THE 2 1/2 INCH HANDLINE

BY ANDREW A. FREDERICKS

For decades, 2 1/2-inch hose was the mainstay of fire departments across the nation. Despite the widespread availability of smaller, lighter 1 1/2-inch hose after World War II, many fire departments continued to use 2 1/2-inch hose exclusively for interior and exterior firefighting. Urban fire departments in particular--confronted with large factories, high-rise office buildings, and residential neighborhoods crowded with combustible housing stock--found the limited flow of 1 1/2-inch hose insufficient. In New York City, 2 1/2-inch hose was required for all structure firefighting up until the late 1960s.

During the early 1970s, a combination of factors caused a reevaluation of 2 1/2-inch hose as the handline of choice for many fire departments. One factor was the sudden, dramatic increase in fire activity throughout urban America. Increased fire activity required handlines that could be deployed swiftly and drained and repacked with a minimum of effort. Recently introduced 1 3/4-inch hose met these specifications. With the appearance of 2-inch hose during the late 1970s, still more fire departments abandoned their allegiance to the "deuce-and-a-half."

A second factor for the reevaluation of 2 1/2-inch hose was staffing. Firefighter layoffs, resulting from the near-bankruptcy of some cities, decimated the ranks of career fire departments. The membership rolls of many volunteer departments also began to dwindle. Bending, maneuvering, and advancing 2 1/2-inch hose are normally difficult, but the painful staffing reductions made them even more so.

A third factor was the introduction of various experimental technologies to the fire service, including friction-loss reduction agents, which were popular in the early to mid-1970s. These agents, which allowed flows of 250 gpm through 1 3/4-inch hose, convinced many chief officers that 2 1/2-inch hose no longer was needed. By the mid-1980s, the most potent offensive weapon at the disposal of the fire service had been relegated to second- and even third-class status among available handline options. Some fire departments retired it altogether.

With all these arguments against 2 1/2-inch hose, can a valid case be made for its continued survival as part of the municipal fire service arsenal? The answer is unequivocally yes, and the balance of this article makes such a case.

LIMITATIONS OF 1 3/4-INCH HOSE

As James J. Regan points out in his thought-provoking article, "1 3/4-Inch Hose: The Booster Line of the '90s?" (Fire Engineering, September 1993), the main reason for
developing 1 3/4-inch hose was its greater speed and maneuverability during fire attack operations within cramped tenements houses in New York City. This handline could be deployed and advanced much more quickly than 2 1/2-inch lines without suffering the 50 percent flow reduction resulting from the use of 1 1/2-inch hose. This history has apparently been lost on many fire service members; 1 3/4-inch hose is erroneously viewed as the answer to almost all firefighting problems. As Regan observes: "We have seen 1 3/4-inch hose used as a replacement for 2 1/2-inch hose in fireground situations that the original proponents and developers of the small-diameter hose did not contemplate and, in all likelihood, would not support."

Fireground flows from 1 3/4-inch hose should range from 150 to 190 gpm. The City of New York (NY) Fire Department (FDNY) considers 180 gpm the ideal flow from 1 3/4-inch lines in terms of fire extinguishment capability and handling characteristics. Some members of the fire service (myself included) suggest that actual fireground flows from 1 3/4-inch hose are somewhat less than the 150-gpm minimum given above. The main reason for this is widespread under-estimation of the friction loss in 1 3/4-inch hose at flows of 150 gpm or more.

How many pump operators have been taught that the pump discharge pressure (PDP) for a 150-foot preconnected line of 1 3/4-inch hose fitted with a 100-psi fog nozzle is only 120 to 130 psi? At a PDP of 120 psi, a flow of about 100 gpm is delivered--simply not enough water for interior fire attack operations. I contend that handline flows of less than 150 gpm are insufficient and potentially dangerous. A target flow of 175 gpm is much safer. To flow 175 gpm through 1 3/4-inch hose, a friction loss of at least 20 psi per 50-foot length must be overcome. In the example above (150-foot preconnected line with 100-psi fog nozzle), the PDP must be at least 160 psi.

THE TWO-FIVE SYNDROME

There is a movement afoot to promote the notion that only two sizes of hose are needed: 2-inch for handlines and 5-inch for supply lines. Some departments never adopted 1 3/4-inch hose and instead converted directly from 1 1/2-inch to 2-inch when it became widely available. Two-inch hose offers a higher practical flow limit than 1 3/4-inch (about 220 gpm vs. 190 gpm) while maintaining the handling and maneuverability characteristics that have made 1 3/4-inch hose so popular. Despite an increased flow over 1 3/4-inch hose, 2-inch hose is still no substitute for the 2 1/2-inch handline in many situations.

When comparing flows from 2-inch and 2 1/2-inch hose, 2 1/2-inch hose will deliver on average about 50 gpm more at the same PDP--and possibly as much as 100 gpm more--depending on the size of the nozzle tip used. This is a direct result of a much higher practical flow limit for 2 1/2-inch hose (around 330 gpm). Obviously, fireground situations will arise at which the reduced flow from 2-inch hose may make a critical difference in controlling the fire. And, like 1 3/4-inch hose, the friction loss per length of 2-inch hose is often underestimated. To flow 210 gpm through 2-inch hose, a friction
loss of between 15 and 18 psi per 50-foot length must be calculated. Just as with 1 3/4-inch hose, some pump operators believe that a PDP of 120 psi is sufficient for a 150-foot preconnected 2-inch line equipped with a 100-psi fog nozzle. A PDP this low will produce a flow of about 125 gpm. If only 125 gpm is desired, you might as well return to using 1 1/2-inch hose.

If a pump operator attempts to deliver the 250 to 260 gpm normally expected from 2 1/2-inch hose through a 2-inch line, friction loss quickly becomes excessive and the required PDP goes through the roof (especially when 100-psi fog nozzles are used). This increases the chances of a burst length, makes the hoseline extremely rigid and difficult to bend, and increases the nozzle reaction burden. Consequently, the advantages of better handling and maneuverability offered by 2-inch hose are lost, and both fireground safety and efficiency are compromised.

IMPACT OF REDUCED STAFFING

The staffing that existed in fire departments across the country before the reductions that occurred during the early to mid-1970s has never been fully restored. Today, the typical career engine company is staffed with an officer and only two firefighters, including the chauffeur/pump operator. This leaves only two personnel, the officer and a firefighter, available to get the first handline into service. If the officer must break away from the line to complete a search, the firefighter is left alone to struggle with the line and try to keep it moving until help arrives. And in some suburban and rural areas, help may be five, 10, or even more minutes away.

Many volunteer departments, especially on weekdays, also suffer from staffing shortages, causing the burden of stretching and operating the first handline, in many cases, to fall on the shoulders of one or two firefighters. Mutual aid can be summoned, but it will take time for it to arrive. In these situations, the tendency to always stretch a 1 3/4- or 2-inch handline is quite understandable. Fire departments also get away with it because most fires occur in residential buildings with small rooms ideally suited for the use of 1 3/4- and 2-inch lines. This is called the "residential room fire mindset." Unfortunately, problems arise when a fire is beyond the flow capabilities of the smaller-diameter handlines. Even when 2 1/2-inch hose is carried by engine companies, often no one thinks to stretch it or no one has been trained in its effective use.

"SLIPPERY WATER"

Forward-thinking fire chiefs greeted the advent of friction-loss reduction agents in the early 1970s with great optimism. For a variety of technical and political reasons, these agents fell into disfavor and quickly disappeared from the scene. Recently, attention has been focused on various types of Class A foams, and they represent first and second cousins to the "slippery water" agents of 25 years ago. A discussion of Class A foams, however, is beyond the scope of this article.
I will not dispute that 2 1/2-inch hose is difficult to use. Many a big, burly firefighter has been humbled by its sheer size and weight. The water alone contained in a 50-foot length of 2 1/2-inch hose weighs some 106 pounds (compared with 52 pounds for 1 3/4-inch hose). But no combination of smaller handlines can duplicate the volume, reach, and pure knockdown power of a single, well-placed 2 1/2-inch line. In addition to its high volume flows (between 250 and 320 gpm) and long stream reach, 2 1/2-inch hose provides the following benefits when used with a 1 1/8-inch solid stream tip: low friction loss per 50-foot length (only about six to eight psi at 262 gpm), exceptional penetrating power due to hydraulic force of stream, little premature water vaporization in highly heated fire areas, easy reduction to smaller-diameter hand-line(s) after knockdown, and much better maneuverability than 3-inch hose (sometimes used as a handline) or portable master stream devices.

To realize each of these advantages, personnel must be thoroughly trained in the use of 2 1/2-inch hose as a mobile, highly effective handline. In addition, to avoid the problems caused when each of several engine companies stretches its own smaller-diameter handline at large fires, an incident commander should not hesitate to team up two, even three, engine companies to place a 2 1/2-inch line into service and ensure its mobility. In previous articles, I have questioned the practice of using 3-inch hose as a handline, especially by chronically understaffed departments. I’ve heard chiefs argue for the use of 3-inch hose as a "blitz" attack line, but its weight, its size, and the extreme difficulty it poses in handling should cause a rethinking of this approach. In practical terms, 2 1/2-inch hose provides just as much water but is less fatiguing to use and more maneuverable, increasing its tactical flexibility.

Some departments that use 2 1/2-inch hose equip their handlines with high-volume fog nozzles (250 to 300 gpm). This practice decreases the effectiveness of the 2 1/2-inch handline because the nozzle reaction (in straight-stream position) may be as much as 125 pounds or more at a flow of 250 gpm. A nozzle reaction this high rapidly fatigues the nozzle team and requires a large commitment of resources to keep the line moving. If the nozzle is changed to a fog pattern, the reaction force is reduced, but the reach of the stream is lost, and a long reaching, high-volume stream is the reason 2 1/2-inch hose is employed in the first place. Fog streams also turn readily to steam and never reach the burning solid fuels. Even very compact fog streams (commonly called "straight streams") will suffer more premature water vaporization than solid streams when directed into highly heated fire areas.

Some suggest that when 1 3/4- or 2-inch hose is "outgunned," the solution is to employ lightweight, portable master stream devices, bypassing the 2 1/2-inch hose altogether. Fireground flows now have jumped from 150 to 200 gpm all the way up to between 400 and 800 gpm. Is there not room for some middle ground here? In addition, just how advantageous can a portable master stream device be when it must be secured in
position for safe operation and does not provide the mobility offered by a handline? Portable master streams have their place, but not at the expense of 2 1/2-inch hose.

TACTICAL CONSIDERATIONS

FDNY standard operating procedures call for the use of 2 1/2-inch hose at fires involving retail stores, factories, warehouses, and industrial occupancies. Below-grade fires in commercial buildings also require that 2 1/2-inch hose be used. FDNY requires that 2 1/2-inch hose be stretched as the first handline during all standpipe system operations. It can also be stretched on order of the engine company officer any time fire conditions appear to indicate its use.

When should a 2 1/2-inch handline be used instead of smaller hose? One way to remember those situations that call for 2 1/2-inch line is to use the mnemonic device "ADULTS," created by an FDNY firefighter while studying for the lieutenant promotional exam:

- Advanced fire on arrival
- Defensive operations
- Unable to determine extent (size) of fire area
- Large, uncompartmented areas
- Tons of water
- Standpipe system operations

Advanced Fire on Arrival

Any time you encounter an advanced fire condition on arrival, consider deployment of a 2 1/2-inch handline. An advanced fire condition often precludes immediate entry into the fire building. Even private dwellings may warrant an attack with 2 1/2-inch hose, especially when a large volume of fire involves the front porch or first floor, or if combustible siding is burning and threatening nearby exposures. While the use of master stream devices at fires in occupied residential buildings is not recommended, the same cannot be said about 2 1/2-inch hose. After all, it is a handline and can be advanced into the building to complete extinguishment once the fire has been given a quick dash from the outside.
If the 2 1/2-inch line itself proves too difficult to bend and maneuver within the confines of a residential building (which is almost always the case), two potential solutions exist. In the first solution, the 2 1/2-inch line can be shut down and abandoned and a smaller-diameter handline can be stretched for interior operations. The second solution is to shut down the 2 1/2-inch line, remove the nozzle tip, and extend the line with smaller hose. One caution with this second method: If the shutoff handle becomes submerged in water or is buried by a fallen plaster ceiling, it may inadvertently be bumped and closed by a passing firefighter. To ensure the safety of the nozzle team, station a firefighter at the shutoff. If this is not practicable, secure it open with a short length of rope or a hose strap. (This practice should also be followed when 2 1/2- or 3-inch hose is used with a gated wye or manifold to extend the length of preconnected handlines.)

If an engine company opts to use a master stream attack when encountering an advanced fire condition, two issues need to be addressed. The first is the speed with which a portable master stream device can be set up for an attack on the fire. Even new, lightweight portable deluge guns require that a supply line be preconnected and that their deployment be well-rehearsed at drills for effective use. The second issue involves use of an engine-mounted deck pipe. Depending on circumstances, heavy fire venting from a storefront might suggest a quick shot from the deck pipe, but will the height of the deck pipe above the ground allow for penetration of the stream into the fire building? The stream will not be effective if most of the water is directed at the floor 25 feet inside the entrance door. In both of these cases, stretching a 2 1/2-inch handline fitted with a large tip (1 1/4-inch) might well be the fastest means of getting water where it is needed to quickly darken down the fire.

Defensive Operations

When an offensive fire attack fails or the fire building is a "loser" right from the start (unoccupied vacant, with a history of previous fires), use of 2 1/2-inch handlines from outside positions is an effective tactic. A 2 1/2-inch line is far more mobile than any master stream device and can be placed in service rapidly. It can be stretched and operated from windows and rooftops of adjoining buildings, alleyways, and rear yards--areas often inaccessible to master stream placement. If a harder-hitting stream proves necessary, two 2 1/2-inch lines that already have been stretched can be combined to supply a portable deluge set, providing flows of 500 gpm and more. Firefighters operating from outside positions must constantly be aware of the danger of collapse. The size of the "collapse zone" is dictated by the height and construction of the fire building. Using the long reach of the 2 1/2-inch stream is essential to keep firefighters out of the danger area. Avoid the temptation to creep into the collapse zone for a better shot at the fire. Line and sector officers must exercise close supervision in these cases due to the inherent aggressiveness displayed by most firefighters. If the stream isn’t reaching the desired objective, reposition to another safe location or consider the use of a master stream device, as discussed above.
Unable to Determine Extent of Fire Area

If the size of the potential fire area cannot be determined initially or if the size (volume) of fire within a particular occupancy is unknown, use the 2 1/2-inch line. The 2 1/2-inch handline is needed for its high-volume flow and because it can deliver its high flow a distance of some 70 feet or more. With a solid-stream tip, the water can be directed into highly heated fire areas without significant loss of volume due to premature water vaporization. If a size-up of the fire area or the amount of fire reveals that the fire can be handled with smaller hose, the 2 1/2-inch line can be put aside or reduced to 1 3/4- or 2-inch hose, as previously described.

Large, Uncompartmented Areas

Large, undivided areas require the volume, reach, and penetration offered by the 2 1/2-inch line. The wide-open floor spaces found in supermarkets, bowling alleys, and warehouses are common examples. Most of these occupancies also feature high ceilings. High-ceiling areas allow large amounts of heated fire gases to collect while giving little indication of their presence at floor level. These gases can ignite suddenly, and the streams produced by smaller handlines may not be sufficient to push back the flames, cool the ceiling (which may be combustible itself), and penetrate to the burning solid fuel. The reach provided by a properly pressurized 2 1/2-inch line often allows it to be operated from the safety of a doorway until the ceiling gases have been dealt with and advance is possible.

Tons of Water

A 2 1/2-inch handline with a 1 1/8-inch solid-stream tip will deliver approximately 260 gpm at a nozzle pressure of 50 psi. With a weight of about 8.33 pounds per gallon of fresh water, that’s more than one ton of water per minute. Lobbing more than a ton of water per minute on smoldering rubble or large piles of rubbish from a safe distance is another use of the 2 1/2-inch line. Although many times a master stream device can accomplish the same objective with less physical effort on the part of the firefighters operating it, sometimes the flexibility afforded by a high-volume handline is required. At many fire operations, master stream devices and high-volume handlines are used simultaneously, and this often is the soundest approach in terms of its tactical benefit to the incident commander.

Standpipe System Operations

As I discussed in my article "Standpipe System Operations: Engine Company Basics" (Fire Engineering, February 1996), the many variables involved in using standpipe systems require that 2 1/2-inch hose be used. A 2 1/2-inch handline fitted with a 1 1/8- or 1 1/4-inch solid-stream nozzle tip can deliver a significant quantity of water at
very low pressure. Pressure problems are common at standpipe operations, and the pressure available at upper-floor hose outlets may not be sufficient to overcome the high friction loss produced by smaller handlines at desired flows. The chapter "Standpipe Work at Fires" in The Fire Chief's Handbook, Second Edition (The Reuben H. Donnelley Corporation, 1960) indicates that even with less than 50 psi pressure available at the hose outlet, a flow of about 220 gpm can be provided through three lengths (150 feet) of 2 1/2-inch hose equipped with a 1 1/8-inch solid-stream tip. The Handbook states on page 360 that "about 30 to 35 pounds nozzle pressure is enough for men to handle when working into a smoke-filled floor and will furnish a stream of sufficient strength and reach if properly applied." The fact that even at very low pressures 2 1/2-inch hose can easily deliver more than 200 gpm makes it the best choice for firefighting safety and effectiveness during standpipe system operations.

Regardless of when and where a 2 1/2-inch handline is used, reducing the tip pressure will produce a more manageable nozzle reaction force and facilitate better line movement and handling. At a flow of 260 gpm, the nozzle reaction produced by a 1 1/8-inch tip at 50 psi is about 95 pounds. By lowering the tip pressure to 40 psi, the nozzle reaction drops to about 76 pounds at a not-too-modest 236 gpm. Although by lowering tip pressures the upper end flows will not be delivered, streams significantly higher in volume than those produced by smaller-diameter lines are readily attained.

HANDLING 2 1/2-INCH HOSE

Many otherwise excellent texts and training guides on firefighting procedures depict 2 1/2-inch hose as an immobile handline reserved for use at lumberyard fires or other defensive operations. It is usually illustrated in a fixed position, with the hose formed into a loop and the nozzleman sitting atop the line at the point where the hose crosses over itself. Sometimes it is shown being held by three or four firefighters, often on opposite sides of the line, grasping the handles of the nozzle playpipe or supporting the hose on their shoulders using hose ropes or straps. In either case, movement of the 2 1/2-inch line is handicapped, and it can hardly be considered an effective handline for interior fire attack. With the right hose and nozzle and regular training, however, 2 1/2-inch hose can be developed into a highly mobile handline, well-suited to offensive and defensive firefighting.

Modern fire hose is exceptionally lightweight. Most outer jackets are made of a synthetic fiber weave, and couplings are constructed of aluminum alloy. Modern nozzles are also very lightweight and of aluminum-alloy construction. Some new solid-stream nozzle tips are made of highly durable plastic. Nozzles used with 2 1/2-inch hose are not limited to stacked-tip configurations and large playpipes with handles. FDNY has used "direct-connect" 2 1/2-inch nozzles for decades, never having adopted playpipes. Direct-connect nozzles feature a compact shutoff and a detachable nozzle tip. FDNY currently uses a 1 1/8-inch nozzle tip, but the 1 1/4-inch tip was used for many years and still is the standard tip size in Chicago and several other cities. Recently, FDNY has started a pilot program to evaluate pistol-grip shutoffs for 2 1/2-inch hose. While there are pros
and cons to using pistol grips (which I have discussed in previous articles), I am in favor of pistol grips on 2 1/2-inch handlines to aid in resisting the high nozzle reaction force generated by a ton-per-minute fire stream. Even if your department prefers 2 1/2-inch nozzles with playpipes, modern playpipe assemblies are available in lightweight construction.

Effective use of the 2 1/2-inch handline requires thorough training so firefighters become familiar with its size, weight, and handling. A nozzle team assigned to operate a 2 1/2-inch line should stretch the line dry as far as safely practical. It is much easier to move an uncharged line than a charged one. Once the line is charged, it must be bled of air. While all handlines must be bled prior to advancing, 2 1/2-inch hose entrains more air than smaller lines. Thoroughly bleeding the line is of particular importance at operations involving automatic and nonautomatic dry standpipe systems. In addition to air being trapped within the 2 1/2-inch hose itself, large amounts of air from an improperly flushed standpipe riser will enter the line and must be bled off at the nozzle. A story was related to me about a nozzleman who failed to bleed the line properly at a fire involving a couch in a standpipe-equipped building. The air that was discharged through the nozzle quickly increased the size and intensity of the fire, which grew to involve the entire living room.

-Controlling and operating a 2 1/2-inch hand-line, while far from easy, can be facilitated by following these basic rules:

-The nozzleman must keep sufficient hose out in front to permit unhindered nozzle movement.

-The backup man should lean into the nozzleman to provide physical support in resisting the nozzle reaction.

-The backup man must keep the line low behind the nozzleman and as straight as possible.

-The backup man should "pin" the hose to the ground using his hands or knees, thus easing the task of resisting the reaction force without adversely affecting nozzle movement.

-When moving the line, shut down or gate down the nozzle to reduce the reaction-burden. Make sure the fire area ahead of the line has been cooled sufficiently before advancing.

-Attempting to stand while operating a 2 1/2-inch line is difficult at best. If a doorway, wall, or tree is nearby, lean against it and use it to help resist the nozzle reaction.
- It may be necessary to assign additional personnel to "lighten up" on the line and keep it moving. This is especially important during standpipe operations or when the line must make several bends and turns.

- If a 2 1/2-inch line is being used in a purely defensive mode and staffing levels are light, forming the line into a loop, as described earlier, is an acceptable technique.

It should be noted that many of these rules apply to any size handlines. In addition, due to the long stream reach produced by a solid-stream tip and 2 1/2-inch hose, geometry tells us that a small movement of the nozzle will result in the distribution of water over a rather wide arc some 60 or 70 feet away. This is important because rapid nozzle movements are not easily performed when 250 gpm or more is flowing.

BIG FIRE, BIG WATER

Most structure fires (probably around 90 percent or so) are quickly controlled by a single 1 1/2, 1 3/4, or 2-inch handline. It's the other 10 percent, however, that necessitate fire departments' maintaining 2 1/2-inch handlines on their apparatus. Minimal staffing does not alter the fact that some fires require 2 1/2-inch handlines for expeditious control. When big fires occur, big water is needed; 2 1/2-inch hose is a time-tested fire attack tool for delivering high-volume flows with long reach and exceptional knockdown power. It remains a vital part of the municipal fire service arsenal.

FDNY standard operating procedures require the use of 2 1/2-inch hose for fires involving stores, factories, and other commercial occupancies. Nozzle teams should use the long reach and high volume of the 2 1/2-inch stream to best advantage when attacking fires in these and similar occupancies. Be cautious when advancing the line at commercial building fires. It is possible that what appears to be a first-floor fire actually originated in the cellar or subcellar. (Photo by Bob Pressler.)

When an advanced fire is encountered, a 2 1/2-inch handline is needed for
rapid control. Unlike most portable master stream devices, 2 1/2-inch hose can be deployed quickly and is highly mobile, allowing its operation from positions that are inaccessible to master stream devices. This is particularly important when life safety is a factor or when the potential for autoexposure or fire extension to nearby buildings exists. Large, un compartmented areas (supermarkets, department stores, manufacturing occupancies, service garages, and so on) require the use of 2 1/2-inch hose to best ensure firefighter safety. High-heat conditions and a large volume of fire demand the 250 to 320 gpm flow possible from a 2 1/2-inch handline. A solid-stream tip (1 1/8 or 1 1/4-inch) will provide exceptional reach while minimizing premature water vaporization. A 2 1/2-inch handline is ideal for defensive firefighting operations. Its long-reaching, high-volume stream permits firefighters to operate outside the collapse zone, but it is more flexible than a portable master stream device. Oftentimes, 2 1/2-inch handlines and master stream devices are used together to control large fires and keep exposure buildings cool. Standpipe system operations require 2 1/2-inch hose and solid-stream nozzles because they can deliver flows of more than 200 gpm at very low pressures. The friction loss per 50-foot length of 2 1/2-inch hose while flowing 260 gpm is only about six to eight psi.

A 2 1/2-inch handline often proves too difficult to bend and maneuver within the confines of residential buildings and other small occupancies. After a quick knockdown from the outside, the 2 1/2-inch line can be reduced to a 1 3/4- or 2-inch hose by simply unscrewing the nozzle tip and connecting the smaller hose to the nozzle shutoff. It is important to prevent the shutoff from being inadvertently closed, which could result in burn injuries to the nozzle team. It is easily secured in the open position using a short length of rope. (Photo by author.)
Note how the backup man is "pinning" the 2 1/2-inch hose to the ground using his hands and knees. This allows him to resist the nozzle reaction without undue stress and permits the nozzleman to freely move the nozzle. The nozzleman must strive to keep the nozzle in front of and away from his body to permit effective movement of the stream. (Photo by Matt Daly.)
Modern 2 1/2-inch nozzles are lightweight and very compact. These so-called "direct-connect" nozzles often feature pistol grips. Attaching this type of nozzle to lightweight 2 1/2-inch hose makes a highly effective hose/nozzle combination that is well-suited to offensive firefighting. If your department prefers 2 1/2-inch nozzles with playpipes and handles, modern types are made of lightweight aluminum alloy and are much easier to carry and manipulate than heavy, brass ones. This 2 1/2-inch handline is fitted with a lightweight nozzle that features three stacked tips to provide a range of high-volume flows. (Photos by author.)