IDOL Inspectors Receive Training

By Dan Smith

From October 10th to the 13th, the Institute conducted training of both a special and unique type. The Fire Service Institute was given the opportunity to provide the IDOL inspectors training and information on how the fire service operates and a basic understanding of the requirements of the IDOL standards.

We were fortunate to have ALL eighteen of the Illinois Department of Labor Public Sector Inspectors at the Institute for training.

The purpose of the training session was two fold.

First, and most important, the training session was designed to provide them with information needed specific to the fire service. This will help prepare them to adequately inspect fire departments.

Secondly, we hoped to extend the openness and cooperation already shown by the Department of Labor to the Fire Service of Illinois to the Inspectors and the staff at the Institute.

The training session was a success from all viewpoints. The inspectors came to the training sessions eager to gain new information. They also effectively conveyed the purpose of their existence, that being safety, and not any of the others opinions currently being offered. The instructional staff found a receptive audience. The staff also had their questions answered as they related to the proposed Department of Labor standards and how various sections of the standards would be interpreted.

The final result of this training session is that the fire service of Illinois benefited because a dialogue was established, and the persons responsible for the inspections have a better working knowledge and understanding of the fire service.

The topics covered during the training were:

1. The development of NFPA standards,
2. Organization of Fire Departments and Fire Protection Districts,
3. Training and records,
4. Maintenance and records,
5. Apparatus, ladders, self-contained breathing apparatus, & protective equipment,
6. ISO it organization and purpose,
7. The overview of the NFPA standards,

The NFPA overview was designed to provide not only an understanding of how they were developed, but also the fact that many of the standards are relatively recent.

The section on organization dealt not only with legal issues, but also the funding of organizations.

The sections relating to apparatus, ladders, protective clothing, and self-contained breathing apparatus dealt with components, labeling, and what they should be looking for to show compliance.

Training and records overviewed the training provided by the Institute, as well as the other methods that departments could use to meet the training.

The maintenance and record keeping section dealt with what maintenance activities should be taking place and the documentation which should be maintained. Also, the requirements for service testing apparatus and ground ladders were discussed.

(Con't, see "IDOL" page 2)
The inspectors also observed a live training burn to give them a little better understanding of what went into fire fighting.

As a result of this training session, the Institute will develop and have ready for delivery, in March or April, a 12-unit training Session on "Voluntary Compliance with IDOL Standards." I would like to conclude by expressing my thanks to the Instructional staff, Howard Eskridge, Paul Morrison, Tom Ruane, and Terry Sutphen from the Institute; Chief Douglas Forsman, Champaign Fire Department; John Brady, Attorney-at-Law; and John Vissering, ISO.

The Illinois Fire Service Institute Newsletter

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The Illinois Fire Service Institute will consider for publication articles or items of interest to the fire service of Illinois and encourages materials from all fire related professions for consideration.

Persons interested in furnishing material should forward it to:

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Champaign, IL 61820

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FROM THE DIRECTOR'S DESK

by Gerald E. Monigold

As I promised in the last issue of the NEWSLETTER, I'll spend a little time reviewing the FY 1989 Annual Report. As expected, the figures did not indicate dramatic increases in the various categories of activities, rather steady growth. A total of 708 training programs or public service activities were conducted, up from 698 in FY 1988. This broke down into 630 training courses and 78 public service activities. The courses included 157 fire fighter courses (levels I and II), 317 technical and specialized courses (Fire Fighter III and various specialized subjects such as arson and hazardous materials), and 52 fire officer courses, including 18 instructor classes. Over 88% of these activities were conducted off campus in 84 different counties of the State.

There was a total of 23,289 registrations in 11,446 hours of instruction. That made a total of 242,899 student instructional hours of training conducted. One interesting figure that the computer has made possible is an unduplicated headcount—that is just how many individuals were represented by the 23,289 registrations. We are now able to determine that 15,587 persons from 957 fire departments, and certain other emergency response agencies, attended Institute courses. Most of these numbers reflect 2-4% increases over FY 1988.

Use of the Institute's Training Center increased from fifteen to twenty-six classes not including three National Fire Academy Field Courses, the Illinois Fire College, and several industrial fire schools.

On to other matters. The Illinois Department of Labor has sent the final version of its Fire Brigade Safety Regulations to the Joint Council on Administrative Rules (JCAR). If approved by that body, they should be implemented yet this year. Most provisions, however, will be phased in between next summer and 1994. The Institute is conducted training for the Department's inspectors October 10-13, 1989. This should make the implementation process go more smoothly.

The SARA Title III Hazardous Materials Grant has been extended through December 30, 1989; however, this is not new money. It only allowed us to spend a small amount of funds that were unexpended at the end of the original grant period. Most of those funds are now committed. We will continue to do Hazardous Materials training, but not at the level of the last two years. There is hope that funds will be appropriated by Congress for Fiscal Year 1991, which begins October 1, 1990. Between now and then, the Institute will have no additional Federal funding.

There are still openings for volunteer fire officers from Illinois who wish to attend the Volunteer Incentive Programs (VIP) of the National Fire Academy. These classes have been praised highly by all the people we have sponsored. You'll find additional information on the classes elsewhere in the NEWSLETTER.

I recently attended two meetings that are of particular interest. The first was the Training Resource and Data Exchange (TRADE) Association meeting, which was held in Chicago. This group is made up of the training directors from the six states and twelve "metro" fire departments which make up the Federal Emergency Management's Region V. The group is sponsored in part by the National Fire Academy. The second meeting was held in Raleigh, NC, and was sponsored by the National Association of Directors of Fire Service Training and Education. It is at these kinds of meetings that I have an opportunity to find out what other states and agencies are doing to improve the delivery of fire training in their states and what new programs they have designed. Needless to say, we swap a lot of information and materials. Illinois can be proud that we almost always have something new to offer. In the next issue, I'll try to share some of the innovations taking place in other states.
CERTIFIED FIREFIGHTER II UNIT TRAINING PACKAGE
3rd Edition

Designed to meet Certified Firefighter I or II through the Division of Personnel Standards and Education, Illinois Officer of State Fire Marshal. This edition is also divided into the modular format being used by many departments to accomplish Firefighter II certification. Objectives of the National Fire Protection Association Standard No. 1001, Firefighter Professional Qualifications, Level 1 and 2, are also covered in the units.

Each book contains the 22 units required for Illinois Firefighter II Certification plus 3 other units taught by the Illinois Fire Service Institute in its Firefighter II Academy. Units typically include behavioral objectives, course outline, written and skill examinations material, answer key and in some cases, materials for reproduction as handouts and overhead transparencies.

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The cost of each book is $35.00, which includes postage and handling. To order, use the form on the back. Due to University of Illinois Business policy, payment for publications purchased by individuals must accompany the order before it can be processed. Orders for Fire Departements, Industry, Governmental Agencies, etc., may be billed is desired, or payment can accompany the order form. If billed, the FEIN number (Federal Employers Identification Number) must be included on the order form. Orders without the FEIN number will not be processed.

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NEWSLETTER SUBSCRIPTION SERVICE

The Illinois Fire Service Institute will be providing a subscription service for those parties not presently receiving the FSI newsletter. The current FREE mailing of the newsletter is provided only to those fire departments, fire service agencies, organizations and individuals who are scheduled to received the Fire Service Institute state-wide mailings.

Many people are showing interest in receiving the newsletter on a regular basis. Though the Fire Service Institute would like to, it is not able to provide every firefighter with a free copy of each issue of the Fire Service Institute Newsletter. Therefore, this subscription service is being offered to those who would like to have the Fire Service Institute Newsletter sent to them on a quarterly basis. To subscribe, use the order form on the back.

Subscription Rate: $10.00 per year (4 quarterly issues)

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VOLUNTEERS LEAD IN LINE-OF-DUTY DEATHS
FIRE SERVICE HEALTH ISSUES

In 1988, 129 firefighters died in the line of duty. This was the highest death toll since 1981. Volunteer firefighters accounted for 81 of the deaths (63%), the highest share of total firefighter deaths they have had since NFPA began its complete tracking system in 1977.

RESPONSE/RETURN DANGEROUS TO VOLUNTEERS

Nearly half of all fatal injuries to firefighters (48%) occurred during firefighting, but more than one-fourth occurred during response to or return from an emergency call (29%). Of the 37 victims killed during response or return, 32 were volunteers.

29% of the deaths occurred during response to or return from an emergency call. Of the 37 killed in vehicle accidents 32 were volunteers.

In a special study of ten years of firefighter deaths during response, and return, NFPA analysts found that both motor vehicle accidents and heart attacks, while operating vehicles, were major causes. The motor vehicle accidents involved a large number of fire apparatus accidents, but also a nearly equal number of private vehicle accidents, all but one of which involved volunteer firefighters. These private vehicle accidents also have been increasing in recent years.

HEART ATTACK IS LEADING INJURY

The most frequently reported fatal injury was heart attack, which accounted for 51 deaths (or 41%). Of these 51 victims, at least eight had prior heart problems, such as heart attacks or heart surgery, and at least another 10 had serious pre-existing medical problems, such as diabetes, hypertension, or severe arteriosclerotic heart disease.

Heart attacks were exclusively a cause of death for firefighters age 38 or older. No one under that age died of a heart attack, and two-thirds of victims over age 40 died of heart attacks.

Source: NFPA: Fire Facts, June 1989

For more information, contact:
Dr. John Hall
NFPA Fire Analysis & Research
(617)770-3000 ext. 450

Openings Remain for N.F.A. Volunteer Incentive Program

Six of the primary seven positions allotted to the State of Illinois in the National Fire Academy’s Volunteer Incentive Program (VIP) have been filled. One enrollment remains unfilled for the May 6-11, 1990 offering of the Community Fire Protection: Master Planning course. Also open are at least five alternate spots, three for previously mentioned course and two for the Fire Command Operations course. Since a number of states do not send their allotted number of students, alternates have a very good chance of attending. All of Illinois’s qualified alternates were accepted in last year’s classes.

To be eligible, candidates must be volunteer fire department officers responsible for duties such as those described in the course descriptions. The National Fire Academy stipend program covers the cost of air travel or automobile mileage to its campus in Emmitsburg, MD, and provides on-site lodging. The student or their department must cover the cost of meals and incidental expenses. Meals are available on the Campus at approximately $13.00 per day.

Interested persons should contact Jerry Monigold, at (217) 333-3801 for further information and application forms. Applications must be received by the Illinois Fire Service Institute at least sixty (60) days preceding the start of the desired course in order to process the enrollment forms through the Academy.

Let’s not only fill all of our allotted spots, but use any others that may become available. Previous attendees attest to the quality and usefulness of the programs.

This year’s courses include:

Fire Command Operations, a class designed for volunteer command officers responsible for implementation of an incident command system.

July 22-27, 1990
August 26-31, 1990

Community Fire Protection: Master Planning for officers responsible for long-range planning and management of their volunteer fire department. Courses are scheduled as follows:

February 18-23, 1990
May 6-11, 1990
July 15-20, 1990
Fire Mechanics Seminar
Sponsored by
The Illinois Fire Apparatus Mechanics Association (IFAMA)

The 4th Annual Fire Mechanics Seminar will be held at the Jumers Castle Lodge, Bloomington, Illinois, March 12-14, 1990. The Seminar is open to those people who have an interest in fire apparatus maintenance.

Topics to be presented at the seminar are:

- Apparatus Electrical Problems
- Maintenance for Waterous Pumps
- Maintenance of Automatic Transmissions
- Maintenance of Apparatus Hydraulic Systems
- Maintenance of Heavy Duty Truck Axles

For further information concerning the Fire Mechanics Seminar, contact Terry Sutphen, 11 Gerty Dr., Champaign, IL 61820, (217) 333-8927.

Fourth Annual Fire Investigator's Conference
Sponsored by
The Third District Fire Investigators

February 23 & 24, 1990
Harvey, Illinois

For more information write:
Lt. Thomas Martello
Chicago Heights Fire Department
83 East Joe Orr Road
Chicago Heights, Illinois 60411

Firesafety Issues in the 1990s

What's in store for the fire protection community in the 1990's? Recently, we asked a group of leaders in the field to discuss what challenges the next decade will bring to firesafety. Here are some of their thoughts:

Economics
Economic restraints will continue to restrict dollars spent on firesafety and fire protection efforts, and the need for increased firesafety education will be even greater in the 1990s, creating an unprecedented challenge. NFPA's recent fire loss report showed that civilian home fire deaths were higher in 1988 than they have been in seven years. With 80 percent of civilian fire deaths occurring in the home, fire protection practitioners will have to target the high-risk populations, particularly the elderly, the very young, and the poor.

Hazards
We are heading into an era of limits in fire protection-economic as well as environmental. Halons will be limited or nonexistent as a fire protection tool. On the other hand, flammable liquids and hazardous materials will have a major impact on the ways in which fires are fought in the future. Additionally, there will be a shift toward reducing hazards and creating safer products.

Fire Fighting
Incident command will be more important than ever because of limited resources and the awareness of an increased need for fire fighter safety. Fire fighter protective equipment will be so advanced it will allow access to places fire fighters were never able to go before. We'll be seeing fire fighters advance further inside buildings, at greater risk of structural collapse. Additional cautions in certain fire situations, such as hazardous materials, high heat concentration fires, and high-rise fires, will be a necessary ingredient of incident command in the future.

Building Construction
Industrialized, modular, and manufactured housing and construction will continue to grow in the 1990s. For example, modular housing, an industry dominated by the Japanese who have designed totally exportable, prewired "smart houses," offers energy efficient, convenient, and reliable electronic monitoring systems built into homes. Although expensive today, the "smart house" concept will most likely catch on in the next decade, opening the market and increasing competition.

High-rise buildings have already proven to be a challenge to engineers developing fire and life safety systems. In the 1990s, more and taller high-rise buildings will put safe evacuation to the test. Two concepts that will most likely be debated in the years to come are "areas of refuge," spaces where disabled individuals will await rescue in fire situations, and the controversial idea of dedicating elevators to be used by the disabled for escape. Finally, as our population ages, the number of mobility-impaired occupants will grow, increasing the problem of a safe evacuation.

Technology
Management of new information and technology will also be a major issue in fire protection in the nineties. Opportunities afforded by new engineering calculation methods, technological advances, and computer programs and models will be offset by the need for qualified fire protection engineers. The supply of young engineering talent is expected to drop 50 percent by the year 2005. As older organizations have begun to modernize their operations, electronic infiltration of computer, telephone, and cable wiring in existing buildings is presenting a challenge to fire safety practitioners and is expected to complicate fire safety even more in the 1990s as the trend continues.

Source: NFPA's Fire News, December, 1989
EPA Reimbursement for Local Haz Mat Emergency Response

There have been many inquiries in reference to EPA reimbursement program for emergency response to hazardous materials incidents. The comprehensive Environmental Response, Compensation and Liability Act (CERCLA), originally enacted in 1980, provides broad Federal authority and resources to respond directly to releases of hazardous substances that may endanger human health or the environment. In the EPA's Fact Sheet, October 1987, the intent of the program is stated as:

“The intent of the reimbursement program is to alleviate significant financial burden on a local government resulting from temporary emergency measures taken in response to hazardous substance threats. Temporary emergency measures may include such activities as erecting security fencing to limit access, responding to fires and explosions, and other actions that require immediate response at the local level. EPA will distribute the reimbursement money to those applicants who demonstrate the greatest financial burden. The law specifies that not more than 0.1 percent of the total amount appropriated to the Fund be used for local government reimbursement. This represents a maximum of $8.5 million over a four-year period, or approximately $2 million per year for all requests received nationwide.”

It has been frequently asked whether or not fire districts and fire protection districts are eligible to apply for these funds. Eligibility is determined under 40 Code of Federal Regulations 310.20 which limits it to “general purpose units of local government” and specifically includes: “cities, counties, municipalities, parishes, townships and Federally-recognized Indian tribes.” Fire districts and Fire Protection Districts are excluded from being eligible for applying for these funds. However, the general purpose unit of local government (such as the town, village, city, or county) may apply. There is no reason that the fire district or fire protection district should not be provided with some portion of the reimbursement for expenses attendant upon their emergency response.

YOUTHFUL FIRESETTERS HOTLINE

By Frank D. Hart
Bureau of Alcohol, Tobacco, and Firearms

On August 15, 1989, the Youthful Firesetters Hotline began operation in the State of Illinois. The hotline is designed to provide 24-hour assistance to the fire service, law enforcement, and the public dealing with youthful firesetter problems. The hotline number is 1-800-446-1589.

The idea was conceived by members of the Illinois Networkers Committee and the DuPage County Youthful Firesetters Association. The concept was made a reality due to the work of the Illinois Advisory Committee on Arson Prevention, which is funded by the Illinois FAIR Plan. The hotline also has support of the Illinois Fire Inspector’s Association and the Illinois Chapter of the International Association of Arson Investigators.

The Illinois Networker’s Committee is a group of fire and police personnel who have been trained in counseling youthful firesetters, or those children with the tendency toward firesetting. These experts are located throughout the state and their numbers are constantly growing.

When callers dial the hotline number, they are asked by the operator to give their zip code. The operator will then check a computer data base to locate the networker nearest to the caller. The networker will then make a return call. Fire and police agencies who need the expertise that the networkers can provide, as well as the public, are encouraged to call the hotline.

Complementing the hotline is the availability of a brochure called, “What You Should Know About Youthful Firesetters,” which has been provided by the Illinois Advisory Committee on Arson Prevention. These brochures are being circulated throughout the state and are available upon request through the hotline.

Youthful firesetting is a major problem in this country, accounting for a large percentage of the arson fires which occur. In Illinois, professional assistance to deal with these problems is now available. It is no longer necessary for parents, the fire service or law enforcement to feel inadequate or helpless in dealing with these situations.

For further information about the Youthful Firesetters Hotline,

Please contact:

Dave Kruzil, of the Lisle-Woodridge Fire Protection District (DuPage County Youthful Firesetters Association), (708) 964-2233;

Wayne Parthun, of the North Maine Fire Protection District, (Chairman of the Illinois Networker’s Committee), (708) 297-5020;

Frank Hart, of the Bureau of Alcohol, Tobacco and Firearms, (Chairman of the Illinois Advisory Committee on Arson Prevention) (312) 886-7376.
Ground Ladder Testing - Fact and Fiction
A History of Standard NFPA 1932

by
Terry Sutphen

NFPA 1932, “Use, Maintenance, and Service Testing of Fire Department Ground Ladders,” (currently in its 1989 edition) has been around now for five years. NFPA 1932 was in existence for about one year before its impact began to be felt. When the fire service discovered that some of their extension ladders were breaking during test, the controversy began. The standard was then met with strong opposition from the fire service, especially the International Association of Fire Chiefs (IAFC).

The most controversial test method in the 1932 standard was the Horizontal Bending Test.

This test subjects the ground ladder to a 500 lbs. load with the ladder in a horizontal position. Early test results indicated that extension ladders manufactured prior to 1984 were having difficulty meeting the horizontal bending test requirements. These concerns prompted the NFPA Standards Council to issue a Temporary Interim Amendment (TIA) on July 16, 1987.

The TIA stated that any extension ladder manufactured prior to 1984 could, at the request of the authority having jurisdiction, be tested using 400 lbs. instead of 500 lbs.

Test results on extension ladders indicated that extension ladders had a much better chance of surviving a 400 lbs. load test than a 500 lbs. load test. Along with this optional reduced test load, the TIA required that a reduced in-use load be used. Instead of the 750 lbs. maximum in-use load, a ladder tested using the 400 lbs. test had an in-use load limit of 400 lbs. concentrated or 500 lbs. distributed.

The TIA further stated that this exception could only be used until 1994; at which time all ladders have to meet the 500 lbs. horizontal load test. The TIA proved to be an acceptable compromise.

---

Why the 500 lbs. horizontal load test?

There is still considerable confusion over the engineering principles behind the Horizontal Bending Test. Many are under the impression that this test simulates bridging.

The 500 lbs. horizontal load test is not intended to simulate bridging. It is intended to simulate a worst case loading of a ladder in an inclined position; that is, two firefighters and an unconscious victim at the center of a fully extended ladder, along with all of the dynamic forces those persons create by moving on the ladder.

The loading parameters of a ladder in an inclined position are:

1. The maximum load of personnel permitted by NFPA 1931 is three people or 750 lbs.
2. The most critical location of this load is the center of the ladder.
3. The most critical condition of the ladder is full extension.
4. Dynamic forces of as much as three times the personnel load must be accounted for.

---

Item no. 4 above was discovered through research by the American Ladder Institute and others during the revision work to the ANSI industrial ladder codes in the late 1970’s. This research indicated that the dynamic forces imposed on a ladder from moving on a ladder can be as much as three times the static forces.

Therefore, the total load that an in-service ladder can see is:

750 lbs. times 3 = 2250 lbs.

The ladder must be tested in its weakest condition; that is full extension with the load at the center of the ladder. The ladder must be able to withstand this load with no damage to the structure. Obviously, loading 2250 lbs. onto an inclined ladder is cumbersome and dangerous. Therefore, the test is conducted with the ladder in a horizontal position. By calculation, the load on a ladder inclined at 75 degrees can be simulated in the horizontal position by dividing the load by 4 (the cosine of 75 degrees is approximately 4).

Therefore, the horizontal test load in this case is:

2250 lbs. divided by 4 = 560 lbs.
The area on the ladder that the test load is applied to, per NFPA 1932, is 32 in. The area is significantly narrower than the area that would be occupied by three persons. By calculation, the load is reduced to 500 lbs. to compensate for the narrower loading area.

---

**How may ladders actually fail the Horizontal Bending Test?**

Another area of considerable confusion is the percentage of ladders built prior to 1984 that have failed the horizontal bending test. It is common to hear comments such as, "I had our ladders tested and they all broke." This is simply not the case.

Underwriters Laboratories (UL) has kept statistics on all ladders we have tested since 1984 (when the 1932 standard was published).

As of this printing, UL has tested over 5000 aluminum ladders built prior to 1984:

- Of over 2500 folding, combination and roof ladders tested, NONE have failed the Horizontal Bending Test.
- Of over 1200 extension ladders tested, 30 ft. and shorter, only 2.7 percent have failed the Horizontal Bending Test.
- Of over 2000 extension ladders tested, any length, only 11.7 percent have failed the Horizontal Bending Test.

The only ladders that have had difficulty meeting the Horizontal Bending Test are extension ladders 35 ft and longer.

UL's statistics show the following trends:

- 35 ft. extension ladders have a 21.7 percent chance of failing the Horizontal Bending Test.
- 40 ft. extension ladders have a 37.8 percent chance of failing the Horizontal Bending Test.
- 50 ft. extension ladders have a 66.0 percent chance of failing the Horizontal Bending Test.

---

**Things to know when testing ground ladders.**

If you intend to test your ground ladders yourself or hire a testing company to do this work, you should be aware of the following information contained in NFPA 1932, 1989 edition:

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**Only free weights may be used to apply the load in the Horizontal Bending Test.**

A cable pull via a pulley under the ladder is NOT an equivalent loading procedure. Weight from firefighters is more accurately simulated by using free weights. The standards defined free weights as, "Test weights that are not controlled from any direction except by the force of gravity. For example: sand bags, concrete blocks, water tank or lead weights."

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**Horizontal Bending Test permanent set requirements are now different from the 1984 edition.**

Allowable permanent set is now:

- 1/2 in. for ladders 25 ft. or less
- 1 in. for ladders 26 - 34 ft.
- 1-1/2 in. for ladders 35 ft. and longer

---

**You are allowed to use a device such as a cable tie or strap to prevent the sections of extension ladders from extending during the Horizontal Bending Test.**

This strap ties together one rung on the base section and one rung on the second section, thus preventing any movement between the sections. By preventing this slippage during loading, the ladder has an improved chance of meeting the test requirements.

---

**5/8 in. diameter mild steel roof hooks will not meet the roof hook load test.**

These hooks should be replaced with at least 3/4 inch diameter steel hooks in order to meet the strength requirements in NFPA 1932. Also available from some manufacturers are UL Listed Retrofit Roof Hook kits. These hooks have been tested for compliance with NFPA 1931, 1989 edition by UL and come with all installation hardware needed.

In conclusion, the tests outlined in NFPA 1932, 1989 edition have a solid foundation in engineering principles and are designed to provide firefighters with a reliable and repeatable method with which to judge the serviceability of their ground ladders. The test fixtures needed to conduct this work are easily purchased or fabricated. If you prefer to hire out this work, the cost is reasonable; currently around $2.00 per ft. of ladder. Whichever method you choose, ground ladder testing is an essential annual service test to perform.

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**Technical information supplied by Brad Schmitt, Engineering Group Leader, Fire Equipment Services, Underwriters Laboratories (UL), Northbrook, Illinois.**
Within the past 10 years, the fire service has experienced a number of changes. We now handle our fireground operations through an Incident Command System. Fires are being fought with straight bore tips rather than fog streams, and 3/4 boots are getting as difficult to find as leather helmets. With all of the changes comes controversy. Fire departments throughout this country have some elements in common that bind them together with other areas of the nation. Yet, without exception, there are varying conditions specific to the region that make it impossible for all departments to function in a uniform manner.

One needs only to visit 2 or 3 departments outside of their own area to see that conditions change drastically with a difference in climate, working conditions, financial assistance, and training. It is the intent of this article to introduce one suppression technique that has recently been traveling the road of, "let's try it out and see what you think," you know, the process of accepting or rejecting an idea for general use in the fire service. It is the desire of the authors to dispel rumors, untruths, and misrepresentation of the facts concerning a technique currently being used for ventilation.

Recently, a new phrase has been added to our vocabulary, it is: Positive Pressure Ventilation (PPV). It has been heralded as an improvement which will revolutionize the way we fight fires in the 1990's, by those who have developed a missionary zeal on the subject. Many departments have been quick to adopt this new technique, applying it to every circumstance, and developing opinions based upon their experiences. The problem with this is that the conditions under which the experiments have taken place may not have been realistic; therefore, the results either, "positive," or "negative," may be invalid.

Opinions then develop and are sold as fact. Unfortunately, it is difficult to recognize which is truth and which is fiction without a clear understanding of the subject. First, Positive Pressure Ventilation is a pressurized method of ventilation. It is a mechanical/forced procedure for removing contaminants from a building. It has been found to be an effective means of eliminating smoke, smoke odor, and heat from a building. The Los Angeles City Fire Department has been utilizing the technique of Positive Pressure Ventilation for a number of years. Mr. John Mittendorf, a Battalion Chief on the Los Angeles Department, has been one of the principal advocates of the procedure, and as such, has written a number of articles on the subject.

Their success is based upon two principles. First, the key to effective use of Positive Pressure Ventilation is properly trained fire suppression personnel that are aware of the goal of the intended operation. Second, proper selection of fire conditions that warrant the use of Positive Pressure Ventilation.

Positive Pressure Ventilation is used to ventilate a building by opening a door, and positioning a fan outside the building. Air pressure from the fan is forced inside the building, creating a positive pressure (similar to a balloon). The positive pressure is equal at the top, bottom, and corners of the building. When the window is opened (in the room involved with fire), the contaminants from all parts of the building exhaust to the exterior (as when a blown-up balloon is pierced).

The effective implementation of positive pressure is dependent on several considerations:

- The fan must be positioned so that the cone of air issued from it completely covers the building's entrance opening.
- The flow of pressurized air between the entrance opening and the exhaust opening must be controlled and directed to achieve effective ventilation. If other doors or windows are open, the ventilation process will not be as successful.
- The size of the horizontal or vertical exhaust opening should be determined by the capacity and number of fans being used.
- Positive Pressure Ventilation cannot be applied to every structural fire. The decision to use Positive Pressure Ventilation should be based upon an initial company inspection of the entire outside of the building, and knowledge concerning the location and extent of the fire.
Positive Pressure Ventilation has many advantages, if used effectively. It reduces the smoke and heat within a fire structure, improves visibility, and reduces internal temperatures within a structure. Also, with the proper consideration for the type of multiple-story building that is being ventilated, positive pressure can be used effectively.

Advocates of the Positive Pressure Ventilation talk about the use of it during the fire attack stating it can clear a building to the point that you can walk up to the fire. Upon interviewing the firefighters that extensively use Positive Pressure Ventilation, it was found that the only time that Positive Pressure Ventilation would be considered for use during the initial attack would be for a single-story family dwelling.

Then, it would be a judgment call depending on the following circumstances:

- **Initial suppression companies must send someone to walk completely around the building checking the progress of the fire, windows and other openings, as well as the weather conditions. (Wind has an adverse effect on this technique)**

- **Backdraft conditions must not be present.**

- **Fans must be put into place, and within 5-15 seconds, the handlines must be advanced within the building.**

Although Positive Pressure Ventilation can be effective during the fire attack, it does have its limitations. If it is used improperly, it can be dangerous to the firefighter, as well as any victim trapped within the burning structure. In real structures which are on fire, doors and windows are often left open, or are broken, or burned out. Plaster fails, opening new unforeseen routes of travel for the fire. Primary search must be completed prior to the fire attack, and/or ventilation to evacuate all individuals that may be trapped behind the fire (exit opening). Also, during the search, the condition and location of the fire can be judged. It is at this time the decision should be made by the suppression personnel whether Positive Pressure Ventilation would be effective or not. The laying of lines and placing of fans must be timed perfectly, as delays in fire suppression after the room has been positively charged can cause the fire to spread. The fans used for this operation must be at least 18" and 3-5 horsepower for single-dwelling operations. For operations in large commercial buildings, multi-story office buildings, and high-rise buildings, 21" - 24", up to 5 horsepower are necessary. Smoke ejectors that do not meet this performance level will not be adequate for this type of ventilation.

Is there a place in the fire service for Positive Pressure Ventilation? When asked, the Los Angeles City Firefighters consistently stated they do use Positive Pressure Ventilation after the extinguishment of the fire has taken place. Further, they were extremely concerned that the use of Positive Pressure Ventilation prior to extinguishment would drive the fire throughout the structure and endanger civilians and firefighters alike.

A number of other large fire departments including: New York, Chicago, Pittsburgh, Philadelphia, Washington, D.C., and San Francisco, were contacted and queried about their use of Positive Pressure Ventilation. Most did not use Positive Pressure Ventilation at this time. Those that did utilize Positive Pressure Ventilation did so during the overhaul stage, after extinguishment. Most indicated they felt its most beneficial use would be for use in high-rise fire fighting where it could be used to pressurize stairways for evacuation purposes.

The Faculty and Staff from the University of Illinois Fire Service Institute have conducted a number of field tests on single-story plaster and lath structures. The research staff chose this type of structure because it is a common construction type found throughout the United States. Typically, this construction type exhibits multiple void spaces, and open channels which allow the fire to spread throughout the structure.

The field tests were conducted under controlled conditions using the procedures and equipment in accordance to the recommendations determined by the fan manufacturers. Essentially what was found is that when Positive Pressure Ventilation is used during suppression activities, it can have an adverse effect if suppression is not immediately possible. Within a manner of minutes, the fire increases in intensity and behaves in an uncharacteristic manner. The erratic behavior of the fire was dramatically demonstrated when during one test, the fire breached a door and wall system allowing the fire to get behind the initial suppression crew.

All of the conducted field tests met every requirement necessary for successful use of positive pressure under fire conditions. The individuals conducting the test were well-trained fire suppression personnel familiar with building construction and Positive Pressure Ventilation techniques. The data collected during the suppression operations was conflicting due to varying conditions of residential property and the behavior of the fire. Numerous properties were tested and the results on most occasions were negative. Therefore, our recommendation is that Positive Pressure Ventilation should be avoided during the suppression phase of fire fighting.

Positive Pressure Ventilation does have a place in the fire service. The important thing to remember about this technique is the limits of its usefulness. As with any other
ventilation technique on the fireground, all the individuals that participate in the operation must have a firm understanding of the principles behind this technique. The proper amount of equipment and personnel must be maintained. Also, fire suppression personnel must be able to apply their knowledge of fire behavior and building construction to determine what method of ventilation would be best for the specific incident.

A fire officer faces many variables when evaluating a ventilation situation. Decisions must be based upon those indicators with which the officer is familiar. The form of ventilation utilized, whether it be horizontal, vertical, or forced ventilation, will be derived from the fire officer's knowledge of the three methods of ventilation.

**In Summary:** Positive Pressure Ventilation is still in the, "let's try it out" stage of the fire service. The authors believe it is an effective form of ventilation when the proper procedures are followed. Just as with any other change in the fire service, the individual conditions that each fire department must work under will determine if this technique will have practical use within your area. As to whether Positive Pressure Ventilation should receive recognition throughout the fire service, the answer should be YES. It is a practical method to use for mechanical/forced ventilation. It cannot, however, take the place of horizontal and vertical ventilation. Just as in California, the key to effective use of Positive Pressure Ventilation in your community will depend on properly trained fire suppression personnel.

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**Introducing**

The Illinois Fire Apparatus Mechanics Association

The Illinois Fire Apparatus Mechanics Association (IFAMA) is beginning its 4th year. IFAMA was formed in late 1986 by several fire service personnel in Illinois who saw a need for an organization to represent the interests of those who service and maintain the fire apparatus and equipment.

The association hosted the first Fire Mechanics Seminar in LaSalle-Peru in February, 1987. After the first seminar, the membership grew to 55 members the first year. Presently the membership stands at approximately 130 members representing over 125 fire departments and other fire service organizations.

Individual membership is open to anyone who is associated with the fire service and associate memberships are available to companies who wish to be affiliated with IFAMA.

IFAMA has become very active in the field of fire apparatus maintenance. It presently has representation on two committees which are actively addressing fire service maintenance issues. Both committees are sponsored by the IAFC. The first is the IAFC's Fire Apparatus Mechanics Certification Task Force, which is establishing a national fire mechanics certification program. IFAMA attended the first organizational meeting which met in Houston, Texas. On the second committee, IFAMA has a member who is the elected Director of the IAFC's Maintenance Section, representing the Great Lakes Division.

IFAMA has shown an active interest in the NFPA's standards making functions. A member of IFAMA is presently sitting on the NFPA's Fire Department Equipment Committee. This committee is responsible for developing the fire apparatus standards 1901, 1902, 1903, 1904, 1911 and 1914. These standards are scheduled to be revised in 1991 and are about ready to be presented for public comment.

**The Objectives of IFAMA are:**

To promote better service, maintenance and design of the fire service apparatus and equipment.

To study mutual problems in the field of maintenance and promote the exchange of ideas and techniques in the field of repair, maintenance, and design of fighting equipment.

To study and encourage safety devices and practices in the maintenance and operation of fire service vehicles and equipment.

To seek and suggest, in cooperation with the other fire service organizations and manufacturers, improved safety features in the design of fire fighting equipment.

To promote the training and education of fire apparatus mechanics.

**To meet these objectives IFAMA is currently involved in several ongoing activities.**

The hosting of the Annual Fire Mechanics Seminar which provides a forum for maintenance personnel to obtain instruction from industry representatives on various equipment utilized in the fire service. (see announcement on page 4)

The publishing of a quarterly newsletter, the WRENCH, to keep the membership current on news and activities which may impact upon their areas of responsibility.

Hosting regional 1-day training activities to all interested parties.

Persons desiring more information about IFAMA or membership in IFAMA can contact Terry Sutphen, 11 Gerty Dr., Champaign, IL 61820, (217) 333-8927.
Monitoring of Gases for Confined Space Rescue

by Paul Morrison, RPh.

The monitoring of selected gases is a recognized safety procedure for any confined space rescue. Although for many years municipal and volunteer fire departments have been exempted from OSHA and other regulatory control when performing rescues, modern interpretation of the regulations may find them enforced on rescuers, as well as industry. If it is not a legal responsibility for rescuers to monitor confined spaces for these toxic gases, it is certainly a moral responsibility of the rescue organizations to see that it is done. With this in mind, we shall look at a few of the expected toxic gases in this and future issues.

Carbon Monoxide (CO)

**Carbon Monoxide** has caused more injuries and deaths than any known toxic gas. Firefighters are certainly aware of its presence in burning buildings. However, when these same firefighters perform confined space rescue, they often overlook the significance of the danger due to carbon monoxide. Carbon monoxide is often present due to combustion. This can be due to gasoline or diesel engines or any other form of incomplete combustion.

Carbon Monoxide has no color and no odor. Its vapor density is very near that of air. In calm air it will slowly rise. However, for all practical purposes, it may be considered to have the same vapor density as air since it will be found at all levels and dispersed throughout a space if any air currents are present. Its explosive range is between 12.5% to 74% in air.

**Concentration levels:**

Carbon Monoxide works on the human body by combining with the oxygen carrying component of blood (hemoglobin). It combines with human blood between 200 and 290 times as strongly as oxygen. Although a steady state will occur with low concentrations, the degree of toxicity is based both on time and concentration. Most persons of reasonable health can tolerate a 50 parts per million (ppm) concentration with little significant effects. A very short term exposure of 400 ppm should cause no noticeable effects. However, if concentrations were to reach 1500 ppm, a person would have extremely limited time to evacuate the area.

Carbon monoxide can be accurately measured by a variety of electrochemical measuring instruments. Colorimetric tubes, such as the "Dreager Tube," can also be used to detect and measure carbon monoxide concentrations. There are also several forms of colorimetric papers and tablets available.

**Symptoms:**

The first symptoms of carbon monoxide poisoning are generally a severe headache, fatigue, weakness and an increased breathing rate. This is generally followed by confusion, nausea and dizziness. This is followed by hallucinations, changes in heart actions, fainting, a reddening of the mouth and lips and darkening of the skin. This is followed by coma and/or death. Recovery may or may not be complete.

**First Aid:**

First aid and other measures include:

1. Immediate removal of the person from the contaminated atmosphere.
2. Administration of oxygen (support by CPR if needed).
3. Hyperbaric oxygen administration may be advisable.
4. Seek medical attention as soon as possible for all persons exposed to toxic gases. Not all symptoms and toxicologic processes are evident immediately.
5. Contact the National Poison Control Center for the latest toxicologic information (713) 654-1701.

**Precautions:**

In all areas above 500 ppm concentrations of carbon monoxide, positive pressure breathing apparatus is needed. When it is necessary to enter any atmosphere containing carbon monoxide, an in depth risk analysis should be conducted.
In the last column, I overviewed some approaches to determining what needs to be taught. The next logical step is determining what method to use to convey the information and/or skills from the instructor to the students. I will first deal with the more conventional methods of instruction, such as, lecture, conference and demonstration. Then I will deal with some of the not so conventional methods that have recently been shown to have merit in the education of firefighters, these include role playing, video tape, and computers. For each of these, I will indicate what type of material it is best suited for and then the important techniques.

### Conventional Instructional Methods

#### The Lecture Method:

The lecture method is best suited to present facts, figures, techniques, information that normally is covered by lists. It can also be used to teach the steps of a skill. This method has wrongly been associated with no student involvement, i.e. a speech. This is not the case, and the more student involvement, the better received the training session will be.

Another important technique to keep in mind when using the lecture is to use audio visual materials as often as possible. These should enhance the presentation, not be the presentation (this will be covered in a later article).

The final technique involves keeping the students involved not only by asking questions and visually, but also mentally by asking rhetorical questions, encouraging them to apply the material to their own experiences and citing examples when possible.

#### The Conference Method:

The conference method is best used when the students are experienced or have the knowledge necessary to draw conclusions. This approach is probably best used for problem solving type instruction, such as: “there are 4 different hose loads, which one are we going to use.” It requires that the students apply information they already have to solve the current dilemma. It is widely used in officer development classes.

The key to the success of this method is the skill of the instructor, how well the instructor is prepared, the preparation of the participants, and finally the willingness of the “instructor” & “administration” to accept the outcome or results. This is not an approach to use for the dissemination of information.

#### The Demonstration Method:

The demonstration method should be one of the most widely used methods in the fire service, but unfortunately its not. Look back over the last year and think of the number of hours “doing” and the number of hours spent in the classroom learning about it. The only way to “learn” a skill and become “proficient” at it is to practice or do it.

The important technique of this method is the three-step approach and not permitting the student access to any equipment until after this process has been completed.

**Step One:**

The first step involves the instructor performing the task at normal speed; this gives the student a frame of reference.

**Step Two:**

The second step involves the instructor explaining the task step by step; this provides for the transfer of information.

**Step Three:**

The final step involves the instructor doing the task step by step while the student(s) tell them the steps, this provides for confirmation that the transfer occurred. At this point the students are given the necessary equipment and are permitted to practice.
Unconventional Instructional Methods

Role Playing:

Role playing is best used for staff development type courses. The material is first taught and then the students are permitted to display their mastery of the material under controlled conditions. An example would be during a live fire drill where the “perspective engineer” is permitted to operate the pump under the supervision of another person and a ranking engineer is permitted to take a crew in, to the structure. The key to this method is the individuals need to have mastered the skills prior to this method being used. This only permits them to “apply” the skills to simulated real life conditions. This activity will require planning and additional manpower to be conducted safely.

Video:

The use of video as a training method has become common place in recent times. Probably the most common use is the fire “critique” when members of an organization are permitted to view their performance and then perform a self-evaluation. Actually this method can be used in conjunction with any other method. The key to the success of this method involves the approach used by the instructor to the use of the material. The instructor should permit the student to first evaluate themselves and then ask leading questions if areas for improvement are not identified during the self-evaluation. This method may also avoid conflicts between the student and the instructor as the actual evolution can be viewed as it happened, not as either “remembered” it.

Computer:

The final method is the use of the computer. This can either be used by itself or in conjunction with video tape. In either case, because of its’ relatively recent use, its’ impact on fire service training has not been fully realized. It can be used to provide facts, information, and with interactive - video, it can even provide limited teaching of manipulative skills. The key to the success of this approach is the equipment and the time necessary for the development of the training programs.

Any comments or questions regarding these methods can be made by writing or calling Dan Smith, Fire Service Institute, 11 Gerty Dr., Champaign 61820, (217) 333-9027

New Publications

"Fire Station Planning Design & Construction"

Fire Station Planning, Design and Construction is a new publication from the IAFC Foundation which provides a fire station design and construction model to assist in station development. It was written by Director Robert H. Ely, and edited by Colin A Campbell.

The book does not dictate what the facility will look like, inside or out, but it does raise questions and serve as a source of ideas for the fire department, developer and architect involved in this planning.

Prototype fire department designs, a new station checklist, and a sample architect’s contract are included.

Categories include:

- functions and uses;
- size and types of rooms;
- proximity of spaces;
- space requirements;
- size of property;
- safety features;
- materials;
- heating/cooling;
- lighting and power;
- exterior configuration;
- communications;
- special considerations;
- codes and standards;
- fire station property;
- future planning;
- space requirements;
- safety features;
- heating/cooling;
- lighting and power;
- exterior configuration;
- communications;
- special considerations;
- codes and standards.

The publication costs $24.95. Checks should be sent to the IAFC Foundation, 1329 18th St., NW, Washington, DC, 20036-6516.

Haz Mat Handbook & Computer Software

A handbook, and related software, has been developed to provide state and local governments, as well as industry, with the guidance needed to plan and respond to emergencies associated with episodic discharges of hazardous materials into the environment.

The 515-page "Handbook of Chemical Hazard Analysis Procedures," and its companion software, was developed for the Federal Emergency Agency (FEMA) by Arthur D. Little, Inc., a management and technology consulting firm.

The handbook and software program are designed to provide non-technically oriented individuals with assistance with the complex physicochemical phenomena associated with episodic discharges of hazardous materials.

Copies of the handbook and software are being distributed by FEMA’s regional offices to state emergency response commissions and local emergency planning committees established under SARA Title III. To obtain copies, or further information, contact Craig Wingo, Chief of the Technological Hazards Division at FEMA, 500 C St., SW, Washington, DC, 20572.
Institute Provides EENET Video Program Duplication Service

The Fire Service Institute is providing a video duplication service for the training and education programs broadcast by the Emergency Education Network (EENET). These videos are satellite broadcasts recorded at the Institute's Training Center. Fire departments or training agencies desiring copies of these programs can contact the Illinois Fire Service Institute.

Those wanting copies will be expected to provide a blank tape in the 1/2" VHS format for each program to be duplicated. Each program will run about 3 to 6 hours in length, depending on the topic covered. In addition, you must specify which programs you desire to have copied.

List of 1989 Video Programs Available

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<td>&quot;Meeting Special Needs of the Disabled in Evacuation and Sheltering Systems&quot;</td>
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### FSI TRAINING CALENDAR

#### 40-Hour Instructional Courses for 1989-90

(scheduled as of Aug 4, 1989)

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#### Weekend Programs

at FSI Training Center

**No Weekend Courses Scheduled at time of Printing**

### National Fire Academy Field Courses 1989-90

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<th>Month</th>
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<td>Flossmoor</td>
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All NFA Field Courses are 12 hours unless otherwise stated.

Registration for all courses offered by the Fire Service Institute must be made by completing a FSI registration card. For further information, contact the Fire Service Institute at:

**Illinois Fire Service Institute**
11 Gerty Dr.
Champaign, IL, 61820
(217) 333-3800
Illinois Fire Service Institute Offices and FSI Training Center
Fire Service Institute Building
11 Gerty Drive
Champaign, IL 61820
(217) 333-3800

For Specific Information

<table>
<thead>
<tr>
<th>Course Coordinators</th>
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<tbody>
<tr>
<td>Arson I,II,III</td>
<td>Benny King</td>
</tr>
<tr>
<td>Auto Extrication</td>
<td>Daniel Smith</td>
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<tr>
<td>Breathing Apparatus Specialist (Smoke Divers)</td>
<td>Tom Ruane</td>
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<tr>
<td>Certified Airport Fire Fighter</td>
<td>Dan Smith</td>
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<tr>
<td>Certified Fire Fighter II Academy</td>
<td>David Clark</td>
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<tr>
<td>Fire Apparatus Engineer</td>
<td>Jack Rutledge</td>
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<tr>
<td>Fire Attack &amp; Suppression Training</td>
<td>Jack Rutledge</td>
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<tr>
<td>Fire College</td>
<td>Jack Rutledge</td>
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<tr>
<td>Fire Prevention Principles I &amp; II</td>
<td>Nancy Ducey</td>
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<tr>
<td>Hazardous Materials I,II,III</td>
<td>Paul Morrison</td>
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<tr>
<td>Industrial Fire Training</td>
<td>Howard Eskridge</td>
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<tr>
<td>Instructor I,II,III</td>
<td>Daniel Smith</td>
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<tr>
<td>LPG &amp; Flammable Liquids Fire Fighting</td>
<td>Howard Eskridge</td>
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<tr>
<td>Management I,II,III,IV</td>
<td>Terry Sutphen</td>
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<tr>
<td>Rescue</td>
<td>Paul Morrison</td>
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<tr>
<td>Tactics &amp; Strategy I,II</td>
<td>David Clark</td>
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<tr>
<td>National Fire Academy Courses</td>
<td>Gerald Monigold</td>
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<tr>
<td>Campus Week-end Programs</td>
<td>Jack Rutledge</td>
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Class Registration:

<table>
<thead>
<tr>
<th>Programs</th>
<th>Coordinators</th>
<th>Phone</th>
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<tbody>
<tr>
<td>40 Hour On-Campus Programs</td>
<td>Patty Wieland</td>
<td>333-8921</td>
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<tr>
<td>40 Hour Off-Campus Programs</td>
<td>Kristy Berbaum</td>
<td>244-6185</td>
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<tr>
<td>Essential Fire Fighter I-IV Programs</td>
<td>Kathy Peavler/Marcia Swope</td>
<td>333-3800</td>
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<tr>
<td>Specialized Programs</td>
<td>Kathy Peavler/Marcia Swope</td>
<td>333-3800</td>
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<tr>
<td>NFA Field Programs</td>
<td>Jan Hartman</td>
<td>333-3707</td>
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Administrative Staff:

<table>
<thead>
<tr>
<th>Administrative Secretary</th>
<th>Virginia Stahl</th>
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