



**Informational Summary Report of Serious or Near
Serious Injuries, Illnesses and Accidents**

GREEN SHEET

Training Burn Near Miss

April 29, 2018

Live Fire Burn Injury and Near Miss

Incident Number 18-CA-MNT-0002755

SUMMARY

On Sunday April 29th, 2018 Monterey Fire Engine 11 (E11) was participating in a live fire training evolution at the Salinas City Fire Department Training Tower. At approximately 10:00 AM a firefighter (FF) suffered burn injuries during a training exercise in a concrete burn building. The FF was performing an interior attack on a basement fire, making access through an interior stairway, down to the basement toward the seat of the fire. The FF suffered 1st and 2nd degree burns to the head, neck, back, shoulders and forearms. The FF was transported to a local hospital, treated and released with follow up appointments.

CONDITIONS

This near miss incident occurred during live fire training in the basement of the Salinas City Fire Department Training Tower located at Salinas City Fire Department Station #3. This injury occurred during the third burn evolution of the morning.

Weather:

Temperature: 57° Fahrenheit

Relative Humidity: 71%

Winds: WSW at 9 mph gusts to 14 mph

Visibility: Mostly Clear

Fuel Type: Large coal base from previous burns with the addition of three cut up wood pallets, hay, two sheets of OSB, Tar paper and the bottom half of an old recliner.

Fire Behavior: Extreme due to the fuel loading in the size of room below grade. There was an increase in oxygen to the fire when an outside access door to the basement was opened allowing the wind to pressurize the burn room.

Structural Features: The 14' x 19' burn room is located below grade in the basement of the Training Tower. It is accessed through either interior or exterior stairways and has two exterior window openings that can be sealed with steel covers. There was also a 12" x 12" opening in the center of the ceiling covered with a wood panel.

SEQUENCE OF EVENTS

The Monterey Peninsula College Firefighter 1 Academy (MPC Fire Academy) was conducting live fire operations at Salinas City Fire Department Training Tower at Salinas City Fire Department Station #3. MPC Fire Academy is an accredited California State Fire Training Firefighter 1 Academy (CSFT FF). This academy lasts approximately 17 weeks consisting of Thursday Evening, Saturday and Sunday classes.

The live fire drills taking place on Sunday April 29th, 2018 was designed to be an accumulation of all training the MPC Fire Academy students received during the course. Monterey Fire Department was invited to take part in these drills. Monterey Fire Department Engine 11 (E11) staffed with a Fire Captain (FC), Fire Apparatus Engineer (FAE), and Firefighter (FF) arrived at the training site at approximately 9:30 AM. The MPC Fire Academy was already in the process of running drills when E11 arrived.

Upon arrival, the FC received a short briefing from the crews doing the burning. The engine crew made access into the basement of the building for the scenario prior to the near miss. During this scenario, the MPC Fire Academy students were on the hose line progressing into the basement when they were forced to retreat due to excessive heat.

When it was E11's turn to take part in the drill they positioned the engine just south west of the training tower. The scenario started with a simulated dispatch; at that point the stokers started the fire in the burn room (basement). The FC and FF prepared for an interior attack at the "A" side of the building, while the FAE was extending a supply line to secure an adequate water source. The FC performed a walk around and simulated securing utilities and returned to the "A" side of the building.

At that point, both the FC and FF donned their SCBA's and made entry through the door at the "A" side of the building. When the FC and FF made entry to the building, the stokers added an old recliner and an additional two full sheets of OSB and tar paper to the burn box. While making access, the FC and FF encountered a fortified door that required breaching.

As they moved through the room to get to the stairway, down to the basement, the FC had to return multiple times to free the hoseline. The corners of the interior walls have a three-inch gap between the floor and walls. This created a separation of approximately 20 feet between FC and FF. These unique friction points caused a delay in making access to the burn room. The FF had to stop at the top and again halfway down the stairway waiting for additional hose to be freed up from friction points. It was at that point the FF said he was "getting too hot" and rotated 180 degrees and continued down the stairway backwards. During this time, the FC attempted to make radio contact with the FF using an academy issued radio but was unsuccessful. The FC made two attempts via radio and attempted to verbally advise the FF to exit the building due to the intense heat. Upon retreat, the FC, and other Academy Cadets, (that were working on Division 1), were stuck behind a closed door. This door was an inward swinging door that briefly trapped several members, when they piled up against the door while trying to retreat. The Interior Officer was eventually able to open the door allowing all members to escape the intense heat, smoke and gases.

The FF proceeded to the seat of the fire and was able to apply two short bursts of water to cool the fire. At that point, the FF was experiencing extreme heat stress and exited the basement door to an exterior stairway which led to the surface (B Side of Building). Upon exiting the building, he noticed that some of his Personal Protective Equipment (PPE) suffered heat damage. At this point, the FF began removing all PPE with the assistance of the FC and academy staff.

After removing the FF's PPE and T-Shirt, they discovered burns on the shoulders, neck, back and forearms. At that point they treated the burns by pouring bottled water and saline over the burned areas and followed up with ice packs. After placing the engine back in-service, they returned to the City of Monterey which was approximately 30 minutes away. Upon arrival to their home station, they contacted

the Duty Chief. The Duty Chief directed them to transport the injured firefighter to the local hospital.

The FF was treated at the hospital and released with follow up appointments. The FF is currently receiving regular treatment and is expected to make a full recovery.

INJURIES/DAMAGES

- First and Second degree burns to 9% of the body occurring on the head, neck, back, shoulders and forearms.
- The FF PPE including helmet, goggles, hood, SCBA and jacket suffered varying degrees of thermal damage.
- The Radio utilized was issued by MPC Fire Academy and was not a current fire service rated radio. The thermal insult melted the radio rendering it out of service.
- While conducting interviews, it was determined that three other Monterey Fire Dept. structure helmets had been melted in previous burns in the weeks prior to this incident.
- The Salinas Training Tower was built in 1966 and had notable damage, including exposed rebar, throughout the building.

SAFETY ISSUES FOR REVIEW

Tactical Considerations:

- Below-Grade Fires are Likely to be Ventilation-Limited.
- Coordinating Ventilation with Water Application is Required to Limit the Growth of a Ventilation-Limited Fire.
- Water Application into the Below-Grade Space is Key to Smoke Cooling.
- Effective Water Application into the Below-Grade Space Reduces the Hazard Throughout the Structure.
- Placing Yourself in the Flow Path has an adverse impact on firefighter safety.
- When Possible, It Is Best to Fight the Fire on its Own Level.
- Many firefighter LODI's and LODD's have occurred while operating at a basement fire or a fire on a level below them. Prior research has shown the high risks presented by basement fires are unexpected floor collapse and rapid onset of high heat. Past experiments in basements have indicated that the

most effective method of fighting a basement fire may be through the use of a transitional attack, beginning from the exterior of the building prior to moving in for search and extinguishment.

Fire Behavior Considerations:

A study conducted by Underwriters Laboratories (UL), "Understanding and Fighting Basement Fires," conducted in a substantially similar building configuration and fuel loading, included examination of the temperature and velocity results from the top of the stairs. Those showed that firefighters would not have been able to make it down that stairway due to high heat and gas velocity.

It also showed temperatures throughout the stairwell exceeded 900 C (1,650 F) with velocities between 5–10 m/s (11–20 mph).

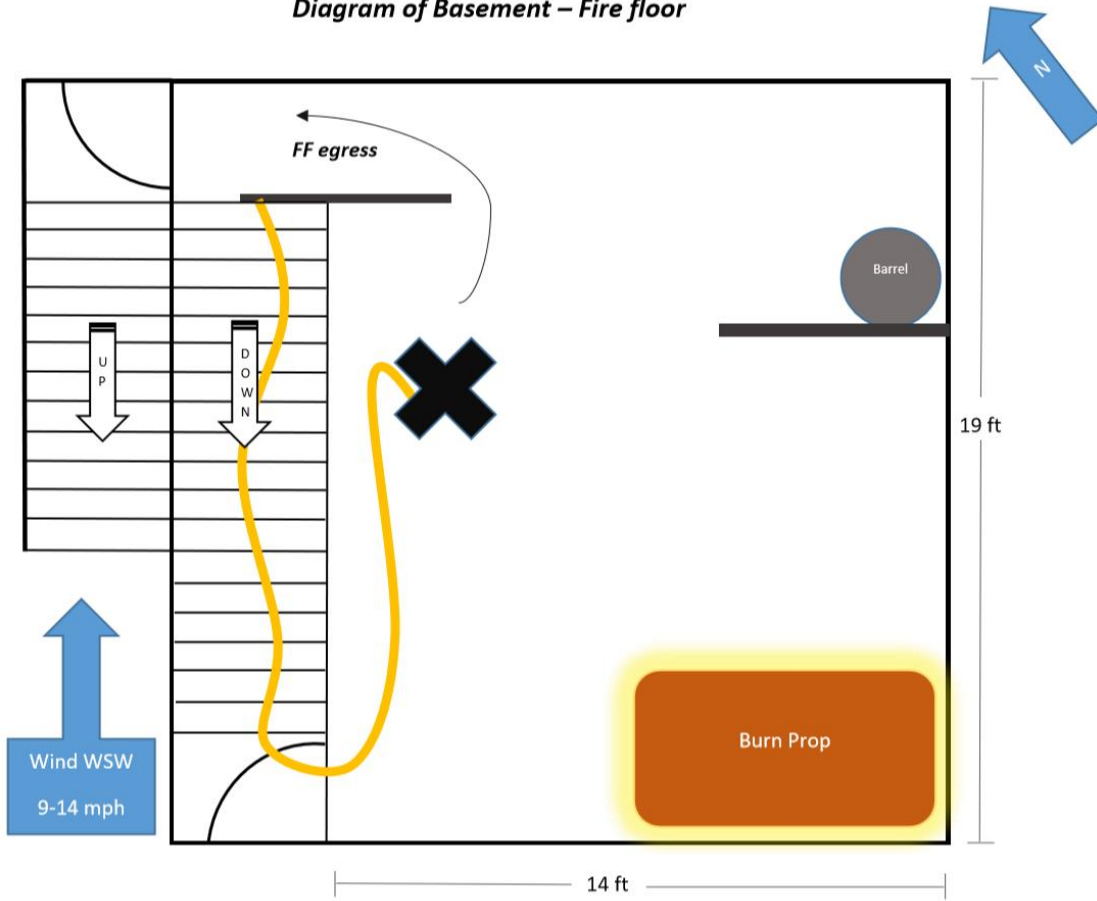
These conditions resulted in both high convective and high radiative heating rates that would quickly overcome the protective capabilities of structural firefighter protective gear.

This test did not include the wind loading that was present on the day of this near miss. At some point during the fire attack the basement door was opened for the ignition team. This created an increase in Flow Path velocity. When taken into consideration with the wind, fuel loading, smoke conditions and damage to PPE, it is very likely the FF had direct flame impingement overhead in both the stairwell and burn room.

INCIDENTAL ISSUES/LESSONS LEARNED

- Maintain situational awareness and validate tactics as fire conditions change.
- Adhere to State Fire Training Fire Control 3 guidelines.
- Adhere to NFPA 1403 guidelines.
- Ensure that an adequate number of certified instructors are present at Live Fire Training.
- Utilize department issued radios during training.
- Review UL Firefighter Safety and Research Inst. Study, "Understanding and Fighting Basement Fires".

Diagram of Basement – Fire floor





Interior Access Stairway down to Burn Room



Burn Crib with metal parts of recliner base on top



Helmet showing damage to goggles and brim



Helmet showing damage to Shield



SCBA showing damage to Pack