# NISTIR 5222

# Small Board and Care Fire Evacuations: A Guide for the Fire Safety Professional

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*Prepared for:*
**U.S. Fire Administration**
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# INTRODUCTION

**This report is intended for...**
individuals working with fire safety issues in small Board and Care (B&C) homes. The report addresses ways in which fire safety professionals may evaluate and improve small B&C home fire evacuation plans. A small B&C home is defined for this report as a detached dwelling providing shelter for 16 or fewer individuals. This definition is consistent with that used in the National Fire Protection Association Life Safety Code®; however, the contents of this report are not limited to material appearing only in the Life Safety Code® (LX). This report is not intended for use with apartment' buildings or high-rise occupancies.

**Why this report was developed...**
Residents of a B&C home are five times more likely to die in a house fire than residents of a typical single family home[1]. As B&C homes improve their fire evacuation capability more occupants will escape life-threatening fires.

**This report can be used to...**
improve fire evacuation planning, fire evacuation training and fire plan evaluation programs. Maintaining an effective B&C evacuation capability is a multidimensional task. Motivation as well as technical skills are necessary to sustain effective, long term training programs. Tables 1 and 2 contain items for improving the technical content of a training program. Fire safety professionals using an instructive tone, consistent judgements, and technical competence can improve training motivation. An opportunity for using these professional skills presents itself when B&C staff prepare their first evacuation plan. By offering his or her assistance at this early date, a fire safety professional will gain from their involvement a more accurate assessment of that B&C's true evacuation capabilities.

A fire safety professional can improve training motivation by explaining the consequences of inappropriate evacuation performance. Consequences can range from the cost of installing a sprinkler system, to revocation of business license, to emotional and financial responsibility for loss of human life.

# PLANNING FIRE EVACUATIONS

**An appropriate fire evacuation plan is...**
a strategy for moving every occupant away from the danger and to a *point of safety* in a timely manner. A *point of safety* maintains--by virtue of construction or location--the separation of heat and smoke from people. A point of safety may be located outside or inside a B&C home. The preferred point of safety is a designated outside meeting location. An inside point of safety is not a final destination but a safe location to await rescue by the fire department. An exit should be connected to the point of safety for quick entry and egress.

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[1] **The Life Safety Code Handbook,** National Fire Protection Association, 1991, Section 21-1.1, pp. 684.

**If the evacuation plan does not include exit route diagrams this is...**
not a serious deficiency as long as the occupants are familiar with exit routes and a variety of drill situations are practiced.

**When a B&C occupant can not evacuate alone then...**
that occupant needs assistance to reach a point of safety. In such cases it might be more economical and timesaving for the fire safety professional to direct efforts toward improving occupant assistance rather than upgrading building construction. Assigning disabled occupants to rooms located rooms near ground floor exits will improve this evacuation effort.

**It is the professional duty and responsibility of the B&C staff to.;.**
assist resident evacuation as long as they remain safe themselves. Staff should prioritize their assistance to those residents who will benefit most from their help. Staff should be competent in moving difficult occupants. Every physically capable resident should participate in evacuation drills. If a resident is unable to participate in drills but will need evacuation assistance then a replica should be used to simulate the effort needed to move the disabled resident.

**Most fire evacuation drills should be preannounced because too many...**
surprise drills promote the fire alarm signal as a false alarm. Many individuals learn more effectively in the relative calm of a preannounced drill. The number of surprise drills can be based on resident motivation but the decided objective remains reaching points of safety in a timely manner. Twelve surprise drills per year is probably too much.

**How do water spray sprinklers effect the evacuation plans?**
They don't; even with water spray sprinklers building evacuations should be planned and practiced. Emergencies other than fire exist. In recognition of sprinkler's superb record of preserving life and property the LSC allows evacuations of any duration when the B&C home is protected throughout by a properly designed quick response sprinkler system.

**What should the evacuation plans include?**
Evacuation plans should match the evacuation capabilities and fire protection features of individual homes. Table 1 lists items which can be considered for most evacuation plans. Common sense and experience should be used in making evacuation and evacuation plan evaluations.

## EVALUATING FIRE EVACUATIONS

**Evaluating evacuation capability is the second step in...**
providing B&C fire safety. The first step is evacuation planning and the last step matches the building fire protection features to the building evacuation capabilities. For example, a small, 'prompt' (see below for definition of prompt) B&C home may have adequate protection for second floor residents by providing only hallway smoke detectors and windows as second room exits. If this 'prompt' B&C were to become 'slow' then the second floor bedrooms might warrant a second, distinct and protected stairway (fully enclosed with doors at the top and bottom) to the ground floor. If this 'slow' B&C home were to become 'impractical', justifiable protection for the entire home could now include a properly designed, installed and maintained quick response sprinkler system.

**Evaluating the building evacuation capability is important because...**
having an evacuation plan does not guarantee effective evacuation. The evacuation evaluation is the responsibility of the fire safety professional. Within the LSC there are several criteria for evaluating B&C evacuation capability. Each criteria attempts to categorize (albeit from different approaches) the evacuation performance into one of three capabilities. These capabilities are: prompt, slow and impractical. The criteria used to evaluate the capabilities are: word definitions, timed drills, and a numerical worksheet.

In applying the word definitions a fire safety professional must use personal judgement. A *prompt building evacuation* is defined *as"quivalent in capability to the general population (living) in residential occupancies..."*[2] The slow evacuation is completed "*...in a timely manner, and some assistance may be required.* l Slow evacuations are further described as facilities where *"...there is continuous staffing and all residents can travel to the centralized dining facilities without continuous assistance from staff ."*[3] The impractical evacuation *...*can not be completed in a timely manner, even with staff assistance.* [4]

When timed drills are-used to evaluate the evacuation capability the drills are considered completed when the last occupant reaches a point of safety inside or outside the home. *A prompt evacuation is completed in 3 minutes or less, slow evacuations in 13 minutes or less, and impractical evacuations in more than 13 minutes.*[5] Drills are not good evaluation criteria to the extent that they do not exercise decision making skills and actions needed during true fire emergencies.

The numerical worksheet method for defining prompt, slow and impractical evacuation capability is called the *EDC* [6] *or the Evacuation Determination Capability* and is found in the NFPA Chapter 101M® on B&C homes. The method uses an interviewing technique which produces numerical rankings that enter a worksheet formula. This method is claimed to be the most accurate and if not the most comprehensive, certainly the most systematic evaluation criteria. It involves substantial interviewing of B&C residents and staff as well as analyses of home egress design and fire construction detail.

Another approach used by some jurisdictions is simply to assign a single evacuation capability -to all new B&C license applications. For instance, all new B&C homes might be assigned a 'slow' capability until such point that residents demonstrate they no longer are capable of evacuating in a timely manner. At this point the fire safety professional can use the EDC criteria to identify the problem and pose a solution.

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[2] NFPA Chapter 101•, 1991, 22-1.3.

[3] Ibid, Appendix note A-23.1.3.

[4] Ibid, 22-1.3.

[5] Ibid.

[6] NFPA 101M', Alternative Approaches to Life Safety, 1991, pp. 35-45.

**The reason for the multiplicity of evaluation criteria has more to do with...**
making the evaluation job easier than with any uncertainty in one criteria. For example, rather than waking up at 390 AM to verify a fire drill, the evaluator can compare the drill rating with the word definition or EDC criteria. In another example, if a large home with perhaps 40 residents performs slower and slower fire drill evacuations over the span of several months the evaluator needs to understand why this is occurring. Rather than interview all 40 residents for the EDC evaluation criterion the fire safety professional can simply apply the word definition.

**How can the fire safety professional verify the evacuation performance?**
The best method is personal involvement, whether by witnessing surprise drills or interviewing residents and staff. Alternatively, drill records completed by staff can be collected and examined. Sample drill record sheets appear as Table 2.

**What should be done when a B&C has an impractical evacuation?**
*The LSC requires 12 drills each year, or at least 4 drills per shift each year.* If one drill takes too much time, another drill should be run. If this drill also takes too much time then the problem should be identified. If the occupants need more training they should receive more training. If increased training does not improve the evacuation then three approaches remain: 1). hire more staff, 2). increase fire protection,. or 3). close the home. Constructing interior points of safety is one. fire protection option; installing water spray sprinklers is another.

## CONCLUSION

**How do you know if you have done enough?**
Evacuation training is not something that is done once and then forgotten; it is a capability that needs maintenance. This is a real concern for B&C homes in general because the evacuation capability can change rapidly with the introduction of a new resident or with a fall and subsequent injury of an existing resident.

Evacuation training and performance are appropriate if every building occupant gets to a point of safety in a reasonable amount of time. This report introduced three criteria for defining “reasonable amount of time’: timed drills, word definitions, and scored interviews. Typically, evaluations using these criteria are applied by the fire safety professional once a year during inspections. After successfully. completing their annual fire safety inspection it is the B&C provider’s responsibility to maintain the evacuation performance level.

**Where do we look for more information?**
The local fire department is the first place to look; they should be eager to develop a joint training exercise which involves a practice fire drill with firefighter assisted evacuation. Beyond this local source of information are some nationaldistributed resources. First, there are code books on building construction and fire safety. North America has three building codes and two fire safety codes which are currently being used. Of these, the NFPA LSC• offers more specific guidance on B&C evacuation planning than all the other codes combined (all items in this report having LSC• citations *are italicized).* Second, there are national agencies which specialize in fire safety. These include the U.S. Fire Administration in Emmitsburg, MD, the Building and Fire Research Laboratories in Gaithersburg, MD and the National Fire Protection Association in Boston, MA.

**Table 1**

**Recommended Checklist for Small Board & Care Evacuation Plans**

**Overall**

*Is the evacuation plan in writing?*
*Are copies of the plan located in the building and available at all times?*
What is the expected time for completing the building evacuation?
What are the worst case scenarios necessitating emergency evacuation?

**After reviewing the period in time beginning one year ago from today...**

*were there at least 4 drills per staff shift?*
were the drill starting times varied within each shift?
how many different alarm stations initiated the evacuation drill?
how many surprise drlls were there?
how many resident training sessions were there?
*how many staff training sessions were there?*
*how many exits were used at least twice?*
*how many drills simulated afire blocking the primary exit path?*

**Points of safety**

Do the evacuees travel to a Designated Outside Meeting Location?
How many interior points of safety are available to an occupant?
Which occupants intend to use interior points of safety?
Is the fire department aware of their role regarding interior points of safety?

**Occupants**

*Are occupants specifically trained to reach a point of safety?*
*Are occupants incapable of sufficient movement trained to stay in place?*
*Are occupants trained to assist each other in evacuation?*
*Is every physically able occupant participating in evacuation drills?*
*Are occupants incapable of self evacuation exempt from participating in drills?*
Are occupants with disabilities located in rooms near ground floor exits?
Are building occupants trained to activate the fire alarm?
Which occupants awake or recognize with difficulty the emergency alarm signal?
Which occupants will be receiving staff assistance in evacuating?

**Staffing**

How many staff members are there?
What hours are the staff on duty?
Are staff awake throughout the shift?
Are staff instructed on the local alarm system operation?
Are staff instructed on the suppression systems operation?
Are staff aware of their responsibilities in assisting occupant evacuation?
Do the staff specifically train in assisting disabled occupant evacuation?
***How open do staff receive instructions on the evacuation plan?***

**Fire Department**

Is the fire department within an appropriate response tune?
Is there effective training on how to notify the fire department?
Are instructions on how to notify the fire department posted near the telephone?
Is the fire department needed to assist in evacuation?
Is the fire department aware of their role in this evacuation?
Can the fire department find the house numbers from the street?
Is there adequate fire department access to the building?

**Evaluation & Update**

Is there a formal process for accepting and recording suggestions?
DO Supervisors update staff instructions at least every 2 months?
Has the plan changed since the last inspection?
Is there a contact point for obtaining more information?

*LSC citations appear in italics. Most citations appear in Chapter 101 section 31-7.* Sections 22-1.4 *and 23-1.4 are also cited.*

## Table 2
## Board & Care Evacuation Drill Record

B&C Provider (Owner) _____ Drill Date _____ Drill Type (Unannounced or Announced) _____ Exits Blocked by 'Fire' _____

B&C Street Address _____ Drill Time (24 hour)_____ Location of Simulated Fire _____ Designated Outside Meeting Location _____

B&C City & Zip Code _____ Drill Conditions (warm/cold) (rainy/dry) (windy/calm) (lit/dark) Alarm Initiating Station _____ Location of Inside Point of Safety _____

| Resident Name | Minutes to Reach Point of Safety | Which Point of Safety was Reached | Assistance Received (y/n) / Assistance Given (y/n) | Comments on constructive or resistive behavior during evacuation |
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