

**Injury Investigation  
City of Apopka Fire Department  
Apopka, Florida  
July 04, 2007**



**Prepared by the  
Bureau of Fire Standards and Training  
Florida Division of State Fire Marshal  
BFST Safety Investigative Report**

Issued April 23, 2008

**Firefighter Injury**  
**City of Apopka Fire Department**  
**July 04, 2007**  
**Orange County, Florida**  
**Prepared by the**  
**Florida Division of State Fire Marshal**  
**Bureau of Fire Standards and Training**

**Authority, Purpose, and Scope**

The Department of Financial Services, Division of State Fire Marshal is authorized by the provisions of Section 633.806, Florida Statutes, to conduct investigations with respect to the causes of firefighter employee injuries for the purpose of enhancing firefighter occupational safety and health in the State of Florida, and to make recommendations to the Legislature, firefighter employers, and insurers as to the best means of preventing firefighter injuries. The Division of State Fire Marshal is authorized to impose penalties on any firefighter employer who violates or fails or refuses to comply with Sections 633.801 through 633.821, Florida Statutes, the “Florida Firefighters Occupational Safety and Health Act,” (hereinafter “FFOSHA”), Rule 69A-62, Florida Administrative Code, and lawful orders of the Department of Financial Services under FFOSHA. The scope of this investigation is to determine the cause of the firefighter injuries, whether violations of FFOSHA, rules relative thereto, or lawful orders occurred, and make recommendations to the firefighter employer as to the best means of preventing similar injuries in the future.

**Background and Methodology**

The Bureau of Fire Standards and Training (hereinafter “BFST”) was notified on July 4 2007, by the Bureau of Fire and Arson Investigations, that an Apopka firefighter had been hurt and burnt significantly after falling through the roof of a house on fire, and that there were other firefighter injuries on scene. The Bureau of Fire and Arson Investigation responded immediately to photograph the scene and conduct initial fact finding. The BFST notified the firefighter employer that it was conducting an investigation of the firefighter injuries. Additional documentation was collected and reviewed, and follow up interviews were conducted as needed. On July 25, 2007, a meeting with the fire department members who were present at this incident was conducted by representatives of the BFST. In the open discussion with the Fire Chief and fire department members, the purpose and scope of the investigation was explained. Subsequent to this meeting and based upon further information received by phone calls regarding the incident along with variations in details and discrepancies, additional taped and videoed interviews were conducted over several months. After receiving the draft report, the city contested a number of items and took sworn statements from several key individuals at the fire, and insisted that these individuals be interviewed. The interviews resulted in further discrepancies, with the determination that a completely accurate

accounting of the incident will most likely not be reached, especially with the passage of time since the event.

## The Fire Department

The City of Apopka Fire Department (hereinafter “fire department”) is a combination fire department (career and volunteer firefighters) serving the City of Apopka and a large surrounding, unincorporated county area on mutual aid. The area served by the fire department is slightly larger than 30 square miles and has a population of more than 31,000 citizens. The fire department has 75 full-time firefighters, 30 volunteer firefighters and an administrative staff of 6. The fire department is rated by Insurance Services Office (ISO) as a class 1 department.

## Description of Incident

The fire department was initially dispatched to this approximately 8,000 square foot house on July 03, 2007, to investigate a report of a strange odor within the home by the current occupant who is also the owner/builder (hereinafter “owner/builder”). Upon arrival they found no visible smoke but detected an odor of smoke. Further investigation led to the attic area where they discovered melted and shorted electrical wire, damage to the plastic coating of a metal gas line and charred wood structural framing.

The owner/builder had shut off the main power to the structure before fire units arrived. Arriving units found a burned area in the east side “D” (refer to photo this page for designations). Following an investigation, power was restored to the structure and fire department members reexamined the spot where the damage was discovered. They found two more shorted electrical lines on the west side “B”, which had melted into the gas line. With the Thermal Imaging Camera (TIC) they could see heat being given off by the gas line throughout the attic area. Power to the house was shut off again. With the power shut off, they could find no other sources of heat and the gas line was cooling off.

Electricians arrived and attempted, but failed, to correct the problem. The electricians advised they would return in the morning to fix the problem. The fire department advised



At a building fire, the building is identified by A,B,C,D sides, with side A being the front of the building, and sides B, C, and D being designated in a clockwise fashion. Apopka does not follow the standard convention, using numerical rather than alphabetical designators. Under the standard convention numerical refers to floor numbers. For clarity herein, the standard alphabetical designations have been used per the above photo.

the owner/builder and electrician not to turn the power to the structure back on without a fire department unit standing by.

The fire department Shift Commander returned to the structure later that evening as a matter of precaution because it was known that the owner/builder had left town. Nothing was found and the Shift Commander returned to quarters. The power box was not checked to ensure it was still off.

Annotated Timeline	
0909:	Dispatched with report of smoke venting from eaves and roof.
0910:	Dispatch advises that callers are reporting flames through the roof.
0912:	Commander 1 and Ambulance 1 arrive, report heavy smoke
0913:	Engine 1 arrives.
0913:05	Rescue 1 arrives and asks for assignment. By SOP this is designated RIT, they are assigned to ventilate the roof.
0913:48	Chief 3 arrives and assumes command.
0916:10	Command requests a second alarm.
0917:19	Interior crew reports heavy smoke-zero visibility on the second floor.
0919:10	<b>Firefighter falls through the first floor roof.</b> Second firefighter injured trying to pull the first out of flames.  Chief 3 asks, "Where's my RIT?"
0923:32	Engine 3 on scene
0927:05	"Interior Command" expresses concern for the ceiling on the first floor and asks for a RIT to stand by.
0929:04	First floor ceiling collapses, injuring a third firefighter (Captain) who needs to be extracted from the structure.
0929:34	Evacuation of the structure is called.
0930:46	Chief 1 assumes command.
1014:01	Fire Under Control.
See Appendix 2 for more detailed timeline	

At shift change the morning of July 04, the departing Shift Commander informed the arriving Shift Commander of the previous day's event and told him to expect to be called for stand-by after the electrician had made the necessary repairs.

At 8:45 a.m. the now off-duty Shift Commander went back to the location and spoke with the electrician who asked for the fire department to be present in "a few hours" when he expected to re-energize the house. The officer contacted his on-duty counterpart to advise him of the electrician's request.

Some time between 8:45 and 9:09 a.m., a neighbor noticed smoke at the eaves and notified an electrician on the property. The electrician then cut a hole in the ceiling of a first floor pantry and looked inside. He discovered a small fire which grew rapidly with the introduction of air into the space and the fire department was called.

Dispatch notified responding units that callers reported seeing flames "coming through the roof." The first engine on the scene reported "... extreme smoke approximately 6000 – 7000 sq ft residential structure." One uncharged 1 3/4" hoseline was deployed without orders from the Incident Commander<sup>1</sup> (hereinafter "IC") to the garage doors on side "D," while another

<sup>1</sup> Incident Commander is not a rank, it is the designation found in NIMS and previous incident command systems for the person overall in charge of an incident, not necessarily the highest ranking official present. The position has set responsibilities which can be found in numerous training programs and in the Florida Field Operations Guide (FFOG) that has been issued for every fire, law enforcement and emergency medical response vehicle in the state.

crew was sent to the roof of the second floor to ventilate the roof. A third person carried a thermal imaging camera from the engine to the garage and left it on the floor and returned to assist with hose efforts.

The aforementioned crew was sent to the roof on side “D” to initiate ventilation and was equipped with a chain saw and TNT tool<sup>2</sup> (photo #4). As the assigned crew started up to the roof, they were joined by a Lieutenant who had self-assigned to the crew and brought an uncharged hoseline (photo #3). On the roof, the line was reportedly charged but quickly abandoned. As the first injured firefighter (identified herein as “Firefighter 1”) walked along the first floor roof in front of a second floor dormer, he penetrated the roof and the ceiling coming to rest with upper body entrapment, suspected to be wiring in the 1<sup>st</sup> floor attic space. From fire department radio logs, this appears to be 7 minutes after arrival. As he stood trapped inside the 1<sup>st</sup> floor attic space, the opening he made became a ventilation hole to the outside for the fire trapped in the attic space. He was exposed to flames, heated gases, and smoke pouring out of the attic. The Lieutenant received burns to his hands while he and another firefighter attempted to pull Firefighter 1 back up to the roof. After enduring 20 to 30 seconds of direct flame contact, Firefighter 1 asked the other two to let go of him. He then kicked his feet causing him to fall through to the first floor shower stall. From there, Firefighter 1 made his way to the rear of the structure on his own. Others outside the structure assisted him in removing his protective clothing and he was then transported to the hospital. Firefighter 1 suffered extensive burns to both hands and left forearm. This resulted in amputation of his left hand and forearm several days later and multiple surgeries to his right hand. According to the Lieutenant, the hoseline on the roof was not used during extinguishment and when its use was attempted, it was found not to be charged (pressurized with water).

Simultaneously, crews went to side “C” to fight the fire on the first floor. It was apparent soon after arriving that the first floor ceiling was noticeably sagging and everyone was ordered out. As the last firefighter exited, a Captain standing next to a sliding glass door leading to the outside patio on side “C” (photo #6), stuck his head inside to ensure everyone was out of the building. The ceiling and roof above him collapsed into the structure, striking and removing the Captain’s helmet and inflicting 1<sup>st</sup> and 2<sup>nd</sup> degree burns to his scalp. He was removed by crew members and attended to on the scene, but later taken to the hospital for treatment and released. Shortly after this an evacuation signal was transmitted and all were ordered out of the structure.

The crews re-assembled to initiate another fire attack on the main body of the house from the inside by pulling ceilings and applying water from ladders above the ceiling joists. The fire was declared under control at 1018 hrs.

## **Results of Investigation**

From the group debriefing and interviews conducted with personnel, and upon review of

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<sup>2</sup> A TNT tool ® is a combination prying, cutting, striking, pulling hand tool about the size of a fire axe.

all documentation, photographs and videos provided by the fire department, members of the State Fire Marshal's Bureau of Fire and Arson Investigation, and detectives of the Apopka Police Department, the following are relevant factors identified during the investigation:

1. Proper monitoring of firefighting activities was not sufficient and the potential for injuries not recognized. The photographs taken by a fire department member reveal fire venting itself at the point where the dormer intersected with the roof on the "C" side of the dormer (photo #4). The first injured firefighter can be seen on the "D" side of the dormer attempting to start the chainsaw but unable to see the flames on the "C" side. The fire had vented itself by burning through the roof and further ventilation in that area by the fire department was not needed.
2. Firefighters were sent to ventilate the roof without first assuring they had a charged hoseline. Three firefighters, assigned to be the Rapid Intervention Team (RIT) crew, were assigned to the roof along with the first due officer who assigned himself to be with the crew. The Lieutenant stated that he carried a hoseline to protect the ventilation operation; however, the hoseline was not utilized to protect Firefighter 1 or the other personnel as attempts were made to pull Firefighter 1 back up onto the roof. Later, the aforementioned Lieutenant stated he attempted to use the hoseline and found it not charged. When he pulled open the nozzle valve only air rushed out before the hose went limp. The Lieutenant suffered burn injuries in his attempt to extract the Firefighter I.
3. Although melted insulation, charred wood framing member, and a damaged gas line were found on July 3, neither an electrical inspector nor the appropriate inspector for the gas line were summoned, nor was the Power Company requested to lock out the power to the structure. The crew relied on the expertise of the electricians on scene to check the electrical system for faults.
4. Multiple and consistent violations of personal protective equipment in the hot zone including the Training Officer of the fire department. Firefighters and command staff were found repeatedly in the "Exclusionary" zone, also known as the "Hot-Zone" areas, threatened by fire, smoke and structural failure without full Personal Protection Equipment (PPE) or respiratory protection. This included a lack of either components of the required ensemble, turnout (bunker) pants, gloves, turnout coats, helmet, hood, etc., or even total lack of PPE both exterior and during interior fire suppression activities.
5. Personnel self-assigned and in some cases operated without the direction or possibly the knowledge of the IC. This allows for personnel to possibly operate contrary to the objectives of the IC and without the IC's knowledge as to their location in case of building collapse or other need for rescue.

6. Injuries were incurred by the firefighters not using all protective equipment as it was designed to be used. Fire department members were issued gauntlet gloves that did not have wristlets on them, which is allowable under NFPA Standard 1500 as long as a thumb loop<sup>3</sup> (see photo on right) or a thumb hole are at the coat sleeve ends of the bunker coat to maintain protection of the wrist area during reaching, stretching and extension of the arms. Although provided on the coats used, it appears the thumb loop may not have been utilized as the burn injuries indicate the coat did “ride up” allowing the firefighter’s arm to receive 3<sup>rd</sup> degree burns.



### **Recommendations by the Bureau of Fire Standards & Training:**

There are steps that the City of Apopka can take to minimize the risk of a similar occurrence of this type of incident that are not necessarily required by state statute or rule. It is highly recommended that these steps be taken with due regard to the safety of the firefighters and for the safety of the citizens of Apopka.

1. The fire department should complete National Incident Management System (NIMS) training, as prescribed in US Homeland Security Presidential Directive HSPD-5. Specifically, all personnel need to complete NIMS I-100, I-200. Additionally, all command staff should complete I-300 and I-400. All of the aforementioned, except for I-300 and 400, are available online at no cost from FEMA. As of the publication of this report this process has begun.
2. Practical training and tactical plans should be developed for the Thermal Imaging Camera. Interviews clearly indicated a lack of familiarity with the capabilities and full potential for the use of this device.
3. Develop and implement standard operating procedures (SOPs) and Standard Operating Guidelines (SOG) that are NIMS compliant, addressing emergency scene operations to include, but not be limited to:
  - a. Assumption of Command - SOG 6500.00.00 has been adopted, however on page 3. item C. 1. is confusing as written, “Command may be transferred to officers of higher rank, to officers of lower rank, or between officers of equal rank. Command is not transferred to officers of higher rank.” There are several conflicting items in the policy that need clarification.

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<sup>3</sup> The brand used by Apopka is shown in above photo, term used by the manufacturer for the strap is tabbed long wristlets. Photo provided by Manufacturer.

- b. Geographical and functional divisions for smaller areas of supervision. The Florida Field Operations Guide (FOG) outlines this process in a NIMS compliant manner. Completed as of this date.
- c. Mandatory Personnel Accountability procedures, as part of the “2 In/2 Out” law. Without such policies, firefighters can be endangered by entrapment or disorientation without the IC’s knowledge that they are in trouble. In case of structural failure or significant changes in fire conditions, the IC may be unaware of the locations and numbers of personnel operating in an effected area. This has been the topic of a number of “near miss” and fatality investigations in the U.S., with considerable literature and training directed towards the topic. Completed as of this date.
- d. Tactical Plans - Specific plans for how the fire department will handle various incidents and special procedures such as roof ventilation, or fires in larger buildings including large single family dwellings such as this. Several issues such as high ceilings with fire above can be addressed and planned for before the event. Many agencies have plans for specific types of occupancies that would differ from the day-to-day operations such as for banks, Post Offices, Magnetic Resonance Imaging facilities, higher hazard sites due to construction, occupancy or contents. Revised as of this date, further direction should be considered.
- e. Requesting the help of utility providers and city inspectors when necessary for utility emergencies, the use of shut-offs/lock-outs, etc.

Model policies are available from IFSTA, the Phoenix Fire Department, local fire rescue departments, the State Fire Marshal’s Firefighter Health and Safety website, [www.firefighterclosecalls.com](http://www.firefighterclosecalls.com), <http://www.everyonegoeshome.com> and many other sources. A “Google” search on “Fire Dept SOPs” resulted in over 850,000 sites.

4. Injuries were incurred by the firefighters not using all protective equipment as it was designed to be used. The equipment purchased by the fire department came with FEMSA (Fire and Emergency Manufacturers and Services Association) brochures attached that stress the need for the local fire department to train its personnel on the proper utilization of the ensemble, along with proper donning/doffing, cleaning, maintenance, etc. Every new recruit must be trained on the use of all equipment specific to their agency. All firefighters shall be given equipment refresher training on an annual basis.

The fire department is comprised of well-equipped and dedicated personnel; however, like many fire departments, they need to change their tactics and operations during emergencies larger or more complex than their normal experience. Compliance with the National Incident Management System and further training of the department’s officers is required.

### **Remediation Requirements:**

To avoid formal action, the City of Apopka Fire Department shall comply with the following in the timeframes provided:

Adopt and implement standard operating procedures along with a training plan/schedule, approved by the BFST, within 90 days of the date of issuance of this report. The standard operating procedures must address, at a minimum:

- the two-in two-out rule (completed)
- personnel accountability (completed)
- proper use of protective clothing and breathing apparatus (completed)
- proper use of protective equipment (completed)
- designation of on scene Incident Safety Officer and other supervisory/functionary roles required by Rule 69A-62.021 and .022, Florida Administrative Code.

The above items contain completion dates. As each item is complied with, the fire department shall notify the Bureau of Fire Standards & Training's Safety Program Manager by mail, and include the required documentation of compliance. The BFST will conduct a follow-up inspection to assure compliance with this plan. Failure to comply with the foregoing remediation requirements within the required time period may result in the initiation of formal proceedings against the City of Apopka Fire Department by the Department of Financial Services acting as State Fire Marshal, pursuant to the provisions of Section 633.811, Florida Statutes.

### **Report Preparation**

This report was prepared in accordance with Sections 633.801 – 633.821, Florida Statutes and Rule 69A-62, Florida Administrative Code by the Bureau of Fire Standards and Training (BFST) of the Division of State Fire Marshal by the following personnel:

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On Scene Photos Provided By Apopka Fire Dept.



Photo 1 – front (“A side”)



Photo 2 – “D” side – note ladder location, upper windows are same as in photo 4



Photo 3 – same perspective as photo 2



Photo 4 – Firefighter 1 seen to the left of upper floor window before falling through roof.



Photo 5 – back of house (side “C”) showing an officer without PPE

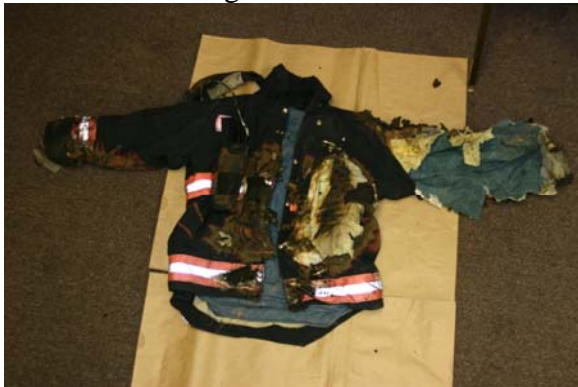
Appendix 1  
Damage to Firefighter 1's Protective Clothing



Firefighter 1's helmet



Firefighter 1's gloves



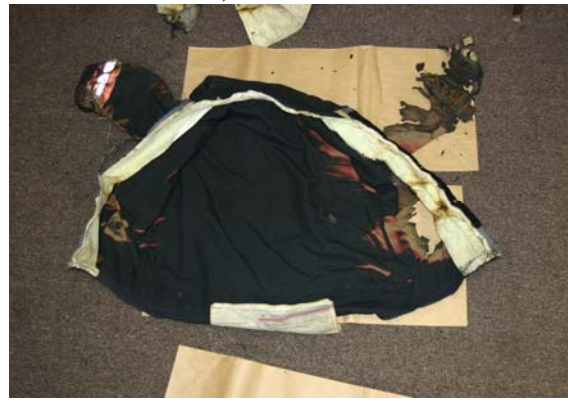
Firefighter 1's coat with liner, note coat sleeve was cut to remove



Firefighter 1's coat with liner, coat was black, see note below



Thermal liner and moisture barrier (inside) of Firefighter 1's bunker coat



Outer shell of Firefighter 1's coat

The firefighter's bunker coat and pants are made with three layers, an outer shell, a moisture barrier to protect from scalds and/or common fire ground chemical and body fluid penetration, and a thermal barrier as insulation from heat. The fabric of the coat shown was dyed black, and per the manufacturer, the areas seen on the coat that now appear to be brown indicate once the material reached 450-500° F dye sublimation occurs and the fabric loses the color of the dye. Where the outer shell is destroyed, it indicates temperatures of at least 700° F.

Appendix 2

**Timeline: Apopka Fire Department Injuries July 04, 2007**

**July 3, 2007**

- 1800: Apopka Fire Dept (FD) is summoned to residence by builder/owner; report of strange odor in house.  
Found shorted wires and charred wood lying on damaged gas line in attic.  
Electrical service shut off, told builder to call electrician to repair and check electrical service.  
**Owner/builder told to call FD before re-energizing electrical service.**
- 2200: FD returned to location, owner away for holiday, nothing found.

**July 4, 2007**

- 0845: Off duty FD Shift Commander stops at location to check with owner/builder, reminds owner/builder to notify FD before re-energizing electrical service.
- 0909: Units are dispatched to location of previous day call; report of smoke venting from eaves and roof.
- 0910: Dispatch advises all responding units that callers are reporting flames through the roof.
- 0912: Commander 1 and Ambulance 1 arrive on scene; they report heavy smoke on arrival.  
Attempted to attack fire 1 ¾" hoseline through open garage door and up stairs to 2<sup>nd</sup> floor. Crews unable to make second floor due to insufficient hose length.
- 0913: Engine 1 arrives on scene and asks Ambulance 1 for the location of the hydrant.
- 0913:05 Rescue 1 arrives on scene and asks for assignment (this is the designated RIT) they are assigned to ventilate the roof.
- 0913:32 Commander 1 radios Engine 2 for a line. Engine 1 having difficulty pumping.
- 0913:48 Chief 3 arrives on Scene and assumes command.
- 0914:23 Chief 3 radios Command Support (Aide to Incident Commander) to check accountability as soon as he arrives, "make sure we do it right"
- 0914:40 EMS 1 arrives.
- 0916:10 Command (IC) requests a second alarm.  
"Interior to Command" (This is the second call, no response)

0916:37 Inspector 1 arrives  
C3, now the IC, orders every line off Engine 2; “let’s get all the lines off.”  
Engine 1 reports to Command; “we’re (unreadable) right here.”

0917:19 Inspector 1 reports that they have the hydrant wrapped and asks; “are we ready for water at the engines?”  
C3; tells him to wait; “Hold up Nate” (They are having difficulty with pumping from Engine 1)  
Interior crew reports heavy smoke-zero visibility on the second floor.

0917:29 Second alarm is called.

0918:28 Engine 1 is told to “charge the red line” (Blue line taken with ventilation crew to the roof is not charged)

0918:49 Inspector 1 asks again if he should open the hydrant; no response.

0919:10 “Firefighter 1” penetrates the first floor roof on his way to ventilate second floor. Lieutenant is injured trying to pull him out of roof with flames venting around firefighter 1.  
C3 asks, “Where’s my RIT?”

0920:05 E 2 calls for water on the orange line; “Charge the orange line, charge the orange line.” (Blue line on roof still doesn’t have water)

0921:35 Inspector 1: “OK, I need a clear channel for a minute. Can we charge a red line to inside the structure?”  
C 3; “Charge the Orange line.”

0922:03 Chief 1 advises he is responding.

0923:32 The IC orders engine 2 to shut down that orange line.  
Engine 2 asks: “Which one Chief, we’ve got two orange lines running.”  
Engine 3 announces they are on scene.

0924:29 Chief 2 advises he is responding.  
Engine 3 repeats they are on scene announcement, requests assignment.

0925:25 Interior crew asks for the orange line to be charged and announces they are starting on the second floor, “we’re pulling the ceiling from the first floor and hitting it now. Get them to charge the orange line.”  
Inspector 1; “I need the orange line charged, pre-connect off the first engine.”

0926:01 Inspector 1, Interior crew; announces they have 4 inside and they have water on the fire. (14 minutes after arrival.)  
  
E 3; “Engine 3 requesting assignment, can you advise?” (3<sup>rd</sup> call)

0926:45 Brooks; "Engine 3 is on scene requesting assignment." (Dispatch intercedes)  
The IC calls for firefighters to the second floor.

0927:05 Officer in charge of the Interior operations expresses concern for the ceiling on the first floor and asks for a RIT to stand by.  
C 2 orders a code 5. (all available FD resources in city are committed)

0929:04 First floor ceiling collapses, injuring a Captain who needs to be assisted from the structure.

0929:34 Evacuation of the structure is ordered.

0930:46 Chief 1 assumes command

0938:44 The first PAR is called but interrupted by numerous radio calls.

1014:01 Fire Under Control.

### Appendix 3

Apopka's new marking of Rapid Intervention Team (RIT) personnel to clearly delineate them from other personnel on scene to reduce chance of them being assigned to a different function.

