

## **M 9.0 INSTRUCTORS PRE-BURN CLASS GUIDE**

### ***Firefighter Materials Needed For This Class:***

- One adjustable pattern fog nozzle capable of delivering a 95 G.P.M. minimum flow and other nozzle suitable for the evolutions.
- One complete set of turn out gear.
- One complete SCBA with PASS device.
- One flash light.

### ***Audio Visual Equipment Needed***

- 110 volt extension cord with outlet adaptor.
- Overhead Projector.
- Overheads of the site plan and floor plans.
- VCR and monitor.
- PowerPoint projector.
- PowerPoint files for pre-burn class.
- or -
- Video tape for pre-burn class.

## ***I. Welcome from The Minnesota State Colleges and Universities System***

### Introductions

- Instructors
- Others

### Facility announcements.

- Registration
- Roster sheets explained
- Facility rules
- Exits
- Bathrooms
- Break times

## **II. Class Outline (Details in section M 9.1)**

Motivational statements.  
Class Objectives  
Purpose of Pre-Burn Class.  
Purpose of Structural Burn Training.

### **Before Starting Next Section:**

Have one of the students get their PROTECTIVE CLOTHING items including SCBA. As you lecture, have the student get dressed showing the class the proper way to don the equipment.

### **Protective Clothing**

Boots  
Pants  
Hood  
Coat  
Gloves  
Flashlight  
Other tools

### **Self-Contained Breathing Apparatus**

30-minute minimum  
Tank valve open all the way  
Face piece check and donning  
Test for Face piece seal  
Test for Exhalation valve leaks  
Harness adjustments and check  
Adjust harness so the weight is carried on your hips.  
PASS Device activation

### **Regulator**

Emergency by-pass test and procedures  
Main line valve open all the way  
Low air warning signal  
Demonstrate test procedures

Survey class for experience levels and time on the department before moving into Levels of Training.

### **Levels of Training for structures**

Level I - Explain in detail what will take place.  
Level II - Explain in detail what will take place.  
Level III - Explain in detail what will take place.

**Attack Team**

Make Up - Student to Instructor ratio.  
Function during the drill.  
Procedures that they will follow during the drill.

**Back Up Team(s)**

Make Up - Student to Instructor ratio.  
Function during the drill.  
Procedures that they will follow during the drill.  
RIT Activities during the drill.

**Methods of Attacking a Fire**

Direct  
Indirect  
Combination

**Hose Line and Nozzle Operations**

Operational difference between automatic nozzles  
Flow setting  
Pattern adjustments  
On/Off operation of the nozzle  
Hose line pressure test - NFPA test (5 Min.)  
Hose line positioning

**Fog Ventilation**

Define Ventilation  
Level I procedures  
Level II procedures  
Level III procedures

**Hose Line Handling**

Attack team  
Back up team  
Hose tender team

**Overhaul**

Evidence preservation  
Drill Procedures

**Safety**

Overall safety concerns during the drill  
Explain the purpose use of the instructor hose line  
Explain rehab and EMS  
Describe the emergency evacuation signal for the drill  
Describe the procedures for calling for a PAR (Personnel Accountability Report)

during or after the evacuation

**Critique with your instructor**

Describe the process of the question and answers period while re-hydrating in rehab with the instructor immediately following the exit from the building.

**III. *Building and site information***

Site plan  
Building floor plans  
Anticipated apparatus positioning  
Emergency medical and rehab area  
Vehicle parking and staging  
Water supply information  
Safety procedures  
Pre-burn briefing session

**IV. *Summary and Closing Remarks***

Remind students to eat a good meal and **drink plenty of fluids that are high in potassium, such as sport drinks** prior to participating in the training session.

Remind them to wear the proper street or station clothing under their turn out gear for the training session.

Remind students of start time and location of training session.

Turn the training session back over to the officer in charge for final comments.

## **M 9.1 PRE-BURN CLASS CONTENT DETAIL**

### **M 9.1.0 Pre-Burn Class Introduction To Students**

"Firefighter Injured In Training Session"; "Firefighter Dies In Training Session"; "Fire Department Burns Wrong House Down In Training Session". These are just some of the many headlines that appear from time to time around the country. These events are tragic and/or embarrassing. Each one of these situations has one thing in common, **THEY COULD HAVE BEEN PREVENTED !!!**

**M 9.2.0** - Live fire evolutions provide good training and are used by most fire departments. The live fires used by fire departments may vary widely by type and size. They may include flammable liquid fires, and structural fires ranging from small pan fires to large commercial structures such as grain elevators.

**M 9.3.0** - Firefighters will always run the risk of being injured or killed while learning to do their job. National Incident Reports revealed in the year 2001, the following statistics.

Fourteen firefighters died in 2001 during training activities. Nine of the training deaths involved heart attacks that were suffered during training, including 2 deaths during physical fitness training and 2 deaths during return to duty or annual recertification tests.

One firefighter was killed when he fell from an aerial ladder during training; 1 firefighter drowned during dive rescue training; 1 firefighter injured his back during training and died of surgical complications; 1 firefighter was killed in a motorcycle collision as he returned to the fire station after an offsite training session; and 1 firefighter was caught and trapped by fire progress in a structural live-fire training exercise.

<b>NOTE:</b> Insert the most current data from NFPA and USFA.
---

## **M 10.0 PRE-BURN COURSE OBJECTIVE**

**M 10.1.0** - The objective of this class session is to prepare you for the live burn drill. Also we will refresh your memory on basic fire behavior, safety procedures, fire attack, and fire ground operations. We will meet this objective in the following way. You will receive instruction during this pre-burn class that will refresh your memory on basic fire behavior and attack skills. Using your protective clothing you will demonstrate the ability to don your protective clothing properly along with your SCBA. Using a fog nozzle you will demonstrate the proper operation of the nozzle. After a lecture and viewing slides or video tapes, you will have an understanding of what you will do during the live burn drill.

**M 10.2.0** - Live fire training conducted in suitable buildings available for demolition provides the realism missing in other types of training. The sights, sounds and sensations the trainee experiences are real. While this level of realism provides excellent training, it obviously carries with it most of the hazards of interior firefighting at an actual emergency. This training session will, therefore, be planned with great care and supervised closely by qualified instructional personnel. Building construction, building condition, exposures, terrain, water supply and a multitude of other variables affect the safety of the participants. The on-site judgment of qualified personnel will be the final factor in determining the safety of any specific situation.

**M 10.3.0** - In order for you to function as a valuable member of your fire department, you must know how to keep yourself from becoming a liability on the fire ground. This type of live burn drill can help to develop the confidence you need to become a well- trained firefighter for your fire department.

## **M 11.0 PERSONAL PROTECTIVE EQUIPMENT**

### **M 11.1.0 NFPA And MN-OSHA Required Personal Safety Equipment**

Helmet  
Hood  
Coat  
Bunker Pants  
Boots  
Gloves  
Flash Light  
Other

<b>NOTE:</b> All personal equipment that STRUCTURE firefighters wear must meet NFPA standards and MN-OSHA rules.
--

#### **M 11.1.1 HELMET**

1. The helmet must meet NFPA standards and MN-OSHA rules.
2. The helmet must have a helmet liner.
3. The helmet must fit on your head with your SCBA face piece and hood on. This means that the helmet suspension must be resting on your head. If your helmet is not properly fitted, you may lose it. If you lose your helmet, a brick or other objects may strike your head, producing serious injury. Another possibility is your helmet may get knocked off or driven down on top of your head, forcing your SCBA face piece off, which may cause you to inhale toxic vapors, proving fatal.

4. The chin strap on your helmet must be able to secure your helmet to your head by fastening under your chin.
5. If your helmet does not fit properly when you show up for the live burn you will not be allowed in the training area.

#### **M 11.1.2 Hood**

1. Hoods are to be worn over the top of the SCBA face piece. This means that you put on your hood first and pull it back like the hood on a hooded sweat shirt. Then you put on your SCBA face piece, adjust the straps, check the seals and pull the hood back up over the top of the face piece straps. After this is complete, put your helmet on.

#### **M 11.1.3 Coat**

1. The coat must meet NFPA standards and MN-OSHA rule.
2. The coat must be in good condition. No holes larger than a U.S. dime, tears, broken snaps, etc.
3. When the coat is on, it must be snapped or fasten together correctly. The storm flap in the front of the coat must be overlapped to form a water tight seal as designed. When the coat is on you should not be able to slide your hand in past the outer flap and touch your street clothes.
4. The insulation liner must be in place.
5. The collar latch and fastener must be working.

#### **M 11.1.4 Bunker Pants**

1. The bunker pants must meet NFPA standards and MN-OSHA rule.
2. The bunker pants must be in good condition. No large holes, tears, broken snaps, etc.
3. When the bunker pants are on, it must be snapped or fasten together correctly. The storm flap in the front of the bunker pants must be overlapped to form a water tight seal as designed. When the bunker pants are on you should not be able to slide your hand in past the outer flap and touch your street clothes.
4. The insulation liner must be in place.

#### **M 11.1.5 Boots**

1. Fire boots must meet NFPA standards and MN-OSHA rule.
2. High top fire boots shall be used if you are not wearing bunker pants.
3. Short boots will only be allowed with bunker pants.

### **M 11.1.6 Gloves**

1. The fire gloves must meet NFPA standards and MN-OSHA rule.
2. The fire gloves must be in good condition. No large holes, tears, etc.

### **M 11.1.7 Flashlight**

1. Every firefighter who enters a structure **should** have a flashlight.
2. Every team who enters the structure **WILL** have at least one flashlight or lantern.

**NOTE:** The use of a flashlight by firefighters inside a building or prop for the purposes of assisting with overhaul is necessary. It is impossible for you to do a thorough job of overhaul in low light conditions.

### **M 11.1.8 Other Items**

1. Other items such as spanner belts should be put on **before** your SCBA so as not to interfere with the donning and doffing of your SCBA.

**NOTE:** The use of other items is optional based on your department policies.

### **M 11.2.0 REQUIRED SCBA**

Cylinder/Air Supply  
Face piece  
Harness  
PASS Device  
Regulator

**All entry people (students and instructors) must comply with MN-OSHA facial hair ruling. Refer to policy dated February 14, 1990 which states:** Fire Training Instructors shall not teach respirator use to students with facial hair or other conditions which impair the mask-face seal.

Reference the March 20, 1984 Minnesota OSHA press release.

### **M 11.2.1 Compressed Air Tank**

1. An SCBA that uses a compressed air cylinder, must supply a minimum of 30 minutes of air supply. It must meet NFPA and MN-OSHA rule.
2. Other types of SCBA must comply with NFPA 1981.
3. Cylinders must have an up-to-date hydrostatic test.
4. Cylinder valves must be turned to the fully-open position.
5. Cylinders should be properly marked as to which department they belong.

### **M 11.2.2 Face Piece**

1. Install your face piece on your head before you place your hood over your head.
2. Perform your two-step face piece seal check.
  - a. Exhaust port check.
  - b. Facial seal check.

### **M 11.2.3 Harness**

1. Make sure to extend all straps before attempting to don SCBA.
2. When you are through with the SCBA, place the unit as instructed by your instructor.
3. Make sure you secure loose straps so you will not become tangled while using the SCBA.

**NOTE:** Most inexperienced SCBA users will over-tighten the shoulder straps. This causes problems with the student's ability to expand the lungs to satisfy the body's need for oxygen. We all know what happens when you think your not getting enough air to breath: PANIC. The other problem is when you over tighten the shoulder straps, your back bone and shoulders are strapped in like you're on a back board which limits movement and causes sore muscles and back pain.

Most SCBA are designed to tighten the waist strap enough to carry the weight of the SCBA on your hips. Then you can loosen the shoulder straps enough to breath properly and gain mobility.

### **M 11.2.4 Regulator**

1. Make sure the student is familiar with emergency procedures.
2. Make sure the main line valves are fully opened while in use.
3. Make sure units that use levers to transfer the unit into positive pressure mode are engaged before entering the hazardous area.

### **M 11.2.5 PASS Device**

1. Make sure the student is familiar with the operation and emergency procedures.
2. Make sure the device switch is activated and test the device before entry.
3. Make sure that the unit is engaged before entering the hazardous area.

## **M 12.0 LEVELS OF TRAINING**

### **M 12.1.0 Level One Training**

The members of the attack team shall be made up of a maximum of three members. One of which can be an experienced firefighter and two lesser experienced members. This will be the decision of the Instructor-in-Charge as to the experience level required and position on the team.

This level of training will consist of sitting down, watching the start of a fire and its growth. The students will view the first stage incipient fire and its growth to a second stage fire where the flames will start to spread across the ceiling area. The students, one by one, will make an attack on the fire, perform ventilation and overhaul the fire. This will be done within the confines of one room.

This guide is designed for you as a reference of the topics you need to cover with your students at a Level I Structural Burn.

#### **LEVEL I**

**Ask the following questions** to find the experience level of each student.

- Have any of you been involved with this type of training before?
- (If Yes) Is your department training through the Minnesota State Colleges and Universities?
- How many years have you been on a fire department?
- When was the last time that you participated in a fire training session like this?
- When was the last time you were on the nozzle at a structure fire?

Use this information to determine the size of fire to build and what location in the building that you want for this team.

**REMEMBER - If you have a student who is doing this for the first time, take extra care to reassure and build confidence.**

Tell the students this:

We are going to show you one method of attacking a structure fire. This method is called **INTERIOR FIRE ATTACK**. What we as a team will see and need to know when we start our part of this training is this: as a nozzle operator on your fire department, you have a very important and hazardous job to perform. In order to do that job safely, you need to understand some things about fire behavior.

We are going to take you into this building, sit you down in a room and start a fire. This will give you a chance to see how fire behaves in one room of a structure such as this.

We have a pile of Class A material (straw or hay, etc.) in the corner of the room. We are going to ignite the pile next to the floor. You will have a chance to see a fire start from a two-inch flame and grow into a second-stage fire.

**Remember** in a second-stage fire we will have fire starting to spread across the ceiling area. This fire spread takes a little time, so you will have plenty of time to ask questions. After each of you have had a chance to apply water and control this fire, each of you will perform fog ventilation through the window.

During this time of fog ventilation each of you will overhaul the fire remains with evidence preservation in mind. Are there any questions so far? What I want you to do next is this.

Which of you has been on the fire department the longest? OK \_\_\_\_\_(name) you are going to be on the nozzle first. Take this nozzle and the team, go over there and let's check our nozzle settings and line pressure. When you operate this nozzle, I want you to open the nozzle all the way (**note difference for automatic nozzles**) and close it all the way when we are applying water to the ceiling area (Indirect Attack).

For a **Level I** burn we are **not** going to use a lot of water to control the fire. We will use most of our water in the fog ventilation of the building. This means you will need to open and close the nozzle quickly if we are going to place the right amount of water into the upper part of the room.

**EXAMPLE:** Typical bedroom fire **total involvement**

A room 12 feet long, 12 feet wide and a 8 foot high ceiling.

$$\frac{L \times W \times H}{100} = GPM$$

$$\frac{12 \times 12 \times 8}{100} = 1152 \text{ cubic feet}$$

$$\frac{1152}{100} = 11.52 \text{ GPM}$$

needed to control the fire **IF** the room was totally involved in fire, floor to ceiling and wall to wall. A fog nozzle operating at 100 psi would then discharge 95 gallons per minute.

This means the nozzle will discharge 1.58 gallons per second.

The nozzle would need to be turned on for 7.29 seconds in order to deliver 11.52 gallons of water into the room to control the fire:

$$\frac{95 \text{ GPM}}{60 \text{ sec}} = 1.58 \text{ gallons per second WHEN THE NOZZLE IS FULL ON!}$$
$$\begin{array}{r} 1.58 \text{ Gallons per second} \\ \times 7.29 \text{ Seconds of nozzle time} \\ \hline 11.5182 \text{ Gallons of water applied} \end{array}$$

\*\*\*\*\*

**EXAMPLE:** Typical bedroom fire, **3 feet of fire across the ceiling.**

A room 12 feet long, 12 feet wide and 3 foot of fire in the ceiling

$$\frac{L \times W \times H}{100} = GPM \qquad \frac{12 \times 12 \times 3}{100} = 432 \text{ cubic feet} \qquad \frac{432}{100} = 4.32 \text{ GPM}$$

needed to control, the fire **IF** the room has 3 feet of fire in the ceiling. A fog nozzle operating at 100 psi would then discharge 95 gallons per minute.

This means the nozzle will discharge 1.58 gallons per second.

The nozzle would need to be turned on for 2.739 seconds in order to deliver 4.327 gallons of water into the room to control the fire.

$$\frac{95 \text{ GPM}}{60 \text{ Sec}} = 1.58 \text{ gallons per second WHEN THE NOZZLE IS FULL ON!}$$
$$\begin{array}{r} 1.58 \text{ Gallons per second} \\ \times 2.73 \text{ Seconds of nozzle time} \\ \hline 4.237 \text{ Gallons of water} \end{array}$$

When I give you the order to "HIT IT", I want you to aim your nozzle so you will place your water on the ceiling, above the fire area. This is generally towards the corner of the room. If the fire has covered most of the ceiling area, then aim for the center of the ceiling area.

**Remember,** you will need to open and close the nozzle quickly. This is the only time we will allow a water hammer on the hose line. If you put too much water into the room we will up set the **THERMAL BALANCE**. This will cause the super heated atmosphere at the ceiling level to be forced down to the floor where we are.

**Remember** you can always give the fire another shot of water, but you can't take it back if you give it too much. This is all part of **SIZE UP** and you must **remember** that the bigger the fire, the more water you need which means the nozzle will be on longer.

I will give each of you a chance to attack and control the fire. Once you have the fire under control, I will ask you to go to where the third team member is on the line. I want you to **CRAWL** when changing positions. I do not want you to stand up and walk to the last position. If you stand up, you may be placing your head into temperatures over 500 °F so crawl!

After each of you have done this to my satisfaction, we will start fog ventilation through a window or door way in the room. Here's what I will ask you to do. First, we will locate a window or door to **VENT**. This means to relieve pressure and heat. During this time period in a building the upper layers of gases may get very hot. It is the utmost importance that you **remember** that you are the most important person on the fire ground and, therefore, your safety is your number one concern.

In most cases, if the Incident Commander on the outside of the building has done his/her job, you should hear glass breaking in the room or rooms that are showing fire. This will do three things: 1) increase oxygen flow, which will increase the fire growth; 2) increase the visibility by allowing smoke to exit the building; and 3) allow heat to exit the building, which will make a safer and cooler work environment for you.

By keeping all this in mind, we **should** be able to go to the window and remove any obstructions that will interfere with ventilation. **Remember** to remove **ALL GLASS** from the window if possible and any other obstructions.

Let me give you a hypothetical situation. Here we are, in this room, and we decide to ventilate by using the hose stream method out the window. If we spray water out through the window without removing the glass pieces, we will blow them out into the street or yard.

Spectators, or even your son or daughter have come down to watch Dad or Mom fight a fire. You just stuck a piece of glass into their face!! Your fire department just became the most incompetent bunch in town.

Public relations, that you have worked so hard on over the last twenty years, just went down the tube. Again, if the Incident Commander is doing his/her job, the public or spectators will not be close enough to get hurt!! This includes our fire fighters who are not directly involved in fire operations - we call these persons "spectators" also.

So if conditions are good enough to allow you to check the window before ventilating, then do so, but if not, do what you have to do to keep yourself safe. In other words stay down on the floor, use your straight stream to break out the window and ventilate from the floor, out the top part of the opening!!

If this is necessary, I will tell you to do it, otherwise we will go to the window and break the glass and check for obstructions. When you are ready to start ventilation, get back as far as you can from the window and yet see the outline of the window before you open your nozzle.

Once everyone is ready, open the nozzle enough on **STRAIGHT STREAM** to cause the water to just pass through the window. This gives the fire fighters on the outside of the building a chance to get out of the way. After a couple of seconds or so, open the nozzle full open (**note difference for automatic nozzles**) and adjust the pattern adjustment towards the fog so as to just fill the window opening.

Try to get all of the water to flow out through the window. This will cause large amounts of air to move through the room and out the window. This will carry smoke and heat out very quickly and cool the room down to a more livable condition.

This process will also bring fresh air to any smoldering fire that you may have. You will more than likely get increased flame activity again. So have your team mates watch for rekindling fires.

**UNDER NO CONDITIONS DURING THIS DRILL WILL YOU MOVE OR WALK BACKWARDS WITH THE NOZZLE TURNED FULL ON OR HAVE THE HOSE LINE ABOVE YOUR SHOULDER WHILE VENTILATING.**

When you try to move with a charged flowing hose line, as soon as you lift up your one foot to take a step, your body will try to pivot on the other foot. This makes your whole body unbalanced. The nozzle reaction pressure in the hose line will try to spin you around in a circle. When this happens you run the risk of losing control of your line and or slipping or failing.

When I tell you to "SHUT DOWN" I want you to adjust the nozzle back to straight stream, and then shut off the nozzle all the way. You will then go to the origin of the fire and start "OVERHAULING THE FIRE".

To do this you will need to remember that your fire is more than likely deep seated. This means that your fire may be at the bottom of the couch cushion or at the bottom of the mattress. If this is the case try to use as little water as possible and yet get the water to the area that needs it.

If you need to move something to extinguish the material under it, put it back in the same place as you found it if at all possible. This will help in the investigation of the fire. This is where you will need a flash light to allow you to see where the smoke is rising from the debris. Adjust the nozzle to straight stream and place the nozzle directly over the rising smoke.

Then turn the nozzle on enough to penetrate to the seat of the fire. This is called the "DIRECT ATTACK" method of fire attack. After each of you have had a chance to go through this ventilation and overhaul procedure we will take a look around the building to check for extension of fire. If finding none we will leave the building remembering to **BACK DOWN ANY STAIRS** that we come across.

I will ask the third team member to call the hose tenders and tell them we are coming out. Once we are out side, get your SCBA off as quickly as possible and report to the critique area for debriefing.

Now that you have an idea what we are going to be doing while we are inside, do you have any questions? If not, lets get our attack line and check it out. **Remember** to always check your line before entering a fire area of the structure.

We always prepare for the worst conditions when we enter a building. This means we set the nozzle pattern to narrow fog pattern so we are prepared to attack overhead fire. The gallon age adjustment is set to 95 G.P.M. so we have adequate volume to handle most residential type fires. Next get a good grip on the line and turn the nozzle on slowly. With the water flowing and the nozzle full open, count to five like this: 1001, 1002, 1003, 1004, 1005. Now we should be relatively assured of a good attack line. No kinks, the pump operator is attentive, and all the air has been removed from the line.

Next I want you to practice opening and closing the nozzle and refresh yourself on which way to turn the nozzle for wide fog and straight stream ((**Left for (L)ife**, WIDE FOG and **Right for w(R)eck**, STRAIGHT STREAM)). When each of you are finished doing this we will enter the structure and we will show you a few more things.

OK, lets spread out so there is about four (4) feet between you and the person in front of you. We don't want to trip the person in front of us. **Remember this** - if we climb stairs, when we come down, we **back down** the stairs. That way, if you slip and fall, you will land on your hands and not on your back! We do not bunch up in a stairway, either.

**NOTE:** At this point make a last minute equipment safety check of your students and yourself. Then make sure all of the students are on the same side of the hoseline and tell the safety officer you are ready to enter the structure. When ordered by the safety officer, take the students to the area for their training.

All of the above information should be covered in the pre-burn class. It should also be covered at the burn site with your team during their time in R & R before you enter the structure. Then cover this information while you are inside with your team. Once you are outside in the critique area, recap the events and the activities that were done by each student.

### **ADDITIONAL INSTRUCTOR INFORMATION FOR YOU TO USE**

#### **Steam Production**

Visualize a nozzle discharging 95 gallons of water fog into an area heated to approximately 212°F, with the water converting into steam. During one (1) minute of operation, 10 cubic feet of water will have vaporize and expand to approximately 17,000 cubic feet of steam. This is enough steam to fill a room approximately 10 feet high, 25 feet wide and 68 feet long. In extremely hot atmospheres, steam will expand to even greater volumes.

### **VOLUME OCCUPIED BY WATER TURNED INTO STEAM**

<b>TEMPERATURE °F</b>	<b>ONE U.S. GALLON (cu.ft.)</b>
212	225
300	250
400	275
500	300
600	325
700	350
800	400
900	450
1000	500
1200	550

#### **M 12.2.0 Level Two Training**

The members of this team shall be made up of firefighters of Level I ability. They will use skills acquired in Level I to attack a fire which has extended beyond one room.

Their objective will be to stop the forward progress of the fire and to gain control of the fire by reducing the fire to a Stage I or incipient fire.

The students may wish to start their attack from within the structure so as to watch the growth of the fire, or they may start from the outside of the structure and work their way in to the seat of the fire.

In this level of training each student is acting as team member, rather than in an individual learning situation. Each member of the team will be able to act as team leader and make an attack on the fire.

The team leader will be acting under the direction of the instructor, who will be right behind the student, but the student will make all decisions regarding attack methods. The instructor will be there for support and/or any corrections that may be needed.

Once the fire has been brought under control (all overhead fire is gone), the instructor will back the team out and start over with a new team leader. This procedure will continue until all three students have accomplished the objective.

The last team member to attack the fire will perform any ventilation that may be needed to clear the structure for the next team.

This guide is designed for you as a reference of the topics you need to cover with your students at a Level II structural burn.

## **LEVEL II**

**Ask the following questions** to find the experience level of each student.

- Have any of you been involved with this type of training before?
- (If Yes) Is your department training through the Minnesota State Colleges and Universities?
- How many years have you been on a fire department?
- When was the last time that you participated in a fire training session like this as a Level I participant?
- When was the last time you were on the nozzle at a structure fire?  
Use this information to determine the size of fire to build and what location in the building that you want for this team.

**REMEMBER: If you have a student who is doing this for the first time as a Level II, take extra care to reassure and build confidence.**

Tell the students this:

We are going to show you one method of attacking a structure fire. This method is called **INTERIOR FIRE ATTACK**. What we as a team will see and need to know when we start our part of this training is this:

As a nozzle operator on your fire department, you have a very important and hazardous job to perform. In order to do that job safely you need to understand some things about fire behavior.

We are going to start a fire inside of this building. As a team, you will have the chance to attack a multiple room fire and bring the fire under control. I can either take you into this building and let you watch the fire progress or we can stay out side until it is time to enter; it will be your choice.

This training is different from what you did in Level I. **Remember** in Level I we showed you fire behavior from a small one room situation with short applications of water to control the overhead fire.

Level II fires are larger and require more water. On this drill our number one mission is to get this fire under control. That means we need to knock down the fire in all areas involved. We are not concerned at this point with water damage or rescue.

If we don't bring the fire under control, we will not have a structure left in which to perform a search. We have to stop the forward progress of the fire by placing our attack line between the advancing fire and the rest of the structure.

This Level II training will give you a chance to see how fire behaves in multiple rooms of a structure such as this. We have a pile of Class A material (straw or hay, etc.) in the rooms we going to ignite.

We are going to ignite the pile next to the floor, just like we did at your Level I training. You will see a fire start from a two-inch flame and grow into a second-stage fire.

**Remember** in a second-stage fire we will have fire spreading across the ceiling area. This fire will extend into the areas around it. You will see the fire extend downward from the ceiling and eventually fill the ceiling area, so it has to come through the door way.

At this point the smoke that has been collecting in the ceiling area of the other rooms will start to ignite and spread across the ceiling. This fire in the ceiling area will radiate downward and cause more heating of combustibles in the area.

This all will happen quickly once the temperature inside of the first room that we ignited gets high enough to cause all combustibles to give off enough vapors and ignite. At this point the room will become totally involved. When I say totally involved, I mean fire from wall to wall and fire from floor to ceiling.

During this time while the fire is growing, remember your fire behavior. Hot unburned gases in the form of smoke will be traveling upwards looking for a way out of the structure. This means that the upper floors or areas will be very hot and loaded with unburned fuel.

Once the upper floors or areas fill, the smoke will push its way to the floor restricting visibility and bring hotter temperatures as it goes. As we enter the structure your turnout gear will heat up. This means we need to get in, get the job done and get out. Because of the heat factor, I want you to switch nozzle operators frequently.

A good rule of thumb is each of you will knock down fire in one room, then give the nozzle to the person behind you and let them take the next room. This will give you a chance to cool down a little.

After you, as a team, have had a chance to control this fire, you will perform ventilation through the window ventilation as necessary. We are not going to spend as much time venting as we did in the Level I training.

Are there any questions so far?

What I want you to do next is this. Decide among yourselves who is going to be on the nozzle first. OK \_\_\_\_\_(name) you are going to be on the nozzle first. Take this nozzle and the team, go over there and let's check our nozzle and line pressure. When you operate this nozzle I want you to open the nozzle all the way and close it all the way when we are applying water to the ceiling area (Indirect Attack) just like you did in Level I.

For a LEVEL II burn we are going to use a lot more water to control the fire. Our mission is to locate the fire and drive it back where it came from. If the outside ventilation team does their part, we will be able to easily push it out of the building. When you apply water, I want you to apply it to the upper areas of the room.

At no time should you rotate the nozzle in a combination attack method. This will upset the thermal balance and things will really get hot. It may be difficult to see the ceiling area because of the thick dense smoke.

You must **remember** to watch the overhead area with your eyes, use your ears to listen for the fire, and use your face to feel the direction of the source of the fire. **Remember** most of the fire will be traveling towards you. If you see the smoke in the ceiling in front of you start to turn orange in color, you must apply just enough water to the ceiling area to bring the ceiling temperature down below the ignition temperature of the smoke.

At the same time you may have to apply water into other areas. **Remember**, if there is no fire in the ceiling area be careful about putting any water in the ceiling, it may not be hot enough to convert it to steam. You may have 211 °F water dripping down on you.

If there is no fire in the ceiling you should re-adjust your nozzle pattern to straight stream and use direct attack on the fire, NOT FOG.

**EXAMPLE:** Typical bedroom fire **total involvement**

A room 12 feet long, 12 feet wide and a 8 foot high ceiling.

$$\frac{L \times W \times H}{100} = GPM \qquad \frac{12 \times 12 \times 8}{100} = 1152 \text{ cubic feet} \qquad \frac{1152}{100} = 11.52 \text{ GPM}$$

needed to control the fire **IF** the room was totally involved in fire, floor-to-ceiling and wall-to- wall. A fog nozzle operating at 100 psi would then discharge 95 gallons per minute.

This means the nozzle will discharge 1.58 gallons per second.

The nozzle would need to be turned on for 7.29 seconds in order to deliver 11.52 gallons of water into the room to control the fire:

$$\frac{95 \text{ GPM}}{60 \text{ sec}} = 1.58 \text{ gallons per second } \mathbf{WHEN \ THE \ NOZZLE \ IS \ FULL \ ON!}$$

1.58 Gallons per second  
 x 7.29 Seconds of nozzle time  
 11.5182 Gallons of water applied

\*\*\*\*\*

**EXAMPLE:** Typical bedroom fire **total involvement**

A room 12 feet long, 12 feet wide and 3 feet of FIRE in the ceiling area

$$\frac{L \times W \times H}{100} = GPM \qquad \frac{12 \times 12 \times 3}{100} = 432 \text{ cubic feet} \qquad \frac{432}{100} = 4.32 GPM$$

needed to control, the fire IF the room has 3 feet of fire in the ceiling area. A fog nozzle operating at 100 psi would then discharge 95 gallons per minute.

This means the nozzle will discharge 1.58 gallons per second.

The nozzle would need to be turned on for 2.739 seconds in order to deliver 4.327 gallons of water into the room to control the fire.

Gallons per second **WHEN THE NOZZLE IS FULL ON!**

1.58	Gallons per second	$\frac{95 GPM}{60 Sec} = 1.58$
x <u>2.73</u>	Seconds of nozzle time	
4.237	Gallons of water	

You will decide when to turn on the nozzle and start your attack. If it looks like you're waiting too long, I will suggest to you that we get going NOW. By this stage in your training, you should know what needs to be done and I will be right beside you to help.

**Remember**, you will need to open the nozzle long enough to darken down the fire. This means that the light from the fire will disappear and it will get dark again. When you shut off the nozzle be careful and ready so the fire does not come right back in your face. This is all part of **SIZE UP** and you must **remember** that the bigger the fire the more water you need. Hopefully each of you will have a chance to attack and control the fire, but conditions at the time will dictate that. Once you have the fire under control, and do some mop up, we will leave the structure. **DO NOT** stand up to move around while we are inside unless I tell you it's okay. If you stand up, you maybe placing your head into temperatures well over 500 °F, **so crawl!**

If we have to ventilate through the window or door way in the room, here's what I want you to do. First we will locate a window or door to **VENT**. This means to relieve the pressure and the heat. During this time period in a building the upper temperatures will be very hot.

It is of the utmost importance that you **remember** that you are the most important person on the fire ground and, therefore, your safety is your number one concern. In most cases, if your Incident Commander on the outside of the building has done his/her job, you should hear glass breaking in the room or rooms that are showing fire.

This will do three things; increase oxygen flow, which will increase the fire growth, increase the visibility by allowing smoke to exit the building, allow heat to exit the building which will make a safer work environment for you. Keeping all this in mind we **SHOULD** be able to go to the window and remove any obstructions that will interfere with ventilation.

**Remember** to remove **ALL GLASS** from the window if possible. Let me give you a hypothetical situation. Here we are in this room and we decide to ventilate by using the hose stream method out the window. If we spray water out through the window without removing the glass pieces, we will blow them out into the street or yard.

Spectators, or even your son or daughter who came down to watch Dad or Mom fight a fire -- you just stuck a piece of glass into their face!! Your fire department just became the most incompetent bunch in town. Your public relations, that you have worked so hard on over the last twenty years, just went down the tube.

Again, if the Incident Commander is doing his/her job, the public or spectators will not be close enough to get hurt!! This includes our fire fighters who are not directly involved in fire operations, we call these "spectators" also.

So if conditions are good enough to allow you to check the window before ventilating, then do so. If not, do what you have to do to keep yourself safe. In other words stay down on the floor,

use your straight stream to break out the window and ventilate from the floor, out the top part of the opening!!

If this is necessary I will tell you to do it, otherwise we will go to the window and check for obstructions if we have to start ventilation. As in Level I, get back as far as you can from the window, but at a place where you are able to see the outline of the window, before you open the nozzle.

Once everyone is ready, open the nozzle enough on **STRAIGHT STREAM** to cause the water to just pass through the window. This gives the fire fighters on the outside of the building a chance to get out of the way. After a couple of seconds or so, open the nozzle full open (**note difference for automatic nozzles**) and adjust the pattern adjustment towards the fog so as to just fill the window opening.

Try to get all of the water to flow out through the window. This will cause large amounts of air to move through the room and out the window, which will carry smoke and heat out very quickly and cool the room down to a more livable condition. This process will also bring fresh air to any smoldering fire that you may have. You will more than likely get increased flame activity again. So have your teammates watch for rekindling fires.

**NOTE:**

**UNDER NO CONDITIONS DURING THIS DRILL WILL YOU MOVE OR WALK BACKWARDS WITH THE NOZZLE TURNED FULL ON OR HAVE THE HOSE LINE ABOVE YOUR SHOULDER WHILE VENTILATING.**

When you try to move with a charged flowing hose line, as soon as you lift up your one foot to take a step, your body will pivot on the other foot. This makes your whole body unbalanced. The back pressure in the hose line and the nozzle reaction will try to spin you around in a circle. When this happens you run the risk of losing control of the line and or slipping on the floor.

When I tell you to "SHUT DOWN" I want you to turn the nozzle over to the person behind you and go to the third position on the team. When leaving the building **remember** to BACK DOWN ANY STAIRS that we come across. I will ask the third team member to call the hose tenders and tell them we are coming out. Once we are outside, get your SCBA off as quickly as possible and report to the critique area for debriefing.

Now that you have an idea what we are going to be doing while we are inside, do you have any questions? If not, let's get our attack line and check it out. **Remember** to always check your line before entering a fire area of the structure. We always prepare for the worst conditions when we enter a building.

This means we set the nozzle pattern to narrow fog pattern so we are prepared to attack overhead fire. The gallon age adjustment is set to 95 G.P.M. so we have adequate volume to handle most residential-type fires. Next get a good grip on the line and turn the nozzle on

slowly. With the water flowing and the nozzle full open, count to five like this: 1001, 1002, 1003, 1004, 1005. Now we should be relatively assured of a good attack line. No kinks, the pump operator is attentive, and all the air has been removed from the line.

Next, I want you to practice opening and closing the nozzle and refresh yourself on which way to turn the nozzle for wide fog and straight stream ((**Left for (L)ife**, WIDE FOG and **Right for w(R)eck**, STRAIGHT STREAM)). When each of you have finished doing this, we will start our training.

Are there any questions so far?

Have you decided if you want to go inside and watch the fire start or stay outside and wait for it to come to us. OK let's spread out so there are about four (4) feet between you and the person in front of you. We don't want to trip the person in front of us.

**Remember** this if we climb stairs, we back down the stairs when we come down. If you slip and fall, you will land on your hands and not on your back! We do not bunch up in a stair way, either.

<p><b>NOTE:</b> At this point make a last minute equipment safety check of your students and yourself then tell the safety officer you are ready to ignite the fire.</p>
--

<p><b><u>INSTRUCTOR NOTE:</u></b> All of the above information should be covered in the pre-burn class. It should also be covered at the burn site with your team during their time in R &amp; R before you enter the structure. Once you are outside in the critique area, recap the events and the activities that were done inside by each student.</p>
--

### **ADDITIONAL INSTRUCTOR INFORMATION FOR YOU TO USE**

#### **Steam Production**

Visualize a nozzle discharging 95 gallons of water fog into an area heated to approximately 212° Fahrenheit with the water converting into steam. During one (1) minute of operation, 10 cubic feet of water will vaporize and expand to approximately 17,000 cubic feet of steam. This is enough steam to fill a room approximately 10 feet high, 25 feet wide and 68 feet long. In extremely hot atmospheres, steam will expand to even greater volumes.

## VOLUME OCCUPIED BY WATER TURNED INTO STEAM

TEMPERATURE °F	ONE U.S. GALLON (cu.ft.)
212	225
300	250
400	275
500	300
600	325
700	350
800	400
900	450
1000	500
1200	550

### M 12.3.0 Level Three Training

This level of training is designed to simulate as close as possible, a normal response to an involved structure.

The members of this team shall be made up of minimum of five (5) people. An officer, a pump operator, an outside vent person, and two (2) nozzle people. All members must be of Level II experience. This team will have a choice of starting their attack from somewhere on the drill site and reacting as if they were responding to an actual emergency. Each team member will have specific duties to perform. They will be instructed to do so by the OIC (Officer-In-Charge). The duties of the team are as follows:

#### **Officer-In-Charge** (Accompanied by one instructor)

Conduct a size-up of the situation and find a location from which to conduct the operation and coordinate the attack plan. The OIC should locate a position on the outside of the structure where he/she can have visual contact with all team members if radio communications with team members is not available. This individual will make one complete trip around the structure (residential house) to obtain size-up information. He or she will be looking for the location of smoke and it's condition, fire and stage of

burning and any potential for rescue. Then report back to the awaiting team with a tactical plan. Once every one understands their assignment the order is given to GO.

### **Pump Operator**

The pump operator must position the apparatus so as to facilitate the use of tankers, drop tanks, hose lines, and other equipment on the apparatus from a safe area. Also the operator must maintain adequate nozzle pressure for the attack lines and adequate water supply to ensure the safety of the attack team. The pump operator must warn the team in the event of his water supply becoming dangerously low. This individual must be a qualified pump operator on the department. No student operators will be allowed to operate the pump during this drill.

### **The Vent Person**

When given the order from the OIC, this person will vent the structure starting with the room or rooms which have fire showing. This individual will use a pike pole long enough to reach all windows. All windows, screens and all glass must be removed in the room or rooms with fire showing.

The objective of this team member is to relieve the structure of heat and smoke. If at all possible, also change the direction of fire travel from an inward travel to an outward travel. This will allow the nozzle team to accomplish their objective of reaching the seat of the fire safely.

When this is accomplished return to the OIC and wait for orders to vent the rest of the structure as soon as steam production is evident and the attack crew is making progress.

### **The Nozzle Team**

These two individuals, shall wear SCBA and will be responsible to stretch a pre-connected inch-and-a-half (1-1/2") minimum hose line to the attack point which is determined by the OIC. They must select a line that will be long enough to reach wherever they have to go.

Air trapped within the hose line must be bled off through the nozzle prior to entering the structure. The team must adjust the flow G.P.M. discharge and set the fog pattern. When they are ready to enter the structure they will signal the OIC and wait for the OIC to give the team a signal to begin.

These firefighters will use the water that is available in their booster tank and skills acquired in Levels I and II to attack a fire which has extended beyond one room and may involve one or more floors.

Their objective will be to arrive by fire apparatus, set up operations to control and extinguish a structure fire by stopping the forward progress of the fire and gaining control of the fire by extinguishment, and perform any fog ventilation that is needed.

The students will start their attack from outside the structure so as to size up the growth of the fire and work their way in to the seat of the fire. In this level of training each student is acting as a team member, rather than in an individual learning situation.

One member of the team will be selected to act as team leader and lead the attack on the fire. The team leader will be acting under the direction of the instructor, who will be right behind the student, but the student will make all decisions as to attack methods.

The instructor will be there for support and any corrections that may be needed. Team members will rotate to the nozzle position about every 30 seconds throughout the attack to help maintain a cooler body temperature. Once the fire has been brought under control (all over head fire is gone), the instructor will back the team out and start over with a new team.

## **M 13.0 ATTACK TEAM**

Make-up  
Function  
Drill procedures

### **M 13.1.0 Make-Up**

The interior attack team will be made up of a maximum of four (4) people. One (1) instructor and normally three (3) firefighters. The reason for three is to ensure existence of the crew system in the training session. This does not mean that your department must use the crew system of three (3) people on an attack team. **Remember** for maximum safety you should use the crew system.

### **M 13.2.0 Function**

The function of an interior attack team is to:

- (1) Place the nozzle between the fire and any potential victims; or
- (2) Place the nozzle between the fire and the unburned or undamaged portion of the structure; or
- (3) Confine and control the fire; and
- (4) Extinguish the fire.

The function of the attack team for this drill session will be basically the same for each level of training.

### **M 13.3.0 Drill Procedures**

The interior attack team will be assigned an instructor, and a team number or letter by the Instructor-in-Charge. The team instructor, will direct the evolution from beginning to end and stay with the team until the team has been critiqued. While operating on the attack team you will take direction from your instructor as he/she will be responsible for your safety and individual training.

The interior attack team will enter the structure only when a back up team is ready.

The instructor will:

- (1) Double check each team for equipment safety.
- (2) Determine the level of training (I, II, or III).
- (3) Assign a position for you on the team (1, 2, or 3).
- (4) Explain your assignment to you.
- (5) Make sure the instructor line is in the appropriate position.
- (6) Critique you and your team when done.

### **M 14.0 BACK-UP TEAM(s)**

Make-up  
Function  
Drill procedures

#### **M 14.1.0 Make-Up**

The back-up team(s) will be made up of a maximum of four (4) people. One (1) instructor and normally three (3) firefighters. The reason for three is to ensure existence of the crew system in the training session. This does not mean that your department must use the crew system of three (3) people on an attack team. **Remember** for maximum safety you should use the crew system.

This team will be exterior to the building be ready outside of the point of entry by the attack team.

If it is necessary for this team to perform it's backup duties inside the structure, then another backup team will need to be placed outside of the structure, essentially replacing the first team.

MN-OSHA requires an outside exterior backup team (two-in-two out rule)

### **M 14.2.0    Function**

The function of the back-up team is to be a rapid intervention rescue crew for the attack team. The interior back-up team will:

- (1) Be completely suited up, ready to enter the structure at a moments notice from their instructor. The only thing they will have to do before entry is to hook up the breathing tube on their SCBA.
- (2) Be alert to indications of trouble from the attack team.
- (3) Be alert to indications of structural problems.

The function of the back-up team for this drill session will be basically the same for each level of training.

### **M 14.3.0    Drill Procedures**

The back-up team(s) will move to a location **outside** the structure as directed by the instructor as soon as the attack team has entered the structure. Adjust the nozzle for proper flow and pattern, then wait for the instructor to call you in if needed.

The back-up team will be assigned an instructor and a team letter or number by the Instructor-in-Charge. The team instructor, will direct the evolution from beginning to end and stay with the team until the attack team has returned to the outside of the structure. While operating on the back-up team you will have an opportunity to review what you will be doing when you are the attack team. Your instructor will be responsible for your safety and your individual training.

The instructor will:

- (1) Double check each team for equipment safety.
- (2) Review the level of training (I, II, or III).
- (3) Assign a position for you on the team (1, 2, or 3).
- (4) Prepare you with the attack team procedures.

## **M 14.4.0 Rapid Intervention Crew and Rescue Plans**

A 5-person rapid intervention crew (RIC) as reference in NFPA 1500, of skilled individuals qualified by the Fire/EMS/Safety Center or local college administration staff to maintain a state of readiness for the purpose of retrieving participants in case of emergency. Appropriate RIT equipment will be positioned outside the operations area for immediate deployment at all live fire-training activities. The team leader will work directly with the safety officer.

In the event that a rescue or assistance needs to be provided to a down or distressed firefighter a MAYDAY message will be issued. If firefighters report problems to their supervisors without issuing a mayday, ANY personnel on the training ground may issue one for them if they feel conditions warrant.

The on-scene rapid intervention crew will be sent to the area of the incident.

If an interior crew mayday alarm is initiated, the nearest interior or exterior back-up line will immediately search and assess the situation and conditions. Communicate their findings to the command staff and start rescue or fire control if able.

If the on-scene resources or not adequate based on the situation, additional resources will be immediately dispatched to the scene.

In the event that the interior back up line is also in distress and cannot search and assess the next due back up line will perform this function. The next in attack crew will still become the RIT and staged crews will move up and await assignment.

An accountability or 'PAR' check will be conducted by the IC of those in the operations area as early on as possible. Distressed firefighters will be identified by name.

If an exterior crew mayday alarm is initiated, the next in attack lines will assist the RIC. Back up lines will remain in stand by mode for interior crews.

A instructors will be given training on RIC, terminology, and RIC rescue concepts and operations regardless of pervious background.

## **M 15.0 ATTACK METHODS**

### **M 15.1.0 Direct**

Water is applied in a solid stream or in a fog straight stream form on the combustibles at the seat of the fire. This is the most common and the most traditional method. It is most

effective on incipient fires, or fires in the pre-flash over stage. If used correctly this method does not upset the thermal balance in the room.

### **M 15.2.0 Indirect Attack**

Water is injected in a narrow fog form into the upper area or space within a highly heated and confined location. This causes rapid generation of steam which inerts the area, cools the combustibles below their ignition temperature, and transfers concentrations of excessive heat from the involved area to the outside by way of convection.

### **M 15.3.0 Combination**

The combination method incorporates both the direct and indirect method of attack. It is done with fog nozzles set in the narrow fog pattern to begin with. The nozzle and the end of its hose line are rotated in a large circle by the person operating the nozzle.

Usually the circle is moved in a **clockwise direction**. The alleged reason for clockwise rotation is that the water in the hose rotates clockwise and tends to drive the heat and smoke away from the firefighter. The nozzle will direct the water into both the upper atmosphere and upon the seat of the fire. As this method is used, you must remember to adjust the nozzle slowly towards the straight stream position to get the water fog into new areas of heat so as to continue steam production. Failure to do this will cause the immediate area to cool down, but will not cause the steam or water to reach deeper into the structure or the area you are working.

The combination method is generally the most effective method of structural fire attack when the structure is well involved. The method can be applied from a door way towards the inside of the building or on the outside through a window, in a defensive mode. This method lends itself to easy application by one person when using lines smaller than 2-1/2". **REMEMBER** - It's not a good idea to do this method if you are inside of the room or area that you need to bring under control. This method upsets the thermal balance and will bring hot ceiling temperatures to the floor area.

It is also important that you **DO NOT** shut the nozzle off until you have backed away from the opening or the fire has been reduced to an incipient stage. You will possibly get a blast of hot gases or flames coming out of the opening you are in. If you must move or reposition to another opening, adjust the nozzle back to the wide fog setting as this will protect you and reduce nozzle reaction pressure. The indirect method will work under ideal circumstances and does have its value in firefighting. However, use of the direct or combination method in coordination with conventional ventilation techniques is suggested.

The direct method inherently encourages fighting the fire "blind" from outside the fire area or building. If an offensive attack can be made safely or if rescue is a problem, then lines must be taken inside to the seat of the fire, or to a point between the fire and the occupants. If the fire cannot be fought from the inside, after proper ventilation is accomplished, then a defensive attack is better accomplished by using the combination method or heavy streams depending upon the magnitude of the particular fire.

## **M 16.0 HOSE LINE AND NOZZLE OPERATIONS**

G.P.M. Flow Setting  
Fog Pattern Setting  
ON/OFF Timing & Operations

### **M 16.1.0 Flow Setting**

Before entering the structure you must check the nozzle for proper G.P.M. setting (flow in gallons per minute). A nozzle of at least 95 G.P.M. must be used. Anything less than 95 G.P.M. does not afford enough protection for the firefighter in the average residential structure fire. Depending on the size of structure you may be required to use larger flow capacities to ensure adequate safety for the nozzle team.

### **M 16.2.0 Fog Pattern Setting**

Fog nozzles have an adjustment for determining the way the water leaves the nozzle: straight stream, narrow fog, and wide fog. Before entering the structure you must check the nozzle for proper pattern setting. A nozzle pattern of narrow fog is recommended for most interior applications.

#### **RECOMMENDED PATTERN USE FOR TRAINING**

##### **Straight stream**

- = Direct Attack in over-haul. Level 1,2,3
- = Direct Attack in cooling the outside walls and roof before entering the structure. Level 2,3
- = Direct Attack in cooling the burning materials when steam generation is no longer effective. Level 2,3

##### **Narrow Fog**

- = Indirect Attack Interior application to the ceiling area. Level 1,2,3

##### **Wide Fog**

- = Indirect Attack Exterior approach to the entrance for self cooling. Level 2,3
- = Indirect Attack Interior for protection or confinement of the fire. Level 1,2,3

## M 16.3.0 ON/OFF Timing & Operations

Before entering a structure you must remove the air from the hose line. To accomplish this, aim the nozzle in a safe direction so as not to cause injury to others or damage property, then open by pulling back on the bail, allowing the water to flow from the nozzle. When finished push forward on the bail, shutting off the water.

It is important to open the nozzle all the way to ensure that there are no restrictions in the hose line and that the pump operator has the pump set at is at the proper discharge pressure. Allow the nozzle to flow at least five (5) seconds.

A short on/off operation will not always determine if you have an active line that is ready to be used. For this drill you will be expected to count 1001, 1002, 1003, 1004, 1005, before shutting down the nozzle. While the nozzle is flowing check for rocks or other debris in the nozzle pattern.

When you have accomplished this, and are sure you have a good active line that won't go flat or blow air instead of water on the fire, you are then ready to enter the structure.

Once you are inside and you are a member of a Level I evolution, listen for your instructor to tell you when to turn the nozzle on and off. For this level of training you will not need a lot of water applied at one time.

The objective is to control the fire by the indirect attack method. This is done by applying a small amount of water to the upper levels of the room in a short (one or two second) application. All water applied to the ceiling area should turn into steam. If it does not, it will rain down on you at a temperature of 211 ° F.

This will be the only time you will be allowed to turn the nozzle on and off (water hammer) rapidly. This will cool the super-heated atmosphere in the ceiling area, retarding the ignition of the gases collecting in the ceiling area by cooling them down below their ignition temperature. In this way you can control the spread of the fire and keep the super-heated gasses above your head and away from you. It will help to keep you cool and allow for better visibility.

For Level II and III training you will encounter more fire, so you will need longer on time for the nozzle. The simple rule is, more fire equals more water. Watch for the reduction of flames to give you an indication that enough water has been applied. **Remember** you don't want a sauna, so don't upset the thermal balance!

## **M 16.4.0    Hose Line Pressure Test**

Before any hose lines are to be used, a NFPA hose test shall be conducted. This can be done as soon as the lines are positioned before entering the structure. A five (5) minute, 250 PSI pressure test will be conducted.

## **M 16.5.0    Hose Line Positioning**

Positioning of hose lines for fire control, back up, instructor line and exposure protection is of great importance. Hose lines will be positioned as per the instructions of the Instructor-in-Charge. The instructor line, which is feed from the back up pumper, is used to reduce the amount of time it takes the backup team to reach the area of the attack team. With this line the instructor can bring the fire under control immediately.

The hose layouts and sizes used are primarily for safety purposes only. It is not the intent to suggest that this is the only way for the local fire departments to position hose lines at a fire.

### **M 16.5.1    Attack Pumper Lines**

In most training situations a two-and-a-half inch (2-1/2") line from the attack pumper, stretched to the location where the teams will enter and terminating with a 2-1/2" gated wye, is recommended. From the gated wye, attach two (2) inch and a half (1 1/2") lines with fog nozzles. Make sure that these lines will reach all areas of the structure by stretching them in dry to the farthest point and actually check for hose length.

One of these lines will be used for the attack teams. The other will be at the discretion of the Instructor-in-Charge. Most often it will be used as a practice line.

### **M 16.5.2    Back Up Pumper Lines**

From the back-up pumper, stretched to the location where the teams will enter a two-and-a-half inch (2-2 ") line terminating with a 2-2 " gated wye. From the gated wye attach two (2) inch and a half (1 2 or 1 3/4") lines with fog nozzles. Make sure that these lines will reach all interior areas of the structure to within one foot of the wall on the farthest point. One of these lines will be used for the back-up teams.

### **M 16.5.3 Instructor Safety Line**

The other will be used as an additional safety line, which is brought in and positioned near the attack team instructor. This line may have an additional instructor or safety officer in position on this line. This will be at the discretion of the Instructor-In-Charge. The purpose of this line is to reduce the amount of time it takes before the backup team to reach or have an effect on protecting the attack team. We have found that this line being immediately accessible to the instructor increases the safety of the team substantially.

### **M 16.5.4 Quick Knock Down Line**

From the attack pumper, stretch an additional line capable of a 200 G.P.M. mid-range flow. If this is not available then stretch an uncharged two-and-a-half inch (2-1/2") line. This line will have a two-and-a-half inch (2-1/2") fog nozzle attached as a safety precaution. Accepted fire service practices tell us that at least one back up line should be larger than the lines used for attack. This line may be unattended and used if needed.

## ***M 17.0 FOG VENTILATION DRILL PROCEDURES***

### **M 17.1.0 Ventilation**

VENT = A means of escaping or passing out; an outlet, as from confinement.

VENTILATION = To provide fresh air in place of air which is contaminated.

**NOTE: It is recommended that you DO NOT conduct a class on positive pressure ventilation while your main focus is on fire suppression.**

The use of positive pressure ventilation equipment and practices will be at the discretion of the Minnesota State Colleges and Universities staff.

The strategy of ventilation may need to occur at anytime in the suppression operation, based upon the situation. The value and importance of ventilation is overlooked many times by fire officers. This is especially true in fire departments that do not have ladder companies. Ventilation is sometimes looked upon as something that is done after the fire is out or done solely for the comfort of the firefighter.

In reality, ventilation is a key firefighting tool which may be vital to rescue operations, confinement, extinguishment, and which could affect exposure protection. In rescue, ventilation can be employed to channel heat, smoke and fire away from potential victims.

In older, multi-story buildings with open stairways, the stairway is a primary path for fire, smoke and heat to travel. It may be vital to ventilate over stair shafts as a part of the rescue operation in this case. In confinement operations, rooftop ventilation is used to help prevent flash over by removing heat. Ventilation also channels the travel of heat and fire.

In extinguishment operations, ventilation will clear the atmosphere and cause the fire to be more visible to the firefighter. It allows the interior of the structure to be more tenable and safer for firefighting operations. Fire attack teams that can properly coordinate ventilation operations with hose line operations will generally have a high level of success in combating fires.

The key point is knowing the **WHEN**, **WHERE** and **HOW** to perform ventilation. Ventilation may be employed as a tactic in a structure that is full of flammable or toxic gases. Ventilation may be employed at a building experiencing a back-draft condition. The building is opened up at the highest point to allow the smoke, heat, and gases to escape, prior to entry at a lower level by the fire department.

A typical order regarding ventilation might be: "Truck 1, perform rooftop ventilation" or "Truck 2 ventilate". The type of order depends on the desired effect, the complexity of the situation, and the level of competency of company of officers on scene.

## **M 17.2.0 Drill Procedures**

### **Level One**

In level one, fog ventilation will be done after all students have had a chance to control the fire. Then the instructor will direct you to go to the window. You (**the student**) will then do the following:

1. Be aware of the higher temperatures near the ceiling.
2. Check to see if all the window glass, screens, curtains and other restrictions have been removed by outside crews. If not remove all obstructions.
3. Take the time if possible to remove any and all pieces of glass from the window frame. If you fail to do this, the small pieces may fly out the window with the water possibly injuring firefighters or civilians. If it is too hot to do this, then your safety comes first and force ventilate with the hose line.
4. Set the fog pattern to straight stream.
5. Tell your partner you are ready to ventilate.

6. Turn the water on just enough to alert the people on the outside and allow them time to get out of the way.
7. Next after a few seconds open the nozzle fully (note the difference in automatic nozzles).
8. Adjust the fog pattern towards the wide setting until the pattern just about fills the opening. It is important to have all water going out the opening.
9. Hold this position until the room clears enough for you to see the outline of the opening or until the fire rekindles. It is important at this point to think about your next actions. Depending on the conditions of the fire you must shut off the nozzle or reduce the nozzle reaction pressure, to either move or attack the fire.

**Remember to SHUT DOWN THE NOZZLE BEFORE MOVING IF IT IS SAFE TO DO SO** or you may lose your footing, which in turn may cause you to lose control of the hose line. If the fire conditions in the room or area are life threatening then you will probably NOT want to shut off the nozzle but retreat using the fog nozzle for protection. The farther you get from the opening the more air you will move, so when the room starts to clear enough to reposition, do so.

10. Repeat steps four (4) through nine (9) as needed. You will be directed by your instructor when to switch with your fellow team members.

### **Level Two**

The nozzle person will make the decision when, where and how to ventilate. The same procedure as in Level I will be used.

### **Level Three**

Ventilation will be done by the vent person before you enter the structure, as you would in a coordinated attack. You will receive the order from your officer when and where to vent. How, the ventilation is to be accomplished will be up to you.

## ***M 18.0 HOSE HANDLING***

Attack Team  
Back-Up Team  
Hose Tenders

### **M 18.1.0    Attack Team**

The interior attack team is made up of a maximum of three students and one instructor. You will receive direction from your instructor as to what side of the hose line to place yourself. Space out approximately an arms length apart as you advance in. Go slowly with safety in mind and be alert for hazards. You must be able to communicate with your hose tenders.

### **M 18.2.0    Back-Up-Team**

The back-up team is made up of three students and one instructor. You maybe responsible for rescuing fellow firefighters inside or assisting in fire control. Take direction from your instructor, but be aware of safety conditions or signals from inside. Use the same entry procedures as the attack team.

### **M 18.3.0    Hose Tenders**

Hose tending needs will be determined by the Safety Officer or the Instructor-in-Charge.

The hose tending team is made up of enough students to assure proper hose tending needs. Your responsibilities are to tend hose for the attack team. Space out on the hose line so as to assure that the hose can be moved by the attack team. Take direction from your instructor, but be aware of safety conditions or signals from inside. Use the same entry procedures as the attack team.

It is important for your team to **remember NOT TO PULL OR PUSH ON THE HOSE LINE**. You are to carry the hose so that it doesn't bind on corners or other objects. If you feel the hose being advanced, carefully assist in the movement of it. When taking the hose out, do not retreat to fast or you will pull the line and nozzle away from the attack team. You may pull them down stairs or may endanger their safety. Do not sit in doorways or openings, remember the ventilation process. Try to keep the hose line in the middle of the openings as this will make easier for the interior attack team to move the hose.

## **M 19.0    OVERHAUL**

### **M 19.1.0    Evidence-Preservation During Overhaul**

The attack team has a responsibility to preserve evidence as to the cause of fire. For this reason do not disturb the pile of debris that was burning. Apply water to the smoldering material where the columns of smoke are rising up and out of a pile or objects. Remember, this may be a deep seated fire at the bottom of the pile or objects. Straight streaming and turning nozzle on enough to force the water where you want it is

acceptable. **Do Not** turn the nozzle on full open and drown everything in the area unless ordered to do so by your instructor. You will each take turns venting and overhauling the fire.

Once you have practiced this procedure, your instructor will tell you to spread out the smoldering material and soak it with water to ensure that the fire is totally out. This means NO SMOKE PRODUCTION.

Remember, you are the eyes and ears of your Fire Ground Officer and Fire Investigator. From the time you arrive on the scene, enter the structure, work on extinguishing the fire, and return outside, you should look and listen for signs of the cause of the fire.

**NOTE:** Instructor MUST extinguish all smoldering fires on Level I burns before exiting the building.

## ***M 20.0 CRITIQUE and REHABILITATION***

### **M 20.1.0 Critique Instructions**

As each team completes their activities of attacking and overhauling the fire, they will then meet at a rehab location predetermined by the instructor for a review of their activities and to get answers to any questions they may have.

Tell your students this:

When you reach the outside, remove your SCBA and other protective equipment, if others are waiting for it, and without delay go to the predetermined location as directed. **DO NOT** stand around telling your fellow firefighters about your experiences.

When your critique is over, report to the Instructor-In-Charge for a new assignment.

### **M 20.2.0 Rehabilitation**

Rehab area supervisor will ensure crews are rested, and fluids are replenished before further participation in training exercises. Training will be postponed until adequate crews are assembled. Vital signs will be taken of participants who enter the burn building before and after each training evolution. EMS crew of at least First Responder Level will stage near the rehab area to provide medical care if necessary. The rehab area shall be of sufficient size to handle the number of participants on the training scene to rest and provide protection from adverse weather.

Original: June 10, 1987  
Revised: February 7, 1991  
Revised: March 1, 1992  
Revised: June 1, 1997  
Revised: June 3, 2000  
Revised: August 8, 2004