Disaster Management Procedures for the Birmingham Fire and Rescue Service

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and the appropriate credit is given where I have used the language, ideas, expression, or writings of another.

Signed: ________________________________
Abstract

The problem is the Birmingham Fire and Rescue did not have a plan in place to adequately guide administrator or responder actions during large-scale disasters which contributed to disorganization, inefficiency, confusion, and ineffective use of vital resources during the tornado that struck the City of Birmingham on April 27, 2011. The purpose of this research project was to identify elements, codes, standards, policies, and procedures that are commonly used in disaster management planning which could provide direction for Birmingham Fire and Rescue Service administrators and responders during large-scale disasters. This was accomplished by evaluating codes, standards, guidelines, policies, procedures, and relevant laws currently in effect that guide administrator and responder actions during large-scale disasters. Descriptive research was used to identify (a) what specific problems did fire department members encounter during their response to the Tuscaloosa-Birmingham tornado, (b) what elements should be included in a policy for response to large scale disasters, (c) what codes, standards, or guidelines exist to guide emergency responders during large-scale disasters and, (d) what policies and/or procedures do other organizations have in place that guide their response during large-scale disasters. Three survey instruments and a personal interview revealed that there is not a “one size fits all” procedure that will satisfy the needs of every entity; emergency operations procedures should be tailored to the needs of the particular jurisdiction. Recommendations focus on providing support for family members of responders, streamlining the personnel recall process, more accurately identifying the scope and magnitude of an incident, efficient utilization of the incident command system,
knowledge of incident command roles and responsibilities, and training and exercising the disaster response plan.
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Disaster Management Procedures for the Birmingham Fire and Rescue Service

Introduction

Man-made and natural disasters of a large scale occur world-wide. In recent years the State of Alabama has been impacted by a terrorist event, snow storms, ice storms, hurricanes, flooding, and most recently, tornadoes. These events severely disrupt the lives of the victims while placing a heavy financial burden on society during the response and recovery processes. Where these events affect the lives, property, and environment of our citizens, the fire service is expected to respond with efficiency and effectiveness.

On April 27, 2011 the State of Alabama was struck by several tornadoes which necessitated the activation of local mutual aid as well as the state-wide Alabama Mutual Aid System (AMAS). The Birmingham Fire and Rescue Service (BFRS) provided local and received mutual aid from other fire service organizations both locally and state-wide. The problem is that the Birmingham Fire and Rescue Service does not have a comprehensive policy that adequately addresses the fire departments response to large scale disasters.

The purpose of this research project was to identify elements, codes, standards, policies, and procedures that are commonly used in disaster management planning which could provide direction for Birmingham Fire and Rescue Service administrators and responders during large-scale disasters.

Descriptive research will be used to answer the following questions: (a) what specific problems did fire department members encounter during their response to the Tuscaloosa-Birmingham tornado, (b) what elements should be included in a policy for response to large scale disasters, (c) what codes, standards, or guidelines exist to guide
emergency responders during large-scale disasters and, (d) what policies and/or procedures do other organizations have in place that guide their response during large-scale disasters.

Background and Significance

Birmingham is located in Jefferson County, Alabama, encompasses an area of 149 square miles, and is home to more than 212,000 residents. Even though Birmingham’s population has steadily decreased over the past 50 years it is still the most populous city in Alabama (U.S. Census Bureau, 2010). The City has seen a recent resurgence of growth due to revitalization efforts in the downtown area. The Birmingham Fire Department was established in 1872 and has since progressed to include service delivery to various response areas including industrial, commercial, residential, high-rise and urban/wildland interface. Because of the inclusion of emergency medical services, fire inspections, fire investigations, public education, fire suppression, technical rescue, hazardous materials, and aircraft rescue the Birmingham Fire Department changed its name to Birmingham Fire and Rescue Service to more accurately reflect the variety of services provided. The Birmingham Fire and Rescue Service employs six hundred forty-eight full-time paid firefighters who are housed in thirty-one fire stations. They responded to 54,865 calls for assistance in 2010. The 2010 budget for the department was $64 million with 94% of the budget allocated to salaries (City of Birmingham, 2010). While two of the primary responsibilities of all firefighters in the Birmingham Fire and Rescue Service are fire suppression and EMS, seven of the City’s stations have personnel who are crossed trained to provide specialized
rescue; personnel at these stations provide various aspects of specialized rescue and staff these units on an as-needed basis once a call for assistance is received (Russell, 2010).

One of the key factors in implementing an effective response strategy to any incident is the identification of the types of hazards to which an authority having jurisdiction will respond. Since 1961 in the State of Alabama there have been forty-nine major disaster declarations. There have been major disaster declarations for thirty-three floods, twenty-three tornadoes, nine hurricanes, as well as one winter storm and one drought. Eleven of these produced emergency declarations by the federal government; all eleven the result of natural disasters (FEMA, 2011). Floods have produced the greatest number of disaster declarations. Hurricanes have historically been the most destructive disasters affecting Alabamians, but due to the City’s distance from the Gulf Coast hurricanes remnants often leave residents in the City of Birmingham with high winds, flash flooding, and spawned tornadoes. Prudence dictates that the Birmingham Fire and Rescue Service plan for all types of hazards, paying particular attention to floods and tornadoes which so often and most severely affect the residents of our city (Jefferson County Emergency Management Agency, 2010).

The amount of risk a community faces is derived from the likelihood that an adverse event will occur and the susceptibility to that adverse event (NFPA 1500, 2007). The scope of a disaster is often determined by the number of casualties during the event and/or the geographic area involved (Gad-el-Hak, 2011). With large trees and numerous wooded neighborhoods the topography and landscape of the City of Birmingham lends itself to susceptibility from high winds generated during tornadoes and the remnants of hurricanes. Toppled trees and downed power lines blocking streets and roadways have
impeded responders from gaining perspective on the scope of no-notice events as well as their ability to respond in a timely fashion. Increased response times often contribute to the severity of injuries sustained by victims during natural disasters. The BFRS defines a mass casualty incident as being one where greater than ten patients are involved or where local resources will be overwhelmed due to the scope of the incident (Birmingham Fire and Rescue Service, 2004). History has proven the City of Birmingham vulnerable to severe weather. Many of these events have been large in scope and produced a high number of casualties.

On April 27, 2011 the State of Alabama experienced a record sixty-seven tornadoes resulting in two hundred fifty fatalities (State of Alabama, 2011). On this day, the Tuscaloosa-Birmingham EF-4 tornado produced winds up to 190 miles per hour, resulted in twenty fatalities in Jefferson County, caused over one-thousand injuries, and left a path of destruction for over eighty miles (NOAA, 2011). Five thousand seven hundred structures in Jefferson County alone were damaged and/or destroyed (AEMA, 2011).

Implementation of the recommendations generated from this research will satisfy the United States Fire Administration (U.S.F.A.) operational objectives of a) Reducing risk at the local level, b) Improve local planning and preparedness, and c) Improving the capability for response and recovery by promoting a comprehensive, multi-hazard risk reduction plan led by the fire service organization (U.S.F.A., 2011, Pg I-2). Identification of common elements for inclusion into a future policy is a secondary prevention measure designed to reduce the severity of future large scale disasters that occur in the City of Birmingham (F.E.M.A., 2011, Pg SM 1-10). This research relates to the EACRR course,
Unit 2 Leading Organizational and Community Change, in that there is now an awareness of BFRS deficiencies that need to be addressed which has created a sense of urgency (F.E.M.A., 2011) and understanding of the need to improve BFRS response to large-scale disasters. This research also relates to the EACRR course, in that the recommendations will assist in creating a vision and strategy (F.E.M.A., 2011) for future operations during large scale disasters.

Literature Review

A literature review was conducted of numerous documents in order to determine what elements should be included in a disaster response plan. Much of the literature was obtained from online resources. Other materials referenced were books, field operating guides, and fire service trade magazines.

The Merriam-Webster online dictionary defines a disaster as “a sudden, calamitous event bringing great damage, loss, or destruction”. Disasters are relative to those who are affected. A residential kitchen fire could be described as “disastrous” to an individual family. While there were no human casualties, the Exxon Valdez Alaskan oil spill killed 580,000 birds, including 144 bald eagles, and covered 1,200 miles of coastline (Bahme and Kramer, 2006). This incident was described as disastrous to the environment. Whether a disaster includes a large numbers of casualties, affects a large geographic area, has a detrimental financial impact, or a profound psychological impact it is essential that emergency management officials and public and private sector responders work collaboratively to mitigate these incidents (Hawkins and McClees, 1988).
Identification of the hazards and risks to which fire service organizations respond is critical to the safety of responders and the public. For the past thirty years the consequence of risks being evaluated by our citizens and fire service leaders has resulted in the demand for emergency medical services, hazardous materials response, and technical rescue by first responders. This increased demand for services has exposed firefighters to greater risk of injury and death. N.F.P.A. 1600, *Standard on Disaster/Emergency Management and Business Continuity Programs*, 2010 Edition, lists three categories of hazards: Natural, human-caused, and technological. The vulnerability of a particular risk, or hazard, on a community is determined by the frequency with which the hazard occurs, severity of damage imposed by the hazard, duration of the hazard, and capacity of responders to mitigate the effects of the hazard (EACRR, F.E.M.A., 2011).

Emergency response plans are implemented at the strategic, operational, and tactical levels (F.E.M.A., 2010). Strategic plans are an organization’s long range vision and are created by senior officials. Operational plans are used to define an organization’s roles and responsibilities and how the organization will integrate with other coordinating and supporting agencies. Tactical plans involve direct resource management during incident response.

Two common methods used to address the vulnerability of responders to risk are the implementation of policies and procedures and training of personnel (N.F.P.A., 2007). Only when risks are identified can policies be implemented to address the risk. Training of personnel to a defined standard provides them a framework within which they can safely operate and provides them with a relative blanket of security from litigation. Because of the ever expanding duties of fire service organizations emergency
management is a continual process; as such updates to policies, procedures, protocol, and training must be conducted frequently enough to maintain responder capabilities (N.F.P.A., 2010).

Identification of risks, knowledge of first responder vulnerabilities and capabilities, policies, procedures, regulations, and training are elements that must be understood by responders in order for them to maintain situational awareness. The U.S. Coast Guard defines situational awareness as “the ability to identify, process, and comprehend the critical elements of information about what is happening” (U.S. Coast Guard, 1998).

The goal of a disaster response procedure is to limit disruptions to a manageable level. The ability of an organization to suppress disruptions and maintain essential functions during an emergency is vital to the resiliency of that organization. Organizational leaders must provide direction for their members, a means to exchange information, and the facilities in which to perform these operations during a crisis (Continuity Guidance Circular 1, 2009). These principles are rooted in the National Incident Management System (NIMS) doctrine and are the foundation for successful emergency operations. The BFRS adopted the Incident Command System (ICS) in 1988 and operates under the National Incident Management System. An effective disaster response procedure should include well-defined roles and responsibilities of the incident management team, job action sheets, and position checklists which will provide direction to those who may not be as familiar with the procedure (California Hospital Association, 2011). Building the incident management organization during the early stages of an incident, controlling access to the affected area, accounting for personnel, and
mobilization/demobilization are key factors in controlling resources and providing safety to responders (N.F.P.A., 2010).

Safety of responders is a primary concern and is often the basis for policy and procedure implementation. Daily minimum staffing for engine and truck companies in the BFRS is three personnel. N.F.P.A. 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical operations, and Special Operations to the Public by Career Fire Departments*, 2010, recommends that engine companies be minimally staffed with four personnel; truck companies with high call volume or high hazard occupancies should be minimally staffed with five or six personnel. Granito and Dionne (1998) suggest that in order to provide the safest, most efficient response possible five firefighters are needed.

Timely response to disasters is essential to save lives. Patients involved in disasters experience all types of traumatic injuries. Without medical intervention by first responders the adverse effects of traumatic injuries are compounded (de Boer, 1995). When a disaster strikes there is often a surge in requests for fire department services. Due to the scope, duration, and magnitude of any given disaster it may be necessary to solicit additional personnel and equipment. One method used to acquire additional resources in a timely manner is through personnel recall. Recall of personnel can be accomplished with automated calling systems. There are several commercially available systems designed to notify civilians as well as emergency responders of an impending emergency and provide them guidance regarding self-protection measures. Some of these systems will provide automated feedback so that the sender is informed of key personnel who are capable of responding to the emergency. Automated feedback
provides the sender a sense of the number of responders to expect and allows the sender to begin preparations for assignment and deployment of those who indicated they were available for recall. Such systems include Reverse 911, Wide Area Rapid Notification, Desktop Alert, Global Connect, and Telestaff.

Another method used to obtain additional resources is through mutual aid. Because no community has all resources it needs to mitigate every incident it might face, procedures should be in place to request mutual aid from entities including other public sector agencies, private non-governmental organizations, and non-profit faith based groups (U.S. Department of Homeland Security, 2007).

Because lines of authority are often blurred with unusual circumstances, coordination with other agencies prior to a disaster is essential. Recognizing the roles and responsibilities and statutory authority of other agencies will help to clarify these circumstances (Hawkins & McGlees, 1998). Advantages of working collaboratively through mutual aid include the ability to coordinate preparedness activities, support during the response effort, and sharing of costs and resources.

Most fire service organizations have established policies and procedures to help guide the behavior of their employees in day to day operations. Large-scale disasters often present ethical dilemmas. Ethical dilemmas force company officers to choose a course of action that violates established policies and procedures but airs on the side of safety and security or civilians and/or responders. An example of such a dilemma includes deciding whether patient transport should be delayed because no ambulances are available, resulting in worsening of the patients condition or transporting the patient on a fire engine, which is against company policy. Another example of an ethical dilemma
might include deciding whether a company responds immediately upon dispatch when there is large debris falling from the sky during a tornadic event creating the potential for injury to responders. The establishment of an Executive Policy Group during large-scale disasters will assist the Incident Commander and responders by providing direction and clarity of mission (F.E.M.A., 2008). The Executive Policy Group should be comprised of the senior executives who have the authority to set policy and procedures.

In order for responders to remain focused on their duties it is essential that they first make provisions for the safety and security of their families (Ready Responder, 2010). Cox and Landahl (2009) made several recommendations for inclusion of families in the preparedness process including involving families in preparedness efforts, creating a family support network, providing family shelters for responders, and paid leave while responders secure their families. The Jefferson County Emergency Management Agency Comprehensive Emergency Management Plan (CEMP) recommends that departments, agencies, and organizations “develop personal preparedness plans and supplies” (JCEMA, 2010).

The ability to communicate during a disaster is vital to responder and civilian safety and security. Prior disasters have proven there are enduring interoperable communications issues (U.S. Department of Homeland Security, 2007). Interoperability refers to the ability of various different organizations to communicate. The National Task Force on Interoperability (2003) specifies incompatible equipment, inadequate funding, inadequate planning, and limited radio spectrum as challenges to efficient interoperable communications.
Mitigation strategies designed to “limit or control the consequences, extent, or severity of an incident that can not be prevented” (N.F.P.A., 2010) include education and enforcement. One prevention strategy includes educating the public in emergency response actions and self preparedness (JCEMA, 2010; N.F.P.A., 2010). Administering and exercising public education programs allow emergency responders to more accurately predict the actions of citizens once an incident occurs.

A secondary prevention strategy includes enforcement of building and fire codes for structures that are already erected. Code enforcement serves to ensure buildings function, operate, and are maintained to protect citizens from fire and other similar emergencies (N.F.P.A., 2009). Buildings where the electrical, plumbing, mechanical, and other systems are well-maintained, lack an accumulation of refuse, and means of access and egress are not encumbered, typically signify attentiveness to existing regulations which translate into a safer, more secure facility for occupants as well as responders.

This literature review reinforced the necessity of working collaboratively with other public, private, non-governmental, and faith-based organizations. During large-scale disasters organizations are forced to work with other public, private, and non-profit organizations because most don’t have all resources they need to function independently.

Key elements of any disaster management procedure should include strategies for prevention, preparedness, response, and recovery.
Procedures

Procedures used to gather information for this research project included two questionnaires, an analysis of the BFRS mobile asset inventory, an analysis of the daily staffing levels in the BFRS, and an oral interview with Jefferson County Emergency Management Agency Deputy Director Alan Knipher.

Immediately following the Tuscaloosa-Birmingham tornado that struck on April 27, 2011 this researcher was tasked with developing an After Action Review/Improvement Plan to discover lessons learned from BFRS responders. The Homeland Security Exercise and Evaluation Program (HSEEP) After Action Review/Improvement Plan template (HSEEP, 2007) was used as a guide to assist in formulation of questions for responders. On May 19, 2011 the April Fury questionnaire (Appendix A) was distributed to all six hundred forty eight line personnel of the BFRS in addition to the four Assistant Chiefs. The purpose of the questionnaire was to determine issues, concerns, and problems faced by BFRS responders to the Tuscaloosa-Birmingham tornado that occurred on April 27, 2011. Recipients were selected based on the fact that all BFRS personnel were rotated to the affected area for one week after the tornado struck and were exposed to various degrees of problems throughout the course of the rescue process. The questionnaire included thirteen items and was distributed by City email as a Microsoft Word document. Respondents were asked to contemplate issues they observed, discuss the causes of the problems, and respond to the questionnaire as a crew. Of the possible one hundred forty-seven front line crews who could have responded to the questionnaire, 56% (82) had returned the questionnaire by the requested return date of June 10, 2011.
Recipients of the April Fury Questionnaire being asked to respond as a crew created a potential limitation. On the night of the tornado because there was a mass recall of personnel responders were assigned to crews with which they had not previously worked. When they were asked to contemplate, compile, and respond to the questionnaire they were at their regular work assignment. There is a potential that respondents could have been dissuaded from voicing their opinion about the problems their crew encountered the night of the storm. Additionally, because they were asked to respond as a crew, there is a potential that some problems brought forth were eliminated from the final questionnaire that was submitted.

The Disaster Management Questionnaire (Appendix B) was constructed using the internet survey tool, StellarSurvey.com. A link to the questionnaire was distributed by email to the Alabama Fire Chiefs Association, the Central Alabama Fire Chiefs Association, and to all Fire Chiefs in Jefferson County, Alabama. The questionnaire was distributed to the recipients listed above as well as to a local utility company, Alabama Power Company, on August 9, 2011 (Appendix C). The recipients of the questionnaire were chosen because of the similar demographics of their constituents and the disasters they commonly face in the State of Alabama. The questionnaire included nineteen items that were designed to determine what policies other organizations have in place to guide their response to large-scale disasters.

Limitations to the Disaster Management Questionnaire are that respondents who completed the survey instrument may be members of all three organizations and as such could complete more than one questionnaire resulting in skewing of the results, respondents may answer vaguely, or they may not answer at all if their organization
doesn’t have a policy that addresses disaster management. An additional disadvantage of all questionnaires is that they may have low response rates (Botman & Thornberry, 1992). The disadvantages listed here all result in a lack of confidence of survey results.

There are three primary modes of transportation immediately available to BFRS personnel including front line apparatus, special operations apparatus, and reserve apparatus. On July 22, 2011 an email survey was distributed to all BFRS stations requesting the kind and serviceability of apparatus housed in their respective stations. The summary, Mobile Asset Inventory, is attached as Appendix D. All stations responded by August 5, 2011.

In order to determine the average number of personnel working each day in the BFRS an analysis was conducted of the daily staffing for 2011. This information was retrieved on July 25, 2011 from the daily rosters which are stored electronically in Telestaff®. Actual daily staffing patterns were analyzed and contrasted with hypothetical staffing considering a minimum of three personnel to the maximum of five personnel on front line apparatus (Appendix E). This analysis provided the range of personnel who potentially could staff front line BFRS apparatus on any given day. Additional staffing models were analyzed which considered minimum and maximum staffing of front line apparatus and special operations apparatus (Appendix F) as well as minimum and maximum staffing of all apparatus including front line, special operations, and reserve apparatus (Appendix G). Identification of minimum and maximum staffing levels was necessary in order to determine the number of personnel who could potentially be recalled during a disaster as compared to daily staffing on any given day.
One limitation of the daily staffing analysis is the assumption that in order to be recalled BFRS personnel must have an apparatus on which to respond. Another is that all apparatus in the BFRS fleet will be operational during a disaster and that special operation and reserve apparatus will be available for recalled responders.

On August 22, 2011 an interview was conducted with the Jefferson County Emergency Management Agency Deputy Director Alan Knipher. The interview focused on codes, standards, guidelines, and laws that exist to guide emergency responders during large-scale disasters and which of these standards could be used as guiding documents toward the development of disaster management procedures. Mr. Knipher suggested focusing on N.F.P.A. 1561, Standard on Emergency Services Incident Management System, N.F.P.A. 1600, Standard on Disaster/Emergency Management and Business Continuity Programs, Implementing N.F.P.A. 1600 National Preparedness Standard by Donald L. Schmidt, F.E.M.A.’s Comprehensive Preparedness Guide (CPG) 101, the Jefferson County Emergency Management Agency’s Comprehensive Emergency Management Plan (CEMP), and Developing and Maintaining Emergency Operations Plans, Version 2.0, November 2010. Mr. Knipher stated the materials cited above are often used as reference materials for emergency managers. He also suggested that fire department disaster management procedures might include components listed in these sources, but because fire departments have specific missions their disaster management procedures should be specifically tailored to their duties, responsibilities, and needs.
Results

The April Fury Questionnaire (Appendix A) revealed numerous shortfalls of the BFRS response to the Tuscaloosa-Birmingham tornado. This questionnaire was designed to address the initial research question: what specific problems did BFRS members encounter during their response to the Tuscaloosa-Birmingham tornado?

Initial goals (Item 2) cited by 60% (49) respondents indicated that their primary task was search and rescue. Fifteen percent (12) indicated their primary task was to identify and mitigate hazards, while another 10% (8) indicated that they were charged with reconnaissance.

Safety issues encountered (Item 3) by respondents included environmental hazards such as downed power lines, natural gas leaks, unstable structures, storm debris, inclement weather, darkness, and unrestrained dogs.

Fifty percent (41) of respondents indicated the lack of a formal check-in process as a contributing factor to lack of accountability (Item 4) for on-scene personnel. Others indicated difficulty in orientation to place due to the lack of street signs and/or landmarks while 3% (2) indicated that freelancing contributed to a lack of accountability of personnel.

No companies indicated that they had equipment failures (Item 5). One exception was the air conditioning unit for the personnel rehabilitation unit. While not an equipment failure, twenty-two percent (18) of respondents indicated they were extremely fatigued due to wearing full structural firefighting gear for more than four hours while conducting search operations.
Communications (Item 6) were cited by 85% (70) of respondents as a hindrance to their response efforts. Respondents stated there was too much radio traffic, lack of interoperable radio channel to communicate with other city departments, no base radio in the command trailer, were dispatched to vague locations such as an intersection rather than a particular address, and were not given specific directions as to the measures to communicate to citizens who wanted to shelter in place rather than evacuate the area.

Resources requested upon arrival by respondents (Item 7) included heavy machinery, all terrain vehicles, batteries for radios, area maps, hand held global positioning systems, and hand lanterns.

Ninety-one percent (75) of respondents felt they were adequately trained capable of performing their assigned tasks (Item 9). Five percent (4) recommended awareness level training for everyone in the BFRS.

Other issues encountered by respondents (Item 10) included the initial lack of unified command structure, lack of awareness by initial commanders that similar operations were taking place in adjacent Branches/Divisions, an uncoordinated recall of off-duty personnel, no account of evacuees prior to or after their transport to shelters, and lack of continuity of structure marking systems.

Respondents cited the willingness of crews to work collaboratively, leadership of the initial Incident Commander, the number of personnel available on site, training conducted through the Alabama Mutual Aid System (A.M.A.S.), flexibility, and teamwork as major strengths (Item 11) of the BFRS response.

Respondents cited the need for modifications to policies, procedures, training, and equipment including a method to effectively track resources from the outset of an
incident, providing the appropriate personal protective gear for a given task, mass casualty training, implementation of a personnel recall policy, providing rehab to responders on a frequently scheduled basis, providing relief to Fire Communications personnel, and utilizing the task force concept inclusive of fire, police, public works, and public utilities (Item 12).

While all respondents identified problems they experience, one hundred percent of respondents (82) felt that overall the BFRS response was a success (Item 13).

In order to more efficiently mitigate large-scale disasters future responders should (Item 14) establish a unified command early in an incident, conduct daily briefings that include all cooperating and assisting entities, provide adequate staffing to allow for excess personnel in Staging, provide direction to responders regarding the status of resident actions (shelter in place or evacuate), and staff rescue units (ambulances) with one EMT-Basic and one EMT-Paramedic.

The Disaster Management Questionnaire was formulated with the intent of determining policies that other organizations have in place that guide their response to large-scale incidents. The questionnaire included nineteen items. A limitation of this questionnaire was that some of the recipients belonged to the same organization or to other organizations to which the questionnaire was distributed and could have completed more than one questionnaire.

Fifty percent of the recipients indicated their organization had a disaster management plan in place.

Respondents indicated the major elements of their organizations disaster management plan (Item 2) addressed natural and man-made disasters, call back for senior
staff, conference calling to city officials, incident command/NIMS/emergency support functions, mutual aid, communications, resources lists, information dissemination, implementation of a policy group, work assignments, work hours, directives, activation of the plan, and annexes for wild land fires, floods, civil disturbances, terrorism, hazardous materials, winter storms, tornadoes, and mass casualty incidents.

Forty-four percent of respondents indicated their disaster management plan does not include an organization chart depicting the positions that should be filled. Sixty-six percent indicated a minimum of the Command and General Staff positions are filled during a large-scale disaster (Item 3).

Seventy percent of respondents indicated that their disaster management plan does specify the roles and responsibilities of those staffing the command organization (Item 4) but only thirty-three percent of the plans include a checklist for those in command positions (Item 5).

Incident command training provided to employees (Item 6) varied. One organization indicated their department provides no training for those who staff the command organization; others indicated typical NIMS courses ranging from 100-800, while others have taken advantage of mass casualty and Integrated Emergency Management Course (IEMC) at the Emergency Management Institute.

Of those surveyed only twelve percent indicated that their disaster management plan addressed methods for securing family members of responders (Item 7). Fifty-five percent of disaster management plans did not address how responders would contact their families while they were on assignment (Item 8).
Thirty-six percent of respondents indicated that their disaster management policy does not address dissemination of information to the public (Item 9). Others indicated information would be transmitted to the public (Item 10) through “Reverse 911” or “W.A.R.N.” (Wide Area Rapid Notification), they would disseminate information through establishment of a joint information office established by their department public information officer, or information would be distributed exclusively through their Mayor.

Policy groups are established during large-scale disasters (Item 11) by only forty-five percent of respondents. Twenty-two percent indicated that the Fire Chief was the sole representative who made policy decisions. Another twenty-two percent indicated that the policy group was comprised of the Fire Chief, elected and appointed officials, and a city attorney.

Respondents cited various methods of personnel recall (Item 12) including a manual phone tree system, pagers, radios, Southern Linc radios, text messaging, and email. One respondent indicated their department does not have a recall procedure. Only one respondent cited the use of an automated system to recall personnel.

Most respondents cited the scope of the incident as a factor in determining who would be recalled (Item 13). Twenty percent indicated the due to the limited number of personnel in their department they often recall everyone.

Forty percent of respondents answered that they practice and revise (Items 14 and Item 15) their disaster management plans at least yearly. Another forty percent indicated that they rarely or never practice or review or revise their plans.

Items recommended from respondents to enhance the value of this research (Item 16) included ensuring incident management personnel are knowledgeable of their roles
and responsibilities, practicing and updating disaster management plans at least yearly, consultation with local emergency management agencies, providing depth for incident management positions, and addressing the full spectrum of mitigation, preparedness, response, and recovery versus the typical fire service role of response. One respondent emphasized the importance that all facets of local government be engaged and committed to the disaster management process.

Sixty-six percent of respondents were Fire Chiefs or Assistant Chiefs. Respondents served populations ranging from 2501 citizens to more than 250,000. Thirty-eight percent of respondents worked for organizations with less than fifty employees. Fifteen percent of respondents worked for organizations with greater than two hundred fifty personnel.

Results of the Mobile Asset Inventory (Appendix D) survey revealed a total of eighty-four apparatus on which BFRS could respond. Respondents indicated that while these eight-four apparatus were serviceable, not all were fully stocked with equipment necessary for structural fire protection. Nonetheless these apparatus could be used as a means of transporting personnel to a work site in or around the City of Birmingham. There are a total of thirty-three front line apparatus that are staffed with a minimum of three personnel and sixteen rescue units that are staffed with two personnel around the clock. There are six special operations units that are staffed on an as-needed basis. As the special operations units receive a call their engine will go out of service and personnel will respond on the special operations apparatus. There are a total of twenty-seven other reserve engines, trucks and rescue units.
Average daily staffing of the BFRS from January, 2011 through August, 2011 was one hundred fifty-eight. Vacation, sick, holiday, and military were the leave categories used most often by BFRS personnel in 2011. Given a specific target staffing level by the Fire Chief, Table 1, *Range of BFRS Staffing*, provides an indication of the number of personnel that would be needed to staff front line, special operations, and all reserve apparatus in the event personnel were recalled during a large-scale disaster.

Table 1

**Range of BFRS Staffing**

<table>
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<th>4 Personnel</th>
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<td>Front line, special operations apparatus</td>
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<tr>
<td>Frontline, special operations, and reserves</td>
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<td>316</td>
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Discussion

N.F.P.A. 1500, *Standard on Fire Department Occupational Safety and Health Program*, A.8.3.2 states “The risk to fire department members is the most important factor considered by the incident commander in determining the strategy that will be employed in each situation”. This notion should be pervasive throughout the fire service
DISASTER MANAGEMENT PLANNING

and manifest in all decisions regarding policies, procedures, strategy, and tactics including disaster management planning.

Large-scale disasters to which emergency responders and citizens in Jefferson County are exposed have been quantified in the Jefferson County Continuity of Operations Plan, Risk Assessment Matrix (Jefferson County Emergency Management Agency, 2010). The greatest risks of disaster occur from flooding/severe storms, tornadoes, hurricanes, and lighting (Jefferson County Comprehensive Emergency Management Agency, 2010). Since these natural phenomenon cannot be prevented, measures must be taken to minimize their impact.

Mitigation procedures which fall under the purview of the fire department include public education, safety inspections, risk communication programs, protection/retrofit of facilities, and life safety code enforcement. Other mitigation measures where the fire department may have influence include building codes, facility use regulations, and advance warning systems (Jefferson County Comprehensive Emergency Management Plan, 2010). A multi-faceted, collaborative approach to educate the public must be employed by emergency responders, emergency management officials, building and fire code enforcement officials, utility companies, faith-based organizations, the news media, and not for profit groups such as the American Red Cross and Salvation Army. Each entity above has an obligation to educate the public, make them aware of risks they face, and offer them strategies which will minimize public risk (U.S. Department of Homeland Security, 2010).

During the course of this research a theme that continued to arise was working collaboratively to build resilience of the community. Resilience signifies that a
community “has the ability to resist, absorb, recover from, or adapt to an adverse occurrence” but does not break, meaning that critical infrastructure components may be temporarily stressed, but can soon be restored (F.E.M.A., 2011). Emergency operations procedures describe how local governments will provide resources to meet the needs of an incident (F.E.M.A., 2010). One component of resiliency is the ability of an organization to obtain internal and external resources in a timely fashion. The most effective, timely means for mitigating an incident is to call for internal resources. In order to do so it is necessary for BFRS incident commanders to know the types and kinds of resources that are available and their locations. The Mobile Asset Inventory (Appendix D) identifies the kind, type, and number of internal assets immediately available to them.

The current method of recalling personnel in the BFRS is similar to many other organizations throughout Alabama, through a manual call tree system. As was evident during the Tuscaloosa-Birmingham tornado of April 27, 2011 this system has severe limitations in that personnel who were supposed to be recalling others were not available because they were responding to calls for service caused by two waves of severe weather. The BFRS has an automated staffing program in place, Telestaff®, which is currently only used for arrangement of daily staffing. Because this automated calling system already has personal contact information input into its database, it has the capability of being used to recall personnel to fill daily vacancies or to recall personnel during large-scale disasters. Implementation of Telestaff as a primary recall method in conjunction with the manual “Call station” method would provide redundancy and resilience to obtaining additional personnel during large-scale disasters.
During the Tuscaloosa-Birmingham tornado a recall of all BFRS line personnel was initiated. Administrative officers were instructed to staff all front line apparatus with five personnel. Knowledge of the actual daily staffing on April 27, 2011 compared to the number of personnel who were needed to fully staff apparatus (Appendices D, E, and F) along with the Mobile Asset Inventory (Appendix D) would have provided a more succinct picture of resources that were available. This would have allowed administrators to only recall those personnel needed to staff apparatus to the desired level resulting in more efficient utilization of recalled personnel. To staff all front line apparatus with five personnel would require 197 personnel, all front line and special operations units would require 226 personnel, and to staff all front line, special operations, and reserve apparatus would require 316 personnel. In the event of a large scale disaster it may be beneficial to fully staff all functioning apparatus in the BFRS fleet including reserves (Appendix G). This strategy would provide a mode of transportation to more than three hundred firefighters allowing them to arrive at a work site but, depending on their assigned task, may be impractical. The BFRS has limited resources, such as self-contained breathing apparatus, to sustain this number of personnel.

Any request for external resources to supplement ongoing operations in the City of Birmingham must be approved by the Fire Chief or his designee. The BFRS has mutual aid agreements with several surrounding municipalities, through the Central Alabama Fire Chiefs Association (C.A.F.C.A.), and through the Alabama Mutual Aid System (A.M.A.S.). If resources are needed at the local level on a limited basis fire departments can communicate directly with each other to provide or receive mutual aid. If the mutual-aid is the result of a large-scale incident where the Jefferson County
Emergency Operations Center is activated all resource requests are routed through the Jefferson County Emergency Management Agency (J.C.E.M.A, 2010).

“Resilience begins with prepared individuals” (F.E.M.A., 2010) and families. Responders who are concerned about the well-being of their families will not devote full attention to their assigned task. In a survey by Cox and Landahl (2009) results revealed that 52.9% of respondents believed that employers should encourage training and education for individual and family preparedness. Schechter (2007) recommended supportive care for family members required to report to work and implementation of a “Responders First” model where responders needs take priority. Delaney (2008) recommended involving families in the planning process, the employer providing family training and education and developing a family support network within the organization.

As indicated by respondents to the April Fury Questionnaire (Appendix A) and Disaster Management Questionnaire (Appendix B) large-scale disasters should be managed by using the Incident Command System. The Incident Command System is designed to facilitate organization, coordinate response activities, and account for resources (F.E.M.A., 2008). As the scope of an incident increases so should the incident management organization. Filling command positions commensurate with the scope and size of the incident helps to maintain the appropriate span of control and allows individuals assigned to those positions to focus on their assigned tasks. As indicated by respondents to the April Fury Questionnaire (Appendix A) there was difficulty with communications, rehab for personnel, determining the affected areas, and accounting for all resources that were on scene during the Tuscaloosa-Birmingham tornado. Filling the Logistics Section Chief position in order to provide assistance with communications
issues and rehab for responders and Planning Section Chief position to assist with the situation status and resource status would have relieved the on-site Incident Commanders of these responsibilities. Birmingham Fire and Rescue Service ICS Organizational Assignments, Appendix H, is attached as an example of an initial ICS organization which could be implemented in the BFRS during large-scale disasters.

An effective disaster management plan will define the roles and responsibilities of individuals within an organization (F.E.M.A., 2010). If emergency management procedures and individuals who are assigned to fill ICS positions are not practiced and exercised on a routine basis personnel will not be familiar with their job duties and the effectiveness of the procedures will be diminished (F.E.M.A., 2011). Employing job action sheets and position checklists serve as a reminder of roles and responsibilities during emergency incidents, particularly for those who may not be familiar with emergency procedures (California Hospital Association, 2011).

The Federal Emergency Management Agency does not mandate any particular format or content for emergency operations plans (E.O.P.). However, local jurisdictions typically benefit from functional or agency/department E.O.P.’s while larger jurisdictions use emergency support function format (F.E.M.A., 2010). Typically the larger, more complex the government entity, the greater number of personnel will be needed, the more complex the E.O.P can be. Still E.O.P.’s should be tailored to the needs of the particular jurisdiction. The results of this research revealed that like N.I.M.S., emergency operations procedures can be adapted to suit the needs of the organization and they are appropriate if they are logical, contain suitable information, and are functional.
During the Birmingham-Tuscaloosa tornado BFRS responders and administrators learned many lessons regarding preparedness, mitigation, response, and recovery. This research reinforced many of those lessons. The BFRS has many well-intentioned personnel who are fully capable of performing when called upon and will conduct and/or direct any task asked of them. Providing them with an effective disaster management procedure will prevent future responders from duplicating the same mistakes.

Recommendations

This research has prompted several recommendations to BFRS administrators for consideration including:

1. Strategic considerations
   a. Develop a disaster management procedure that will guide emergency responders and administrators during large-scale disasters
      i. The disaster management procedure should describe activation points or triggers that would cause activation of the disaster management procedure.
      ii. The disaster management procedure should address who will notify the public, how they will be notified, and what emergency response procedures they should take for their safety and security.
      iii. The disaster management procedure should contain an organizational chart depicting the various ICS positions.
iv. The disaster management procedure should define by checklist or job action sheet, the roles and responsibilities of those assigned to the incident management organization.

v. The disaster management procedure should address recall of off-duty personnel

vi. The disaster management procedure should include Annexes that address specific types of emergencies such as hazardous materials, terrorism, and natural disasters.

vii. The disaster management procedure should define and establish a policy group whose responsibility is to formulate strategies to problems which fall outside of or conflict with normal operations.

b. Develop, train, and equip a BFRS incident management team that can be activated during large-scale disasters.

c. Provide a comprehensive public education program which encompasses all levels of the BFRS during National Preparedness Month in September each year.

2. Operational considerations should include:

a. Develop plans for tracking resources that include the use of an ICS 211 Incident Check-In List

b. Develop plans for integration of other city, county and state radio communications systems that will allow for interoperable communications during large-scale disasters.
c. Develop and distribute plans to command level officers for requesting external resources such as county and state mutual aid.

d. During large-scale disasters develop the incident command structure to keep pace with incident demands being mindful of the need to establish a Unified Command structure when indicated.

e. Distribute lists of internal resources available to initial on-duty incident commanders.

3. Tactical considerations

a. Purchase of search and rescue personal protective equipment for responders that will reduce responder fatigue during protracted operations.

b. Provide awareness and operations level search and rescue training for all responders within the BFRS.

c. Provide daily briefings to responders during large-scale disasters.
Appendix A

April Fury Questionnaire

(Page 1 of 2)

1. To which unit were you assigned?

2. What were the initial objectives?
   a. Strategic (goals communicated from the IC)?
      i. List the initial objectives communicated by the IC.
      ii. Did the IC clearly communicate the strategic objectives?
   b. Tactical (company level)
      i. List the initial tactical objectives
      ii. Did you understand your tactical assignments?

3. What safety issues did your crew encounter?

4. Did your crew encounter any accountability problems?

5. Did your crew experience any equipment failures?

6. Did your crew encounter any communications problems?

7. What resources did you request upon arrival?

8. In retrospect were there resources that you needed but did not request?

9. Were responders trained and capable of performing their assigned tasks?

10. What other issues/problems did you encounter during your response?

11. What were the major strengths of the BFRS response?

12. Considering BFRS response to the tornado what changes would you recommend
to policies, procedures, training, or equipment?

13. What was your impression of the overall outcome of this incident?
Appendix A

April Fury Questionnaire

(Page 2 of 2)

14. What recommendations would you make to future responders that would help
them more efficiently mitigate a similar incident?
Appendix B

Disaster Management Plan Questionnaire

(Page 1 of 2)

1. Does your organization have a disaster management plan that outlines procedures for mitigation of large scale disasters?

2. What are the major elements of your organizations disaster management plan?

3. Does your disaster management plan include an organizational chart that depicts positions that should be filled during a large scale disaster? If so, which positions are staffed during a large scale disaster?

4. Does your disaster management plan specify the roles and responsibilities of the command organization?

5. Does your disaster management plan provide a checklist of responsibilities for each position within the command organization? If so, what items are included in these checklists?

6. What provisions does your disaster management plan include for securing family members of responders?

7. What methods are used to convey information to family members of responders?

8. Does your department have a standard operating procedure for dissemination of information to the public during large-scale disasters?

9. Does your disaster management plan include provisions for establishing a policy group? Who comprises the policy group?

10. What methods does your organization use to determine the scope and magnitude of an incident?
Appendix B

Disaster Management Questionnaire

(Page 2 of 2)

11. What triggers would cause activation of your organization's disaster management plan?

12. What methods does your organization employ for personnel recall?

13. Which key personnel are included in the recall?
Appendix C

Cover letter for questionnaire to Jefferson County Fire Chiefs

(Page 1 of 2)

Hello,

My name is Matt Russell and I serve as a Battalion Chief with the Birmingham Fire and Rescue Service. I am conducting research for the Executive Analysis of Community Risk Reduction (EACRR) course at the National Fire Academy. My project focus is on improving organizational response to large-scale disasters. The final phase of this research entails surveying other organizations to determine the processes used during large-scale disasters. The expectation is that this research will assist the Birmingham Fire and Rescue Service in developing a policy that will increase our efficiency and effectiveness to unusually taxing, large-scale emergencies.

I ask that you, or someone within your organization, complete a brief questionnaire. All responses will remain confidential. I will be glad to share the survey results as well as the final project with you once it is complete if you desire. So that I can compile and analyze the information in a timely fashion I request that you complete the questionnaire by Sunday, August 28, 2011.

The questionnaire can be found at:

Appendix C

Cover letter for questionnaire to Jefferson County Fire Chiefs

Page (2 of 2)

Thank you for your assistance with this research project. I look forward to hearing from each of you!

David M. Russell, Battalion Chief

Birmingham Fire and Rescue Service

600 11th Street South

Birmingham, AL 35233

205-933-4161

205-873-9557

David.Russell@Birminghamal.gov
## Mobile Asset Inventory

<table>
<thead>
<tr>
<th>Kind of Apparatus</th>
<th>Housed at</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front line engine companies (29)</td>
<td>1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31, 32</td>
</tr>
<tr>
<td>Reserve engines (5)</td>
<td>18, 20, 21, 23, Fire Shop</td>
</tr>
<tr>
<td>Recruit engines (5)</td>
<td>16, 19, 23, 30, 31</td>
</tr>
<tr>
<td>Front line truck companies (4)</td>
<td>1, 2, 20, 27</td>
</tr>
<tr>
<td>Reserve truck companies (4)</td>
<td>25, 29, 30, 32</td>
</tr>
<tr>
<td>Front line rescue units (16)</td>
<td>1, 3, 6, 8, 11, 12, 13, 15, 16, 19, 20, 22, 25, 27, 28, 32</td>
</tr>
<tr>
<td>Reserve rescue units (4)</td>
<td>12, 14, 28, Fire shop</td>
</tr>
<tr>
<td>Special event rescue units (8)</td>
<td>1, 20, 31</td>
</tr>
<tr>
<td>Technical rescue companies (7)</td>
<td>1, 2, 3, 10, 12, 13, 30</td>
</tr>
<tr>
<td>Deployment trucks/trailers, EMS trailers, RTV, Smoke house (10)</td>
<td>2, 6, 9, 11, 24, 30, 31</td>
</tr>
<tr>
<td>Brush trucks (2)</td>
<td>17, 29</td>
</tr>
<tr>
<td>Foam unit/foam trailer (2)</td>
<td>9, 25</td>
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<tr>
<td>Air units (2)</td>
<td>2, 7</td>
</tr>
<tr>
<td>Boats (8)</td>
<td>3, 16, 26</td>
</tr>
</tbody>
</table>

Note: F.E.M.A. Resource Types: All twenty-nine engines are Type I, three trucks are Type I, one truck is Type III, all sixteen Rescue Units are Type I ambulances. All special operations units are F.E.M.A. Resource Type I: Heavy Rescue 1, Heavy Rescue 10, Medium Rescue 2, Haz Mat 3, and Haz Mat 30.
Appendix E

Personnel needed to staff BFRS front line apparatus with various staffing configurations

<table>
<thead>
<tr>
<th>Apparatus</th>
<th>Staffed at 3 personnel</th>
<th>Staffed at 4 personnel</th>
<th>Staffed at 5 personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engines (29)</td>
<td>87</td>
<td>116</td>
<td>145</td>
</tr>
<tr>
<td>Trucks (4)</td>
<td>12</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Rescue units (16)</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Technical rescue Units (3)</td>
<td>As needed</td>
<td>As needed</td>
<td>As needed</td>
</tr>
<tr>
<td>Haz Mat units (2)</td>
<td>As needed</td>
<td>As needed</td>
<td>As needed</td>
</tr>
<tr>
<td>Decon units (2)</td>
<td>As needed</td>
<td>As needed</td>
<td>As needed</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>131</strong></td>
<td><strong>164</strong></td>
<td><strong>197</strong></td>
</tr>
</tbody>
</table>

*Note*-Special operations teams, technical rescue, haz mat, and decon, are staffed on an as-needed basis. The engine company assigned to that station will be placed out of service to staff their special operations unit when dispatched on a call.
Appendix F

**Personnel needed to staff BFRS front line and special operations apparatus with various staffing configurations**

<table>
<thead>
<tr>
<th>Apparatus</th>
<th>Staffed at 3 personnel</th>
<th>Staffed at 4 personnel</th>
<th>Staffed at 5 personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engines (29)</td>
<td>87</td>
<td>116</td>
<td>145</td>
</tr>
<tr>
<td>Trucks (4)</td>
<td>12</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Rescue units (16)</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Technical rescue Units (3)</td>
<td>9</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Haz Mat units (2)</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Decon units (2)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>150</strong></td>
<td><strong>188</strong></td>
<td><strong>226</strong></td>
</tr>
</tbody>
</table>

*Note*-Special operations teams, technical rescue, haz mat, and decon, are staffed on an as-needed basis. The engine company assigned to that station will be placed out of service to staff their special operations unit when dispatched on a call.
Appendix G

Personnel needed to staff BFRS front line apparatus, special operations, and reserve apparatus with various staffing configurations

<table>
<thead>
<tr>
<th>Apparatus</th>
<th>Staffed at 3 personnel</th>
<th>Staffed at 4 personnel</th>
<th>Staffed at 5 personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engines (29)</td>
<td>87</td>
<td>116</td>
<td>145</td>
</tr>
<tr>
<td>Trucks (4)</td>
<td>12</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Rescue units (16)</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Technical rescue Units (3)</td>
<td>9</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Haz Mat units (2)</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Decon units (2)</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Reserve Engines (10)</td>
<td>30</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Reserve Trucks (3)</td>
<td>9</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Reserve Rescue Units (12)</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>213</strong></td>
<td><strong>264</strong></td>
<td><strong>316</strong></td>
</tr>
</tbody>
</table>

*Note*-Special operations teams, technical rescue, haz mat, and decon, are staffed on an as-needed basis. The engine company assigned to that station will be placed out of service to staff their special operations unit when dispatched on a call.
Appendix H

Birmingham Fire and Rescue Service ICS Organizational Assignments During a Disaster
References

Table 1: National Oceanic and Atmospheric Administration, 2011, Retrieved from http://www.srh.noaa.gov/bmx/?n=event_04272011

Tulsa, OK: Pennwell.


