all else. The FFD will continue to strengthen its hard earned status as one of the best in the fire service as we cultivate quality safety practices. I would hope these safety practices would not be challenged; however, should that occur, immediate and necessary corrective action will result. I will keep you apprised of our progress as S.A.R.T. continues to provide findings and offers recommendations.

MEMO
 TO: ALL FIRE SUPPRESSION MEMBERS
 SUBJECT: SAFETY CONCERNS AS IDENTIFIED BY SART
 May 20, 2015
 Page 2

The items listed below outline the modifications the Department will immediately put in place in order to provide you with maximum safety benefits; this very well may mean response times may increase. Should that be the case then we will adapt as needed.

1. Personal Protective Equipment (PPE): *Standard Operating Procedures*, Sections 205.7, 207.1 and 208.2 will be enforced. These policies will be updated to include clear expectations of compliance and accountability.

Specifically, these policies direct members to don and wear PPE prior to and during emergency responses. Any damaged safety equipment will be brought to the attention of the member's direct supervisor and replacements will be facilitated through channels.

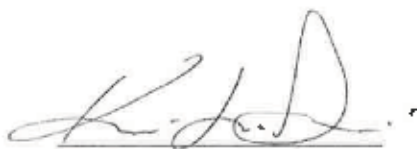
2. Seat Belts: *California State Law*, Section 27315, and *Standard Operating Procedures*, Sections 208.2 and 207.1 give clear expectations that seatbelts are to be worn during responses or anytime the apparatus is in motion.

Specifically, and effective immediately, seat belts will be worn, and properly in place, at all times while in a moving vehicle.

3. Radio Communications: *Standard Operating Procedures*, Sections 204.2b and 204.2c will be enforced. The policies will be updated to include clear expectations of compliance and accountability.

Specifically, and effective immediately, radios will be utilized by all members on emergency scenes, on the correct radio channel and settings as prescribed in *Standard Operating Procedures*, Section 204.2c. Training will continue to be a regular practice within stations and through formal Department multi-company drills. The Communications Committee will continue to meet and discuss areas of improvement in regard to radio communications. The Department intends to obtain an independent comprehensive analysis of the radio communications system addressing known issues.

It should be noted, members of the Local 753 Executive Board and President Flores partnered with Administration in writing this document. We all are in agreement on the importance of member's safety.



Kerri L. Donis, Fire Chief



Pedro Flores, President, Local 753



KERRI L. DONIS, CFO, EFO, MSOL
FIRE CHIEF

Office of the Fire Chief • (559) 621-4002 • FAX (559) 498-4261
Fresno Fire Department • 911 H Street • Fresno, CA 93721-3082

DATE: April 15, 2015
TO: ALL FIRE DEPARTMENT MEMBERS ON THE CORTLAND INCIDENT
FROM: KERRI L. DONIS, FIRE CHIEF
SUBJECT: COOPERATION WITH SERIOUS ACCIDENT REVIEW TEAM

As you are aware, our Department experienced a significant incident on Cortland Avenue that has impacted all of us. The Department is in the process of investigating the incident with the goal of determining the lessons learned and to prevent future injuries, not only in our Department, but likely lessons that will benefit the fire service.

When an incident such as this occurs, an outside Serious Accident Review Team ("SART") is convened to compile the facts and review the incident. Part of the SART review process is to interview Department members who were at the incident (and/or related to the review process) for post-incident, fact finding purposes only, and not for disciplinary reasons.

Captain Brad Driscoll and/or Firefighter John Pepper will be reaching out to members to schedule interviews. Captain Driscoll (also a member of the SART) will be sitting in on these interviews. If you are contacted, you are required to cooperate with the SART investigation into the incident. Again, the information shared about the incident during these interviews will help our Department going forward and no punitive action towards members will result. We appreciate your cooperation during this difficult time.

Respectfully,

Kerri L. Donis, Fire Chief

cc: Pete Flores, President, Local 753
James Scoggins, Vice President, Local 753

"To protect and put service above all else."









**911 H Street
Fresno, CA 93721**