

# A Primer on Purple K

by Battalion Chief Steven San Filippo

**F**DNY Firefighters strive to become familiar and knowledgeable regarding the various tools at their disposal. These tools include basic equipment, such as axes, Halligans and hooks, to the more complicated special equipment, such as Hurst tools, air bags and torches. They possess the constant need to become better at what they do. Everyday, they are challenged to perform at a very high level in short periods of time.

The fire and emergency ground on which Firefighters operate daily depends on the expertise gained by employing these tools. As members of the FDNY, Firefighters are required to be familiar with the ever-changing complement of tools that make them the professionals they are today. One such tool with which all members--especially Chief Officers--must become more familiar is the Purple K apparatus.

## What is Purple K/dry chemical?

Purple K or dry chemical are two terms that are used interchangeably to define an extinguishing agent, which when applied correctly, combats class "B" (flammable liquid) and class "C" (electrical) fires. The name "Purple K" comes from the color of the powder (violet) and the periodic table symbol for potassium, "K." It is composed of potassium bicarbonate powder that extinguishes fires by interrupting the chemical chain reaction of fuel, oxygen and heat and prevents it from creating active flaming. It is at least four to five times more effective in extinguishing fires than carbon dioxide and more than twice as effective as sodium bicarbonate-based methods.

Purple K has been used for many years in the petroleum industry, military facilities and gasoline stations (fixed systems) and is very prominent aboard U.S. Navy ships. When used aboard ship, it is applied using a dual nozzle, which is capable of applying either dry chemical or foam separately or in combination to extinguish class "B" engine room fires. It is very effective on spill fires and three-dimensional fires where the flow cannot be stopped until the fire is extinguished.

## How does the FDNY utilize Purple K?

Currently, the Department has six Purple K units, each quartered with an associated engine around the City. Two of the original units (Engine 228 and Engine 229) were introduced to the FDNY fleet in 1997 and the four newer units (Engines 33, 84, 163 and 326) were placed in service in 2006. As with the foam system, each of these six units has a corresponding back-up company, which has been trained in its operation.

Should the original unit be unable to respond, one of the back-up units is called on to pick up the Purple K unit, respond and efficiently operate this special piece of equipment. This provides a continued and seamless response to any and all incidents that require the services of a Purple K unit.

The amount of Purple K product in the original units compared to the four newer units differs. The two original units carry less than the four newer units. Engines 228 and 229 (original units) contain 700 to 750 lbs. each of Purple K, which, when used continuously, is expelled after two minutes. While the four newer units contain 1000 lbs. each of Purple K powder, the operational time is increased only slightly.

## When do these units respond?

Two units are required to respond City-wide on a 10-86 (foam operation) and also can be special-called to any incident scene at the discretion of the Incident Commander (IC). At other than a 10-86 or when the IC determines that there is a need for the use of one unit, he/she should consider calling a second unit as a back-up.

Members should think of a Purple K operation in the same way as a foam operation. When considering a foam operation, ensure that there is enough concentrate on the scene prior to operating. This guarantees that the operation will be continuous and fluid. Having a second Purple K unit on the scene prior to commencing operations provides Firefighters with an uninterrupted application of dry chemical product on the fire.



photos by Battalion Chief Steven San Filippo

The Purple K unit of Engine 228, one of the original units introduced in 1997. It carries 700 to 750 lbs. of Purple K.

### Important Information for the Incident Commander

1. Two hundred feet is the maximum distance that nitrogen can propel powder through the one-inch hose.
2. Do not charge line unless Purple K will be used. Unlike a water hand-line in a standby position, charging a Purple K line does have some drawbacks, such as:
  - Possible loss of nitrogen pressure, which will reduce the flow and require changing cylinders.
  - Once line is charged (whether used or not), line will be required to be bled prior to repacking hose.
  - Any loss of dry chemical powder will require refilling dry chemical chamber prior to placing unit in service.
3. Maximum two minutes of continued use. Consider calling a second unit prior to operating.
4. Back-up lines should be stretched; consider a foam line.
5. Only trained personnel should operate equipment.
6. Purple K has no cooling effect. Therefore, you still have vaporization and the potential for rekindles.



The Purple K unit of Engine 163. This newer unit contains 1000 lbs. of Purple K powder and increases members' operational time slightly.

### Important Information for Primary and Back-up Units

1. Tremendous knockdown of active flaming.
2. Compatible with foam.
3. Deploy hose completely prior to use.
4. Don't turn back on fire. Continue to operate until well after fire is out.
5. Discharge range is 30 to 40 feet.
6. Attack fire from upwind, using a side-to-side motion from 20 to 30 feet away.
7. Extinguishing effect is transient and can dissipate quickly.
8. Each primary unit maintains one complete refill of dry chemical and nitrogen cylinders in quarters.

*Note: MSDS sheet lists Purple K as a mild irritant to eyes and respiratory tract. Appropriate PPE is required during operations.*

### Complement of equipment

Each unit carries its Purple K powder contained in its cylinder ready to use. There are two nitrogen cylinders stored on the apparatus, which are used to propel the powder out of the container and through the one-inch hose. Each of these units has been issued two nozzles.

One nozzle is a 1 1/4-inch straight-bore nozzle, which distributes the powder in a wide pattern. Additionally, a dual hydro-chem nozzle is carried on the apparatus. This nozzle gives each unit the capability of providing foam and dry chemical powder through the same nozzle, either simultaneously or independently. Each of these nozzles is connected to a hose reel, which contains 100 feet of hose on each reel. *Note:* The four newer units have two hose reels with 150 feet of hose each.

It is important that the Incident Commander be cognizant that the maximum distance the nitrogen can propel the powder through the hose is 200 feet. Also, each unit carries a complement of portable dry chemical extinguishers should the incident require less powder and a more flexible approach.

### How does the FDNY utilize these units?

As mentioned previously, Purple K works well on class "B" and class "C" fires. *Fact:* Everyday, tanker trucks travel through the City carrying thousands of gallons of flammable liquids. Whether a tanker truck's purpose is to refuel gasoline stations, provide heating oil to commercial or residential buildings or support industry, Firefighters must be aware of the capabilities at their disposal. Should one of these flammable liquid tanker trucks become

involved in fire while traveling on a bridge, the ensuing fire could expose structural components and endanger the bridge's integrity.

On arrival, FDNY's Purple K units--in conjunction with a foam line--can provide the quick knockdown of active flaming and protection of the bridge structure. With this in mind, the four newer units have been assigned to locations that are in the vicinity of many City bridges. This provides protection for some of the major roadways in this City.

Another incident in which these units could become an important asset would be class "C" fires. Whether manhole fires, power stations, transformers, conduits, cell phone sites or any other type of electrical fire, Purple K can provide an alternative to water.

As a safety precaution, electrical power should be secured prior to operating, which is standard procedure for hand-line use.

Underwriters Laboratories has given Purple K a "C" rating. This rating has deemed Purple K powder extinguishers safe to operate on electrical components up to 100,000 volts. *Note:* Prior to employing these units on any electrical component, Con Edison should be consulted.



The two nozzles carried on the Purple K units. The top nozzle is a dual hydro-chem nozzle, which gives the unit the capability of providing foam and dry chemical powder through the same nozzle, either simultaneously or independently. The bottom nozzle is a 1 1/4-inch straight-bore nozzle, which distributes the powder in a wide pattern.

### About the Author...

Battalion Chief Steven San Filippo is a 29-year veteran of the FDNY. Currently, he is assigned to Operations as the Foam Manager. He recently participated in the West Point Counter-Terrorism leadership and Fire Officers Management Institute (FOMI) programs. He is also a member of the Department's Incident Management Team that responded to New Orleans for Hurricane Katrina. This is his third article for WNYF.



### FDNY Engines that Comprise the Purple K System

Primary Engines/Location		Backup Engines/Location	
Engine 228	Brooklyn	Engine 242	Brooklyn
Engine 229	Brooklyn	Engine 230	Brooklyn
Engine 33	Manhattan	Engine 3	Manhattan
Engine 84	Manhattan	Engine 59	Manhattan
Engine 163	Staten Island	Engine 157	Staten Island
Engine 326	Queens	Engine 315	Queens