

## A TEN-POINT CHECKLIST FOR EMERGENCY PLANNING

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**Keywords:** Emergency Planning; Emergency Management; Evacuation Planning; Hazard Identification; Hazard Mitigation; Crisis Planning

### **Abstract**

The World Trade Center disaster on September 11, 2001 (911) underscores the critical importance of evacuation plans for rapid escape from our nation's buildings. Since 911, a growing number of small businesses and non-profit organizations have recognized shortcomings in their emergency preparedness, and put in motion urgent reviews of their existing emergency, evacuation, and security procedures. However, most of these small businesses do not possess the emergency preparation expertise in-house, nor do they have the funds necessary to obtain outside consultant expertise. Recently, Dr. Susan M. Smith and health and safety graduate students at The University of Tennessee, Knoxville, under Dr. Smith's direction developed a ten-point checklist that addresses the emergency preparation needs of small businesses and nonprofit organizations. This checklist is presented in this paper, and was recently posted for download on the National Safety Council Web site (<http://www.nationalsafetycouncil.org/issues/prepare.htm>). This checklist guides the novice through the important phases of risk assessment and emergency planning, leading to a comprehensive written plan. Questions on evaluation of current preparedness are designed to identify gaps in communications, alarm systems, restricted passageways, as well as potential adjacent hazards, such as industrial parks, fuel storage tanks, and public transportation thoroughfares. Potential low cost solutions involving training, use of existing relationships with local fire and safety departments and building insurance underwriters, and effective use of existing staff are also explored. By implementing this checklist, small businesses and non-profits will have made significant progress towards preparedness without the resource expenditure of big business.

### **Introduction**

The World Trade Center (WTC) disaster on September 11, 2001 (911) underscores the critical importance of emergency planning in reducing the potential number of casualties when disaster strikes, whether natural or man made. Following the World Trade Center bombing in 1993, the Port Authority of New York and New Jersey conducted an extensive review and upgraded their emergency evacuation procedures [6]. During the 1993 WTC evacuation, workers crammed into pitch-black exit stairways, bumping into walls and each other in the smoke and darkness [1]. As a result of these lessons learned, a series of improvements were added after the bombing. For example, batteries were added to every other light fixture in the stairwells in case of power outage, and handrails and a stripe down the center of the stairs were painted with yellow glow-in-the-dark paint [1]. In addition, a public address system was added so fire command stations could address evacuees. As a result, it can be argued that thousands of additional deaths were probably avoided on 911.

The events of 911 resulted in managers and employees everywhere evaluating the possibility of their business being targeted by terrorists for the first time. Obvious targets like the Sears skyscraper in Chicago and the Prudential building in Boston, as well as other building landmarks in New York, took extraordinary steps to upgrade their security posture and emergency preparedness [2]. However, large businesses such as these have existing security and emergency management expertise, or possess the funds to contract consultants if necessary. As was the case at the WTC, smaller buildings and businesses in the vicinity of these obvious potential targets also were at risk by virtue of their proximity. In addition, many smaller businesses and non-profits might be potential terrorist targets by virtue of what products or services they provide, or their worldwide recognition.

Since 911, a growing number of small businesses and non-profit organizations have recognized shortcomings in their emergency preparedness, and put in motion urgent reviews of their existing emergency, evacuation, and security procedures. However, most of these small businesses do not possess the emergency preparation expertise in-house, nor do they have the funds necessary to obtain outside consultant expertise [3].

### **Preparing to Plan**

Recently, Dr. Susan M. Smith and health and safety graduate students at The University of Tennessee, Knoxville, under Dr. Smith's direction developed a *Ten-Point Checklist for Emergency Preparedness* that addresses the emergency preparation needs of small businesses and nonprofit organizations [4]. The *Checklist* is designed for use by novice planners, and helps them evaluate needs through a series of clear, basic questions divided into ten emergency preparedness areas. Properly executed, it provides the hazard assessment information necessary to formulate or update a comprehensive emergency plan.

In assessing potential hazards, the planners must first determine two things: (1) what types of emergencies might the business be susceptible to, and (2) how likely (relative risk) is the emergency to occur. In most cases, the primary hazard is fire, and the accompanying fire hazards of smoke, toxic gases, and superheated air rising to upper floors. Even if a fire is contained, confusion and panic inside smoky stairwells or blocked exit routes can have dire consequences. Many other potential emergencies might require full-scale evacuations, such as bomb threats, radiation or bacterial assault, or the aftermath of earthquakes. In other instances, such as chemical spills, tornado warnings, or severe storms, the best action may be to seek shelter, and then relocate to safer areas when conditions permit [5].

When assessing potential hazards, planners must not forget to consider hazards present in adjacent structures, businesses, and transportation routes. Industrial parks may support businesses engaged in a host of activities that might be risk factors for their neighbors. Fuel storage tanks, small airports, river barges, and rail lines may all provide hazards that must be accounted for in emergency planning [5].

### **The Ten-Point Checklist**

Effective response to emergencies begins with prompt and effective warning. Therefore, the first point of the plan is an evaluation of existing warning systems. This section steps the evaluator through visual and audible alarm identification and reviews the appropriate requirements for each type of alarm. For example, the *Checklist* asks the evaluator if audible alarms are present, operational, and detectable from work areas. The *Checklist* then steps the evaluator through types of activation (manual, or automatically by types of sensors), proper placing (height above floor, distance between, etc.), and whether there are different sounds for different types of emergencies and "all clear."

Alarm systems should include both evacuation and indoor relocation to shelter signals. Although most emergencies require evacuation, there are situations where evacuation may be the wrong thing to do. In cases of severe weather and tornadoes, hazardous chemical spills, or some security scenarios, for example, following directions to an inside sheltering location may be required. Therefore, visual and audible warning systems must allow occupants to distinguish between these conditions and follow the appropriate direction to either evacuate or shelter [4] [6].

The *Checklist* also asks if battery backup capability exists for warning systems in case of a loss of electrical power, if there is a maintenance plan in place that checks operability, and if the alarm also automatically notifies the fire station, security, or other controlling station. Audible alarms by themselves are not sufficient. Hearing impaired people, as well as those who work in noisy areas, must be accommodated by flashing visual alarms, and newer buildings are required to have visual alarms in a number of public areas, such as bathrooms, changing rooms, doctors' examination rooms, hallways, and public areas [4].

The second *Checklist* point addresses communication capability. Good, reliable two-way communication is a key element in ensuring effective emergency response. If responders cannot determine where to respond to, or what equipment to respond with, situation awareness suffers, and valuable time is lost. Likewise, a method for directing evacuees away from the conflagration can be indispensable. In 911, conflicting public address announcements confused many inside the WTC, and many started to return to their offices instead of continuing to evacuate [6]. This section asks if there are accessible phones on every floor, and whether emergency numbers are posted on or near the phones. The availability of alternate means of communications, such as two-way radios, is also explored [6].

The longest series of questions forms Point 3, "Evacuation." This is the primary response for most emergencies, and a well thought out and exercised evacuation plan is the best protection for building inhabitants. Under current residential design standards, the goal is to evacuate a building in less than five minutes. However, the WTC towers were designed in the 1960's, and had only two main stairwells each. When firefighters started entering the building, evacuees were forced to go down single file in order to let the firefighters pass by on their way up. The stairwells quickly became overcrowded, and evacuees took 35-40 minutes to escape from the 32<sup>nd</sup> floor [6] [7].

Narrow stairwells also make evacuation of people with disabilities difficult. Assisting mobility-limited persons down narrow staircases may become problematic, since most lifting devices require room for three persons abreast. Fortunately, modern building codes mandate wider and more plentiful staircases. However, if the evaluated building has narrow, undersized, or insufficient numbers of stairwells, planning must be carefully undertaken in order to ensure orderly quick evacuations, or remodeling may be in order. The best way to gauge the adequacy of existing exit routes and stairwells is by measuring occupant evacuation times during evacuation exercises and assessing where the bottlenecks are and what can be done to remove them [5].

Evacuation times can normally be significantly reduced by training building occupants to recognize building alarms and evacuate promptly, coupled with well thought out evacuation plans that have been exercised repeatedly to identify and eradicate bottlenecks. Point 3 provides a number of questions that will lead to low cost improvements that will markedly improve evacuation time. First of all, are evacuation routes properly posted and correct, or have they become outdated due to building remodeling? Exit signs should be positioned appropriately, so they are visible to the evacuees, and point in the correct direction of the exit. Some may be positioned to point to blind alleys and padlocked doors, or back towards the flow of traffic, such that a bottleneck might occur in an actual evacuation. Are the exit signs illuminated and exit paths supported with emergency lighting that does not rely on normal electrical power? Every room should have at least two exits, and exit doors should open from the direction of exit so that evacuees do not have to stop and open

a door towards themselves, causing a potential bottleneck. The operation and physical condition of self-closing fire doors should be checked to ensure they properly perform their safety function. Additionally, guardrails and handrails should be checked for sturdiness and freedom from rough edges.

Finally, evaluation of the evacuation plan does not stop with the building exits. Many of the casualties from 911 died in the streets and areas surrounding the WTC when the buildings collapsed. The *Checklist* asks the evaluators to determine if there is a designated assembly point outside the building a safe distance away from the building, as well as determine if the access roads and walkways to the building are free of obstructions, and accessible to law enforcement, fire department, and emergency medical services (EMS) vehicles and personnel [3][4].

Utilities is the fourth emergency guide point. Utilities such as natural gas, electrical power, or steam can initiate or greatly complicate an emergency. Likewise, backup utility systems such as emergency lighting can be of great benefit. Point 4 evaluates the condition of utilities in the building from all of these perspectives. The *Checklist* evaluates whether gas and steam isolation valves and electrical isolation breakers are clearly marked and function properly. It prompts an evaluation of electrical cords, outlets, and portable equipment for possible degradation or overloading that may lead to a fire, and assesses the adequacy of emergency lighting.

Fire suppression capability is evaluated in Point 5. Portable fire extinguishers, alarm pull stations, and sprinkler systems are evaluated. Portable fire extinguishers should be of the correct type, in sufficient numbers, and appropriately located. Annual inspections should be up to date, and the extinguishers should be clearly visible and clear of obstacles. Fire alarm pull stations should be operable, visible, and free from obstruction as well. Fire suppression sprinkler systems should be in good condition and the sprinkler heads should be free from obstructions.

Point 6 evaluates contingency planning for severe storms and tornados. In this section, sheltering in place or in an alternative facility is evaluated. Items of importance include having a plan for sheltering in place of sufficient size to accommodate the number of individuals it is designated for, and the adequacy of the protection the facility will provide. The *Checklist* determines if there are emergency power sources available to the facility that will function if normal electrical power fails, and ensures adequate food, water, first aid equipment, and blankets are available [5].

Although Point 7 is labeled "Management Issues," its primary focus is to evaluate the safety and emergency training, planning and motivation of the building occupants. If employees are programmed to assume building alarms are system malfunctions and fail to evacuate in a timely manner, response in an actual emergency will be slowed, and additional casualties may result. Management leadership by example is a vital ingredient in establishing the right safety and emergency preparedness culture in any organization. Senior leadership interest in the emergency preparedness and evacuation plans will enhance the quality of the plans. Actions supporting emergency management and safety initiatives should be assigned to well-respected, credible employees and managers, and cross all levels of the organization. All should be participators in drills and training. The more training and understanding managers have, the more they become an extension of the safety function, and the better they can supervise evacuations and safety actions. In fact, incorporating safety and emergency roles and duties in job descriptions and work rules are further methods of engendering a safety and emergency preparedness culture in the business [5].

Drills should be well planned and instructive. They should be designed to detect flaws in emergency planning, and to exercise alarms and communications systems, assess managers' performance, and to refine and improve the plan. Drills should be realistic, and few simulations should be used. Managers should look upon drills as opportunities to set an example, and should not excuse themselves from participating. The frequency of drills will normally vary according to the type of business and needs of the occupants. Scheduling drills a minimum of every six months

is a good goal, but the date and time should not be predictable. Perhaps the best form of training is to critique the drills immediately after they are completed, and provide constructive feedback immediately to all participants. Evaluation sheets, which prompt evaluators to observe and evaluate the key elements the drill is designed to exercise, and comparative statistics should be used to ensure concrete improvement is being made [5].

Point 8 has the mundane title of "Housekeeping." However, this title belies its significance. Poor housekeeping can cause, complicate, or extend emergencies. Allowing materials to be stored in stairwells, or furniture to infringe upon exit routes, will result in restricting egress routes, and could cause bottlenecks or a general slowdown in exiting the building. The storage of hazardous materials such as cleaning solutions or flammable liquids is addressed. The amount and location of combustible materials is also evaluated. Often combustibles such as trash or discarded paper build up at the bottom of stairwells, resulting in a fire hazard with direct chimney effect right where evacuees expect to be able to find safe exit. Since smoking prohibitions have been instituted in many buildings, the propensity for smokers to congregate and smoke at stairwell exits has been observed. Such activity can result in a significant fire potential in the stairwells, often where smoke and fire detectors are not placed [3][4][6].

The last two points are a direct result of the times in which we live. Point 9 is "Bomb Threats." Although bomb threats have been with us for some time, they have taken on much more urgency since our sense of security has been so deeply shaken by 911. The *Checklist* evaluates the adequacy of bomb threat procedures, including ensuring call-in checklists are located by each phone, and where appropriate, telephones are equipped with recording devices. In some instances, threat assessments should be conducted, employees should be trained in letter/parcel bomb recognition, and trained bomb search teams established [4].

The last point in the *Checklist* is "Security Issues." Until recently hardly a thought had been given to security in many businesses. That situation changed dramatically after 911, and today, security concerns have clearly come to the forefront. This section looks for employee photo ID's, and client/guest sign-in logs. Mailroom procedures may require evaluation, and processes for handling security after hours should be in place. Plans should exist for securing office space and equipment, and receptionists should be trained in security and response to all types of crises.

### **The Comprehensive Emergency Plan**

Once the *Checklist* has been completed, the next step is to fold the information into a comprehensive plan. All of the identified potential emergency events must be prioritized so that the most hazardous and most likely scenarios are given due emphasis. The plan should be tailored to take building design and construction materials, height and floor layout, occupancy rates, usage, activities, etc. into account. Local building codes and variances must be reviewed and complied with. However, some degree of liability will still exist even if minimum code standards are met [5].

The best plans are simple, easily implemented and effective. Complicated emergency procedures are difficult to execute, and will fail in the middle of an emergency. The high level of turnover in many industries should be recognized, and techniques to enhance recall in the middle of a crisis should be considered, such as emergency action postings, strategically placed abbreviated copies of emergency procedures, and trained cadres of emergency teams or leaders to provide direction and ensure correct actions are taken in the case of an emergency [3][6][7].

The *Ten-Point Checklist* will likely identify a number of discrepancies that should be corrected or potential good practices that should be implemented. Normally, discrepancies that can be corrected without substantial cost can be corrected on the spot or shortly thereafter. In some cases, funding to correct design flaws or provide important emergency equipment may be required. In either case,

discrepancies that can't be corrected on the spot should be listed on a discrepancy list and tracked to completion.

Once written, the new emergency plan will soon become outdated and lose effectiveness unless the plan is reviewed and updated periodically. To prevent this from happening, management attention must be placed on the continuing validity of the plan. Responsibility for maintaining the plan and pursuing the corrective action list should be assigned to someone who has the time it takes and an interest in it. Usually, that is not the resident "old-timer" who does not have the time to devote to it, and assigning a junior manager to the role will likely be seen as a signal that the project is of low importance. Ultimately, the success of the plan rests with the organization as a whole's sense of commitment, from the owner to the supervisor, tenants and occupants. If the correct emergency preparedness culture is established, the plan should be an active, viable document that will result in minimizing casualties should an emergency occur [5].

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**The International Emergency Management Society**

*9<sup>th</sup> Annual Conference Proceedings*

*University of Waterloo, Canada, May 14-17, 2002*

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