

CLOSE CALL/HAZARD REPORT



TRANSFORMER EXPLOSION
4060 FAIR RIDGE DR.
OCTOBER 25, 2006



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Executive Summary

On October 25, 2006, at 1448 hours, E415 was dispatched to an outside fire. A citizen called in an electrical transformer smoking. Upon arriving on the scene at 1457, E415 found a green 6x8x4 foot electrical transformer with no smoke or fire visible. The unit officer and two bucket personnel exited the engine, and after walking completely around the transformer, they noticed what appeared to be oil leaking from a few different locations on the sides of the transformer. At that point, all three personnel turned to go back to the engine when they heard a loud explosion. As the unit officer turned around, he noticed the top of the transformer had shot off and a large amount of smoke and fire was coming from the transformer.

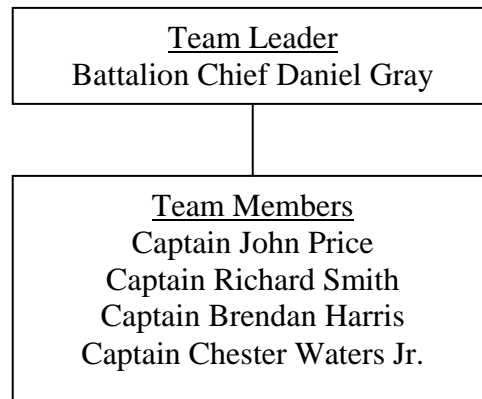
One firefighter was transported to the hospital for minor injuries. No fatalities occurred.

Due to the fact that this event nearly resulted in traumatic injury and/or electrocution of several members of the department, an investigation of the incident was initiated.



Investigation Team

The Firefighter Injury Investigation Team was activated on October 25, 2006, to investigate the circumstances that occurred during the incident. The team was assembled under the direction of Deputy Chief Kevin Kincaid who appointed Battalion Chief Daniel Gray as the Team Leader.



Investigative Tasks

- Review all written statements.
- Conduct follow-up interviews as needed.
- Review pictures.
- Review information regarding similar incidents within the fire service.
- Review all relevant departmental procedures, operational manuals and other pertinent documents for insight into the need for preventative action and procedural changes by the department.



Incident Information

Date: October 25, 2006
Dispatch Time: 1448 Hours
Incident number: 20062981829
Incident Address: Monument Dr. / 4060 Fair Ridge Dr.
Fire Box number: 2100
Weather¹:

Time	1452 Hours
Temperature:	78.1° F
Precipitation:	None
Wind:	West 4.6 mph
Sky:	Clear
Humidity:	60%

1. Wunderground.com, Dulles Airport, VA.



Event Synopsis

On October 25, 2006, E415 was dispatched for an outside fire, with a report of a ground-mounted transformer on fire. When E415 arrived on the scene within 40-50' of the transformer, nothing out of the ordinary was observed. All personnel, excluding the driver, exited the vehicle to assess the transformer more closely. After viewing all sides of the transformer, they all observed oil seeping down the sides of the transformer in several different locations. At that time, the officer ordered the two bucket personnel to get the CO2 extinguisher from the engine. As they turned to head back to the engine, a loud explosion was heard. Smoke and fire was seen pouring from the transformer, and several panels from the transformer were blown in different directions. The two firefighters ducked to safety, then proceeded to the engine to don their SCBA. The engine officer immediately requested a HAZMAT response and the assistance of Dominion Virginia Power from DPSC. Fire line tape was extended to help deny entry of the citizens prior to the arrival of the additional units. The engine driver repositioned approximately 20 feet farther away from the scene and traffic cones were deployed to block off the road. HM440, HMS440, SAF401, and Dominion Virginia Power arrived on the scene quickly to help mitigate the problem. Unfortunately, one firefighter received minor injuries, was assessed on the scene, and transported to the hospital for further evaluation.

Three main parts of this heavy gauge metal box, two sides, and a top, were forced in three separate directions. The top was propelled 63 feet away; one side was propelled 50 feet, and another side 30 feet. The only direction where pieces of the transformer box did not explode was where the firefighters and the engine were originally positioned.

It was determined by Dominion Virginia Power that the cause of the explosion was due to mechanical failure inside the transformer.



Findings and Discussion:

Findings

- 1. E415 arrived and positioned the unit 40 feet from the transformer.**

Discussion

All Fire and Rescue Department (FRD) personnel are reminded to handle transformer events similar to hazardous material emergencies. Prior to arrival, identify the hazard, deny entry, cordon off the area and request the utility company.

- 2. All FRD personnel disembarked the unit in structural personal protective equipment (PPE).**

Discussion

All FRD personnel are reminded to increase the safety awareness and to provide a risk analysis when responding to a transformer fire. The decision making process must start prior to the arrival and a plan to mitigate the incident should be discussed. This includes the level of PPE for the identified hazard.

- 3. The firefighter/bucket person was injured while returning to the unit.**

Discussion

The firefighter was injured when the explosion occurred. The firefighter received a blast injury to the ear, medically assessed at the scene, transport to the hospital and treated and released to full duty.



Technical Information

Transformer Specifications provided by Dominion Virginia Power ¹

- Name: Electric Switch Box
- Size: - 6'x8'x4' made of heavy gauge metal, green in color
- Electrical Power: - 3 power lines entering with 19,900 volts each (amps not relevant)
- The box has a 34,000 volt insulation rating
- Coolant: - 382 gallons of mineral oil inside
- Oil used for insulation purpose (normal temp. of 120 degrees F)
- General: There are tens of thousands of switch and transformer boxes similar to this one located in Fairfax County. Some boxes have mineral oil or compressed gas as insulators, while others have no insulation at all. Any of these boxes can fail; some with no consequences, some with just venting, some with small explosions, and some with catastrophic explosions.
- Hazards: - Electrical shocks (direct contact or arch)
- Burns from direct flame or hot oil contact
- Injuries from explosion and flying debris
- It may take hours for the box to be 100% de-energized by the power company

Recommendations

- Handle switch box and transformer fires as HAZMAT calls
- If you have to approach, use full PPE w/ SCBA
- Position well away from the transformer
- Deny entry and cordon off the area
- Contact power company
- If the transformer is on fire, do not apply water or other extinguishing agents, or approach it until it is confirmed de-energized
- Look/Listen for scorching, leaking fluid, venting, smoke, and noises

1. Dominion Virginia Power Technical Information – Supervisor Dennis Pergola

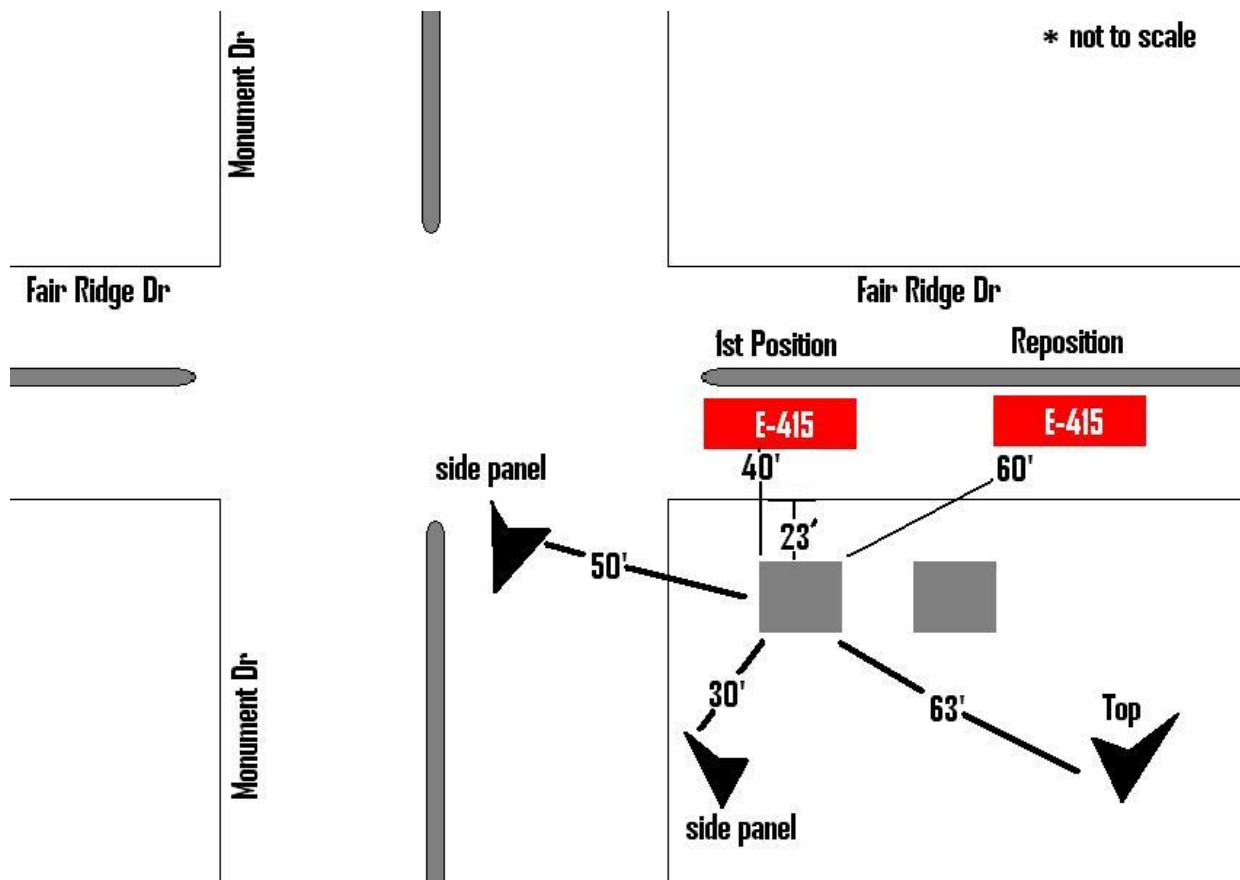


Additional Information

Some buildings have these switch and transformer boxes located inside. An example would be 5205 Leesburg Pike (Skyline Towers), which has four transformers located on the roof, with 700 gallons of oil each. In the early 1970's, there was an electric transformer fire in Tyson's Mall. This was a significant incident due to the magnitude, complexity, and possible health ramifications of the event.

For High Voltage Awareness Classes, contact Richard Reeves (Technical Specialist) at 703-994-1922 or email Ricky_Reeves@dom.com

Appendix A







Side panel 30 feet
from box



Other two panels held, but
bowed heavily from force.