

**"A Hazard in Every Community"
Fighting Fires in
Fast-food Restaurants**

presented by
Joseph Knitter
Fire Chief
South Milwaukee Fire Department

My Goal

That one person leaves here today with one new idea, notion or thought that could save their life or the life of a brother or sister fire fighter

In honor of Houston FF's Kim Smith & Lewis Mayo III

February 14, 2000

Death in the line of duty...

A Summary of a NIOSH fire fighter fatality investigation
February 7, 2001
Restaurant Fire Claims the Life of Two Career Fire Fighters - Texas
<http://www.cdc.gov/niosh/pdfs/face200113.pdf>

Arson Blaze Claims Two Houston Bravest

Father of Three, Former Combat Challenge Finalist Die When Roof Collapses

Houston Arson Investigators are filing murder charges today against three adults and one juvenile suspect in connection with the early morning, multiple-alarm McDonald's restaurant fire, 12602 Bissonnet that claimed the life of two firefighters on Monday.

Kim Smith Lewis Mayo III

In honor of Houston FF's Kim Smith & Lewis Mayo III

February 14, 2000

"I went from a . . . nothing fire to a WOW fire from one side of the building to the other . . . I was really surprised"

“Those who do not remember the past are destined to repeat it”



George Santayana

Spanish born American Philosopher, Poet and Humanist

1863-1952

And . . . It happened again . . .

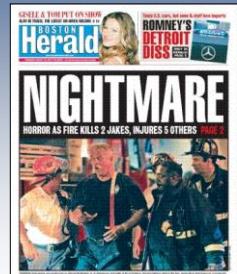
In Boston.

2 firefighters die, 11 hurt in West Roxbury blaze

Responders trapped as flames engulf West Roxbury restaurant, spread to adjacent businesses



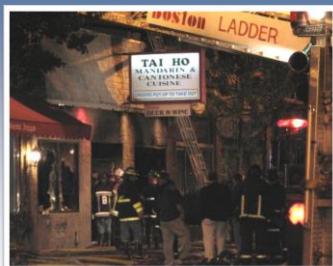
A roof collapse trapped crews after a fire broke out last night at a Chinese restaurant on Centre Street. Above, firefighters regrouped this morning after the fire. (Globe Staff Photo / George Rose)



August 29, 2007

And . . . It happened again . . .

In Boston.



August 29, 2007

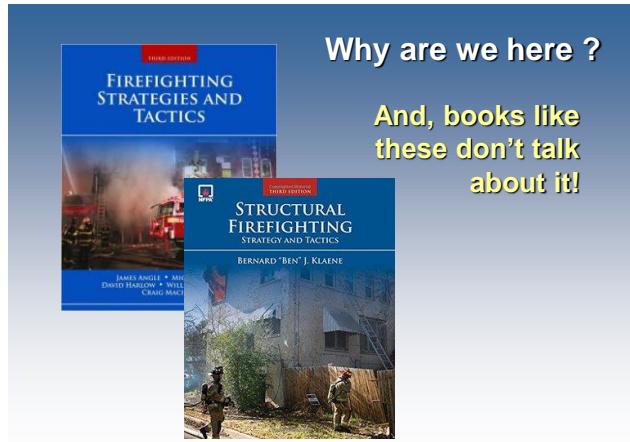
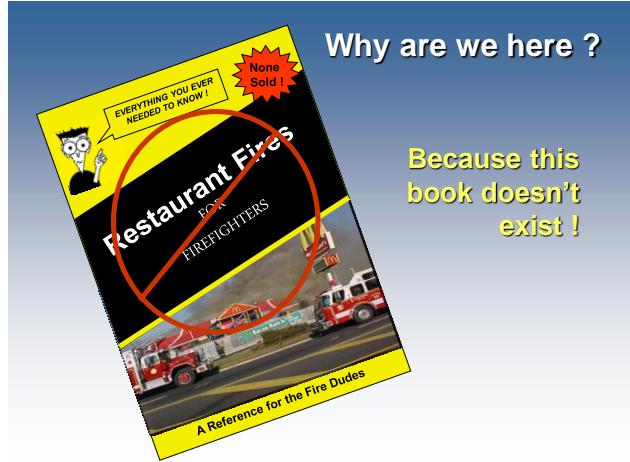
Photo courtesy of www.UniversalHUB.com

Back to Houston . . .

It's February 14, 2000 at 4:30 AM . . .

So why take the risk of an interior attack ?







Due to the large number of restaurants, incidents are more prevalent than we think



Photo credit: Pennsville, NJ Fire Dept.



Photo credit: Keith Muratori, Bridgeport Fire Department

More often than not, this is the end result



Symmes Township, OH



Milwaukee, WI

Photo courtesy of Billy Goldfeder



North Charleston, SC

Photo courtesy of SCONline.com

Common Causes of Fires in Fast Food Restaurants



Photo credit: North County Times, Escondido, CA

Common Causes of Fires in Fast Food Restaurants

• Unintentional

- Overheated cooking media from appliance malfunction or human error



French fry machine to blame in Burger King fire
By Dennis Stier | Published March 25, 2014, 8:00 a.m. | Updated March 25, 2014, 11:45 a.m.
KXAN | NBC Austin
Photo: AP

Common Causes of Fires in Fast Food Restaurants

• Unintentional

- Grease build-up in ductwork

2 firefighters die, 11 hurt in West Roxbury blaze

Responders trapped as flames engulf West Roxbury restaurant, spread to adjacent businesses



A roof collapse trapped crews after a fire broke out last night at a Chinese restaurant on Charles Street. Above, firefighters regrouped this morning after the fire. (Globe Staff Photo / George F. Hersey)

Fire's fuel apparently missed

Rescuer indicates exhaust pipe not cleaned of grease

Email | Print | Single Page | Text size

By Dennis Stier | Published September 7, 2007

The owner of Tai Ho Mandarin and Cantonese Restaurant has given city officials a heads-up about a potential fire hazard at his restaurant in the West Roxbury section in June. But he did not clean the kitchen exhaust pipe. Firefighters have said grease buildup in that pipe fueled a blaze last week that killed two Boston firefighters.

The rescript from Roslindale-based J&B Cleaning says its staff worked in the kitchen below and climbed onto the roof above to clean the exhaust fans. But it does not say they cleaned the crucial area in between - where fire officials say the hidden, grease was building.

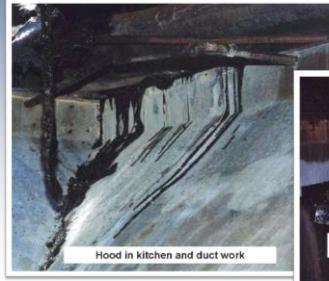
There is no indication on the June 21 receipt that the cleaners even examined the pipe.

State fire codes mandate quarterly inspection of entire kitchen exhaust systems and the cleaning of any buildup found. The codes charge restaurant owners with the ultimate responsibility for making sure it is done right.

Fire Chief Kevin MacCurdy has said grease from the exhaust pipe had gotten into a crawl space above a ceiling, where it ignited Aug. 29 and burned undetected for at least an hour before firefighters arrived.

Common Causes of Fires in Fast Food Restaurants

- Unintentional
 - Grease build-up in ductwork



From Boston FD Report

Common Causes of Fires in Fast Food Restaurants

- Unintentional

- Carelessness

- Improper Storage



Common Causes of Fires in Fast Food Restaurants

- Unintentional
 - Poor Housekeeping
 - Accumulation of Refuse



Common Causes of Fires in Fast Food Restaurants

- Unintentional

- Poor Housekeeping

- Accumulation of Grease / Residue



Common Causes of Fires in Fast Food Restaurants

- Intentional
 - Arson
 - Vandalism
 - To cover burglary attempts (Houston)
 - Revenge (Disgruntled employee)
 - Fraud

Arson suspected in restaurant fire

By Daily Courier Staff

Police are tracking a suspected arsonist who torched a highway service restaurant early Tuesday.

Somessa ignited an accelerant at the rear dining area of BP's Parkway Inn just after 2 a.m., nearly 12 hours after the restaurant at Coggin Road and Harvey Avenue closed on Monday.

Flames erupted simultaneously and blew out the windows, said John Shadron, a fire prevention officer who investigated the blaze.



Common Causes of Fires in Fast Food Restaurants

- Intentional
 - Civil Disturbances
 - Protests / Demonstrations
 - Hate Crimes

ccREGISTER.com

TOP NEWS
Restaurant fire fuels hate-crime concerns in city

Authorities investigating the blaze say cause is unclear. Community remains on edge.

By DARRYL MCKEELEY, CHARLES ASHLEY and JON ZELLY
The Daily Register
September 21, 2001

LAST
A Palermo restaurant was gutted early Thursday morning. No official response and that blade machine were used to extinguish the flames.

September 21, 2001

McDonald's Fire Claimed By Anti-Globalization Activists



THE HORNET

Fire Destroys Local Pakistani Restaurant

For a report on the Islamic Handi Tandoor restaurant located at 3000 W. 10th Street, call 832-237-1222. For more information on the restaurant, call 832-237-1222.

Common Causes of Fires in Fast Food Restaurants

- Intentional
 - Civil Disturbances
 - Animal Extremist / Ecoterror Activists
 - ALF - Animal Liberation Front
 - ELF - Earth Liberation Front



Building Components / Features



"If you want to know how they come apart when attacked by fire . . . You better learn how they're put together before the fire"

Building Components / Features

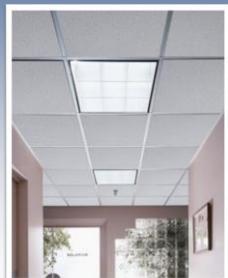


Mixed Use Buildings



Suspended ceiling tile systems serve several purposes

- Aesthetics
- Environmental Control
- Fire Resistance



Ventilation / utility ductwork & wires in concealed spaces



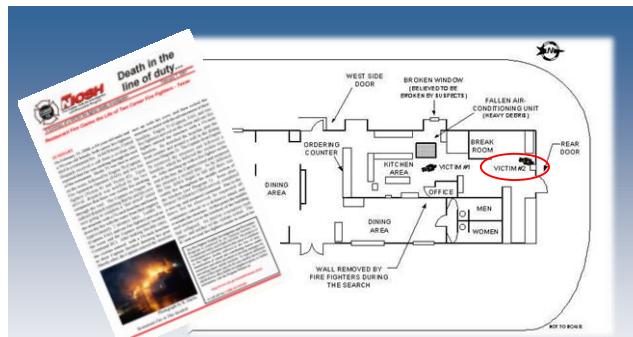
Ductwork, soda lines & telephone and computer data wires running through concealed spaces not only provide additional fire load, but provide another means for fire spread



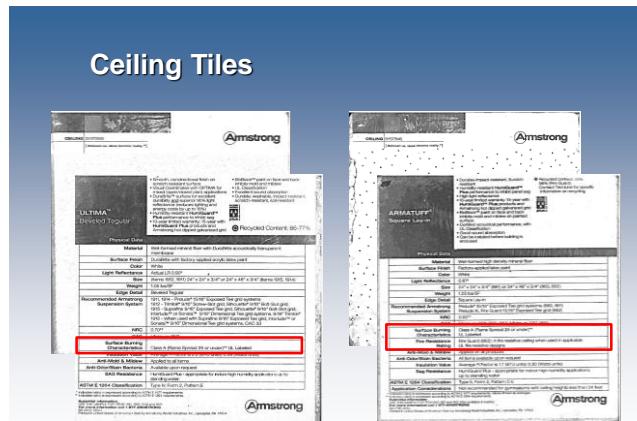
These obstructions and false ceiling grids can fall and become entanglement hazards for fire attack crews



Photos credit: Indianapolis Fire Department



"She was found by a safe, approximately 6 feet to the west side of the rear, steel door. She was found entangled in wires and a pair of wire cutters (believed to be hers) were found nearby." (Houston NIOSH Report)



Suspended Ceiling Systems

Large, concealed spaces . . .



Lead to large, uncontrolled fires . . .

Ingress / Egress

Photo credit: Keith Muratori, Bridgeport Fire Department

In an inherently risky business, Company / Chief Officers have a duty & obligation to provide for as safe a work environment as possible – allowing unsafe actions is unacceptable

Photo credit: Keith Muratori, Bridgeport Fire Department

Ingress / Egress



Ingress / Egress



Ingress / Egress

Panic Bar

Hoselines



Ingress / Egress



Will that be paper, plastic, cardboard
or styrofoam ?



Have you ever had food or a beverage served without
a wrapper or container ?

Large amounts of stored combustibles



Due to the nature of the business, large amounts of paper products are kept on hand

Large amounts of stored combustibles



Due to the nature of the business, large amounts of paper products are kept on hand



“Temporary” storage can provide additional fire load, as well





**“Temporarily” blocked aisles
can limit avenues of ingress
and egress**



**The large amount of plastics found in the playground areas
can provide a tremendous fireload**



**A displaced ceiling tile can provide a
means of fire spread into the attic space**



**Like most hydrocarbons, the plastics found in the playground equipment
can also release a tremendous amount of dark, acrid smoke**

Indoor Playgrounds



Firefighters may have to search these areas under heavy smoke and high heat conditions to locate lost or missing children

Outdoor Playgrounds



Fire fighting efforts may also be hampered by outdoor playgrounds that obstruct access and create immediate exposure concerns if on fire

Roof-top HVAC Equipment



The largest concentration of HVAC units is *normally* above the food preparation area

Roof-top HVAC Equipment



But not always. The largest concentration of HVAC units on this Hardee's Restaurant is above the dining area

Dead Load



16 block x 45# each = 720# + the weight of the dish & platform additional, unanticipated dead load



Photo courtesy of Earlene Fredricks.

Note the large concentration of rooftop hazards

Photo courtesy of Kenosha Fire Dept.



Note the location of the HVAC unit in relation to the doorway – collapse of the roof structure could certainly result in serious injury or death to firefighters



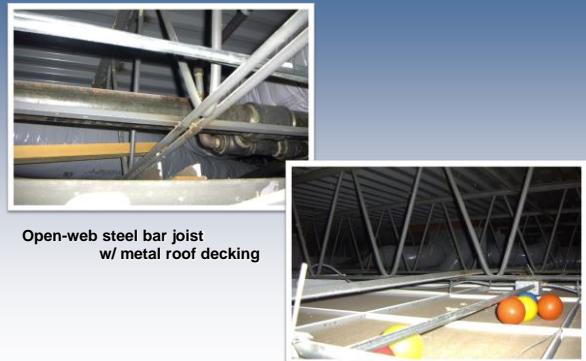
Vents
HVAC Units

The HVAC unit is located over the main building, however, its ductwork is run to the playground addition

Lightweight Metal Roof Decking



Roof Structures



Open-web steel bar joist
w/ metal roof decking

Tubular Steel & Wood Truss Roof

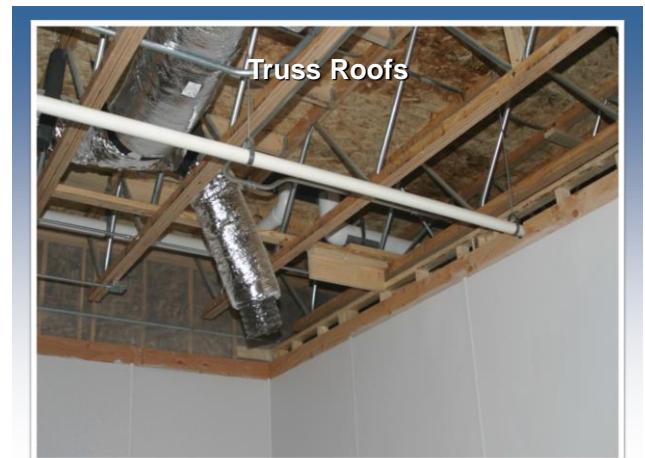


Truss Roofs





Typical failure of a tubular steel & wood truss



Truss Roofs

WARNING
Trusses are unstable until laterally braced.
Review Installation Instructions.



DO NOT
walk on trusses until adequately braced.



DO NOT
stack building materials on unbraced trusses.



"One-dimensional charring tests of structural composite lumber products . . . confirmed that charring of these products . . . may be considered comparable with solid wood.

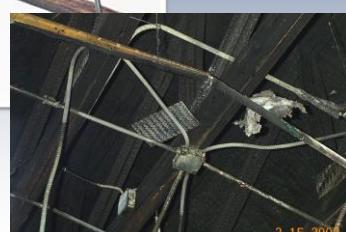
TrusJoist Company – Fire Facts Guide



Combination Wood Joist / Truss Roof



Truss Failure



Notice the absence of the gusset plate – displaced as a result of the fire

3.15.2009

Truss Roofs = Concealed Spaces

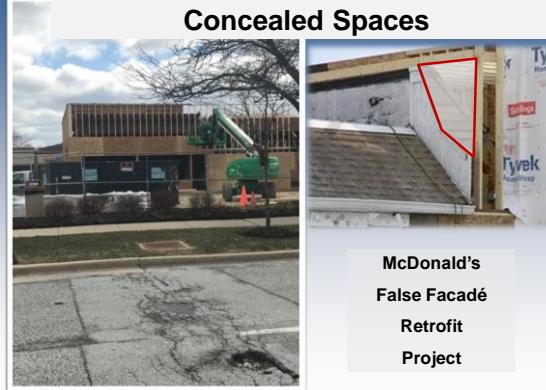


Truss construction can also make up the false overhang

Truss Roofs = Concealed Spaces



Concealed Spaces



Photos courtesy of Chief Forest Reeder, Tinley Park (IL) FD

Concealed Spaces



Wooden I-Joist Roofs

Newer McDonald's Restaurants are being built with a combination of steel I-beams and engineered wooden I-joists



**Important Fire Safety Information Regarding
Fire Rated Building Assemblies and Components of Fire Rated Assemblies:**

Certain components of products are specified and acceptable for use as components in fire rated assemblies. These components are not fire rated products and are not certified or labeled as having fire resistance or endurance characteristics. Such products include, but are not limited to, "I" Beams, Sheathing, Backer or Wood Joists, etc.

Fire rated building assemblies are assemblies consisting of specified components and found, based on standards established by third party organizations, to provide certain levels of fire resistance, usually measured in time periods such as one-hour, two-hour, three-hour, etc. These standards are based on controlled conditions and pursuant to certain procedures. The fact that a particular fire rated assembly has been specified test criteria related to fire resistance or endurance characteristics does not mean that a particular component of the assembly is fire rated or has fire resistance characteristics.

Because actual fires vary greatly from lab conditions and actual fire to fire based on a wide variety of factors – such as the size of the fire, the amount of available fuel and ventilation, the type of fuel, the type of configuration, and other characteristics of the components in which the fire occurs – fire tests are not representative of actual fire conditions. Actual fire conditions are unique and cannot be precisely simulated to assess the potential of an assembly to perform for the designated time in case of a fire. An assembly having a "one-hour" fire rating, for example, will not necessarily withstand a fire for one hour. The time period for which an assembly will withstand a fire depends on the manner in which the assembly is constructed and may also vary.

Given the very different circumstances that may exist from one fire to another, the differences between conditions in an actual fire and the laboratory test conditions, and the inherent variability of fire tests, passing a fire test in a controlled laboratory setting does not mean that an assembly itself will necessarily provide "one-hour" fire protection in an actual fire. It also does not mean that any given component of a fire rated assembly will provide "one-hour" fire protection. "Two-hour" fire protection, for example, will provide fire protection in an actual fire.

In the event of an actual fire, you should immediately take any and all action necessary for your safety and the safety of others without regard for any fire rating of any product or assembly.

Fire test standards often do not contain specific details for construction of the test furnace or furnace conditions. The test furnace may be subject to significant variance due to individual characteristics of construction, design and control, including, but not limited to, ventilation, atmospheric conditions, and general thermal reactivities. Test conditions may be unique to the test furnace and not representative of actual fire conditions. Test regimes and the manner in which the assembly is constructed may also vary.

In the event of actual fire, you should immediately take any and all action necessary for your safety and the safety of others without regard for any fire rating of any product or assembly.

- - fire tests are not representative of actual fire conditions

regard for any fire rating of any product or assembly.

Wooden I-Joist Roofs

"While we are no longer building buildings with vertical balloon construction, we have no shortage of buildings with horizontal balloon construction"

Capt. Bill Gustin
Miami-Dade Fire-Rescue
2015



Notice how the fire impinging on one side broke through the web and auto-exposed the opposite side to fire



Because of the relatively small "mass" of the OSB web material, failure of that portion of the truss occurs much earlier than the top / bottom chords

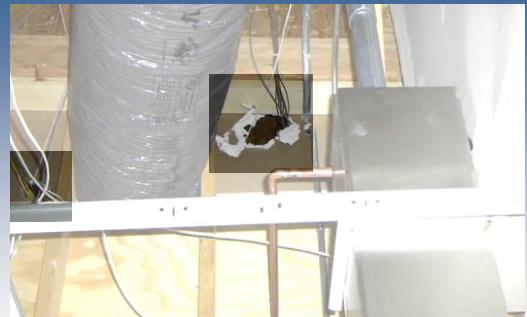


Remember, MASS is our FRIEND !!

Fire Spread



I-joists can also be severely weakened by contractors placing "poke-through" holes in the webs to pass utilities through



Contractor "poke-throughs" provide a means for fire to spread unknowingly inside concealed spaces

Roof Access



Due to the extended overhang design of the roof, access via ground ladders is limited to the rear of the bldg. If this and the interior access is blocked by fire, access to the roof must be accomplished via an aerial ladder

Roof Access



Attempts to use ground ladders to access the roof is only possible if exaggerated climbing angles are used

Roof Access



The “false mansard” design of the roof hides the 3’ high parapet

Roof Access

Some parapet walls are as high as 5'



Roof Access



Photo courtesy of Kentland Volunteer Fire Co. (MD)

A combination of ground and aerial ladders may be the best method of gaining access

Roof Access



Photos courtesy of Kentland Volunteer Fire Co. (MD)



Caution must be used when preparing to step onto a roof from either a ground or aerial ladder

Roof Access



Photos courtesy of Warrenton Volunteer Fire Co. (VA)

Roof Access



Photos courtesy of Madison (WI) Fire Department

Extended Overhangs



Extended overhangs in drive-through lanes create another avenue of possible fire spread if a vehicle fire occurs while in the drive-through lane

The Salt Lake Tribune

A pickup truck that caught fire in the drive-through lane of a 24-hour McDonald's restaurant in Sugar House early Saturday morning ignited a 2-alarm blaze that caused an estimated \$1 million in damage.

By Cimaron Neugelbauer
The Salt Lake Tribune

Published: October 29, 2011 11:04AM

Updated: October 30, 2011 12:07AM

A pickup truck that caught fire in the drive-through lane of a 24-hour McDonald's restaurant in Sugar House early Saturday morning ignited a 2-alarm blaze that caused an estimated \$1 million in damage.

Salt Lake City Fire Battalion Chief Gary McCarty said the fire started about 4:30 a.m. at the restaurant's 949 E. 2100 South location when flames and smoke began to pour from under the hood of the truck, which had just pulled up to the drive-through window. Flames quickly spread into the building as the heat broke out the glass of the drive-through window.





Grease Duct Fires

One major cause of restaurant fires - hidden fires in ventilation ductwork



"Dirty" ductwork



Cleaned ductwork

Any residual grease build-up provides for a hidden and extremely combustible fuel load

Grease Duct Fires

The owner of the Central West Grill, Michelle John Baptiste, must pay a non-criminal \$100 fine for a violation of the state fire code, said State Fire Marshall Stephan Coan.

"This is a troubling for all of us," Coan said at the city's fire headquarters. "The owners of (the restaurant) did not adhere to the schedule of cleaning."

Coan stressed the importance of inspecting and cleaning duct work. Restaurant owners must hire a licensed professional to inspect and clean cooking systems, according to state fire code regulations. The fire code established the non-criminal fine, Coan said.



The June 26 fire destroyed the building at 171-175 Main St. The fire caused \$1 million in damage, displaced 17 people from the apartments and put the restaurant and a hair salon out of business.



Grease Duct Fires

Two major questions must be answered in response to grease fire in exhaust ducts:

1. Is the fire contained to the interior of the duct or has it communicated to surrounding combustibles, including structural members ?
2. Does the duct work exit the restaurant directly or is it carried to the roof via an interior system of ducts ?

Grease Duct Fires

Upblast ventilators can be forcibly opened to gain access to the ventilation ductwork



Grease Duct Fires

Fires involving accumulated grease in exhaust ducts are difficult to extinguish and can cause rapid fire extension into concealed areas of the building or built-up roofing materials



Accumulated grease fires burn extremely hot. Ceilings and walls surrounding the duct run must be opened up to check for fire extension



Burning grease can cause heavy smoke conditions which can be re-circulated back into the restaurant due to the proximity of exhaust vents to roof-top HVAC appliances (NFPA 96 requires a minimum 10' separation)



Fire extending into the HVAC units can jeopardize the integrity of the refrigerant lines which could result in the production of hydroflouric and hydrochloric acids along with smaller amounts of chlorine & phosgene gases



Additional Dangers Delayed Alarm

It is not uncommon to arrive on the scene to find a well advanced fire due to a delayed alarm. Management personnel are often reluctant to report fires due to the possibility of lengthy shut-down times and bad press

Tactical Expectations

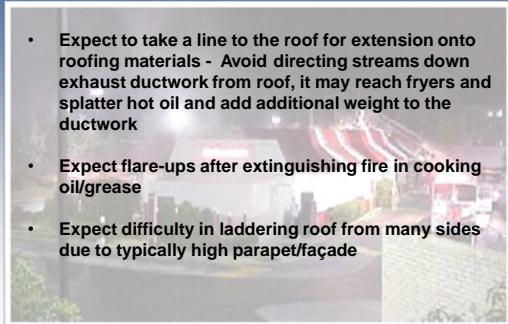
- Expect the unexpected
- Expect four fires:
 - 1-kitchen,
 - 2-exhaust hood / duct work,
 - 3-attic (or concealed spaces), and
 - 4-grease residue burning on roof
- Expect to check for fire in concealed spaces immediately upon entering
- Expect to access the kitchen through a rear door – entry here may avoid a long, difficult stretch around counters, tables, etc.

Tactical Expectations

- Expect early collapse, hastened by heavy a/c and exhaust units on lightweight truss roofs
- Expect large gas supply lines - Make sure gas was automatically shut off upon activation of extinguishing system
- Expect a violent reaction if you apply water directly to burning cooking oil or grease - it will splatter and spread fire
- Expect to carefully examine the entire run of exhaust ductwork, especially where it may penetrate a combustible wall, ceiling or roof

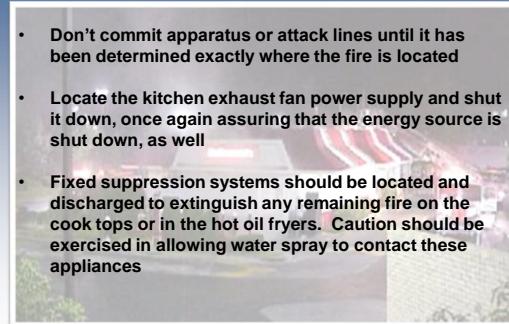
Tactical Expectations

- Expect to take a line to the roof for extension onto roofing materials - Avoid directing streams down exhaust ductwork from roof, it may reach fryers and splatter hot oil and add additional weight to the ductwork
- Expect flare-ups after extinguishing fire in cooking oil/grease
- Expect difficulty in laddering roof from many sides due to typically high parapet/façade



Tactical Tidbits

- Don't commit apparatus or attack lines until it has been determined exactly where the fire is located
- Locate the kitchen exhaust fan power supply and shut it down, once again assuring that the energy source is shut down, as well
- Fixed suppression systems should be located and discharged to extinguish any remaining fire on the cook tops or in the hot oil fryers. Caution should be exercised in allowing water spray to contact these appliances



Tactical Tidbits

- Upon determining the location of the fire, the initial attack line should be advanced into the interior of bldg. This line can be cautiously operated into the kitchen duct via clean-out openings or access holes made in the ductwork to limit extension (Req'd by NFPA 96)

Note the indication of high heat build-up within the ductwork



Tactical Tidbits

- Cautiously use dry chemical extinguishers in the kitchen area to minimize clean-up and resultant damage to the restaurant operation



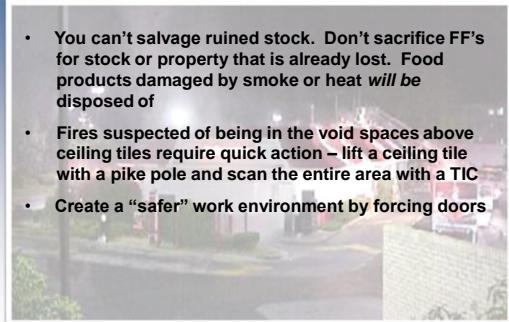
Tactical Tidbits

- Pull ceilings to determine if the fire has extended to combustible ceiling members or tiles



Tactical Tidbits

- You can't salvage ruined stock. Don't sacrifice FF's for stock or property that is already lost. Food products damaged by smoke or heat *will be* disposed of
- Fires suspected of being in the void spaces above ceiling tiles require quick action – lift a ceiling tile with a pike pole and scan the entire area with a TIC
- Create a "safer" work environment by forcing doors.



Tactical Tidbits

- There is no property worth the life of a FF – if all occupants are out of the building and the risk to human life has been removed, a cautious, interior attack can be initiated.



Lesson to be Learned



Photo Courtesy of The Newberg Graphic, Newberg, OR

Lesson to be Learned



take in the entire scene

Photos Courtesy of The Newberg Graphic, Newberg, OR

Lesson to be Learned



and do your 360° before you commit personnel

What looks like this from this side

Photos Courtesy of The Newberg Graphic, Newberg, OR

Lesson to be Learned



looks like this from the other

Photos Courtesy of The Newberg Graphic, Newberg, OR

Remember

It is easier to justify to a property owner
why you went defensive

than to explain to a grieving family why
you
didn't.

J. Knitter

If there is any doubt as to the structural integrity of the building – evacuate the structure and go defensive against the structure however, offensive in an effort to save firefighter's lives !!



Photo courtesy of Tucson, AZ, Fire Dept.

"Those who do not remember the past are destined to repeat it"



George Santayana

Spanish born American Philosopher, Poet and Humanist

1863-1952

Questions



Special acknowledgement is given to the following for information contained in or assistance in developing this program:

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Fire Engineering Magazine

Elaine Fredricks

NIOSH

