DEVELOPMENT OF SIMPLE RAPID DAMAGE ASSESSMENT PROCEDURES FOR PREDICTION OF NEEDED EMERGENCY RESPONSE FOR DISASTERS THAT OCCUR WITHOUT WARNING

Executive Analysis of
Fire Service Operations
In Emergency Management

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ABSTRACT

For the past several years, the Board of Fire Commissioners of Hopewell Township Fire District #1 had been commissioning research of their district to determine the hazards they face and had assessed the resources they currently have to protect those hazards. The product of the above research has shown that human resources are very scarce, often at critical times such as during the daytime hours, Monday through Friday.

The problem that was identified by the Union Fire Company and Rescue Squad which serves Fire District #1 was that no procedures currently in use could assist a fire officer with limited disaster experience in quickly determining the resources needed to stabilize the life threatening situations which would be faced in the immediate aftermath of a no notice disaster. This will be a critical factor to reduce the deaths and injuries which result when such emergencies occur. The purpose of this research project was to develop a simple procedure to quickly determine the resources needed during any disaster by using action research to answer the following questions:

1. What indices have been used to predict the number of casualties which could be anticipated during a disaster?

2. What are the key features of an effective, rapid damage assessment tool the primary purpose of which is to determine immediate, life safety resource needs?

3. What simple procedures should be used to determine resource needs utilizing a rapid damage assessment tool?

The procedures used to accomplish this project consisted of researching what indicators have been used to predict the number and/or types of casualties likely to be

found in various disaster situations, researching what procedures have been used for the employment of rapid damage assessment tools and designing a rapid assessment tool and the procedures for its use.

The results of these inquiries are encompassed in the procedure outlined in the Appendix of this report. These results showed that there are several indicators which have been commonly used to predict the number of casualties which would occur in a disaster situation. Predictions were divided between without warning disasters and those that occur with warning.

Utilizing the estimating procedures outlined in the Appendix should result in fewer wasted resources and better utilization of scarce resources in the immediate aftermath of a disaster. This procedure uses the number of houses destroyed as a basis for estimating the deaths and injuries which would occur from a disaster that occurs without warning.

Based on these results, the following recommendations were made:

1. That the Board of Fire Commissioners, as a matter of policy, require the operational departments which serve Hopewell Township to implement the procedure for response to without warning disasters;
2. That the Board of Fire Commissioners insure that the rapid damage assessment procedure outlined in the Appendix of this report becomes a part of the Emergency Management Plan for Hopewell Township;
3. That the Board of Fire Commissioners continue to assist in the development of useful tools to enable officers who have little experience with disasters to properly and quickly determine their needs;

4. That further research be conducted on a national scale to determine statistically what estimating formula for deaths and injuries should be used to best estimate the emergency response resources needs.

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INTRODUCTION

The problem was that there existed no tool available to fire officers to rapidly assess the resource needs during a disaster or large scale emergency. This is a key piece of the decision making puzzle when natural or man-made disasters strike a community, particularly a community having little experience in disaster response and recovery.

The purpose of this research was to design a simple and useful tool to allow fire officers to quickly and accurately determine the resource needs of a community in the immediate aftermath of a natural or man-made disaster.

Action research was used to answer the following questions:

1. What are the indicators which could be used to predict the number of casualties which could be anticipated in the aftermath of a disaster?

2. What are the key features of an effective, rapid damage assessment tool the primary purpose of which is to determine emergency resource needs?

3. What procedures should be used to determine resource needs utilizing a rapid damage assessment tool?

BACKGROUND AND SIGNIFICANCE

For many years, the number of volunteers who are available to assist fire departments and first aid squads nationally has been declining. Indeed, statistics show that the number of volunteer firefighters has declined by 33,000 in the last four years. (Stevens, 2000) The fire departments which serve Fire District #1 have experienced a

similar decline in the number of available volunteers, particularly during the daytime hours. In September of 1999, the Board of Fire Commissioners of Hopewell Township Fire District #1 were advised by the Chief of the Union Fire Company and Rescue Squad, which serves a portion of the fire district, that he could not guarantee any response by the fire company to an emergency during the daytime hours. (Holcombe, 1999) This fact has caused the Board of Fire Commissioners (Board) to hire five emergency services specialists to add to the available resources in the district during the daytime hours. Despite these steps, the manpower resources available to the District remain at critically low levels.

It is necessary for the Chief of any department to continually evaluate the services that his/her fire department provides to its community in light of changing circumstances and conditions. As a result of this type of evaluation, it became evident that wise use and deployment of manpower resources during an emergency is now one of the most critical factors in assuring that protection in both the affected and surrounding communities remains responsive to their continuing needs.

In the face of the decline in available resources, it is vitally important that resources requested during an emergency are not squandered; that their efforts in the first few critical hours of a disaster response be directed solely at “preservation of life” activities. It is also critical that excessive resources not be ordered so as to maintain response capabilities both within the affected community and in mutual aid communities. This research is related to Executive Analysis of Fire Department Operations in Emergency Management class of the National Fire Academy’s Executive Fire Officer Program in the Damage Assessment unit. Specifically, that chapter

suggests that “there are cases on record where poor immediate damage assessments have resulted in either too few or too many resources being dispatched to the event or incident.” (Agency, 2001 p.8-4) It is also related to the operational objectives of the United States Fire Academy in that it is designed to “appropriately respond in a timely manner to emergent issues.”

LITERATURE REVIEW

In order to determine the best method for conducting a rapid damage assessment, the primary purpose of which is to determine the immediate, emergency resource needs, it was first necessary to determine how large a problem the unneeded assigning of resources was to the scene of a disaster. Many sources agreed that this occurred often and that it was an important issue. Time and time again, sources stated that typically in the immediate aftermath of a disaster, too many resources were ordered and then unused.

“The transportation of disaster victims to hospitals is almost invariably uncoordinated; there is usually an oversupply of EMS resources (especially transportation resources like ambulances) after a disaster; triage tends to be ‘informal, sporadic, and partial,’ and central coordination of emergency care activities is rare.” (Mileti, 1999 p. 224) Should this occur in the aftermath of a disaster in Hopewell Township, precious resources which would otherwise be used for normal emergencies in the area would be drawn away from this purpose, putting additional lives in jeopardy. Conversely, if too few resources were ordered for the disaster area, many of those who would have been saved by keeping their triage, treatment and transport within the

“golden hour” could easily die.

Often, sources referred to proper damage assessment in the immediate aftermath of a disaster as not only helpful toward reducing casualties but necessary to make accurate judgements. “Property damage may be a lot worse than it appears-or nowhere near as bad. In the immediate aftermath, the verdict hinges on proper assessment.” (Moore, 1996 p.17)

Nearly all of the sources which outlined damage assessment procedures recommended surveys conducted from the ground as the most efficient, there was a caution that the procedures needed to be appropriate. “It is likely, however, that for a long time to come, ground surveys will remain the most efficient way to proceed. This requires that appropriate survey methods and reliable health indicators be developed. Research in those fields is expanding rapidly and a number of standard indicators have been proposed. These comprise the ratio of death to injuries, age specific death rates, ratios of deaths to number of houses damaged, classification of types of casualties and patterns of medical consultations.” (Cuny, 1987 p. 55)

The literature that detail which indicators could be used to determine the number of casualties resulting from a natural disaster are historical in nature. Most of the available research in this area has been carried out through conducting a review of historical records and determining the number of anticipated casualties generally encountered for a given situation. “This estimate-at least at first-will probably have to be based on census figures and experience of the impact of earlier, similar disasters: the variables of climate, point in the agricultural cycle, kinds of injuries, etc. can then be ‘fed in’ to the calculation.” (Cuny, 1987 p. 54)

However, such research is hampered by the fact that there seems to be no clearinghouse for the collection, analysis and dissemination of this type of information. The result is that any inquiry in this area, in order to produce reasonably accurate results, often lies outside of the scope of research being conducted. “Ideally, the casualty ratios would have been determined from statistical data and records of previous earthquakes. However, such detailed data could not be obtained without an extensive investigation considerably beyond the scope of the present study.” (Agency, 1985 p.2-55) Indeed, such an exhaustive inquiry is also well beyond the scope of this research.

Most of the resources surveyed did offer guidance on estimating casualties which seem to have been based on some research attributed generally to the National Institutes of Science. For example, many sources have defined the anticipated number of casualties based on the number and extent of damage to residential structures. Many have further refined this number to make this determination based on the time of day that the event occurs. “Most nighttime casualties will occur in residences” (Agency, 1985 p.2-56) The Central United States Earthquake Preparedness Project in its report which estimates damage and casualties for six cities in the New Madrid Seismic Zone uses states that the “primary producer of casualties was assumed to be the collapse of occupied buildings” (Agency, 1985 p.2-54)

They further postulated that the number of deaths would be estimated at two percent of the occupants of collapsed buildings and the number of injuries at eight percent of the occupants. (Agency, 1985 p.2-55) “The probable number of residential casualties in each census tract was calculated by multiplying the average number of

persons per structure by the expected number of collapsed structures and then multiplying this product by the death and injury ratios for the occupants of collapsed buildings (two percent and eight percent, respectively)." (Agency, 1985 p.2-57)

These figures are roughly confirmed in the aftermath of a tornado incident. In the Will County, Illinois incident, over 1700 residences and businesses were either completely destroyed or severely damaged. Twenty-nine people died and over 350 were treated at hospitals. (Administration, 1992 p. 2) In this incident, while the death figure was slightly lower than would have been anticipated using this formula, the injury rate would have been approximately eight to ten percent if the average occupancy rate was between two and three persons per household; however, the actual average number per household affected was not reported.

The Central United States Earthquake Preparedness Project further broke down the casualty estimates for daytime hours. "The residential daytime casualties were…estimated at between 30 and 40 percent of the residential nighttime casualties in each census tract… The calculation of expected casualties in commercial, industrial and public non-educational buildings followed a procedure similar to that employed for the nighttime residential casualties, except that employment data were used to determine the population at risk." (Agency, 1985 p.2-59)

"For hospitals, schools and universities, instead of calculating an average number of occupants per structure, the total number of persons in all buildings of each type of construction (primarily masonry shear wall and masonry bearing wall) was determined for each census tract, based on occupancy data obtained from available data bases or information resources. Deaths and injuries were then estimated by

multiplying the total number of persons in each type of building by the probability of collapse obtained for that type of building from the appropriate fragility curve, and then multiplying that product by the casualty ratios for death and injury among occupants of collapsed buildings." (Agency, 1985 p. 2-60)

In each case, this project estimated the casualty figures using two percent for deaths and eight percent for injuries of the occupants of collapsed buildings as a base. Another project estimated that the ratio of deaths to serious injuries would mirror the two and eight percent figures. "It will be assumed for planning purposes that a 4:1 ratio applies for "serious" injuries to deaths, with "serious" injuries being defined as those requiring hospitalization, however brief. For non-serious injuries, the ratio will be taken as 30:1." (Administration, 1973 p.166)

Again, these figures seem to be roughly confirmed in an actual incident reviewed: "At approximately 1:30 PM on Friday, August 6, 1993, a tornado struck the central Virginia Tri-Cities area (Colonial Heights, Hopewell and Petersburg), approximately 20 miles south of Richmond. Before dissipating, it had left four people dead, approximately 200 with injuries (23 requiring hospitalization)…" (Messersmith, 1993 p. 22)

Other estimates were based on the total affected population. "Night time casualty figures are based on the fact that the population is essentially in its dwellings at that hour. A reasonable death ratio for persons in single family dwellings in the hardest hit areas is about 12 deaths per 100,000, or about that experienced in the 1971 San Fernando earthquake." (Administration, 1973 p. 166) "Daytime casualties (around 2 P.M.) could be as high as 500 per 100,000 population in the downtown (concentrated

population) area." (Administration, 1973 p. 169)This researcher was unable to confirm these figures through any incidents reviewed since total overall population affected was not reported. Using these figures, however, the Will County incident in rural Illinois it is estimated could have affected in excess of 225,000 people which would have yielded an 27 deaths and the Virginia Tri-Cities incident it is estimated could have only affected 33,000 people, yielding an estimate of 3 deaths. These population estimates are based on 1990 census figures and the resultant casualty estimates are quite accurate.

An estimate for slowly developing, or, with warning disasters such as floods include the following: "…However, as a rough indication of the casualties which could be caused by flooding, a casualty rate of 0.1% per 100,000 affected persons was applied…the number of affected persons being defined as the population of the 100 year flood plain…" (Agency, 1985 p. 2-63) As these figures are substantially different from those of disasters occurring without warning, it was decided to concentrate solely on disasters occurring without warning in this research.

Lastly, it was also necessary to determine the likelihood of a disaster occurring in the area of Hopewell Township as this would be encourage the use of and practicing with the instrument(s) that would be developed. New Jersey is listed as 31st for risk of tornado (Center, 2002). Further, central New Jersey is listed as having a maximum experienced intensity of earthquake as a 5.0 on the Richter Scale. This doesn't preclude the possibility of a stronger quake occurring and confirms that earthquakes are possible in this area. (Fratto, Ebel, & Kadinsky-Cade, 1986) In addition, Hopewell Township has two major North-South highways feeding Interstate highways on the western side of New Jersey as well as a portion of Interstate 95. Each of these

highways has the potential for serious hazardous materials incidents from truck traffic. Such an incident could present a threat such as that of a natural disaster like a tornado or earthquake and indeed is more likely to occur. (Hopewell, 2001)

PROCEDURES

Definition of Terms

Deaths. Those victims of a disaster which would be "black tagged" in emergency triage.

Minor injuries. Those injuries requiring no hospitalization; these include treatment given by EMS at the scene without transport

Serious injuries. Those injuries requiring some treatment at the hospital.

Triage. A system of determining which victims of a disaster should be assumed dead, those requiring immediate treatment, those requiring treatment soon and those who can wait for treatment.

Research Methodology

The desired outcome of this research was to determine the procedures and calculations which could be used in a large-scale, without-warning emergency or disaster to determine the immediate resource needs to effectively mitigate the life threat to the residents of the area effected. This would be utilized by the officers of the fire departments which serve Hopewell Township Fire District #1 in the event of such an occurrence. The procedure should be easily comprehended and implemented because

the officers have little experience in this area. The research was action research in that the information gathered described the results of various types of large scale emergencies and disasters and was utilized to develop a standard operating procedure. In addition, estimates used by other agencies, particularly FEMA and its predecessor, to predict casualties in the aftermath of various disasters were researched to attempt to find a simple calculation to assess casualties estimates.

The first step performed during the process of this research was that of examining various sources which described the results of a variety of disasters. The researcher examined various factors which influence the number of casualties in any given disaster.

The researcher then determined which factors found in many different rapid damage assessment tools particularly influenced the casualty rate and the unlivable housing rate. The researcher next designed procedures for the use of a rapid damage assessment tool, the sole use of which is to determine the immediate resources needed to save the lives of those effected by the disaster or emergency.

Assumptions and Limitations

In the course of this investigation some assumptions had to be made. Among these are:

1. That adequate and reliable indicators currently exist on which a fire officer could rely to estimate casualties as a result of a disaster;
2. That the indicators found could be quickly assessed in the immediate aftermath of a disaster; and,

3. That resource needs could be accurately predicted based on the estimated casualties.

This investigation was limited in that time constraints would not allow for a complete study of all available records of major natural disasters both with and without warning. While there are certainly various records which, if studied, could show one or more predictive variables of the number casualties which could be expected based on the type of disaster, no known database has been compiled which could afford timely and useful statistical analysis of such information. There have been statistical relationships found and developed such as that by Lees (1987), which holds that "the number of people injured may be approximately estimated by calculating the radius for 50% injury and assuming that all persons inside the circle suffer injury while those outside it escape injury." (Lees, 1987 p.259) However, these would not be useful to the average fire officer in the immediate aftermath of a disaster since training in their use would, of necessity, be extensive and in-depth.

RESULTS

The results of this research show that there are indicators which can be used to judge resource needs in the immediate aftermath of a disaster. A Standard Operating Procedure which shows a methods for estimating the resource needs in the immediate aftermath of a disaster is located in Appendix A of this paper and represents the results of this research.

Answers to Research Questions

Research Question 1. The indicators which could be used to determine resource needs include the average number of deaths per 100,000 persons involved in a disaster and the number of destroyed houses multiplied by a factor based in research. Each of these indicators are qualified based on the time of day and then multiplied to find the number of serious injuries and the number of total injuries.

Different formulas are used for different types of disasters. Slow developing disasters such as flooding will result in fewer casualties and would use a different formula for determining the number of anticipated deaths, thus were not further examined in this paper.

Research Question 2. The qualities of an effective rapid damage assessment tool designed to determine emergency resource needs following a disaster are that such a tool must be simple, able to be understood quickly and easily in a stressful situation; it must be short enough to complete within 10 minutes following arrival at the scene. It must be capable of being relayed to a collection point quickly so that the calculations can be made and the appropriate number of units dispatched within 5 additional minutes. The point to the speed of this procedure is to arrive on the scene, assess the scene, determine needs, have units arrive and get patients to the hospital within the "golden hour" to reduce the deaths from trauma.

In addition, estimates have to be accurate in order to minimize the impact of the disaster on the surrounding, otherwise unaffected community. If estimate of impacts were too high, the tool would be no more useful than the guessing which so often occurs and results usually in too many units being dispatched and not utilized.

Research Question 3.

The procedure outline in the Appendix of this report uses the collapsed residential building marker for determining the estimated number of casualties in residential buildings. This marker was used since the entire population of Hopewell Township is just slightly over 17,000 people. Estimates based on formulas using 100,000 people would yield two deaths if the entire township is affected by a disaster. In addition, the source further states that casualty figures could be as high as 500 per 100,000 in downtown concentrated population areas.(Administration, 1973) Hopewell Township does not have a downtown or concentrated population area. If this estimate were used, 85 casualties would be the result. Estimating the affected population of Hopewell Township with speed or accuracy, then multiplying this percentage by the above casualty estimates could yield questionable results. This can be shown using the following example: If a tornado struck in the evening and affected fifty houses destroying twenty, at an average of 2.86 persons per household (2000 Census), that would yield an affected population of 143 persons. This number divided by 100,000, then multiplied by 12 would yield an estimate of significantly less than one death (0.017). Multiplying that number by four should yield the serious injury estimate again of significantly less that one serious injury (0.07). To arrive at the minor injury count, we would multiply the death estimate by 30 to arrive at the minor injury estimate of again less than one (0.5).

Conversely, the same twenty houses destroyed during the evening hours would, at two-percent death rate, be just over 1 death (1.14), at eight percent serious injury rate, the estimate would be just under 5 injuries (4.58), and at 30 times the number of

deaths, minor injury estimates would be 30 minor injuries.

The tool selected for the standard operating procedure based on this example, is the one which utilized the destroyed houses as a marker. It is noteworthy that the other estimate of casualties was quite accurate when using greater numbers of affected population and may be more accurate than the destroyed house estimate in greater population areas.

In addition, estimates of casualties from commercial structures are derived from the number of anticipated occupants which are available in the Hopewell Township Emergency Response Plan. As there are so few commercial structures, the population serving each is defined in that plan and can be used to derive estimated casualty figures using the two percent death, eight percent serious injury rates.

DISCUSSION

In reviewing the results of this research, it became obvious that there are a variety of natural or man-made disaster scenarios which could occur without warning in Hopewell Township. (Hopewell, 2001) Though they occur infrequently, it is nonetheless incumbent upon public safety officers to be prepared for such disasters.

Part of that preparation includes the understanding of the relationship between unnecessary resource ordering and potential further harm to the public. When too many resources are ordered, it puts the remaining unaffected public at risk. Conversely, when too few are ordered, it puts those that are affected by the disaster at greater risk. Too often, those with little experience in disaster response tend to over order resources to avoid looking bad to the affected public or his/her peers. (Mileti, 1999) It is therefore necessary to develop a tool which could aid officers, particularly

those with little experience responding to disasters, in determining their immediate emergency resource needs.

Generally, “with-warning” disasters leave fewer casualties. The reasoning is that prior to a slowly developing disaster, people have enough time to make preparations for avoiding the worst or hardest hit areas with fewer casualties and less damage resulting. In addition, given a low casualty rate, local responders have the benefit of time; that is, they can work more slowly to recover from the disaster. Slow developing disasters include flooding, most hurricanes and droughts.

Acute onset disasters or those that occur without warning, however, are unexpected and difficult to predict in sufficient time to avoid the large-scale damage and, often, high casualty rates. It is these types of disasters which can severely stress the response capabilities of local emergency services.

Casualty estimates for acute onset disasters are divided into two categories; daytime and nighttime. Nighttime casualty estimates vary from twelve deaths in 100,000 people affected to one death for each 18 destroyed houses in Hopewell Township. Daytime estimates are lower than nighttime by 30 to 40 percent due to the fact that more people are in their houses at night and are often sleeping and unaware of any danger. Daytime figures vary from four deaths in 100,000 people affected to one death for each 60 houses destroyed.

Most rapid assessment tools which have been developed for other departments seem to contemplate that those acquiring the information are from paid departments; that is that they always have crews on duty or that those collecting the information are from other departments and are most concerned with other aspects of the response.

(Ganz, 1998);(Lees, 1987);(Parker & Penning-Roswell, 1972); (Landesman, 2001); (Choudhury & Jones, 1996); (Cuny, 1987) The result is that they have a lot of information which while it would help in the overall response to a disaster, may indeed inhibit the rapid and accurate response of emergency personnel since it takes longer to acquire that information. The result would naturally be a slower response, slower treatment of those in the severest danger of death from trauma injuries and a higher than necessary death toll. Alternatively, another possible and more likely response is that too many resources are ordered which put those otherwise unaffected by the disaster in more danger. (Ali Farazmand, 2001)

The difficulty in designing a rapid damage assessment which addresses this shortcoming of other rapid damage assessments is that there seem to be only two models which have been used previously to predict casualties; neither of which have been proven statistically.(Agency, 1985) While both models appear to be rather accurate when used to predict casualty figures based on two incidents studied (Administration, 1992); (Messersmith, 1993), at low numbers of affected population or housing, the estimates derived from using each model are quite divergent and no justification for using either model can be made. This leaves the officer in charge of responding to the rural or low affected population incident essentially right back where he/she started. In choosing either model, the officer could end up ordering too many resources or too few, depending on the model.

In Hopewell Township, the likelihood of a greater number affected incident, where either model could be used with some accuracy, is low. Due to the population distribution in the mostly rural area, there are few areas which if struck by a disaster

such as a tornado, would have sufficient numbers of affected population or housing to generate an accurate estimate of casualties based on the models. This is evidenced in the example shown in the results section above.

In order to develop a procedure that could be used for Hopewell Township, it became necessary to decide which of the models provided estimates which, while potentially inaccurate, still provided some degree of comfort to the responding officer that he/she was using something other than judgement based on little or no experience. It also was necessary to judge which of the models was easier to use in the immediate aftermath of a disaster when the pressure is on; and, which information could be obtained faster.

This led to the development of the procedure in the Appendix of this report. This procedure utilizes the destroyed housing model to estimate the number of casualties. Since the example above revealed that in small numbers of affected population or housing, less than one casualty would be found using the 100,000 population model, this researcher believes that number to be too low. On the other hand, the destroyed housing model yielded one death, five serious injuries and 30 minor injuries. This result, from very limited experience seems more plausible.

While it may be found that five serious injuries was too high an estimate, this would only require the response of three to four ambulances. Even if this number were ordered, it would not severely tax Hopewell Township or its mutual aid communities, nor jeopardize other unaffected population. It is for that reason that this researcher believes that this was the best model to use in this application.

RECOMMENDATIONS

It is recommended that the Board of Fire Commissioners endorse the use of the procedure outlined in the Appendix by all officers serving the Fire District. It is further recommended that the Union Fire Company & Rescue Squad institute the training needed to have the officers become familiar with its use. In addition, this SOP should become part of the Hopewell Valley Emergency Management Plan and it is recommended that the Board insures that this occurs.

Additionally, the Board of Fire Commissioners should continue to assist in the development of tools which could assist inexperienced officers in determining resource needs for all types of assignments. This would alleviate the strain on many of the surrounding mutual aid companies as well as those within the Township.

The author also recommends that FEMA, NOAA and other national agencies develop the research necessary to accurately estimate the needs of disaster affected areas. The information which is currently collected by these agencies in other forms could, no doubt, be used to find statistically accurate estimation tools for all types of disaster needs including sheltering, emergency response, public works needs and so forth. While this effort would undoubtedly cost a good deal of money, much could be saved in avoiding the needless resource ordering which normally comes with disaster management. In the current era, the manpower resources of every fire department and first aid squad throughout the nation are being cut or otherwise lost. The needless waste of their time and energy that occurs now, jeopardizes others in the community.

This research could not be done locally in Hopewell Township. The experience level in Hopewell Township is very low. Too few incidents would yield results which could be clearly skewed and unusable. Nationally, though, there are plenty of incidents each year that could be studied to arrive at accurate estimating tools.

Lastly, the author recommends that anyone conducting such a study within their community, be wary that the results arrived at, while helpful, could be skewed. Unless the community under study has a great deal of experience with disasters occurring without warning, the results arrived at could be either much too high or much too low. While any study of without-warning disasters will be beneficial and will add to the overall knowledge base, the results need to be viewed in the context of experience.

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Appendix

Rapid Damage Assessment

Standard Operating Procedure

Standard Operating Procedures

Title: **Determining Emergency Resource Needs at Disasters Occurring Without Warning**

Approved By: Chief of Department	Prepared By:
Section Number: 900	Section Name: Emergency Management Ops
SOP Number: 920.1	Number of Pages: 4
Date: January 9, 2007	Replaces: None

Scope: This Standard Operating Procedure shall be used to determine emergency resource needs at the scene of a disaster which occurs without warning. Such disasters shall include tornados, earthquakes, severe summer storms, airplane crashes into developed areas, etc.

Personnel: All personnel who are required to evaluate conditions following a disaster occurring without warning shall utilize this SOP when trying to determine their immediate life safety resource needs.

Procedure: The following procedure shall be used:

Assessors

1. Report to area assigned for evaluation.
2. Enroute to area, make note of the condition of the roadways, bridges, etc. and note any blockages or problems.
3. Upon arriving in area, make a general note of conditions found. Are there any downed power lines? Are there victims walking toward or away from buildings, etc. Note whether you can smell any gas in the area.
4. Using the check sheet at the end of this SOP(page 3), complete all information available to you. Be especially aware of the number of houses or other buildings which are destroyed or largely destroyed. Make special note of the common names of commercial buildings in this condition.
5. Call dispatch using the frequency assigned and advise them you are reporting an “emergency damage assessment.”
6. Dispatch will assign a control number beginning with the last two digits of the year. Note that control number on the damage assessment sheet in the upper right corner.
7. Relay all information as quickly and concisely as possible that is on the assessment sheet. Advise dispatch when your have completed giving them your information.

8. Do not leave your vehicle at any time prior to completing the transfer of information from your damage assessment. This information is critical to the operations which will be carried out from that point on.

9. Following the transfer of information, if it is necessary, advise dispatch that you will be assisting residents or victims and will be on radio and out of the vehicle. You will become the area supervisor for your assigned area.

Dispatchers

1. Units in the field will be sending emergency damage assessments to you via radio on assigned frequencies following a disaster. These damage assessments are to be compiled by you and certain calculations will need to be made to insure the timely and adequate response of emergency personnel.

2. When a unit calls in from the field, they will announce that they have an emergency damage assessment. The dispatcher will assign a control number to that assessment which will be unique to the year, date, incident and report and will relay that number to the officer or member reporting.

3. The dispatcher will then receive information in a standard report format which will explain what the conditions are for that area of the disaster. Most critical is the number of severely damaged or destroyed buildings. This will determine the number of emergency resources that will be needed in that area. In addition, routes to the area will be critical to insure that the responding personnel and apparatus can arrive quickly.

4. The dispatcher will log all of the information on the standardized format form accompanying this SOP(page 4), perform the calculations and dispatch or request from County the appropriate emergency resources. When requesting resources from the County, be sure to advise them which area and which supervisor that the resources will be assigned to.

5. All completed forms shall be date and time stamped and delivered to Hopewell Valley Office of Emergency Management as further use of them will be made by the Health department and Housing and Inspections departments.

Rapid Damage Assessment

Primary Frequency: _____ Control Number: _____

Secondary Frequency: _____

Assessor's Checklist

Instructions: Use this checklist to record disaster intelligence information from your vehicle. Do not leave your vehicle until all information has been recorded and transmitted to EOC.

Date**: _____** Time Reported**: _____** Type of Incident**: _____**

Sector: _____

Assessment Target (neighborhood name): _____

Collector's Name: _____ Access Route to Target: _____

Life Safety Operations:	*Confirmed*	*Reported*	*Location*
Houses Destroyed	_____	_____	_____
Dead	_____	_____	_____
Injured	_____	_____	_____
Trapped	_____	_____	_____
Commercial Buildings Destroyed	_____	_____	_____

Names of Commercial Buildings Destroyed:

_____ _____

_____ _____

Status of Lifelines:	*Functioning*	*Non-Functioning*	*Imminent Hazard*
□ Electricity	_____	_____	_____
□ Gas	_____	_____	_____
□ Telephone	_____	_____	_____

Roads Used:	*Passable/Impassable*	*Blocked By:*
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Dispatcher's Checklist

Date of Incident: Year _____ Month _____ Date: _____

Time of Incident:_____

Control Numbers Assigned:

_____ _____ _____

Assessor's Name

_____ _____ _____

Area Assessed:

_____ _____ _____

a) Number of Houses Destroyed:

_____ _____ _____

b) Calculated number of Deaths ("a"x 2.86 x 2%(x 30% if daytime)):

_____ _____ _____

c) Calculated number of Serious Injuries ("a" x 2.86 x 8%(x 30% if daytime)):

_____ _____ _____

d) Calculated number of minor injuries ("b" x 30)

_____ _____ _____

Calculated number of Transport Ambulances needed ("c"/2):

_____ _____ _____

Calculated number of additional units needed for triage and treatment ("d"/15):

_____ _____ _____

Commercial Properties Destroyed:

_____ _____ _____

_____ _____ _____

Note: Advise Hopewell Valley OEM immediately of commercial properties/schools, etc. destroyed.

Roads Used & Condition:

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

Best Access Route:

_____ _____ _____

Additional Resources Needed eg. PSE&G, Rescue Company, Public Works, etc.:

_____ _____ _____

_____ _____ _____

_____ _____ _____

Time of Report:

_____ _____ _____