

**Fire Department Operations
in Vacant and Abandoned
Buildings
Support Slides**

**Developed by the Massachusetts Department of
Fire Services as part of the**

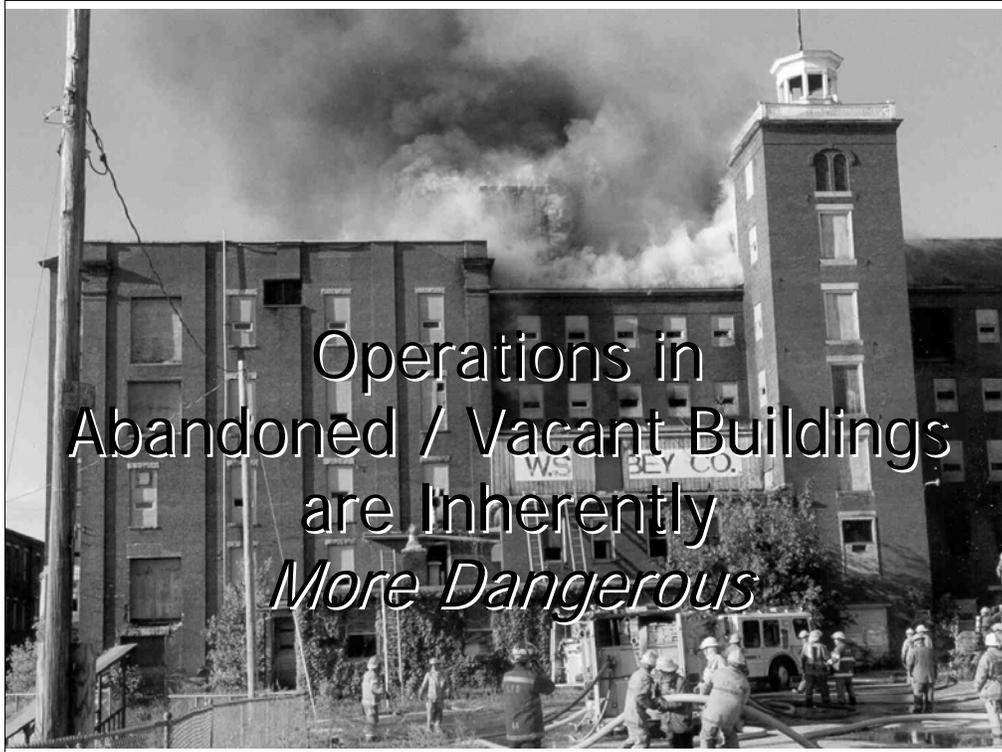


**IAAI/USFA Abandoned
Building Project**



This presentation is intended to support presentations regarding fire department operations in vacant and abandoned buildings. Additional information related to the presentation is found in the project background package and lesson plan that accompanies the presentation.

Fire Department Operations in Vacant and Abandoned Buildings



This slide appears several times during this presentation and it shall be stressed and clearly distinguish these buildings from normal firefighting operations.

INSTRUCTOR NOTE: The instructor should ask the participants to identify the factors that make them more dangerous. Create a list on a flip chart or writing board and refer to it when appropriate during the presentation. Add to the list as the presentation progresses and additional risk factors become apparent.

Abandoned Buildings

Commercial

- Usually heavier construction
- Usually larger open areas
- May have storage
- Less likely to be occupied

Residential

- Usually lighter construction (wood)
- Generally smaller areas, more spaces and confinements
- Likely to be occupied

Review the differences as listed on the slide.

Ask the class what hazards accompany wide areas v. small compartments. While both may be occupied, former residential properties may be more of a problem. Consider and mention the storage issue in both of these but don't dwell on it as it will be covered as a specific issue later in the presentation.

Fire Department Operations in Vacant and Abandoned Buildings



Point out height area and size of the building

Does it make sense to conduct a primary search; how long and how many personnel would it take?

Point out open roof area.

Modified windows

Main Stair tower

What type of construction, what is collapse potential and likelihood?

Ask class to point out additional items that could be hazardous to fire fighting operations

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Residential



Ask class to point out features

Type of construction (Class V wood) likelihood of fire spread and early collapse?

Fuel loading, structural integrity.

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Ask an overhead question to the class about what are the hazards with regular church fires (occupied and not abandoned)

Answers should include:

Large open area, high fuel loads, concealed spaces, and others.

How is this different in an abandoned building?

Look at the picture and have students identify potential problems.

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Are windows secured?

What effect has weather had on this structure?

Will these openings create a necessary draft for fire development and spread?

Pose the question of a fire start at the lower left hand corner of the screen, climbing upward and right toward the openings at the windows.

Common Problems

- **Known or suspected abandoned**
- **Length of time abandoned**
- **Known to fire department**
- **Systems in place or disconnected**
- **Building Contents, equipment / machinery / storage**
- **Deterioration due to weather exposure**
- **Unsecured buildings**

Briefly review these elements – each one will be expanded upon in depth in the next several slides.

Known Abandoned

- **Pre-fire planning by companies**
- **Records from city or town offices**
- **Fire prevention inspection records**
- **Request for termination and shut down of systems and equipment**

Town hall records are one of the best indicators. In a small department the chief may know; in a larger department, the code enforcement people may know.

Regular in-service pre-planning inspections by in-service companies may also indicate a problem.

The building owner may have asked for a request to shut down systems, get a demolition permit, and other procedural items that would give someone in an official capacity the knowledge that a building is abandoned or about to be abandoned.

Length of Time Abandoned

- **Will have an impact on structural deterioration**
- **Will have an impact on the accessibility and frequency of vandalism**
- **Security measures will begin to fail**
- **Economic incentives for the building may shift and change**

The longer a building stays vacant, the longer it will deteriorate. Very seldom will this situation get any better.

Initial security efforts will become less and less vigilant as time goes on, live guards are replaced by fencing and locks.

When initially abandoned, the building might have been suitable for a conversion to apartments or something other than what it is. After a while the economy could shift and it could be more beneficial to rip down or stay as manufacturing, for instance.

Known to the Fire Department

- Officially
- Unofficially
- Subject to compliance regulations
- Walk through tour conducted
- Pre fire plan diagram in place?
- Tactical operations pre-fire plan in place?



If the building is officially known to you, then your failure to take appropriate actions might leave you in a precarious legal position and, more importantly, could leave you tactical disadvantage that could injure or kill firefighters.

If it is at all possible, conduct a tour and get companies to do at least a building assessment.

Create an actual diagram of the scene.

Determine some strategic and tactical objectives early.

INSTRUCTOR NOTE: Have the participants create a list of vacant or abandoned buildings in their first response district. Write these on a flip chart and indicate if they are known unofficially or if they are on an official list.

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Piping, electrical wiring, and other materials of value may be removed. What will be left behind will be asbestos, openings, void spaces etc.

Explain about websites that are explaining the concept and “sport” of urban exploring. These websites describe which buildings are vacant / abandoned and tell how to get in, when to go, etc., almost like touring sites.

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Fire loading / entanglement hazard in a residential property.

Also point out the openings created during a previous fire as well as open windows.

Abandoned but has Storage

- **Are large pieces of machinery and equipment still in place?**
- **Are there large open holes where machinery once was?**
- **Is there neglected material storage still in place?**
- **Was the structural integrity compromised during the removal of large machinery?**

Large pieces of machinery in manufacturing settings can pose as additional weight loads, large obstructions for effective use of hose streams, and obstructions for firefighter egress and access.

When much of this machinery is removed, there are structural supports that are compromised, and openings cut into roofs and floors.

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This slide shows an example of large open floor areas with chain fall in place.

How would you like to encounter this in a moderate or significant smoke condition?

What would this do to fire spread?

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Is there valid information available on the hazardous materials that were used in the building when it was occupied?

Is this material even from this building or has it been illegally stored there?

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Consider what this means to fire load.

What potential firefighter entanglement would this present?

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More examples of debris left behind.

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What is the real floor condition?

Are columns intact and un-damaged?

What openings in construction are there?

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Snow loading and water deterioration affecting integrity.

Now that that damage has occurred, what is the likelihood for future deterioration?

Stability now? Stability under fire?

Natural ventilation for fire spread?

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Same notes as previous slide

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Point out collapsed floor, tires and trash that could entangle a firefighter working in heavy smoke.

Secured or Unsecured

- **What method was used to secure the building?**
- **Are security measures monitored periodically and repaired when necessary?**
- **Has the fire department pre-planned the building and its access points?**
- **Does the security inhibit detection and discovery of the fire?**
- **Once inside can fire department escape?**

The building was originally secured. Has that been maintained in any way?

Consider the fact the owner was probably forced to do this, or the community was doing it...what are the chances that that level of security will be maintained.

Have the in-service local fire companies pre-planned as a walk around what the security is and how they might gain access?

How have the security measures delayed alarm detection and has the department considered what affect this advanced fire development will do to their operation?

With limited points of access, how does that affect firefighters attempting to escape if the decision is made to enter?

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Is this locked door considered security?

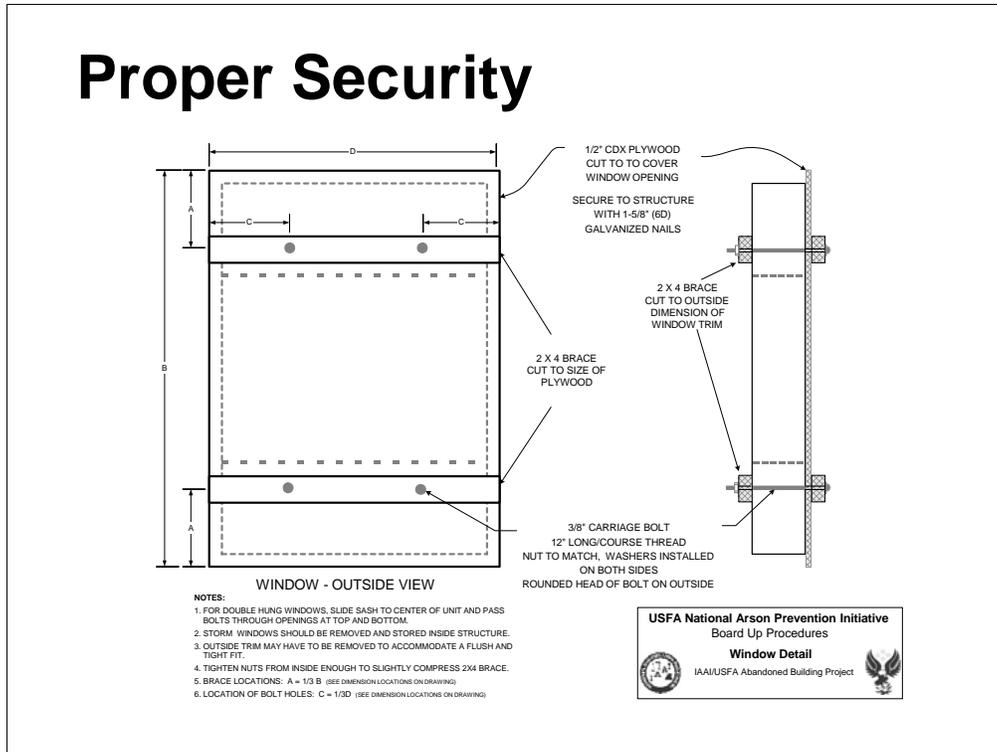
What would it take to force entry? In this case the interior of the door is braced with wood planks and would be very difficult to breach. A building evaluation would provide the information necessary to make this type of decision during a fire.

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Is this security?

What will it take to force entry?



Refer to student handout on this diagram of a proper board up procedure. The USFA National Arson Initiative procedure shown on this slide is the process suggested by HUD for securing vacant/abandoned building where the risk of unauthorized entry is high. It is very difficult to gain access through building openings secured using this reinforced method.

HUD Board up Methods



Standard



Reinforced

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Good security, but still not the approved board up procedure

Single bolt as opposed to the double. Unknown what the outside looks like.

Know the System



**Training should involve understanding how
the components are assembled**

Example of firefighter training that provides indepth knowledge of the HUD system and increases awareness of the vacant/abandoned building issue.

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Standard particle board or plywood over doorway

Is that security?

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Size-Up



The decision to commit fire forces into vacant or abandoned buildings should not be automatic as it normally is. The decision to make an entry should be made after the size-up has been conducted.

The following slides discuss the importance of proper size-up prior to committing fire fighters to interior operations at a fire involving a vacant or abandoned structure.

Considerations on Arrival

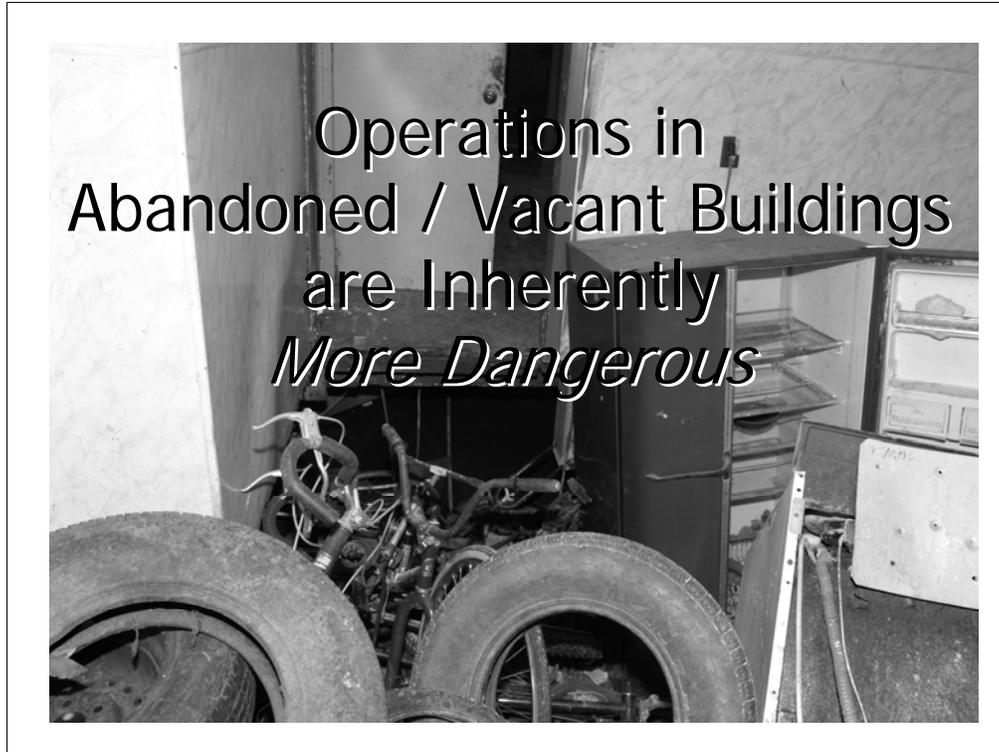
- **How much smoke upon arrival?**
- **How much fire upon arrival?**
- **What is burning?**
 - ✓ **Contents Only?**
 - ✓ **Structural components?**
- **Length of burning time – Was there a delay in alarm?**
- **How difficult to make entry or access points**
- **What rate of flow do you need, what rate of flow can you support?**

All of the above considerations should be talked about individually.

In addition the following point should be stressed:

The decision to commit fire forces shall not be automatic as it normally is. The decision to make an entry shall be made after size -up has been conducted and completed.

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This message appears several times during this presentation and it should be stressed and clearly distinguish these buildings from normal firefighting operations. Stress the potential hazards – refer to the list prepared earlier in the presentation and add any additional items.

Additional Considerations

- **Life safety**
- **Special considerations/Hazards**
- **The building**
- **Security measures**
- **Exposures**
- **Weather**
- **What is burning**
- **Location of the fire**
- **Fire fighting operations**

Life Hazard

- **The most critical life hazard factor in an abandoned building are the lives of the attacking fire forces**
- **Before committing resources to possible life hazard scenarios, the incident commander should clearly assess the risk to fire fighting personnel**

The only ABSOLUTE life hazard is that of the fire fighters operating at the incident. A number of SUSPECTED or POTENTIAL life hazards may also exist.

“Most vacant buildings usually have a low potential for civilian victims and a high injury risk to firefighters. Therefore, commanding officers must take into account the safety of all personnel at the fire scene. Interior operations are not mandated at vacant buildings. Entry into a vacant building is an option, not an obligation.”

From “Fighting Fires in Sealed Buildings”, Michael M. Dugan, Firehouse, June 2001

Special Considerations

- **Extensive deterioration.**
- **No access or limited access on one side.**
- **High tension wires.**
- **Multiple or split level buildings.**
- **Weather**
- **Time of day**



Point out that many New England Mill Buildings are along the waterfront of rivers and present no or at least limited access in the rear.

Buildings may be two stories in the front and 3 - 4 stories in the rear.

The presence of electrical wires prohibit or restrict the use of aerial devices required for safe operation of high volume streams.

Work each of these points and others that develop as group scenarios.

Weather Conditions

- **Current weather conditions could lead to delay in apparatus arrival and operating.**
- **Any extreme weather could indicate persons seeking shelter.**
- **Weather can clearly deteriorate building conditions.**

Heavy extreme weather conditions including torrential rains, severe cold, or heat, etc., might drive people for shelter. This point has to be mentioned as it is factual, **but it by no means indicates with any certainty that there is a bona fide life hazard in place.**

Refer back to the slides of the snow load roof collapse as an extreme example of building deterioration.

Time of Day

- **This should have a minimal impact on a properly secured vacant building as the civilian life hazard should be non existent**
- **Late night/early morning fires may not be discovered as fast as others**

At any time there is a fire in these buildings they are inherently more dangerous.

The time of day factors that are normally considerations during size up are not applicable at vacant building fires as these buildings should not have a civilian life hazard.

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The Building



Have the participants identify the problems they see with this structure. Is it a building that fire fighters should be committed to enter? **NO**

Construction Features

- **In addition to all normal construction considerations consider**
 - ✓ **Deterioration**
 - ✓ **due to vandalism and weather exposure**
 - ✓ **Openings or holes in structural elements that will allow abnormal fire travel**
 - ✓ **Removal of structural elements that reduce stability and create fall hazards**

The building construction features normally considered at the time of construction may have been violated and compromised.

You should also consider that some structural components have been removed.

Occupancy

- **What was the occupancy used for prior to its abandonment?**
- **Has the occupancy now been used for storage?**



Do not confuse occupancy with OCCUPANTS!

Consider any weight loading the building did have, v. current condition.

Height & Area

- **Consider the fire flow required for the area involved.**
- **A properly boarded building will be difficult to open up for stream placement, causing an increase in fire spread.**
- **Access with ladders and aerial streams may be required.**

Many of these buildings are large open areas and will require significant fire flow.

Open to Weather Conditions

- **Excessive water in wooden structural members**
- **Water openings that have frozen, thawed and re-frozen causing structural cracks and possible failures.**
- **Snow loading and ice loading.**
- **Wind conditions and small flying fragments**



Review each point and develop others through group discussion.

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Consider shut valves (zones) broken and scavenged piping. If piping is intact, can it be used to assist in fire control?

Fire Department Operations in Vacant and Abandoned Buildings



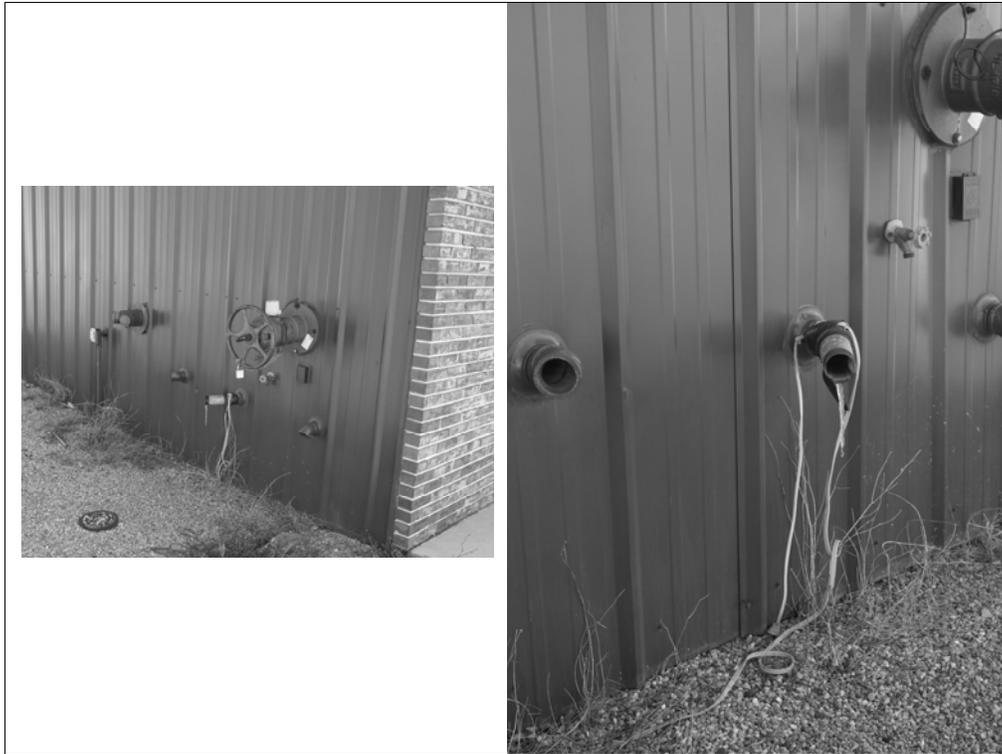
Same as previous slide

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Alarm systems are questionable at best and have probably long since been disabled.

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Possible system freeze-up

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Systems or components that are in place today may not be required by today's code.

Location of Fire

- **Lower floors or upper floors?**
- **Near shafts openings, voids?**
- **Exterior and has now spread to interior?**
- **What is the fire growth potential?**
- **How will it travel through the building?**



Where the fire is in these buildings will affect many of the factors previously discussed. The shaft in this photo is located in the mill building just to the right of the ladders placed on the roof structure.

Even an outside rubbish fire that has extended inside will affect operations.

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Always consider massive openings in construction and rapid fire spread potential.

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Conditions of interior stairways in vacant buildings should always be suspect. If entry by firefighters is considered, they should use extreme caution around stairways and any vertical openings.

Exposures

- **If no offensive attack is planned or anticipated, then plan for extensive exposure protection due to radiant heat, embers, etc.**
- **Consider this exposure protection early on.**



Large vacant building - Large radiant heat fire spread problem.

Collapse

- **Not risking personnel for interior operations may lead to greater fire involvement**
- **If only defensive operations are to take place, prepare for collapse in the operational plan**
- **Initial placement of apparatus is an important factor**

If a conscious decision has been made not to enter and attack, then fire condition will grow and collapse will become imminent.

Collapse at an abandoned building should not be considered “without warning”. The warning is **TODAY** it should be expected!

Fire Fighting Operations



The next portion of the program discussed operations at vacant and abandoned buildings.

Apparatus & Manpower

If no manpower is to be committed to interior operations, then additional resources may still be needed to compensate for

- ✓ **heavy fire conditions**
- ✓ **large water supplies**
- ✓ **exposure protection**
- ✓ **access issues**

BIG FIRE = BIG WATER

Big water = lots of personnel and resources!

Water Supply

- **Expect rapid fire spread and extensive involvement.**
- **Usually will require large caliber streams from a distance.**

Same as previous slide

Streams

- **Heavy large caliber streams should be operated from flanking positions.**
- **Large streams add a tremendous amount of weight and impact loading to a building.**
- **Adequate drain time should be given after operating heavy streams**

Same as previous slide

Systems in Place

- **What system were in place while occupied?**
- **Were systems shut down?**
- **Was one system shut and another not?**
 - ✓ **Suppression v. detection**
- **If sprinklers are in place**
 - ✓ **Has piping been removed or broken?**
 - ✓ **Can system be pumped?**

When in doubt, pump any existing sprinkler system, but the performance should be considered marginal at best.

The Incident Commander should not expect that that engine company will have the same effect as if the system were maintained and intact.

Use the system but do not commit massive resources to it.

Scenarios

What would you do?

Fire Department Operations in Vacant and Abandoned Buildings



Play the following three life hazard scenarios out for this photo?

“Hey about a month ago there used to be people living in there.”

“I saw a guy hanging around there this morning.”

“Me and Johnny were in there when the fire started. I made it out and now I can’t find Johnny.”

Also discuss:

- What would your normal attack be if this were not abandoned?
- How does that differ from the current scenario?
- What could be a possible successful attack here?

Possible answers:

- Exterior stream, then cautious interior attack after conditions have changed.
- Aerial or ground ladder attack
- Develop others with class.....

Fire Department Operations in Vacant and Abandoned Buildings



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Interior / Exterior

The decision to commit interior firefighting personnel should be made on a case by case basis with proper risk benefit decisions being made by the incident commander.

The commitment of firefighters' lives for saving of property and an unknown or marginal risk of civilian life must be balanced appropriately.

In an abandoned building, an automatic interior attack cannot even be considered an option until all factors have been considered.

As in the life hazard scenarios just covered, there is a difference between an actual life hazard and a hearsay report that has been unconfirmed.

Consider the Risks

“Interior operations are not mandated at vacant buildings. Entry into a vacant building is an option, not an obligation.”



Michael M. Dugan, Firehouse, June 2001

The quote on this slide is from Dugan’s article “Fighting Fires In Sealed Buildings” Firehouse, June 2001. This is a point that should be stressed to firefighters and officers over and over again.

Alternatives

- **Consider the use of thermal imaging cameras to conduct primary searches of vacant/abandoned structures from the exterior or just inside of door openings**
- **If the building is secure, what is the potential of it being occupied?**

Brainstorm on how thermal imagers could be used.

Discuss the potential of life safety risk in a secure building.

Use of Thermal Imagers



Most structures could be effectively searched from the exterior using thermal imaging.

This rules out the life safety risk without endangering firefighters.

This search in some cases might even be faster than an interior search.

Glass must be removed from openings or the reflection will reduce the cameras effectiveness.

Use of Thermal Imagers



- **Doors, windows, basement windows and bulkheads can be used to conduct an exterior search.**
- **Glass must be removed or imager will be ineffective.**
- **Walls and other obstructions may reduce effectiveness of imager.**

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This rules out the life safety risk without endangering firefighters.

This search in some cases might even be faster than an interior search.

Glass must be removed from openings or the reflection will reduce the cameras effectiveness.

Gaining Access

- **If unsecured there is no significant issue other than standard firefighter forcible entry operations.**
- **If marginally secured additional companies may be required with sledge, axe, and halligans.**
- **If secured as recommended power saws and multiple cuts will be needed.**



If the building is properly secured, then power saws should be used to breach any secured openings.

If it is standard plywood or particle board of the windows then a standard forcible entry method could be used.

Gaining Access

Fire departments should train regularly to determine the most efficient methods they will use to gain access to secured buildings



Examples of a truck company training with various types of security on a vacant property.

Marking Buildings

- **Used to alert fire fighters of the potential hazards in a vacant/abandoned building**
- **Makes public aware of problem properties**
- **Allows for increased surveillance**

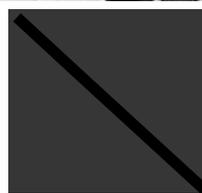


Building marking is one way that many communities identify that hazards exist in a structure. The marking process is coupled with the inspection and evaluation. This process has been used successfully in many large cities such as New York and Boston. As a result of the Worcester fire, many other communities have implemented similar programs.

Vacant Building Markings



**Exterior operations Enter
for known life hazard**



**Interior operations
with extreme caution**

These markings are based on the system used by FDNY in New York City. Other jurisdictions may utilize different marking systems or include a red blank sign that indicated that the building has been inspected and no hazardous conditions were noted.

Marking Buildings



- **Severe structural or interior deficiencies**
- **Operations should be conducted from outside except for life safety**
- **If interior operations are required:**
 - Approved by Incident Commander
 - Tactics modified
 - Examined before units are committed
- **Time of any interior operations must be limited**

The X indicates that the building is a significant hazard and that, unless there is a known life safety hazard, operations should be conducted from the exterior.

Fire Department Operations in Vacant and Abandoned Buildings



Operations in vacant/abandoned buildings are inherently more dangerous

Stress this point and that of Dugan discussed earlier.

“Most vacant buildings usually have a low potential for civilian victims and a high injury risk to firefighters. Therefore, commanding officers must take into account the safety of all personnel at the fire scene.

Interior operations are not mandated at vacant buildings. Entry into a vacant building is an option, not an obligation.”

From “Fighting Fires in Sealed Buildings”, Michael M. Dugan, Firehouse, June 2001

Summary

- **Identify abandoned buildings in your area.**
- **Monitor buildings' condition over time.**
- **Do not risk firefighters' lives needlessly.**
- **Prepare for defensive operations early.**
- **Expect rapid fire spread and early collapse potential.**
- **These buildings are inherently more dangerous!**

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The assistance provided by
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appreciated.



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